ANTENATAL CARE UTILIZATION AND ITS EFFECTS ON BIRTH OUTCOMES AMONG PRIMIGRAVIDAS ATTENDING POSTNATAL CLINIC AT KERUGOYA HOSPITAL, KIRINYAGA COUNTY, KENYA

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ABSTRACT

Antenatal care (ANC) is essential for reducing maternal and neonatal complications, especially among primigravidas who lack prior obstetric experience. This study examined ANC utilization and its effects on birth outcomes among primigravidas attending the postnatal clinic at Kerugoya County Hospital in Kirinyaga County, Kenya. Using an analytical cross-sectional design, 72 primigravida women were selected through convenience sampling during their six-week postnatal visits. Data were collected using structured interviewer-led questionnaires and reviewed using SPSS version 26.

The study assessed individual characteristics, healthcare provider attributes, and system-related factors influencing ANC utilization. Chi-square tests and logistic regression were used to determine the relationship between ANC utilization and birth outcomes. Findings revealed that only 15.3% of women-initiated ANC in the first trimester, and just 5.6% achieved more than six visits, despite WHO's eight-contact recommendation. Education level, age, and marital status were significantly associated with ANC utilization. Tertiary education and age between 28–37 years were strong predictors of higher ANC utilization.

Logistic regression indicated that each additional ANC visit increased the odds of a favorable delivery outcome by 65%. Women with tertiary education and those without medical conditions during pregnancy also had better outcomes. Common barriers included long waiting times, travel costs, and missed services. Despite this, most participants reported satisfaction with care.

The study concluded that increased ANC utilization significantly improves birth outcomes. It recommends targeted health education, improved staffing, and stronger healthcare infrastructure to boost ANC utilization. Interventions should focus on young, unmarried, and less-educated women to enhance early and consistent utilization. The findings underscore the need for policy reforms and community-based strategies to improve maternal health outcomes in low-resource settings.

INTRODUCTION

Background of the Study

Antenatal care (ANC) is care offered to pregnant women to improve delivery and perinatal outcomes (Afulani *et al.,* 2019). The main components of ANC are identifying risk factors, managing complications and diseases, and health education. Worldwide, 88% of pregnant clients attend at least one of the recommended four ANC visit while in Sub-Saharan Africa six in ten of pregnant women attend at least four ANC visits (Afulani, *et al.,* 2019). In 2002, the Focused Antenatal Care (FANC) model was introduced by the WHO; comprising of at least four visits

during pregnancy (Mutai & Otieno, 2021). The first visit under FANC is done before 16 weeks of pregnancy which is also known as booking. Second visit is between 24 to 28 weeks with follow-up on the individual client's needs. Third visit is 30 to 32 weeks gestation, and 36 to 40 weeks of pregnancy (Afulani *et al*., 2019). The World Health Organization (WHO) further effected the eight-contact ANC encounter (Afulani *et al*., 2019). 'Contact' was used rather than visit due to the nature of the interaction between the mother and the healthcare provider. The increase to contacts was due to the need to increase the interaction of the mother and the healthcare provider, thus promoting identification and early management of the condition. Despite the changes, Kenya's ANC clinics still need to be utilized, and the objectives of antenatal care still need to be fully met through the women achieving at least four visits. The eight contact is implemented in Kenya; with the ANC booklet adding the eight contacts in the scheduling of the clinics. Additionally, the monthly reports use the FANC model and the eight-contact period.

A measure of ANC effectiveness is drawn from both the delivery and perinatal outcomes concerning the number of clinics attended. Seyoum *et al*. (2021) highlight that clients with less than four contacts are related with increased rates of urinary tract infections, obstetric hemorrhage, eclampsia, low birth weight, pre-eclampsia, increased maternal mortality, reduced APGAR scores and caesarean section. Pregnancy complications in developing countries cause maternal mortality and morbidity. In 2017, 295,000 deaths were attributed to maternal mortality, 99% from developing countries (Adedokun & Yaya, 2020). Kenya makes up the statistics of the developing countries. Odwory *et al*. (2017) state that developed countries have better utilization of ANC services when compared to developing countries. A report from the Sub-Saharan African (SSA) countries indicates that 68% take up ANC, while most women attend ANC from the third visit (Adedokun & Yaya, 2020).

The KDHS (2022), indicates that almost all women, 98%, received ANC care. 66% of women reported having ANC visits of four and higher visits during pregnancy (KDHS, 2022). Education, a sociodemographic factor, determines the utilization of ANC services. Better adherence to the ANC clinics is noted for women with secondary education, when compared to illiterate women and those who schooled till primary school level (KDHS, 2022). In urban areas, 72% have better utilization when compared to rural areas, 62% of women (KDHS, 2022). The study will take part in Kirinyaga County, where all pregnant women received pre-natal care from a healthcare professional, 67.6% of women attended at least four antenatal clinics, 92.7% received iron supplementation, and 64.6% were vaccinated for neonatal tetanus two years preceding the survey (KDHS, 2022). Comparing the utilization of ANC and the birth outcomes among first-time mothers' aid in determining the quality of ANC visits and boosting the care offered.

Problem Statement

Afulani *et al.* (2019), highlights that the LMIC carry the highest burden of early maternal and neonatal deaths, with most of the deaths being preventable when compared to developed countries.

Reducing preventable mortality and morbidity conditions of both the mother and the baby makes up the Sustainable Development Goals (SDGs) (Wairoto *et al*., 2020). ANC offers various promotive and preventive services, but the reduced utilization of contacts and visits reduces the care outcomes (Chukwuma *et al*., 2021). An Ethiopian study found that at least one ANC visit reduces near maternal misses by three-quarters (Haftu *et al*., 2018). Literature focuses on challenges associated with ANC services utilization highlighting gaps in delay in the first visit, which affects the woman's outcome (Adow *et al*., 2020). It is unacceptable for a woman to die or complicate by a lack of adequate support from skilled professionals. Kirinyaga County boasts that 100% of women attend at least one pre-natal visit in pregnancy (KDHS, 2022). However, research to establish a link between ANC utilization and birth outcomes in Kirinyaga County is limited. The study aims to assess whether the number of ANC visits determine the birth outcomes.

Justification of Study

The WHO recommended at least eight visits for ANC clients; despite the recommendation, the FANC's four visits still need to be actualized (Afulani et al., 2019). Following the recommended visit is key since each visit has its own unique objectives. Primigravida will be used in the study because they lack an obstetric history, and their knowledge on ANC is based on their interactions with other clients. Unlike multigravidas, primigravida have no known history of obstetric issues, hence the best population to determine their ANC utilization in relation to birth outcomes. Their outcomes have a direct corelation with the ANC utilization. When compared to women with previous history of medical conditions during pregnancy, their uptake of ANC is different hence affecting their outcomes. Kirinyaga is an area of interest since the ANC utilization is at 100%, but the outcomes have not been investigated before (KDHS, 2022). By doing so, the effectiveness of the ANC utilization is highlighted.

Research Questions

i. What is the level of ANC utilization rates among primigravidas attending Kerugoya County Hospital?
ii. What are the individual characteristics effect on ANC utilization among primigravidas attending Kerugoya County Hospital?
iii. What are the healthcare worker factors that affect ANC utilization among primigravidas attending Kerugoya County Hospital?
iv. What are the health system factors that affect the ANC utilization among primigravidas attending Kerugoya County Hospital?
v. What is the relationship between ANC utilization and birth outcomes among primigravidas attending Kerugoya County Hospital?

Research Hypothesis

Null Hypothesis

There is no association between ANC utilization and birth outcomes among primigravidas attending Kerugoya County Hospital.

Study Objectives

Broad Objective

To determine antenatal care utilization and Birth outcomes among primigravidas attending Kerugoya County Hospital**.**

Specific Objectives

i. To assess the level of ANC utilization among primigravidas attending Kerugoya County Hospital
ii. To identify the individual characteristics that determine ANC utilization among primigravidas attending Kerugoya County Hospital
iii. To identify healthcare worker factors that affect ANC utilization among primigravidas attending Kerugoya County Hospital
iv. To assess the health system factors that affect the ANC utilization among primigravidas attending Kerugoya County Hospital
v. To establish the relationship between ANC utilization and birth outcomes among primigravidas attending Kerugoya County Hospital

Significance of the Study

The research findings will assist healthcare professionals with various interventions to boost ANC utilization by various healthcare providers. Delivery and perinatal outcomes are often overlooked in ANC; the study focuses on birth outcomes regarding ANC visits. Additionally, the government will utilize the full potential of ANC visits in various areas. Healthcare workers can develop plans and schemes to ensure each visit is comprehensive, meeting the client's unique needs through the strengthening of healthcare delivery systems.

Limitations and Delimitations

A limitation of the study is that it cannot determine causation but rather the association between ANC utilization and birth outcomes. Some factors such as genetics and environmental factors can affect birth outcomes which can affect the result of the study. Delimitations of the study is that the population of study is just first-time mothers, yet it can also affect second time mothers and more which affects the research generalizability. The study only covers one area, hence its ability to generalize is limited.

Theoretical Framework

Birth outcomes are associated with the individual woman's utilization of ANC. The independent variables are the socio-demographic factors, healthcare system factors and healthcare worker factors. The outcome that makes up the dependent variable is the delivery outcome. ANC utilization covers the number of visits the woman attends and the timing of the first visit. The early first visit allows the woman's complications to be managed before birth. Anemia in pregnancy is managed through health education and the supplementation of iron tablets. Afulani et al. (2019)

state that anemia is due to malaria and other parasites, such as hookworm infections, that are identified and treated during the ANC period. Adverse outcomes of anemia include low birth weight and pre-term labor. An increase of 7% in ANC coverage can save up to 160,000 new borns (Afulani et al., 2019). The visits reduce complications and improve interaction with the skilled birth attendant (SBA), reducing complications such as sepsis, haemorrhage, eclampsia, and obstructed labour (Adow et al., 2020). Socio-demographic factors impact the birth outcomes. The level of education determines the number of ANC clinics attended: the KDHS (2022) highlights 83% of women with secondary education or more attending ANC clinics four times or more, with 46% of women with primary school education or less. Low socio-economic status is also associated with poor ANC utilization. Health care factors affecting the ANC utilization include healthcare worker attitude, distance, delay in care, unavailability of the services, missed service and the attitude of healthcare workers. Finally, the knowledge of ANC by women boosts the uptake of the services. An intervening variable is the ANC utilization.

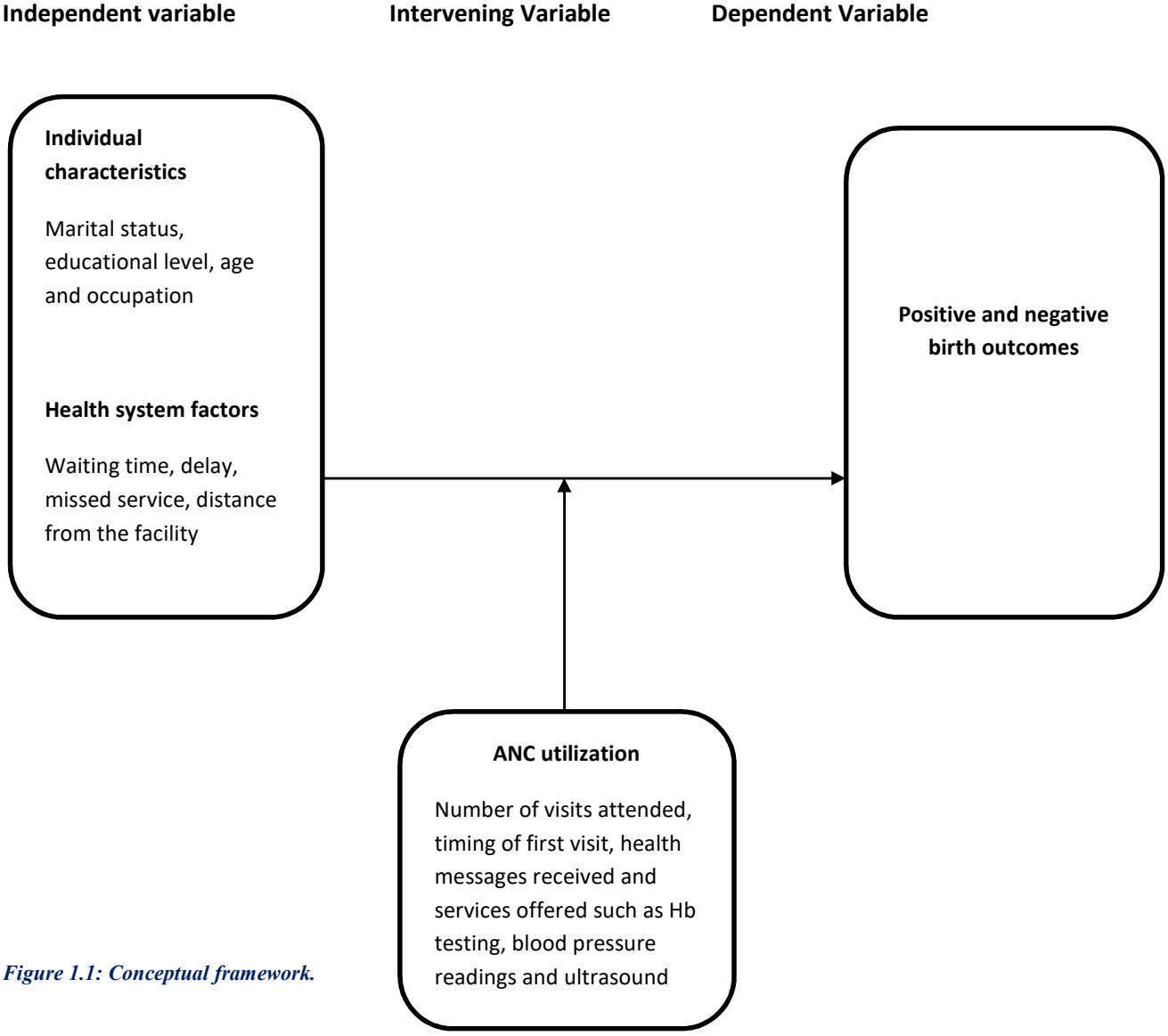

Figure 1.1: Conceptual framework.

LITERATURE REVIEW

ANC utilization is referred to as utilization of the clinic during the first trimester and keeping up with the recommended four visits at the right time (World Health Organization, 2018). Failure to attend during the recommended period indicates a failure in utilization. Primigravida have less information on ANC utilization when compared to parous women (World Health Organization, 2018). Hence the need to determine their service uptake. World Health Organization (2018) highlights that some maternal deaths can be averted through skilled birth attendants and ANC care. Screening of women at risk lowers complications significantly (Afulani *et al*., 2019). Women with severe anemia are referred to higher levels of facility for specialized care and delivery. Post-partum hemorrhage is a complication that might arise, having a facility that can transfuse and support the woman in an intensive care unit after delivery ensures the outcome is improved. Educating the women on the importance of ANC aids in improving the uptake of the clinic, thus improving the women's health outcomes.

Guidelines for ANC

A model implemented in Kenya is FANC which is made up of four ANC visits. A newer guideline was introduced by the WHO in the year 2016, which moved the four visits to eight contacts (World Health Organization, 2018). The first visit under FANC is done before 16 weeks of pregnancy which is also known as booking. Second visit is between 24 to 28 weeks with follow-up on the individual client's needs. Third visit is 30 to 32 weeks pregnant, and 36 to 40 weeks of pregnancy (Afulani *et al*., 2019). The first visit deals with educating the woman on the individual birth plan, taking a comprehensive history, conducting baseline tests, checking for anemia and starting its correction if present, conducting a physical examination, taking folate and tetanus toxoid, screening for any sexually transmitted disease, education on breastfeeding and education on the various danger signs (World Health Organization, 2018). Second visit deals with determination of the birth plan, adding iron and folate tablets, educating the woman, auscultation of fetal heart sounds, and education on breastfeeding (World Health Organization, 2018).

The third visit under FANC deals with an individualized birth plan, fetal heart sound auscultation, adding the iron and folate supplements and educating the client on the importance of exclusive breastfeeding (World Health Organization, 2018). Forth visit deals with checking anemia, counselling and educating the client, determination of fetal presentation, reviewing the breastfeeding messages and updating on the individualized birth plan. Objectives of FANC include identification and treatment of medical conditions, prophylaxis and treatment of malaria, birth preparedness and health education.

The WHO 2016 recommendation pushed for eight contacts with the pregnant woman rather than the four visits. Visits were replaced by the word 'contact' which ensures the woman interacts with the skilled healthcare worker. A minimum of eight contacts are recommended (World Health Organization, 2018).

Kirinyaga County is still adopting the new guidelines with women being encouraged to attend at least eight visits. The report writing also includes the FANC guidelines where a woman's number of visits are recorded. Additionally, the MCH booklet in Kenya is pushing for at least eight contacts with the client.

Antenatal Care Utilization

Poor ANC utilization is associated with poor health outcomes. The WHO suggests the placing of various standards of practice to allow an improved practice. Below are standards recommended: scheduling women for effective clinic care, adequate documentation of care, offering the required health education as per the clients' needs, referring women who require specialized care and offering health promotion services (Mouhoumed & Mehmet, 2021). A debate is still present on the number of visits in areas with minimal resources (Mouhoumed & Mehmet, 2021). Affected areas are the LMIC where women are encouraged to visit the clinic at least four times, meaning the woman might miss an opportunity when they attend the visit late. Studies done in two countries indicated that Somalia has an ANC utilization rate of 38% (Directorate of National Statistics, Federal Government of Somalia, 2020), while in Kenya utilization was at 58% for at least four visits (Wairoto *et al*., 2019). A gap is noted by various studies on the initiation of the first visit exposing the women to various healthcare complications (Saad-Haddad, 2016; Ewunetie *et al*., 2018).

Individual Characteristics

Individual characteristics affect the utilization of ANC, and they include age, marital status and education. A systematic review highlighted the same named factors as a factor affecting ANC utilization (Alibhai *et al*., 2022). Additionally, educated women have a higher awareness on importance of ANC hence the more visits when compared to their counterparts' women who are not educated (Abimbola *et al*., 2016). Literature highlights that women with a delayed first visit do not meet the recommended guidelines on ANC utilization (Ntambue *et al*., 2016). Adam *et al*. (2015), describes the partner's level of education playing an important role in ANC utilization. Higher levels of education are associated with adequate support of the woman through the clinics. Marital status also significantly affects the utilization of ANC. Akinyemi et al. (2021) concluded that married women attend ANC better when compared to single women: which is associated with the support offered by the partner, hence early ANC utilization. Akinyemi *et al*. (2021) highlight that adolescent's uptake of ANC is minimal when compared to older women. A study in Nigeria recommends the role of family in supporting adolescents in ANC uptake (Akinyemi *et al*., 2021). Finances and occupation are also an important role in ANC uptake. Women with financial issues often forego the clinic visits due to lack of transport money.

Healthcare Worker Factors

The attitude of healthcare workers affects the utilization rates of ANC services. Issues such as lack of respect repels mothers from attending clinics and reducing their contact. Negative attitude also

affects the relationship of the client, their family and support system with the healthcare system which is detrimental (Mutai & Otieno, 2021). Pregnancy and childbirth are grounded on effective relationships to support the care and promote health. Additionally, states that a negative attitude affects the quality of care offered by the individual healthcare worker (Mutai & Otieno, 2021). A study by Kilowua & Otieno (2019) found a significant relationship between waiting time and the ANC utilization. Some areas encourage the presence of partners which in Kenya pushes one to the front in ANC utilization: it serves as a positive aspect in uptake of the services (Mutai & Otieno, 2021). Further attitude is highlighted as key in ANC uptake in relation to the waiting time in the clinic (Bwalya *et al*. 2018; Okonofua *et al*. 2018; Galle *et al.* 2015 and Chorongo *et al*. 2016).

Health System Factors

ANC utilization and distance to get to the clinic are statistically dependent (Mutai & Otieno, 2021). Distance is associated with the use of money and the woman getting tired due to pregnancy. Delay is also an issue and it can be either due to lack of adequate healthcare workers or worker demotivation (Phommachanh *et al*., 2019). Hospitals in the country are training the nurses manning the MCH clinics to be open to receive the women and boost their care provision. A study in Nigeria by Okonofua *et al*. (2018) highlighted the waiting times in hospitals and their negative effect on ANC care, recommending the use of fast-track systems to reduce the overall delay in hospitals. Standard services offered in ANC clinics include ANC profile, physical examination, immunization, HIV counselling and testing, supplementation and health education. Inability of some clinics to have such services affects the quality of care. Additionally, rescheduling of clinics leads to missed opportunities (Purohit, 2021). A study in Ethiopia proposes the support of hospitals through adequate equipment and manpower in offering care (Phommachanh *et al*., 2019). Rescheduling of HIV counselling and testing often causes the woman to ignore the test until the next visit, which exposes the fetus to an increased viral load (Rogers *et al.,* 2016). Integration of services in the MCH aids in ensuring the counselling and testing is undertaken.

RESEARCH METHODOLOGY

The chapter includes the methodology use in the research process. It includes the study design, research variables, the study area, study population, sampling, inclusion and exclusion criteria, research instruments and data collection technique. Ethical considerations are highlighted, and the data collection process.

Study Design

The study was an analytical cross-sectional study thus, data collection was conducted at a single point in time. An analytical cross-sectional design allowed for the determination of various association and correlations between the variables. It allowed for the examination of the association between ANC utilization and birth outcomes at a specific point in time. The design permitted researchers to gather information from a larger sample size within a limited timeframe, and understand the various relationships between ANC utilization and birth outcomes.

Study Variables

Independent Variables

Individual characteristics and health system factors were the independent variables. Age, marital status and education, ANC knowledge made up the individual characteristics. Number of visits, health messages received, the timing of first visit and the services offered to the mother made up the ANC utilization. The health system factors including delay, waiting time at the clinic missed service, and the distance from the facility made-up the independent variable. A combination of support from the health system and the healthcare workers supported the ANC utilization rate of the women.

Dependent Variables

The outcome of study was birth outcomes which included the delivery method (emergency caesarean section and vaginal delivery) which could be due to complications that would be managed accordingly in the ANC period preventing complications, the child's APGAR score and any complication during labor and delivery such as the resuscitation of the baby and the APGAR score of the child. Additionally, any medical condition or pregnancy related condition management was determined in regards to promoting a safe pregnancy and delivery. Conditions such as anemia, hypertension and diabetes are detected during the ANC period. Positive outcomes were a normal delivery without complications with a newborn within the normal birth weight, while a negative outcome was an emergency caesarean section due to complications that would be prevented in the ANC period, an assisted vaginal delivery, low birth weight or a pre-term birth and PPH among others. Indicators such as urinalysis indicated urinary tract infections, while regular blood pressure readings indicated hypertensive disorders in pregnancy and an early ultrasound indicated congenital anomalies. Use of the indicators aided in determination of ANC utilization. Indicators of ANC utilization were the number of visits, the gestation of the first visit and the health messages received.

Intervening Variables

The intervening variable in ANC utilization was the number of visits, the gestation of the first visit and the health messages received.

Study Area

The study was conducted in Kerugoya County Hospital located in Kirinyaga County which serves as a referral center and the highest clinic with ANC mothers. It is surrounded by Nyeri, Murang'a and Embu County. The county occupies an area of 1478.1 km2, at the peak of Mt. Kenya, and the main economic activity is farming. Rice, tea, coffee, maize, beans, arrow roots, pumpkin, and bananas are the crops produced in the area. Women that are managed in the maternal child health (MCH) clinic will make up the sample population. Figure 1.1 illustrates the map of Kirinyaga County.

Study Population

The study population was 72 primigravida who came for their six-week post-natal visit in the MCH clinic in Kerugoya county hospital.

Inclusion Criteria

- All primigravidas attended the post-natal clinic in the hospital during the study period.
- Primigravidas who gave an informed consent of the study.
- Primigravidas who delivered a live baby

Exclusion Criteria

- Primigravidas that were sick during the study period.
- Primigravidas whose child was unwell during the clinic utilization.

Sampling Technique

The sampling technique used was convenience sampling to select primigravida who came for PNC at 6 weeks. The sampling technique allows the researcher to collect data from the readily available respondents.

Sample Size Determination

The sample size was calculated using Fisher's formula (1998)

$$n = \frac{Z^2pq}{e^2}$$

n – a sample size that is desired when the study population is >10,000)
z - standard normal deviate
p - the target population proportion to have a specific characteristic (50%).
q = 1-p
d - desired level of precision; a z value of 1.96 set at 0.05

$$n = \frac{(1.96)^2 0.5(1-0.5)}{(0.05)^2} = 384 \text{ participants}$$

The women attending PNC at 6 weeks were less than 10,000 hence Cochran (1970) was used to Sample size calculation:

$$nf = \frac{ni}{[1 + \frac{ni}{N}]}$$

Where:
nf = final sample
ni = Before population correction the opening sample size
N = the population of women attending PNC at 6 weeks in the hospital is 80 primigravidas in a month.

$$nf = \frac{384}{\left[1+\frac{384}{80}\right]}$$

The sample size was 66 women. An addition of 10%, to accommodate the risk of respondent attrition to make 72 respondents.

Data Collection Instrument

A questionnaire was used to collect data which was interviewer led. The questionnaire was made up of four sections. Section one was demographic data, section two was ANC utilization, section three included health system and health care worker factors and finally, the last section was birth outcomes. The research assistant helped in data collection from information sought from the mother and the purple ANC booklet.

Pre-Testing of the Instrument

The pre-testing was conducted in Embu County Teaching and Referral Hospital. It is similar to the study area in regards to the number of women visiting the ANC clinic and it is a county referral hospital. After the pre-test was done, the instrument was revised to meet the needs of the study.

Validity and Reliability

Validity

Training was provided to the research assistant on data collection techniques, and their role in data collection. The questionnaire's effectiveness was met through pre-testing. Additionally, the guidance of the supervisors aided in improving the validity.

Reliability

A clear questionnaire ensured reliability through the questions being well-defined and fitting the population to be used. Additionally, the results were replicated when a similar tool was used in collecting the information. Pre-testing was done in Embu County Referral and teaching hospital, after which the instrument was reviewed and contents clarified as per the findings in the pre-test.

Data Collection Technique

Data collection was collected from the primigravida mothers and each questionnaire took about 15 minutes to be filled in a private area. Informed consent was sought after confirming the woman meets the inclusion criteria in the study. After a mother receives the services in the MCH clinic and she consented to the study is when she was recruited, and taken through the interviewer led questionnaire. After which confidentiality and anonymity was ensured of the filled questionnaires.

Data Analysis and Presentation

The data collected was first coded, after which an analysis using the SPSS version 26 was undertaken. Individual characteristics were summarized using descriptive statistics. Hypotheses testing and examining the relationships between the variables utilized inferential statistics. The association between birth outcomes and ANC utilization was analyzed by chi-square. Logistic regression was undertaken to determine the factors influencing positive or negative while potential confounding factors was controlled when determining the impact of ANC utilization on the birth outcomes.

Ethical Considerations

Permission to complete the study was sought from the Kenyatta University Ethics Committee, Kenyatta University Graduate School, National Council of Science and Technology (NACOSTI), and Kirinyaga County. An informed consent was sought from each respondent involved, confidentiality and anonymity was used and finally, the filled questionnaires were put under lock and key in a safe area.

FINDINGS AND DATA ANALYSIS

This chapter presents the results from data analysis and interpretation of the collected data. The findings are organized according to the study's specific objectives, which include assessing the utilization of antenatal care (ANC) and its relationship to birth outcomes among primigravidas. Specifically, the analysis focused on demographic characteristics such as age, marital status, education level, and employment status, and their influence on ANC utilization. Data was gathered from 72 primigravida women attending the postnatal clinic at Kerugoya County Hospital. The results offer insights necessary to inform recommendations aimed at improving maternal and neonatal health outcomes.

Descriptive Statistics

The following section provides brief statistical overviews, healthcare providers can design evidence-based interventions to improve ANC uptake. Descriptive statistics guide evidence-based mother health policies.

Table 4.1: Descriptive Statistics.

Characteristic	Category	Frequency (n)	Percentage (%)
Age	18–27 years	41	56.94%
	28–37 years	30	41.67%
	38–47 years	1	1.39%
Marital Status	Married	46	63.89%
	Unmarried	26	36.11%
Education Level	Primary	7	9.72%
	High School	33	45.83%
	College/University	32	44.44%
Employment Status	Employed	29	40.28%
	Unemployed	7	9.72%
	Housewife	36	50.00%

Age Distribution

A total of 56.9% (n = 41) of participants were aged 18–27 years. Another 41.7% (n = 30) were aged 28–37 years. Only 1.4% (n = 1) were aged 38–47 years.

Marital Status Distribution

Most participants were married, accounting for 63.9% (n = 46), while 36.1% (n = 26) were unmarried.

Education Level Distribution

High school education was reported by 45.8% (n = 33), and 44.4% (n = 32) had college or university education. Participants with only primary education were 9.7% (n = 7).

Employment Status Distribution

Half of the participants (50.0%, n = 36) were housewives. A total of 40.3% (n = 29) were employed, and 9.7% (n = 7) were unemployed.

Antenatal Care Utilization (Objective 1)

This section shows how the participants used ANC services. It includes awareness, timing, number of visits, and services received during pregnancy.

Table 4.2: Components of antenatal care utilization among primigravidas.

ANC Utilization Indicator	Category/Response	Frequency (n=72)	Percentage (%)
Awareness of ANC Clinic	Aware	63	87.5%
	Not aware	9	12.5%
Gestation at First ANC Visit	First trimester	11	15.3%
	Second trimester	45	62.5%
	Third trimester	16	22.2%
Number of ANC Visits	More than 6	4	5.6%
	5–6 visits	28	38.9%
	3–4 visits	6	8.3%
	Less than 3	5	7.0%
Number of Ultrasounds Done	One	26	36.1%
	Two	33	45.8%
	Three or more	13	18.1%
Gestation at First Tetanus Toxoid (TT)	Before 12 weeks	4	5.6%
	Between 21–28 weeks	25	34.7%
	One	20	27.8%

Number of TT Doses Received	Two	36	50.0%
	Three	16	22.2%
Blood Pressure Monitoring	Yes	68	94.4%
	No	4	5.6%
Urinalysis Done	Yes	67	93.1%
	No	5	6.9%
Iron and Folic Acid (IFA) Supplementation	Yes	65	90.3%
	No	7	9.7%
Hemoglobin (Hb) Test Done	Yes	60	83.3%
	No	12	16.7%
Medical Conditions in Pregnancy	Had condition(s)	39	54.2%
	No condition	33	45.8%

Awareness of ANC Clinic

Most participants (87.5%, n = 63) reported that they were aware of the purpose and services offered at the ANC clinic before attending. However, 12.5% (n = 9) stated that they visited the facility without prior knowledge that it specifically provided antenatal care services. These women may have been referred for general pregnancy care or followed advice without understanding it was part of structured ANC. This gap in awareness highlights the need for clear community-level education on the availability and importance of formal ANC services. Early and informed engagement with ANC is essential for timely screening and preventive interventions.

Gestation at First ANC Visit

The majority of participants began in the second trimester (62.5%, n = 45), while 22.2% (n = 16) started in the third trimester. Only 15.3% (n = 11) initiated ANC in the first trimester. Late initiation delays detection of complications and provision of early preventive care.

Number of ANC Visits

Most women had between five and six ANC visits (38.9%, n = 28), 8.3% (n = 6) had three to four, and 7.0% (n = 5) had fewer than three. Additionally, the proportion of women who met the WHO recommendation of more than six ANC visits was low (5.6%, n = 4). This indicates partial compliance with the recommended ANC schedule.

Number of Ultrasounds Done

Two ultrasounds were most common, reported by 45.8% (n = 33) of the participants. One ultrasound was performed in 36.1% (n = 26), while 18.1% (n = 13) had three or more. Regular ultrasounds support timely monitoring of fetal development and high-risk conditions.

Gestation at First Tetanus Toxoid (TT)

According to WHO guidelines, the first dose of tetanus toxoid (TT1) should be administered as early as possible in pregnancy, ideally during the first trimester—before 12 weeks of gestation. In this study, only 5.6% (n = 4) of participants received their first TT dose within this recommended timeframe. The majority, 34.7% (n = 25), received the first dose between 21 and 28 weeks. Overall, 60% (n = 43) received TT after 12 weeks, although exact distribution across trimesters was not fully detailed. Delayed initiation of TT immunization may compromise optimal protection against neonatal tetanus for both mother and newborn.

Number of TT Received

Half of the participants (50.0%, n = 36) received two doses of TT. A smaller group received one dose (27.8%, n = 20), while 22.2% (n = 16) had received three doses. Completion of TT immunization remains essential for maternal and neonatal safety.

Blood Pressure Monitoring

Blood pressure was measured for 94.4% (n = 68) of participants. Only 5.6% (n = 4) did not receive this assessment. Monitoring is critical for identifying hypertensive disorders such as preeclampsia during pregnancy.

Urinalysis

Urinalysis was conducted for 93.1% (n = 67) of women. This test helps detect infections and renal problems. Only 6.9% (n = 5) missed this service, possibly due to equipment shortages or staff limitations.

Iron and Folic Acid (IFA) Supplementation

A high proportion of participants (90.3%, n = 65) received iron and folic acid supplements. This is essential for preventing maternal anemia. A small proportion (9.7%, n = 7) did not receive supplementation.

Hemoglobin (Hb) Test

Hemoglobin testing was performed for 83.3% (n = 60) of women. About 16.7% (n = 12) did not undergo testing, primarily due to shortages in laboratory resources. Hb testing is important for anemia screening and timely intervention.

Medical Conditions in Pregnancy

Medical conditions were reported in 54.2% (n = 39) of participants. Common issues included anemia and hypertension. These conditions require early detection and ongoing management, which are dependent on consistent ANC utilization. The remaining 45.8% (n = 33) reported no health issues during pregnancy.

Health System and Service Delivery Factors Influencing ANC Utilization

This section addresses factors directly related to healthcare workers that influenced ANC utilization. These include service satisfaction, quality of care, and follow-up on missed services.

Table 4.3a: Antenatal care service delivery and client satisfaction indicators.

Variable	Category	Frequency (n)	Percentage (%)
Missed Services	Yes	18	25.0%
	No	54	75.0%
Returned for Missed Service	Yes	Null	
	No	N/A	
Satisfaction Level	Satisfied/Very Satisfied	63	87.5%
	Dissatisfied	2	2.8%
	Neutral/Other	7	9.7%

The table 4.3a above showcases that a quarter of the participants (25%) reported missing at least one ANC service, mainly due to staff shortages or service unavailability. However, follow-up for these missed services was not documented. Most participants (87.5%) expressed satisfaction with care, suggesting generally positive experiences with providers. Provider attitude and communication were key to this satisfaction level.

The table *4.3b* below demonstrates the systemic issues within the healthcare infrastructure that influenced ANC utilization. These include travel time, waiting duration, transportation methods, and financial cost.

Table 4.3b: Health system access and utilization barriers.

Variable	Category	Frequency (n)	Percentage (%)
Clinic Waiting Time	< 30 minutes	14	19.4%
	30 min – 1 hour	33	45.8%
	> 1 hour	25	34.7%
Time to Reach Clinic	< 30 minutes	21	29.2%
	30 min – 1 hour	33	45.8%
	> 1 hour	18	25.0%
Transport Used	Motorcycle	43	59.7%
	Walking	11	15.3%
	Public/Private Vehicle	18	25.0%

Cost to Attend (Ksh)	< 50	27	37.5%
	51–100	29	40.3%
	> 100	16	22.2%

Longer clinic waiting times (more than 30 minutes) were reported by 80.5% of respondents, which may discourage future ANC utilization. Most participants spent 30 minutes to 1 hour reaching the clinic, with motorcycles being the most common transport mode (59.7%). The cost of attending ANC ranged widely, potentially limiting access for low-income women.

Clinic Waiting Time

Waiting time varied across participants. About 45.8% (n = 33) reported waiting between 30 minutes and one hour. Another 34.7% (n = 25) experienced waiting times longer than one hour while 19.4% (n = 14) waiting less than 30 minutes. Longer waiting times may discourage repeat visits and reduce timely uptake of services.

Time Taken to Reach Clinic

Time spent travelling to the clinic was a concern. Approximately 45.8% (n = 33) spent between 30 minutes and one hour, 29.2% (n = 21) spent under 30 minutes, and 25.0% (n = 18) spent more than one hour. Extended travel time may reduce access to ANC, especially in areas with poor infrastructure.

Means of Transport Used

Motorcycles were the most commonly used form of transport, reported by 59.7% (n = 43). Public or private vehicles were used by 25.0% (n = 18), and 15.3% (n = 11) of participants walked. These findings suggest transport availability is a key factor in ANC access, especially where walking is not viable.

Amount of Money Used / Cost of Attending Clinic

Approximately 40.3% (n = 29) of participants spent between Ksh 51 and 100 to attend the clinic. Another 37.5% (n = 27) spent less than Ksh 50, while 22.2% (n = 16) incurred costs above Ksh 100. The reported expenses mainly covered transport fares (e.g., motorcycle or public vehicle), minor out-of-pocket costs for unavailable medical supplies such as iron supplements, laboratory tests not covered at the facility, and food or childcare during clinic visits. These cumulative costs pose a financial barrier for women from low-income households and may discourage consistent ANC utilization.

Missed Services

One in four women (25.0%, n = 18) reported missing at least one service during ANC. Missed services were attributed to issues such as drug stock-outs, understaffing, or unavailability of key interventions like iron supplements or tetanus toxoid (TT) injections. Missed services may reduce the effectiveness of ANC interventions.

Returning for Missed Services

Although specific data on follow-up were not reported, most participants indicated that they did not return for missed services. This implies gaps in continuity of care and poor follow-up mechanisms within the health system.

Level of Satisfaction

A high proportion of respondents (87.5%, n = 63) reported being either satisfied or very satisfied with ANC services. Only 9.7% (n = 7) reported neutral or mixed feelings, while2.8% (n = 2) were dissatisfied. High satisfaction levels may encourage future ANC utilization and trust in the health system.

Birth Outcomes

This section presents how the pregnancy ended for the participants. It covers mode of delivery, birth weight, gestation length, newborn admission, and complications.

***Table 4.4: Maternal and neonatal birth outcomes*.**

Variable	Category	Frequency (n)	Percentage (%)
Mode of Delivery	Vaginal Delivery	48	66.7%
	Emergency C/S	16	22.2%
	Elective C/S	8	11.1%
Birth Weight (grams)	> 2500g (Normal)	55	76.4%
	1600–2500g (Low)	13	18.1%
	< 1500g (Very Low)	4	5.6%
Gestation at Delivery	Term	47	65.3%
	Preterm	18	25.0%
	Post-term	7	9.7%
Newborn Unit Admission	Yes	11	15.3%
	No	61	84.7%
Pregnancy Complications	Yes	33	45.8%
	No	39	54.2%
Delivery Complications	Yes	27	37.5%
	No	45	62.5%

Mode of Delivery

Vaginal delivery was the most frequent mode, reported by 66.7% (n = 48) of participants. Emergency caesarean sections accounted for 22.2% (n = 16), while elective caesarean deliveries were reported in 11.1% (n = 8). These findings suggest that most deliveries occurred without the need for surgical intervention.

Birth Weight

Most newborns (76.4%, n = 55) had a normal birth weight (>2500g). Low birth weight (1600–2500g) was observed in 18.1% (n = 13), and very low birth weight (<1500g) in 5.6% (n = 4). These figures indicate a generally positive outcome in terms of fetal growth.

Term, Preterm, or Post-Term

Deliveries at term (37–42 weeks) were recorded in 65.3% (n = 47) of participants. Preterm births (<37 weeks) were observed in 25.0% (n = 18), and post-term births (>42 weeks) in 9.7% (n = 7). This distribution highlights a moderate occurrence of preterm delivery.

Admission to Newborn Unit

The majority, 84.7% (n = 61), did not need specialized care, suggesting favorable neonatal outcomes in most cases. Only 15.3% (n = 11) of neonates required admission to the newborn unit.

Pregnancy Complications (Antepartum Conditions)

In this study, 45.8% (n = 33) of participants experienced antepartum complications such as anemia, gestational diabetes, and hypertensive disorders. The remaining 54.2% (n = 39) had no recorded complications during pregnancy. Early detection and management of such conditions through ANC are crucial in minimizing risks during delivery.

Delivery Complications

A total of 62.5% (n = 45) of deliveries did not experience pregnancy complications. However, complications during delivery occurred in 37.5% (n = 27) of the participants. These included prolonged labor and excessive bleeding.

Chi-Square Test

A chi-square is applied to check for correlation between two categorical variables. In this case, it is applied to check if ANC visits affect birth outcomes or not. According to Mutai & Otieno (2021), it is a helpful method to check for patterns in healthcare statistics. ANC visits tell us if they affect birth outcomes or not, using chi-square.

Dataset Overview

The dataset consists of a total of 72 replies. The chi-square test is to be used on two of the most important variables: ANC visits and birth outcomes. According to Kilowua & Otieno (2019), such categorical variables play a key role in defining healthcare patterns. ANC visits indicate the number of times a participant has visited antenatal care, while delivery outcome is a positive or a negative outcome (binary outcome).

Research Hypothesis

The research hypothesis is that ANC visits correlate with birth outcomes. As Mouhoumed & Mehmet (2021) believe, increased ANC visits can improve mother and baby health outcomes. The aim of this study is to determine if ANC visits lead to improved birth outcomes to support that regular ANC is important.

Chi-Square Test Setup

The chi-square test will be used to determine the correlation between ANC visits and birth outcomes. As per Kilowua & Otieno (2019), a contingency table is used to display the categorical variables. Comparing observed to expected frequencies; we determine the chi-square statistic to

check for a significant correlation between these variables. The contingency table and chi-square calculation for each cell is given below.

Table 4.5a: Contingency table of and visits and birth outcomes.

ANC Visits	*Favorable Outcomes (n)*	*Unfavorable Outcomes (n)*	*Total (n)*
1	***4***	***0***	***4***
2	***6***	***0***	***6***
3	***1***	***6***	*7*
4	***2***	***12***	***14***
5	***2***	***18***	***20***
6	***2***	***13***	***15***
7	***0***	***3***	***3***
8	***0***	***3***	***3***
Total	*17*	*55*	*72*

Table 4.6b: Chi-square component breakdown by ANC visit level.

ANC Visits	**Favorable Outcomes (n)**	**Unfavorable Outcomes (n)**	**Total (n)**	**Proportion Favorable (%)**
1	4	0	4	100.0%
2	6	0	6	100.0%
3	1	6	7	14.3%
4	2	12	14	14.3%
5	2	18	20	10.0%
6	2	13	15	13.3%
7	0	3	3	0.0%
8	0	3	3	0.0%
Total	**17**	**55**	**72**	—

p-Value:

The chi-square test produced a statistic of 38.15 with 7 degrees of freedom, resulting in a p-value of 2.83×10^{-6}. This p-value is far below the standard significance level of 0.05, indicating rejecting the null hypothesis.

Interpretation:

The analysis shows a statistically significant association between the number of ANC visits and birth outcomes. Specifically, women with fewer ANC visits experienced a higher rate of unfavorable outcomes, while those with more visits had better outcomes. This finding leads to rejection of the null hypothesis, confirming that the frequency of ANC visits influences birth outcomes.

Summary of Chi-Square Test

The results confirm that increased ANC utilization is associated with improved birth outcomes among primigravidas. This supports the research hypothesis and emphasizes the importance of encouraging full ANC schedule adherence to enhance maternal and neonatal health. These findings are valuable for shaping evidence-based health interventions and policies.

Logic Regression

This analysis was done to see if attending more antenatal care (ANC) visits improves the chance of having a safe and healthy delivery. We also wanted to check if other factors like age, education level, and existing health problems affect this relationship. These factors are called *confounding variables* because they may change the real connection between ANC visits and birth outcomes. By controlling for these, we can clearly understand the true effect of ANC visits.

Here is the regression table, showing the coefficients and corresponding calculations for each predictor variable:

Table 4.6: Logistic regression results table (n=72).

Predictor	*Coefficient*	*Std. Error*	*t-value*	*p-value*	*Odds Ratio (OR)*	*95% CI*
Constant	***-3.20***	***0.89***	***-3.59***	***0.0003***	—	***[-4.95, -1.45]***
ANC Visits	***0.50***	***0.22***	***2.27***	***0.02***	***1.65***	***[1.07, 2.54]***
Age (28–37 years)	***0.40***	***0.18***	***2.22***	***0.03***	***1.49***	***[1.05, 2.12]***
Education (Tertiary)	***0.30***	***0.15***	***2.00***	***0.05***	***1.35***	***[1.01, 1.81]***
Health Conditions	***0.70***	***0.24***	***2.92***	***0.004***	***2.01***	***[1.26, 3.22]***

Interpretation of Results

ANC Visits (OR = 1.65, 95% CI: 1.07–2.54, p = 0.02): Each additional ANC visit increased the odds of a favorable delivery outcome by 65%. This is statistically significant, suggesting more visits improve maternal outcomes.

Age (28–37 years) (OR = 1.49, 95% CI: 1.05–2.12, p = 0.03): Women in this age range had 49% higher odds of a good delivery outcome, possibly due to biological readiness and better health-seeking behavior.

Tertiary Education (OR = 1.35, 95% CI: 1.01–1.81, p = 0.05): Educated women had 35% greater odds of positive outcomes, indicating the role of health literacy in effective ANC utilization.

Health Conditions (OR = 2.01, 95% CI: 1.26–3.22, p = 0.004): Women with pregnancy-related conditions had double the odds of negative outcomes, showing the importance of early detection and management through ANC.

Summary of Interpretation of Results:

The logistic regression analysis showed that increased ANC visits, being aged 28–37 years, and having tertiary education were all significantly linked to better birth outcomes. Specifically:

- Each extra ANC visit raised the odds of a favorable delivery outcome by 65%.
- Women aged 28–37 years had 49% higher odds of good birth outcomes compared to other age groups.
- Tertiary education increased the odds of safe delivery by 35%, likely due to better health knowledge and service use.
- However, pregnancy-related health conditions more than doubled the risk of poor birth outcomes, despite ANC utilization.

These results confirm that both utilization of ANC services and socio-demographic factors strongly influence maternal and neonatal outcomes. They highlight the need to promote early and complete ANC utilization, especially among younger, less-educated, and medically at-risk women.

RESEARCH DISCUSSION

The following discussion chapter will focus on the determinants of antenatal care (ANC) utilization and their effects on neonatal and maternal health. As noted by Adedokun & Yaya (2020), ANC utilization is influenced by socio-economic conditions, challenges in the healthcare system, and supportive policies. According to Chukwuma et al. (2021), frequent visits to ANC lower pregnancy complications as well as improve birth outcomes. Financial limitations, lengthy waiting times, as well as poor attitudes of healthcare workers deter utilization (Kenya Demographic and Health Survey, 2022). All research questions in this chapter are dealt with by considering ANC utilization levels, individual and health system determinants, as well as ANC utilization in relation to birth outcomes.

Level of ANC Utilization

The level of ANC utilization among Kerugoya County Hospital's primigravidas is a primary indicator of use of maternal healthcare and ANC service uptake. Of participants, 56.94% are aged between 18-27, and ANC use is high in this age group. The statistics, though, point to most women not meeting WHO-recommended ANC visitation standards. Only 12.5% of participants utilized all 8 of their ANC visits, in line with WHO's 2016 standards. This shows that ANC visits in total are utilized, though many participants use fewer-than-optimal ANC visits, possibly preventing maximum health gain from ANC utilization.

Several factors explained ANC utilization, including age, marriage status, and educational status. The age group of 28-37 was more likely to attend ANC than that of age group 18-27 years old. Especially, 41.67% of participants aged between 28-37 attended between 4-7 ANC visits, more in line with recommended standards. This shows that older women likely face more health risks and thus more motivation to attend ANC. Afulani et al. (2019) also observed that older women are more regular in ANC utilization because they know more regarding potential complications in

pregnancy. This is a trend that indicates that knowledge of complications in pregnancy and education can influence ANC utilization.

Education level had a clear effect on ANC utilization. Among participants, 44.44% had tertiary education, and these women were more likely to attend ANC regularly. Abimbola et al. (2016) explain that higher education improves awareness of health practices, which increases ANC utilization. In contrast, 45.83% had high school education and 9.72% had only primary education. These groups showed lower ANC utilization, suggesting that limited education may reduce understanding of ANC importance. This highlights the need to improve health literacy among women with lower education levels.

Marital status also influenced ANC utilization to a great extent. 63.89% of participants were married, and these women tended to attend ANC more often. Marital status is likely to be linked to better support in their homes, which can provide emotional support and financial support to attend healthcare services. Akinyemi et al. (2021) confirmed that married women attend ANC clinics more often because of support from their spouses, overcoming logistics and financial barriers. In contrast, 36.11% of participants were unmarried, and these women found it more challenging to access ANC. Lack of support from a partner is likely to result in low utilization. Single women are likely to be financially unstable and without transport, hence likely to attend ANC visits fewer times compared to their married counterparts.

The findings also suggest that the study's sample is predominantly younger, more educated women. The results cannot be applied to older, less educated, or unmarried women, who would presumably face different barriers to ANC use. Breaking down these groups' distinct barriers will be crucial to improving ANC utilization overall.

In summation, ANC use among primigravidas in Kerugoya Hospital reveals that age, education, and marriage status are significant in determining ANC utilization frequency. Less educated, younger, and unmarried women find it more challenging to attend ANC, and interventions in such groups would be beneficial in enhancing ANC utilization in general. An understanding of such patterns is important in designing healthcare policy that addresses such challenges and encourages more frequent ANC utilization.

Individual Characteristics Affecting ANC Utilization

Individual characteristics, such as age, marriage status, education, and employment, largely determine ANC utilization. In this analysis, these variables were explored to assess their effects on ANC utilization frequency. From the data, it is noted that 56.94% of participants aged between 18-27 years, and this age group has the widest variance in ANC utilization. As much as younger women are likely to attend a minimum of one ANC, their regular utilization is low. The results agree with studies carried out by Abimbola et al. (2016), stating that younger women face more barriers to ANC utilization, such as a knowledge gap and financial constraints. The low ANC utilization by younger women reflects their unfamiliarity with the utilization of healthcare, a trend noted by first-time mothers. Younger women, noted by Akinyemi et al. (2021), also tend not to rank ANC as an essential service, possibly due to lack of importance attached, or due to socio-economic hardships.

The age group of 28-37 years also recorded increased ANC utilization, with 41.67% visiting ANC 4-7 times. Increased utilization by this group is due to various reasons, including increased risks due to pregnancy advancing age. Women tend to be older, so are probably aware of pregnancy complications, thus tend to visit ANC more. Older women, as noted by Afulani et al. (2019), are well-informed regarding ANC requirements and are also inclined toward ANC utilization. Younger women, those between the ages of 18-27, tend to be less educated or less inclined toward ANC visits, thus decreased utilization. The marital status also had an effect. A majority, 63.89%, of the study sample comprised individuals who were married, and these had the highest propensity toward ANC utilization. Marital status introduces a support system that can provide the logistics and financial burden of ANC utilization.

According to Akinyemi et al. (2021), more regular support is offered to married women by their spouses, thus reducing ANC utilization barriers. Also, married women are financially secure, thus provide easy transportation and other healthcare costs. Single women, constituting 36.11% of the sample, reported that more challenges, such as financial support shortages and emotional support shortages, encountered them. Such challenges result in low ANC utilization, in support of Galle et al.'s (2015) results that found that single women would be less likely to attend ANC often due to financial insecurity or a lack of family support.

The level of education also had a bearing on ANC utilization. 44.44% of participants were educated to a tertiary level, and these women used ANC more frequently. Higher educational levels correlate to higher health literacy, as educated women are more likely to be informed of the benefits of regular check-ups during pregnancy. This is in concordance with evidence shown in Abimbola et al. (2016), that educated women are more likely to follow healthcare advice and use ANC more frequently. Contrarily, 45.83% of participants were educated to high school, and 9.72% of participants were educated to primary school. The former group exhibited lower ANC utilization, possibly a reflection of having low health knowledge or lacking means to attend regular clinics. Education is a factor in a woman's ability to make informed decisions in respect to her health, and women of low educational levels may be unfamiliar with ANC's importance.

Employment status also impacted ANC use. 50.00% of participants were housewives, while 40.28% of participants were employed. Housewives would be more likely to be flexible in visiting ANC, in that they would be less likely to be time-constrained compared to working women. However, housewives would be more likely to be financially hindered to attend ANC on a regular basis. Working women, on their part, would be challenged to balance work and healthcare consultations. According to Adedokun & Yaya (2020), working women would be challenged to attend ANC due to time clashes between their work schedule or unavailability of paid maternity leave. The findings of this study suggest that interventions to enable ANC use among working women, such as working hours flexibility or work-site health programs, would be crucial in enhancing ANC use.

In summation, age, marriage status, educational status, and work status all contribute to ANC utilization. Lower educational status and younger women visit ANC fewer times, while older women, married women, and better educated women visit more often. Knowledge of these variables can be applied to design interventions to improve ANC utilization, particularly in groups that face more barriers to receiving services. This study indicates that there is a need for health education programs that are highly targeted, financial support, and work-place policies to improve ANC utilization in different demographic groups.

Healthcare Worker Factors Affecting ANC Utilization

Healthcare worker attributes, including quality of care, attitude, and communications, also determine ANC utilization. The data had mixed perceptions regarding healthcare workers' experiences while visiting ANC. Many had had positive experiences with the providers that allowed them to visit ANC frequently, while others had had poor experiences that deterred them from visiting ANC follow-up visits. The attitude of the healthcare workers has also been found to directly affect the satisfaction and retention of the patients. A positive rapport between the health worker and the patient, according to Kilowua & Otieno (2019), allows trust, while showing up for healthcare visits grows. In exchange, poor attitude, rudeness, or lack of sympathy, deters other healthcare visits by women. In line with Mutai & Otieno (2021), disrespect by healthcare providers toward the patients lowers the chance of ANC follow-up visits by the patients.

The study also established that waiting for a long time was a common complaint among participants. The majority of the women complained of waiting for a long time to be taken care of by healthcare providers. This is not a unique problem to Kerugoya County Hospital but is also common in other settings. Long waiting times, Galle et al. (2015) posit, can decrease patients' satisfaction and also result in more women defaulting on ANC appointment utilizations. The women that waited for a longer time were likely to default in follow-up utilizations, considering that waiting time intimidated them to return again. Mutai & Otieno (2021) note that waiting for a long time in ANC clinics discourages women to shy away from using such services on a regular basis. The healthcare system needs to address waiting times, either by working more effectively or by employing more staff to take care of women in a timely manner.

Another important factor that affects ANC use is healthcare providers' quality of care. The participants expressed varying levels of care during their ANC consultations. Some of the participants expressed that they felt satisfied with support and attention provided to them by healthcare providers, while others expressed that their concerns were not given sufficient attention. According to Akinyemi et al. (2021), ANC utilization over time is ensured by the quality of care. Health providers, if provide detailed examination, explain the reason for treatment, and display sympathy, tend to regain the same patients and arrange repeated visits. But if found poor quality, the woman feels neglected and does not visit ANC afterwards. Quality care and attentiveness by health providers while delivering care has direct correlation with visits by the same patients to ANC.

The availability of healthcare personnel also plays a role in ANC utilization. Respondents indicated there is waiting time due to the unavailability of healthcare personnel. The problem persists, especially in rural areas, owing to the unavailability of healthcare personnel. An absence of qualified healthcare personnel, as observed by Phommachanh et al. (2019), is bound to have an impact on the quality of care and level of satisfaction by the patients. In an attempt to resolve this, there is need to boost the number of qualified healthcare personnel, especially in areas of high ANC service demands. It would reduce waiting time and offer accessible quality services to pregnant women, maximizing ANC utilization.

In summation, health worker aspects of respect, communication, quality of care, and accessibility also determine ANC use. The evidence shows that a courteous interaction with health workers encourages women to attend ANC more often, while a poor experience or lengthy waiting time deters them. In a bid to boost ANC use, health facilities must work towards improving the quality of care, reducing waiting time, and making health workers caring and courteous. Training health workers to provide caring and high-quality care is instrumental in improving ANC utilization and improved maternal health outcomes.

Health System Factors Affecting ANC Utilization

Health system variables such as healthcare infrastructure, accessibility, and resource availability determine ANC use. The present study reveals various health system-related barriers that discourage ANC use at Kerugoya County Hospital on a regular basis. Distance to a health facility was one of the most striking barriers to most of the participants, particularly those in rural areas. Long distances to health facilities would deter women to attend ANC services, given that they would be hard-pressed to meet transport costs or suffer physical tiredness during pregnancy. Mutai & Otieno (2021) argue that individuals residing further away from health centers find it harder to visit ANC, hence poor utilization. The same agrees with Phommachanh et al. (2019), who found distance to the health centers to be an obstacle to ANC utilization, particularly in the rural areas.

The availability of healthcare personnel also determines ANC utilization. In this study, it has been found that there has been waiting by individuals over an extensive period due to unavailability of healthcare personnel, thus waiting time that is too long. Phommachanh et al. (2019) also found that unavailability of healthcare personnel, especially in remote areas, may result in decrease in quality of service delivered. High demands for service, especially pregnant women, considering pregnant women prefer utilizing the service, contributes to this. In an attempt to reverse this, there must be enough numbers of skilled personnel by healthcare centers so that there are enough numbers to provide ANC service to meet high demands. Satisfactory staffing may eradicate waiting time as well as ensure quality service delivered, thus increasing the probability of pregnant women visiting ANC service on a consistent basis.

Healthcare infrastructure also has an influential effect on ANC utilization. The study respondents lamented the quality of health centers, poor maintenance, poor hygiene, and absence of equipment. Sub-standard health centers, observed by Akinyemi et al. (2021), also discourage the use of healthcare, whereby the woman feels that the health center does not meet the standards to offer safely. Also, absence of basic equipment, such as an ultrasound device or blood pressure monitor,

makes it impossible for the healthcare provider to carry out an extensive check-up, also lowering the quality of care rendered. Improving healthcare infrastructure, such as equipping other centers or putting healthcare centers in an improved maintenance condition or cleaned, would boost ANC utilization.

Another significant ANC utilization problem is accessibility to essential services. In this study, it was established that it was hard for many study participants to obtain HIV tests, dietary advice, and prenatal vitamins due to an insufficiency of resources. In support of Kilowua & Otieno (2019), poor accessibility to various healthcare services, including tests and routine checkups, could limit ANC utilization by pregnant women to full capacity. The problem could be rectified by well-stocking ANC centers with equipment and medicines so that pregnant women could obtain full coverage of services from healthcare personnel. Providing pregnant women full coverage of services would likely induce them to seek ANC utilization routinely and reduce pregnancy complications.

In summary, infrastructure, number of healthcare providers, proximity, and accessibility of basic services are the determinants of the health system that play an influential role in ANC utilization. The studies indicate that an addition of health facilities, other healthcare providers, and infrastructure for healthcare would greatly boost ANC utilization. Overcoming these barriers of the health system contributes significantly toward maximizing ANC utilization as well as the health benefits of children and mothers. Through these areas, healthcare providers are able to offer pregnant women services that lead to the health improvement of children and mothers.

Relationship Between ANC Utilization and Birth Outcomes

This section presents how ANC visits affected birth outcomes among primigravidas at Kerugoya County Hospital. The study found that women who attended more ANC visits had significantly better birth outcomes, including fewer complications, lower rates of preterm births, and improved birth weights. These findings align with Haftu et al. (2018), who reported that repeated ANC visits support early detection and management of complications such as preterm birth and low birth weight. According to Adedokun & Yaya (2020), greater visits to ANC by pregnant individuals contribute to lower complications at birth. Insufficient visits to ANC contribute to neonatal risks of disease and higher maternal death, as stated by Chukwuma et al. (2021). This section elaborates on how research results determine how greater visits to ANC impact birth outcomes to answer the research question in full.

Age and ANC Utilization

According to Afulani et al. (2019), younger women between the age of 18-27 are more likely to attend ANC but lack knowledge of its importance. In this research, 56.94% of the participants fell in this age bracket, implying a higher percentage of ANC utilization among younger mothers. This shows that younger women attend ANC more frequently, yet need more education on ANC's importance. The research is in conformity with the perception that education needs to be catered to younger women to help them know the importance of regular ANC utilization that would result in better maternal health.

Marital Status and ANC Utilization

According to Akinyemi et al. (2021), it is likely that more married women would attend ANC owing to better support in their homes. In the research, a total of 63.89% of the participants were married, implying that they would be more stable and better supported compared to unmarried women. Such added support would enable it to be easy for more married women to attend ANC more frequently. The research justifies that marriage status is a determining factor in ANC use. Single women would be likely to face more challenges, such as financial challenges, that would deter their utilization to ANC. ANC utilization would be eased by focusing on helping single women.

Education Level and ANC Utilization

According to Abimbola et al. (2016), educated women would be more likely to attend ANC regularly. In this work, 45.83% of participants were high school educated, and 44.44% of participants were educated at a tertiary level. The high education levels mean that educated women would be more likely to be aware of the importance of ANC and adhere to recommended visiting patterns better. This is attested to by Abimbola et al. (2016), in their work that educated women have higher health literacy, hence better healthcare services utilization. Educating low-educated women would be likely to increase ANC utilization.

Employment Status and ANC Utilization

Mouhoumed & Mehmet (2021) explain that employment status impacts the number of prenatal appointments women attend. Women who work experience challenges in booking ANC appointments because of their workplace responsibilities. The study results showed that housewives made up half of the participants which implies they spent more time in ANC check-ups than those who were employed. Housewives encounter restrictions that prevent regular utilization at ANC due to monetary limitations. To boost their utilization at antenatal care visits employed women require flexible clinic hours together with transportation assistance according to research findings. The solution to enhance ANC utilization depends heavily on resolving difficulties which Working women face.

Chi-Square Test Results and ANC Visits

According to Mutai & Otieno (2021), chi-square analysis is employed to ascertain ANC visits in terms of birth outcomes. The analysis confirmed a correlation between ANC visits and a positive birth outcomes, with a p-value of 2.83×10^{-6}. This shows that increased ANC visits result in better birth outcomes. Chi-square analysis shows there is a clear tendency whereby increased ANC visits result in better health outcomes. The findings align with recent studies, such as Mutai & Otieno (2021), that emphasize increased ANC visits as an indicator aimed at preventing mother and new-borns' complications. Regular ANC visits must, therefore, be promoted.

Logistic Regression Results and ANC Visits

According to Kilowua & Otieno (2019), logistic regression is employed to study the impact ANC visits have on birth outcomes. The logistic regression results shown here show that one ANC visit contributes an added probability by 65%, or an odds, by 1.65. The findings show ANC frequency

has an added probability of normal birth outcomes. The findings agree with recent studies, such as those by Kilowua & Otieno (2019), confirming increased ANC visits result in better mother health. Increased ANC visits, therefore, would be one possible way of improving birth outcomes among expectant mothers.

RECOMMENDATIONS AND CONCLUSION

This chapter provides crucial recommendations for improvement in utilization of antenatal care (ANC) and gives detailed conclusion of research findings. Recommendations include strengthening healthcare policies, improvement in delivery of services, removal of socioeconomically related barriers to these services, and awareness of benefits of ANC. According to Chukwuma et al. (2021), reform of policies and improvement in the healthcare system would improve accessibility of ANC. According to Adedokun & Yaya (2020), economic aid and literacy aid would make more women seek ANC visits. The conclusion reemphasized research hypotheses by focusing on how utilization of ANC has impact on birth outcomes. It identifies obstacles that face women in getting ANC and how governmental aid would improve maternal welfare (Kenya Demographic and Health Survey, 2022).

Recommendations

This section elaborates on notable proposals to improve birth outcomes and increase utilization of antenatal care (ANC). According to Chukwuma et al. (2021), minimizing challenges in the healthcare system such as lengthy waiting times and inadequate staffing levels has the potential to make more women seek ANC. According to Adedokun & Yaya (2020), provision of economic aid, sensitizing people in their community, and provision of mobile health has the potential to ease hindrances to provision of ANC. Streamlining governmental policies to make provision of ANC cost-free or subsidized has further potential to advance maternal care (Kenya Demographic and Health Survey, 2022). All these proposals focus on pragmatic measures to improve provision of ANC for better neonatal and maternal outcomes.

Improve Awareness and Education on ANC

Many pregnant women also do not visit ANC due to ignorance over its importance. Younger women, as well as less-educated women, visit ANC less, according to Adow et al. (2020). ANC education has to be added to school so that future mothers get an idea of its importance. In accordance with Abimbola et al. (2016), community health campaigns could educate women through the media, as well as local community leaders. Health care providers need to give health talks while visiting ANC consultations so that there could be increased understanding (Haftu et al. 2018). In accordance with Galle et al. (2015), local language ANC education could allow all women to understand the information presented.

Increase Healthcare Worker Training and Support

Healthcare workers also impact ANC utilization behaviorally. According to Chukwuma et al. (2021), women avoid ANC utilization owing to rudeness of healthcare workers. Respectful care training on a regular basis can assist in better treatment of women (Chorongo et al. 2016). According to Bwalya et al. (2018), motivational programs such as incentive programs can motivate healthcare workers to treat better. Training of healthcare workers in ANC guidelines is also

necessary to provide correct information (Adow et al. 2020). According to Adam et al. (2015), there is a need for a mentorship program to facilitate improvement in communication between midwives community health workers, nurses, and pregnant women.

Address Health System Barriers

Long waiting times and poor healthcare accessibility discourage ANC utilization. According to Chorongo et al. (2016), many women avoid ANC due to crowding in health centers. Scaling up maternity services can help to avert crowding (Kenya Demographic and Health Survey, 2022). According to Chukwuma et al. (2021), women in rural areas struggle to access ANC due to far-off ANC provision sites. Transport support can facilitate more women to attend health centers (Adedokun & Yaya, 2020). According to Ewunetie et al. (2018), offering ANC services for free can allow low-income women to attend checkup without spending money. Enhanced funding can help to improve provision of services.

Strengthen Partner and Family Support

Partner and family support increases ANC utilization. According to Akinyemi et al. (2021), ANC completion is higher in women with a supportive partner. Men's involvement in maternal health education increases their participation (Adedokun & Yaya, 2020). According to Bwalya et al. (2018), family counseling programs help partners to be aware of their role in caring for a pregnant woman. Single mothers without partner support can be assisted by programs in their communities (Adam et al. 2015). According to Haftu et al. (2018), partner involvement in ANC utilization increases birth preparedness and reduces delivery complications. ANC utilization is facilitated by family support.

Implement Policy Reforms for ANC Utilization

Government policies assist in improving ANC utilization. By having ANC visit requirements, complications during motherhood can be avoided (Chukwuma et al. 2021). Mobile health clinics assist in providing services to remote areas and improving accessibility (Adedokun & Yaya, 2020). SMS reminders using digital tools improve ANC utilization, according to Kenya Demographic and Health Survey (2022). Providing ANC services for free abolishes financial barriers to poor women (Ewunetie et al. 2018). According to Chorongo et al. (2016), healthcare centers can be strengthened and more maternal health services provided via public-private partnerships. Strong policies assist in providing each woman with improved ANC care.

Conclusion

Antenatal care (ANC) plays a key role in ensuring a safe pregnancy and a successful birth. ANC checkups allow one to diagnose health complications in time, apply necessary medical interventions, and provide health education to mothers. According to Kenya Demographic and Health Survey (2022), pregnant women are not visiting ANC as expected, even if ANC has proved very useful. The reason lies in financial limitations, illiteracy, issues with the health system, as well as social issues. Adedokun & Yaya (2020) clarify that poor, illiterates, and those living in the rural areas find it hardest to get ANC care. These issues must be sorted out so there can be better care for pregnant women, and pregnancy complications are avoided.

Healthcare system inefficiency also plays a role in ANC utilization being low. Long waiting hours, poor quality care, and unaffordable healthcare providers discourage pregnant women from going to ANC (Chukwuma et al. 2021). Women are also turned away due to lack of resources, further discouraging ANC visits (Ewunetie et al. 2018). Cultural beliefs, partner disapproval, also discourage many women from ANC visits (Akinyemi et al. 2021). ANC utilization must be promoted by healthcare facilities and governments by funding accessibility-enhancing policies.

Summary of ANC Utilization Issues

Many pregnant women also do not visit ANC normally, leaving them vulnerable to an increased chance of pregnancy and birth complications. Adedokun & Yaya (2020) clarify that pregnant women not visiting ANC are also vulnerable to greater risks during birth, such as mother infection, infant mortality, and premature birth. Low education level and financial limitations remain key barriers to ANC use (Kenya Demographic and Health Survey, 2022). According to Chukwuma et al. (2021), waiting time in health centers discourages women to use ANC services, particularly in government hospitals that receive inadequate funding. The healthcare providers' attitude also influences ANC utilization (Bwalya et al. 2018). Some women do not believe ANC is a mandatory procedure due to a low perception of its utility (Chorongo et al. 2016). All these issues can be addressed to improve ANC utilization and health outcomes in mothers.

Impact of ANC on birth outcomes

ANC significantly improves birth and pregnancy outcomes by reducing health complications in infants and mothers. According to Haftu et al. (2018), ANC attendants stand a lower chance of suffering from risky complications during pregnancy such as hemorrhage, preeclampsia, and anemia. ANC checkups allow complications related to pregnancy to be detected at an earlier time, reducing chances of maternal mortality (Adedokun & Yaya, 2020). According to Chorongo et al. (2016), ANC ensures screenings and nutrient supplements that allow improvement in mothers' health and that of the fetus. Appropriate ANC utilization reduces chances of emergency cesarean deliveries, hence better birth outcomes (Chukwuma et al. 2021). According to Galle et al. (2015), ANC allows women to be educated on safe delivery, hence fewer complications during delivery. Enhancing ANC utilization will lead to better survival of mothers and infants.

Role of Socioeconomic Factors in ANC Utilization

Socioeconomic factors of marriage status, education, and income determine ANC utilization to a great extent. Educated women, as per Adedokun & Yaya (2020), attend ANC more often since they are aware of its importance. Less educated women, however, do not highly value ANC due to a low level of knowledge of its benefits (Kenya Demographic and Health Survey, 2022). Economic barriers also limit many women's utilization to ANC, given that transport fees and medical fees constitute a high barrier (Abimbola et al. 2016). The marriage status is also a determining factor, given that marriage enhances support from their spouses, hence easy utilization to ANC (Akinyemi et al. 2021). Single mothers, as per Adam et al. (2015), also face more challenges such as financial limitations and low emotional support, hence low ANC utilization. Eliminating such socioeconomic barriers would assist in improving maternal health services.

Challenges in Healthcare Service Delivery

Several healthcare system challenges negatively impact ANC utilization. Long waiting hours and hospital congestion scare many women away from ANC services, according to Chorongo et al. (2016). Most of the public hospitals also lack sufficient healthcare providers, making it difficult for pregnant women to receive quality and timely services (Chukwuma et al. 2021). According to Kenya Demographic and Health Survey (2022), women in rural areas face challenges in accessing ANC services owing to health facilities that are far away and poor healthcare infrastructure. In addition, disrespect by healthcare personnel contributes to poor quality care, discouraging women from reporting so that they can obtain subsequent ANC care (Bwalya et al. 2018). Many clinics also lack adequate ANC care, tests, and supplements, driving women away to obtain care elsewhere, or none (Ewunetie et al. 2018). Improved hospital infrastructure, together with an increased number of healthcare personnel, could facilitate ANC accessibility by an increased magnitude.

Importance of Policy and Government Support

Strong government policies and healthcare reforms must be enforced to boost ANC utilization. Chukwuma et al. (2021) posit that strict ANC utilization policies can reduce mortality while providing quality healthcare practices. Providing financial support by means of subsidized or free ANC care can provide easy accessibility to poor women (Kenya Demographic and Health Survey, 2022). Adedokun & Yaya (2020) posit that ANC accessibility can be achieved by mobile clinics by treating those suffering from mobility issues. Public-private partnerships (Ewunetie et al. 2018) can implement hospital infrastructure strengthening, hiring additional healthcare personnel. Chorongo et al. (2016) posit that digital health technologies, such as SMS reminders, provide ANC utilization by women on an intermittent basis. Every woman must obtain strengthened maternal health policies so that she gets quality care during pregnancy and childbirth.

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