UTILIZATION OF MOBILE MATERNAL HEALTH SERVICES AMONG WOMEN OF REPRODUCTIVE AGE IN MAKUENI COUNTY, KENYA

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DECLARATION

I declare that this document presents my own research thesis which has never been submitted elsewhere for purposes of award of an academic degree.

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We the undersigned, have approved the submission of this research thesis for review as the university appointed supervisors.

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DEDICATION

This thesis is dedicated to my husband and children for their support, humble time, prayer and words of motivation.

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ABBREVIATIONS ACRONYMS

ANC	Ante-Natal care
AU	African Union
COVID	Corona Virus Disease
GWs	Gestational weeks
KDHS	Kenya Demographic and Health Survey
KII	Key Informant Interview
KNBS	Kenya National Bureau of Statistics
KUERC	Kenyatta University Ethics and Review Committee
MDGs	Millennium Development Goals
MMHS	Mobile Maternal Health Services
MMR	Maternal Mortality Rate
MOH	Ministry of Health
NACOSTI	National committee for Science Technology and Innovation
NMR	Neonatal Mortality Rate
OBA	Output Based Approach
PNC	Post-Natal Care
SBA	Skilled Birth Attendants
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
TBAs	Traditional Birth Attendants
UN	United Nations
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Attitude: Are thoughts that affect a person's behaviour towards family planning (Puspita *et al.*, 2018).

Free maternal healthcare program: This is a program aimed at providing health care services at no payment to pregnant mothers (Gitobu et al., 2018).

Health System: Means all actions aimed at promoting, restoring or maintaining health (WHO, 2000)

Maternal and child Health services (MCHS): Major on issues of health about women and their children especially prenatal care, infant and prevention of deaths of mothers, child immunization and nutrition.

Maternal health care: It is a term that incorporates contraception, preconception, prenatal and post-delivery care.

Maternal health: A woman's health status in the process of pregnancy, giving birth and the period of postpartum.

Maternal Mortality Rate (MMR): This refers to "the number of maternal deaths per every 100,000 live births" (WHO, 2015).

Mobile maternal health Services: Refers to a well facilitated bus/van with basic maternal health care services, operated by well-trained medical professionals dropping village by village at stipulated timings.

Neonatal Mortality Rate (NMR): This is the sum of infant deaths for every 1000 live births within the first month after birth (Neogi et al., 2018)

Universal Health Coverage: Program that ensure everyone gets quality healthcare without suffering financial hardship (Njuguna et al., 2017).

Utilization: Quantity of mobile maternal healthcare services utilized by women of reproductive age within a specified time period (Kassa et al., 2018).

Women of reproductive age: This refers to all females aged 15 to 49 years of age.

ABSTRACT

Mobile maternal health is a way of resolving challenges that are of public health concern while shifting the pattern of accessing care and provision to rural areas hence improving maternal and child outcomes. The health of women depicts the economic growth and a country's well-being. Despite this, it is worrying that approximately 295,000 mothers died in 2017 with impoverished countries accounting for 94%. About 66% of those deaths occurs in Sub-Saharan Africa. Maternal mortality rate in Kenya is 362 per 100,000 live births. The Kenyan Government has put in place several interventions to address this including mobile maternal health services. This research sought to evaluate mobile maternal health service use among women within reproductive age in Makueni County, Kenya. An analytical cross-sectional study was carried out in Makueni County. Kibwezi East and Kaiti Sub-Counties were purposively selected. Ukia ward from Kaiti sub-county and Nzambani ward from Kibwezi East sub-county were randomly selected using folded pieces of paper. Both qualitative and quantitative data were collected. Questionnaires were the tools used for quantitative data while guides for key informant were used to collect data qualitatively. The study systematically sampled 367 women of reproductive age as primary respondents from households at a sampling interval of 5. Twelve Key Informant Interviewees were purposively selected to provide additional qualitative data which were community health extension workers and healthcare providers. The research instruments were pretested at Kilome Sub County before actual data collection. Analytical correctional statistical analysis was done using the Statistical Package for Social Sciences software version 20.0. Pie-charts, frequency tables and graphs were used to present data. Triangulation of data collected qualitatively with quantitative data was done and presented as direct quotes. Tests of Chi-Square were done at 95% CI and an error of precision of 0.05 to calculate inferential statistics showing variable associations. Ethical considerations were taken into account and informed consent acquired from participants. The study concludes that 40.6% of respondents utilized mobile maternal health services in Makueni County. The most common service sought was antenatal care. Distance from health facilities was the main reason for using mobile maternal health services. Majority of individual factors such as average family income (p=0.001), parity (p=0.019), type of pregnancy related complication experienced (p=0.027) and awareness (p=0.006) influenced use of mobile maternal health services. About 59.9% of respondents had a positive attitude towards mobile maternal health services and attitude (p=0.010) significantly affected mobile maternal health service use. Further, the study concludes that most health system factors including facility distance (p=0.001), source of information (p=0.012), waiting time (p=0.004), affordability (p=0.013) and experience with healthcare providers (p=0.023) played a key role in influencing utilization mobile maternal health services. These results would inform policy makers to craft interventions seeking to advance mobile maternal health services utilization. This would further avoid preventable complications thus improving maternal and health outcomes of children in the country.

CHAPTER ONE: INTRODUCTION

1.1 Study Background

Maternal mortality is the death of mothers from sources related to pregnancy or within 42 days of pregnancy while Maternal Mortality Ratio (MMR) is sum of deaths of mothers per 100,000 live births (WHO, 2019). Globally, about 295,000 deaths of mothers were recorded in 2017 with developing countries accounting for 94% of the mortalities (WHO, 2019). Every day about 810 women succumb in the course of pregnancy and birthing. The biggest burden rests in Asia and Africa at 86%. In Sub-Saharan Africa (SSA) alone, approximately 196000 (two-thirds) maternal deaths were reported in 2017 (WHO, 2019).

Most causes of MMRs are preventable through avoiding delays of the 3Ds Model; decision making on seeking care, accessing care and getting appropriate care (UNFPA, 2018). These delay effects are more significant especially among populations in remote and hard to reach areas. The main causes may include abortion, hemorrhage, obstructed labor, hypertensive disorders, sepsis and ectopic pregnancy (Tessema, 2017). The main risk factors maternal mortalities around the world include teenage pregnancy, short inter-birth intervals, home deliveries, unskilled birth attendance among others (Ntoimo *et al.,* 2018).

Despite significant improvement in reduction of MMR worldwide, SSA as a region shows slower rate compared to other developed regions. Worldwide, concerted efforts have been heightened with several interventions bearing fruits through ensuring existing health systems provide better access to quality maternal services (Girum *et al.,* 2017). United Nations through Millennium Development Goals (MDGs) tried bridge the gaps in maternal mortalities but some countries lagged behind in attaining

the targets by 2015. This gave birth to Sustainable Development Goal 3 target 1 aiming at reduced deaths of mothers to lower than 70 per live births of 100,000 (UNDP, 2015). In Africa, some efforts especially from Africa Union (AU) have been directed at helping countries prevent and reduce maternal and child deaths. This includes interventions to increasing contraceptive uptake, antenatal care, hospital deliveries and postnatal care (Nannan *et al.,* 2019).

In Kenya, some strategies have been initiated to accelerate achievement of SDGs especially improvement of maternal and child health outcomes (Benjamin and Timothy, 2020). These initiatives include costless delivery of mothers using Linda Mama insurance, under-utilized maternal shelter, subsidized safe motherhood through Output Based Approach (OBA), Universal Health Coverage and Mobile Maternal Health Services to prevent and reduce death of mothers (Moindi *et al.,* 2016). Adoption of all these interventions would contribute to improved access and provision of quality maternal services thus lowering maternal and child mortalities (WHO, 2015).

Mobile Maternal Health Services (MMHS) is a well facilitated bus/van with the basic maternal health care services, operated by well-trained medical professionals who drop village by village at stipulated timings (Njuguna *et al.,* 2017). It involves using mobile devices that support delivery of services from distant places so as to check thus improving users' status of health (Akter *et al.,* 2013). The main difference between MMHS and traditional health services is that on adequate implementation they will ensure health services accessibility, individualized health solutions, timeliness of services, targeted information base and mobility (Kahn *et al.,* 2010).

This makes MMHS cheaper, accessible, most convenient and faster delivery of services (Chatterjee *et al.,* 2009).

The Government of Kenya, in 2016 initiated the idea of mobile maternal health services to bring services closer to people especially in far to reach areas (MOH, 2016). This has been adopted by county governments including Makueni. Currently there are three mobile maternal health clinics providing maternal services on a rotational basis at designated stations in the county. This addresses accessibility challenges especially in far to reach areas within the county.

1.2 Problem Statement

In the County of Makueni, MMR stands at 452/100,000 live births (DOH Makueni County, 2021). This is more than the national average which is 362 out of 100,000 live births (KDHS, 2014) while death of neonates is 21/1000 live births (KDHS, 2022). Despite this, home deliveries have been witnessed averaging at 18% nationally with Makueni County accounting for 11.9% (KDHS, 2022). Women are preferring home deliveries under the care of unskilled birth attendants leading to complications during delivery hence poor maternal and child outcomes.

On average, the nearest health facility distance to households is six Kilometers which is more than nationally recommended of four kilometers (Makueni County, 2013). Majority of the hospitals are located far apart with impassable roads becoming a hindrance in case of instant labor pains. This contributes to delays in accessing and receiving healthcare services. The impoverished women are mainly affected by costs directly or indirectly. It is approximated that 50% of communities are surviving below one dollar per day (MOH, 2015). The unending issue of deliveries at home has called

for measures to address these such as mobile maternal health services (Mulinge, 2017).

1.3 Justification

Since implementation of mobile maternal health services (MMHS) in Kenya in 2016, there is scanty information on its utilization especially in Makueni County. The county having adopted the idea, it was worthy undertaking this study. Makueni is among the counties with highest number of home deliveries and high maternal mortality rates in the country.

1.4 Research Questions

i. What proportion of women of reproductive age are utilizing mobile maternal health services in Makueni County?
ii. Which individual factors are associated with mobile maternal health services utilization among reproductive age women in Makueni County?
iii. What is the attitude towards mobile maternal health services utilization among women of reproductive age in Makueni County?
iv. Which health system factors are associated with mobile maternal health service utilization among reproductive age women in Makueni County?

1.5 Null hypotheses

i. There is no association between individual factors and utilization of mobile maternal health services among reproductive age women in Makueni County.
ii. Attitude is not associated with mobile maternal health services utilization among reproductive age women in Makueni County.
iii. Factors of the health system are not associated with mobile maternal health services utilization among reproductive age women in Makueni County.

1.6 Study Objectives

1.6.1 Main Objective

To establish mobile maternal health service utilization among reproductive age women in Makueni County, Kenya.

1.6.2 Specific Objectives

i. To determine the proportion of reproductive age women utilizing mobile maternal health services in Makueni County.
ii. To identify individual factors associated with mobile maternal health services utilization among reproductive age women in Makueni County.
iii. To determine attitude towards mobile maternal health services utilization among reproductive age women in Makueni County.
iv. To identify the factors within the health system that are associated with utilization of mobile maternal health services among reproductive age women in Makueni County.

1.7 Significance of the Study (Rationale)

The main beneficiaries targeted are reproductive age women through the health ministry and other associated stakeholders by identifying factors that may influence mobile maternal health services use. This would contribute positively to improve maternal and child health outcomes. Decision makers would structure policies aimed at reducing/prohibiting delivery at home and services of unskilled birth attendants. It also adds more information to the existing body of knowledge for reference later on.

This also forms part of efforts to attain Sustainable Development Goal (SDG) number three, especially target number one and two which would lower global MMR and curbing newborn and under 5 mortalities that are preventable (UNDP, 2015).

Moreover, this report would also be helpful to healthcare partners especially donors, as it would inform them of the rationale for continuing partnership with county governments. Conducting this study would act as a springboard towards deeper understanding of the dynamics in the healthcare sector in Kenyan rural areas; and this would significantly help to enrich the existing research on maternal healthcare utilization and the outcome in terms of reducing maternal mortality.

1.8 Limitations and Delimitations

1.8.1 Limitations

The principal investigator anticipated and encountered a number of challenges which included inaccessibility due to poor road networks and hence accessing most interior parts was difficult. This affected data collection exercises. Language barrier, especially when collecting data from mothers whose understanding of English language was an issue could have affected the quality of data. The study was limited to conducting Focused Group Discussions due to restrictions of COVID-19 on social distancing and assemblies affected collection of qualitative data.

1.8.2 Delimitations

In order to overcome the above limitations, the researcher sought services of motor bikes (*boda bodas*) as a means of transport in areas with poor road networks to navigate most interior parts of the county. Moreover, the issue of language barrier was solved by using research assistants who were trained and well versed with the local dialect. Due to the COVID-19 restrictions, only KIIs were done to obtain additional data while observing the Ministry of Health (MoH) protocols, where water and soap/sanitizers were provided for washing of hands, wearing of mask were mandatory

with the researcher providing them in cases where the respondents missed them and social distancing.

1.9 Conceptual Framework

The study's dependent variable was utilization of mobile maternal health services. The variables in the independent section were; socio-demographics such as status of marriage, age, religion, highest level of education attained and average monthly income; individual factors such as gravida, parity, awareness, maternal age and pregnancy related complication; attitude towards mobile maternal health services such as culture, beliefs, myths, self-vulnerability, spouse accompaniment, anxiety due to familiar women in the clinics, insufficient services and decision making; and health facility factors such as source of information, nearest facility distance, affordability of services, possession of a medical health insurance, waiting time and attitude of the healthcare personnel towards the mothers. This explains the linkage of independent factors towards use of mobile maternal health services.

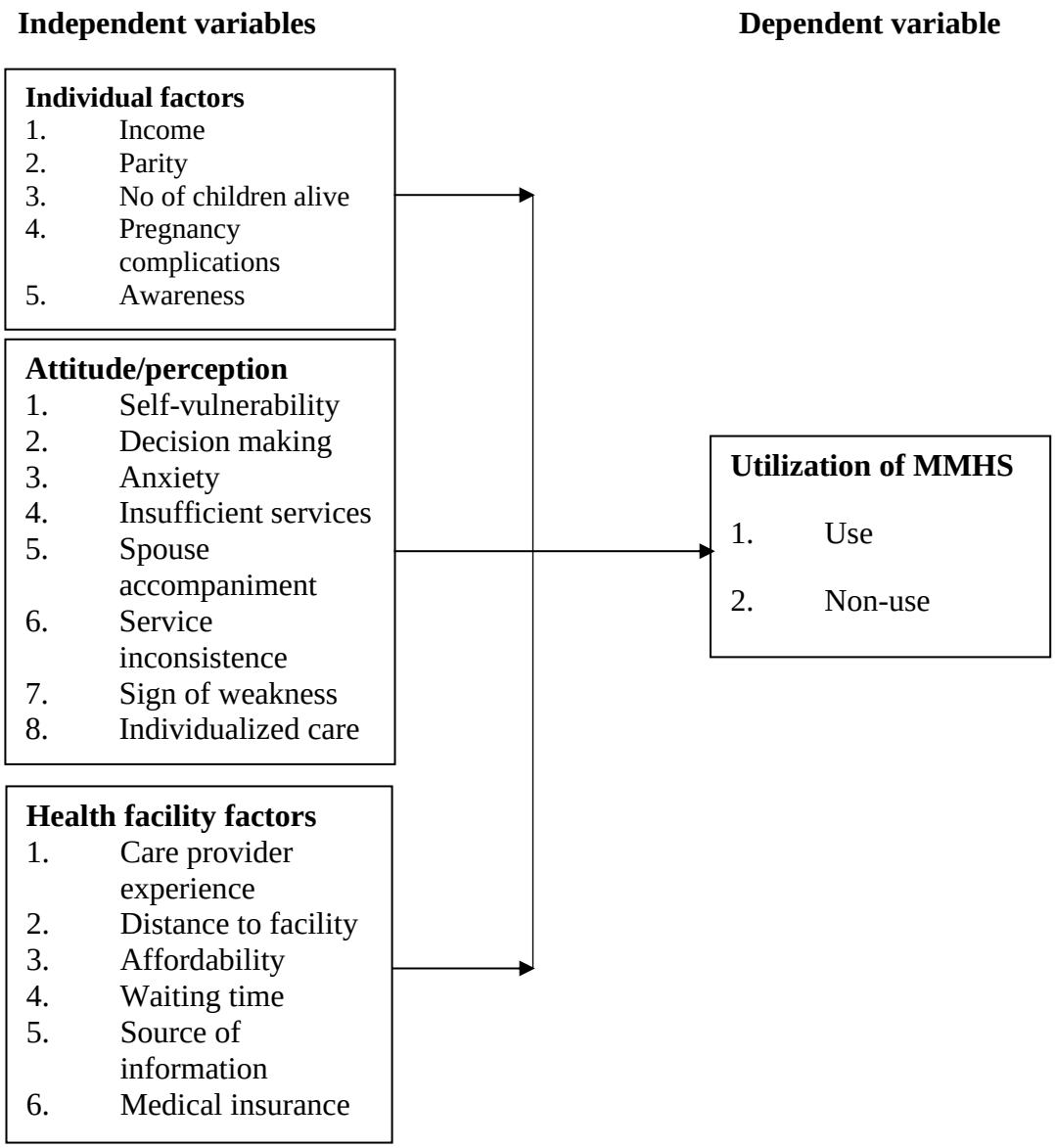

Figure 1.1: The conceptual framework

Source: Adopted and modified from Adane et al (2017).

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter presents extensive reviewed literature on mobile maternal healthcare service utilization. This covers overview of mobile maternal health services, individual, attitude, and health facility factors. Furthermore, summary of literature review has been provided exonerating existing gaps.

2.2 Mobile Maternal Health Services

Mobile maternal health services refer to a well facilitated bus/van with basic maternal health care services, operated by well-trained medical professionals dropping village by village at stipulated timings (Neke *et al.,* 2018). The services provided by mobile maternal health clinics include skilled birth attendance, family planning services, child growth monitoring and immunization are just but examples. Implementation of MMHS was an idea to bridge the gap on child and maternal healthcare utilization (Seebregts *et al.,* 2018). The main impediment to use of maternal services is mostly in remote and unreachable areas. These services are community-based hence factoring in cultural issues which may be a barrier in seeking services. This makes them appealing to community members from diverse cultural backgrounds (Attipoe-dorcoo, 2018).

Maternal health services are very critical in ensuring a healthy population prompting a lot of emphasis from governments across the world (Farah & Karim, 2016). Mobile healthcare facilities have emerged as one of the strategies aimed at ensuring accessibility and usage of healthcare services in the general population (Coleman *et al.,* 2020). In most interior parts in low income countries, socio-economic status affects maternal healthcare accessibility (Ali *et al.,* 2018). In the United States of

America, mobile clinics have increased accessibility to services especially remote parts with less uninsured individuals (Malone *et al.*, 2020).

In Europe, mobile clinics were used to provide ANC services among the most vulnerable populations such as frequent migrants. In Italy, MMHS were used to ensure equity in access to essential healthcare services (Borsari *et al.,* 2018). Research findings from India shows that MMHS innovation has led to increased visits to ANC and giving birth in facilities where they had been implemented (Ilozumba *et al.,* 2018). A study conducted in rural India, patient-centered mobile maternal services promoted utilization of antenatal services even among those who could otherwise not have had maternal services (Kojma *et al.,* 2017).

In other countries, MMHS have been integrated with m-health technologies to improve its effectiveness (Haddad *et al.,* 2019). This idea has also been adopted in some African countries. Studies from South Africa have indicated that MMHS have contributed to more than a half of ANC attendees (LeFevre *et al.,* 2018). Research findings from central Haiti, revealed that although mobile clinics were more efficient in serving larger number of pregnant women, they offered limited services and hence ineffective in offering comprehensive ANC services (Philips *et al.,* 2017). In rural Bangladesh, effective ANC services from mobile clinics improved service utilization among pregnant women from poor income areas and interior parts (Jo *et al.,* 2019).

The Kenyan Government through beyond zero campaigns in 2016, initiated the idea of mobile maternal health services bringing services closer to people especially in far to reach areas (MOH, 2016). Targeted patients are believed to be less educated, poorer and sicker compared to those using regional facilities. All the 47 counties grasped the idea with significant investments in MMHS, an alternative to using stationed health

facilities which may be costly (MOH, 2017). Community health workers are at the forefront of this initiative informing the general public on its importance. To increase acceptance, traditional healers and leaders from religious institutions have also enhanced collaborations. These services are provided on a rotational basis at designated stations within the counties (Davies *et al.,* 2018).

2.3 Individual factors

Accessing and utilizing healthcare services is anchored on the effect of socio-demographic factors. People from different socio-demographic backgrounds exhibit different patterns regarding maternal healthcare. In Ethiopia, women with considerable higher socio-economic status often start antenatal care (ANC) services much far earlier than their counterparts (Birmeta *et al.,* 2015). The issue of cost implications was among key impediments hindering women from lower socioeconomic status to utilize ANC services at fairly lower rates (Ali *et al.,* 2018). Moreover, literature has shown that lack of awareness affects utilization of ANC services for many women from low-income families, even if they are freely offered in available health facilities (Shahram *et al.,* 2015).

Education is another factor that influences access to mobile maternal health services in most rural populations (Ali *et al.,* 2018). Those with levels that are higher have increased odds of utilization (Efendi, 2016). It also affects individuals' perception and value for quality of healthcare. This is because mothers with low literacy levels prefer traditional treatment services in their communities to formal ANC services (Mulaki & Muchiri, 2019). Research shows that available maternal services automatically may not result to utilization of such services while education does some change of beliefs and attitudes (Shahram *et al.,* 2015).

Age has also been a researched factor with an effect on maternal health service use. However, different researchers have presented varying opinions in their explanations. Yaya *et al* (2018) showed that maternal age was a key factor in usage of maternal services in Benin. Young mothers have low odds to use such services as they don't have adequate experience as argued by Gadson *et al* (2017). Research findings from across African countries indicate that increase in age results to increased utilization of maternal services especially ANC services (Dimbuene *et al.,* 2018). In China, women of advanced ages visited ANC more than the young ones (Zhao *et al.,* 2017). This is perhaps due to past pregnancy experiences which contributed to their preference for formal and quality ANC services for successful pregnancy management, delivery and eventual PNC services.

Obstetric history also affects usage of maternal healthcare. Among most Sub-Saharan African countries, mothers portraying poor obstetric history sought more maternal health services (Geleto *et al.,* 2018). Some would like to deliver under SBA care but because of other circumstances they deliver at home or on their way to health facilities. This may affect maternal and child outcomes especially if complications occur. Women with bad historical trends of reproductive losses or pregnancy complications tend to go for ANC at early pregnancy stages compared to their counterparts with no history of complications (Ali *et al.,* 2018). Pre-existing health conditions requires much attention thus need for quality maternal healthcare. This calls for close monitoring of pregnancy to detect danger signs at early stages thus likelihood of using available maternal health services (Dimbuene *et al.,* 2018).

Research findings have shown that when mothers have been enlightened on significance of seeking maternity services from SBAs, they stand at higher chances

of utilizing them. Research from Bangladesh revealed that increasing level of awareness of mother-in-law's had a direct influence on professional deliveries among their daughter-in-law's (Shahabuddin *et al.,* 2017). However, this means that existence and availability of mobile maternal health services without improved awareness does not mean they would readily accept such services. A study done in Uganda reported that awareness improves mother's knowledge thus increasing usage of MMHS (Morgan *et al.,* 2017). Indian studies noted improving awareness led to change of attitude towards ANC and PNC services usage especially in rural areas (Chattopadhyay & Govil, 2021).

Maternal gravidity and parity influences MMHS utilization. Studies conducted in Madagascar reported that gravidity and parity were associated with more visits to mobile maternal health clinics (Benski *et al.,* 2020). Women with high parity sought more family planning services to prevent further pregnancies as shown from studies from Uganda (Anguzu *et al.,* 2018). In Indonesia, low parity was associated with high health facility visits. High parity women are presumed to have more maternal experiences hence little significance is attached to seeking skilled maternal health services during their subsequent pregnancies (Laksono *et al.,* 2020).

2.4 Attitude/perception

The attitude of mothers towards mobile maternal health services is at the center stage for service utilization. Myths and misconceptions play a key role in managing pregnancies as reflected in some religious and cultural perspectives. Studies from rural Indonesia indicates myths and norms on nutrition during PNC period as the main barrier towards maternal service utilization (Probandari *et al.,* 2017). Findings from Southeast Sulawesi, Indonesia, women trust traditional birth attendants (*Shaman*)

whom check their pregnancy status (Gobel *et al.,* 2019). Strong traditional and religious beliefs that men should not be involved in ANC utilization affecting partners seek for maternal health services. Comparatively Christians tend to go for ANC and delivering in hospitals than their Muslim counterparts (Mathe, 2017).

Self-vulnerability level on risks associated with pregnancy management and eventual child delivery among women also affects utilization of maternal health services. This affects taking precautions by seeking the services of skilled birth attendants to prevent poor maternal and child outcomes. During an epidemic like COVID-19, pregnant mothers fear not only going for ANC visits but also delivery at the hospital to avoid contradicting such infections (Nosratabadi *et al.,* 2020). This would expose them to pregnancy and delivery complications. Perceived poor outcome of delivery lures women to seek services of skilled attendants thus opting for seeking maternal health services from health facilities (Munkhondya *et al.,* 2020).

Making decisions about matters reproductive health is a serious concern. Men as heads of families dictates decisions regarding family matters especially in Africa. In Ethiopia, home delivery was as a result of power to make decisions (Berhe & Nigusie, 2020). Findings from Tanzania reported low women involvement in making decisions was the main barrier for ANC utilization (Gibore *et al.,* 2019). Research findings from Nepal revealed that the main decision maker regarding utilization of ANC services was the husband due to male dominance (Awasthi *et al.,* 2018).

Culture determines acceptance and usage of MMHS. Findings from Nigeria depicts that some cultures suggests that hospital delivery is for weak women (Egharevba *et al.,* 2017). Research done among the Karimojong mothers from Tanzania reported

that their cultures dictates that the placenta should be buried at home. This discouraged hospital delivery since they don't have access to the placenta for their own preferred disposal (Nayor, 2018). Reviewed literature from African has indicated that most women don't go for the ANC visits recommended due to cultural sensitivity (Esegbona-Adeigbe, 2018). In a Gambian study, high MMR was attributed to cultural beliefs restricting maternal health services usage (Lowe *et al.,* 2019).

2.5 Health facility factors

Factors within the health system may influence healthcare service utilization. Perceived attitude towards conduct of healthcare providers may make them shy off or use available services. Findings from Botswana revealed that poor attitude by healthcare providers negatively influenced pregnant women's desire to seek for ANC services (Mathe, 2017). Study findings from Kisumu County, in Kenya revealed perceived attitude influenced ANC visits made by service seekers (Kilowua & Otieno, 2019). According to research findings from Uganda, it was concluded that use of health services was influenced by the perceived negative attitude of healthcare providers (Morgan *et al.,* 2017).

Location of health facilities in terms distance is a long-term hindrance affecting maternal service utilization especially in sparse populations in arid and semi-arid regions. In Ethiopia, increase in distance to health facility resulted to reduced visits to ANC (Tegegne *et al.,* 2019). Ideally, the concept of MMHS was designed to improve utilization of such services in poor access and hard to reach areas. Results from five major towns in Kenya showed that women were willing to travel longer distances at an average of 4.5 kilometers to obtain free maternal services in public hospitals

(Escamilla *et al.,* 2018). In Sierra Leone, it was reported that distant health facilities encouraged home deliveries (Treacy *et al.,* 2018).

Nowadays, affording maternal care has been easier through strategies adopted by different stakeholders. These services have been made to be relatively cheaper. Despite most of them being free or subsidized, women incur some expenses to access them. Findings from Benin reported that cost hindered service accessibility (Yaya *et al.,* 2018). High costs of transportation barred women from hospital delivery even if they were subsidized in Tanzania (Ngowi *et al.,* 2017). Studies from Zambia reported that rural women had low odds of utilizing MMHS as they were poor hence couldn't manage costs attributed to service provision directly and indirectly (Jacobs *et al.,* 2017).

Long waiting time especially in public health facilities witnessed in Nigeria through long queues barred maternal health service utilization (Okonofua *et al.,* 2017). Bringing services closer to people eases congestion in public health facilities hence increased maternal service utilization. Patients kept relatively longer waiting for services results to dissatisfaction. They may shy off from seeking subsequent services in such health facilities (Gitobu *et al.,* 2018). In Yemen, long waiting time was a significant factor that affected ANC utilization resulting to introduction of mobile maternal health clinics as an alternative (Othman *et al.,* 2017).

Healthcare professionals should pay attention on concerns of patients, offer advice that is reliable, and convey information that is accurate. These empowers mothers to make informed decisions about use of maternal services (Kamali *et al*., 2018). Kenyan findings are showing that most of those who got information on free delivery from

social media utilized maternal health services (Njuguna *et al.*, 2017). In Bangladesh, relatives were the main source of information about availability of MMHS (Akter *et al.*, 2020).

2.6 Reviewed Literature Summary and Gaps

Based on the review of literature, most past studies have paid attention to use of maternal health services at established facilities enhancing accessibility and quality of service provision. A number of factors likely to contribute to service usage among reproductive age women as indicated in some studies have been identified ranging from individual, health facility to organizational context factors. Empirical research conducted from other countries across the world shows that MMHS has improved access to maternal care services, quality and awareness of programs. However, scanty information is available on the utilization of MMHS since its inception in Kenya in 2016 despite all the 47 counties significantly backing the idea through massive investments. So far, very little empirical evidence exists on user quality perceptions regarding maternal care services offered to the people in rural areas. Moreover, utilization in terms of coverage in rural areas in Makueni, given its high maternal mortality rates and sparse populations, remains scanty. Therefore, this study is expected to bridge the existing gaps in knowledge and literature.

CHAPTER THREE: METHODS AND MATERIALS

3.1 Introduction

The chapter outlines the methods used by the researcher in conducting this investigation. The choice of the research design and methods of collecting data were well-versed by the nature of the enquiry problem. The chapter focused on research variables, study location, study and population targeted, techniques of sampling, instruments and data collection methods, analysis of data and concerns of ethics.

3.2 Study Design

An analytical cross-sectional study design was applied. In line with research objectives, this analyzed the individual factors, nature of attitude and health facility factors linked to MMHS utilization among reproductive age women in Makueni County, Kenya.

3.3 Variables

3.3.1 Independent Variables

This included individual factors like parity, income, number of children, bad obstetric history and awareness on mobile maternal health services. This was measured using a checklist. The second independent variable was health facility factors including health care provider experience, facility distance, cost, possession of medical insurance, waiting time and source of information. The factors were measured using a checklist.

The third independent variable was attitude towards mobile maternal health services. This included factors such as self-vulnerability, decision making, healthcare sign of weakness, anxiety, spouse accompaniment, insufficient services in MMH clinics, and inconsistent use of services in MMH clinics and provision of individualized care. Its

measurement entailed using a five-point Likert scale with scores ranging from 1-5 with “1” signifying agreeing strongly while “5” signifying disagreeing strongly. There were eight statements where participants were required to pick what they think would most suitably answer. Eight would be the minimum score while forty was the maximum score. A score ranging 8-24 was categorized to be a negative attitude while 25-40 as a positive attitude.

3.3.2 Dependent Variable

This was utilization of mobile maternal health services. The utilization rates were determined by enquiring whether respondents had ever used any MMHS. The expected outcome was use and non-use of mobile maternal health services.

3.4 Study location

The County of Makueni was previously in the past Eastern Province. Wote is its largest town and capital. The population in the county is 987,653 and covers 8,008.9 km² (KNBS, 2019). There are six (6) sub-counties which include: Mbooni, Kilome, Kaiti, Makueni, Kibwezi West and East Constituencies. It lies 144 KM from Nairobi, Kenya’s capital City. It is ranked amongst the poorest counties hence with many challenges towards access to medical services which include; far located facilities, information deficiencies, poorly equipped and inadequate medical services, cultural practices and beliefs especially in interior parts of the county and poor socio-economic status.

3.5 Study population

This encompassed reproductive age women (15 to 49 years) with at least 20 gestation weeks or have given birth at least 6 months post-delivery and had lived in the county for at least 6months. This group was the primary target for this study as highlighted

in the target population for conduction of interviews on accessibility and usage of mobile child and maternal health services. Moreover, their perception towards the mobile health services and also service providers so as to get their views/perceptions on the trends, challenges, and prospects made within the region.

3.5.1 Criteria for Inclusion

Pregnant women with at least 20 gestation weeks and postnatal women 6 months post-delivery living in Makueni County were included. Those who lived in the county exceeding 6 months, aged between 15-49 years and gave consent to participate were included.

3.5.2 Exclusion criteria

It excluded very sick respondents thus incapable to take part.

3.6 Techniques of Sampling and Determining Sample Size

3.6.1 Sampling techniques

The choice of Makueni County informed by it having a high number of women delivering at home. Kaiti and Kibwezi East sub-counties were randomly selected whereby Ukia Ward from Kaiti sub-county and Nzambani Ward from Kibwezi East were also randomly selected. Mang'elete sub-location from Nzambani Ward and Utaati and Iuani sub-locations from Ukia Ward were also randomly selected. A third of the villages were sampled from the respective sub-locations. Study participants from households were chosen through systematic random sampling at an interval of 5. Riffles were used to select first participant randomly. Respondents sampled were proportionate to the number of reproductive age women from every selected sub-location. The KIIs were chosen due to their experience and knowledge. A total of 12 KIIs comprising of 3 health center in-charges, 3 MCH in-charges, 3 community health extension workers and 3 mobile health clinic staffs.

Table 3.1: Selection of participants proportionately

Sub-county	Wards	Sub location	Villages	Total HHs	Sampled HHs
Kaiti	Ukia	Utaati	5	326	60
		Iuani	3	156	28
Kibwezi East	Nzambani	Mang'elete	11	1530	279
Total			**19**	**2012**	**367**

3.6.2 Determining Sample Size

This was informed by Taro and Yamane (1967).

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

Where: n = desired sample size

N = the population size (2012)

e =the acceptable sampling error (0.05)

Therefore, $n = \frac{2012}{1+2012(0.05)^2} = 334.$

To cater non-responses 10% of participants were included to account. Therefore, making a total of 367 who were proportionately selected.

3.7 Research Instruments

Questionnaires that were structured assisted in quantitative data collection. All variables covered includes; socio-demographic factors, individual factors, nature of attitude, hospital factors and MMHS utilization. Key Informant Interview (KII) guides helped in collecting additional data qualitatively from community health extension workers, healthcare providers and local administrators.

3.8 Research Instrument Pre-Testing

All the instruments used in this research were pretested at Kilome Sub- County in Makueni County with 37(10%) of respondents. This ensured reliable and valid tools

through improving level of understanding and making necessary corrections as may be required.

3.8.1 Validity of instruments

To ensure this, opinions from experts were sought including study supervisors. Structuring of research tools well and ensuring that the variables addressed was done. Adoption of sampling methods resulted to randomization ensuring sample representativeness. The techniques of generating random samples and population homogeneity enhanced internal validity while selection of a large random sample ensured external validity.

3.8.2 Reliability of instruments

To achieve consistent result generation, the RAs were selected, trained while later familiarised with research topic and area before actual collection of data. Pretesting of instruments of research was conducted and necessary amendments made Sekaran, 2013).

3.9 Data Collection Techniques

In collecting data for this study, the researcher adopted self-administered questionnaires whereby I relied on sub-chiefs and '*Nyumba Kumi'* officials in identifying potential participants who were walking with them from household to household to offer protection to them. The researcher then visited each selected participant with a questionnaire and conducted a one-on-one interview through assistance from 2 research assistants engaged in data collection. Overall data collection process took a month and half starting on mid-June to end July 2022. Being self-administered research, the investigator and RAs were keen on ensuring credibility and strict level of integrity was upheld in the exercise.

3.10 Analysis of Data and Presentation

Various data analysis methods were adopted. For quantitative data, SPSS (22.0) software for analysis was adopted. The results were presented through graphs, percentages, charts and frequency tables. After doing Chi-square tests to generate inferential statistics at 95% CI and precision error of 0.05, presentation was done by cross tabulations. Qualitative data from KII were expressed as direct narrations.

3.11 Ethical Considerations

The Graduate School of Kenyatta University provided research approval. Ethically, it was cleared by Kenyatta University's Ethics and Review Committee (KUERC). The National Council for Science, Technology and Innovation (NACOSTI) also provided the necessary research permit. Research authorization from Makueni County Commissioner, County Director of Health Services were obtained. The researcher also sought informed consent from research participants before interviewing them.

CHAPTER FOUR: RESULTS

4.1 Introduction

There were 367 questionnaires given to reproductive age women with at least 20 weeks gestation or those who had given birth at least 6 months post-delivery in Makueni County. They were required to fill in their responses regarding utilization of mobile maternal health services. After completing collection of data from the respondents, 347 questionnaires filled duly were collected and analyzed with a 94.6% rate of response.

4.2 Demographic Characteristics

4.2.1 Distribution of Respondents' socio-demographic traits

The findings showed that 119 (34.3%) of the participants were aged between 20-29 years followed by 103 (29.7%) who were aged 30-39 years. 178 (51.3%) of the respondents had secondary level of education followed by 82 (23.6%) with tertiary level.

On marital status, results showed that 198 (57.1%) of them were married while 83 (23.9%) were single. Protestants were 171 (49.3%) followed by 154 (44.4%) Catholics. Results depicted that 149 (42.9%) were self-employed followed by 131 (37.8%) who were not employed. Result were as table 4.1 below.

Table 4.1: Distribution of socio-demographic characteristics among respondents (n=347

Variable	Respondent response	Frequency (N)	Percentage (%)
Age in years	≤19	51	14.7
	20-29	119	34.3
	30-39	103	29.7
	40-49	74	21.3
Highest level of education attained	No formal education	29	8.4
	Primary	58	16.7
	Secondary	178	51.3
	Tertiary	82	23.6
Marital status	Single	83	23.9
	Married	198	57.1
	Divorced/widowed/separated	66	19.0
Religion	Protestants	171	49.3
	Catholics	154	44.4
	Muslims	22	6.3
Occupation	Not employed	131	37.8
	Self-employed	149	42.9
	Employed	67	19.3

4.2.2 Socio-demographic Factors Associated with Utilization of MMHS

The study results revealed that 91 (44.2%) of the respondents aged between 20-29 years did not utilize mobile maternal health services. There was a significant statistical association between age of respondents use of mobile maternal health services (p=0.001). One of the Nurse who was in charge of a clinic in a KII session reported;

"…most of the clients who come to these mobile clinics for services especially family planning are the young women. Most of them tell us that the mobile clinics are very convenient for them with their busy schedules of working and learning. They find these services also appealing in terms of saving time as compared to the hospitals where you will have to wait for longer to be served because of the high number of clients…"

(**KII Respondent**)

About 79 (56.0%) of respondents with secondary level of education had utilized mobile maternal health services. The results further showed that education was associated with utilization of mobile maternal health services (p=0.019). Most 95 (67.4%) of those who were married had utilized mobile maternal health services. There was a significant statistical association between status of marital and mobile maternal health services utilization (p=0.007). Results on religion, 78 (55.3%) of the respondents who were Protestants had used mobile maternal health services. However, religion did not influence utilization of mobile maternal health (p=0.583).

Further 66 (46.8%) of the respondents who were not employed utilized mobile maternal health services. There was a significant statistical association between status of occupational and utilization of MMHS (p=0.026) as shown in Table 4.2. The results were echoed by a hospital administrator who was part of a Key Informant Interview session as he reported;

"…as much as we offer the services free of charge here some women cannot be able to afford the transport money to the facility. To reach the health facility they may be required to part with at least Kshs.100 which is quite a lot for them since most are not employed. That's why the county embraced this idea of mobile clinics so that we can be able to take the services especially in the difficulty to reach areas. The uptake has really been encouraging and I hope we continue scaling up and increasing the number of service providers and the clinics…" **(KII Respondent).**

Table 4.2: Association of socio-demographics and utilization of MMHS (n=347)

Independent variable	Response	Utilization of MMHS		Statistical significance
		Use (N= 141)	Non-use (N=206)	
Age in years	≤19	14(9.9%)	37(18.0%)	χ^2=23.366
	20-29	28(19.9%)	91(44.2%)	df=3
	30-39	56(39.7%)	47(22.8%)	p=0.001
	40-49	43(30.5%)	31(15.0%)	
Highest level of education attained	No formal education	7(5.0%)	22(10.7%)	χ^2=56.665
	Primary	12(8.5%)	46(22.3%)	df=3
	Secondary	79(56.0%)	99(48.1%)	p=0.019
	Tertiary	43(30.5%)	39(18.9%)	
Marital status	Single	31(22.0%)	52(25.2%)	χ^2=13.573
	Married	95(67.4%)	103(50.0%)	df=2
	Divorced, widowed or separated	15(10.6%)	51(24.8%)	p=0.007
Religion	Protestants	78(55.3%)	93(45.1%)	χ^2=1.078
	Catholics	55(39.0%)	99(48.1%)	df=2
	Muslims	8(5.7%)	14(6.8%)	p=0.583
Occupation	Not employed	66(46.8%)	65(31.5%)	χ^2=7.334
	Self-employed	58(41.1%)	91(44.2%)	df=2
				p=0.026
	Employed	17(12.1%)	50(24.3%)	

4.3 Utilization of MMHS

4.3.1 Ever utilized mobile maternal health services

Results showed that 206 (59.4%) of the participants had never utilized mobile maternal health services while the rest 141 (40.6%) had utilized the mobile maternal health services. The results were as shown in the figure 4.1 below.

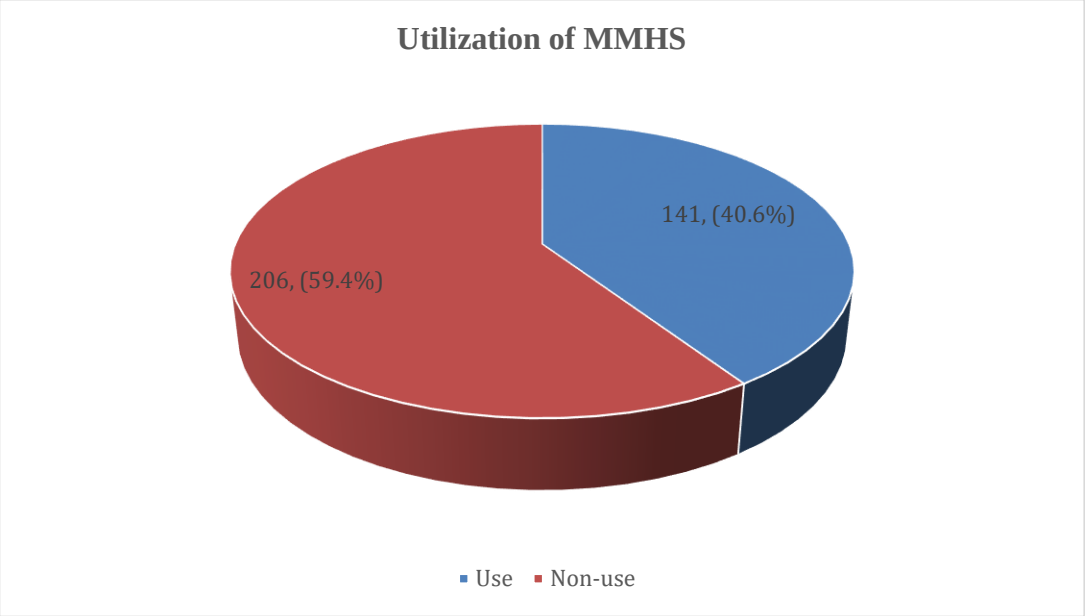

Figure 4.1: Ever utilized mobile maternal health services

4.3.2 Type of services sought in MMHS

Concerning the most recent type of service sought by the respondents, results revealed that 89 (29.3%) had sought for antenatal care services followed by 81 (26.6%) of those who had sought for family planning services. The results on most recent type of service sought was as presented in table 4.3. In connection with this, a Nurse in a KII session claimed;

"…we offer all the MCH services in the mobile clinics but when we compare the services utilized more, we find out that most women seek ANC services here. Initially they used to complain of distance as a key barrier to seeking for the ANC services. The mobile clinics have really increased the ANC service utilization since now most women are able to attend the clinics for the recommended 4 visits. Even the uptake of services like family planning has increased as well as we have had a great reduction of home deliveries which were common before the implementation of the mobile maternal health services…" **(KII Respondent).**

Table 4.3: Type of service sought in MMHS (n=304)

Variable	Response	Frequency (N)	Percentage (%)
Most recent type of service sought	Family planning	81	26.6
	Antenatal care	89	29.3
	Preconception care	37	12.2
	Delivery	22	7.2
	Postnatal care	75	24.7

4.3.3 Organization/program responsible for MMHS

On whether the respondents who had sought for the MMHS were aware of the organization/program responsible for the mobile maternal health services, results showed that more than half 81 (57.9%) reported that beyond zero provided van run by the county was responsible followed by 29 (20.7%) who reported that the county provided vans were responsible for the clinics. The results were as shown in figure 4.2 below.

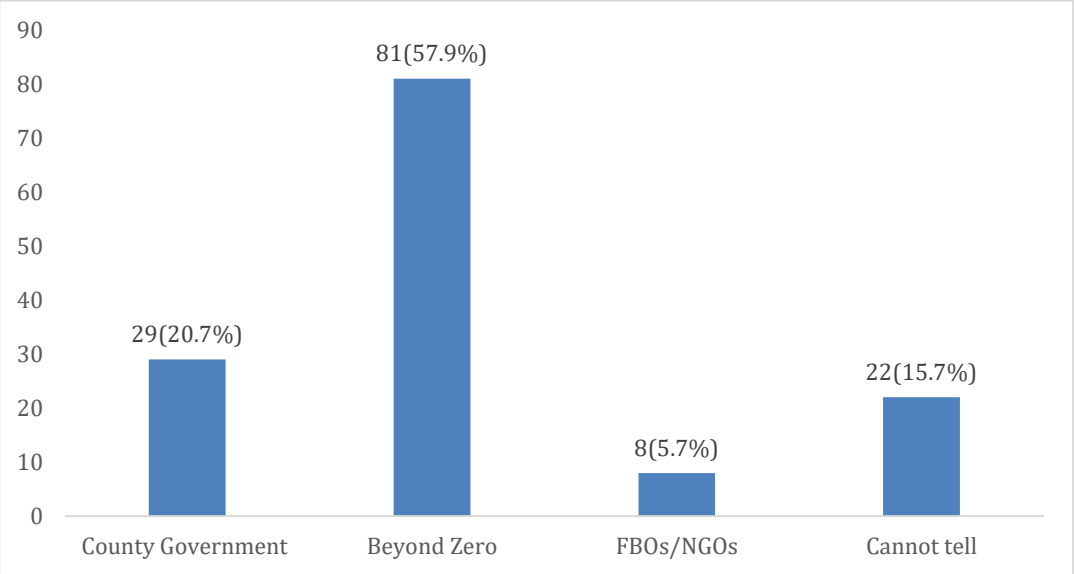

Figure 4.2: Organization/program responsible for running MMHS

4.3.4 Reasons for seeking MMHS

Results revealed that 52 (37.1%) of the respondents sought for the services because the health facilities were distant followed by 37 (26.4%) who sought for services at

the mobile clinics because they were readily available. The results were as shown in the figure 4.3 below.

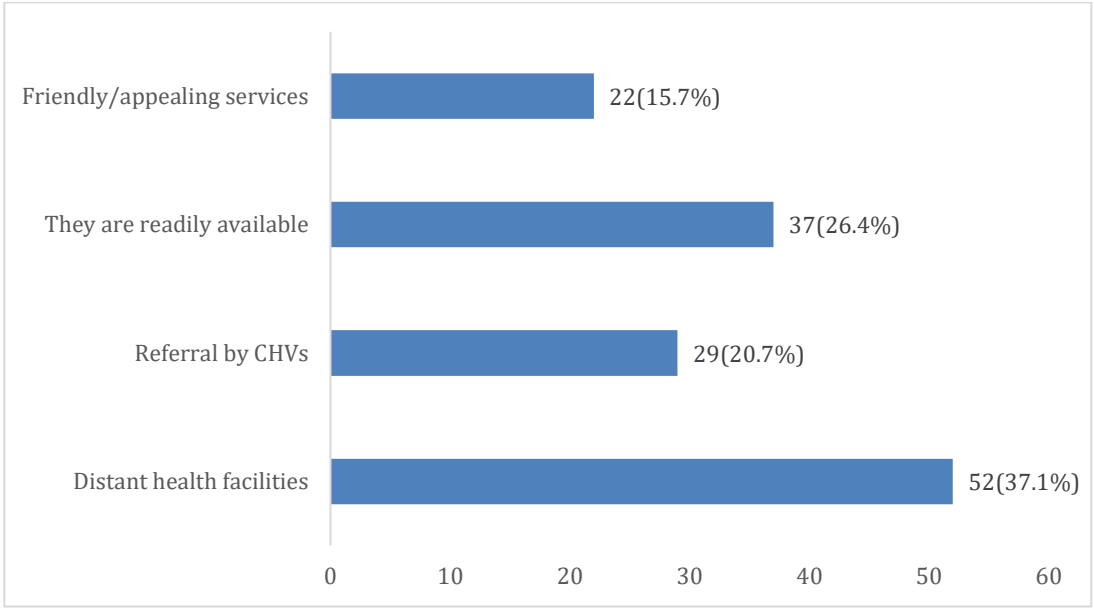

Figure 4.3: Reasons for seeking MMHS among respondents

4.3.5 Reasons for non-use of MMHS

The researcher sought to find out reasons for the non-use of mobile maternal health services, results showed that 67 (32.45) did not seek for services at the mobile clinics because they had preference for hospitals followed by 59 (28.5%) of those who lacked information about mobile clinics. The results were as shown in the figure 4.4 below.

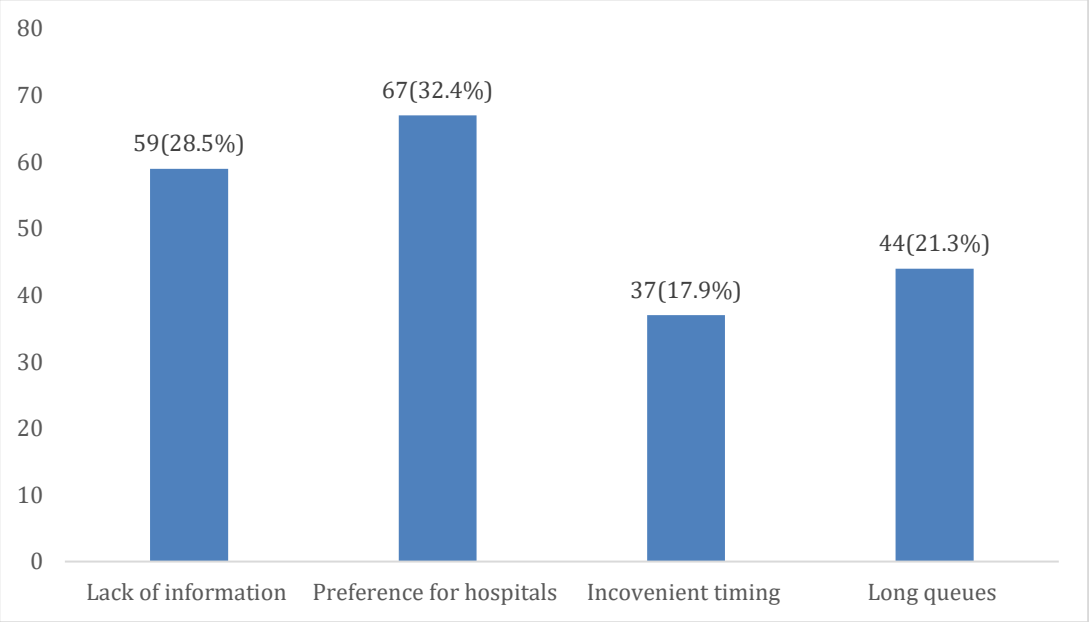

Figure 4.4: Reasons for non-use of MMHS among respondents

4.4 Individual factors

4.4.1 Distribution of individual factors

Results on average family monthly income revealed that 135 (38.9%) earned between Kshs 5001-10000 followed by 67 (19.3%) who eared Kshs 5,000 or less. Concerning parity, 133 (38.3%) had a parity of 3 or 4 followed by 119 (34.3%) who had a parity of 1 or 2. Further 127 (36.6%) of them had 3 or 4 children alive followed by 101 (29.1%) who had 1 or 2 live children. On whether the respondents had ever experienced any pregnancy related complication, results showed that majority 251 (72.3%) had never had any complication while the rest 96 (27.7%) reported to have ever had a complication.

On the type of complication was experienced, results revealed that 38 (39.6%) of the respondents had experienced postpartum hemorrhage followed by 27 (28.1%) who had experienced postpartum sepsis. Majority 228 (65.7%) knew MMHS existed while the rest 119 (34.3%) weren't aware. The results are as in table 4.4 below.

Table 4.4: Distribution of individual factors (n=347)

Variable	Response	Frequency (N)	Percentage (%)
Average monthly family income in KShs	≤ 5000	67	19.3
	5001-10000	135	38.9
	10001-15000	57	16.4
	15001-20000	51	14.7
	> 20000	37	10.7
Parity	0	44	12.7
	1-2	119	34.3
	3-4	133	38.3
	≥ 5	51	14.7
Number of children alive	0	82	23.6
	1-2	101	29.1
	3-4	127	36.6
	≥ 5	37	10.3
Ever experienced pregnancy related complications	Yes	96	27.7
	No	251	72.3
Type of pregnancy related complication experienced	Postpartum hemorrhage	38	39.6
	Postpartum eclampsia	20	20.8
	Postpartum sepsis	27	28.1
	Puerperal psychosis	11	11.5
Awareness on mobile maternal health services	Yes	228	65.7
	No	119	34.3

4.4.2 Individual factors influencing mobile maternal health services

Results showed that 56 (39.7%) of the respondents who earned between Kshs 5001-10,000 had utilized mobile maternal health services. There an association between income for the family and utilization of mobile maternal health services (p=0.001). On parity, 69 (48.9%) of those who had 3 or 4 had utilized mobile maternal health services. Parity influenced utilization of MMHS (p=0.019).

Concerning children alive, 92 (44.7%) of the respondents who had 3 or 4 live children did not utilize mobile maternal health services. However, there was no association between number of alive children and use of mobile maternal health (p=0.072). On whether the respondents had ever experienced pregnancy related complications,

majority 108 (76.6%) of those who never had a complication had utilized mobile maternal health services. There was no statistically significant association between ever had a pregnancy related complication and utilization of mobile maternal health services (p=0.168). However, qualitative results from Key Informant session reported; "*…some clients who use our services confirm to us that indeed the fear of previous complications made them to use mobile clinics that are near them. When they get any sign of discomfort in the course of their pregnancy they have to come to our clinics for assessment and advice. They have mastered the days the clinics are coming near their home and they always get in touch with the community health volunteers who will always remind them on the day when the clinics will be coming to their community…*" **(KII Respondent).**

Regarding the type of pregnancy related complication experienced, results showed that 28 (42.4%) of the respondents who had experienced hemorrhage had never utilized mobile maternal health services (p=0.027). Most 101 (71.6%) of them were aware of mobile maternal health had utilized them. Further results showed that awareness on mobile maternal health services influenced its utilization (p=0.006). Results are as presented in table 4.5 below.

Table 4.5: Individual factors associated with utilization of mobile maternal health services (n=347)

Variable	Respondent response	Utilization of MMHS		Statistical significance
		Use (N= 141)	Non-use (N=206)	
Average monthly family income in Kenya shillings	≤ 5000	37(26.2%)	30(14.6%)	χ^2=68.119 df=4 p=0.001
	5001-10000	56(39.7%)	79(38.3%)	
	10001-15000	13(9.2%)	44(21.4%)	
	15001-20000	16(11.3%)	35(17.0%)	
	> 20000	19(13.5%)	18(8.7%)	
Parity	0	15(10.6%)	29(14.1%)	χ^2=58.075 df=3 p=0.019
	1-2	31(22.0%)	88(42.7%)	
	3-4	69(48.9%)	64(31.1%)	
	≥ 5	26(18.4%)	25(12.1%)	
Number of children alive	0	29(20.6%)	53(25.7%)	χ^2=6.711 df=3 p=0.072
	1-2	55(39.0%)	46(22.3%)	
	3-4	35(24.8%)	92(44.7%)	
	≥ 5	22(15.6%)	15(7.3%)	
Ever experienced pregnancy related complications	Yes	33(23.4%)	63(30.6%)	χ^2=37.337 df=1 p=0.168
	No	108(76.6%)	143(69.4%)	
Type of pregnancy related complication experienced	Hemorrhage	10(33.3%)	28(42.4%)	χ^2=9.141 df=3 p=0.027
	Eclampsia	9(30.0%)	11(16.7%)	
	Postpartum sepsis	5(16.7%)	22(33.3%)	
	Puerperal psychosis	6(20.0%)	5(7.6%)	
Awareness on mobile maternal health services	Yes	101 (71.6%)	127 (61.7%)	χ^2=5.536 df=1 p=0.006
	No	40 (28.4%)	79 (38.3%)	

4.5 Attitude towards mobile maternal health services

Regarding attitude towards mobile maternal health services, there were eight (8) likert scale statements of points 1-5 where ‘1’ meant strongly agree, ‘2’ agree, ‘3’ neutral, ‘4’ disagree and ‘5’ meant strongly disagree.

4.5.1 Attitude responses towards mobile maternal health services

Results on responses on attitude towards mobile maternal health services revealed that, 121 (34.9%) of the respondents disagreed and 94 (27.1%) strongly disagreed that

delivery in a mobile maternal health clinic was a sign of weakness. On whether complication development was not risky in pregnancy and delivery, results depicted that 115 (33.1%) of the respondents were neutral followed by 72 (20.7%) who disagreed. More than a third 127 (36.6%) and 65 (18.7%) of them disagreed strongly and disagreed respectively that seeing familiar women increased anxiety in seeking mobile maternal health services.

Results further revealed that 127 (36.6%) strongly agreed followed by 72 (20.7%) agreed that only women should make decisions regarding mobile maternal health services utilization. Concerning respondents feeling embarrassed being accompanied by a spouse to mobile clinics results showed that 142 (40.9%) were neutral followed by 84 (24.2%) strongly agreed with the statement. Less than a third 103 (29.7%) agreed and 62 (17.9%) strongly agreed with the statement that mobile clinics availed services with no guarantee for consistent use.

Regarding to whether mobile clinics offered insufficient services, results showed that 119 (34.3%) strongly disagreed followed by 86 (24.8%) disagreed with the statement. Concerning mobile maternal health services offering individualized care although culturally incoherent results showed that 106 (30.5%) disagreed followed by 87 (25.1%) who strongly disagreed with the statement. Results are as presented in table 4.6 below.

Table 4.6: Responses on attitude towards mobile maternal health services among respondents (n=347)

Independent Variable	Response				
	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Delivery in a mobile maternal health clinic is a sign of weakness	42(12.1%)	53(15.3%)	37(10.7%)	121(34.9%)	94(27.1%)
Complication development is not risky in pregnancy and delivery	61(17.6%)	44(12.7%)	115(33.1%)	72(20.7%)	55(15.9%)
Seeing familiar women increases anxiety in seeking MMHS	58(16.7%)	51(14.7%)	46(13.3%)	65(18.7%)	127(36.6%)
Only women should make decisions regarding MMHS utilization	127(36.6 %)	72(20.7%)	56(16.1%)	64(18.4%)	28(8.1%)
It's embarrasses being accompanied by a spouse to mobile clinics	84(24.2%)	35(10.1%)	142(40.9%)	32(9.2%)	54(15.6%)
Mobile clinics avails services with no guarantee for consistent use	62(17.9%)	103(29.7%)	30(8.6%)	67(19.3%)	85(24.5%)
Mobile clinics offers insufficient services	57(16.4)	63(18.2%)	22(6.3%)	86(24.8%)	119(34.3%)
MMHS offer individualized care although culturally incoherent	43(12.4%)	37(10.7%)	74(21.3%)	106(30.5%)	87(25.1%)

4.5.2 Attitude level towards mobile maternal health services

Eight (8) statements on attitude had a low score of 8 and high score of 40. Then they were categorized into negative and positive. Whereby, 8-24 was categorized as negative attitude while those between 25-40 represented positive attitude. Further results depicted 208 (59.9%) of the respondents with positive attitude while the rest

139 (40.1%) had negative attitude towards mobile maternal health services. The results were as shown in the figure 4.5.

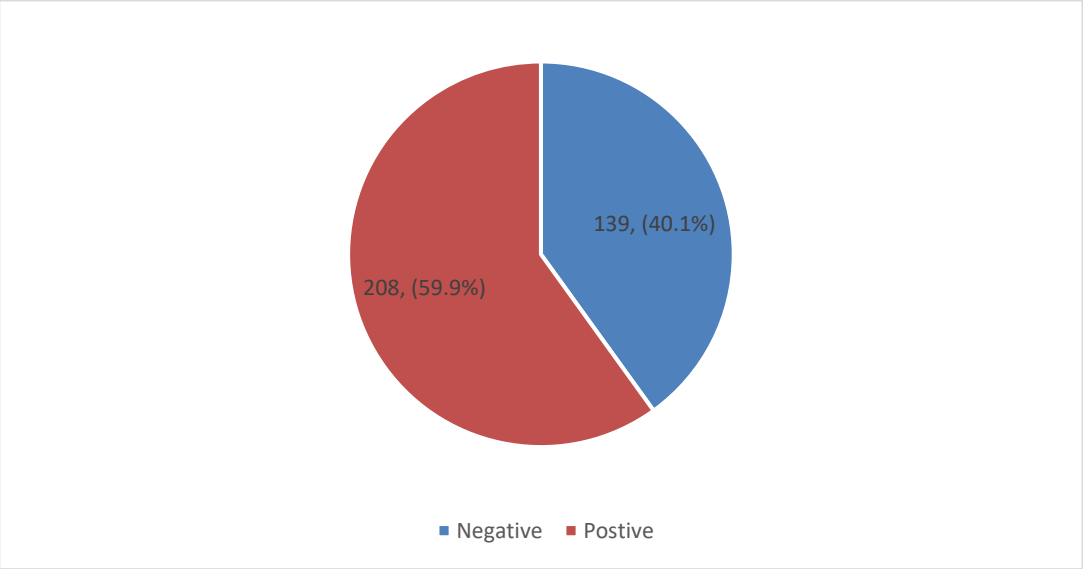

Figure 4.5: Attitude towards MMHS

4.5.3 Influence of Nature of attitude on utilization of mobile maternal health services

Majority 101 (71.6%) of the respondents who had positive attitude towards mobile maternal health services had utilized the services. Nature of attitude significantly influenced utilization of MMHS (p=0.010). The results were presented in table 4.7. In connection with this, a County reproductive health officer during a Key Informant session reported;

"*…most women we have tried to reach over utilization of the mobile maternal health services have been so positive. Most who are not using such service did not know whether they existed they even said they would prefer to be access the services since they are brought near their homes for their convenience. Some challenges like distance to nearest facility and cost of transport will no longer be an issue to them since the services come to just a walking distance from their home. Since the clients*

are acceptable to the services it is our work to ensure they get adequate information through sharing information though the churches, schools, market places and other places where women gather. This way we will increase the awareness and thus utilization of the services…" **(KII Respondent).**

Table 4.7: Attitude level and utilization of MMHS (n=347)

Independent variable	Response	Utilization of MMHS		Statistical significance
		Use (N= 141)	Non-use (N=206)	
Level of attitude	Negative	40(28.4%)	99(48.1%)	χ^2=6.558 df=1 p=0.010
	Positive	101(71.6%)	107(51.9%)	

4.6 Health system factors

4.6.1 Responses on health system factors

Results on distribution of health system factors revealed that 133 (38.3%) reported that the distance was between 4-5kilometers and 96 (27.7%) whose distance was more than 5 kilometers. Community health volunteers were the main source of information on mobile maternal health services to 76 (33.5%) of the respondents followed by 64 (28.2%) who got information from health care providers. Results of waiting time showed that 140 (40.3%) waited for 2-4 hours followed by 126 (36.3%) who reported to have waited for more than 3 hours in their last visit to the facility.

Most 259 (74.6%) of the respondents possessed a medical insurance while the rest 88 (25.4%) who did not have any medical health insurance. Among those who had a medical insurance more than half 141 (54.4%) had Linda mama followed by 88 (34.0%) of those who had NHIF.

185 (53.3%) reported that maternal health services from the nearest health facility expensive to them followed by 117 (33.7%) who reported that the services were inexpensive to them. Further results revealed that 148 (42.7%) of the respondents'

experience with providers was good in their last visit to the facility followed by 133 (38.3%) who had fair experience. The results were as shown in table 4.8 below.

Table 4.8: Distribution of health system factors among respondents (n=347)

Independent variable	Response	Frequency (N)	Percentage (%)
Distance to facility	≤ 1 KM	44	12.7
	2-3 KM	74	21.3
	4-5 KM	133	38.3
	> 5 KM	96	27.7
Source of information on mobile maternal health services	Friends/relatives	43	18.9
	Religious leaders	14	6.2
	CHVs	76	33.5
	Healthcare provider	64	28.2
	Media	30	13.2
Waiting time	≤ 1 Hour	81	23.3
	2-3 Hours	140	40.3
	> 3 Hours	126	36.3
Possession of a medical health insurance	Yes	259	74.6
	No	88	25.4
Main type of insurance in possession	Linda mama	141	54.4
	NHIF	88	34.0
	Private insurance	30	11.6
Affordable maternal health services from nearest facility	Yes	117	33.7
	No	185	53.3
	Cannot tell	45	13.0
Experience with healthcare provider	Good	148	42.7
	Fair	133	38.3
	Poor	66	19.0

4.6.2 Health system factors associated with MMHS utilization

More than half 74 (52.5%) of those whose distance to the facility near to them had utilized mobile maternal health services. Statistically distance influenced use of MMHS (p=0.001) 37(45.1%) who got information on mobile maternal health services had utilized the services. Information source influence the utilization of mobile maternal health services (p=0.012).

Most 165 (80.1%) of respondents with a medical health insurance did not utilize mobile maternal health services. However, possession of medical health insurance was not significantly associated with utilization of mobile maternal health services

(p=0.755). More than half 90 (58.1%) of respondents who possessed Linda mama did not utilize mobile maternal health services. Type of health insurance didn't influence utilization on MMHS (p=0.067). 69(48.9%) of those who reported waiting time to be less or equal to an hour had utilized MMHS. Statistically, waiting time affected utilization of MMHS (p=0.004). Nurse in charge of a mobile clinic during a Key Informant session reported;

"*…most women here are farmers so they prefer a place where they can be served so fast within an hour or less so that they can go about their other businesses. In the clinic we try to reduce the waiting time by having enough health care providers to offer services. However sometimes due to high turn-out the clients are forced to wait longer and some actually leave the clinic without being attended to. That's why we have recommended to the county to increase the number of mobile clinics as well as more health workers and if possible, we try to reach more villages so that we serve all the women who needs our services…*" **(KII Respondent).**

More than half 81(57.4%) of those respondents who reported that maternal health services from nearest facility were not affordable had utilized MMHS. Affordability of services influenced use of MMHS (p=0.013). Slightly less than half 67 (47.5%) of these who had a good experience with service providers had utilized mobile maternal health services. Further results showed that experience with health care providers influenced MMHS use (p=0.023). The results are as table 4.9.

Table 4.9: Health system factors and utilization of MMHS (n=347)

Independent variable	Response	Utilization of MMHS		Statistical significance
		Use (N= 141)	Non-use (N=206)	
Distance to nearest healthcare facility	≤ 1 KM	6(4.3%)	38(18.4%)	χ^2=65.449
	2-3 KM	12(8.5%)	62(30.1%)	df=3
	4-5 KM	74(52.5%)	59(28.6%)	p=0.001
	> 5 KM	49(34.8%)	47(22.8%)	
Information source on mobile maternal health services	Friends/relatives	7(8.5%)	36(24.8%)	χ^2=41.287
	Religious leaders	5(6.1%)	9(6.2%)	df=4
	CHVs	11(13.4%)	65(44.8%)	p=0.012
	Healthcare provider	37(45.1%)	27(18.6%)	
	Media	22(26.9%)	8(5.5%)	
Possess a medical health insurance	Yes	94(66.7%)	165(80.1%)	χ^2=0.097
	No	47(33.3%)	41(19.9%)	df=1 p=0.755
The main type of insurance possessed	Linda mama	51(49.0%)	90(58.1%)	χ^2=3.929
	NHIF	39(37.5%)	49(31.6%)	df=2
	Private insurance	14(13.5%)	16(10.3%)	p=0.067
Waiting time	≤ 1 Hour	69(48.9%)	12(5.8%)	χ^2=21.488
	2-3 Hours	46(32.6%)	94(45.6%)	df=2
	> 3 Hours	26(18.4%)	100(48.5%)	p=0.004
Affordable maternal health services from nearest facility	Yes	29(20.6%)	88(42.7%)	χ^2=4.757
	No	81(57.4%)	104(50.5%)	df=2
	Cannot tell	31(22.0%)	14(6.8%)	p=0.013
Experience with a healthcare provider	Good	67(47.5%)	81(39.3%)	χ^2=10.19
	Fair	46(32.6%)	87(42.2%)	df=2
	Poor	28(19.9%)	38(18.4%)	p=0.023

CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter's arrangement is guided by study objectives; demographics, MMHS, individual factors, attitude towards MMHS and health system factors influencing MMHS use.

5.2 Discussions

5.2.1 Socio-demographic factors

About a third of those interviewed had ages ranging between 20-29 years. This is a prime age for women to get into stable relationships thus pregnant or having a child. This agrees with a Gabon that found out that most of the mothers were 29 years and below (Yaya, 2020). The results further reported that age influenced utilization of MMHS. This is because majority of respondents were of younger ages who probably preferred healthcare facilities as a result of their inadequate maternal experience. Consistent results were reviewed from Ghana which showed that utilization of mobile maternal health services increased with age (Nuamah *et al.,* 2019). In another study from central Ethiopia, contrary findings were reported where the odds of utilizing mobile maternal services were higher among women aged 20-34 years (Ali *et al.,* 2018).

A good number had secondary education level. This may also be as a result of secondary education being regarded as basic education before people try to specialize in their relevant career paths. Findings concurred with a Nigerian study where most of the respondents who utilized mobile maternal health services had secondary level of education (Ajayi & Akpan, 2020). Education influenced utilization of MMHS among the respondents. Education empowers people in accessing information

regarding sexual and reproductive health hence MMHS use. This agrees with a study from India which depicted that education was a key determinant for utilization of MMHS (Bangal *et al.,* 2018). Odetola *et al* (2018) published that education changes perception of women towards MMHS use.

Majority of those interviewed were married. This is because most were in their twenties and thirties, an age group in which majority of women in Kenya are settled in their marriages or are in stable relationships. This agrees with Tiruaynet & Muchie, 2019 who argued that women reproductive age seeking maternal health services were married. Status of marriage influenced utilization of MMHS. This is supported by the findings as most of the married respondents had utilized MMHS. This could be probably due to support from their respective spouses. In Kenya's Bungoma County and in rural Nigeria studies revealed a significant statistical association between marital status and MMHS utilization (Kisiangani *et al.,* 2021; Okonofua *et al.,* 2018).

Respondents' religion was majorly Protestants. This is a typical representation of the distribution of population in terms of religion in which majority of Kenyans are Protestants. Okonofua *et al* (2018) noted that those who sought maternal health services were Christians. In Malawi 's rural set up majority of respondents seeking MMHS service were Muslims (Kim *et al.,* 2019). Despite this, religion did not influence use of MMHS. This is probably because irrespective of religion, women of reproductive age undergo pregnancy and delivery processes which attracts assistance from skilled attendants. Same findings were reported by study from Kwale County in Kenya where religion influenced utilization of maternal health services among women (Mochache *et al.,* 2020). In India, contrary results were reported where religion

influenced MMHS utilization such as family planning among reproductive age women (Paul & Chouhan, 2020).

Finally, status of occupation of the respondents showed majority were self-employed. This is because the study location was in a rural set up with scarce employment opportunities were scarce thus forcing most of them to resort to looking for alternative ways of generating income. The results differed with Okonofua (2018), who reported that majority of women interviewed regarding utilization mobile maternal health services in Nigeria were employed. Occupational status influenced use of MMHS. Majority of the respondents who were not employed utilized these mobile maternal health services. This is because mobile maternal health services are free compared to seeking same services in health facilities. Inconsistent results from Eastern Ghana revealed that occupational status influenced utilization of maternal health services (Konlan *et al.,* 2020). Similarly, in Ethiopia ANC attendees showed that occupation status influenced utilization of such services (Tekelab *et al.,* 2019).

5.2.3 Individual factors

The average monthly income earned was less than 10000 Kenyan shillings. This is because most of them were self-employed/not employed with meagre incomes. Contrary findings by Temesgen and colleagues *(*2021) amidst the COVID-19 period showed majority earned less than 5000 Kenyan shillings. The average monthly family income significantly influenced MMHS use. In fact, most of those who utilized the mobile maternal health services were low-income earners. Mobile maternal health services reduce costs associated with getting such services in health facilities as reported by a Nigerian study comprising pregnant women (Dasuki & Zamani, 2019).

In South Africa, higher income earners were the most users of mobile maternal health clinics (Kabongo *et al.*, 2019).

Majority of respondents had a parity and number of children alive ranging 3 to 4. Similar results were reported in India where women's parity was more than 3 (Mahapatro *et al.,* 2022). Parity influenced use of MMHS which increased with increase in parity. This means that those with higher parities were more experienced with pregnancy and child care thus preferred them. In India, those with a parity exceeding two had a negative influence on MMHS use (Zhou *et al.,* 2020). According to studies from Ghana, it was noted that high parity was significantly linked to low utilization of mobile maternal health services (Konlan *et al.*, 2020). Koroglu *et al* (2019) revealed that those respondents with more children preferred mobile clinics.

The results noted that majority of respondents never experienced any pregnancy related complication. This concurs with a study conducted in Rwanda on birth preparedness and complication readiness which revealed that most respondents did not get a pregnancy related complication (Smeele *et al.,* 2018). There was no influence between ever had a pregnancy related complication and utilization of mobile maternal health services. However, majority of those who never had a pregnancy related complication utilized mobile maternal health services. This is because experiencing a pregnancy related complication calls for more specialized care which could be offered by health facilities. Fear of complication especially among women who had history of complications negatively affected use of mobile maternal clinics according to arguments by Ayele *et al* (2019). Another study showed that complications did not influence mobile maternal health services usage in less developed countries (Riley *et al.,* 2020).

The most type of complication reported among those with history of pregnancy related complication was postpartum hemorrhage. Findings from USA were similar to this with postpartum hemorrhage being the most common complication among women (Reale *et al.,* 2020). Those who had experienced postpartum hemorrhage never utilized mobile maternal health services. They mostly might have preferred seeking more specialized care in hospitals. Results from Zanzibar among postpartum women, pre-eclampsia was the common complication reported (Machano & Joho, 2020).

Further, majority interviewees acknowledged existence of MMHS. This may be through to exposure to information through different platforms. This differed with an awareness, perceptions and utilization of mobile health clinics study where the respondents were not able to identify clinics and services for offer (Grieb *et al.,* 2022). Further results showed that awareness on mobile maternal health services influenced its utilization. Information significantly convinces women to use MMHS. Lack of awareness negatively influenced utilization such services according to a systematic review in developing countries (Kruse *et al.,* 2019).

5.2.4 Attitude towards mobile maternal health services

According to results on responses on attitude towards mobile maternal health services, most disagreed that delivery in a mobile maternal health clinic was a sign of weakness. This culminates the effect of culture on acceptance and usage mobile maternal health services. On the contrary, findings from Nigeria depicts that some cultures suggests that hospital delivery is for weak women (Egharevba *et al.,* 2017). Research done among the Karimojong mothers from Tanzania reported that their cultures dictates that the placenta should be buried at home discouraging hospital delivery since they don’t have access to the placenta for their own preferred disposal (Nayor, 2018).

Reviewed literature from African has indicated that most women don't go for the visits of ANC recommended due to cultural sensitivity (Esegbona-Adeigbe, 2018). In a Gambian study, high MMR was attributed to cultural beliefs restricting maternal health services usage (Lowe *et al.,* 2019).

About a third of those interviewed were neutral on whether complication development wasn't risky in pregnancy and delivery. Some women may perceive complications as a normal happening in pregnancy and sometimes this may be due to lack being informed. The level of self-vulnerability on risks associated with pregnancy management and eventual child delivery among women affects service utilization (Erasmus *et al.,* 2020). This affects taking precautions through seeking services of skilled birth attendants to prevent poor maternal and child outcomes. During an epidemic like COVID-19, pregnant mothers feared not only going for ANC visits but also delivery at the hospital to avoid getting infected with such diseases (Nosratabadi *et al.,* 2020). Perceived poor outcome of delivery lures women to seek services of skilled attendants thus opting for seeking maternal health services from health facilities (Munkhondya *et al.,* 2020).

Approximately 50% disagreed that seeing familiar women increased anxiety in seeking mobile maternal health services. This is because most had a parity of more than 2 thus had experienced the process previously. An anxiety and depression study among women seeking prenatal services noted that seeing fellow friends seeking for the same services increased their anxiety (Browne *et al.,* 2021). Similarly, another study showed that sometimes women feel insecure especially among young and adolescent girls whenever they see familiar faces in places where SRH services are

provided (Trinh *et al.,* 2022). This significantly affects their desire to go for the services in subsequent visits as they shy off.

The study opined that only women should make decisions regarding mobile maternal health services utilization. This sometimes could true especially in African cultures where issues to do with childbirth and pregnancy are seen as women affairs. The negligence of involving men in matters decision making has become a serious concern in societies. However, contrary results were informed in a study conducted in Ethiopia, where men's power as the heads of their families influenced home deliveries (Berhe & Nigusie, 2020). This could be attributed to male dominance in family decision making. Findings from Tanzania reported that not involving women to make decisions was the main barrier for MMHS use including ANC (Gibore *et al.,* 2019). Research findings from Nepal revealed that the main decision maker regarding utilization of ANC services was husbands due to male dominance (Awasthi *et al.,* 2018).

Most women felt embarrassed being accompanied by a spouse to mobile health clinics. Deep rooted cultures especially in African societies is the main reason for this phenomenon as working around with their male counterparts displays a feeling of shame. This concurs with findings from Uganda where women felt uncomfortable being accompanied by their partners when seeking maternal health services (Ladur, 2021). According to results from Ethiopia, women felt embarrassed in company of their husbands to seek for ANC services (Tekresilasie & Deressa, 2020). In other studies, from Afghanistan showed contrary opinions where male accompaniment encourages women to seek maternal health services (Safi & Doneys, 2020).

Study findings also revealed that as much as mobile maternal health clinics brings services near to those who need them, there is no significant guarantee for consistent use. This may be attributed to issues to do with their sustainability in the long run and also due to their availability at designated areas in designated days. This makes women fear if they would get them at vicinity when they could need them for use in subsequent outings. Similar findings were reported in other studies where fear of sustainability of services offered by the mobile clinics in Northern Cape in South Africa and also according to a systematically reviewed research in low-income countries (Losper, 2021; McGowan *et al.,* 2021). However, in the United States of America, inconsistent results were noted where people did not have issues concerning sustainability of the mobile clinics since they have been offering portable maternal health clinics for a considerable long period of time (Khan *et al.,* 2020).

Women had a perception of insufficient services being offered in mobile maternal health clinics. This may be explained by the nature and environment in which the services are offered especially when they compare that to infrastructure and equipment in facilities. Same was anchored by a study conducted among women utilizing mobile maternal health services who perceived limited services were on offer thus could not meet their personal needs (Attipoe-Dorcoo *et al.,* 2020). Another study reported that women did not receive adequate treatment when they sought mobile maternal health services in the remote's parts of South Africa (Hoffman *et al.,* 2019).

The results showed that mobile maternal health services offered individualized care although incoherent with community cultures. This may be explained by the fact that such services are offered at personalized level especially among women who have specialized needs which require more attention as well as calling for further referral

to high level facilities. The results were in agreement with a USA study noting that personalized care attracted women to seek for maternal services in mobile health clinics (Rangel *et al.,* 2019). In Tanzania, women alluded that only generalized care was provided which affected their cultural norms especially in matters sexual and reproductive health (Sanga *et al.,* 2019).

Further, there was a general positive attitude regarding utilization of MMHS. An attribution to services being brought near to their households especially in far to reach areas thus avoiding incurring direct and indirect costs when seeking similar services in health facilities. This finding replicates Alnobani *et al* (2021), reporting that the nature of attitude towards mobile maternal health clinics was positive. This significantly influenced MMHS use. This is justified by this study results where respondents with positive attitude towards mobile maternal health services utilized them. Differs with Bangladesh findings where women had negative attitude towards portable clinics and this negatively affected utilization of such services (Hossain *et al.,* 2019).

5.2.2 Utilization of mobile maternal health services

Majority of the respondents had never utilized mobile maternal health services. However, a significant number of women targeted by the initiative utilized the services especially in far to reach areas. Again, this could also be affected by the fact that mobile maternal health clinics are availed at designated areas in designated days hence affecting its utilization among respondents. The results were contrary to a systematically reviewed study on utilization of MMHS in humanitarian emergencies where most of the respondents utilized such services (McGowan *et al.,* 2020). From USA, studies conducted show utilization of mobile health clinics have improved

delivery of services in some states (Malone *et al.,* 2020). In South Africa, MMHS clinics were used to offer especially sexual and reproductive health service among adolescents which improved their maternal service utilization (Smith *et al.,* 2019).

The study findings showed that antenatal care services were the most sought in mobile maternal health clinics. This is attributed to the fact that it is the most common service used as WHO recommends four minimum visits for ANC before delivery. This result concurs with a study from Cambodia which revealed that antenatal care was the most common maternal health service used among women of reproductive age (Zhou *et al.,* 2020). In Ethiopia, it was contrary as majority of respondents revealed that sexual and reproductive health counselling was the most sought service among reproductive age women (Demisse *et al.,* 2019). In another study from Uganda, it was noted that postnatal care services were the most common sought in mobile maternal health clinics (Ndugga *et al.,* 2020).

On enquiring from the respondents on why the decided to seek MMHS, the results reported majority sought the services due to distant health facilities. This is supported by the fact that the main reason for the conception of the idea was to bring services nearer to the people especially in far to reach areas where public health facilities are inadequate. This differed with reports from South Africa where reproductive age women sought mobile maternal health services since they were appealing to them (Smith *et al.,* 2019). In Tanzania, pregnant women seeking mobile maternal health services noted that they preferred getting such services because they were immediately available compared to health facilities (Kaaya & Luhanga, 2021). In Bangladesh, women preferred portable health clinics since the services were brought to their households hence convenient (Kikuchi *et al.,* 2021).

The results further noted that the major hindrance to using MMHS was preference for hospitals. This could probably be due to a perception that mobile maternal health services being insufficient to meet the maternal needs especially in cases of complications amongst them. The results concur with a study from western China which reported that most women prefer health facilities to mobile maternal clinics irrespective of the availability of the latter (Wu *et al.,* 2019). In another Tanzanian study among women seeking antenatal care revealed that even though mobile health clinics were available, timing inconvenience was the major reason for non-use (Mgata & Maluka, 2019).

5.2.5 Health system factors

According to the findings, the distance to the nearest health facility was between 4-5kilometers as reported by most participants. This means that facilities were distantly located thus call for use of MMHS. This underscores the reason for introduction of MMHS in the far to reach areas. Ideally, the concept of MMHS was designed to improve utilization of such services in poor access and hard to reach areas. This is similar to results from five major towns in Kenya which showed that women were willing to travel longer distances at an average of 4.5 kilometers to obtain free maternal services in public hospitals (Escamilla *et al.,* 2018). The distance to the nearest healthcare facility influenced utilization of MMHS. The results were inconsistent to results from Ethiopia where increase in distance to health facility resulted to reduced number of ANC visits (Tegegne *et al.,* 2019). In Sierra Leone, it was reported that distant health facilities resulted to home deliveries (Treacy *et al.,* 2018).

Community health volunteers were the main source of information on MMHS. The CHVs are based in the communities and could easily get touch with pregnant women for referral to mobile maternal health clinics. This concurs with results from Ethiopia where the main source of information on maternal issues among women of reproductive age was healthcare providers (Demisse *et al.,* 2019). In Bangladesh, relatives were the main source of information about availability of MMHS (Akter *et al.,* 2020). The source of information influenced utilization of mobile maternal health services. Those who got information from healthcare providers on MMHS with high likelihood to use such services. This is because healthcare providers are trusted sources of information leading to more compliance from the mothers. This is different from a Kenyan research showing those who got information on free delivery from social media utilized maternal health services (Njuguna *et al.,* 2017).

The waiting time for most women who sought maternal services ranged from 2-4 hours. Statistically, waiting time influenced utilization of MMHS services among the respondents. Longer waiting time make women to shy off from using such services due to tiredness and inconveniences. This concurs with another study where long waiting time especially in public health facilities witnessed in Nigeria through long queues barred maternal health service utilization (Okonofua *et al.,* 2017). Bringing services closer to people eases congestion in public health facilities hence increased maternal service utilization. Patients kept waiting longer for services results to dissatisfaction. They may shy off from seeking subsequent services in such health facilities (Gitobu *et al.,* 2018). In Yemen, long waiting time was a significant factor that affected ANC utilization resulting to introduction of mobile maternal health clinics as an alternative (Othman *et al.,* 2017).

Most respondents were in possession of a medical health insurance cover. Further, Linda mama was the most dominant among those who had a medical insurance cover. This is because it is offered free of charge among women who are seeking antenatal care services across different types of health facilities in the country. Majority of women from USA seeking maternal health services had a medical insurance cover (Malone *et al.,* 2020). However, possession of a health insurance did not influence utilization of MMHS. This is because mobile maternal health services are offered without any attached costs. This was contrary to a study done in Ghana where possessing a medical insurance influenced services use such as postnatal care (Yaya *et al.,* 2019). In rural Indonesia, lack of ownership of a medical health insurance barred MMHS use (Laksono & Wulandari, 2020).

It was reported that that maternal health services from the nearest health facility were not affordable. Nowadays, affording maternal care has been easier through strategies adopted by different stakeholders. These services have been made relatively cheaper. Findings from Benin reported that cost hindered access to MMHS (Yaya *et al.,* 2018). The reported high costs of transportation barred women from hospital delivery even if they were significantly subsidized by the Tanzanian Government (Ngowi *et al.,* 2017).

There was an association between affordability of services at the nearest facility and MMHS utilization. In fact, most of those who reported that maternal health services from nearest facility were not affordable had utilized mobile maternal health services. This is because MMHS in mobile clinics are free and accessible as compared to seeking for those services in health facilities. Despite most of them being free or subsidized, women incur some expenses to access them. Studies from Zambia

reported that rural women had low odds of utilizing MMHS as they were poor hence couldn't manage costs attributed to service provision directly and indirectly (Jacobs *et al.,* 2017).

Finally, majority reported having a good experience with healthcare provider in their last visit to the facility. In South Africa, poor attitude from healthcare providers was reported among women seeking mobile maternal health services (Bisnauth *et al.*, 2022). Experience with health care providers had a significant statistical association with utilization of MMHS. Perceived poor attitude towards conduct of healthcare providers may make women shy off from using available MMHS. This was also reported as per findings from Botswana which revealed that poor attitude by healthcare providers negatively influenced pregnant women's desire to seek for ANC services (Mathe, 2017). Study findings from Kisumu County, in Kenya revealed perceived attitude was associated with the number of ANC visits (Kilowua & Otieno, 2019). According to research findings from Uganda, it was concluded that utilization of maternal services was affected by the perceived negative attitude of healthcare providers (Morgan *et al.,* 2017).

5.3 Conclusions

In conclusion, four out of ten women utilized mobile maternal health services in Makueni County. The most common service sought was antenatal care. The main reason MMHS utilization was due to distant healthcare facilities in the study sites. However, the main reason for non-use was preference for hospitals among respondents.

Majority of individual factors influenced utilization of mobile maternal health services. In fact, average monthly family income ($p=0.001$), type of pregnancy related

complication experienced (p=0.027), parity (p=0.019) and awareness (p=0.006) were significantly associated with utilization of MMHS among women of reproductive age in Makueni County.

Further, there was a positive attitude towards MMHS among reproductive age women in Makueni County. Issues of decision making, embarrassment being accompanied by spouses, insufficient services, lacking guarantee of consistent services and anxiety seeing familiar women while seeking mobile maternal health services were significant attributes. The respondents' nature of attitude (p=0.010) significantly influenced the rate of utilizing MMHS.

Finally, most factors with the health system influenced utilization of the mobile maternal health services in Makueni County. These included distance to the nearest facility (p=0.001), information source (p=0.012), waiting time (p=0.004), affordability (p=0.013) and experience with healthcare providers (p=0.023).

5.4 Recommendations

5.4.1 Recommendations from the study

i. The county government of Makueni, the Health Ministry and other concerned stakeholders should consider increasing the number from 3 to at least 5 operational mobile clinics, double designated days from twice weekly to increase the coverage to other parts within the county.

ii. The county government of Makueni through the use of Community Health Volunteers should conduct house to house campaigns on availability of mobile maternal health clinics and the designated days on their respective regions to increase awareness among women of reproductive age.

iii. The Health Ministry, Makueni County and other stakeholders need to demystify harmful cultures that have negative effect on women utilization of maternal health services, involve men in decision making regarding sexual and reproductive health services thus improve their attitude towards mobile maternal health services.

iv. The Health Ministry should increase number of healthcare providers in the mobile clinics to reduce congestion and waiting time taken in those clinics. They should also sensitize healthcare providers through continuous medical trainings to enhance service provision.

5.4.2 Suggestions for further study

A further study should be conducted on level of knowledge on mobile maternal health services among reproductive age women.

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APPENDICES

APPENDIX I: CONSENT FORM

Introduction

"My name is Joyce K. Mumo and I am a Masters student at Kenyatta University. I am conducting a study on "***Utilization of Mobile maternal health services among women of reproductive age in Makueni County, Kenya".*** You are requested to participate in this study and that the information that you will provide will be treated with high level of confidentiality and privacy."

Study purpose

"The study aims at assessing utilization of MMHS among reproductive age women in Makueni County thus address the challenges facing access to maternal health services among this population. The study results will help strengthen and support in addressing the health needs of women of reproductive age thus improving maternal and child health outcomes."

Study procedure

"Participation in this research involved answering questions which you will be asked in a research questionnaire concerning utilization of mobile maternal health services in Makueni County. You are required to fill your responses in the spaces provided. At any given time, you are free to ask questions and seek more clarification on all aspects related to this study."

Voluntary participation

"You have the right to refuse participating in this research as it is purely voluntary and thus optional. You may as well decline to answer some queries that you find irritating and against your cultural beliefs. Moreover, you will be free to withdraw

from the study any time you wish and you will not be required to give reasons for your decision."

Discomforts and risks

"This interview session is detailed and you might get tired underway. You may realize that a number of questions provoke your cultural and religious beliefs hence you may choose not to answer. This exercise may interfere with your time while doing your daily activities, however will be glad if you take your time to participate in this study."

Benefits and rewards

"Your participation in the study will provide us with the necessary information ensuring development and implementation of strategies aimed at improving utilization of maternal health services among women of reproductive age in Makueni County. No monetary rewards will be provided to participants".

Confidentiality

"The interview questionnaires will be distributed to women of reproductive in Makueni County meeting the inclusion criteria. The information you provide will be kept private and confidentially handled. Your identity will not be disclosed to at any time and the information provided shall be utilized to achieve the aim of the current study only."

Contact information

In case of any queries concerning this study, you may opt to contact my research supervisors.

Dr. Sarah Tai

Email: tai.sarah@ku.ac.ke Tel No: 0722610684

Dr Rosebella Kipkalom

Email: kipkalomr@gmail.com Tel No: 0721593173

Kenyatta University Ethics and Review Committee (KUERC)

The Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke, secretary.kuerc@ku.ac.ke, ercku2008@gmail.com.

Participant's statement

The information concerning my involvement in this study has been clarified to me. An opportunity has been accorded to me to seek further clarification and my concerns addressed adequately. Taking part in this research is optional and voluntary. To my understanding, this information shall be kept private and confidential. I can also choose to withdraw from participating in this study at any given time.

Sign…… Date……

Principal Investigator's statement

I, the undersigned, have explained to the participant in a language that he/she best understands the procedure to be followed in the research and the risks and benefits to be involved.

Name: Joyce Kanini Mumo

Email address: joysmumo17@yahoo.com

Tel No: 0721729469

Signature…… Date…….....

APPENDIX II: RESEARCH QUESTIONNAIRE

Assessing of utilization of mobile maternal health services among women of reproductive age in Makueni County, Kenya.

Participant number…… Date of the interview……

Instructions: Please tick or insert the option that best fits you

Section A: Socio-Demographic Characteristics of the study population

1. Age in years……..

2. What is your highest level of education?

[1] No formal education [2] Primary [3] Secondary

[4] Post-secondary [5] Others (Specify)

3. What is your marital status?

[1] Married [2] Single [3] Divorced/widowed

4. What is your religion?

[1] Christian [2] Muslim [3]Others (Specify)……

5. What do you do for a living?

[1] Employed [2] Self-employed [3] Not employed

Section B: Individual factors

6. What is your average family monthly income in KShs?

[1] Less than 5000 [2] 5001-10000 [3] 10001-15000

[4] 15001-20000 [5] More than 20000

7. How many times have you been pregnant? ----------

8. How many children do you have? ----------

10. Have you ever had any pregnancy related complications?

[1] Yes [2] No

11. If yes, which ones? ----------

12. Are you aware of the existence of mobile maternal health clinics?

[1] Yes [2] No

Section C: Utilization of Mobile Maternal Health Services

13. Have you ever used mobile maternal health services?

[1] Yes [2] No

14. If yes, which services did you seek? (Tick all that apply)

[1] Family Planning [2] Ante-Natal Care [3] Pre-Conception Care

[3] Delivery [4] post-Natal [5] Others (Specify)……

15. What was the mode of delivery of the mobile maternal health services?

[1] Vehicle [2] Boda boda [3] Others (Specify)……..

16. The mobile maternal clinics were run by?

[1] County [2] Beyond zero clinics [3] Others (Specify)……

17. What was the main reason for seeking mobile maternal health services?

[1] Distant facilities [2] Referral by CHVs

[3] Readily available [3] Friendly/appealing services

[4] Others (Specify)……..

18. If no to number 13, why have never sought for the services? .....

Section D: Attitude towards mobile maternal health services

On a scale of 1-, please tick one response which best describes your opinion where "1" means "Strongly agree" "2" means "Agree" "3" means "Neither Agree nor Disagree" "4" means "Disagree" and "5" means "Strongly Disagree"

	Statement	1	2	3	4	5
19	In our societal cultures, it is believed that delivery in healthcare facilities is a sign of weakness among women.					
20	I believe that am not at risk of developing complications during pregnancy and delivery.					

21	In our society, attending mobile maternal clinics may not be preferred since seeing familiar women increases anxiety					
22	I think only women should be involved in making decisions regarding utilization of maternal health services.					
23	I would feel embarrassed if my husband/spouse offers to accompany me to seek maternal health services.					
24	Bringing services near via mobile maternal clinics is not a guarantee for consistent use of services					
25	Mobile clinics contains insufficient services					
26	Mobile clinics offer opportunity for individualized care although incoherent with community cultures					

Section E: Health system factors

27. What is the average distance from your home to the nearest health facility?

[1] Less than 1 KM [2] 2-3 KM

[3] 4-5KM [4] Over 5KM

28. Are you able to pay for the maternal health services if applicable?

[1] Yes [2] No

29. What was the source of information on mobile maternal health services?

[1] Friends/relatives [2] Religious leader

[3] Community Health Workers [4] Health care provider

[5] Media [6] Others, please specify……..

30. When you last visited a health facility, approximately how long did you wait before being served by healthcare providers?

[1] 30 Min [2] 1 Hour [3] 2 Hours

[4] 3 or more Hours

31. Are you currently covered by a medical insurance cover?

[1] Yes [3] No

32. If yes, which one (Specify)……..

33. Are you in a position to meet the cost of maternal health services provided in health facilities?

[1] Yes [2] No [3] I can't tell

34. If you ever sough for maternal health services, how can you rate your experience with care providers when you last visited the facility?

[1] Good [2] Fair [3] Poor

Thank you for your participation

APPENDIX III: KEY INFORMANT INTERVIEW GUIDE

Introduction

Good morning/afternoon? "My name is Joyce Kanini Mumo, a student at Kenyatta University undertaking a Master of Public Health. I am conducting a study on, "***Utilization of mobile maternal health services among women of reproductive age in Makueni County Kenya."*** You are one of the selected Key Informants for this study. Your cooperation in this research will be highly appreciated. The information you give will be kept confidential and used only for this study. Thank you."

Contextual information

1. How can you describe the availability of mobile maternal health services in this region? In your opinion, what can you say about women preference to using established health facilities?
2. Do you think there are cases of home deliveries in this region? In your own opinion, what are the reasons hindering women from delivering in health facilities?
3. Has the main objective of mobile maternal health services been achieved since inception of this idea in this region?
4. How can you describe the attitude towards utilization mobile maternal health services? Are there myths and misconceptions about hospital delivery?
5. In your own opinion, what are some of the health system factors associated with utilization of maternal health services?
6. What are some of the challenges hindering provision of mobile maternal health services? What do you think should be done to improve the provision of mobile maternal health services in this area?
7. In your own opinion, what impact has the mobile clinics made in this county?
8. In your own terms, has deliverance of outreach and awareness programs in the county been achieved?
9. What is the availability of mobile health care policies/guidelines in the county?
10. In your opinion, what are there enough healthcare staff/personnel to provide mobile maternal health services?
11. Is there anything else about mobile clinic health services that we haven't discussed that you would like to tell me about?

Thank you for participating!!!

APPENDIX IV: RESEARCH AUTHORIZATION FROM KENYATTA UNIVERSITY GRADUATE SCHOOL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Our Ref: Q139/CTY/PT/39221/2016 DATE: 11th March, 2022

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MS. JOYCE KANINI MUMO REG. NO. Q139/CTY/PT/39221/16

I write to introduce Ms. Joyce Kanini Mumo who is a Postgraduate Student of this University. She is registered for M.P.H. degree programme in the **Department of Population, Reproductive Health & Community Resource Management.**

Ms. Mumo intends to conduct research for a M.P.H. thesis Proposal entitled, **"Utilization of Mobile Maternal Health Services among Women of Reproductive Age in Makueni County, Kenya."**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

17 MAR 2022

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke
P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School DATE: 11th March, 2022

TO: Ms. Joyce Kanini Mumo
C/o Department of Population, Reproductive Health & Community Resource Management

REF: C139/CTY/PT/89221/16

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on 2nd March, 2022, approved your Research Proposal for the M.P.H. Degree entitled, "Utilization of Mobile Maternal Health Services among Women of Reproductive Age in Makueni County, Kenya."

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation and Ethics Review Committee, Kenyatta University.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

KENYATTA UNIVERSITY
17 MAR 2022
GRADUATE SCHOOL

DR. HARRIET ISABOKE
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Department of Population, Reproductive Health & CRM

Supervisors:

1. Dr. Sarah Tai
C/o Medical Surgical Nursing & Pre-Clinical Sciences Department
Kenyatta University

2. Dr. Rosabella Kipkalom
C/o Department of Population, Reproductive Health & Community Resource Management
Kenyatta University

APPENDIX V: ETHICAL CLEARANCE FROM KU ETHICS AND REVIEW COMMITTEE

KENYATTA UNIVERSITY
CENTRE FOR RESEARCH ETHICS AND SAFETY

Fax: 8711242/8711575
Email: chairman.kuere@ku.ac.ke
Nairobi, 00100

P. O. Box 43844,

Tel: 8710901/12

Website: www.ku.ac.ke
Our Ref: KU/ERC/APPROVAL/VOL.1

Date: 10th /05/2022

Joyce Kanini Mumo
P.O BOX 43844-00100
Nairobi.

Dear Ms. Mumo,

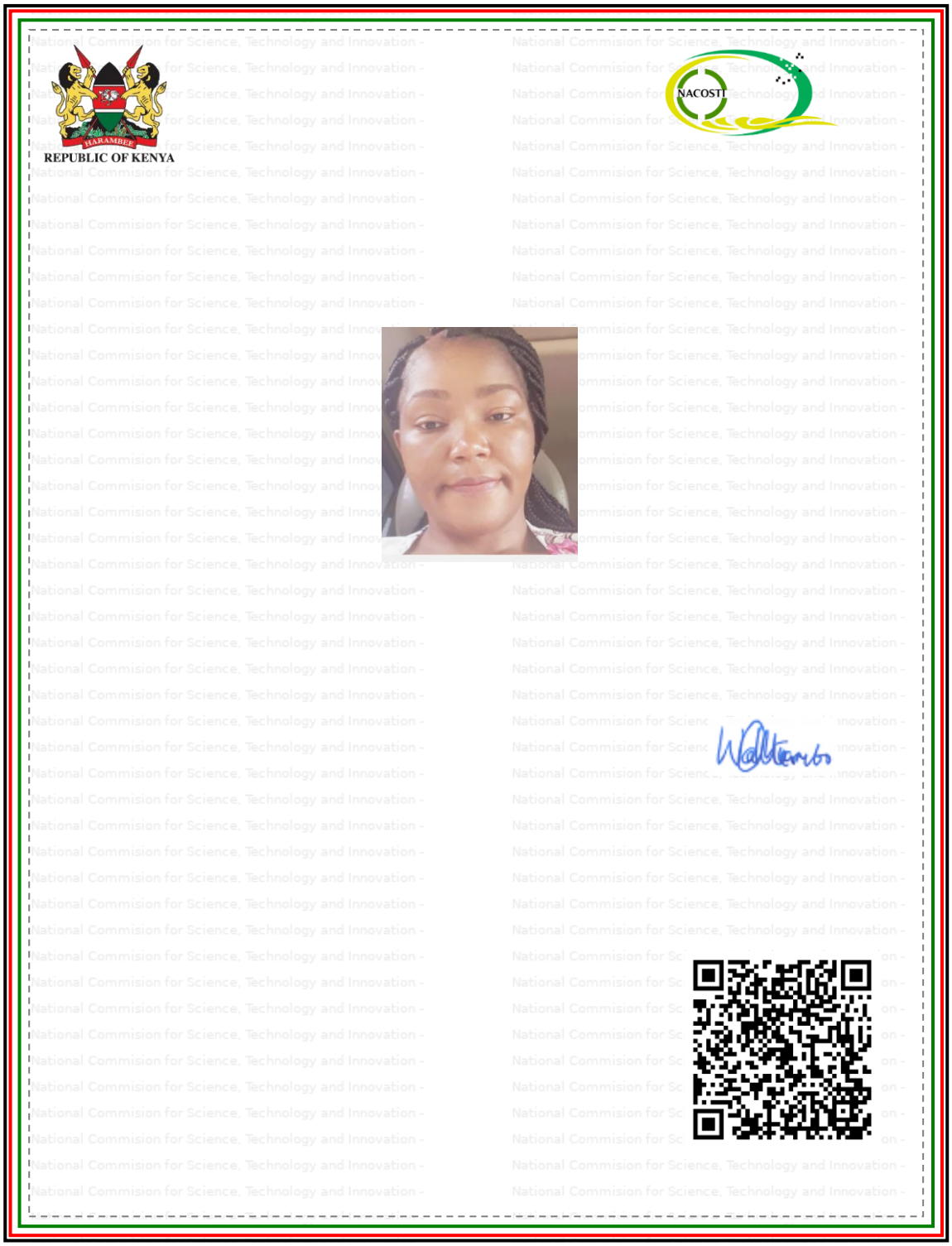
APPLICATION NUMBER: PKU/2495/E1622- UTILIZATION OF MOBILE MATERNAL HEALTH SERVICES AMONG WOMEN OF REPRODUCTIVE AGE IN MAKUENI COUNTY, KENYA

This is to inform you that ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** has reviewed and approved your above research proposal. Your application approval number is **PKU/2495/E1622**. The approval period is **10th /05/2022** ***to*** ***10th /05/2023***

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE***
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.

APPENDIX VI: RESEARCH AUTHORIZATION FROM NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION



APPENDIX VII: RESEARCH AUTHORIZATION FROM MAKUENI COUNTY

REPUBLIC OF KENYA

GOVERNMENT OF MAKUENI COUNTY

OFFICE OF DIRECTOR HEALTH SERVICES
P.O. BOX 89-90300 MAKUENI
Email: countyhealthmtr@gmail.com *contact@makueni.go.ke*
Website: www.makueni.go.ke

REF: GMC/DOH/CDH/GEN/II (56) 6th June, 2022

Jovse Kanini Mumo
Kenyatta University
P.O Box 43844-00100
Nairobi-Kenya

RE: AUTHORIZATION TO CARRY OUT A STUDY

Reference is made to your letter dated May 21st, 2022 and NACOSTI/P/22/17499 dated 13th May , 2022 regarding the above matter.

You are hereby authorized to do research on *"Utilization of Mobile Maternal Health Services among Women of Reproductive Age in Makueni County, Kenya."*

You are directed to:-

1. Report to the SCMOH/ Medical Superintendents prior to the initiation of the fieldwork to enable further facilitation.
2. Collaborate and liaise with Unit Head Reproductive Health for dissemination of study findings.
3. Submit the final study report to the undersigned office.

Yours

Dr. Kiio S. Nzoia
Director Medical Services
Makueni

COUNTY DIRECTOR OF HEALTH
MAKUENI COUNTY
06 JUN 2022
P. O. Box 89 - 90300, MAKUENI.

Copy to:

- Ag. ED VI – Health Services
- Ag. CO – Health Services
- Director(s) – Health Services
- Concerned Medical Superintendents & SCMOHs
- Reproductive Health Coordinator
- Research Focal Person – Health Services

APPENDIX VIII: MAP OF STUDY LOCATION