

SOCIOECONOMIC DETERMINANTS OF UPTAKE OF WHO-RECOMMENDED
ANTENATAL CARE VISITS AMONG PREGNANT WOMEN IN MAKUENI COUNTY,
KENYA

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DECLARATION

I declare that this research project is my original work that has not been presented to any other examining body for the award of any degree.

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Date 7/12/2022

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The research project was submitted for examination with my approval as the university supervisor.

Signature...

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DEDICATION

This work is dedicated to my family; my wife, Juliet, my daughter, Pendo and son, Amani and the larger Kiuluku family.

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First of all, I would want to express my deep gratitude to God for bestowing upon me excellent health, which has enabled me to complete this task.

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LIST OF ACRONYMS

ANC	Antenatal clinic
FANC	Focused antenatal care
KDHS	Kenya demographic survey
LMIC	Low- and middle-income countries
PMA	Performance Monitoring for Action
SSA	Sub-Saharan Africa
WHO	World Health Organisation
NACC	National Aids Council
EPMM	Ending preventable maternal mortalities
SDGs	Sustainable Development Goals
CIDP	County Integrated Development Plan

ABSTRACT

Globally and in Kenya, morbidity and mortality of mother and new-born are a priority public health problem. This led to countries to improve on maternal and child health status. In Makueni County has specifically been prioritizing the health sector by allocating significant amount of its county allocation to health that had improvement of the health outcomes being monitored through health indicators; however, antenatal care (ANC) uptake was 67% below World Health Organisation (WHO) recommended coverage of 90%. The study generated a point estimate of ANC and determined factors affecting ANC uptake to inform policy. Secondary data was used which had been generated by Performance, Measurement and Action (PMA) to determine social economic factors affecting uptake of ANC. The study used binary Probit model to determine the significant factors which affected the attendance of ANC services. The study found that quality of services, education, wealth, age, residence, parity, and attitude of health care workers were statistically significant which influenced the current pattern of the ANC visits during pregnancy in Makueni County. The uptake of ANC services was not associated with religion nor marital status. The study suggested that comprehensive education services on the benefits of ANC services be incorporated into public health intervention programs to enhance pregnant women's and their families' health seeking behaviour for enhanced maternal and child health. To increase uptake, interventions aimed at empowering women, removing obstacles to accessing ANC, educating pregnant women about their health, and improving the quality metric in ANC programming should be put into place. The study also revealed disparities in resident and marital status, indicating that women of reproductive age are particularly vulnerable. As a result, the department of health should implement targeted interventions, such as lowering costs and enhancing services for these women who live in rural areas and are divorced.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Chapter one provides an overview of the burden of preventable maternal mortalities at the global, regional, national and county levels within the context of the Sustainable Development Goals while highlighting the factors that have been associated with the uptake of the WHO-recommended antenatal care (ANC) visits.

1.2 Background Information

The introduction of the Sustainable Development Goal (SDG) 3 on “ensuring good health and well-being” has increased the prioritization of countries on implementing reforms that are aimed at enhancing the health of their populations (Marmot & Bell, 2018; WHO, 2016). While the global focus is overall on improving the health and well-being of the population, the first two targets of this goal prioritize reducing maternal mortalities and preventable neonatal deaths to “70 per 100,000 live births and 12 per 1,000 live births” respectively. Specifically, maternal mortality remains high and inequitably distributed globally (Figure 1) (WHO & Division, 2019).

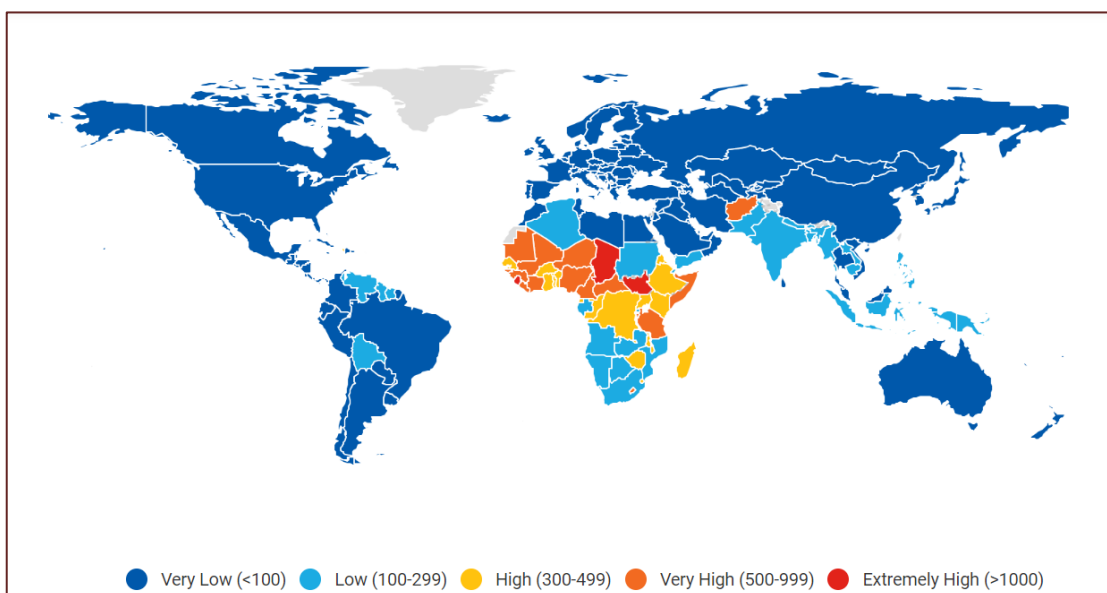


Figure 1: Global Maternal Mortality rates
(Source: (WHO & Division, 2019))

Consequently, ending preventable maternal mortalities (EPMM) remains a quintessential target globally (Das et al., 2021). In 2017, over 295,000 deaths occurred due to pregnancy-related and childbirth complications (WHO, 2019b), most of which were inequitably distributed globally with sub-Saharan Africa and Southern Asia, accounting for 86% of all maternal deaths (WHO, 2019b). Within the sub-Saharan Africa (SSA) region, Sierra Leone, South Sudan and Chad recorded maternal mortalities that are as high as 1000 deaths per 100,000 live births with the rest of the countries still way above the “SDG target of 70 deaths per 100,000 live births” threshold targeted by 2030 having only eight years to the end of the SDGs (WHO & Division, 2019). In Kenya, the maternal mortality ratio improved from 362 in 2014 to 342 maternal deaths per 100,000 live births in 2017 (KNBS & NACC, 2015; WHO & Division, 2019).

While the evidence on maternal mortality globally, regionally, and locally highlights a higher rate than recommended, several approaches have been postulated to collectively lead to a reduced maternal deaths if employed with great uptake. First, uptake of deliveries assisted by a skilled birth attendant and second, uptake of the WHO-recommended four or more (4+) antenatal care (ANC) visits among pregnant women (WHO, 2019a).

Consequently, ANC uptake remains a crucial intervention for enhancing maternal outcomes. The WHO targets to achieve “90% of pregnant women attending at least four ANC visits during their pregnancy” (Benova et al., 2018). However, evidence from LMICs including in Kenya indicates a much lower level than the target (Benova et al., 2018). For instance, a study published in the *Lancet* indicated that the uptake of ANC visits was 84.8% in developed countries but only 48.1% attended the recommended 4+ ANC visits in developing countries in 2013 (Moller et al., 2016). This meant that nearly twice more pregnant women attended the recommended ANC visits in high-resourced countries than in low-resourced countries. Further, a recent study that examined the level of 4+ ANC uptake across nine SSA

countries indicated that the average uptake of the recommended visits was only 55.5% with the highest uptake achieved in Ghana at 85.6% which was still below the WHO 90% target (Andegiorgish et al., 2022). In Kenya, the 2014 KDHS showed that only 58% of pregnant women attended ≥ 4 ANC visits (Kenya, 2015). Other studies conducted at the county level indicated similar uptake rates at 55% in the Western region (Lawrence, 2020), 52% in Tharaka Nithi County (Gitonga, 2017) and 49% in Taita Taveta County (Ndegwa, 2019).

The uptake of focused ANC visits is associated with several sociodemographic, socioeconomic, and behavioural factors. Positively associated factors include the mother having some level of education, being married, coming from a better-off household, place of residence (urban), being employed and delivering in a health facility (Adedokun & Yaya, 2020; Gitonga, 2017; Lawrence, 2020; Ndegwa, 2019; Rurangirwa et al., 2017; Wairoto et al., 2020).

Besides, the high cost of services, long distances to health facility, unplanned pregnancy lack of health insurance, and lack of husband's support have been negatively associated with uptake of the recommended focussed ANC visits (Gitonga, 2017; Okedo-Alex et al., 2019).

While several studies have examined both the level and correlates of the uptake of the WHO-recommended 4+ ANC visits globally and in Kenya, only one study examined this in Makueni County, and this was prior to the introduction of reforms targeting improving maternal outcomes such as the Linda Mama and the Makueni care programs. Consequently, this study fill these gaps and provide the latest evidence to support policy formulation on enhancing the uptake of 4+ ANC visits. Against this backdrop, this study determined the uptake of the WHO-recommended ANC visits among pregnant women in Makueni County.

1.3 Current Pattern of WHO-recommended Antenatal Visits Among Pregnant

Globally, maternal mortality has been on a decline though the decline has been much slower in low-income countries. A known contributor to these high mortality rates is deducted as pregnancy complications and sometimes during childbirth. The WHO recorded that women from low-income areas have higher exposure to maternal mortality because of their trends in achieving the four ANC-recommended visits. For instance, Wekesa et al. (2018) argue that there have been significantly low ANC visits among the women in Kwale county Kenya, notably as a result of a low level of education (Wekesa et al., 2018). As urged by WHO, the recommended first visit is often expected to occur in the pregnancy's first trimester. The article by Wekesa et al. (2018) estimates that the women in Kwale county often took the first visit later than expected, making it quite challenging for them to meet the four ANC visits (Wekesa et al., 2018). In their study, Wekesa et. al (2018) estimated that the women with better knowledge were established to start the ANC visits as expected in the first trimester, with their record showing that 75% achieved the goal. However, this is different from what was noted in the females with low levels of education. In a total of two hundred and eighty gestation women, the research generated that 24.0% of women—mostly the uneducated—visited practitioners during the gestational period, It was recorded that the uneducated mothers had four times higher odd of initiating ANC clinic late compared to educated mothers.

The poor ANC visits in Makeni county are also significantly associated with the number of initial pregnancies among the mothers. Mlandu, Zvifadzo, & Eustasius (2022) stated that the time of starting ANC visits was comparatively later in women that have given birth prior (Mlandu et al., 2022). For instance, they generated that women who were attributed to birth orders of three or more children started ANC visits later by approximately 70.3%. The research also pointed out that the women with birth order of two kids started their ANC visits

later by about 65.2%, and those with one child or less were generated at 57.7%. This review of the sub-Saharan African countries like Kenya and Tanzania alliterates that the mothers that have given birth to two or more children successfully often assume the need for ANC visits, even though they are aware of this requirement. Arguably, the fact that mothers who had already given birth often delay their ANC because they feel they are fine from the prior experience.

Mlandu, Zvifadzo, & Eustasius (2022) also argues that the mothers' occupation often determines their likelihood of either starting their ANC visits late or early Mlandu et al., 2022. For instance, in their study, they garnered that the women living in rural SSA had more likelihood of starting their ANC visits late. They also found that rural women visited ANC 63.5% late, which was significantly high compared to urban women, who recorded 56.7%. Christopher et al. (2019) consequently support the claim that occupation and financial ability are significant determinants of ANC visits. In the research of SSA countries' ANC visits, Christopher et al. (2019) generate that some areas recorded significantly lower ANC visits comparatively. In Kenya, Pell et al. (2013) note that in areas such as Nyanza, Specifically, Siaya county, the low-income women that relied on fishing and farming often recorded lower ANC visits (Pell et al., 2013). This deduction can be used to generate that the area and the immediate occupation of the pregnant women determined their ability to take the ANC visits. The trend elucidates that women with low-income abilities will often take comparatively low visits to ANC.

The age of the pregnant women, pregnancy disclosure, and parity, acted largely in determining the trends of the ANC visits among the women. For instance, women with lower awareness and customization of pregnancy often try to seek medical advice when they are subjected to pregnancy symptoms. In some cases, it is recorded that women who are not accustomed to the signs and symptoms of pregnancy, such as young mothers such as

teenagers, often presumed pregnancy for other ailments. Under such instances, they visit the hospitals, the pregnancy is disclosed, and the teenagers are subjected to the ANC. In such a circumstance, the young mothers often start their ANC visits in time and often meet the minimum of four visits advocated by WHO. This is different from the cases of the other females accustomed to pregnancy. It ascertained that they recorded lower visits than their counterparts.

1.4 Problem Statement

The uptake of the WHO recommended four ANC visits remains a crucial intervention for enhancing maternal outcomes. Kenya's uptake of ANC visits is 58% lower than 90% the WHO recommended target of 90%. While Kenya has implemented several reforms to specifically enhance maternal and newborn outcomes, there remains a dearth of evidence to inform the current progress in improving the uptake of key interventions for improved maternal health outcomes such as the recommended four or more ANC visits. Importantly, given that healthcare was devolved in Kenya, it was paramount to assess progress towards this target at the county level. Makueni county is one of 47 counties in South-Eastern Kenya. The county has been continuously investing in the building blocks driven by the investment plans particularly County Integrated Development Plan (CIDP). For example the county has increased the number of the health facilities from 156 in 2013 to 238 in 2021. This has reduced the distance from 10 km to 4.5 km to facility lower than recommended 5 km by WHO. In addition the department has been implementing the "Transforming Health Systems Universal Care Project (THS-UC)", a performance-based funding supported by World Bank. This project aimed at "improving the uptake of reproductive, maternal, new-born, child and adolescent health services". The county is also implementing its own universal health coverage (UHC) programme dubbed *Makueni Care* which has been celebrated as an innovation in healthcare financing. This has led to the access of health care services as

evidenced by USAID (2019) evaluation report on performance of program. However, the ANC coverage has not attained target of 90% as recommended by WHO. The study in Makueni would provide more context-specific evidence to tailor interventions that will boost uptake.

1.5 Research Questions

1. What was the current pattern of WHO-recommended antenatal visits among pregnant women in Makueni County?
2. What social economic factors influenced the uptake of the WHO-recommended ANC visits among pregnant women in Makueni County?
3. What policy options could the department of health in Makueni, and other counties leverage to enhance uptake of the WHO-recommended ANC visits?

1.6 Study Objectives

1.6.1 Broad Objective

This study aimed to assess the social economic determinants of the uptake of WHO-recommended antenatal care visits among pregnant women in Makueni County.

1.6.2 Specific Objectives

Specifically, the study aimed to:

1. Examine the current pattern of WHO-recommended antenatal visits among pregnant women in Makueni County
2. Determine social economic factors affecting the uptake of WHO-recommended ANC visits among pregnant women in Makueni County.
3. Provide policy recommendations to the department of health in Makueni and other counties in Kenya that would guide enhanced uptake of recommended WHO ANC visits.

1.7 Justification

From conception to the onset of labour, expectant women require routine care as an opportunity for delivering health promotion and other preventive services (Moller et al., 2016). The study focused on establishing the crucial role ANC plays in protecting the expectant mother and the unborn child in order to improve their health status and enable a seamless transition to a post-natal period with the fewest concerns and obstacles. Expectant mothers should undergo a minimum of four ANC appointments (Organization, 2018). Therefore, the study would provide policymakers with information on ANC consumption patterns among expecting mothers and how they align with WHO FANC model recommendations (Organization, 2018). Additionally, the study's findings added to our understanding of how socioeconomic dynamics—including residence, wealth, education, religion, parity, and age—as well as structural dynamics—such as the quality of the clinical environment and the attitudes of the staff—affect the uptake and utilization of ANC services. In order to improve maternal health care service delivery by experienced professionals during the prenatal and postnatal period and promote pleasant pregnancy experiences among expectant women, it was essential to understand the impact of these dynamics on ANC service delivery.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The theoretical foundation of this subject was looked into in the chapter's first section. The second half of the chapter reviewed the current trends in ANC visits among pregnant women. The final section of the chapter looked on the current factors impacting pregnant women's decision to receive the prescribed ANC check-ups.

2.2 Theoretical Review

Theoretical research specialized in the mechanisms behind the usage of healthcare or the standard of healthcare service delivery. Thus, the Andersen Behavioural Model of Health Service Use, self-determination, and the idea of planned behaviour were the guiding concepts that could be

2.2.1 Theory of Planned Behaviour

The theory of planned behaviour argued that several premises, including the person in question's subjective norms, attitudes, and overall behavioural control, would predict that behaviour (Moshi et al., 2020). It was reasonable to anticipate that attitudes regarding the behaviour in question (attendance at prenatal clinics), would predict that behaviour (Moshi et al., 2020). Subjective standards can either be injunctive—that is, based on what a specific social group considers acceptable behaviour—or descriptive—that is, the behaviour that the social group exhibits. Perceived behavioural control refers to a person's capacity to carry out a particular behaviour (Moshi et al., 2020). The theory of planned behaviour posited that these input variables would cause the expected behaviour to manifest itself. When appropriate, desired behaviours become real behaviours. According to the theory of planned behaviour, three psychosocial domains related to behavioural, normative, and control

attitudes came before the input elements themselves (Moshi et al., 2020). The idea was that women's intentions to attend local antenatal care services were what caused them to do so.

These intentions were moderated by the women's prior attitudes and beliefs about the importance of receiving ANC locally, as well as the extent to which they had control over upholding those norms, such as by having the option and means to travel to the location where antenatal care was provided. Then, comparable components that function as staff influence mechanisms mediate this process, resulting in a complex dynamic system where users and staff are agents.

2.2.2 Self-determination Theory

Self-determination theory alliterates that the involved parties were often self-determined when their needs for competence, relatedness, and autonomy were substantially met in the whole process (Tungaraza & Joho, 2022) . The perceived autonomy based on antenatal care is the ability of the women to act or make decisions from a sense of freedom and, ultimately, individual experience. Besides, the argument for perceived competence was used to explain the argument for self-efficacy of pregnant women to be able to meet their desired results from the process (Tungaraza & Joho, 2022). Relatedness in the self-determination theory explained the notion of social acceptance and belonging, for instance, the ability to align to the immediate social environment, such as community or family beliefs.

2.2.3 Andersen Behavioural Model of Health Service Use

This theory argued healthcare service used as a result of three important domain function: use, enabling factors and perceived need to use healthcare Ruhul (2021).Accordingly the model enabled to determine measures such as access, equity, effectiveness and external environment influencing it.

The model further expounded the external environment and individual characteristics that could influence the disposition of health services which may later influence health outcome. The predisposes may include social-demographic, characteristics, social-structural and behaviour factors (Ruhul, 2021).

2.3 Empirical Review

This section provides the social-economic factor that have been empirically investigated in terms of affecting ANC visit.

According to Aksünger et al. (2022), in their article, argued that one of the enabling factors in meeting the ANC recommended visit was place of residence. In their study, the researchers speculated that the number of ANC visits in Kenya was higher in areas with a shorter distance covered in pursuit of the services. Rural areas in sub-Saharan Africa were attributed to the low allocation of resources. For instance, compared to urban areas, rural areas were often presented with comparatively fewer health centres mentored at serving a large population. Consequently, in their article, Ebonwu et al. (2018) deduced that rural areas presented higher levels of late ANC attendance (Ebonwu et al., 2018). For example, they deduced in their research that the number of late ANC attendance in the first trimester was 51% in rural areas. Based on their research, Ebonwu et al. (2018) argued that the inability to access health centres conveniently was a significant factor that contributed to late ANC registrations in rural areas (Ebonwu et al., 2018). They also argued that the significant factor for this low turn-up was the unavailability of these resources in the areas or the distance covered to meet the visits.

Gevera et al. (2020) research on generating accessibility of clean drinking water in Makueni county established that the county was estimated to be 80% rural (Gevera et al., 2020). The study also alliterated that social services and facilities appreciated in the rural areas were

majorly government-provided services. In a study of sub-Saharan Africa, researchers trying to establish the relationship between the areas of settlement and ANC visits made significant insights. The research confirmed that among the 40% of individuals that presented late attendance to the ANC, 70% of the females that presented late attendance came from rural vicinities (Ebonwu et al., 2018). It is ethical to argue that the urban women were associated with higher odds of visiting the health facilities for ANC compared to the females living in rural areas. The urban residences were attributed to adequate and accessible health centres where the ANC processes were carried out. The accessibility of health centres was a major issue, and it inconvenienced the users. Moreover, there was a high number of ANC education carried out in the urban centres, which made the process highly recognized in the urban centre compared to the rural areas (Okedo-Alex et al., 2019). Moreover, the perspective of the rural area's expectant women was highly negative, which presented a challenge to their ability to visit the health facilities for ANC programs.

According to a study by Gitonga et al., (2017) in Tharaka Nithi county using binary logistic regression model, marital status was a determinant of uptake of ANC. They found married women go for ANC visit earlier than unmarried. This could be attributed to social acceptance of the pregnancy.

Education level was one of the main factors influencing pregnant women's ability to make ANC visits. The ANC is mentored to reduce maternal mortality. However, this is reliant on the ability of the pregnant women to understand the situation, therefore, work to enhance themselves. In a research, it was established that there was a low level of non-compliance in the areas where the level of literacy was high (Odušina et al., 2021). This study was carried out in sub-Saharan Africa involving eight counties and using multilevel binary logistic regression they showed a positive association with education. The research garnered that women who dwelt in the literate communities were more capable of accessing the ANC

facilities than the others in areas of low literacy. The research also asserts that the high number of ANC visit goals achievement was based on the argument that areas that had higher literacy had comparatively better revenue levels Odusina et al., (2021). The welcoming revenue levels encourage investors to set up facilities such as hospitals, making achieving the ANC visit goals easy. Moreover, it was also argued that the education level prompts the ability to appreciate and recognize positive health behaviours. In that, the education level accelerated the awareness ability of individuals. For instance, they were knowledgeable on ANC, and the decision to make the ANC visit was often easy to make in such settings (Odusina et al., 2021).

Subsequently, Raru et al. (2022) affirms the argument that the level of education affected the ANC visits in their article (Raru et al., 2022). They carried their work in East Africa using multilevel analysis. In their record, they validated that in East Africa, educated women were positively significantly asserted to contribute to the optimum ANC attainment. Of the overall participants participating in the ANC process, 80.96% were individuals who had attained higher education. In the context of education, the report confirms that the women who had achieved higher education had up to 3.8 times higher ANC utilization compared to the ones that only had primary education (Raru et al., 2022). From this research, Raru et al. (2022) argued that the increased appreciation of ANC by educated women was because they understand the program's benefits. Therefore, they utilized the presented opportunity effectively (Banda et al., 2017). Moreover, it is noted that education was a significant aspect of a woman's ability to overcome specific gender discriminative traditions. These women with proper education were oblivious of their health needs. Therefore, they worked to ensure they meet all the particular health requirements (Raru et al., 2022).

There was a significant show of disparities between poor and rich access to the four recommended ANC visits. For instance, when investigating the socio-economic deterrence in

the ability to visit and complete the four ANC, the households where both partners work recorded a higher frequency than those with only the husbands working. Shibre & Mekonnen (2019), in their research on how the four visits of ANC differ between the rich and the poor, asserts that the visits are significantly higher among the wealthy population (Shibre & Mekonnen, 2019). In the article, Shibre & Mekonnen (2019) assert that there were regional differences in timely first ANC visits. For instance, they speculated that in their investigation of Ethiopia, regions that were grown and were occupied by the comparatively wealthier population recorded higher percentages. For instance, they accorded 62% on their timely first visit. This was comparatively high compared to areas with low financial stands, which was recorded at close to 30%. This shows that the wealthy population has appreciated the ANC visits almost twice as much as the poor populations in sub-Saharan Africa. Shire & Mekonnen, 2019, asserts that in households with two working partners, for instance, the government employed father and mother. The partners were all aware of the need to take the visits and showed appreciation for the services. However, there was less than 25% appreciation of the ANC visits when the partners were not employed or there was a single mother.

The socio-economic status, when studied in the whole of Sub-Saharan Africa, was a major deficit in the ability of the women to make the ANC visits (Shibre & Mekonnen, 2019). They used Probit model of regression and showed positive association. First, the recorded number of women who made better and timely visits were ascertained to have significant financial abilities. The counterparts had poor financial skills and, therefore, never made the holidays are effective as the wealthy population (Obse & Ataguba, 2021). The data asserts that the women that made comparatively higher visits in most cases were insured and also educated. Research attests to the argument that women with better financial abilities also had higher education.

Moreover, they also attested to exposure, something the women from the low socio-economic areas never testified to. They understood the importance of the ANC visits and could validate the benefits they were deriving from the services. This argument derives that the women with higher socioeconomic exposure also were empowered (Obse & Ataguba, 2021). Women empowerment was significantly low in the areas where women were not financially capable. Such regions were highly populated with women with low female empowerment. They significantly relied on different traditions, hindering their appreciation of health facilities. This was different from the other women. For instance, the empowered women recorded a better understanding of the ANC. They used binary Probit regression model in 36 SSA Kenya included and there was positive association.

Pregnancy intention plays a vital role in determining whether the expectant mother will take timely visits or not. In Kenya, it was recorded that there were significant unwanted pregnancies, mostly recorded among adolescent youths (Tolossa et al., 2020). Underage pregnancy affects the SSA, which were some of the main reasons that had been argued to increase the percentage of late ANC visits. The research argued that unintended pregnancy often led to some health outcomes, for instance, poor psychological well-being in mothers. This often clouded their ability to take care of the new-borns. For instance, they stayed away from the medical centres for a long time. The current data speculates that from 2010-2015, nearly 65 out of 1000 women in sub-Saharan Africa had unintended pregnancies (Tolossa et al., 2020). Among the women, it was established that the age gap was from 15-40 years. This contributes significantly to the 99.1 million annual global unintended pregnancies (Tolossa et al., 2020). Data alliterated that 70% of the women with unintended pregnancies find out later than two months, especially when it was the first pregnancy or they were young (Tolossa et al., 2020). The poor level of education among sub-Saharan African women also increased their inability to note unintended pregnancies early. It was also estimated that 68% of

unintended pregnancies were often taken for check-up at the age of 4–5 months when they were often too old to cover. This was a significant reason for the increased number of late ANC visits among sub-Saharan African women (Tolossa et al., 2020).

Consequently, Ochako & Gichuhi (2016) builds on the argument that there are several unwanted pregnancies in Kenya right now (Ochako & Gichuhi, 2016). Their article shows that in the country today, unwanted pregnancies account for 40% of the total pregnancies annually. Their research establishes that pregnancies, especially by young girls, were often concealed with the primary assumption that they could go away (Ochako & Gichuhi, 2016). Some of the girls often hide their pregnancy to get a better way of getting rid of them later in life, which accounts for one of the reasons why they may never make it to the four ANC visits. Concealing pregnancy was a standard norm in unwanted pregnancies. This often leads to hospitals conceiving, which was one of the main reasons the SSA community embraces midwives.

According to Allison et al., (2017) using binary logistic regression model on factors associated with social-demographic characteristics on study carried out in Kenya, Senegal and Ethiopia they were able to demonstrate that religion had a positive association with uptake of ANC visits. Similar study by Srijana (2014) in central Nepal showed that religion played a role and had a significant association on ANC attendance.

Moreover, the age factor also influences the ability of pregnant women to attend the ANC (Ochako & Gichuhi, 2016). The older women, generally between ages 25–49, who had successfully given birth more than twice often did not embrace ANC. These women had believed that the process is a waste of time-based on their first child-births. Based on research, 43% of SSA women who have had a successful childbirth experience after using ANC will start later (Ochako & Gichuhi, 2016). They argue that their ability to have successful births shows they are not at risk, and they often presume the next ones will come

out the same (Ochako & Gichuhi, 2016). Moreover, research asserts that the health care workers in Africa have significantly attributed unprofessionalism (Maluka et al., 2020). For instance, they are criticized for how they behave, talk to the patients, and provide services to them. Some older women and men also prefer avoiding the ANC visits to avoid unnecessary spurs and insults. This bad attitude keep women away from coming for ANC visits.

2.4 Overview of Literature

Sub-Saharan Africa had recorded meagre results in their uptake of ANC. Based on the available literature, there were several factors that affected the uptake of ANC. For instance, the place of residence and the available distance to the ANC centres study by Ahinkorah et al., 2022 using Probit regression model showed that there was high demand for ANC services in urban area. Analyses using multilevel analysis by Obse & Ataguba, 2021 in SSA showed women with high education had high tendency to achieve the four ANC visits.

Study done by Gitonga et al., 2017 on determinants of uptake of FANC in Tharaka Nithi using binary logic regression model showed married women had a three times chance of going for ANC visit earlier than unmarried women. Without discussion with a healthcare professional, women may not appreciate receiving a ton of brochures or booklets during maternity check-ups especially with the female education currently lagging in SSA (John et al., 2019).

Study done by Ochako & Gichuhi, 2016 using probit regression model showed that women of higher age had high demand for ANC services than teenagers.

Study by Obse & Ataguba, 2021 in 36 SSA counties observed that women from high quantile of wealth were more empowered and likely to achieve the four ANC visits. Seidu et al., (2022) established in their research that the type of jobs women held influenced the respondents' visits. They generated that the employed women, especially those with white

collar jobs and who were well paid, started their visits comparatively earlier than the ones that did not hold such positions. In their research, Seidu et al. (2022) affirms that women employed in managerial positions had a 53% likelihood of initiating the ANC process early. This was high compared to the women who held the other positions, such as farming, whose data was at 36.9% likelihood of initiating the ANC process on time.

An important tactic for enhancing maternal and new-born health was prenatal care (ANC). The results of surveys conducted in sub-Saharan Africa, however, show that women there frequently began ANC beyond the first trimester and did not complete the necessary number of ANC appointments. This article compares the factors that affect ANC attendance in Ghana, Kenya, and Malawi while drawing on qualitative data (Pell et al., 2013).

According to Allison et al., (2017) using binary logistic regression model on factors associated with social-demographic characteristics on study carried out in Kenya, Senegal and Ethiopia they were able to demonstrate that religion was positively associated with ANC uptake. Similar study by Srijana (2014) in central Nepal showed that religion played a role and had a significant association on ANC attendance.

Therefore, to improve the understanding of determinants that affect the uptake of the recommended WHO ANC visit this study will fill the void of in-depth understanding of other exogenous factor that affect ANC uptake.

CHAPTER THREE: METHODOLOGY

3.1 Conceptual Framework

The conceptual framework recorded from the study deduced that general factors primarily influenced the ANC intakes in Africa. The service social-demographic, moderating factors and social- economic contexts of the women.

The conceptual framework deduces that the three main subdivisions highly contribute to low ANC turnouts. For instance, it was derived that based on these factors, the SSA women only used the ANC services to get the ANC cards and confirm pregnancy and its health. Consequently, understanding the three main factors was a prerequisite because it was the only way to subdue the low ANC appreciation derived (Quinn & Tanis, 2020).

Ultimately, as demonstrated in **(Figure 2)**, the conceptual framework of this study highlighted the factors that immediately affect the ability of pregnant women to meet the four ANC turnout. For instance, it reviews factors such as the immediate environment. These were issues like the resident location of the individuals taking the visits, compared to the availability of the ANC centres within the area. Consequently, this section also highlighted the predisposing factors such as education, parity and age factors.

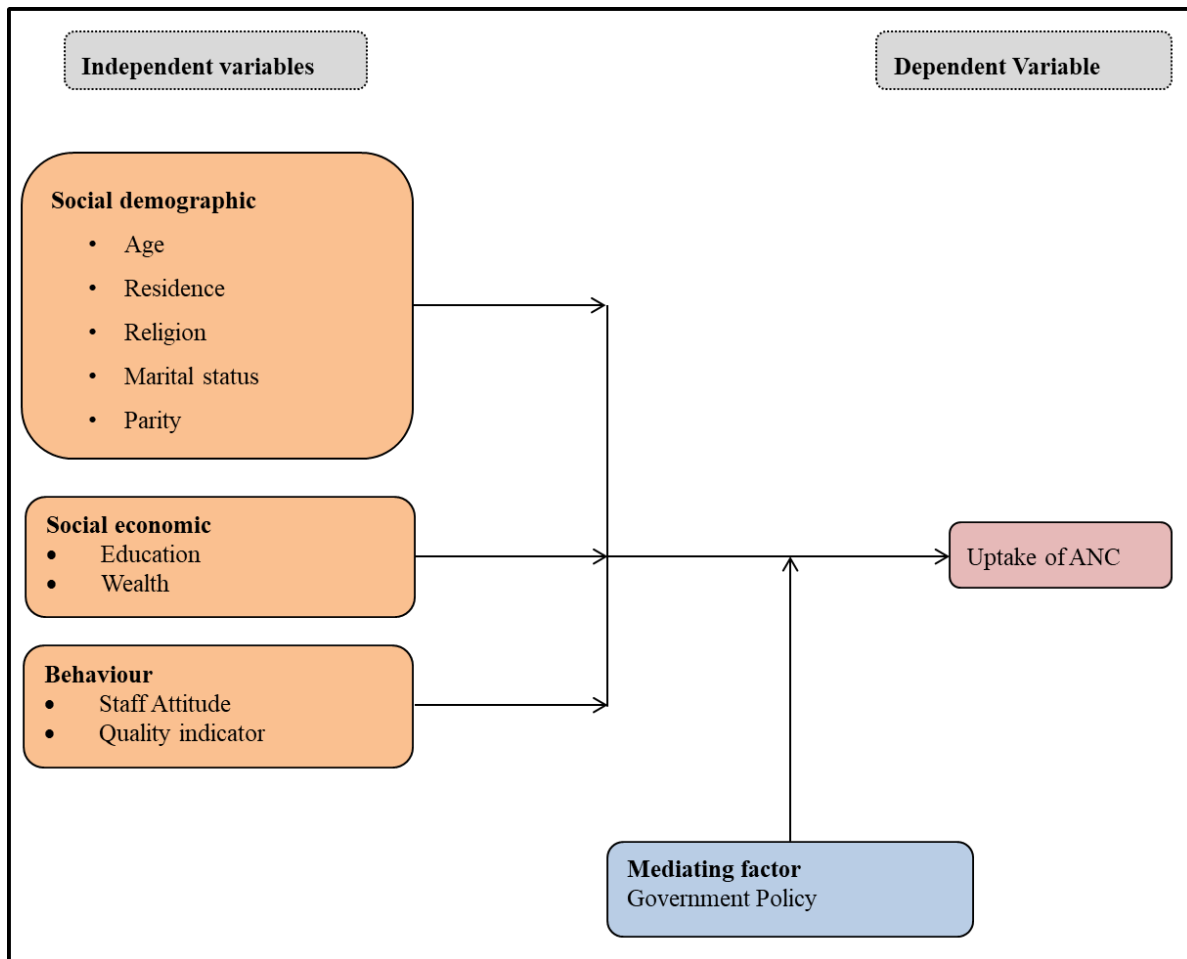


Figure 2: ANC conceptual framework (Source: Author)

3.2 The Econometric Model

Due to the premise that data may not be regularly distributed as expected in other studies, the binary Probit regression model is used in this investigation. The model was employed to calculate the Makeni county ANC-related factors. ANC, the binary outcome variable was 1 for 4 ANC visits and 0 for fewer. The model posits a linear relationship with an inverse standard normal distribution probability between the dependent (latent variable y_i^*) and independent variables (x_i) (Wooldridge 2010).

The model is expressed as:

$$Y^* = X_i\beta + \varepsilon \dots\dots\dots (1)$$

Where:

“Y* = unobserved dependent variable”

“X_i = Vector of independent variables”

“β = Vector of parameters to be estimated”

“ε = Error term”

The observed outcome variable (y) was linked to the unobserved outcome variable (Y*) as follows:

$$Y = \begin{cases} 1 & \text{if } y_i^* > k \\ 0 & \text{if } y_i^* \leq k \end{cases} \dots\dots\dots (2)$$

Where k was the threshold, while four ANC Uptake was y = 1 and less than four ANC is y = 0. The cumulative distribution function of the Probit model could then be expressed as:

To calculate the ME, the following steps are followed:

$$y = \Phi(\beta_0 + \beta_1x_1 + \beta_1x_1 + \beta_1x_1 + \dots + \beta_nx_n) \text{ so} \dots\dots\dots (6)$$

$$\frac{\partial y}{\partial x} = \beta_i\phi(\beta_0 + \beta_1x_1 + \beta_1x_1 + \beta_1x_1 + \dots + \beta_nx_n) \dots\dots\dots (7)$$

Marginal effects (ME) of the Probit model were used to interpret the model with positive ME predicting an increase in the outcome variable while a negative ME predicting a decrease in the outcome variable.

3.3 Estimable Model

The estimate model was as follows:

$$Y = \beta + \beta_1 (\text{Age}) + \beta_2 (\text{religion}) + \beta_3 (\text{Marital status}) + \beta_4 (\text{Resident}) + \beta_5 (\text{Education}) + \beta_6 (\text{Parity}) + \beta_7 (\text{Wealth}) + \beta_8 (\text{Staff attitude}) + \beta_9 (\text{Quality of services}) + \varepsilon$$

3.4 Definition, Measurement and Signs of Variables

The main variable was uptake of the fourth ANC. The outcome was regressed against the explanatory variables of the study which were: age, religion, parity, quality indicator, marital status, resident, education, wealth, and staff altitude.

Table 1. “Definition, measurement, and signs of variables”

Variables	Definitions	Measurements	Expected sign
Dependent			
FANC	Categorical variable	If pregnant woman has attended FANC If not to be represented by 0	
Independent			
Age in years	Number of years lived	≤20 20–34 35–49	Negative (–) Positive (+) Positive (+)
Marital status	Whether married or not married (never married, divorced, separated, Living together, widowed)	0 if married 1 if not married	Negative (–) Positive (+)
Education	Levels of education	1 if no formal, 0 if otherwise 1 if primary, 0 if otherwise 1 if secondary, 0 if otherwise 1 if tertiary, 0 if otherwise	Negative (–) Negative (–) Positive (+) Positive (+)
Quality indicator		1 quality indicator, 0 if otherwise	Positive (+)
Staff altitude		1 if good altitude, 0 if otherwise	Positive
Residence	Area of residence in terms of urban and rural	0 if Rural 1 if Urban	Positive (+) Negative (-)
Parity	How many children does the respondent has	1 if 1-2 child, 0 if otherwise 1 if 2-4 child, 0 if otherwise 1 if >4 child, 0 if otherwise	Positive (+) Positive (+) Positive (-)

3.5 Data Source

Study utilized data obtained from Makueni PMA survey for maternal and child health, insurance coverage and customer satisfaction index modules. Four (4) questionnaires were used: household, female respondent (15–49 years), service delivery point (SDP), and client exit interview questionnaires. In the survey, 227 were eligible respondents with 100%

response rate resulting in 227 respondents. Data was analysed using SPSS software version 20.

3.6 Estimation Issues

3.6.1 Testing for Multiple Correlation (Multicollinearity)

The study used variance inflation factor. If analysis showed a factor of 10 then there is high correlation among independent variables. To correct for that, the study used Robust standard errors to guarantee no inflation of variables of parameters estimate.

3.6.2 Testing for Heteroscedasticity

The study assumed that error term has a continuing variance or be homogenized in nature, however if this assumption was violated heteroscedasticity happens. This was tested using Breusch-Pagan test and was cured using log conversion.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter summarises the findings of the study based on the descriptive statistics and binary Probit regression performed. The demographic characteristics of the participants are described as well as the coverage of ANC and socioeconomic determinants of ANC uptake in Makueni County..

4.2 Demographic Characteristics of the Respondents

Table 2 shows the descriptive statistics of the respondents. Many of the respondents were of age between 25–29 with the highest percentage of 38.8%. Also, majority of them were married with a percentage of 77.1%. Those who had the highest level of education were in secondary comprising of 37.3%. Those who had birth order of 3–4 were highest at 58.6%. Many resided in rural areas with a percentage of 63.9%. Additionally, many of the respondents were Protestants at 60.8%. Those who visited for ANC services more than 4 times were majority comprising 70% and less than 4 times were 30%. Those of second lowest quintile in wealth were highest at 38.3%. Quality indicators among the respondents who agreed were 85.2% and didn't agree were 14.8%. Those who agreed that attitude of health workers had an impact on ANC attendance were 60.7%.

Table 2. Respondents' characteristics

Characteristics	Categories	Frequency	Percentage
Gender	Female	227	100%
	Male	0.0	0%
Age	15–19	20	8.8%
	20–24	39	17.2%
	25–29	88	38.8%
	30–34	48	21.1%
	35–39	19	8.4%
	40–44	10	4.4%
	45–49	3	1.3%
Marital status	Married	175	77.1%
	Divorced	14	6.2%
	Window	1	0.4%
	Never in union	37	16.2%
Education	Never attended	4	1.8%
	Primary	79	34.6%
	Post-primary/ Vocational	16	7.0%
	Secondary	85	37.3%
	College	33	14.5%
	University	10	4.4%
Residence	Rural	145	63.9%
	Urban	82	36.1%
Religion	Catholic	29	12.8%
	Islam	49	21.6%
	Protestant	138	60.8%
	Other	11	4.8%
Visits for ANC	>=4 visits	142	70%
	< 4 times	85	30%
Wealth	Yes	204	90%
	No	23	10%
Quality indicator	Yes	195	85.2%
	No	32	14.8%
Attitude	No	88	38.4%
	Yes	139	60.7%
Parity	1-2	55	24.2%
	3-4	133	58.6%
	>5	39	17.2%

4.2 Current Pattern of ANC Visits

Table 3 shows that those who visited ANC services 4 or more times at age group of less than 20 years were 3.1%, 20–34 ages were 80.6% while 35–49 were 13.6%. Those who visited less than 4 times for ANC during pregnancy at ages 20–24 years were 2% and 35–39 was 0.4% with a P-value of 0.031. This indicated age had statistical significance in uptake of ANC services. Those who never attended school and visited ANC less than 4 times were 0.8%, primary 12.8%, post-primary/ vocational 0.4%, secondary 14.5%, college 7.0% and university 1.8%. Those who visited ANC more than 4 times; never attended school were 0.8%, primary 22%, post-primary/ vocational 6.6%, secondary 22.9%, college 7.5% and university 2.6%. Education showed high statistical significance in explaining the ANC attendance since its P-value was 0.000 was less than alpha level of significance. With secondary being highest at 23% while not attended school lowest at 0.8%. Those who visited ANC during pregnancy more than 4 times and were Catholics were 12.8%, Islam were 21.1%, Protestant were 59% and other religions were 4.4%. The P-value of 0.446 indicate that religion is not associated with uptake of ANC. Those who visited ANC services more than 4 times during pregnancy with 1–2 children order were 14.3%, 3–4 children order were 39.2% and with more than four children were 8.8%. Those who visited ANC services less than 4 times during pregnancy with 1–2 children order were 22%, 3–4 children were 19.4% and with more than four children order were 8.4%. The P-value was 0.033. That meant that there was significance between ANC visits during pregnancy and birth order. Those who visited ANC services more 4 times and above during their pregnancy in urban areas were 63% and in rural areas were 32.2%. Those who visited ANC during their pregnancy less than 4 times in urban areas were 1.8% and in rural areas were 0.9%. The P-value is 0.034. This indicated that, there was significance between ANC visits during pregnancy and residence. Those who visited ANC services 4 times and more during pregnancy and the health care had

good attitude towards them were 59.5% and bad attitude were 40.5%. Pregnant women who attended <4 ANC visits had 37.9% and 0.9% of health care workers having good and bad attitude towards them respectively (P-value is 0.00). This indicated that there was high significance the ANC visits during pregnancies and attitude of the health care worker. Those who visited ANC services 4 times and more during pregnancy and were married were 75.3%, divorced were 5.7%, widow 0.4% and never in union were 15.9%. Those who visited ANC services less than 4 times during pregnancy and were married were 1.8%, divorced were 0.4%, widow 0% and never in union were 0.4%. The results indicated that there was no significance between the ANC visits and marital status since the P-value is 0.749. Those who visited ANC services 4 times and more during their pregnancy and their wealth is lowest were 13.2%, second were 22.5%, middle was 13.2%, fourth were 8.4% and highest were 5.3%. Those who visited ANC services less 4 times during their pregnancy and their wealth is lowest were 12.3%, second were 15.9%, middle was 7%, fourth were 2.2%, and highest were 0%. The results indicates that, there was high significance between the ANC visits and wealth since the P-value was 0.00

Table 3. Current patterns of ANC visits

Characteristics	Categories	Frequency	Percentage
Gender	Female	227	100%
	Male	0.0	0%
Age	15–19	20	8.8%
	20–24	39	17.2%
	25–29	88	38.8%
	30–34	48	21.1%
	35–39	19	8.4%
	40–44	10	4.4%
	45–49	3	1.3%
Marital status	Married	175	77.1%
	Divorced	14	6.2%
	Window	1	0.4%
	Never in union	37	16.2%
Education	Never attended	4	1.8%
	Primary	79	34.6%
	Post-primary/ Vocational	16	7.0%
	Secondary	85	37.3%
	College	33	14.5%
	University	10	4.4%
Residence	Rural	145	63.9%
	Urban	82	36.1%
Religion	Catholic	29	12.8%
	Islam	49	21.6%
	Protestant	138	60.8%
	Other	11	4.8%
Visits for ANC	>=4 visits	142	70%
	< 4 times	85	30%
Wealth	Yes	204	90%
	No	23	10%
Quality indicator	Yes	195	85.2%
	No	32	14.8%
Attitude	No	88	38.4%
	Yes	139	60.7%
Parity	1-2	55	24.2%
	3-4	133	58.6%
	>5	39	17.2%

4.4 Model Summary Statistics and Findings

Table 4 summarises the results of binary Probit regression where variables were considered statistically significant if the $P < 0.05$. The likelihood of ANC visits across all the age groups remained the same across the ages. The odds ratios remained the same for the six age categories at 0.00 when controlling all other variables; the variable age had 6 categories which were 15–19, 20–24, 25–29, 30–34, 35–39 and 40–44 whereby 45–49 was the reference variable. Variable marital status had 4 categories which were married, widowed, divorced

and never in union whereby window was the reference variable. The marital status was not statistically significant with p-values more than 0.05. The likelihood of visiting ANC increased as shown by odds ratios as follows; married= 1.1 times windowed, divorced=1.3 times windowed and never in union =602506557.4 times windowed when controlling all other variables. The p-value for school was 0.000, which indicated that school was highly significant. For those with primary, post primary and university showed a reduced likelihood of making 4 ANC visits, with odds ratio; primary = 0.4 times, post-primary/ vocational = 0.992 and university = 0.7 times that of never attended while secondary and college showed an increased likelihood of making 4 ANC visits with the following odds ratios; secondary=10.088 times that of that never attended and college =1.069 times that of never attended, when controlling all other variables. Wealth was significant with a p-value ($P=0.000$) which was less than alpha level of significance 0.05. The likelihood of ANC visits remained the same across all the categories of wealth with odds ratio of 0.000 when controlling all other variables. Parity is significant since its P-value = 0.033 and the likelihood of ANC visits reduced with the increase of number of children order with more than four children having a odds ratio of = 0.548 times 1–2 children while having less 4 children increased the likelihood of visiting 4 ANC visits with odds ratio of 1.730 times 1–2 children. Variable religion had 4 categories which were protestants, Islam, other and catholic whereby other is the reference variable. Religion was not statistically significant in uptake of ANC visits. The likelihood of ANC visits reduced across the categories as indicated by odds ratios as follows protestants = 0.587 times that of others, Islam = 0.223 times that of other and Catholics = 0.556 times that of other religions, when controlling all other variables. The variable residence is significant with the p-value of 0.034 with those living in urban having an increased likelihood of odds ratio of 1.864 times in rural in uptake of ANC visits. The variable attitude is significant with the p-value of 0.039 with those with bad attitude having a

reduced likelihood of odds ratio of 0.762 times good attitude in uptake of ANC visits. The variable quality indicator was significant with the p-value of 0.003 with those with no quality having a reduced likelihood of odds ratio of 0.876 times having quality in uptake of ANC visits

Table 4. Results of the Probit regression

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Age			12.031	6	.031	
Age(1)	-19.223	22322.109	.000	1	.007	.000
Age(2)	-20.146	22322.109	.000	1	.999	.000
Age(3)	-21.058	22322.109	.000	1	.999	.000
Age(4)	-20.809	22322.109	.000	1	.999	.000
Age(5)	-19.867	22322.109	.000	1	.999	.000
Age(6)	-19.901	22322.109	.000	1	.999	.000
Marital status			.131	3	.749	
Marital status(1)	.133	.440	.091	1	.762	1.142
Marital status(2)	.252	.794	.101	1	.751	1.287
Marital status(3)	20.217	40192.970	.000	1	1.000	602506557.444
School			6.131	5	.000	
School(1)	-.849	1.360	.390	1	.532	.428
School(2)	-.008	.811	.000	1	.992	.992
School(3)	2.311	1.328	3.031	1	.082	10.088
School(4)	.067	.794	.007	1	.933	1.069
School(5)	-.407	.853	.228	1	.633	.665
Wealth			6.167	4	.000	
Wealth (1)	-21.631	10979.463	.000	1	.009	.000
Wealth (2)	-21.264	10979.463	.000	1	.998	.000
Wealth (3)	-20.975	10979.463	.000	1	.998	.000
Wealth (4)	-20.087	10979.463	.000	1	.999	.000
Quality indicator(1)	-.132	.488	.074	1	.003	.876
Attitude(1)	-.272	.326	.696	1	.000	.762
Residence(1)	.623	.340	3.359	1	.034	1.864
Religion			6.492	3	.446	
Religion(1)	-.537	.934	.330	1	.566	.585
Religion(2)	-1.502	.885	2.876	1	.090	.223
Religion(3)	-.569	.831	.468	1	.494	.566
Parity			2.225	2	.033	
Parity(1)	.099	.505	.038	1	.845	1.104
Parity(2)	.548	.436	1.579	1	.209	1.730
Constant	42.109	24876.228	.000	1	.999	1939158631256984060.000

a. Variable(s) entered on step 1: age, marital status, school, wealth, quality indicator, attitude, residence, religion, parity.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

The study assessed the socioeconomic determinants of the uptake of WHO-recommended ANC visits among pregnant women in Makueni County. From the analysis, the point estimate for ANC coverage was 70% indicating that a majority of women in Makueni County attended ≥ 4 ANC visits as per the WHO-recommended antenatal visits among pregnant women. This coverage was much higher than the national average of 58% according to the KDHS (2014) but was below WHO recommended target of 90%. The high coverage in the county could be attributed to the deliberate effort by the county to prioritise health, especially the maternal health.

The results further revealed that there was a relationship between the ANC visits with socioeconomic determinants, which was the same finding to a study by Mwanza (2015). In the findings, education, wealth, age, residence, parity, were determinants that were statistically significant. Marital status and religion were statistically insignificant determinants in the uptake of ANC visits during pregnancy in Makueni County that contradicted findings by Srijana et al. (2014). The results demonstrated that participation in ANC visits among women enrolled in secondary education raised the likelihood about ten times (Gitonga et al 2016, Kimani et al., 2017). Women with ≥ 4 children were less likely to have four ANCs than women with parities of one to two children, three children, or less. This result is comparable to one from a study by Gitonga et al (2016).

In contrast to research conducted by Gitimu et al. (2015), which revealed that the number of visits in urban areas and rural areas were roughly equal, urban women were more likely to receive ANC and to receive it early than their counterparts in rural regions. Results regarding marital status showed that women who had never been married were more likely to visit

ANC than those married though the marital status was insignificant this contradicted the finding by Gitonga et al, (2016). Women who are at age groups 20–24, 25–29, 30–34 and 35–39 were more likely to visit ANC than in ages 15–19, 40–44 and 45–49 with 24–29 and 30–34 being highest this finding was similar to Ahinkorah et al., (2018). Factors such as quality indicator and altitude were highly statistically significant in influencing the ANC visits during pregnancy .That collaborated with study by Cooper et al., (2012) on staff attitude. For quality variable very few studies exist and therefore this study has informed that quality has a high statistically significant on ANC visits.

5.2 Conclusion and Recommendations

In Makueni County, pregnant women are less likely to receive the recommended antenatal care visits as a result of socioeconomic circumstances. To change how pregnant women and their families seek out healthcare for themselves and their families, as well as to enhance mother and child health, comprehensive educational services on the value of ANC treatment must be incorporated into public health intervention programs. Interventions should be focused on empowering women financially and including quality metric in ANC visits. Retaining women more in school would enhance ANC uptake among women, and young women and old women need to be targeted in ANC initiatives; these are also risk age group for maternal death. Increase more ANC services in rural areas. Health care workers to be motivated in order to provide quality services and at the same time modify their attitude to good in order to attract and increase attendance of ANC during pregnancies.

5.4 Policy recommendations

To increase the uptake of the ANC, the study shows that the government need to:

- Increase targeted health education on ANC especially among the teenage women and elderly women this will improve the uptake of ANC visits
- Remove the barriers of access of ANC services and if possible, incentivize the pregnant mothers by reimbursing transport allowance
- Empower women financially this is the most important factor in improving the access of ANC services
- Retain women more in school this will ensure that they are better aware of health benefits of ANC services and will avoid teenage pregnancies
- Increase access of family planning to adequately space and limit family size
- There is service access disparity, and this created vulnerability of rural residents therefore increase health facilities in these areas

5.5 Study strength and limitations

The study uses county-specific data that was rigorously collected making the findings representative to the county. The study's limitations, however, include the inability to infer causality due to the time-limited nature of the data, recall bias because the participants had given birth within the previous three years and might have forgotten, and the omission of some important variables like the timing of the ANC visits.

5.6 Areas for future studies

For comparison, the same study needs to be replicated in counties with similar characteristic in term of demographic to highlight the uptake of ANC services.

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