EFFECTS OF PARENTAL EDUCATION, HOUSEHOLD WEALTH, AND OCCUPATION ON ANTENATAL CARE UTILIZATION IN KENYA

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DECLARATION

This research project is my original work and has not been presented for a degree or any other award in any University.

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To my dear husband Dr. Abednego Musyoki and children Wisdom, Prudence, and Witty.

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ABBREVIATIONS AND ACRONYMS

ANC	Ante Natal Care
FANC	Focused Antenatal Care
FONC	First Order Necessary Condition
FMS	Free Maternity Service
HIV	Human Immunodeficiency Virus
GOK	Government of Kenya
KDHS	Kenya Demographic Health Survey
KHHEU	Kenya Household Health Expenditure & Utilization
KHPF	Kenya Health Policy Framework
LMICs	Low-and Middle-Income Countries
MDGs	Millennium Development Goals
MHC	Maternal Health Care
MLM	Multinomial Logit- Model
MMR	Maternal Mortality Rate
NBRM	Negative Binomial Regression Model
NRHP	National Reproductive Health Policy
OBM	Ordered Probit Model
SBA	Skilled Birth Attenadant

SDGs	Sustainable Development Goals
UN	United Nations
WHO	World Health Organization
OOP	Out of Pocket Payment

OPERATIONAL DEFINITION OF TERMS

Antenatal care is the care provided by skilled health professionals to pregnant women to ensure the best health conditions for both mother and baby during pregnancy.

Health Care Utilization is the use of services by persons for purposes of preventing or curing health problems, promoting maintenance of health and well-being, or obtaining information about their health status and prognosis.

Education is the learning process for the individual to attain knowledge and understanding of the higher specific objects. Highest level of academic achievement.

Household Wealth Quintile is the total value of assets minus the total value of outstanding liabilities of households.

Occupation is the kind of job the parent undertakes for a living.

Maternal Morbidity refers to any physical or mental illness or disability related to pregnancy and /or childbirth.

Maternal Mortality refers to the death of a woman while pregnant or within 42 days of pregnancy termination, regardless of the duration and location of the pregnancy, due to causes related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

ABSTRACT

The Kenyan government implemented a free maternity service policy in June 2013 by eliminating maternity charges in public hospitals and health centres to make maternity services more accessible and affordable, reducing maternal and perinatal deaths, and achieving the global and the Kenya Vision 2030 targets. Despite this effort, maternal deaths are unacceptably high and underutilization of antenatal care still exists among poor, illiterate, and unemployed women living in rural areas. Free maternal services may not sufficiently address antenatal care utilization challenges because other cultural, demographic, and societal factors, such as transport, area of residence, poverty levels, decision-making and literacy levels, can affect access to maternal health services. However, to date, there is limited information at the national perspective in Kenya on how parental education, parental occupation and household wealth affects antenatal care. This study assessed the effects of parental education, parental occupation, and household wealth on antenatal care utilization in Kenya. The specific objectives of the study were to establish the effects of parental education on antenatal care utilization, to investigate the effects of household wealth on antenatal care utilization, and to determine the effects of parental occupation on antenatal care utilization in Kenya. The study design was non-experimental, using the Kenya Demographic and Health Survey data (2022) on women aged 15 to 49 years. The data were analyzed using the negative binomial regression model. The findings revealed that 58.7 per cent of the respondents made at least 4-7 visits, but only 3.5 per cent attained the recommended eight ANC visits. Compared to mothers without formal education, those whose husbands/partners had primary education were more likely to use ANC services, holding other factors constant, but the mother's education level showed no effect on antenatal care utilization. The antenatal care utilization increased with households in the middle-income quintile, and there was no relationship between the mother's or husband's occupation and antenatal care utilization. This study recommends that the government increase investment in the education sector and intensify public awareness of antenatal care services. In addition to the free maternal health care, the government of Kenya can consider formulating ANC policies to eradicate healthcare inequalities among the less privileged by effectively removing all barriers to accessing ANC and ensuring free service delivery to all women, regardless of their socioeconomic status, religion, marital status or place of residence.

CHAPTER ONE

INTRODUCTION

1.1 Background

Health, with its socio-economic underpinnings, is a significant global challenge, and good health for all remains a top-priority global target because it is vital to the social-economic development of a country (Kenya Demographic and Health Survey (KDHS), 2022). Improved health of women and children can translate to improved well-being and reduced poverty levels in developing countries (Arthur, 2012; KDHS, 2022; United Nations, 2024). Further, improved maternal health can lead to low mother and baby morbidity and mortality rates (Arthur, 2012; Carroli, Rooney & Villar, 2001), and is among the top World Health Organization (WHO) priorities .

Globally, about 287,000 maternal deaths occurred in 2020, translating to 800 deaths per day (WHO, 2024). Maternal deaths were disproportionately higher (70%) in Sub-Saharan Africa (SSA). The high levels of maternal deaths in SSA countries suggest that urgent interventions must be put in place in order to reverse the worrying trend of maternal deaths and to meet the sustainable development goals of reducing the MMR to less than 70 deaths per 100 000 live births (Musarandega et al., 2021). Similarly, in Kenya, pregnancy-associated deaths are still high at 362/100,000 live births (KDHS, 2022). Many pregnant women in Kenya die due to lack of appropriate pregnancy care or attendance by skilled birth attendants during delivery (Masaba and Phetoe, 2020). Blood pressure, severe blood loss, hard labour, infections, and unsafe abortions are the leading maternal deaths direct causes, whereas the indirect causes are heart disease, malaria, and anaemia (Habte,Tamenes

and Melis, 2024). To avoid undesirable pregnancy outcomes, healthcare services, including antenatal care (ANC), should be provided to women of childbearing age 15-49 years (Arthur, 2012; Amungulu,Nghitanwa and Mbapaha., 2023; Habte et al., 2024).

Antenatal care is a skilled health professionals' service offered to expectant mothers during pregnancy and delivery to help to detect and prevent adverse pregnancy outcomes, such as, reduce morbidity and mortalily rates (WHO,2016). ANC is a platform for a broad range of healthcare interventions (Habte et al., 2024). For instance, women receive social, emotional and psychological support and acquire information on the importance of seeking skilled attendant services during childbirth and the postnatal period (World Health Organization, 2016; UNICEF, 2022). They also receive information on healthy behaviors during pregnancy, such as dangerous pregnancy and childbirth warning signs, exclusive breastfeeding, postnatal care and family planning (World Health Organization, 2016; Uddin Howlader, 2018; Habte et al., 2024).

Additionally, ANC offers interventions to reduce obstetric complications, such as pre-eclampsia and provides access to micronutrient supplements, tetanus vaccine, and treatment for malaria, syphilis, HIV, and other sexually transmitted diseases (STDs) (WHO, 2016; Jiao et al., 2024). Antenatal care, when started early and consistently offered, can help to detect and prevent adverse pregnancy outcomes, such as, reduce morbidity and mortalily rates (Carroli et al., 2001; Habte et al., 2024). Until 2016, the WHO recommended four minimum ANC visits but recently reviewed upwards to eight visits (UNICEF, 2022). Despite the numerous benefits ANC offers to pregnant women and

unborn babies, many women living in resource-constrained countries fail to attain the WHO (2016)-recommended ANC visits. Inadequate care during pregnancy and failure to use ANC services can adversely affect the pregnancy outcome because it interrupts the continuum of care (Arthur, 2012).

Antenatal care utilization refers to the percentage of mothers who sought ANC services at least once during pregnancy per live birth within one year (Arthur, 2012). Increased ANC access and utilization improve maternal and perinatal outcomes (Carroli et al., 2001; Kebede,Godana,Utaile and Sebsibe,2021). However, only adequate and appropriate care during pregnancy can provide optimal health outcomes to expectant women and their babies (Habte et al., 2024) . The timing of the first contact of pregnant woman with skilled health providers and the number of visits is critical to ensure optimal health outcomes in pregnancy (Moller, Petzold, Chou,and Say, 2017; Habte et al., 2024).

Globally, ANC coverage has gone up over the last two decades, with 88 per cent of pregnant mothers accessing ANC amenity at least once (UNICEF, 2022). Following the recommendation of at least eight ANC contacts (WHO, 2016), the cases of women attaining at least four ANC visits went up globally to about 69 per cent over the last two decades; however, the uptake varies widely across countries, from over 90 per cent in some regions in developed countries, to 13 per cent in resource-constrained countries, particularly in Sub–Saharan Africa (UNICEF, 2022).

Table 1.1: Comparison of coverage of at least four ANC visits in Kenya with other selected regions

Indicator	Kenya	Africa	Europe	Global	SDGs Target
Coverage of at least ANC 4+ (%)	66	56	98	69	100
Proportion of births delivered in health facility (%)	88	61	98	80	100
Percentage (%) of skilled health professional-assisted live births	89	70	97	86	100

Source of data: (WHO 2016; KDHS, 2022; UNICEF, 2023)

Table 1.1 indicates that while Kenya's ANC coverage of atleast four visits (66%) is comparable to the global average, it lags behind developed regions like Europe (98 %). Inadequate ANC services, as reflected in low ANC visits, signify gaps in healthcare accessibility for vulnerable groups. However, at least four ANC coverage depends on residence and wealth, whereby rich women in urban settings, are more likely to attain at least four visits when compared with poor and rural dwellers (UNICEF, 2022). Higher maternal mortality rates occurred in regions, such as Western and Central Africa (53%), where women attained less than four ANC visits (UNICEF, 2022). Therefore, increased ANC coverage in these high-burden regions, for instance Kenya, is warranted to improve maternal and newborn health outcomes (UNICEF, 2022). Antenatal care is only effective when started in the first trimester and regularly pursued throughout the entire pregnancy period.

Despite the many efforts to identify the factors contributing to ANC underutilization (Tekelab, Chojenta, Smith, and Loxton, 2019; Okedo-Alex, Akamike, Ezeanosike, and

Uneke, 2019), ANC coverage of at least 4 visits is still a problem in resource-constrained countries, Table 1.1. In addition to user fee removal for delivery services which many governments have done, it is essential to investigate other social, economic, political and contextual factors which can cause pregnancy-related mortality in low-income countries (Gitobu, Gichangi and Mwanda, 2018). Many barriers exist that hinder women from accessing maternal health care, including transportation and communication, insecurity, economic factors, cultural beliefs, lack of family support, and inadequate and poor-quality ANC services (Dahab and Sakellariou, 2020; Kisiangani et al., 2020; Ochieng and Odhiambo, 2019; Tessema & Minyihun, 2021).

The determinants of completing at least 4 + antenatal visits in Kenya are residence, planned pregnancy, wealth status, birth order, women's age, occupation, healthcare accessibility, marital status, education level, planned pregnancy, and contraceptive usage (Gitonga, 2017; Muyunda ,Makasa, Jacobs, Musonda, and Michelo, 2016; Kamau, 2016). According to KDHS (2022), the coverage of atleast four ANC visits increased with mothers education, from 49 to 83 percent among women with no education and among those with atleast secondary education, respectively. However, most previous studies were localized, and their findings may not reflect national trends or capture the diverse socioeconomic conditions across all regions in Kenya. Thus this study aimed to find out how parental education, occupation and household wealth affects ANC utilization in Kenya .

In addition, the available information on parental education, occupation and household wealth effects on ANC utilization are contradictory. Some study reports suggest that the

level of maternal education influences ANC usage and visits (Arthur, 2012, Chopra et al., 2018, Midhet et al., 2023; Gitonga, 2017; Nzioki *et al*., 2015). Low-educated women have high risks of preterm birth, neonatal and post -neonatal deaths and maternal deaths compared with highly educated women (Babalola, 2014). However, other study reports have shown that educational attainment does not positively determine appropriate use of health services (Konlan et al., 2020). Previous studies indicate that household wealth also positively affects ANC use (Arthur, 2012; Sui *et al*., 2021; Fagbamigbe & Idemudia, 2017; Tessema & Minyihun, 2021). The likelihood of women from poor households accessing ANC services is low due to consultation and medicine costs and other indirect costs, like transport.

1.1.1 Kenya's Health Sector Overview

Health sector in Kenya exhibits a robust public and private mix of health care providers (Okech & Lelegwe, 2015). However, given the high poverty levels and the high charges by private facilities in the country, a large segment, about 51 per cent, of the population use public health facilities (Kamau, 2016) . The private for-profit facilities account for about 34.8 per cent, while the private-not-profit accounts for about 14.8 per cent of the health facilities in Kenya. Because of medical cover shortages, the health system relies mainly on out-of-pocket (OOP) payments as the primary financing source (Salari et al., 2019; Kamau, 2016). Health care facility usage is negatively affected by the fee charges and OOP settlements, such that, the poor are not likely to utilize health care services if they are sick (Kaijage et al., 2023). ANC services are available in all six levels of health care facilities in Kenya, including tertiary referral hospitals, secondary referral facilities, primary referral

facilities, health centres, health care dispensaries and community facilities (Wairoto *et al*., 2020).

1.1.2 Kenya's Policies on Maternal Health Care Utilization

The government of Kenya has not lagged in addressing maternal healthcare utilization challenges since its independence in 1963. There are policies and programmes per the *Kenya Vision 2030* and Constitution of Kenya 2010 to improve healthcare access and utilization by women and children by making the services affordable and accessible (Okech & Lelegwe, 2015; Ministry of Health, 2007; Demographic and Health Survey, 2014; The Constitution of Kenya, 2010). The health-sector-reform policy documents (Ministry of Health, 2005; Ministry of Health, 2014; Ministry of Health, 2015), provide that the health services should be curative, preventive, rehabilitative, promotive and accessible to all Kenyans, within reach of all Kenyans, and should meet the basic needs of the population (Demographic and Health Survey, 2014).

Maternal health policies according to the National Reproductive Health Policy (NRHP) (Ministry of Health, 2022) entail that all women, the adolescent, and youths, have access to reproductive health information. The policies also ensure that all pregnant women access skilled care all throughout their pregnancy period, delivery period and postnatal period despite where they come from. Also, the policies aim to increase access to emergency and comprehensive obstetric care to meet the minimum international standards and remove barriers that hinder pregnant women from accessing skilled care (Ministry of Health, 2014).

In addition, the GOK (2009) implemented the Child Survival and Development Strategy to accelerate child survival and improve children's health indicators (Ministry of Health, 2012). In protecting newborns' health, skilled birth attendant services are vital to prevent perinatal deaths, which mostly occur during child labour and delivery. To empower adolescents to utilize the available health services, the GOK (2013) also developed the first Adolescent and Reproductive Health and Development Policy, and later reviewed in 2015 due to implementation challenges (Ministry of Health, 2013).

Like many other developing countries, Kenya has strived to make maternal services free since independence to improve maternal health outcomes. In 1965, the government waived user fees in public health institutions and started offering free health care services (Kamau, 2016), but again re-introduced it in 1988 following international pressure. The government again, in June 2013, under the Free Maternity Service policy (FMS), exempted pregnant mothers from paying for ANC services in all public health institutions to lower maternal deaths by encouraging more pregnant women to deliver at health facilities (Masaba and Phetoe, 2020; Orangi et al., 2021) .Until 2017, the government launched the Linda Mama programme policy which is a publicly funded scheme to enable Kenya to achieve the Universal Health Coverage (UHC) goals. Linda Mama is a free health insurance cover that targets pregnant women, especially those living in slums and rural areas. It provides a package of health services, including free ANC and deliveries, PNC, family planning, and pregnancy related hospitalization for one year (Masaba and Phetoe, 2020).

A notable rise in ANC visits (89%), hospital deliveries (97%), and live births (98%) were recorded two years after the policy implementation (Lang'at et al., 2019b). Despite the free maternal services in Kenya, there is still underutilization of antenatal care services among women who are less educated, unemployed, and those from poor communities and living in remote areas (Masaba and Phetoe, 2020; Orangi et al., 2021; Gitobu et al., 2018); hence, the need to understand other accessibility barriers in Kenya, such as parental education, occupation and household wealth.

The current Kenya Health Policy 2014-2030 (Ministry of Health, 2014) key objectives are to provide essential health care to all citizens through reduced health risk exposure, formation and building of private and other sectors' collaborations, ending contagious conditions, and lowering the burden of Non-Communicable Diseases (NCDs), violence and injuries (Demographic and Health Survey, 2014). By 2030, the policy targets to improve maternal health indicators by reducing maternal deaths to at least 113 deaths in one hundred thousand live births and under-five, infant, and neonatal death rates to at least 24, 13, and 20 deaths in a thousand live births, respectively (Demographic and Health Survey, 2014). The new policy serves as a guide to address challenges, including high maternal mortality rates, underutilization of health care services (such as ANC), which has been shown to improve the maternal health care indicators. There is a need to identify antenatal care utilization barriers, such as parental education levels, occupation levels, and household wealth which are potential barriers to ANC utilization.

1.1.3 Situational Analysis of Key Maternal Health Care Indicators in Kenya

Kenya has made limited progress towards improving the maternal health indicators outlined in the Kenya Vision 2030 blueprint and the SDG targets (Musyoka, 2019). The targets are to achieve global mortality of below 70 deaths in one hundred thousand live births, zero newborns and under-five preventable deaths, and no less than 12 and 25 deaths inr a thousand live births of neonatal and under-five deaths (UNICEF, 2022).

Table 2.1: Key maternal health indicators in Kenya and sustainable global development targets (SDGs)

Indicator	2022	2014	2008	2003	1998	1993	SDGs Target-
Infant MR (per 1000 live births)	32	39	52	77	74	62	12
Under-five MR (per 1000 live births)	41	52	74	115	112	96	25
Neonatal MR (per 1000 live births)	21	22	31	33	28	26	12
Maternal MR (per 100,000 live births)	355	362	488	414	590	-	<70
Coverage of at least one ANC visit (%)	98	96	92	88	92	95	100
Coverage of at least four ANC visits (%)	66	58	47	52	61	64	100
Births assisted by THP (%)	89	62	44	42	56	45	90
Births delivered in health facility (%)	88	61	43	40	42	44	100

MR- mortality rate, ANC- antenatal care, THP- trained health professional

Source of Data: KDHS reports from 1993 to 2022; Republic of Kenya, 2014; Republic of Kenya, 2022, WHO, 2016; UNICEF, 2022).

Although the Kenyan maternal health indicators show mixed trends from the 1990s to 2022, the country is still lagging in improving maternal health compared to the global targets, Table 2. Improving maternal health indicators is critical to reversing the worrying trends of maternal mortality rates. The 2022 KDHS report indicates that the Kenyan MMR ratio is still high at 362 deaths in one hundred thousand live births compared with the SDG target of <70 deaths in one hundred thousand live births by 2030. The infant MR was 32 deaths in a thousand live births, higher than the SDG goal of 12 deaths/1,000 live births, whereas the under-five MR of 41 deaths in a thousand live births was exceeding the MDG target of 32 deaths in a thousand live births and SDG target of 25 deaths in a thousand live births by 2030.

The Kenyan maternal health indicators suggest a need for new approaches to improve ANC quality and coverage to achieve long-term development plans and meet the SDGs targets by 2030. Compared to other reproductive health issues, pregnancy and childbirth complications can cause more deaths and disabilities if objective measures are not taken (Kamau, 2016). In every woman's death, 30 more women suffer pregnancy-associated complications such as obstetric fistula (Demographic and Health Survey, 2014). Hence, there was a need to understand the factors affecting ANC utilization in Kenya using the most recent KDHS (2022) data via parental education, household wealth and parents' or partners' occupations.

1.2 Statement of the Problem

Improving maternal health is among the WHO's top priorities (WHO, 2024). It can be achieved through increased research evidence, setting global standards, providing clinical-based evidence and programmatic guidance, providing technical support and assisting countries in developing and implementing effective policies and programmes (WHO, 2024). In 2016, the WHO raised the times a pregnant person must have with trained healthcare professionals from four to eight contacts (UNICEF, 2022). In 2020, an estimated eight hundred women succumbed daily from pregnancy and childbirth-related causes (WHO, 2024), mostly (95 %) of LMICs. Sub-saharan Africa reported an estimated 196,000 (66%) of all maternal mortality (WHO, 2024).

Despite the many efforts the government of Kenya has made towards ending preventable maternal deaths, including user fee removal for maternal health care services, which many governments have done (Fagbamigbe & Idemudia, 2017; Lang'at et al., 2019), maternal mortality remains a challenge evidenced by the high rates in most developing countries. The Maternal Mortality Rate (MMR) of 362 deaths/100,000 live births in Kenya is unacceptably high (Demographic and Health Survey, 2014). Free ANC may be insufficient to improve its uptake since cultural, demographic, and societal factors such as transport, area of residence, poverty levels, decision-making and literacy levels can affect access to maternal health services,such as ANC utilization.

Enhancing maternal health through offering health care services, such as ANC, can save the lives of pregnant mothers who die daily due to pregnancy and childbirth-related

complications (Arthur, 2012). During ANC clinics, it is possible to detect any pregnancy-associated health problem and initiate interventions leading to positive maternal outcomes and also improving women's care experience (World Health Organization, 2016). Early and regular ANC visits throughout pregnancy help to identify and prevent adverse pregnancy outcomes. Despite ANC being a critical platform for improving maternal health indicators (UNICEF, 2022) and a crucial strategy for ending preventable maternal deaths, many pregnant mothers living in resource-constrained countries do not access it (Simkhada et al., 2008; UNICEF, 2022).

Previous studies in Kenya (Chorongo et al., 2016; Gitonga, 2017; Kimani et al., 2016; Mulinge et al., 2017) concentrated on identifying factors and determinants of ANC utilization in small study populations in rural and slum areas. The study reports documented numerous barriers to ANC utilization, including maternal education, occupation, and household wealth (Gitonga, 2017; Mulinge et al., 2017) and showed a strong association with antenatal care utilization (Dahab and Sakellariou, 2020; Ochieng and Odhiambo, 2019; Tessema & Minyihun, 2021). However, most previous studies were localized, and their findings may not reflect national trends or capture the diverse socioeconomic conditions across all regions in Kenya hence the need for this study.This study filled the knowledge gap by showing how parental education, household wealth and parental occupation affects ANC utilization for the entire country by using the most recent (Demographic and Health Survey, 2022).

1.3 Research Questions

The study sought to answer the following three questions:

i. How does parental education influence ANC utilization in Kenya?

ii. How does household wealth influence ANC utilization in Kenya?

iii. How does parental occupation influence ANC utilization in Kenya?

1.4 Objectives of the Study

Generally, the study aimed to determine the effects of parental education, household wealth and parental occupation on ANC utilization in Kenya.

The specific objectives were to:

i. Establish the effects of parental education on ANC utilization in Kenya.

ii. Investigate the effects of household wealth on ANC utilization in Kenya.

iii. Determine the effects of parental occupation on ANC utilization in Kenya.

1.5 Significance of the Study

This study's findings will guide the government and other health policymakers in Kenya in formulating policies and guidelines that can make ANC services more accessible to all women categories. The findings will inform them how parental education, parental occupation and household wealth influences ANC utilization. In addition, findings would further inform them about the possible interventions for increasing the number of ANC visits. The study adds knowledge to the existing knowledge on the factors influencing ANC utilization in Kenya. Finally, this study offers suggestions to help improve access to ANC

and make the service provision acceptable to every pregnant woman and to reduce maternal mortality and morbidity.

1.6 Scope and limitations of the Study

The study used 2022 KDHS data, including females aged 15 to 49 years and males (15- 54 years), residents or those who spent the night before the survey in selected 42,300 households. Females aged 15-49 years represent the reproductive age range ,while males aged 15-54 years were included to capture the broader influence of partners and household decision-makers on ANC utilization. The data set represents the entire country, including all 47 counties. The KDHS survey employed a two-stage sampling process to ensure representativesness and collected data on key demographic and health indicators,such as maternal health, child health, and family planning. The 2022 KDHS is the second health survey providing demographic and health indicators estimates at the county level after adopting the new constitution in 2010. This scope allows for a comprehensive analysis of factors affecting ANC utilization, including the influence of parental education, household wealth, and occupation at a national level.

There are some limitations to the study. One, the study used secondary data which may be limited in information, that is, missing data for some certain variables, for example beliefs and cultural practices which may affect ANC utilization. Secondly, the study only focused on ANC services excluding other maternal health services, like postnatal care services and family planning. Thirdly, biased information in self-reported ANC visits or regional disparities in access to healthcare.

1.7 Organization of the Study

This study has five chapters: Chapter one covers the study background, research questions and objectives, problem statement, significance and scope. Chapter two includes the theoretical literature review, empirical literature review, and literature overview. Chapter three covers research design, theoretical framework, model specification, definition and measurement of variables, data type and source, and data analysis. Chapter four covers the study's findings and discussions, while chapter five covers the summary, conclusions and policy implications based on the findings, which aim to provide actionable insights for improving maternal health services in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides an overview of both theoretical and empirical literature.

2.2 Theoretical Literature

Several theories explain the association between parental education, parental occupation, and household wealth on antenatal care utilization, including Grossman's model of health demand, the behavioural model, and the agency theory.

2.2.1 The Utility Maximization Theory

This is an economic theory based on the idea that individuals are rational beings who utilize their resources to achieve the highest satisfaction. The theory explains the behaviour of individuals who rank order consumption choices depending on their preferences. The theory assumes that each individual has a set of consumption bundles and a budget constraint. The theory assumes that individuals have a clear preference that enables them to rank order the bundle according to the level of greatest benefit derived from each bundle of consumption. An individual preference can be represented by a utility function. Given a set of alternatives, a rational individual usually picks the most preferred bundle, that is, the utility maximizing model. According to the theory, more consumption is perceived better than less consumption and rank ordering of bundle of goods is assumed fixed regardless of context and time. The utility maximization function is derived from bundles of goods and services and is subject to a budget constraint. The bundle of goods is divided into two; basic commodities and others. The individuals are expected to spend the budget they have;

as a result, there is an opportunity cost between basic commodities and other goods. The choice problem is generally presented as;

Max U = (X1, X2)……..……...……. (2.1)

SubjecttoP1X1+P2X2=I…….…… (2.2)

Where:

X1 represents basic commodities,

X2 represents other goods and services;

U is a measure of utility to be maximized.

P1 and P2 represent the price of both basic commodities and other goods or services, respectively, and I represent the available income so that P1X1 + P2X2 = I is the budget constraint the individual faces.

The solutions to the choice problem are demand functions for basic commodities and other commodities, which take the form,

X_i = f (P1, P2, I)…….....…….... (2.3)

Where i denotes the commodity.

According to the theory, individuals will choose a combination of goods and services that gives them the highest satisfaction but subject to income level and the prices of the goods and services. In the context of utility theory, the pregnant mother could be thought of as making a decision between optimizing their well being by allocating resources between

health –related and non-health-related goods/services, such as antenatal care. This theoretical grounding is essential for understanding how factors like parental education, household, and occupation influence healthcare utilization decisions, such as antenatal care. The pregnant mother may be facing constraints (barriers) in relation to the choice of how many antenatal visits she should make.

2.2.2 Grossman Model of Health Demand

Many studies on healthcare demand use Grossman's model of human capital to analyze individual health status (Grossman, 1972). In Grossman's model, health is seen as a valuable asset that deteriorates over time and can be improved through investments such as medical care, nutrition, education, and lifestyle choices (Grossman, 2017; Kimani et al., 2016; Kimani, 2014). The model suggests that individuals can optimize their well-being by allocating resources to maintain and improve their health, while also considering other goods and budget constraints. This means that the health level relies on the resources invested in maintaining it.

According to Grossman, (1972) people seek healthcare because it directly benefits them, influences their performance in the labour market, and improves their overall health. The demand for healthcare is derived from the need for good health, with healthy people productive and having increased earnings because they spend most of their healthy days investing in the market and non-market sectors. This qualifies healthcare demand as both a consumption and investment good. Grossman's theory of human capital explains how human capital produces earnings and commodities that finally enter the individual utility

function. Medical care is one of the many inputs that can assist in combating the natural depreciation of health with time (Grossman, 2017; Kimani, 2014). However, Grossman, (1972) demonstrated that health demand directly enters the individual's utility function, not medical care.

Grossman's (1972) model is based on the traditional consumer theory, which assumes that every person possesses a utility function able to rank goods/ services purchased according to preferences and tastes but subject to income constraints. This implies that consumers will buy a combination of goods/ services that will give them maximum utility. The Grossman model reviewed in 2000 used the consumer-behaviour household production function to explain how medical care (input) gets into the production of health and health as an (output) Grossman, (2000). According to the model (Grossman, 2000), individuals purchase health services (antenatal care (ANC) utilization) and other goods and services for good health. (Grossman, 2000) stressed that medical care enters the utility function indirectly via the health production function and clearly distinguishes a commodity from market goods and services. The model presents a commodity, in this case, health, as a function of time, goods and services consumed.

Grossman, (1972) model has been criticized because it is deterministic, not accounting for random illness occurrences or stochastic shocks. Additionally, Grossman's assumption that health deteriorates due to age factor alone is not realistic because study reports show that other factors affect health, such as lifestyle choices. Other unrealistic assumptions are that people have perfect and complete knowledge concerning their health capital, the marginal

benefits of health investment both currently and in future, the current and future interest and depreciation rates, and complete knowledge of the production processes.

Grossman's model (1972) is still fundamental in understanding why people need good health and use health services despite the criticisms. However, scholars have tried to improve the Grossman model. For instance, Acton (1975) model, which is based on a behavioural model of utility maximization found out that time and other demographic factors affect demand for healthcare. According to the model, people can derive utility from consuming healthcare and other goods not related to health. Acton, (1975) assumed that when people fall sick, they have various treatment alternatives which they can choose. Acton, (1975) also assumed that individuals may choose not to seek healthcare to maximize utility but are subject to income and non-income factors, such as travel and waiting time (Musyoka et al., 2018; Musyoka, 2019). Acton (1975) focused mainly on how time and money prices, and earned and non-earned income affect the demand for healthcare services.

Acton, (1975) also shows that the choice of the healthcare provider may affect the demand for healthcare services. Individuals can choose either public or private or no care at all. Thus, Acton (1975) discovered that decisions in choosing healthcare are discrete in nature, and discrete choice models are required when estimating healthcare demand. Due to its limitations, Acton's (1975) model was not applied in the study. The model assumes that two medical care and other goods enter the individual utility function directly, and fixed proportions of money and time enter the utility function directly. These assumptions violate the household production theory Acton, (1975).

Mwabu, (2008) also tried to build on Grossman, (1972) by suggesting a unified model, which can include both marketable and non-marketable health inputs, like behaviour change, and can analyze several factors affecting health care demand. Mwabu's model assumes that individuals in a family know how to prevent or cure sickness and maintain healthy practices and that they can rank the actions taken in such circumstances but subject to income and assets in possession. Lastly, the model assumes that individuals are rational beings aiming to maximize healthcare consumption but subject to income constraints Mwabu, (2008). The basic Grossman model assumes a consumer utility function given as follows (Mwabu, 2008):

$$U = U(\emptyset_0 H_0, , \emptyset_1 H_1, \emptyset_2 H_2 \dots \emptyset_n H_n Z_n Z_1 Z_2 \dots Z_n) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2.1)$$

Where

H_0 =health stock inherited

H_i= health stock for the ith time period

$\emptyset_i$= flow of service for each unit stock

$h_i = \emptyset_i H_I$=sum"health services" consumption

Z_i=other "commodities" consumed in the i^{th} time period

To make health and other commodities "gross investment" in the utility function, consumers employ several household functions given as:

$$I_i = I_i\ (M_i, TH_i; E)$$

$$Z_i = Z_i(X_i, T_i: E)$$

Where,

M_i are market inputs contributing to "gross health investment"

X_i = are goods inputs contributing to production of Z_i

THi and $Ti$are time inputs

E = human capital/consumer stock knowledge exclusive of health capital.

The reduced form of health demand function which results from solving the FONC of the utility maximization problem is given as:

$H_t = f\ (X_t)$, where,

H denotes health outcome measure (maternal mortality rate)

X = personal inputs to the health production function.

2.2.3 A Behavioral Health Care Utilization Model

Andersen, (1968) developed the behavioural health care model to explain why families demand health care services . The initial model concentrated on the household as the primary decision maker, but the later models centred on the individual as a unit of analysis due to a lack of health outcome measures at the family level (Chen & Gu, 2020) At the individual level, it is easier to measure health outcomes because healthcare depends on demographic, social and economic factors. Andersen (1968) did not focus on health outcomes or interactions that may occur as families receive healthcare but tried to demonstrate why people use health services. Through the Andersen model, people can also understand equity in accessing health care, and the model assisted in developing policies aimed at promoting equity in accessing health care (Musyoka, 2019).

Andersen, (1995) demonstrated that people use health services for three reasons: the need for care, predisposing factors and enabling resources. (Andersen, 1995) defined predisposing factors as factors which indirectly influence an individual's ability to use/not use health services (Musyoka, 2019). For example, biological factors, such as age and gender, imply the likelihood that individuals will need healthcare services (Andersen, 1995). According to Andersen (1995), the social structure factor can be measured using several factors, including ethnicity, education, household size, religion, occupation, marital status, social interactions and social networks. These factors can determine an individual's ability level to cope with current problems if they occur, the status quo in the community, and the ability to command resources to combat these problems. These factors can also determine physical health status.

Andersen (1995) defined health beliefs as "people's attitudes, values and stock of knowledge on health and health services" that can significantly impact the subsequent health service use and perception. People who know and believe in healthcare services are more likely to utilize them. Andersen and Newman (2005) and Andersen (1995) stated that enabling resources are conditions that must be present for health services to be used (Andersen & Newman, 2005; Andersen, 1995). Such resources include sickness level, healthcare policies, access to healthcare facilities, availability of healthcare facilities, healthcare insurance, waiting time, household/individual poverty levels, travel time, family support, and one's community (Musyoka, 2019).

Andersen and Newman, (2005) defined need factors as the most immediate reason for seeking health care and categorized them into two: evaluated and perceived needs. Perceived need refers to the general overview of one's health. The ranking of their sickness level determines whether they will seek professional healthcare. Andersen (1995) and (Andersen & Newman, 2005) define evaluated need factors as the actual professional/clinical health checkup of one's health status and objective measurement, which can result in the need for medical care. Aspects of the Andersen behavioural model for health care were incorporated in this study when modelling the theoretical framework to understand the contextual factors that affect ANC utilization. It was necessary because the Andersen model forms a basis for understanding the relationship between contextual factors and ANC utilization since it addresses individual behaviour issues and resource availability well (Musyoka, 2019).

2.3 Empirical Literature Review

Here, the study has reviewed some empirical studies on the effect of parental education, household wealth and parental occupation on ANC utilization. Arthur (2012) in Ghana aimed to find out whether wealth still significantly affects ANC uptake in Ghana despite the free maternal policy, using the national DHS data The author used logistic regression analysis to achieve the study objectives, with univariate and multivariate models employed to examine the impact of wealth and other socio-economic factors on antenatal care. The ANC visits was the dependent variable, while the education and age of pregnant women, children alive, distance to the health facility, lack of transport, and place of residence were independent variables. The study findings indicate that wealth still affects the adequate ANC utilization in Ghana. Other significant determinants of ANC uptake were the mother's

education level and age, parity, transportation, and health insurance. However, the study by Arthur (2012) solely focused on the influence of wealth on ANC uptake in Ghana while the current study assessed the effects of parental education, household wealth and parental occupation on ANC utilization in a different geographical location.

In 2017, (Mulinge et al., 2017) conducted a cross-sectional study in Malindi Sub-County, Kenya to examine the factors affecting the ANC uptake among teenage mothers aged 13-19 years. They collected data from 385 mothers using structured questionnaires and key informant interviews. The data was analyzed using descriptive statistics and presented in frequency tables, graphs, and percentages. The researchers used the Hosmer-Lemeshow model and Chi-square test to assess the relationship between ANC utilization and variables such as marital status, mother's age, educational level, type of pregnancy, knowledge level, and time of booking. The study found that the marital status of the teenager's mother and employment status were the only factors affecting ANC utilization in Malindi Sub-County. However, the study's focus on a specific population segment means that the results may not be generalizable to the entire country. This study utilized secondary data encompassing a larger population, including all 47 counties in Kenya.

Fagbamigbe and Idemudia, (2017) conducted a cross-sectional research to determine the association between wealth and ANC utilization in Nigeria, using the 2012 National HIV/AIDS and Reproductive Health and Serological data. The target population was 6,299 female respondents aged between 15 and 49 years with histories of at least one child within five years. The study included respondents selected through a multi-cluster sampling

technique. The study used the Andersen model, with respondents' age at birth, wealth status, employment status, educational attainment, marital status, location of residence, tribe, religion, birth order, behavioural factors, distance from the health facility and money issues as the independent variables. Antenatal care use was lowest among the illiterate, poor, and mothers living in rural areas, as also shown by Arthur (2012). The current study was in a different geographical location with socio-cultural and economic diversities from that of Fagbamigbe and Idemudia (2017) in Nigeria.

Gitonga (2017) did a descriptive cross-sectional study in Tharaka Nithi County (Kenya) to determine factors affecting the uptake of FANC among 4,732 women with a history of birth within one year of sampling. They selected the health facilities through a stratified sampling technique and used a semi-structured questionnaire to gather the study data. The study analyzed data using STATA version 11, with descriptive statistics and a chi-square test to assess the association between the independent and the dependent variables. The statistically significant factors were further analyzed using logistic regression. Independent variables were the mothers' age and education level, household income, employment type, marital status, parity and gravid, and the dependent variable was the uptake of FANC. To increase FANC uptake, Gitonga (2017) recommended educating the girl child, increasing households' income, getting more formal jobs, advocating for partner's support during pregnancy and reducing the number of births. The study focused on a small population, but the current study included data from the entire country.

Uddin Howlader, (2018) conducted a descriptive cross-sectional study to observe ANC practices among the selected pregnant women (n=1155) in Dhaka City from January 2014 to December 2016, using a simple random sampling technique. They collected anthropometric, socio-economic and ANC practices data using a semi-structured pretested questionnaire, and the data was analyzed using SPSS 20.0. The association between the selected variables was analyzed using statistical tests and correlation coefficients. The study used ANC practice as the independent variable and parents' education and occupation and household wealth, among others, as dependent variables. The study observed a strong association between education and ANC utilization, indicating that educated parents know more about modern healthcare and are more concerned about their health and, hence, likely to use ANC services. Howlader, Hossain and Huq (2018) conducted their study in selected areas in Dhaka City, but the current study was in a geographical setting with different socio-cultural and economic variations in Kenya.

Chopra, Juneja and Sharma , (2018) examined the influence of mother's level of education on ANC utilization and maternal and perinatal outcomes among 525 women who had delivered from 1st January to 31st December 2014 in India. The study group comprised women who had given birth during this period. Some details captured by the proforma included their age, education level, ANC visits, parity, residential status, socio-economic status, occupation, menstrual history, immunization received, obstetrical history, any pregnancy-related complications and treatment taken. The independent variable was education level, whereas ANC utilization and maternal and perinatal outcomes were the dependent variables. The study used chi-square tests for data analysis and presented the

results in percentages. The educational status of women was positively associated with both perinatal and maternal outcomes. This study was conducted in India, targeting a small segment of the population, but the current study was in Kenya based on a large and culturally distinct segment of the population.

Musyoka (2019) using Kenya 2013 KHHEU survey data, conducted a non-experimental cross-sectional study to investigate the impact of poverty on health status, choosing healthcare providers, and utilization of healthcare services. The author used the Negative Binomial Regression Model (NBRM), the Multinomial Logit Model (MLM) and the Ordered Probit Model (OPM). The study results indicate that wealth still positively affects healthcare utilization, with individuals from wealthier families more likely to seek treatment when they fall sick when compared with the poor. Musyoka (2019) suggested strategies to eradicate poverty to enable the country to achieve its SDG of zero poverty. Poverty has positive effects on the choice of health providers, healthcare utilization, and health status despite the free maternal policy in Kenya. The study concentrated on wealth effects on general health care utilization, whereas the current study focused on parental education, household wealth and parental occupation effects on ANC utilization.

A cross-sectional study in Saudi Arabia by Alanazy and Brown (2020) investigated factors associated with missing ANC visits at individual and healthcare system levels among 242 third-trimester pregnant women aged 18 years and above. The authors analyzed the study data using SPSS version 22. ANC attendance was the dependent variable, with maternal demographic factors, health literacy, ANC utilization barriers, maternal satisfaction with

care, and maternal health beliefs as the independent variables. The authors found no strong association between ANC utilization and mothers' demographic characteristics and health education factors and no significant association with income, age, marital status, location, or education. The finding contradicts previous studies that showed that income and lower education were ANC utilization barriers. Notably, Alanazy and Brown conducted their research in Saudi Arabia, a country with economic and socio-cultural diversity compared with the Kenyan population.

Islam, Kabir and Talukder (2020) studied the factors influencing the ANC visits in Bangladesh. The study utilized the national DHS (individual record data, 2014) from 17863 women (15–49 years) with marriage histories drawn from selected households. Antenatal care utilization was the dependent variable, whereas the wealth index, respondent's education level, media access, respondent's residence, and birth order number were the independent variables. The authors employed the negative binomial model and found that ANC utilization was significantly associated with the mother's residence, wealth indicator, education level and media exposure. The current study was in a different geographical and cultural setting from (Islam et al., 2020) in Bangladesh.

Ahinkorah et al. (2021) examined the determinants of ANC and Skilled Birth Attendance (SBA) utilization among 4917 females of childbearing age using the 2018 Guinea DHS data. The authors analyzed the data using Chi-square tests and multivariate logistic regression, with ANC and SBA utilization as the dependent variables. The independent variables assessed were the mother's education level and age, television watching

frequency, partner's education level, marital status, pregnancy intention, parity, wealth, employment status, radio listening frequency, sex of household head, religion, residence, health care decision-making, and newspaper/ magazine reading frequency. The study results show that educational level, wealth, religion, planned pregnancy, health decision capacity, and exposure to media were associated with ANC and SBA utilization.

Apanga et al. (2022) did a study in northern Ghana to establish the relationship between partners education level and early antenatal care utilization. The study used a cross-sectional data among a total of 519 women who had a live birth in the past one year. The study was conducted between April to May 2021. Data analysis was done using the generalized estimating equations to determine whether the husband/partner's level of education modified effects of maternal education, maternal age, planned pregnancy and employment status on early ANC. The study results show that mothers whose husband/partner had secondary education or higher were more likely to utilize ANC early compared to their counterparts. The study established that the level of partners/husband education had modified effects on the relationship between planned pregnancy and timing of ANC visit. Teenage mothers whose partners/husbands had less than secondary education were less likely to utilize ANC early. The study informs the current study because it focused on the partners/husband education level.

Raru et al. (2022) conducted a study to find out the association between higher educational attainment on antenatal care utilization among pregnant women in East Africa using Demographic Health Surveys from 2010 to 2018. The study used a total of 84,660 women

who gave birth in the 5 years preceding each country's DHS survey. STATA 15 software was used for data analysis. To determine the association between educational attainment and ANC utilization, a multilevel mixed –effect logistic regression was used. The dependent variable was ANC utilization. The independent variables were grouped as community and individual level factors. Community –level variables included 11 countries in East Africa and place of residence. Individual-level variables included maternal age, education level, distance from health facility, mass media exposure and wealth index. The study results found out that educational attainment, maternal age, wealth index, media exposure, birth order and living countries were significant factors affecting ANC use. The study findings show that pregnant women who had highest level of education were more likely to utilize ANC compared to their counterparts with no education. Pregnant women who were exposed to mass media were more likely to have optimal ANC utilization. However, the study was conducted across many countries using the various Demographic Health Surveys which make the results more general; hence, inability to draw conclusions for relevant specific countries. The current study was specifically done in Kenya to establish how parental education affects ANC utilization.

Seidu et al. (2022) did a study to establish the relationship between the type of occupation and the timing of antenatal care amid pregnant women from sub-Saharan Africa. The study employed secondary data from 29 countries which were conducted between 2010 to 2018. A total of 131, 912 working women were included in the study. Binary logistic regression models were employed to determine the relationship between the type of occupation and the timing of antenatal care visit. The dependent variable was early antenatal care

attendance while the independent variable was the occupation type. The control variables were education level, age, country, religion, pregnancy intention, mass media exposure, parity, health care decision and distance to health facility. The study results show that women who work at managerial positions (employed), compared to women from other work categories, were more to likely to utilize ANC early. The study findings concluded that irrespective of the type of occupation, women in all categories should be able to access ANC services. However, the study was done across several countries making it hard to draw conclusions for specific countries.The current study was done to establish how parental occupation determined antenatal care utilization in Kenya.

Woldeyohannes et al. (2023) analyzed factors affecting antenatal care utilization in Ethiopia using the 2019 Ethiopian Mini Demographic and Health Survey (EMDHS) among 3962 women aged 15-49 years. To find out the factors affecting ANC utilization, count regression models were employed. The models included Poisson Model (PM), Zero-Inflated Poisson model (ZIP), Negative Binomial Model (NBM) and Zero-Inflated Negative Binomial (ZINB) model. The ZIP model best fitted the study because it had the smallest Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values. The outcome variable was ANC utilization while the dependent variables were education, religion, place of residence, wealth index and region. The study results established that factors significantly affecting ANC utilization in Ethiopia included maternal education level, region, place of residence, and religion. The study concluded that mothers who had education were more likely to utilize ANC services compared to those

who are uneducated, thus health education is necessary for the uneducated mothers. The current study was done in Kenya using the 2022 KDHS via the negative binomial model.

Asiimwe et al. (2024) in Kenya carried out a study to investigate the determinants of quality antenatal care utilization using the 2022 KDHS among women of reproductive age. Data was analyzed via univariate and multivariable logistic regression analysis. The dependent variable was women's receipt of quality ANC. The independent variables were socio-demographic factors, such as, parental education, maternal age, wealth index, place of residence, marital status, religion, region and the household size. Obstetric factors and pre-natal related factors included ANC contacts, timing of first ANC visit, information about ANC, last pregnancy want, place of ANC provision, distance to health facility and ANC provider. The study results show factors associated with receiving quality ANC which includes age, maternal education, region, access to media, time to health facility, health care seeking decision making, number of ANC visits and ANC provider. However, the study focused on factors determining quality of ANC while current study focused on how parental education, parental occupation and household wealth factors affect ANC utilization in Kenya using negative binomial regression model.

2.4 Overview of Literature

The study reviews the Utility Maximization Theory, Grossman model and the Andersen behavioral model theories. In summary, the theoretical literature suggests that there are relationship between parental education, household wealth, parental occupation, and ANC (antenatal care) utilization. These theories indicate that economic, social, and demographic

factors influence ANC utilization. The most relevant theories for this study are the Grossman model and the Andersen behavioral model. The Grossman model informs this study by emphasizing how individuals , in this case, pregnant women, who are faced with income constraints allocate resources to improve their well being and that of their unborn babies, while the Andersen model best suits this study because it provides a framework to analyze the influence of enabling and predisposing factors on ANC utilization.

Most of the reviewed studies in the empirical literature used cross-sectional data to establish factors affecting ANC utilization. Different estimation techniques, including logistic and negative binomial regression models, have also been used to assess the effects of parental education, household wealth and parental occupation on ANC utilization. Several factors influencing ANC utilization, such as the maternal education level and age, area of residence, employment status, marital status, wealth, distance to health amenities, transportation, and media exposure, were identified by previously reviewed studies.

The current study borrowed most variables from the previous reviewed studies. However, none of the previous reviewed studies established parental education, parental occupation and household wealth affects ANC utilization in Kenya. Most reviewed studies focused on the general factors affecting ANC utilization. The current study is different from the previous studies done in Kenya because, first, it will take a national outlook to identify how parental education will affect ANC utilization in Kenya and, secondly, the study will focus mainly on the effects of parental education, household wealth and parental occupation on ANC utilization using negative binomial regression model, unlike other studies which have

focused on the general factors influencing ANC utilization. The results from the literature have also identified the need for continuous assessment of factors affecting antenatal care utilization in developing countries due to the unacceptably high preventable maternal deaths.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The areas covered in this section include the design of research, theoretical framework, empirical model, variables definition and measurement, type and source of data, and analysis of the study data.

3.2 Research Design

The study employed a non-experimental, cross-sectional research design, using secondary data from the 2022 Kenya Demographic and Health Survey (KDHS). This design suits this study because it can explore relationships but limited because of its inability to establish causality. Additionally, the variables were free from the researcher's manipulation. Since the KDHS data is secondary data and publicly available, no ethical considerations were required for the analysis to be carried out. However, authorization was sought from DHS to use the KDHS datasets.

3.3 Theoretical Framework

The study employs Mwabu's (2008) unified model based on utility maximization theory, which suggests that households aim to optimize their well-being by allocating resources between health-related and non-health-related goods subject to income. This theoretical grounding is essential for understanding how factors like parental education, household wealth, and occupation influence healthcare utilization decisions, such as antenatal care

(Musyoka, 2019). Mwabu's (2008) model effectively intergrates both marketable and non-marketable health inputs, making it suitable for analyzing ANC utilization influenced by socio-economic factor.

The study utilizes a discrete data model (counts) because the dependent variable is defined and presented in the number of ANC visits. It draws heavily from the works of (Mwabu , 2008; Adeoti & Awoniyi, 2014, and Musyoka 2019). This study applies an economic model based on family member behaviour, where an individual's utility is maximized but dependent on income constraints (Mwabu, 2008). Therefore, the utility function of any household member, for example, a pregnant woman, can be expressed as: $U = u(X, Y, H)$ (3.1)

Where

X is health related goods (diet, smoking, exercising, risky behavior like unprotected sex), which direct impact on the pregnant woman health and yields utility.

Y refers to health neutral goods (such as clothing, electricity consumption) with no direct impact on the health status of the pregnant woman.

H is the health outcome.

The health production function (H)can be written as:

$$H = h(X, Z. P, G, \mu) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

Where,

$\boldsymbol{Z}$ denotes "health investment goods" and health care services such as antenatal care which have direct effect on the health status of the pregnant woman.

X are goods related health.

P denotes control variables, for instance pregnant woman's insurance coverage and employment status.

G denotes household factors and geographical factors, including age, residence, marital status of the pregnant woman, parental education level, religion and the number of household members.

μ denotes a trait of health due to either known hereditary or environmental conditions (Musyoka,2018; Mwabu,2008).

Equation (3.1) is maximized subject to equation (3.2) and equation (3.3) which is the budget constraint equation given by

$$XP_x + YP_y + ZP_z = M \quad \text{(3.3)}$$

Whereby,

M denotes external income.

P_x = price of good related health (X), P_y= price of good neutral to health (Y).

P_z=price of health investment good.

(Z) "Health investment good". (Z) is assumed to enhance the pregnant mother health status and gets into the individual utility function equation (3.1) via H given by equation (3.2).

The Lagrarian function of maximizing the individual utility function can be given as:

$$L_{xyz\gamma} = U\{X, Y, h(X, Y, Z, P, G, \mu\} + \gamma\left(M - XP_x - YP_y - ZP_z\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots (3.4)$$

The first order conditions after health production following equation (3.4) can be expressed as:

$$L_x = U_x\{X, Y, h\ (X, Y, Z, P, G, \mu) * h_x(X, Y, Z, P, G, u) - \gamma P_x = 0 \dots\dots\dots\dots\dots\dots\dots (3.5)$$

$$L_z = U_z\{X, Y, h\ (X, Y, Z, P, G, \mu) * h_z(X, Y, Z, P, G, u) - \gamma P_z = 0 \dots\dots\dots\dots\dots\dots\dots (3.6)$$

$$L_y = U_x(X, Y, Z, P, G, \mu) - \gamma P_x = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.7)$$

$$L_\gamma = M - XP_x - YP_y - ZP_z = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (3.8)$$

According to (Mwabu, 2008), the solutions of the simultaneous first order conditions (FONCs) give input demand functions to solve the individual problems given as:

$$X^* = D_x\left(P_x, P_y, P_z, M, P, G. \mu\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (3.9)$$

$$Y^* = D_y\left(P_x, P_y, P_z, M, P, G. \mu\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.10)$$

$$Z^* = D_z\left(P_x, P_y, P_z, M, P, G. \mu\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (3.11)$$

The final result is a reduced hybrid demand functions for health status which can be written as follows:

$$H = \emptyset\left(P_x, P_y, P_z, M, P, G, \mu\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .. (3.12)$$

Where $H$and $P_x, P_y, P_z$and M are as explained earlier.

3.4 Model Specification

The study used the reduced form equation (3.11) to address its objectives, with the Negative Binomial Regression Model (NBRM) employed to estimate the equation (Musunuru, Proffit, Ewing and Greene, 2020). Health investment goods, specifically antenatal care, were measured by the frequency of ANC visits to a hospital/clinic, which means they cannot have a negative value. Normally, over-dispersion may occur in health care utilization due to many zero counts in the data, which may arise from the fact that some people may not utilize health care during the period of the survey. The NBRM was better suited due to over-dispersion in the dependent variable (ANC visits). This is because it relaxes the Poisson model assumption of equi-dispersion which limits its use in this study. Initially, a Poisson regression model was constructed based on the assumption that the dependent variable follows a Poisson distribution. The probability of Antenatal care utilization (A) taking a specific value can be expressed as:

$$Pr[A = a_i/X_i] = \frac{e^{-\omega_i}{\omega_i}^{a_i}}{a_i!}, a_i = 0,1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.12)$$

Where,

a_i= observed number of ANC visits, that is ANC utilization.

ω_i represents the mean parameter

$X_i$are the determinants of ANC utilization

Pr denotes probability

According to (Greene, 2002) $\omega_i$can take a log linear model such that:

$$ln\, w_i = X_i'\beta + \varepsilon_i$$

or

$\omega_i = \exp(X_i'\beta), \omega_i >$ (3.13)

Where

ε_i represents heterogeneity characteristics of an individual in a cross-sectional data.

The property of equi-dispersion is implied by the poison distribution:

$E(y_i|x_i) = V(y_i|x_i) = \omega_i$whereby the conditional deviation is greater than the its mean (P. Musyoka et al., 2018).

y_i distribution conditioned on X_i together with μ_i remains poison with conditional mean and variance w_i:

$Pr[a_i|X_i, \mu_i =/X_i] = \frac{e^{-\omega_i\mu_i}\,(\omega_i\mu_i)^{a_i}}{a_i!}, a_i$..... (3.14)

Integrating μ_i in 3.14 produces the unconditional distribution of a_ia form of the negative binomial model given as:

$\Pr[a_i|X_i] = \frac{\sqrt{(\emptyset + a_i)}}{\sqrt{(a_i+1)}}$.....(3.15)

Where a_i is ANC visit counts while X_i are ANC utilization covarites.

The equivalent empirical model to investigate the objectives of the study will be specified as:

$$Visits = \beta_0 + \beta_1 Age + \beta_2 Education + \beta_3 Residence + \beta_4 Marital\ status + \beta_5 Religion + \beta_6 Household\ wealth + \beta_7 Occupation + \beta_8 Distance\ to\ facility + \varepsilon \quad \text{(3.16)}$$

3.5 Variables Definition and Measurement

Antenatal Care Utilization is the use of ANC services by pregnant women for purposes of ensuring best pregnancy outcomes for both mother and baby. It is a count variable and will be measured by capturing the number of times a woman visits a health facility to seek antenatal care services and will range from 0 to 8 and is expected not to have a negative value.

Maternal Education is the highest academic achievement of the pregnant woman. It is a categorical variable and was measured as **0** denoting no education, **1** denoting primary, **2** denoting secondary, and **3** denoting College/University levels.

Paternal Education is the highest level of academic achievement by the pregnant woman's partner. It is a categorical variable and was measured as **0** denoting no education, **1** denoting primary, **2** denoting secondary, and **3** denoting college/university levels.

Age which is a continuous variable was captured as the actual mother age in years.

Marital Status captures whether the pregnant mother is married or not. It was measured as **0** denoting never married, **1** denoting married, **2** denoting divorced/widowed/separated

Mother's Occupation is pregnant woman's employment status, a dummy variable and was measured as **1** if employed and **0** = otherwise

Father's Occupation refers the employment status of the pregnant woman partner, a dummy variable and was measured as **1** if employed and **0** = otherwise

Household Wealth is a continuous variable which proxies a household's standard of living based on asset ownership. The more assets a household possesses, the higher the score and the fewer the assets the lower the score. Individuals from households with higher scores are considered wealthier than those with low scores.

Residence is the place where the mother lives and it was captured as **Rural**=1 or **Urban**=2

Religion is the religion of the pregnant woman and was categorized as 1= Protestant, 2=Catholic, 3= Muslim, 4=Traditionalists/Atheists/Others

Distance to the facility –is measured in kilometers and represents how far the home of the pregnant woman to the nearest health facility is.

3.6 Data Type and Source

This study used the most recent, nationally representative, 2022 Kenya Demographic and Health Survey (KDHS) data, focusing on reproductive women aged from 15 to 49 years. The 2022 KDHS was used due to availability of variables of interest for this study. The datasets used a two-stage stratified sampling design and contained much information on antenatal care utilization. Therefore, the data sets better suited this study because it enabled this study to achieve its objectives outlined in chapter one.

3.7 Data Analysis

Equation 3.16 was estimated using NBRM because the dependent variable (ANC usage), defined in terms of the number of times a pregnant woman visited ANC amenity, was expected not to take any negative value (Musunuru, et al., 2020) .

3.8 Diagnostic Assessments

To ensure the reliability and validity of the regression model, several diagnostic tests were performed to detect and address potential issues. The tests done included Wald test statistic and Pseudo R^2 which showed a good fit when checked for appropriateness (chi2 (6) = 179.78), which was statistically significant. Further assessment rejected the null hypothesis (LR test of $\alpha = 0$), indicating that errors exhibited no overdispersion; hence, the negative binomial regression model was appropriate

CHAPTER FOUR

EMPIRICAL FINDINGS AND DISCUSSION

4.1 Descriptive Statistics

This section provide an overview of the key characteristics of the study participants, which are crucial for understanding antenatal care utilization patterns in Kenya.

Table 4.1: Study data descriptive statistics

Variable	Mean	Std. Dev.	Range		Observation counts
			Min	Max	
Age	35.69	7.71	15	49	82,687
Number of living children	4.35	2.33	0	14	82,687
ANC utilization during pregnancy	4.17	3.65	0	20	10,606
Time taken (minutes) to nearest health facility	42.80	53.43	0	600	43,638

Source: Author computation, study data, 2022.

Table 4.1 displays the descriptive statistics, including mean, standard deviation, observation counts, and variables range, obtained from both the continuous and count variables. The number of mothers aged between 15 and 49 years who participated in the survey was 82,687, with mean age and standard deviation (SD) of 35.7 years and 7.7 years, respectively.

The findings in Table 4.1 revealed that the mean antenatal utilization during pregnancy was 4.17, with a standard deviation of 3.65 visits. The frequency of attending ANC clinics ranged between zero and 20. The mean time to reach a health facility was 42.80 minutes,

with a standard deviation of 53.43 minutes. The number of living children in a household ranged between zero and 14. The standard deviation was large, indicating that the time taken to reach a health facility is skewed, ranging from zero to 600 minutes.

Table 4.2: Summary of discrete and categorical variables statistics

Variable	Observation counts (n)	Per cent (%)
Age		
14 - 19 years	527	1.2
20 - 25 years	4,397	10.1
26 - 31 years	8,539	19.6
32 - 37 years	11,678	26.8
38 - 43 years	9,742	22.3
44 - 49 years	8,755	20.1
Total	43,638	100.0
Mother highest level of education		
No education	18,907	22.87
Primary	38,164	46.15
Secondary	17,703	21.41
Higher education	7,913	9.57
Total	82,687	100
Husband highest level of education		
No education	13,696	20.86
Primary	26,800	40.81
Secondary	16,527	25.17
Higher education	8,644	13.16
Total	65,667	100
Residence		
Urban	26,089	31.55
Rural	56,598	68.45
Total	82,687	100
Wealth index		
Poorest	25,175	30.45
Poorer	16,057	19.42
Middle	15,999	19.35
Richer	15,094	18.25
Richest	10,362	12.53
Total	82,687	100

Source: Author computation, study data, 2022

Religion		
Protestant	50,593	61.19
Catholic	13,344	16.14
Muslim	15,509	18.76
Traditional/atheists/others	3,241	3.92
Total	82,687	100
Mother's employment status		
Unemployed	30,937	37.77
Employed	50,982	62.23
Total	81,919	100
Husband employment status		
Unemployed	11,407	17.55
Employed	53,579	82.45
Total	64,986	100
Marital status		
Single	3,461	4.19
Married	66,329	80.22
Divorced/Separated/widowed	12,897	15.6
Total	82,687	100
ANC facility/provider		
Government	3,993	76.55
Private	841	16.12
FBO/Mission	352	6.75
NGO	30	0.58
Total	5,216	100.00
Parity		
Nulliparity	345	0.4
Low multiparity	31,191	37.7
Grand multiparity	51,151	61.9
Total	82,687	100.0
First ANC		
1 - 12 weeks	2,844	27.9
13 - 28 weeks	7,107	69.6
29 - 40 weeks	256	2.5
Total	10,207	100.0
Number of visits		
1 visit	750	7.1
2 - 3 visits	3,257	30.7
4 - 7 visits	6,228	58.7
8 or more visits	371	3.5
Total	10,606	100.0

Source: Author computation, study data, 2022

Table 4.2 shows categorical data analyzed descriptively and summarized using frequencies and percentages. The analysis of mothers' education levels revealed that 46.2 per cent had primary education as their highest level, with 9.6 per cent of women having a higher education. The husband's level of education also showed that 40.8 per cent had primary education, with 13.2 per cent having a higher education. The majority (68.5 per cent) of the respondents lived in rural areas, while 31.5 per cent dwelled in urban areas.

This study classified the wealth index into five main categories, explaining the extent of wealth in respective households. The findings showed that (30.5%) of the respondents were the poorest, while (12.5%) were the richest. The majority (61.2%) of respondents who participated in the survey were protestants, (16.1%) were catholics ,and (18.8%) were muslims. Further, 62.2 per cent of the respondents in this study were employed, and 37.8 per cent were unemployed. The study findings showed that (82.5%) of the participants' husbands were employed, with 17.5 per cent unemployed.

The majority (80.2%) of the respondents who participated in the survey were married, (15.6%) were either separated or divorced, and (4.2%) were single. The findings also showed that (39.1%) of the respondents attended antenatal care in public facilities, (8.2%) attended ANC at private facilities, and (3.5%) were attending FBO/Mission facilities while (0.3%) attended ANC in non-governmental health institutions. Additionally, the findings revealed that most respondents (61.9%) had five or more pregnancies, and 37.7 per cent had less than five pregnancies. Furthermore, the majority of the respondents (69.6%)

initiated their first ANC during the second trimester (13-28 weeks), and (27.9%) initiated ANC during the first trimester (1-12 weeks). The findings revealed that 58.7 per cent of the respondents made at least 4-7 visits, but only 3.5 per cent attained the recommended number of ANC visits (WHO, 2022).

4.2. Empirical Findings

The study aimed to determine the effects of parental education, household wealth and occupation on ANC utilization in Kenya. The findings are presented in Table 4.3 and discussed per the study objectives.

Table 4.3: Negative binomial regression results for Antenatal Care utilization in Kenya

ANC utilization	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Husband/partner's education							
No education (reference)	0	.	.	.	.	.	
Primary	.063	.034	1.85	.064	-.004	.129	*
Secondary	.046	.037	1.25	.212	-.026	.118	
Higher	.036	.042	0.85	.396	-.047	.118	
Mother education level							
No education (reference)	0	.	.	.	.	.	
Primary	.017	.033	0.53	.597	-.047	.081	
Secondary	.034	.037	0.91	.362	-.039	.106	
Higher	.054	.044	1.22	.222	-.033	.14	
Household Wealth							
Poorest (Reference)	0	.	.	.	.	.	
Poorer	.033	.028	1.20	.23	-.021	.088	
Middle	.103	.029	3.53	0	.046	.159	***
Richer	.059	.033	1.78	.076	-.006	.124	*

Richest	.076	.041	1.83	.067	-.005	.156	*
Mother occupation							
Not working (reference)	0	.	.	.	.	.	
Employed	-.007	.018	-0.38	.705	-.042	.028	
Husband occupation							
Not working (reference)	0	.	.	.	.	.	
Employed	-.026	.027	-0.98	.325	-.078	.026	
Religion							
Protestant (Reference)	0	.	.	.	.	.	
Catholic	.016	.022	0.74	.461	-.027	.06	
Muslim	-.012	.025	-0.47	.635	-.062	.038	
Traditional/atheist	-.056	.042	-1.35	.176	-.138	.025	
Distance to health facility (Minutes)	.009	.019	0.46	.642	-.028	.045	
1o	0	.	.	.	.	.	
Timing of 1st ANC visit							
1-12 weeks (Reference)	0	.	.	.	.	.	
13 - 28 weeks	-.437	.017	-25.57	0	-.471	-.404	***
29 - 40 weeks	-.45	.064	-7.03	0	-.576	-.325	***
Residence (Rural)	-.03	.023	-1.30	.194	-.076	.015	
Maternal Age (years)							
14 - 19	0	.	.	.	.	.	
20 - 25	.065	.043	1.52	.128	-.019	.148	
26 - 31	.04	.043	0.94	.347	-.044	.124	
32 - 37	.092	.044	2.11	.035	.006	.178	**
38 - 43	.016	.05	0.31	.754	-.082	.113	
44 - 49	.061	.073	0.84	.4	-.081	.204	
ANC Provider							
Public Hospital Yes)	.021	.03	0.70	.485	-.038	.08	
Public health centre (Yes)	-.053	.032	-1.67	.095	-.115	.009	*
Dispensary	-.015	.031	-0.48	.634	-.075	.046	
Private Hospital	.035	.037	0.94	.349	-.038	.107	
NGO Hospital	.003	.143	0.02	.985	-.278	.284	
FBO/Mission Hospital	.022	.05	0.44	.662	-.076	.12	
FBO/Mission Clinic	-.005	.128	-0.04	.97	-.255	.245	
Constant	1.65	.077	21.54	0	1.5	1.8	***
Lnalpha	-	.092	.b	.b	-3.588	-3.227	

3.408

Mean dependent var	4.294	SD dependent var	3.325
Pseudo r-squared	0.046	Number of obs	4194
Chi-square	808.628	Prob > chi2	0.000
Akaike crit. (AIC)	16839.425	Bayesian crit. (BIC)	17048.691

*** p<.01, ** p<.05, * p<.1

4.2.1. Effects of Parental Education on Antenatal Care Utilization in Kenya

The factors affecting ANC utilization, as captured in equation 3.16, were analyzed using negative binomial regression. The model showed a good fit when checked for appropriateness using the Wald test statistic (chi2 (6) = 179.78), which was statistically significant. Further assessment rejected the null hypothesis (LR test of $\alpha = 0$), indicating that errors exhibited no overdispersion; hence, the negative binomial regression model was appropriate. Data on marital status was excluded from the model because of collinearity.

Findings displayed in Table 4.3 show that the husband's education level had a positive effect on ANC utilization, though insignificant at a 5 per cent level. The coefficients of primary (β =0.063), secondary (β =0.046), and higher (β =0.036) education levels were all positive, with that of primary education being statistically significant at a 10 per cent level. Mothers whose husbands/partners had primary education levels were more likely to utilize Antenatal care services than those without education, holding other factors constant. The study findings are consistent with those documented elsewhere. Apanga et al. (2022) in Ghana found that early ANC attendance was more prevalent among mothers whose partners had secondary or higher education when compared to mothers whose partners had less than secondary education. A study conducted by Wulandari and colleagues in 2022 in

Indonesia also revealed that mothers whose husbands had higher education were 3.376 times more likely to engage in ANC visits than those whose husbands were uneducated. Alex and colleagues in sub-Saharan Africa also found that having educated partners is ANC attendance predictor (Okedo-Alex et al., 2019; Islam et al., 2020). Educated husbands/partners are more knowledgeable on the benefits of health-seeking behaviours such as attending ANC clinics. The higher the husband's education, the greater the possibility of the husband's involvement in ANC visits compared to mothers whose partners have less than a secondary education. Generally, the husband's education did not influence ANC visits.

As displayed in Table 4.3, the mother's education level had no significant effect on ANC utilization. However, the coefficients of primary (β =0.017), secondary (β =0.034), and higher education (β =0.054) were positive, implying that a higher level of education was associated with an increased likelihood of ANC utilization. The insignificance of maternal education could suggest that factors other than formal education, such as healthcare system factors, health literacy or cultural beliefs, play a more substantial role in influencing ANC utilization. Similarly, Alanazy and Brown (2020) found no significant association between ANC attendance and education in Saudi Arabia. This finding contradicts other studies that showed that maternal education level is significantly associated with ANC utilization. Uwimana, Elhoumed, M., Gebremedhin, Nan and Zeng, (2023) showed that mothers with secondary and higher education had adequate ANC visits compared to uneducated mothers (Uwimana *et al*., 2023). In Bangladesh, (Islam et al., 2020) showed that utilization of ANC services increased as maternal education level increased. Raru *et al*. (2022) showed that

women with higher education levels were more likely to have optimal ANC utilization when compared with those with no education in East Africa. Muyunda *et al*. (2016) found that women with higher education levels were more likely to attend at least four ANC visits when compared to those with no education in Zambia. Other studies reporting similar associations include (Adedokun & Yaya, 2021) and Islam *et al*., (2020).

4.2.2. Effects of Household Wealth on Antenatal Care Utilization in Kenya

The results on the effect of wealth, measured by wealth quintiles, on the number of ANC visits are presented in Table 4.3. The lowest quintile, representing the poorest households and being the basis of the analysis, was excluded from the regression. All the coefficients were positive, with the coefficient of the middle-income quintile compared with the lowest-income quintile statistically significant at the one per cent level. The positive coefficients implied that the odds ratio of ANC usage increased with households in the middle-income quintile. This implied that financial barriers still among exist among the poorer communities, which hinder mothers from utilizing healthcare services, such as antenatal care. Similarly, Fagbamigbe & Idemudia, (2017) found a rise in ANC utilization with increased wealth status in Nigeria. Seidu (2021) also found a similar association in Papua New Guinea. Akter *et al*. (2023) in Bangladesh study findings established that women from the poorest households were less likely to receive high-quality ANC services than those from the richest.

Elsewhere, Dakua and Das found a significant difference in full ANC utilization across wealth groups, with non-poorer women showing a significantly higher likelihood of using

full ANC when compared with poorer women in India (Dakua & Das, 2023). Islam *et al.* showed that the wealth index significantly influences ANC utilization (Islam *et al*., 2020). In Rwanda, Tengera and others found that the women's wealth index was positively associated with adequate ANC utilization (Tengera *et al*., 2023), with a similar finding reported in Uganda by Towongo and others (Towongo *et al*., 2023). Gitonga (2017) reported that household income level positively influenced the uptake of FANC in a study in Kenya.

The current study findings are discordant with those of Osei and others in Ghana. These authors found that household wealth exerts a positive and significant effect on ANC for all wealth quintiles for women who had at least eight ANC visits but was insignificant for the poorer and middle quintiles of those who had four to seven ANC visits (Osei *et al*., (2020). Similarly, Alanazy and Brown (2020) documented no significant association between ANC attendance and income in Saudi Arabia. The strong link between wealth index and ANC utilization suggests that women in better socioeconomic status are more capable of paying for both direct and indirect healthcare costs associated with the uptake of healthcare services, such as transportation and additional costs Raru *et al*. (2022) . Also, women of low-income status may prioritize income-generating activities over attending ANC clinics, even when the services and transportation are free of charge because of lack of awareness of services.

4.2.3 Effects of parental occupation on ANC utilization in Kenya

The study results in Table 4.3 show no relationship between the occupation of both mother and husband and ANC utilization. The coefficient of being employed compared with that of not employed was statistically insignificant at the five per cent level. The current study's finding contradicts several previous studies, which have shown a positive relationship between parental occupation and ANC utilization. Badolo et al. in Burkina Faso reported that working women were five times more likely to utilize ANC services than women who were not working (Badolo et al., 2022). Adedokun and Yaya in sub-Saharan Africa showed that adequate utilization of antenatal care was highest among women who were working than their counterparts who were not working (Adedokun & Yaya, 2020).

Alex et al. documented that women with a working status (employed) had a higher likelihood of attending at least one and at least four ANC visits than the unemployed/not working (Okedo-Alex et al., 2019). Seidu (2021) in Papua New Guinea showed that women who were working were more likely to attend ANC early compared to their counterparts who were not working. These study findings indicate that employment is strongly associated with education, with those having higher education highly likely to get employed than their counterparts, and as such, suggesting the possible explanation for the positive association between ANC utilization and employment status of both the mother and the husband/partner.

4.2.3 Effects of control variables on Antenatal Care utilization in Kenya

This study used a couple of control variables, including religion, timing of the first ANC visit, distance to health facility, place of residence, and maternal age and type of provider. The coefficients for mothers who started ANC at 13 - 28 and 29 - 40 weeks of pregnancy were negative and statistically significant at a one per cent significance level, implying that those mothers had lower ANC utilization when compared with those who began attending ANC between 1 – 12 weeks. The current study finding is consistent with those of (Habte et al., 2024) in Sub-Saharan African countries and (Ikamari, 2020) in Kenya, who found out that women who started attending ANC clinics after the first trimester were less likely to attain the recommended four ANC visits. Additionally, Hailemariam *et al*. (2023) found that women who visited ANC before the 16 week of gestational age were more likely to use antenatal care optimally when compared to those who started after the 16^{th} week. The reason for this association could be that the information the pregnant woman receives at the first weeks of ANC visit may encourage them to continue seeking care throughout the pregnancy, hence women are encouraged to start the ANC visits early (between 1-12 weeks).

The coefficients for respondent's age were positive for all categories, with those of mothers aged 32-37 years positive and statistically significant at a 5 per cent significance level. Mothers aged 32-37 were more likely to attend ANC than those aged 14-19 when other factors were constant. Similarly, Chilot et al. (2023) found that women's age was positively associated with adequate ANC visits, while Islam et al. (2020) in Bangladesh showed that utilization of ANC services increased as the level of maternal age increased. The reason

for this parallel relationship between maternal age and antenatal care utilization could be because of the past experience older women encountered during their previous pregnancies which exposed them to knowledge about the benefits of seeking healthcare services such as antenatal care.

The study estimation results showed that the coefficients for distance to health facilities and area of residence were positive and negative, respectively, and had no statistical significance. Similarly, Kyei et al. (2012) in Zambia found that distance had no effect on number of ANC visits. However, previous study results show a significant effect of distance to health facilities on antenatal care utilization. For instance, Khan et al. (2024) show that every increase in distance in kilometers from where the woman lives reduced the likelihood of ANC utilization.

The estimation results showed that the coefficients of being a Muslim, Traditional /Atheist, and Catholic compared to being protestant were statistically insignificant at a five per cent level. Further, the current study results showed positive coefficients for respondents attending ANC in public hospitals, private hospitals, NGO hospitals, and FBO/Mission. Those who attended ANC in public health centres had a significant negative coefficient at a one per cent significance level. This association may be due to health system challenges, especially in rural areas.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter describes the study summary, conclusion, and policy implications and areas for further study.

5.2 Summary of the Study

Despite the many efforts the government of Kenya has made towards ending preventable maternal deaths, including user fee removal for maternal health care services, maternal mortality remains a significant challenge, as evidenced by the high rates. Using Mwabu's unified model, this study explored how parental education, occupation, and household wealth influence antenatal care utilization in Kenya. The specific objectives of this study were to assess the effects of parental education, parental occupation, and household wealth on antenatal care utilization in Kenya. The study adopted a non-experimental research design using the recent KDHS (2022) data on women aged between 15 to 49 years. The data was analyzed using the negative binomial regression model.

The findings indicate that while household wealth plays a significant role in determining antenatal care utilization in Kenya, the education and occupation levels of both parents have varying effects on healthcare-seeking behavior. The study results indicated that in Kenya, a husband/partner with higher levels of education had a positive influence on the utilization of ANC services. This means that as the husband/partner's education level

increased, there was an increased likelihood of ANC utilization. In terms of household wealth, the study found that increasing wealth was linked to higher ANC utilization. However, both the mother's and husband's employment status had a negative effect on ANC utilization, suggesting that employed parents were less likely to use ANC services probably due to work environment-related challenges. The timing of the first ANC visit, maternal age (32-37 years), and seeking ANC services from public health centres were all factors that positively influenced ANC utilization. On the other hand, the study did not find any significant associations between ANC utilization and factors such as mother's education, mother's and husband's occupation, religion, distance to health facility, and marital status.

5.3 Conclusion

The study draws the following conclusions based on the research questions. First, it aimed to determine whether parental education affected ANC utilization in Kenya. The study found that while maternal education did not affect ANC utilization, the husband's education positively influenced ANC utilization in Kenya. This means that as the husband/partner's education level increased, there was an increased likelihood of ANC utilization. The mother’s education level had no significant effect on ANC utilization. However, the coefficients of primary, secondary, and higher education were positive, implying that a higher level of education was associated with an increased likelihood of ANC utilization. The insignificance of maternal education could suggest that factors other than formal education, such as healthcare system factors, health literacy or cultural beliefs, may play a more substantial role in influencing ANC utilization. The study concluded that parental education is an important factor determining ANC utilization in Kenya, therefore the

findings suggest that formal education should be offered to both girls and boys of all categories, because the higher the education, the higher the likelihood of utilizing antenatal care.

Second, the study examined the effects of household wealth on ANC utilization in Kenya. The strong link between wealth index and ANC utilization suggests that women in better socioeconomic status are more capable of paying for both direct and indirect healthcare costs associated with the uptake of healthcare services, such as transportation and additional costs. Also, women of low-income status may prioritize income-generating activities over attending ANC clinics, even when the services and transportation are free of charge because of lack of awareness of services; hence, the study concluded that household wealth is crucial in increasing the utilization of ANC services in Kenya; and therefore, strategies to reduce the economic gaps existing between the poor and the rich are encouraged so as to increase the utilization of antenatal care services.

Lastly, the study looked at the effects of parental occupation on ANC utilization in Kenya. The current study's finding contradicts several previous studies, which have shown a positive relationship between parental occupation and ANC utilization. The contradictory findings could suggest that other than individual factors, other contextual factors such as healthcare system factors may influence utilization of antenatal care in Kenya. Therefore, the study concluded that parental occupation does not affect ANC usage in Kenya, hence the suggesting the need for awareness campaigns on the benefits of antenatal care to

increase uptake of ANC especially among the poor, uneducated women living in rural areas.

5.4 Policy Implications

The study concluded that women whose husbands/partners have primary education or higher, are more likely to utilize antenatal care services compared to those with no education. Based on this conclusion, the study recommends that, besides investment in free education, the government and other health policy makers should invest in programs such as awareness campaigns targeting both women and men's roles in maternal health or partnerships with local organizations, non-governmental organizations (NGOs) and international donors so as to reach less educated populations living in rural areas. Additionally, the government should make secondary education and college education more affordable to ensure that more Kenyans have access to higher education. This can be achieved through offering scholarships to the less priviledged in the society.The government can also incorporate training on the importance of ANC utilization during pregnancy into the education curriculum, alongside the free education initiatives. This will help enhance awareness about the benefits of ANC services and encourage more women to utilize them.

According to the study findings, women from middle-income households are more likely to utilize ANC compared to those from poorer households. The government of Kenya is already providing free maternal health care, and the study suggests that the government should consider offering free ANC services to all women, regardless of their

socioeconomic status, religion, marital status, or place of residence. This includes formulating ANC policies and guidelines to remove barriers and eradicate health inequalities for the less privileged. The study also found that parental occupation does not significantly affect ANC utilization in Kenya. T his study recommends that the association between parental occupation and antenatal care utilization need more exploration, such as examining the effects of informal versus formal employment on ANC utilization or studying how work schedules affect healthcare access.

5.5.Contribution to Knowledge

This study adds to the existing literature on the factors affecting antenatal care utilization in Kenya. The study specifically examined how parental education, parental occupation and household wealth influences the uptake of antenatal care at a national level using the current 2022, KDHS. Previous studies concentrated on datasets small regions such as specific rural or urban areas and slum areas.

5.5 Areas of Further Studies

The study has given an analysis of how parental education, parental occupation and household wealth affects antenatal care utilization in Kenya. However, the study found out that both maternal education and parental occupation were not significantly associated with antenatal care utilization in Kenya despite most previous studies elsewhere having shown that the two factors are important determinants of antenatal care utilization. Therefore, the study recommends further research on the effects of maternal education and parental

occupation on ANC utilization in Kenya using a different methodology. Areas to focus on may include:

i. Examining the effects of informal versus formal employment on ANC utilization or studying how work schedules affect healthcare access.
ii. Examining the effects of maternal education on ANC utilization using a multinomial regression model

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