

**THE UPTAKE AND UTILIZATION OF FREE MATERNAL
HEALTH CARE SERVICES IN KERICHO COUNTY, KENYA**

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Master of Pharmacy in Pharmacoepidemiology and Pharmacovigilance of the
University of Nairobi*

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DECLARATION

I, MIRANGA CALVIN MOSETI, declare that this thesis contained herein is my original work and has not been presented at any other university.

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DEDICATION

I dedicate this work to my wife Vane Mong'are and my daughter Lissie Gesare for giving me the strength and hope for a better tomorrow.

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My appreciation goes to the Almighty God for giving me the knowledge, strength and zeal to pursue this course.

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ABSTRACT

Background

Utilization of maternal health services is expected to improve maternal and neonatal health outcomes. Understanding the factors affecting maternal health use is crucial. Financial constraints are one of the major factors contributing to lack of access to quality maternal healthcare services for mothers in Kenya. The Government of Kenya introduced Free Maternal Care services policy in all public health facilities. The policy was formulated to ease financial barriers associated with equitable access to skilled maternal health care services.

Objectives

The main objective of the study was to evaluate the impact of the introduction of free maternal care policy in Kericho County's obstetric indicators and challenges in the implementation of the policy.

Method

The study was divided into two parts. The first part was the qualitative cross sectional study that involved key informant interviews. The study population was key county officials involved in the implementation of the policy at the county level. A ground theory approach was used to conduct data analysis of the transcribed interviews.

The second part was a longitudinal ecological study in which quarterly returns of service utilization indicators were obtained from the Kericho County Health Management Information System database from 2011 to the first quarter of 2015. The data was subjected to segmented regression analysis by generalized least square regression. The data was also decomposed to trend and seasonal components. Data was analyzed using R version 3.2.2 statistical program. The level of significance was set at 0.1

Results

The free maternal health care policy implemented in June 2013 has had mixed effects on health care service delivery indicators. With regard to Antenatal care attendance, there was a significant quarter to quarter drop in Antenatal care attendance at the rate of -304.61 visits per

quarter($p < 0.002$). There was a significant increase in maternal deliveries at a rate of 894.074 deliveries per quarter ($p < 0.001$). There was an insignificant decrease in the use of oxytocin at a rate of 2596.4 ampoules per quarter ($p < 0.513$). Maternal mortality ratio decreased insignificantly at the rate of 4.992 deaths per 10,000 live births ($p = 0.102$).

In the qualitative study, it was realized that there was increased workload at the facilities while the staffing levels remained the same. This has led to declined quality of services and overstretching of resources such availability of medical supplies, equipment and infrastructure. Some services such as ante natal care profile, ultra sound were not free as expected in the policy.

Conclusion

The study found out that there was an increased utilization of maternal delivery services as well as use of drugs and medical supplies. The maternal mortality ratio also declined significantly since 2011. However, there was need to improve on the quality of services in order to avoid mothers from turning away from the services.

LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal care
CARMMA	Campaign on Accelerated Reduction of Maternal Mortality in Africa
CEDAW	Committee on Elimination of Discrimination Against Women
CS	Caesarean Section
DHS	Demographic Health Survey
EmONC	Emergency Obstetrics and Neonatal Care
FBO	Faith Based Organizations
FMC	Free Maternal Care
FP	Family Planning
HIPC	Highly Indebted Poor Countries
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HMSF	Health Management Service Fund
HPP	Health Policy Project
HSSF	Health Sector Service Fund
IMPACT	Initiative for Maternal Mortality Programme Assessment
KDHS	Kenya Demographic Health Survey
KEMSA	Kenya Medical Supplies Agency
KHSSP	Kenya Health Sector Strategic and Investment Plan
KNH	Kenyatta National Hospital
LOWESS	Locally Weighted Scatter Plot Smoothing
MCH	Maternal and Child Health Clinic
MDG	Millennium Development Goal
MMR	Maternal Mortality Rate
MoH	Medical officer of Health
MOH	Ministry of Health
NBU	New Born Unit
NGO	Non-Governmental Organization

NHIF	National Hospital Insurance Fund
NHIS	National Health Insurance Scheme
NMR	Neonatal Mortality rate
OOP	Out Of Pocket
RSE	Residual Standard Error
TBA	Traditional Birth Attendants
USAID	United States Agency for International Development
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
WHO	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Africa has the highest burden of maternal mortality in the world and sub-Saharan Africa is largely responsible for the dismal high number of maternal deaths (1). In 2000, it was estimated that approximately 529 000 women died from complications related to pregnancy or delivery (2). The majority of maternal deaths occur in developing countries. Causes of maternal deaths include complications of abortion, hemorrhage, dystocia, eclampsia, sepsis and infections such as tuberculosis and HIV (3).

More than 136 million women give birth each year (4). About 20 million experience pregnancy-related illness after childbirth (4). About 16 million girls aged between 15 and 19 give birth each year, accounting for more than 10 per cent of all births (5). In the developing world, about 90 percent of the births to adolescents occur in marriage (5). In low and middle-income countries, complications from pregnancy and childbirth are the leading cause of death among girls between the age of 15 and 19 years (2).

The state of maternal health mirrors the gap between the rich and the poor. Less than one percent of maternal deaths occur in high-income countries (6). A woman's lifetime risk of dying from complications in childbirth or pregnancy is an average of one in 150 women in developing countries as compared to one in 3800 women in developed countries (6). Maternal mortality is higher in rural areas and among poorer and less educated communities (6). Of the 800 women who die every day, 440 live in sub-Saharan Africa, 230 in Southern Asia and five in high-income countries (7). Reducing maternal mortality and achieving the Millennium Development Goal (MDG) 5 target was a serious challenge for many countries, including Kenya (8).

Antenatal and post natal services in Kenya as well as care provided during delivery are critical for the survival and well-being of the mother and child. According to 2008/9 Kenya Demographic Health Survey (KDHS), 92 percent of women in Kenya received antenatal care from a medical professional (9). During antenatal care visits, women are screened for complications and advice is given on a range of issues such as the place of delivery and referral (10). However, this does not translate to more births taking place at health facilities. The 2008/9

KDHS reported that 43 percent of births in Kenya occur in a health facility, while 56 percent of births take place at home (9). Most births that take place at home accounts for the high maternal mortality rate (MMR) at 488 deaths per 100,000 live births (10). The high MMR is a matter of great concern, as these deaths arise from well-known preventable causes such as obstructed labor, complications of unsafe abortion, infections, hemorrhage and high blood pressure (3). Most deaths can be avoided if presented early enough to a qualified health care professional (11).

Some of the factors hindering women from delivering at a health facility include lack of transport to the health facilities, negative attitudes to health care workers, distance to health facilities, cultural preferences and charges for services which are beyond what most women can afford (12). This led to the government commitment to abolish user fees associated with maternal health in order to encourage women to deliver at health facilities.

Demographic and Health Survey figures (DHS) for the 10-year period in Ghana from 1993 to 2003 showed a steady improvement in the proportion of deliveries by skilled attendants – one of the two proxy indicators for tracking MDG5 (12). Recent figures however indicate that the trend has been reversed. According to the independent review of 2007, the proportion of deliveries attended by skilled health personnel declined from 54 to 35% between 2005 and 2007 (13). The decline in skilled attendants at delivery was linked to under-funding and abolition of the exemption policy for delivery fees, which was introduced in 2004 and a health worker strike of 2007.

Funding is increasingly available to support initiatives to reduce financial barriers as part of the international effort to improve progress towards achieving the MDG (14). A number of aid organisations such as United Nations Children’s fund (UNICEF), United States Agency for International Development and Global Fund have continuously channelled funds to the maternal and child health care in developing countries (15).

1.2 Provision of Free Maternal Care in Africa

There has been growing movement, globally and particularly in the African region, to reduce financial barriers associated to access to health care services, with a special emphasis on high priority services and vulnerable groups (16). In South Africa, for example, free services for

pregnant women and children aged under five years were introduced in 1994 and utilisation of maternal health care services appears to have increased as a result (17). In Zambia, fees were suspended for rural districts in 2006 (18). In Burkina Faso, a policy for subsidy of 80% on deliveries fee was launched in 2006. Sudan announced free care for caesarean sections and children in January 2008 (19).

An exemption policy for delivery was introduced in Ghana in 2004 (12). It was intended to cover all facility costs for intrapartum care in both public and private facilities. Initially payments were effected through the local government administration but later through the national health system. Funding was provided from a debt relief fund, under the Highly Indebted Poor Countries (HIPC) initiative (20). This was gradually phased out and was replaced by health insurance in 2008. Between October 2005 and November 2006, an evaluation of the policy in six districts each in the Central and Volta regions was conducted by the Initiative for Maternal Mortality Programme Assessment (IMMPACT) (21). The findings provided useful lessons for countries that are planning or starting to operate maternal or other service-based

1.3 The Free Maternal Health Policy in Kenya

In June 2013, the Kenyan Government decided to implement the policy of free maternal health care services in all public health facilities. This was in an effort to address the financial barriers preventing mothers from accessing skilled birth attendants and to improve the MMR (10). The services provided under free maternal health package are antenatal care, post-natal care (up to six weeks), deliveries (normal and CS), referrals, and family planning (11). All fees charged for health care services at lower level facilities were abolished. These free maternal health care policy initiative was intended to fast track the attainment of MDGs 4 and 5 (Policy Proposal on the Presidents' Initiative on Free Maternal Health Services in Kenya) (10).

1.4 Study Problem

Maternal mortality levels in Kenya have remained unacceptably high at 488 maternal deaths per 100,000 live births (22). The high rate of maternal deaths could be attributed to high abortion related deaths, primary postpartum hemorrhage, hypertensive diseases in pregnancy and ruptured uterus, HIV related deaths and pre-natal infections. Others causes of maternal deaths include

placental abruption, cardiac failure, ectopic pregnancy, pulmonary embolism, obstructed labor and hypoglycemia (2). In 2013, in order to improve maternal health and survival, the Government of Kenya introduced free maternal health care services in all public health care facilities and some facilities run by faith based organizations. The reduction in maternal mortality and attainment of the MDG5 target is however proving a serious challenge for the country. After the policy was implemented, there was need to do an early evaluation to determine whether the policy had any effect on service utilization and in neonatal and maternal mortality. Challenges in the implementation of the policy and the steps that need to be taken to improve implementation of the policy need to be identified.

The early effects of the new policy was increased maternal deliveries in health facilities and other resources specific to maternal and child health care. The effectiveness of the policy needed to be monitored periodically to ascertain if implementation has been successful or whether additional interventions are required. Thus, this study sought to assess the uptake and utilization of maternal care services after the implementation of the free maternal care policy in Kericho County.

1.5 Research Questions

This study focused on addressing the following research questions:

1. Are there any changes in number of women utilizing the ANC services and maternal delivery services since the introduction of FMC in Kericho County?
2. Are there changes in the consumption of obstetric medicines (oxytocin) within Kericho County since the introduction of Free Maternal Health Care services?
3. What are the effects of the policy on the maternal mortality ratio and the ANC attendance in Kericho County?
4. What challenges are experienced by the health care workers and planners of the County Government since the introduction of FMC services?

1.6 Hypothesis

1.6.1 Null hypothesis

1. There is no difference in the number of patients utilising ANC, maternal delivery services, oxytocin and MMR in Kericho County before and after the introduction of FMC services.
2. There is no difference in MMR in Kericho County before and after the introduction of FMC services.

1.6.2 Alternative hypothesis

1. There is a difference in the number of patients utilising ANC, maternal delivery services, oxytocin and MMR in Kericho County before and after the introduction of FMC services.
2. There is a difference in MMR in Kericho County before and after the introduction of FMC services.

1.7 Main Objective

The main objective of the study was to evaluate the uptake of free maternal health care delivery services, its impact on maternal mortality ratio and the consumption of selected health care resources since the introduction of FMC policy in June 2013 in Kericho County.

1.7.1 Specific Objectives

The specific objectives were to:

1. To determine the changes in the number of patients utilising FMC services in health care facilities in Kericho County.
2. To evaluate the change in the consumption of obstetric medicines and other resources before and after introduction of FMC policy.
3. To evaluate the change in maternal mortality ratio before and after introduction of FMC in Kericho County.
4. To identify the challenges faced by providers in the implementation of FMC in Kericho County.

1.8 Study Justification

Several factors have been identified as the possible causes of death to mothers and newborn children. Cost of maternal delivery has been identified as one of the key factor leading to low utilization of the services provided by skilled health care personnel. Identification of this factor led to the introduction of the free maternal health care policy by the Government of Kenya in 2013. These was to aid access to skilled and specialized maternal health care services and also to meet the Millennium Development Goal five (MDG5) of reducing maternal mortality ratio by three quarters by 2015. Since the implementation of the policy, there have been little or no studies carried out to evaluate the effect and impact of the policy on the access and utilization of free maternal health care policy. The study evaluated the impact of the policy and informed policy makers on the possible effects and progress of the free maternal health care policy. This study may influence on the successful implementation of the policy.

CHAPTER TWO

2.0 LITERATURE REVIEW

Kenya has high maternal morbidity and mortality rates. The most recent estimates set the maternal mortality rate at 488 deaths per 100,000 live births, which is well above the MDG target of 147 per 100,000 by 2015 (11). For every woman who dies during childbirth in Kenya, it is estimated that another 20-30 women suffer serious injury or disability due to complications during pregnancy or delivery (11). These high rates have persisted despite improvements in other health indicators over the past decades (11). The problem is driven, at least in part, by lack of access to quality maternal health services, including ante-natal, delivery and post-natal services. Although health sector infrastructure has grown over the past decade, many women still live at a considerable distance from health facilities, cannot afford to pay fees for maternal services and face other barriers to accessing quality care. Access to skilled delivery is a particular challenge (23). Overall, only 44% of births in Kenya are delivered under the supervision of a skilled birth attendant; well below the target of 90% of deliveries by 2015 (24). Traditional birth attendants continue to assist with 28% of births; relatives and friends with 21%; and in 7% of births, mothers receive no assistance at all (25).

2.1 Kenya's Health Care System

The Kenya health sector comprises of the public health facilities under the MOH and parastatal, private facilities, NGO, and FBO facilities (26). Health services are provided through a network of over 4,700 health facilities. Public health facilities account for about 51 percent of these facilities (26). The Kenya public health system is divided into six levels of health care delivery as shown in the figure 2.1.

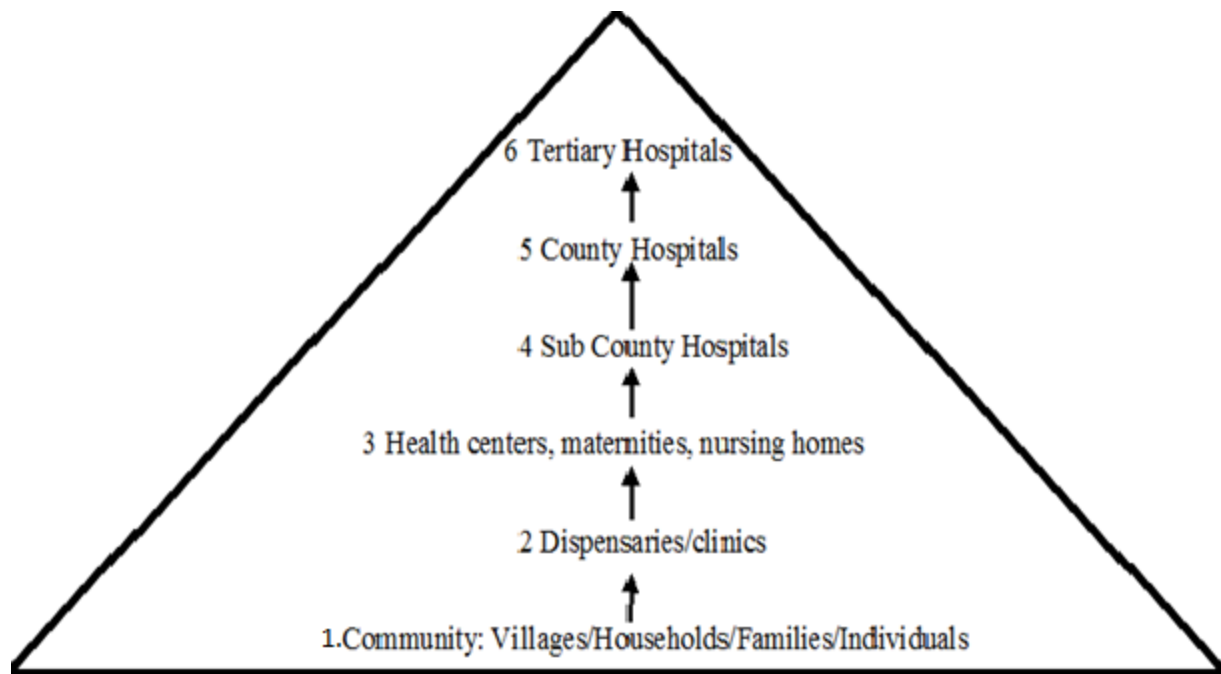


Figure 2.1: Levels of Health care system in Kenya (26).

All health care services have been decentralized. The services are integrated as one goes down the hierarchy of health structure from the National level to the County and Sub county levels (26).

2.2 Policy, Constitutional and Legal Frame work for the Provision of Free Maternal Health Care

The framework for free maternal health services is provided for under several local, regional, and international mandates. Article 43(1a) of the Constitution of Kenya 2010 states that, ‘every person has the right to the highest attainable standard of health; which includes the right to health care services, including reproductive health care (27). Reproductive health is widely recognized to include family planning, antenatal, delivery, and postnatal health services (28). The Constitution of Kenya 2010 further provides that a person has the right to emergency treatment (Article 43 (2), the right to inherent dignity and the right to have that dignity respected and protected (Article 28) and the right to access information (Article 35) (27).

The Kenya National Patients’ Rights Charter (2013) outlines the right to access health care, the right to receive emergency treatment in any health facility irrespective of ability to pay; the right

to the highest attainable quality of health care products and services; the right to be treated with respect and dignity; the right to information; and the right to complain, among others (29). Several international frameworks exist to guide the implementation of the right to health generally and the right to reproductive health in particular. General Comment No. 14 of the Committee on Economic, Social and Cultural Rights states that health services must be available with sufficient health facilities and trained health care professionals (30). The Committee on Elimination of Discrimination Against Women (CEDAW) requires states to ensure women have appropriate services with regard to pregnancy, childbirth, and post-natal care, including family planning and emergency obstetric care (31). Kenya has also committed to fulfilling the Millennium Development Goals to reduce the maternal mortality ratio by three quarters and achieve universal access to reproductive health (32).

In addition, Kenya has signed on to several regional mandates regarding health/reproductive health. Kenya participated in and committed to the 2001 Abuja Declaration, pledging to commit at least 15% of the national budget to health care (33). Kenya signed (but did not ratify) the Maputo Protocol on the Rights of Women of 2003, which recognizes reproductive rights and commits state parties to establishing and strengthening existing pre-natal, delivery, and post-natal health and nutritional services for women (34). As a member of the African Union, Kenya launched the Campaign on Accelerated Reduction of Maternal Mortality in Africa (CARMMA) in November 2010, reiterating the Campaign's slogan that 'no women should die while giving life (35). In recent years, several African countries (Burundi, Zambia, Burkina Faso, Liberia, Niger, and Sudan) have enacted policies to make deliveries and/or health care for mothers and children free or nearly free in order to fulfil these mandates.

On first of June, 2013, the Government of Kenya took action to address this problem by initiating a policy of free maternity services in all public facilities, which was to be effected immediately (10). The Government through the Ministry of Health intends to transfer funds to the facilities through two existing two financing schemes. These are the Health Sector Service Fund (HSSF) for health centers and dispensaries and Health Management Service Fund (HMSF) for hospitals. The MoH intended to use the two existing mechanisms to reimburse public health care for each delivery at Kshs2,500 and Kshs5,000 for health centers/dispensaries and hospitals respectively. It was assumed that once maternal health services were made free, utilization

would increase sharply from the current level of 50 to 70 % in the first year. Thereafter, utilization is expected to increase gradually and stabilize at 80 % (36).

Kenya's new free maternal health services policy is a potentially positive step in this direction (10). However, in order to comply with Kenya's international, regional, and local obligations, implementation of this policy must not override or diminish other rights provided by these frameworks.

2.3 Funding for Free Maternal Care in Kenya

The Government of Kenya's current allotment of Ksh95 billion for health represents only 5.7% of the total budget, well below the 15% required by Kenya's commitment to the Abuja Declaration (33). This contradicts the Jubilee Coalition's manifesto, which promised to increase the health budget progressively to reach 15%; in fact, the current budget is a decrease from rates of 7.2% of the total budget in 2010, 6.1% in 2011, and 5.9% for 2012 (37). It also falls far short of the Ministry of Health's 2012 task force report, which called for a minimum of Ksh217 billion for a three-year health stimulus package (37). Of the 5.7% committed to health budget, Ksh3.8 billion was allocated to fund the free maternal health care program. An additional Ksh700 million was committed for free access to health centres and dispensaries, Ksh3.1 billion for recruitment of 30 community nurses per constituency and Ksh522 million for recruitment of 10 community health workers per constituency (38). However, several observers from within the health system have expressed concern that these commitments were not be enough to meet the additional demand placed on facilities and staff due to the free maternity health policy (39). Others have questioned the feasibility and the appropriateness of the policy altogether which they warn, might lead to a decline in quality of services. This could further increase reproductive inequalities across the country, and will do little to address and could even worsen human rights violations in health facilities (11).

Health care workers and other stakeholders have expressed further concern that the Ksh60 billion allotted to county governments will not be used entirely on health, given that there are other competing priorities like infrastructure, salaries, and local development funds (40). Insufficient funding could seriously jeopardize the success of the maternal health program (41).

Insufficient or slow distribution of the funds that are available for the program could also create problems. Although some facilities have reportedly been given extra money to cover the influx of deliveries (42), others have remained in limbo, uncertain of how to balance the new policy for free care with their need to cover costs. A matron at Pumwani Maternity Hospital, for example, noted that while the hospital used to charge Ksh5,000 for normal deliveries and Ksh10,000 for a caesarean section, the government was reimbursing them at a flat rate of Ksh5,000 per delivery, creating a critical financial gap (38).

As documented in other countries that have implemented free delivery services, such as Ghana, these funding and implementation gaps can create serious friction between communities and health staff and between facility managers and higher levels of the health system (12).

2.4 Infrastructure and Resource Requirements for the Free Maternal Health Care Policy in Kenya

Kenyan public health facilities have long suffered from insufficient infrastructure, equipment and staffing (25). Increasing the budget line for health care is absolutely essential in order to strengthen health systems and ensure there is sufficient infrastructure, equipment, and staff to implement universal free maternal health care effectively (11). Recent survey data found that only 36% of public health facilities offering delivery services had all the basic delivery room infrastructure and equipment needed; rural areas and lower level facilities were particularly unequipped (43).

The Kenya Health Sector Strategic and Investment Plan 2012-2018 (KHSSP) estimates that current staff levels meet only 17% of minimum requirements needed for effective operation of the health system (44). Kenya has only 7 nurses per 4,000 residents which is half the number (14 per 4,000) recommended by the World Bank (38). There is uneven distribution of health care workers across the country, with particular gaps in the former North Eastern, upper Eastern and Northern Rift provinces (44). These problems have been worsened by the initiation of free maternal health services. Hospitals have reported increased overcrowding in maternity wards, with some mothers forced to leave the hospital early to make room for others. Nurses have also reported being overburdened due to the new policy, with nearly all working overtime and as few as three nurses aiding 20 mothers at a time (39).

Studies by the World Bank and World Health Organization have shown that proper training, good remuneration and motivation of frontline service providers can be just as important, if not more important, than increased financing in attaining human development goals (45). When staff are properly trained and well remunerated, accountability relationships between policymakers, frontline service providers, and users of services are strong and better results are observed (45). This training should include: delivery skills; infection control; interpersonal skills; and supervisory structures with audit processes set up to regularly review quality of care (45). As part of this effort, the Ministry of Health and other stakeholders should undertake a comprehensive study of health worker attitudes, beliefs, and concerns. In other areas, such as South Africa, studies have identified key misconceptions and genuine structural problems that shape providers' job satisfaction and treatment of patients (17).

2.5 Potential Benefits of the Free Maternal Health Policy

In the first 18 months after fee exemption was introduced in all maternal care policy, the largest increase in facility utilisation in Volta Region was amongst the poorest (first quintile), while in Central Region it was amongst the poor (second quintile). In terms of household payments, the incidence of catastrophic out-of-pocket (OOP) payment was found to fall (21). For the poorest quintile, the proportion paying more than 2.5% of their income dropped from 55% before the policy to 46% after. Using the poverty head count, the proportion of households falling into extreme poverty as a result of their delivery payments reduced from 2.5% before the policy to 1.3% after policy implementation.

However, the proportionate decrease in OOP payments was greater for the richest households (22%), compared to the poorest (13%). Moreover, to reach the poorest and the poor in some areas, additional demand-side cost issues such as transportation costs, might need to be addressed.

While it may be challenging to immediately strengthen all elements of the health systems for effective and efficient maternal health care. The Kenyan Government through the MoH intends to equitably deploy and re-distribute skilled health care personnel with a focus on those areas contributing most to the high maternal and newborn mortality in the country. It also intends to fast track in-service on-the-job training of the standardized competency based Emergency

Obstetrics and Neonatal Care (EmONC) training and promoting pre-service competency based EmONC training.

It is estimated that 1.5 million pregnancies occur annually in Kenya with about 20 percent supported through prepayment schemes (private health insurance or NHIF). The policy would cover about 80 percent of the pregnancies (36). With the inception of the policy, utilization was expected to increase sharply from the current level of 50 to 70 % in the first year. Thereafter, utilization was expected to increase gradually and stabilize at 80 % (36).

2.6 Barriers to Utilization by Patients

One of the most critical barriers to maternal health care in Kenya on a national scale is the lack of physical access to facilities, due to the insufficient number of facilities, distance to facilities, and inadequate transport infrastructure. During the Kenya's 2008-2009 Demographic and Health Survey, 42% of women who delivered outside a health facility because of the long distance from health facility or there was no transport to the health facility, compared to only 17% maternal mothers who cited the cost of delivery as the key barrier. Cost of health services ranked high for women in Nairobi as a hindrance to hospital utilization while rural women were far more likely to report that they did not deliver in a hospital because it was too far or they lacked transport. In North Eastern region, where only one maternity wing is currently operational, 68.8% of women were deterred from access because of distance, lack of transport, or because the facility was not open, versus only 4.9% who cited cost as the key barrier to skilled delivery (39). The free maternity program is thus most likely to have the greatest effect in Nairobi, a region which already has the highest rate of births delivered by medical professionals at 89%, compared to 32% in North Eastern and 26% in Western regions of the country.

If not accompanied by wider investments to increase the number of health facilities in rural areas and provide transportation infrastructure to link women to these facilities, the program may result in increasing reproductive inequalities between Kenya's regions and counties.

2.7 Quality of Health Care Service and Cultural Preferences

Kenya's public health facilities have long been plagued by reports of abuse, mistreatment, and negligence of patients at the hands of staff; a problem enhanced by poor supervision and

understaffing (46). Patients also report that the public health system is not culturally sensitive, failing to adapt to local circumstances such as values which require women to be attended by female practitioners (43). Health workers are also frequently insufficiently trained. The World Bank's recent report on Kenyan health facilities, found that only 58% of public health providers could correctly diagnose at least 4 of the 5 most common conditions patients present with, and only 44.6% properly managed maternal/neonatal complications (45). Increasing the burden on health professionals without adequate increases in compensation and/or staffing threatens to enhance this systemic problem further. As nurses argue, not only is it impossible to effectively supervise over 20 mothers in a ward at the same time (as some have been doing since the start of the program), it is taxing to work overtime every night and this worsens the already existing morale problems (39). Indeed, less than a month after implementation of free maternal health care, more than 2,000 nurses at the Kenyatta National Hospital went on strike, demanding fulfilment of a promised 46 % increment in their basic pay awarded by the High Court in September 2012 (47). Although the government agreed to implement the pay raise, it remains to be seen whether this will provide sufficient incentive to cope with the demands of free maternal health care.

The poor quality of services in government-run facilities is also well-known among potential patients and acts as a significant deterrent to engaging with the public health system. Indeed, women in North Eastern cited the poor quality of service (17.3%) and lack of female providers (9.0%) as some of the key barriers preventing them from delivering in health facilities, more so than cost of delivery (4.9%) (9).

CHAPTER THREE

3.0 METHODOLOGY

The study was carried out in two parts; the first part was a qualitative study that identified the key challenges in the implementation of the FMC. It also gave an insight on reasons for changes in trend in utilization and on resource consumption. It entailed in depth interviews with health care managers involved in the FMC implementation. The in depth interviews were carried out during the months of May and June, 2015. The second part was a pre-post retrospective ecological longitudinal study on the utilization and consumption of selected inputs associated with provision of maternal care. The data that was used for these study included data from 2011 when HMIS was implemented in all health facilities up to the first quarter of 2015.

3.1 Qualitative Study on Factors that affected the Implementation of the Policy

3.1.1 Study Design and Study Site

This was a qualitative cross sectional study. Kericho County has a population of approximately 758,339 (2009 census) and it covers an area of 2,479 km². It is located within the highlands west of the Kenya's Rift Valley. Kericho County has 210 Health Facilities which can be categorized into 13 FBO, 146 MoH, 5 NGO and 46 private facilities. The facilities are subdivided into levels of health care system as presented in the table 3.1.

Table 3.1: Categories of Health care Facilities in Kericho County

Description	Level 2	Level 3	Level 4	Total
Faith based organizations	7	4	2	13
Ministry of Health	124	15	7	146
Non-Governmental organizations	4	1	0	5
Private health facilities	39	2	5	46
Total	174	22	14	210

3.1.3 Study Population

The study population included the Health Care Managers and health care workers involved in planning and implementing the policy at Kericho County as well as facility level managers and departmental heads involved in maternal care all based in Kericho County.

3.1.4 Inclusion and Exclusion Criteria

The participants for qualitative study were included if they met the following criteria:

- a) They must have been working in the county as health care managers or planners for at least two years.
- b) They were working in public health sector.
- c) They gave informed consent to participate in the study.

Health care managers and health workers who declined to give the informed consent to be interviewed were excluded. Similarly, those who were not working or had not been working in Kericho County since the inception of FMC were excluded from the study.

3.1.5 Sampling Procedure and Participants Recruitment

The principle of sample size determination for qualitative studies in the key informant interviews was applied. In this case, up to four interviews were sufficient. According to the principle, inclusion of new participants should be stopped if no new information is being obtained (48).

Purposive sampling technique was used because it is the most effective method of identifying individuals or participants who have a lot of information for qualitative studies (49). Potential participants were contacted by phone and were requested to suggest a time that was appropriate for them to give an interview. Participants who could not be contacted by phone were contacted through visit to their offices.

The participants included: the county head of maternal health and family planning; medical superintendents; county nursing officer; county pharmacist; monitoring and evaluation experts; head of procurement and supplies; departmental heads in key departments and any health care personnel who played key role in implementation of FMC. No financial inducements were given

to participate. A letter of introduction was obtained from the County Executive Officer of health in Kericho County and the Dean, School of Pharmacy.

3.1.6 Data Collection

Interviews of the key informants were conducted with the aid of a questionnaire guide which is appended (Appendix 1). Informed consent was obtained before the start of each interview. The interviewees were allowed to select the interview dates, time and venue that were convenient to them. The questionnaire was designed to collect information on factors that affect and influence FMC such as the political, social and economic challenges faced in the implementation of the policy. The interviews were conducted orally by two research assistants in which, one conducted the interview while the other was writing notes. The responses were not audio recorded. All the interview notes were transcribed within 24 hours after the interview.

3.1.7 Data Analysis

A ground theory approach was used to analyze data. Ground theory is a systematic guideline for gathering, synthesizing, analyzing and conceptualizing qualitative data to construct theory (50). Data collected was transcribed into Microsoft Word document, and then classified into themes. Themes and sub themes were coded after reading of the transcripts. The findings under each of the themes were discussed.

3.2 Longitudinal Ecological Survey on the utilization of maternal care services and maternal mortalities

3.2.1 Study design and Study Population:

The design was a retrospective longitudinal ecological study (51). It was a quasi-experimental study because it entailed comparing data obtained before and after the introduction of FMC policy. Only one ecological unit was studied, Kericho County. Data was aggregated from the constituent health facilities in the county.

3.2.2 Selection Criteria

There was one study unit and therefore eligibility criteria did not apply. Kericho County was purposively selected because of easy access to records and it has a rural population who face the greatest constraints in accessing health care.

3.2.3 Data Collection

The study used routine data obtained from the County HMIS. The data included quarterly information on supply and use of a wide range of health care services by all health facilities at the county level. Data was then transferred to a spreadsheet in quarterly time periods.

Variables

There were five dependent variables which included: the ANC attendance; health facility maternal deliveries; oxytocin consumption; and maternal mortalities. The main covariate was the time period.

3.2.4 Data Analysis of Longitudinal Data

Graphical analysis was initially conducted in order to provide visual idea of the trend series over time. Decomposition of time series was done in order to separate the series into seasonal, random and trend components. The decomposed time series data was plotted against time periods to obtain trend and seasonal plots.

A scatter plot was plotted by plotting the time series data of the parameters against the quarterly time periods. A smooth curve was fitted into the scatter plot in order to estimate the relation between the independent and dependent variable. Locally weighted smoothing was used to obtain the trend because of its suitability in smoothing for noisy data (52). It also provided information on the form of the relationship between variables where it may not be easily described by conventional regression. The locally weighted smoothing technique uses a weighted average of a set of data points to fit curves rather than the individual points as in conventional regression. The technique is relatively resistant to outlying values and does not require a prespecified global linear function to be chosen. The degree of smoothing is determined by the width of the window determining the weighted average. Optimal smoothing

is obtained by balancing the residual sum of squares for each point against the degree of smoothness (52). Run sequence plot was used to detect seasonality. It was used because it is a recommended initial method of analyzing time series data. Seasonal index was used to measure seasonal variations.

Segmented regression analysis

From the data obtained in the HMIS, a dummy variable was generated to indicate whether the observations occurred before or after the intervention (time before the intervention=0, time after the intervention=1). In order to determine if the changes in level and trend of the measure of interest were due to chance and to control for other effects, segmented regression analysis is used. Segmented regression fits a least square regression line to each segment of the independent variable, time, and thus assume a linear relationship between time and the outcome within each segment (53). We used this regression model to estimate the level and trend of the effect of FMC policy in Kericho County.

The general equation for analysis of times series data by generalized linear regression modelling is presented in equation 1 (54).

Equation 1

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \epsilon_t$$

Where;

Y_t is the aggregated outcome variable measured at each equally-spaced time-point t

T_t is a continuous variable indicating time in quarterly periods since the start of the policy

X_t is a dummy (indicator) variable representing the intervention (pre-intervention periods=0, otherwise=1)

$X_t T_t$ is an interaction term.

β_0 represents the intercept or starting level of the outcome variable.

β_1 is the slope or baseline trend of the outcome variable until the introduction of the intervention.

β_2 represents the change in the level of the outcome that occurs in the period immediately following the introduction of the intervention.

β_3 represents the difference between pre- and post-intervention slopes of the outcome.

The sum of β_1 and β_3 is the slope after the introduction of the intervention

ϵ_t is the random error which is random variability not explained by the model and is assumed to be normally distributed. An error term at time t that may be correlated to errors at preceding or subsequent time points (53).

If β_2 was statistically significant, then the intervention caused a change immediately after its introduction and caused almost immediate increased/decreased levels of the outcome variable. If β_3 is statistically significant, then the intervention caused a change in the outcome over time (53,54).

The parsimonious model was obtained after forward stepwise elimination of the non-significant terms and also searching for the optimal quarter where the change occurred. In building the model, the principle of parsimony was followed. According to the principle, the model with smallest possible number of parameters was selected so as to provide an adequate representation of the underlying time series data. Out of a number of suitable models, one should consider the simplest one while still maintaining an accurate description of inherent properties of the time series (55).

Though officially the FMC policy was launched in June 2013, policy makers stated that they started to experience increased anticipatory demand for free services from the first quarter of 2013. This fact and given that there could have been a lag in the effect of the FMC policy, we first modelled the impact of the policy with the intervention occurring at different time points in 2013. The post-event trend was modelled as either a simple linear or a quadratic function. The quadratic function was generated by mean-centering the post-event time variable and including a squared term in the model as presented in table 3.2. The time variable since the 2011 was also modelled as either simple linear or quadratic function.

Segmented regression analysis can be used to specify if a model has more than one change point. This can occur if different components of an intervention were introduced at different time point

or if there is need to control for changes in level and slope of the series that are caused by reasons other than the policy. The model for two change points is as shown in equation 2.

Equation 2

$$Y_t = \beta_0 + (\beta_1 * \text{time}_t) + (\beta_2 * \text{Intervention1}) + (\beta_3 * \text{Time after Intervention1}) + (\beta_4 * \text{Intervention2}) + (\beta_5 * \text{Time after Intervention2}) + \epsilon_t. \text{ The change points}$$

Change point analysis

The breakpoint is defined as the point where a structural change occurs in a linear regression. Identification of the breakpoints was first done by visual inspection of the trend plots and implementing generalized fluctuation test available in the *strucchange* package of R software. Plots; and use of *SiZer* software (56). This analysis was done on seasonally adjusted data.

Table 3.2: Structural forms of the regression models that were used to explain the time series

	Time since 2011	Time from the intervention
A	LINEAR	LINEAR
B	LINEAR	QUADRATIC
C	QUADRATIC	LINEAR
D	QUADRATIC	QUADRATIC

3.3 Data Analysis

To illustrate the analysis, data from the County HMIS which were the outcome of interest included the ANC attendance, maternal deliveries, oxytocin consumption and maternal mortality ratio. The independent variables that were created included the intervention, pre and post intervention. The analysis was then performed on the R (version 3.2.2)^R statistical program with the outcome variables as the depended variable in the regression. Data layout for a segmented linear regression is appended in appendix 3

3.4 Data Management and Quality Assurance

All data from the HMIS survey were entered into a Microsoft-Access Database. Data cleaning and validation was performed to achieve a clean dataset that was then exported into R (version 3.2.2) statistical program. Back up files were stored in a flash disk. This was done regularly to avoid data loss.

Data collection and interviews were conducted by the first author with the help a research assistant. The research assistant was trained with the guidance of a trainee Standard Operating Procedure. The level of training was considered sufficient if the degree of inter data collector agreement was above 85%. Two data collectors were present during the in depth interview. The research assistant wrote the proceedings of the interview while the first author was conducting the interview. Interviews were transcribed on the same day of the interview so as to capture all non-verbal and verbal interactions during the interview and to avoid loss of information. The interviewers were all Kenyans and were therefore conversant with the local English dialect. A codebook was used to guide the coding and identification of themes (50).

3.5 Ethical Considerations

The ethical approval was obtained from Kenyatta National Hospital and University of Nairobi Research and Ethics review Committee (KNH/UoN-ERC). The letter of ethical approval as appended in appendix 5 (reference number P118/03/2015). Informed consent was obtained, with aid of a consent form (appendix 6) from the participants who were provided with the objectives, methods and expected benefits of the study.

Participant's identities were concealed by using codes and any identifier information was excluded in the data tool to ensure confidentiality. The study adhered to the principles of ethical research as outlined in the Declaration of Helsinki (57).

CHAPTER FOUR

4.0 RESULTS

The results were divided into two major sections. The first part was a quantitative time series analysis of the ANC attendance, health facility maternal deliveries, oxytocin consumption and maternal mortality ratio. All the variables were analyzed separately. The second part of results entailed the findings of qualitative study that involved key informant interviews.

4.1 Changes in Utilization of Antenatal Care Services

4.1.1 Trend and Seasonal Components of Antenatal Care Visits

Decomposition of time series was done in order to separate the series into seasonal and trend components. The ANC attendance data of expectant mothers attending ANC clinic was plotted against time periods. A trend curve was fitted onto the scatter plot as presented in figure 4.1 and the trend components in table 4.1

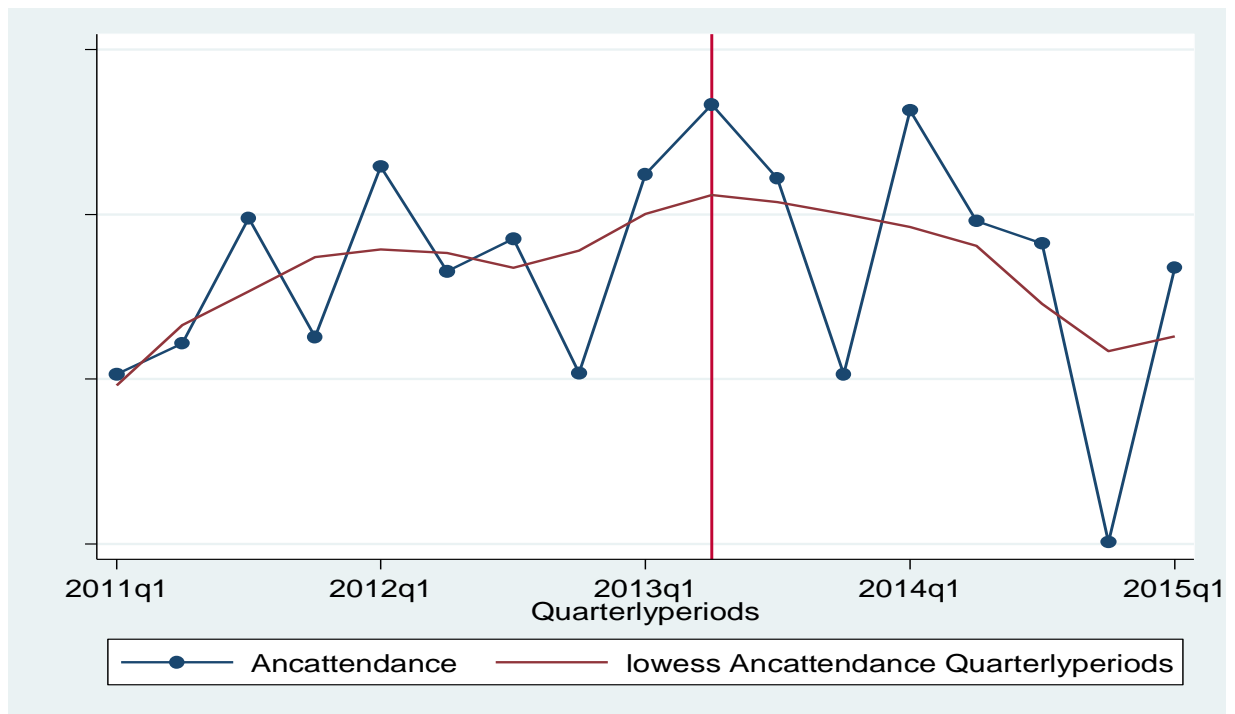


Figure 4.1: Scatter and trend plots of Antenatal care clinic visits in Kericho county

Table 4.1: Trend components of Antenatal care visits

Year	Quarter	Quarter	Quarter	Quarter
2011	-	-	5527.375	5739.875
2012	5779.25	5736.375	5703.375	5824.25
2013	5996.625	6041.375	6088.50	6048.00
2014	5909.625	5732.50	5485.5	-
2015	-	-	-	-

The time-series plot in Figure 4.1 showed that there were seasonal variations in the number of ANC attendance since there were a number of peaks and troughs each year. A locally weighed trend curve was fitted to give the estimated effect of FMC policy on the ANC attendance. The trend curve in Figure 4.1 showed that there was a steady increase in the ANC attendance all through from the first quarter of 2011 up to the first quarter of 2013 before beginning to steadily decline towards the end of 2013. This is also confirmed by the trend components in Table 4.1.

Table 4.2: Seasonal components of Antenatal care visits

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2011	429.97	193.72	203.54	-827.23
2012	429.97	193.72	203.54	-827.23
2013	429.97	193.72	203.54	-827.23
2014	429.97	193.72	203.54	-827.23
2015	429.97	-	-	-

From table 4.2, the ANC attendance was lowest in the fourth quarter with a seasonal index of -827. These meant that the ANC attendance was about 8.27% lower than the average attendance if there was no seasonal effect. The second lowest attendance was in the second quarter of the year with a seasonal index of 194 meaning that the attendance was about 1.94% above the average attendance if there was no seasonal effect.

As shown in table 4.2, highest attendance was in the first quarter represented by months of January to March. This was about 4.3% above the average attendance if there was no seasonal effect. Across the four years the seasonal patterns were regular and occurred at the same time each year. This is explained graphically as presented in figure 4.2.

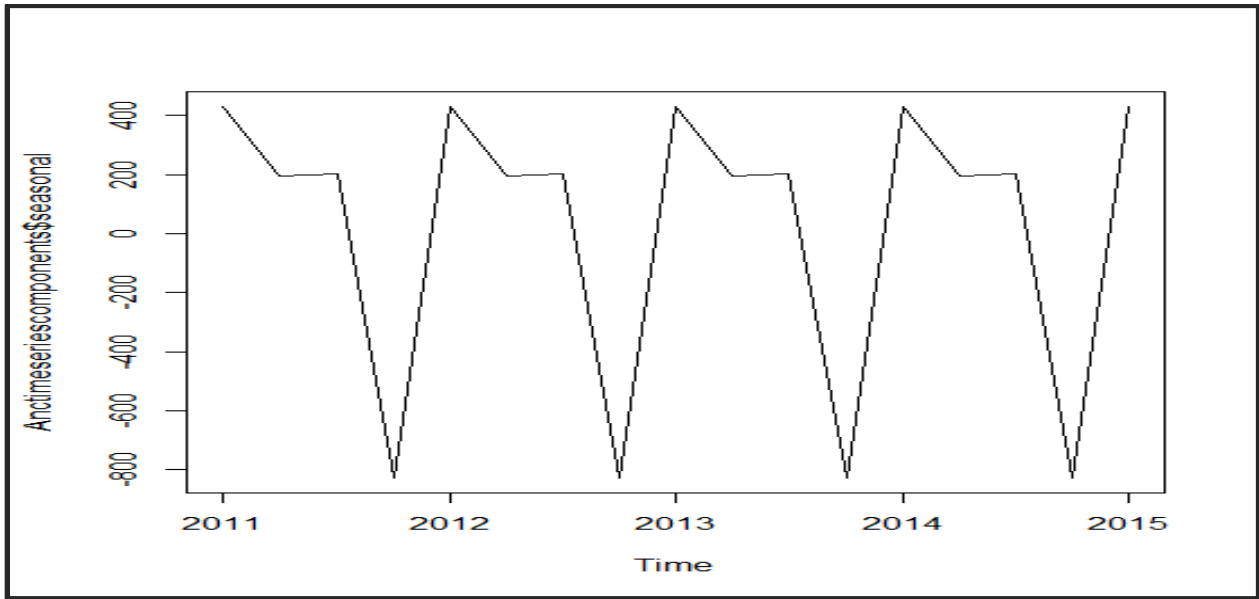


Figure 4.2: Seasonal plot of Antenatal care visits

4.1.2 Segmented Regression Analysis of Antenatal Clinic Attendance

The segmented regression analysis was conducted using generalized least square fit method. As shown in appendix 3, the dependent variable which was the outcome of interest was the ANC attendance while the quarterly time period was the independent variable. The results were as shown in table 4.3.

Table 4.3: Segmented regression analysis of Antenatal care clinic visits

Full segmented regression model(intervention in June 2013)				
	Coefficient	Standard error	t-statistic	P-value
Intercept (β_0)	5607.871	172.622	32.487	< 0.001
Time from 2011 (β_1)	128.329	38.916	3.298	0.006
Policy change (β_2)	115.318	363.872	0.317	0.756
Time after policy change in 2013 (β_3)	-304.610	77.308	-3.94	0.002
Most parsimonious segmented regression model				
Intercept (β_0)	7113.415	378.001	18.819	< 0.001
Time (β_3)	-725.995	267.778	-2.711	0.019
Time² (β_3^2)	-88.494	27.166	-3.258	0.007

From Figure 4.1, there was a general increase in ANC attendance from 2011. However, soon after the introduction of FMC services in June 2013 the ANC attendances started to decline. In the regression analysis model as shown in table 4.3, the ANC attendance stood at about 5608 ($p < 0.001$) cases per quarter in the first quarter of 2011. There was a significant quarter to quarter increase in ANC attendance from the first quarter of 2011 at a rate of 128.33 ± 38.92 cases per quarter ($p = 0.006$). After the implementation of the policy there was an insignificant increase in the ANC attendance at the rate of 115.318 cases per quarter ($p = 0.7563$). After the implementation of the policy, there was a significant decline in ANC attendance at a rate of 305 cases per quarter ($p = 0.002$) visits per quarter.

The parsimonious model reflected the key findings of the full segmented model. The introduction of FMC policy did not have instantaneous effect on the ANC attendance. However, after the introduction of the policy, there was gradual non-linear decline in the ANC attendance. The decline was best described using a quadratic function.

4.2 Changes in Maternal Deliveries

4.2.1 Trend and Seasonal Components of Maternal Deliveries

These were the mothers who gave birth under the care of a skilled health care giver within Kericho County. The scatter plot of maternal deliveries and fitted trend curve are presented in Figure 4.3. The trend and seasonal components are presented in table 4.4 and 4.5 respectively.

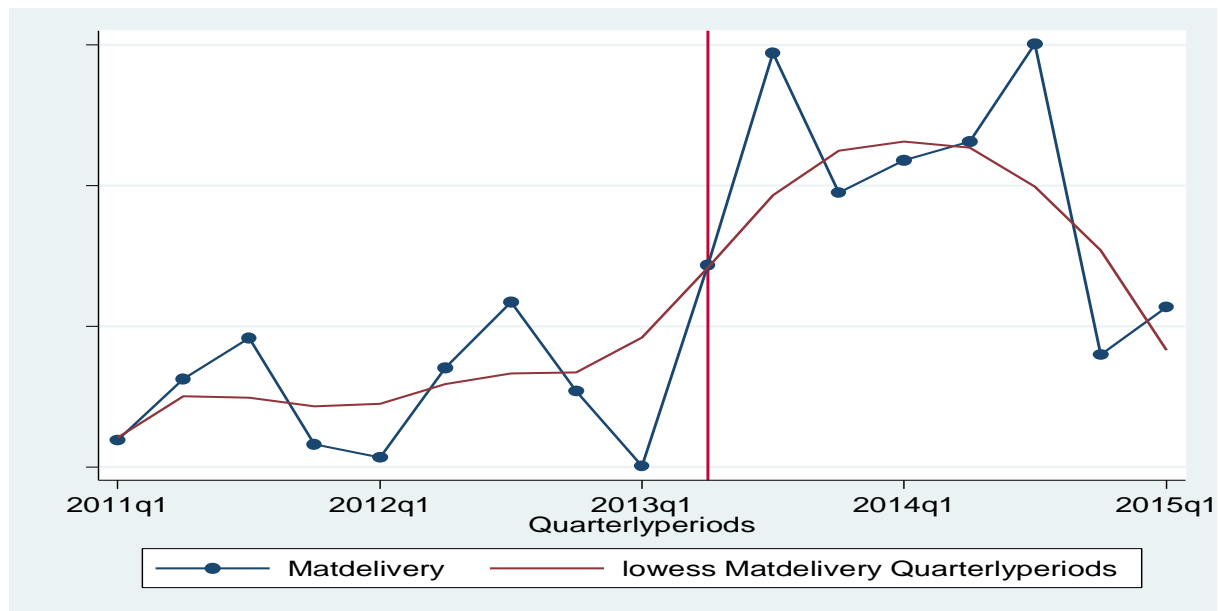


Figure 4.3: Scatter and Trend plots of maternal deliveries

Table 4.4: Trend components of maternal deliveries

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2011	-	-	3728.75	3726.125
2012	3747	3786.75	3806.625	3848.375
2013	4004.75	4203.625	4427.5	4618.25
2014	4677.125	4609	4471.875	-
2015	-	-	-	-

The time series of the maternal deliveries in health care facilities was additive because the random fluctuations in the data were roughly constant in size over time. Secondly, there seemed

to be seasonal variation in the number of births in the year as there were peaks and troughs each year.

From the plot in Figure 4.3, the rate of maternal deliveries remained fairly constant from quarter one of 2011 all through to quarter one of 2013 with peaks in the third quarters of 2011 and 2012. However, from the second quarter of 2013 there was a steady increase in deliveries which coincided with the introduction of FMC. These plateaued in mid-2014 before beginning to decline. This is similarly illustrated by the trend components in table 4.4.

Table 4.5: Seasonal components of maternal deliveries

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2011	-279.641	30.1927	384.0469	-134.599
2012	-279.641	30.1927	384.0469	-134.599
2013	-279.641	30.1927	384.0469	-134.599
2014	-279.641	30.1927	384.0469	-134.599
2015	-279.641	-	-	-

From Table 4.5, the estimated seasonal factors for maternal deliveries were same for each year. Maternal deliveries were found to be highest in the third quarter with a seasonal factor of 384. This meant that maternal deliveries were about 3.84% more than the average maternal deliveries if there was no seasonal effect.

The second highest maternal deliveries were experienced in the second quarter with a seasonal factor of 30. This meant that the average maternal deliveries were 0.3% above the average maternal deliveries if there was no seasonal effect.

The lowest maternal delivery was experienced in the first quarter of the year with a seasonal factor of about -280. This meant that there were about 2.8% fewer maternal deliveries in this quarter than if there was no any seasonal effect. The fourth quarter had the second lowest maternal deliveries with an average of about 1.35% if there was no seasonal effect. This is further illustrated by the plot in Figure 4.4 below.

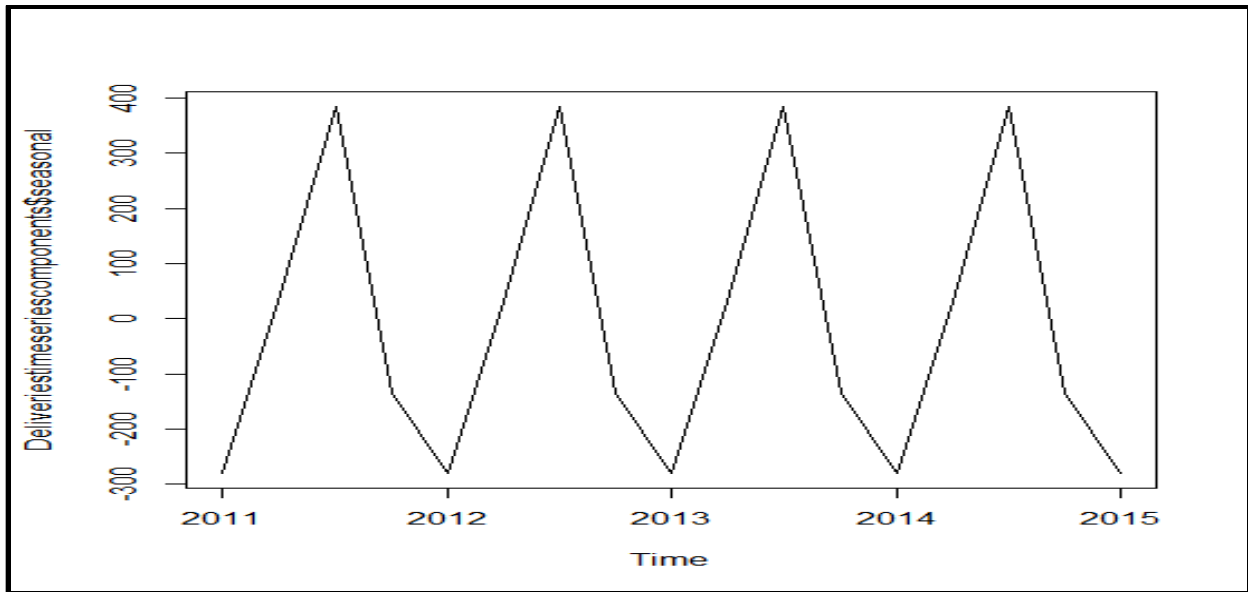


Figure 4.4: Seasonal plot of maternal deliveries

4.2.2 Segmented Regression Analysis of Maternal Deliveries

We used piecewise selection to identify the change point using *sizer* package of R software version 3.2.2 which is designed to look for breakpoints in linear regression model using bootstrapping techniques. We conducted 1000 iterations. In the first run, the change point occurred in the third quarter of 2014 and it was the most significant. It indicated that a linear decline had occurred.

To get the second change point and all observations that occurred from the third quarter of 2014 and thereafter were removed from the time series data. The second change point in the slope occurred in the ninth or tenth observation which was equivalent to either the first or second quarter of 2013. It was an indication that FMC services had an instant significant effect on maternal delivery and it was a positive effect. The results for segmented regression model are presented in table 4.6.

Table 4.6: Segmented regression analysis of maternal deliveries

Full segmented regression model (intervention in June 2013)				
	Coefficient	Standard error	t-statistic	P-value
Intercept (β_0)	3740.654	89.17135	41.94906	<0.001
Time from 2011 (β_1)	26.914	20.10258	1.33883	0.2036
Policy change June 2013 (β_2)	894.074	187.96562	4.75658	0.001
Time after policy change after 2013 (β_3)	-102.722	39.93502	-2.57223	0.0232
Most parsimonious segmented regression model				
Intercept (β_0)	4160.604	60.63537	68.61678	< 0.001
Time (β_3)	118.594	13.18863	8.99214	< 0.001
Policy change 2013² (β_2^2)	-63.062	11.37335	-5.54475	<0.001

From table 4.6, the maternal deliveries were approximately 3741 per quarter since 2011. From the first quarter of 2011, there was no significant quarterly increase maternal delivery at the rate of 26.91 ± 20.1 ($p=0.2036$) deliveries per quarter. During the implementation of the policy, there was an immediate significant increase in the maternal deliveries at the rate of 894.094 ($p<0.001$) deliveries per quarter. However, after the implementation of the policy, there was a significant decline in maternal deliveries at the rate of 102.7 ± 39.94 ($p=0.023$) deliveries per quarter.

The parsimonious model contained the intercept and the most significant level change. This showed significant effect of the policy.

4.3 Changes in the Consumption of Maternal Commodities

4.3.1 Trend and Seasonal Components of Oxytocin Consumption

We looked at the impact of the policy on the consumption of commodities used during maternal deliveries. Oxytocin injection was investigated. The time series was presented graphically using a scatter plot fitted with a trend curve as presented in Figure 4.5. The trend and seasonal components are presented in Table 4.7 and 4.8 respectively.

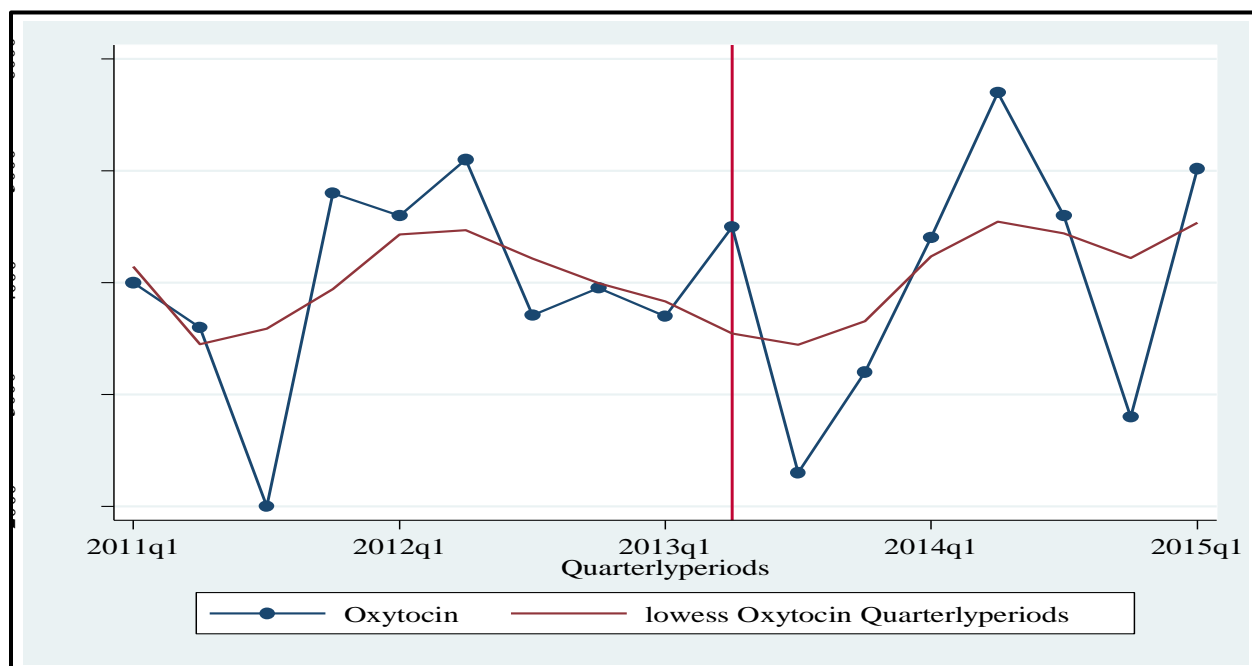


Figure 4.5: Scatter and trend plots on Oxytocin consumption

Table 4.7: Trend components of Oxytocin consumption

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2011	-	-	3675	3937.5
2012	4338.75	4446.25	4227.5	4040
2013	3788.75	3518.75	3512.5	3750
2014	4187.5	4425	4452.25	-
2015	-	-	-	-

The additive model was used in the analysis because of the random fluctuations in the data was roughly constant in size over time. As shown in Figure 4.5, from quarter one 2011 there was a decline in the consumption of oxytocin to quarter two before increasing steadily in the third quarter all through to the first quarter of 2012. Then there was a sharply decline all through to the second quarter of 2013 increasing in the third all through to the second quarter of 2014 then began to decline again. This is further illustrated by the trend components in Table 4.7.

Table 4.8: Seasonal components of Oxytocin consumption

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2011	38.7865	880.4531	-903.859	-15.3802
2012	38.7865	880.4531	-903.859	-15.3802
2013	38.7865	880.4531	-903.859	-15.3802
2014	38.7865	880.4531	-903.859	-15.3802
2015	38.7865	880.4531	-903.859	-15.3802

As presented in table 4.8, the oxytocin consumption was highest in the second quarter with a seasonal factor of about 880.5 meaning that Oxytocin consumption was about 8.805% above the average consumption of the drug in case there was no seasonal effect. The second highest consumption was found in the first quarter with a seasonal factor of 38.8. This meant that the consumption was about 0.388% above the average consumption if there was no seasonal effect.

The lowest consumption was in the third quarter of the year with a seasonal effect of -904 meaning that the consumption of Oxytocin was about 9.04% below the average consumption if there was no seasonal effect. In the fourth quarter, the seasonal index was 0.15% below the average consumption in case there was no seasonal effect. This is graphically illustrated in Figure 4.6.

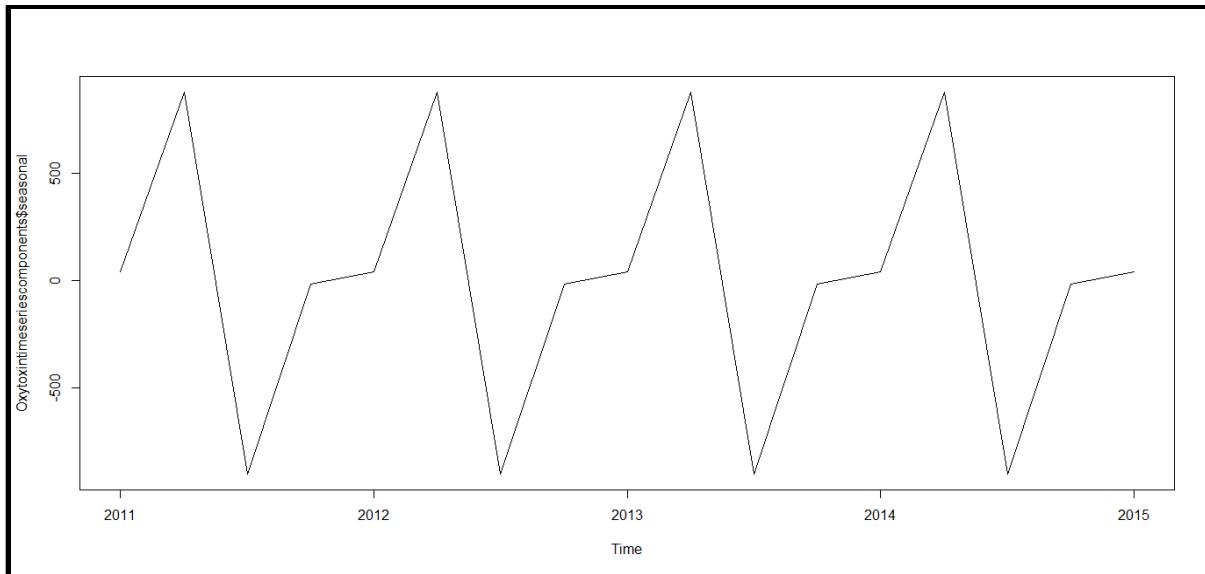


Figure 4.6: Seasonal plot on Oxytocin consumption

4.3.2 Segmented Regression Analysis of Oxytocin Consumption

Both the linear and parabolic assumptions were performed. The parabolic function gave a better fit with a residual standard error of 860.55. The results are as shown in Table 4.9.

Table 4.9: Segmented regression analysis of Oxytocin consumption

Full segmented regression model(intervention in June 2013)				
	Coefficient	Standard error	t-statistic	P-value
Intercept (β_0)	4887.601	1252.822	3.901	0.002
Time from 2011 (β_1)	47.746	94.743	0.504	0.623
Policy change June 2013 (β_2)	-1937.260	1433.279	-1.352	0.201
Time after policy change in 2013 (β_3)	600.537	480.268	1.25	0.235
Time after intervention²	-94.739	93.8936	-1.009000	0.333
Most parsimonious segmented regression model				
Intercept(β_0)	3996.424	185.335	21.563	<0.001
Time (β_3)	-1076.046	960.474	-1.120	0.286

*Degrees of freedom: 17 total; 12 residual, Residual standard error: 860.55

As shown in Table 4.9, from 2011 the average consumption was about 4888 ampoules per quarter. There was no significant change quarterly consumption of oxytocin as from 2011 as the consumption was 47.74 ($p=0.623$). During the implementation period of the policy, there was an insignificant decline in consumption of Oxytocin at a rate of 1937.260 ± 1433.279 ($p=0.201$) units per quarter. Also, time after the implementation of the policy showed an insignificant decline in consumption at a rate of 600.537 ± 480.268 ($p=0.304$) units per quarter.

The parsimonious model contained the intercept and the overall time during the study. It showed there was no significant change in consumption over time.

4.4 Changes in Maternal Mortality Ratio (MMR)

4.4.1 Trend and Seasonal Components of Maternal Mortality Ratio

Maternal mortality ratio is the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period. The scatter plot of MMR was plotted and the fitted trend curve is presented in Figure 4.7. The trend and seasonal components are presented in table 4.10 and 4.11 respectively.

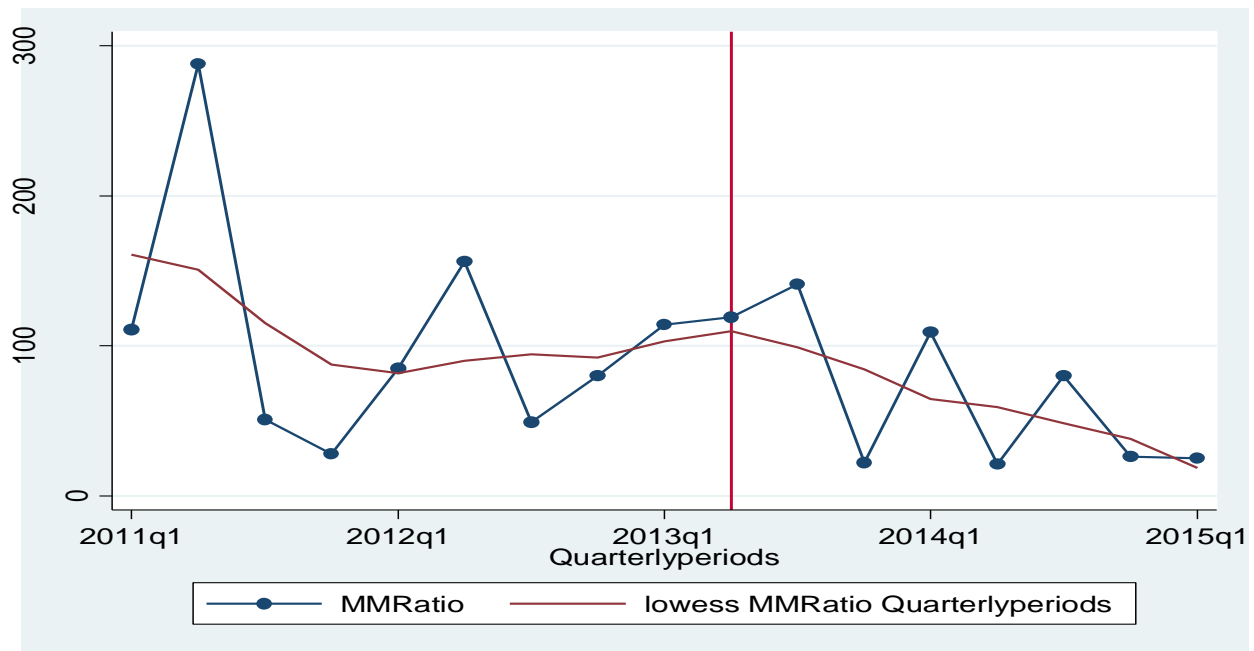


Figure 4.7: Scatter and trend plots on maternal mortality ratio

Table 4.10: Trend components of maternal mortality ratio

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2011	-	-	109.25	89.5
2012	72.75	82.5	96.125	95.125
2013	102	106.25	98.375	85.5
2014	65.625	58.5	48.5	-
2015	-	-	-	-

As shown in Figure 4.7, the series showed random fluctuations over time due to seasonal variations with a general decline in maternal mortality ratio from 2011 all through to 2015. The trend in Table 4.10 indicated a steady decline of MMR from the third quarter of 2011 all through to the first quarter of 2012 before having a slight increase up to the third quarter 2013. Thereafter it declined all through to third quarter 2014.

Table 4.11: Seasonal components of maternal mortality ratio

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2011	28.807	22.516	-1.547	-49.776
2012	28.807	22.516	-1.547	-49.776
2013	28.807	22.516	-1.547	-49.776
2014	28.807	22.516	-1.547	-49.776
2015	28.807	-	-	-

As presented in Table 4.11, the estimated seasonal factors were the same for each year. The highest number of maternal deaths was experienced in the first quarter with a seasonal factor of 28.8. This meant that maternal deaths were about 0.28% higher than the average maternal death if there was no seasonal effect. The second highest maternal deaths were experienced in the second quarter with a seasonal index of 22.5. These meant that there was about 0.225% maternal deaths above the average if there was no seasonal effect.

The lowest number of maternal deaths was experienced in the fourth quarter with a seasonal factor of about -50. This meant that there was about 0.5% lower maternal deaths experienced in this quarter if there was no seasonal effect. The third quarter also experienced a lower number of maternal deaths with a seasonal factor of about -1.5. This meant that the average maternal deaths in this quarter were about 0.05% below the average maternal deaths if there was no seasonal effect. This is illustrated graphically in Figure 4.8.

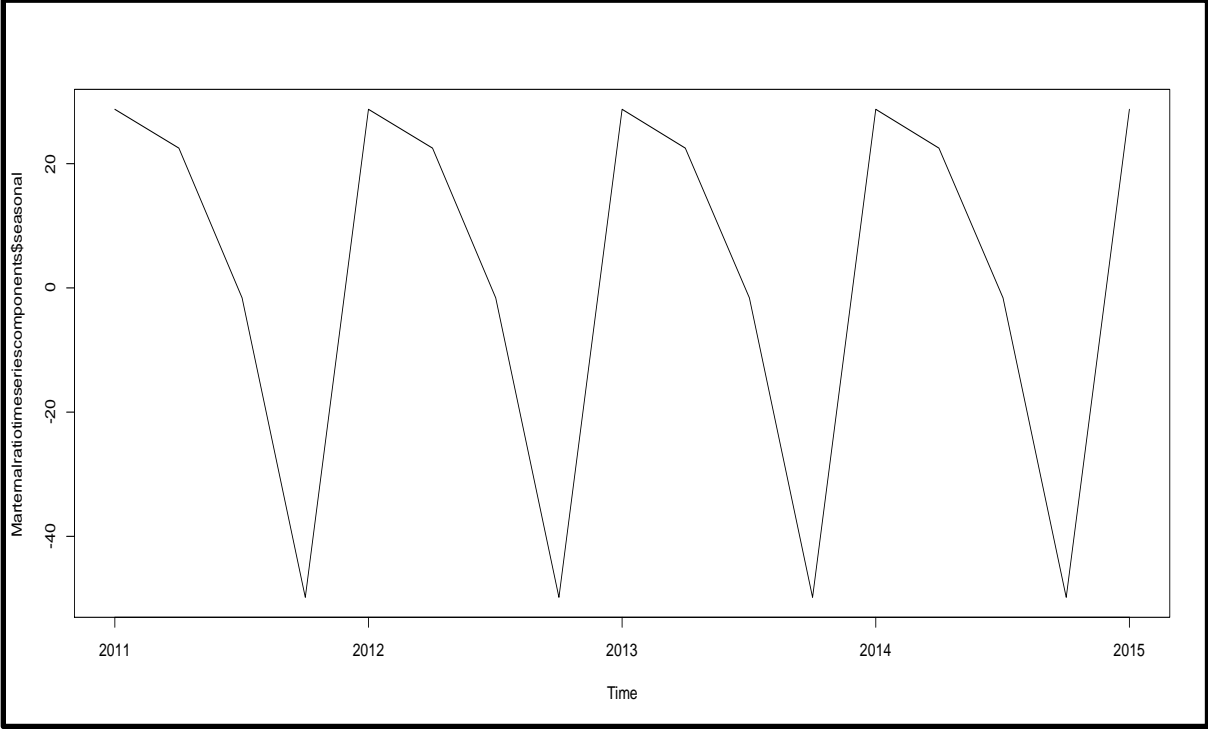


Figure 4.8: Seasonal plot on maternal mortality ratio

4.4.2 Segmented Regression Analysis of Maternal Mortality Ratio

The segmented regression analysis was conducted generalized least square method. Both parabolic and simple linear assumptions were conducted. The residual standard error for parabolic assumption was 361.248 while that of the simple linear function was 353.467 which was less when compared to that of quadratic function. These showed that simple linear model gave a better fit as the sum of squares declined.

Table 4.12: Segmented regression analysis of maternal mortality ratio

Full segmented regression model (intervention in June 2013)				
	Coefficient	Standard error	t-statistic	P-value
Intercept (β_0)	67.393	29.353	2.296	0.039
Time from 2011 (β_1)	-4.0465	6.617	-0.611	0.551
Policy change (β_2)	43.216	61.874	0.698	0.497
Time after policy (β_3)	-11.3	13.146	-0.86	0.407
Most parsimonious segmented regression model				
Intercept (β_0)	85.188	14.029	6.072	<0.001
Time from 2011 (β_3)	-4.992	2.864	-1.743	0.102

Residual standard error: 57.84475, Degrees of freedom: 17 total; 15 residual

As presented in Table 4.12, the average quarterly MMR was approximately 67.4 maternal deaths per 100,000 live births. In 2011, there was an insignificant decline in quarter to quarter MMR at a rate of 4.05 deaths per 100,000 live births ($p=0.551$). During the implementation of the policy, there was an insignificant increase in MMR at a rate of 43.2 maternal deaths per 100,000 live births ($p=0.5$). After the introduction of the policy, there was an insignificant decline in MMR at the rate of 11.3 maternal deaths per 100,000 live births ($p=0.41$).

The parsimonious model contained the intercept and the rate of change of maternal deaths since 2011. It showed that the quarter to quarter MMR was 85.188 and it declined insignificantly at the rate 4.99 maternal deaths per 100,000 live births ($p=0.102$).

4.5: QUALITATIVE STUDY ON CHALLENGES FACED BY IMPLEMENTERS OF FREE MATERNAL HEALTH CARE

The identification of the challenges faced in the implementation of FMC was assessed by conducting twelve in-depth interviews with the managers of various departments involved in the implementation of FMC in the county. These included: the County Nursing officer, the County maternal health and family planning (FP) coordinator, the County Pharmacist, MCH in charge of one the main health facility, Hospital Pharmacist, one Hospital in charge, two sub-county MOH,

one nursing officer from a dispensary; a clinical officer from sub county hospital and one nurse from maternity and labor wards from the referral Hospital.

From the interviews, seven thematic codes were identified as the major challenges facing the implementation of free maternal health care services as shown in appendix 4

4.5.1 Workload and Human Resource Constraints

Of all the participants interviewed, ninety two % of the respondents indicated that there was increased workload within major health facilities or overstretching of the human resource. This was in relation to maternal delivery services provided by the level IV facilities.

Most of level II, III and low volume level IV facilities did not experience a heavy workload but experienced constraints because of working twenty four hours a day. This was to ensure in case any expectant mothers who came at night would either be helped to deliver or referred to higher level facilities. Most clients who turned for the ANC services in lower level facilities never turned up to deliver in the same facilities. Most of them turned up at level IV facilities hence increasing the workload at these facilities. This led to increased workload especially in the nursing and clinical departments in level IV facilities. This was even made worse for those working during night shifts as there were fewer HCW sat night as compared to the day shift.

In the MCH clinics, the respondents said that the attendance has remained same as before the introduction of FMC. The respondents noted that the fee charged for some vital services in the department may be discouraging expectant mothers from coming to the clinic on a regular basis as expected.

The staffing levels for most HCW involved in maternal health care have remained virtually same other than the clinical department that has had about 34% increment in staffing levels. This can be confirmed from the table appended in appendix 2b.

4.5.2 Drugs and Medical Supplies for Free Maternal Care services

All the participants (100%) interviewed complained of insufficient supply of drugs and medical supplies or reduced and irregular financing of the same. Most of the facilities receive their supplies from Kenya Medical Supplies Agency (KEMSA) or buy from local suppliers. Of recent

past most of the drugs and medical supplies are obtained from the local supplies within the county which is very expensive to the health facilities and the patients.

In case of unavailability of the commodities, some patients were forced to buy from local drug stores within the town so that they could access the required services. Some facilities had gone for up to six months without receiving the required regular supplies from KEMSA.

4.5.3 Charges for Maternal Care Services

All participants indicated that the policy only offered free maternal delivery services rather than the entire package of maternal care services in all public health facilities. All mothers who came to deliver did receive free services. However, services such ANC profile, ultrasound, drugs and other lab services are paid for by the expectant mothers.

4.5.4 Adequacy of Equipment and Infrastructure for Maternal Delivery

Participants talked about lack of adequate equipment and infrastructure. These affected all county facilities. Inadequate infrastructure included inadequate delivery space (delivery room) and lack of enough washrooms. There was also need to have separate obstetric and gynecological theater rather than sharing with the surgical department. This was to ease traffic when needed. Participants expressed the need to equip facilities especially level II and III in order to ease the unnecessary referrals and ease the workload at level 4 facilities. Also there was need to renovate the existing facilities and structures so that they could be used for the maternal services required.

4.5.5 Reimbursements

Majority of the participants claimed that the access to reimbursement for expenditure on deliveries was difficult. This has led to less access to the funds that are required for the purchase of other health essentials. The reimbursements were very irregular leading to facilities running short of the required drugs and medical supplies. When funds are disbursed, they are in a consolidated fund thus funds meant for the maternal services ended up servicing other departments with pressing issues.

4.5.6 Referrals of Obstetric Patients

Most participants said that the referrals were not well managed from the lower facilities. These included unnecessary and delayed referrals. Patients were also referred unaccompanied by a health care professional because of lack of enough health care providers to accompany the patients. Patients tended to use small taxi cars as referral vehicles rather than waiting for the ambulances to transfer them.

The use of ambulatory services is not free as the clients were supposed to pay for fuel before being referred. If the expectant mother was unable to pay for the fuelling, then the facility making the referral had the responsibility of the fuelling the ambulance. Most respondents were happy with the availability of new ambulances within the County making referral services easier and more accessible.

4.5.7 Quality of Obstetric Services

Majority of them felt that the quality of the services especially in relation to maternal health care services had dropped. This was mainly occasioned by increased workload, insufficient drugs and supplies, increased workload, lack of equipment and staff at the facilities.

4.5.8 Training, Competency of Health Care Workers

Some participants felt that they were not competent enough to handle obstetric cases in the facilities. They felt there was need for some training and mentorship in handling obstetric cases.

CHAPTER FIVE

5.0 DISCUSSION

This study looked at the implementation process of the FMC policy, the key challenges in its implementation and its achievements. As publicized by the ‘Policy Proposal on the Presidents’ Initiative on Free Maternal Health Services in Kenya’, the policy was to provide free care for a wide range of services. The services included: antenatal care, post-natal care up to six weeks, deliveries (normal and CS), referral services, complications caused by pregnancies and family planning (36).

The study looked at key services offered within the public health system. A key finding was that there has been a steady increase in ANC attendance since 2011 until soon after the implementation of the FMC policy when a significant decline in the utilization of the services occurred. However, the decline may be attributed to the change in policy since it was statistically significant. Though in the policy document, the ANC services were supposed to be free, from the key informant interviews not all services in the ANC package were free as expected. Also it was determined that most expectant mothers only attended the ANC clinic only once during their pregnancy. However, the study could not establish the factors related to the decline of utilization of ANC services. In other studies, most women need to be educated about the importance of ANC clinic. Maternal health education and instructions about the recognition of symptoms leading to obstetric emergencies, usually given at antenatal sessions, can be lifesaving and reduce delay in seeking help (58).

There are a number of factors that may lead to underutilization of ANC services. They include: the quality of services offered in the facility; the waiting time for one to receive the services; distance for the expectant mothers to the facilities; level of education of the women and their husbands; religious and cultural background; and attitudes of the health care workers among other factors (59,60).

On the utilization of maternal delivery services, we established that there was a significant increase in the utilization of health facility maternal delivery services immediately after the introduction of the FMC policy. The quarter to quarter rate of utilization increased at rate of 894.074 maternal deliveries per quarter ($p < 0.001$). This showed that the elimination of maternal

delivery fee had a significant and immediate effect in accessibility to maternal delivery services in the county. This indicated that delivery fee is an important barrier to utilization of health care services within the county (61).

However, the utilization of the free delivery services from the second quarter of 2014 declined significantly at a rate of 102.722 maternal deliveries per quarter ($p=0.0232$). The study could not determine the reasons behind the decline. However, due to increased number of maternal deliveries, there was an increased workload within the health facilities. These had led to increased human resources constraints and overstretching of the available equipment and infrastructure. Health facilities were also often short of the essential drugs and medical supplies due to increased consumption. Furthermore, there was slow release of the reimbursement funds leading to deterioration of the quality of services within the health facilities. There was also increased referral from the peripheral health facilities mainly because of lack of enough equipment and infrastructure and specialized personnel to handle some complicated cases. The decline in maternal deliveries showed that the effect of the policy on utilization was not sustained always and will change as time progresses. However, accessibility of the skilled maternal delivery services is expected to improve maternal outcomes such as decreased maternal and neonatal deaths as well as morbidities (62).

The FMC policy was expected to increase accessibility to maternal delivery services and increased equity among the poor in the society. However, it can be affected by the quality of services offered in the health facilities or other factors. Factors such as industrial action by the health care workers, household wealth, religious beliefs, ANC utilization, place of delivery, unavailability of drugs and other medical supplies, poor referral systems among other factors may lead to change of perception of the services (12,59). In other studies in Africa, it was noted that women were required to bring some medical supplies when delivering at the health facilities. These requirements may have acted as a barrier to utilization of delivery services (18). However, with elimination of delivery charges, there is reduced financial burden and enhanced equity resulting in increased utilization of health services (63).

The effect of the policy on MMR was investigated. From the study, there was a consistent decline in MMR at a rate of 4.992 deaths per quarter since 2011 up to 2015 ($p=1.02$). The introduction of the policy did not bring any significant change in the decline of MMR. Although

the decline was not statistically significant, from the policy point of view it represents progress in meeting the MDG5 targets. The MDGs aim was to reduce the MMR by three quarter by 2015 from 1990 and ensure universal maternal delivery services by skilled health care worker (64). By 2010, the MMR had reduced by 47% to 210 maternal deaths per 100,000 live births from 400 maternal deaths per 100,000 live births in 1990 and maternal deliveries by skilled health care personnel had increased to 65% from 55%. This was mainly occasioned by the abolition of user fee for maternal deliveries by most countries in the developing world. This observation was favorable as it indicated that the country is making gains towards MDG 5 targets .

In the study we also looked into the effect of the policy on the oxytocin consumption as one of the drugs used in obstetric care. We found that the policy led a significant quarter to quarter increase in consumption of Oxytocin at a rate of 792.713 ($p=0.029$) per quarter. This indicated that there was need for continuous and sustained supply of drugs and medical supplies within the facilities. Studies done elsewhere indicated that lack of drugs and medical supplies led mothers to purchasing them elsewhere. These requirements acted as a barrier in utilization of free delivery services (12).

The study had a number of limitations. First, quarterly data on utilization used provides less information as compared to monthly data thus some trend may not have been detected. Second, the study does not give the socio economic characteristics of the beneficiaries of the policy. The policy was meant to help the poorest in the society, but through this study we cannot be able determine if they are the greatest recipients.

Thirdly, the study got its data from the consolidated County HMIS database. This could have been affected by under-reporting by the constituent health care facilities. Lastly, there is need for similar studies to be in other counties and also nationwide to evaluate how the policy has affected the key indicators.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The FMC policy resulted in increased utilization of skilled health care delivery services within the county while the utilization ANC services declined. There was increased consumption of Oxytocin which is a key drug in obstetric care. The policy may have led to consistent decline in MMR within the County.

6.2 Recommendation for Research and Policy

We recommend that the policy should cover the full maternal health care package such as the ANC services, maternal delivery and post natal care.

The findings of the study showed that the financial transfer mechanisms for the FMC services should be revisited in order to ensure that funds and reimbursements reach the intended beneficiaries a bit faster.

Future research should seek to link this study to individual facility level data and qualitative analysis based on expectant mothers' interviews

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APPENDICES:

Appendix 1: Guide for In-depth Interview for Health Care Providers and Planners

1. Introduction:

My name is Dr. Miranga Calvin Moseti, am doing research on free maternal delivery policy and its effects to the county.

2. Purpose of the interview

Free maternal health care has been in existence for the last two years now; i would wish to have some views about the policy.

3. General background

Could you please tell me what's your position on free maternal health care services and for how long have you been working in or with the policy.

4. Interview topics:

Maternal experience

Can you give us your take while highlighting the experience before and after implementation of FMC?

Probe on;

- Patients/mothers paying for any services? if yes, which services and why?
- Changes in patient numbers in utilization of the services

Probe on; patient perception, health care workers' perception,

Quality of services

Compare the quality of service before and after introduction of FMC.

Probe on;

- Availability of medical supplies and obstetric medicines
- Staffing

- New staffs

Challenges

What are the constraints that you have experienced in implementation of the policy?

Probe on;

- Staffing
- Financing
- Infrastructure, medical supplies

3 Prospects of Free Maternal Care

What do you think should be done to improve the policy?

Do you think the policy should be maintained? Why?

5. Wrap-up

Thank you for your time and willingness to participate in this study.

Do you have anything to add to what we've discussed or is there important topics which we've not covered?

Appendix 2: Data Collection and Staffing Level Tools

a) Data collection tool

S. NO	YEAR	QUARTER	ANC ATTENDANCE	TOTAL DELIVERIES	MATERNAL DEATHS	NEONATAL DEATHS	OXYTOCIN
1	2011	1	5029	3594	4	70	4000
2		2	5217	3813	11	74	3600
3		3	5977	3958	2	56	2000
4		4	5256	3580	0	67	4800
5	2012	1	6290	3534	3	48	4600
6		2	5656	3852	6	86	5100
7		3	5853	4086	2	78	3710
8		4	5037	3770	3	48	3950
9	2013	1	6245	3503	4	46	3700
10		2	6668	4217	5	55	4500
11		3	6220	4972	7	77	2300
12		4	5028	4475	1	77	3200
13	2014	1	6631	4589	5	92	4400
14		2	5958	4657	1	83	5700
15		3	5823	5003	4	100	4600
16		4	4008	3899	1	45	2800
17	2015	1	5675	4068	1	53	5018

b) Staffing levels

S. no	Cadre	No of staff before FMC	No of staff after FMC	Change in numbers	Percentage change
1.	Gynecologists	2	2	0	0
2.	Medical officers	35	47	12	34%
3.	Nursing officers	430	430	0	0
4.	Anesthetists	9	9	0	0
5.	Lab specialists	40	42	2	5%
6	Pharmacists	9	11	2	22%
7	Clinical officers	78	79	1	1%
8	Radiologists	9	9	0	0

Appendix 3: Dataset and variables used in the analysis

Date	Outcome variables				Time	Intervention	Pre - Intervention	Post - Intervention
	Antenatal care attendance	Maternal delivery	Oxytocin consumption	Maternal Mortality Ratio				
2011q1	5029	3594	4000	111	1	0	1	0
2011q2	5217	3813	3600	288	2	0	2	0
2011q3	5977	3958	2000	51	3	0	3	0
2011q4	5256	3580	4800	28	4	0	4	0
2012q1	6290	3534	4600	85	5	0	5	0
2012q2	5656	3852	5100	156	6	0	6	0
2012q3	5853	4086	3710	49	7	0	7	0
2012q4	5037	3770	3950	80	8	0	8	0
2013q1	6245	3503	3700	114	9	0	9	0
2013q2	6668	4217	4500	119	10	1	10	1
2013q3	6220	4972	2300	141	11	1	10	2
2013q4	5028	4475	3200	22	12	1	10	3
2014q1	6631	4589	4400	109	13	1	10	4
2014q2	5958	4657	5700	21	14	1	10	5
2014q3	5823	5003	4600	80	15	1	10	6
2014q4	4008	3899	2800	26	16	1	10	7
2015q1	5675	4068	5018	25	17	1	10	8

Appendix 4: Summary of Thematic Codes Generated per Interviewee from Key Informant Interviews

	Thematic Code 1	Thematic Code 2	Thematic Code 3	Thematic Code 5	Thematic Code 6	Thematic Code 7	Thematic Code 8
Interviewee No.	Workload & HR	Drugs and medical supplies	Infrastructure and equipment	Quality of services	Reimbursements and funding	referrals	Service charges
1	√	√	√	√	√	√	√
2	√	√	√	√	√	√	√
3	√	√		√	√		√
4	√	√	√	√			√
5	√	√		√	√		√
6	√	√	√	√	√	√	√
7	√	√	√	√	√	√	√
8	√	√	√	√	√	√	√
9		√			√	√	√
10	√	√	√		√	√	√
11	√	√	√	√		√	√
12	√	√	√	√		√	√
	92%	100%	75%	83%	75%	75%	100%

Appendix 5: Ethical Approval Letter



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355



KNH/UON-ERC
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Website: <http://erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/165

10th April, 2015

Miranga Calvin Moseti
Dept. of Pharmacology and Pharmacognosy
School of Pharmacy
University of Nairobi

Dear Calvin

Research Proposal: The Uptake and Utilization of Free Maternity Health Care Services in Kericho County (P118/03/2015)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 10th April 2015 to 9th April 2016.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- g) Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website www.erc.uonbi.ac.ke

Yours sincerely,



PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

- c.c. The Principal, College of Health Sciences, UoN
The Deputy Director CS, KNH
The Chair, KNH/UoN-ERC
The Dean, School of Pharmacy
The Chair, Dept of Pharmacology and Pharmacognosy
Supervisors: Dr. Faith Apolot Okalebo, Dr. Sylvia Atisa Opanga, Mr. Davis Bundi

Appendix 6: Consent Form for In-depth Interviews

To be read in English

Title of the study

The uptake and utilization of free maternal health care services in Kericho County.

Institution

Department of Pharmacology and Pharmacognosy, School of Pharmacy,
University of Nairobi, P.O BOX 30197-00400, Nairobi.

Investigator

Dr. Miranga Calvin Moseti, P.O BOX, 30197-00400, Nairobi.

Supervisors

Dr F.A Okalebo,

Department of Pharmacology and Pharmacognosy

Dr. Sylvia Adisa Opanga,

Department of Pharmaceutics and Pharmacy Practice,

Mr Davies Bundi,

Department of Mathematics.

Ethical Approval:

Kenyatta National Hospital/ University of Nairobi Ethical and Research
Committee, P.O BOX 20723-00100, Nairobi. Tel 2726300/2716450 Ext 44102

Introduction:

In this study, am evaluating the uptake and utilization of free maternal health care services in Kericho County and the resources involved in it.

Purpose of the study:

The purpose of the study is to assess the changes in the number of patients utilising of Free Maternal Care services in public facilities in Kericho County, evaluate the change in the consumption of obstetric medicines and other resources before and after introduction of Free Maternal Care, to evaluate the change in maternal and neonatal mortality rates before and after introduction of Free Maternal Care and to identify the challenges faced by providers in the implementation of Free Maternal Care services in Kericho County.

Permission is requested from you to enroll in this medical research study. You should understand the following general principles which apply to all participants in a medical research:

- i. Your agreement to participate in this study is voluntary.
- ii. You may withdraw from the study at any time without necessarily giving a reason for your withdrawal.
- iii. After you have read the explanation, please feel free to ask any questions that will enable you to understand clearly the nature of the study.

Procedure to be followed:

With your permission, I will engage in a discussion about free maternal health care services in public facilities and its effects to the maternal matters in Kericho County. I will take some notes using a pen and paper. All the information given will be handled with confidentiality and will only be used for the purpose of this study.

Risks:

There will be no risks involved in this study.

Benefits:

There will be no direct benefits to you but the findings will be useful assess the short term benefits of the policy, its impact on maternal mortality and also ascertain the sustainability of the policy and where it needs to be strengthened.

Assurance of confidentiality:

All information obtained from you will be kept in confidence. At no point will your name be mentioned or used during data handling or in any resulting publications. Codes will be used instead.

Contacts: In case you need to contact me, my academic department or the Kenyatta National Hospital/ University of Nairobi Ethics and Research Committee concerning this study please feel free to use the contacts provided above.

I now request you to sign the consent form attached.

Informed consent

I, the undersigned, willingly agree to participate in this study, the nature and purpose of which have been fully explained to me by the investigator. I understand that the information gathered will be used for the purposes of this study only and maximum confidentiality will be maintained.

Respondent:

Sign:.....Date:.....

Witness (Investigator):

Sign:.....Date:.....

Investigators statement

I, the undersigned, have explained to the participant in a language she understands the procedures to be followed in the study and the risks and benefits involved.

Investigator:

Sign: Date: