DETERMINANTS OF PERINATAL OUTCOMES AMONG WOMEN SEEKING ANTENATAL CARE IN SELECTED KISII COUNTY LEVEL FOUR HEALTH FACILITIES IN THE CONTEXT OF FREE MATERNITY CARE.

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(Public Health)

JOMO KENYATTA UNIVERSITY OF

AGRICULTURE AND TECHNOLOGY

2018

Determinants of Perinatal Outcomes Among Women Seeking Antenatal Care in Selected Kisii County Level Four Health Facilities in the Context of Free Maternity Care.

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A thesis submitted in fulfillment for the Degree of Doctor of Philosophy in Public Health in the Jomo Kenyatta University of Agriculture and Technology

2018

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university

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DEDICATION

This thesis is dedicated to my beloved parents, wife and children for their social, moral and spiritual support through prayers.

ACKNOWLEDGEMENT

I sincerely thank God for leading me this far. I do appreciate the team of the three supervisors who have been resourceful all along; Prof. Simon Karanja and Dr.Kenneth Ngure from School of Public Health, Jomo Kenyatta University and Dr. Peter Wanzala from the Centre of Public Health and Research (CPHR) located in Kenya Medical Research Institute (KEMRI). I do also appreciate the members of staff from the Institute of Tropical Medicine and Infectious Diseases (ITROMID) for their support too. My gratitudes too go to the Kisii County Teaching and Referreal Hospital (KTRH) for allowing me carry out the study in its affiliated health facilities.

I also wish to thank the leadership of the health services in Kisii county moreso the County Excecutive Committee (CEC) member for health, Ms. Sarah Omache and the Couny director of health, Dr. Geoffrey Otomu for giving me the authorization to undertake by research project in kisii county health facilities. I also appreciate the immense goodwill I received from the facility managers of Tabaka, Kenyenya, Christamarrianne and Oresi health facilities. I sincerely thank them all for creating an enabling and supportive environment for the entire period during which I collected data. The research assistants and enumerators led by Ms. Eunice Ombongi, I thank them all for withstanding various challenges during data collection.

I also extend my appreciation to the staff of Hass® scientific and medical supplies limited,Nairobi for always trying their best to import for me the kits I needed for zinc and ferritin analysis all the way from Paris France. .

Finally to my nuclear family; Waceke, Nicole, Mitchelle and Joshua, I appreciate you all for being great pillars of hope and sources of encouragement all along.

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ABBREVIATIONS AND ACRONYMS

µg/dl	Micogrammes per decilitre
µg/ml	Microgrammes per millitre
ANC	Antenatal Care
BMI	Body Mass Index
BP	Blood Pressure
BW	Body Weight
CCC	Comprehensive Care Clinic
CEC	County Executive Committee member
CEmOC	Comprehensive Emergency Obstetric Care
CI	Confidence Interval
CMMH	Christamarriane Mission Hospital
CPHR	Centre for Public Health and Research
EOC	Essential Obstetric Care
ERC	Ethical Review Committee
EVB	Evidence Based Practice
Fe^{++}	Ferrous ion (Iron)
FGD	Focus Group Discussion
FH	Fundal Height
FHG	Full Haemogram
FMC	Free Maternity Care
g/dl	Grammes per decilitre
HB	Hemoglobin

HBsAG	Hepatitis B surface Antigen
HC	Health Centre
HE	Health Education
HIV	Human immunodeficiency virus
HRH	Human Resource for Health
HRO	Human resource Officer
ICM	International Confederation of Midwives
IMR	Infant Mortality Rate
IPT	Intermittent prophylactic treatment for Malaria
ITROMID	Institute of Tropical Medicine and Infectious diseases
IUGR	Intra-Uterine Growth Retardation
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KASP	Kenya Service Provision Assessment
KDHSA	Kenya Demographic Health Survey
KEMRI	Kenya Medical Research Institute
KII	Key Informant Interview
LBW	Low Birth Weight
LDCs	Less Developed Countries
LMP	Last Menstrual Period
MCH	Maternal Child Birth
MDGs	Millennium Development Goals
MmHg	Milimetres of Mercury

MMR	Maternal Mortality Ratio
MNC	Maternal and Newborn Care
MNCH	.Maternal, Newborn and Child Health
MUAC	Mid upper arm circumference
NACOSTI	National Council for Science and Technology
NMR	Neonatal Mortality Rate
OR	Odds Ratio
PLWH	People living with HIV
PMTCT	Prevention of mother to child transmission of HIV
PNC	Post Natal Care
PPH	Post-Partum Hemorrhage
PPS	PropabilityProbability Proportional to Size
QoC	Quality of Care
RCT	Randomized clinical Trial
Sd	Standard deviation
SMI	Safe Motherhood Initiative
SPSS	Statistical Package for Social Scientists
SRS	Simple Random Sampling
SSA	Sub Saharan Africa
SSC	Scientific Steering Committee
TT	Tetanus Toxoid
UA	Universal Access
VCT	Voluntary Counselling Tests

VCT	Voluntary Counselling Tests
VDRL	Vinereal Disease Research Lab test
WHO	World Health Organization

ABSTRACT

Globally, 830 women die daily of preventable pregnancy-related complications; 90% of these mortalities are from developing countries in Sub-Saharan Africa. Mitigating against these deaths continue to be a challenge especially in developing countries Kenya included where only a few countries have implemented the Abuja declaration to allocate at least 15% of the national budget to their health sector. Despite this, the Kenya government adopted universal health care for maternity services in 2013 to reduce the Maternal Mortality Rate (MMR) which was then at 488/100,000 live births. Despite continuous variation in scope of "free maternity" care, it has not been established whether there are differences in perinatal outcomes at public health facilities that offer free maternity services against those at non-public health facilities that charge for services. The study sought to determine client-level factors, facility-level factors and the relationship between client and facility level factors that affect perinatal outcomes among women attending public and non public health facilities in *Kisii* County. The study used a prospective chort approach at comparable level 4 facilities in Kisii County including two public (Oresi Health Centre and Kenyenya Hospital) and two non-public (Christamarrianne-CMMH and Tabaka Mission Hospitals). At the start of the study, 365 mothers were recruited through stratified sampling for follow up from 16 weeks gestation until 2 weeks post delivery. By the end of the study, 287 mothers (187 from public and 100 from non-public facilities) had been followed up to 2 weeks after delivery. Mothers lost to follow-up after first visit were not included in data analysis. At baseline socio-demographic and targeted study variables were measured, at the 2nd and 3rd follow up visits, targeted study variables were monitored. Chi-square tests were used to determine differences between client/facility factors and perinatal outcomes; Paired t and McNemar's tests were used to compare relative means of different factors at different ANC visits for parametric and non-parametric data respectively while Logistic Regression tests were used to measure odds of a normal or abnormal perinatal outcome versus specific study indicators. At the end of the follow-up 31/287 women (11% cumulative incidence in a period of 6 months) developed abnormal perinatal outcomes such pre-term deliveries, obstructed labour and miscarriages among others. Overall, no

statistically significant differences were noted in perinatal outcomes between public and non-public facilities. However, higher maternal BMI was significantly associated with abnormal perinatal outcome (χ^2= 8.900, d.f =3, p=0.031) while higher parity was associated with normal perinatal outcome (χ^2= 13.232, d.f =4, p=0.039). A significant relationship existed between a mother's knowledge of pregnancy related issues and the baby's weight (t=-67.8 d.f. 213 p<0.001). Mothers who were accompanied by their spouses at each visit to the ANC clinic had a 26% higher chance of normal delivery compared to mothers who were unaccompanied for all the 3 ANC visits (OR 0.26 95% CI 0.08-0.792 *p*=0.02). Individuals who delivered at facilities with low midwife-client ratio had a 5% higher likelihood of having a normal perinatal outcome as compared to those delivering in facilities with high midwives staffing ratios (OR=0.05, 95% CI 0.046-0.055, p=0.006). The study concluded that perinatal outcomes were not different at either public or non-public facilities. The perinatal outcomes between individuals who paid and those who did not pay for ANC services either at the public or non-public health facilities were not different.The study recommends that under free maternity care settings, health education of mothers, male involvement and staffing of facilities with more skilled midwives needs to be strengthened for better perinatal outcomes to be increased.

CHAPTER ONE

INTRODUCTION

1.1 General introduction

Perinatal care refers to the care given to a pregnant woman and her fetus from 20th week of pregnancy through 1-4 weeks after birth (Cooper et al, 2008). A perinatal outcome refers to the end result of a pregnancy; a pregnant woman may end up with a normal delivery and normal baby or develop complications such still births, pre-term delivery, obstructed labour and uterine rapture among others. Every pregnant mother is entitled to quality perinatal care to prevent pregnancy associated complications, concurrent illnesses among other health problems. Globally 270,000 mothers are losing lives to pregnancy related complications and 15 million babies are being born prematurely. At the end of Millineum Development Goals (MDGs) in 2015, many less developed countries (LDCs) had not met the targets on the health of women and children (WHO report, 2015). This happened despite the WHO member countries' catalytic programmes to increase womens' Universal Access (UA) to skilled birth attendance.

To mitigate on adverse perinatal care outcomes many countries in Sub-Saharan Africa are introducing universal access to maternal and newborn care yet there are many determinants that potentially influence perinatal outcomes other than the cost of care (Jennifer *et al*, 2011). Nevertheless, the Kenya government in June 2013 introduced free maternity services in all public health facilities with the aim of increasing access to skilled Maternal and Newborn Care (MNC) services in a setting where only 36% of public facilities had access to basic infrastructure that support skilled birth attendance, raising concern if zero-rating maternity and antenatal services will alone reduce adverse perinatal outcomes (Bourbonnais, 2013).

Considering waiver of maternity fees, there are contradictory results; in some studies, scrapping of maternity fee reduces adverse perinatal care outcomes (Senanayake *et al*, 2012). A related study in Ghana established no significant association between maternity fee waiver and maternal deaths (Witter *et al,* 2008*)*. Therefore there could be other determinants that need to be taken into consideration other than the user fee. Related studies in Ethiopia (Luwei *et al*, 2011) and Nepal (Witter *et al*, 2011) found that there is little difference in MNC outcomes between facilities that charge and those that don't charge user fee in MNC services provision. This creates the need to understand the other determinants (and possible confounders) of perinatal outcomes in free maternity settings.

In Kenya, maternal, neonatal and infant mortality rates still remain high at 362/100,000; 26/1000; and 39/1000 respectively (KNBS, 2015). However, efforts to scale up high impact interventions such as focused antenatal care, community outreaches, skilled birth and post natal care, basic and comprehensive obstetric and newborn care have not yet yielded significant results (Schiffman et al, 2010).

This study was thus conducted to establish the determinants of perinatal care outcomes in selected public and non public health facilities in Kisii County within the context of free maternity care.

1.2 Statement of the problem

Although perinatal outcomes are pegged on the quality of care pregnant women receive (Chen *et al*, 2007), the role of other determinants such as maternity user fee waiver policy, male involvement, mothers' knowledge, staffing ratios with skilled midwives, access to skilled care , biological, socio economic and cultural factors among others need to be understood. In Kenya, information on which interventions result in normal perinatal outcomes i.e uneventful deliveries is not available. There is need to understand whether altering one determinant (offering free maternity care) alone in resource

constrained settings translates to improved perinatal care outcomes without addressing other potential determinants.

In addition to *Kisii* being rural county with limited access to expertise based health care, its MNC outcome indicators are above those at the national level; its skilled health care coverage is below world bank recommendation (Kenya Nursing workforce report,2012); 2.3 midwives/10,000 population, 1 doctor for every 34,992 people, skilled birth coverage range of 53% against the national one of 44% and a Maternal Mortality Rate (MMR) of 500/100,000 live births against the national rate of 362/100,000. In the period preceding the study (KDHS 2008/09), neonatal deaths (23/1000 livebirths) in Kisii county were contributing 30-50% of the deaths among the under fives.

Although maternity fee waiver was meant to improve perinatal care outcomes, the high influx of pregnant women in public health facilities was being experienced in an ecosystem with limited access to other resources that potentially influence maternal and newborn care outcomes. The longitudinal study in Kisii County therefore, aimed to establish what other determinants affect the perinatal care outcomes in a free maternity (Universal Health) care setting.

1.3 Justification of the study

Safe motherhood is an imperative human right in Kenya's 2010 constitution. All women need to have equitable and quality MNCH services in both public and non-public health facilities. Previous studies that have delved into this subject from other countries on determinants of perinatal outcomes have employed more of retrospective cross-sectional designs which have inherent limitations in establishing the determinants of perinatal outcomes.

This study has helped generate information that will contribute to evidence based (EVB) decision making on policy formulation in provision of Maternal, Newborn and Child Health (MNCH) services in Kenya. Increasing availability of health care services

doesent always translate to increased access to quality health care. The findings on priority maternity care outcome determinants are also helpful in influencing rationalization of staffing ratios, focused antenatal and postnatal care services. The study has also contributed information that will facilitate streamlining of the free maternity care policy. Ultimately this will result in improved provision of maternity services in both public and non-public facilities.

1.4 Research questions

i. What are the client exposure factors that determine perinatal care outcomes for pregnant women in *Kisii* County?
ii. What are the facility exposure factors that determine perinatal care outcomes for pregnant women attending public and non-public health facilities in *Kisii* County?
iii. What is the relationship between facility and client factors on perinatal care outcomes among women attending public and non-public health facilities in *Kisii* County?
iv. What are the mothers and midwives' service perceptions of MNC care and associated outcomes in *Kisii* county health facilities?

1.5 Null Hypothesis

There are no identifiable determuinants associated with perinatal care outcomes in comparable public and non public health facilities in Kisii County in the context of free maternity care.

1.6 Objectives

1.6.1 General objective

To assess the determinants of perinatal outcomes among women seeking antenatal care in selected public and non-public health facilities in *Kisii* County in the context of free maternity care.

1.6.2 Specific objectives

1. To determine the client-level factors that influence perinatal outcomes among women attending public and non public (mission) health facilities in *Kisii* County.
2. To determine the facility-level factors that influence perinatal outcomes among women attending public and non public health facilities in *Kisii* County.
3. To determine the relationship between facility and client factors on perinatal outcomes among women attending public and non public health facilities in *Kisii* County.
4. To assess service providers' and mothers' perceptions of the MNC services and outcomes in *Kisii* county health facilities.

CHAPTER TWO

LITERATURE REVIEW

2.1 Perinatal outcomes in pregnancy

Maternal and newborn child healthcare remains an intimidating challenge worldwide, thus it has received emphasis in global development goals (MDGs and SDGs), in addition to the preceding 1987 safe motherhood initiative and the 1994 international conference on population development. The health of a mother and that of a newborn are inseparable thus the quality of care given to a mother across the continuum of care; pre-conception, antenatal, intrapartum and postnatal, does directly influence the health of a newborn (McCoy *et al*., 2010).

A perinatal outcome refers to the ultimate consequence of a preganancy; a pregnancy can end normaly or due to the prevailing adverse circumstances it ends up in morbidity or mortality. Perinatal outcomes have been broadly alluded to biological/intrinsic and physical/extrinsic factors of a mother (Fiscella, 1995). This negates the fact that physical or extrinsic factors in any pregnancy are also dependent on the quality of perinatal care pregnant women receive within a health facility which could be either adequate or inadequate (Akashi *et al*, 2004).

According to Kenya's MOH, perianatal and obstetric guidelines (2013), there are two principal perinatal outcomes (dependent variables in the study) i.e having a normal pregnancy without any complications or a pregnancy harmed by adverse perinatal events such as stillbirths, low birthweight baby, gestational diabetes, eclampsia, anaemia, overweight baby, abortion, birth injuries, caesarean section, neonatal and maternal mortalities. A study conducted under humanitarian settings (Gibson-Helm *et al*., 2014) found out that women of African origin are more predisposed to adverse perinatal outcomes as compared to those from other geographical settings. However the study

didn't establish if similar trends will be established for African women receiving perinatal care in non-humanitarian settings.

The European countries have consistently had good perinatal outcomes compared to developing countries; in 2010, European countries had a neonatal mortality rate that ranged 1.2 -5.5/1000 livebirths (Euro-peristat report,2010) compared to Kenya that had a rate of 27/1000 livebirths during the same time . In the same report, while European countries have a Maternal Mortality Ratio (MMR) of 6.2/100,000 livebirths, some countries in Africa experienced a MMR of up to 2000/100,000 livebirths (UNFPA state of the world's midwifery report, 2014).

Although caeserean sections have been associated with adverse perinatal otcomes (Shah, *et al*, 2009), other study findings (Ugwu *et al*, 2014) do conflict with this by indicating that Caeserean sections have a protective role against adverse perinatal outcomes. The World Health Organisation (WHO) has set a threshold of 5-15% rate for caesarean sections (Althabe, 2006) as a protective intervention against adverse outcomes but some developing countries in Africa e.g Kenya and Tanzania have recorded a caeserean section rate of 29-35.5% of deliveries conducted in some non-public and national public referral health facilities for the period 2005 to 2010 (Worjoloh *et al.*, 2012).

2.2 Health facility service delivery and perinatal care outcomes

Although it has not been understood how free maternity policy in Kenya affects the quality of Antenatal Care (ANC), evidence has it that mothers who receive quality antenatal care in a health facility (Brown *et al*, 2008) have a higher chance of experiencing normal perinatal outcomes. In any health facility, quality of services offered are inseparable with the quantitative and qualitive aspects of human resource for health (Witter *et al.,* 2011). This includes, competencies of service providers, staffing ratios of Skilled Birth Attendants (SBAs) as well as the emergency response systems available among other factors. It is argued that the quality of service women receive in

antenatal clinics is associated with the number of visits the same mother might make to the facility in the entire perinatal period (Chen *et al.,* 2007). The more the visits a mother makes, the higher the chance of health workers recognizingand mitigating pregnancy risks. A systematic literature review by Fiscella (1995) on various studies that had focused on effects of perinatal care on birth outcomes, found out that, there is a high probability for good birth outcomes if pregnant women receive quality perinatal care focusing on modifiable pregnancy risk factors. It is however not well understood whether in free maternity care policies in some of the developing countries have strengthened the focus on barriers to seeking ANC services and alleviation of the modifiable risk factors during pregnancy (Ajayi *et al*, 2013).

Waiver of maternity fee (free maternity care) notwithstanding, weak advocacy for universal access to Maternal and Newborn Care (MNC) services, shortage of Skilled Birth Attendants (SBAs), negative attitudes of midwives towards mothers, poor male involvement, shortage of maternity care supplies and equipments have been identified as potential hindrences to provision of quality MNC care to pregnant women in health facilities (Dako-Gyeke *et al*, 2013). Limitations in the aforementioned areas will compromise the quality of maternity care thus contributing to adverse perinatal outcomes. Evidence also shows that the quality of perinatal care during pregnancy is subject to the extent to which an expectant woman's spouse or male partner is being involved by a given health facility in perinatal care (Matiang'i *et al.,* 2013); a knowledgable male spouse on pregnancy issues is an asset to an expectant woman. Perinatal care outcomes are therefore subject to a mothers' holistic access to quality antenatal care in a health facility (Jennifer *et al.,* 2011).

Although it is yet to be established how well mothers are able to access various service packages under maternity fee waiver policyin Kenya, Studies from Nepal (Joshi et al, 2014) have demonstrated that access to adequate health education during pregnancy, monitoring of pregnancy parameters such as Blood Pressure (BP), weight changes in each trimester, timely provision of immunizations and administration of nutrition

suppliments are critical success factors for any pregnancy. Further to this, quality care package for pregnant women includes each mother having a maternal child health booklet and having access to comprehensive emergency obstetric care (CEmOC) services in the facility where she is seeking antenatal care.

According to the Kenya's 2010 road map that was developed to accelerate attainment of Millenium Development goals, a minimum package was designed for health facilities to ensure pregnant women had access to quality care (Roadmap for accelerating attaining of MDGs in Kenya, 2010). The package included measures such as health facilities being able to provide focused antenatal care, hygienic delivery, conduct the most essential surgical procedures e.g. caesarean section, provide indicated immunisations and essential neonatal care. The package also recommended Intermittent Prophylactic Treatment (IPT) and use of mosquito nets to protect pregnant women against malaria.

Adequate staffing ratios and access to essential supplies is a major determinant of quality of care and the ultimate MNCH care outcomes in any health system. The 2004 World Bank report (Bernhard & Liese, 2004) reveals that under-staffed and under-supplied health facilities is a common phenomenon in Sub-Saharan Africa (SSA) health systems; the supply of human resource for health doesn't match the population growth rates in developing countries and to exacerbate the situation, there is imbalanced distribution of Human Resource for Health (HRH) between rural and urban settings.

A Randomised Controlled Trial (RCT) conducted by the American college of obstetricians and gynaecologists found out that when pregnant women receive group perinatal care from a given health facility, they do end up with better birth outcomes compared to women who receive routine perinatal care that focuses on a specific list of defined parameters (Ickovics et al., 2007). In group perinatal care the focus is on health outcomes and empowerment of women while in traditional routine perinatal care the focus is on medical outcomes and recommended testing. Group perinatal care also

provides more provider-patient contact hours as compared to routine perinatal care that is limited to the availability of a service provider. Whether a facility provides routine traditional perinatal care or group perinatal care, either approach has an effect on the quality of perinatal outcomes.

A maternity fee waiver policy study in Nepal, found out that although this provided a relief to households that could not afford user fee levied in health facilities, the universal free delivery service referred to as *Aama* programme led to low quality of Maternal Newborn and Care (MNC). This was linked to the limited capacity of service providers in health facilities and lack of incentives for the increased technical and administrative workload (Witter *et al.,* 2011b)

An evaluation of free maternity care policy in Ghana found out that, the policy suffered constraints on the quality of care as a result of demotivated staff; lack of policy ownership from the health facilities and in addition to this, the policy lacked a strong monitoring and evaluation component (Witter *et al*., 2008a). A comparative study conducted in Ethiopia found out that there was a little difference in quality of care between public facilities that did and those that did not charge user fee (Luwei *et al.,* 2011). The Ethiopian study also found out that although there was a national maternity waiver policy for all public facilities, 65% of them continued charging some "informal fee" for provision of emergency obstetric care and other essential utilities. The study also found out that there was a higher case fatality in facilities that offered absolute free maternity care as compared to facilities that charged user fee.

A study done in Nigeria on determinants of maternal and child health (Adeoti and Awoniyi, 2008) found out that apart from facility factors influencing the quality of MNCH services, a family's' economic status and the education level of partners involved also has influence on the MNCH care quality outcome. The same findings were made in a related study done in Zimbabwe (Muchabaiwa *et al.*, 2012).

The disparity in access to skilled service providers in Kenya's rural and urban settings is potentially associated with the quality of perinatal outcomes. It is estimated that only 34% of mothers have access to skilled birth attendance in rural areas compared to 75% in urban areas (MOH, 2010). This HRH crisis has led to situations where one midwife conducts 480 deliveries in a year instead of the recommended 175.

The Kenya Service Provision Assessment conducted in 2010 (KSPA,2010) indicated that only 74% and 59% of health facilities could offer Voluntary Counselling and testing (VCT) and Post Natal Care (PNC) services respectively. The assessment further found out that only 69% of health facilities in Kenya could provide Tetanus Toxoid (TT) immunisation and only 3% of hospitals in Kenya could provide a full package (eight signal functions) of Comprehensive Emergency Obstetric Care (CEmOC) to mothers. Taking such gaps into consideration, women seeking antenatal care services are potentially at risk of adverse pregnancy outcomes. According to UNFPA, a kenyan woman faces 1 in 35 lifetime risk of suffering an adverse perinatal outcome and more particularly death (UNFPA, 2007) and this risk is increased further in settings where women are of low social-economic status (Chimaraoke, 2010).

2.3 Client level factors and perinatal outcomes

This refers to individual mothers' intrinsic or biological factors that potentially impact on a pregnancy outcome. Services at a health facility level could be of good quality but if the mother lacks adequate knowledge on self care, has nutritional deficiencies or is engaged in unhealthy health seeking behaviours, this might adversely affect her pregnancy outcome. The physiological changes that take place during pregnancy require optimal maternal nutrition to enhance foetal growth and a successful delivery during labour.

The Kenya's national guidelines on obstetric care (2013), observes that an expectant woman should not gain more than 1kilogram in a week during pregnancy or gain less than a kilogram of body weight in a month especially in the 3rd trimester (WHO fact

sheets, 2016). In total a mother should gain 11.5 to 16kg for the entire duration of pregnancy. The weight a mother gains during pregnancy is indicative and suggestive of the placenta efficiency and health of the foetus in utero (Wallace *et al.*, 2016). Therefore it is paramount for ANC settings to have enabling supplies and equipments to monitor pregnant women appropriately so at to detect pregnancy complications early to avoid adverse perinatal outcomes. According to Girsen *et al.,* (2007), underweight women are at risk of delivering preterm and low birth weight infants, while obese women are at risk of complications such as hypertension, gestational diabetes and a higher risk of caesarean sections since they tend to deliver larger birth weight (macrocosmic) babies. Hypertension and diabetes during pregnancy have also been associated with cardio-metabolic disorders that lead to preterm labour and low birth weight babies (Li, Ling-Jun *et al.,* 2018). On the other hand underweight women are at risk of getting small for gestational age infants (SGA) where a full term infant weighs less than 2500grams due to intrauterine growth retardation.or mothers weight changes during ANC visits.

A study conducted by Marlene *et al*. (2007) in 8 counties of Joaquin Valley in California, found out that social-demographic and medical insurance cover disparities among pregnant women had an effect on the birth outcomes of pregnant women; they further found out that women aged 20 years and below with education levels below secondary school education were more likely to receive inadequate antenatal care which led to adverse birth outcomes such as preterm labour, stii births and haemorrhagic complications. Although a causal-effect relationship wasn't established, it is presumed that women of 20 years and below do tend to have a wrong attitude towards pregnancy while pregnant women with lower than high school level of education are less empowered in decision making. Functional Maternity care settings should be able to respond to such unique client factors through provision of personalised health education to young mothers.

An Ecuadorian study involving 1016 pregnant women found out that women of low social-economic status and more especially low education levels had limited knowledge on the indicators of quality antenatal care and were therefore at risk of receiving inadequate antenatal care unknowingly (Paredes *et al,* 2005). The quality of personalised health education women receive during antenatal visits has a direct effect on perinatal outcomes; women's knowledge of the existing perinatal care services in the health system and their time of enrolment for antenatal care does directly affect perinatal outcomes for it influenced their utilization of skilled ANC services (Philbert *et al.*, 2008). The study further revealed that the age of women, their cultural characteristics and social networks i.e. who supports them during the pregnancy period also affects utilisation of perinatal care services. A study done in central Ethiopia to establish the determinants for utilising Maternal, Newborn and Child Health (MNCH) services found out that only 33.7% of women attend all the WHO recommended 4 ANC visits and over 50% started ANC from the 2nd and 3rd trimester contrary to what WHO advises. Although the study didn't establish the effect of user fee on utilisation of MNCH services, there was significant association between utilisation and literacy levels of women, family social-economic status, media exposure, age at last birth and the woman's' attitude towards the pregnancy (Birmeta *et al.,* 2013).

From a study done in Bangladesh (Nitai *et al.*, 2003), although utilisation of health services and and perinatal outcomes were associated with cost of care, other determinants such as quality of services offered at the health facility, social structure, individual women characteristics and health beliefs has statistically significant influence on perinatal outcomes. A woman's' age, access to MNCH services providing facilities and even previous experiences are potentially critical determinants. Although there are a number of unknown confounders for birth outcomes such as hormonal levels, HB and competency of caregivers among others, compliance with ANC services have the potential of enhancing better birth outcomes through helping detect pregnancy and birth related risks early. The systematic review by Fiscella further found out that a number of studies in this topic have failed to control for confounders such a woman's selfcare and

behaviour compliance, psychosocial stress, weight before birth (pre-gravid weight), attitude towards pregnancy and substance abuse all of which have a potential effect on the birth outcomes of a pregnancy (Fiscella,1995).

The extent to which a health facility is prepared to engage male partners in perinatal care has been found to play a significant role on womens'perinatal outcomes during pregancy (LaVeist, 2005). The study further observed that the level of social support has an effect on the attitude the woman develops towards the pregnancy which affects her psychological health during the pregnancy period. Women with psychological distress during pregnancy are considered vulnerable to developing pyschosis related to pregnancy and child birth.

Perinatal care outcomes are also a subject of a woman's body mass index (BMI), vitamin A, Zinc, Iron, and Haemoglobin levels (Kenya, MOH national guidelines for quality obstetrics and perinatal care, 2013). Mothers with low levels of iron are at risk of developing anaemia, obstetric haemorrhage that leads to maternal death and severe anaemia that may lead to heart failure. Zinc deficiency increases the risk of a mother developing pre-eclampsia, anaemia, miscarriage, pre-term labour, foetal growth retardation and early rapture of membranes, perinatal morbidity and neonatal death. Although universal health care contexts are being adopted in developing countries , it is yet to be understood whether nutritional deficiencies are among the factors affecting perinatal outcomes although 68 % of pregnant women in Kenya have been found to have zinc deficiencies (Kombe *et al*., 2014.

Haemoglobin (HB) is a critical oxygen carrying blood pigment that determines the health status of a placenta and in extension the nutritional status of the foetus. Low haemoglobin level is a risk factor for placental infarcts (death of placental tissue) leading to preterm labour, intra-uterine foetal restriction and low birth weight babies. Low haemoglobin level manifests in form of anaemia among expectant mothers (Breen,

1999). It is further observed that 50% of cases of newborns with neural tube defects are born to mothers with inadequate intake of folic acid during pregnancy.

2.4 Women and midwives' perception of perinatal care in public and non-public facilities

Expectations and satisfaction of pregnant women with antenatal care services have been found to directly affect perinatal outcomes through influencing the extent to which they use the healthcare system and this ultimately affects their health states (Galle et al., 2015). The perceptions are shaped by the waiting time, cost of services, and access to skilled services especially distance to the facility, availability of desired services and the attitude of care givers among others. When women fail to seek ANC services in a health facility due to the negative perceptions they have on a facility, they end up suffering commplications such as anaemia and pregnancy induced hypertension among other maternal complications (Tuladhar & Dhakal, 2011).

A Longitudinal survey conducted in Nepal on womens'perception of the quality of maternity care in private and public facilities (Karkee *et al*., 2014) found out that private hospitals were rated higher than public facilities. This trend was observed in nearly all aspects of maternity care except for post-natal care where public facilities rated favourably especially on educating mothers about breast feeding and immunizations. A Nigerian study by Fawole *et al.,* (2008) focusing on perceptions of women who had received ANC services from public and private facilities found out that 10% of them were predisposed to adverse perinatal outcomes because the caregivers never educated them on pregnancy danger signs, prevention of sexually transmitted diseases. Such omissions are common when a facility has staff shortages with limited personalised care.

Research has continued to demonstrate that the outcomes of perinatal care in health settings are associated with the quality of care especially the nursing and midwifery services given to mothers (Alwiena, *et al*., 2014). The South African study further revealed that the quality of care is also pegged on the standards of care and the availability of resources required to provide good patient care. Although a related study in Nigeria only focused on primary health facilities (Obiageli *et al.*, 2014), the pregnant mothers interviewed were generally satisfied with the services at that level of health facility but on the contrary utilisation of ANC services was low. Findings from Enugu state Nigeria on a community and care providers' perception of free maternity care (Uzochukwu *et al.*, 2015), indicate that although free maternity care increased demand for services, the workload of clients overwhelmed the resources available. The study depicted a demotivated health workforce which directly affcets the quality of services given to mothers and associated perinatal outcomes.

The conceptual framework of this study was as given in figure 2.1.

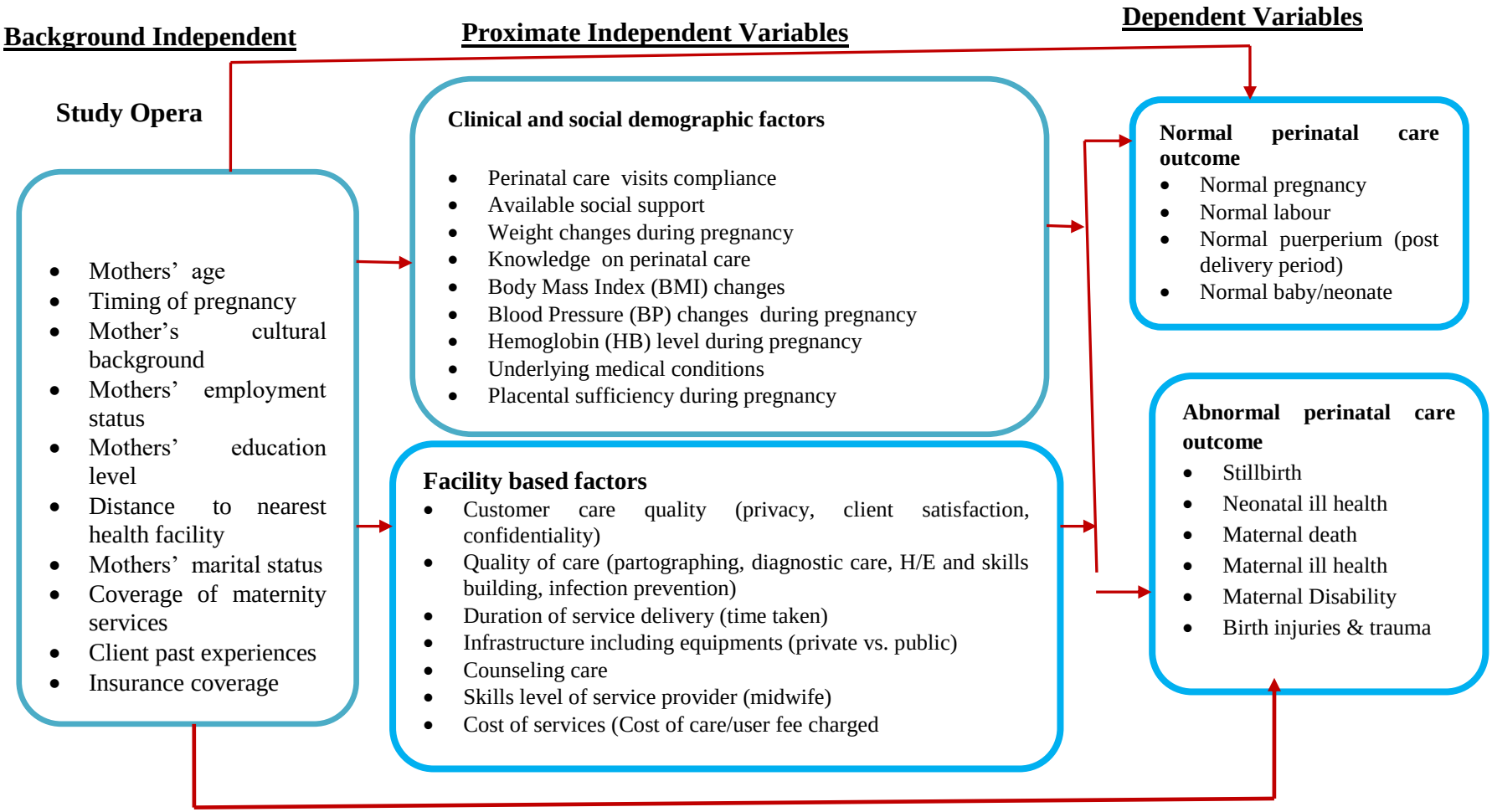


Figure 2. 1. The study conceptual framework

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study site

The study was conducted in selected Kisii County's Public and non public level four facilities (Figure 3.1 and appendix 16). The county has highland equatorial climate with bimodal rainfall pattern. The County is estimated to be covering an area of 1,317.4km^2 with a total population of 1,226,873 persons in 2012; 650,982 males and 711,797 females. The county has 4 district (county) hospitals, 12 sub-county hospitals (9 public and 3 non public), 23 health centres and 80 dispensaries. In all levels of the health system the county hasa total of 104 public facilities, 10 faith based and 16 non public facilities that offer MCH services. According to the county's reproductive health report for the year 2013, the county had projected to conduct 54,071 deliveries out of which only 16,824 accessed skilled care .Out of the 16,824 deliveries conducted in health facilities, there were 438 neonatal deaths.

3.2 Study Design

This was a prospective cohort study design conducted in comparable public and non public (mission) comparable level four health facilities that were offering the full cycle of perinatal care services including in-patient care services in *Kisii* County. Taking into consideration the minimum requirements of a level four facility, seven (7) level four facilities out of the 12 in the county (9 public and 3 non-public) were randomly selected as study sites. The level four facilities were selected because they are able to offer a full cycle of perinatal care services although the client flow varies from one facility to another (Table 3.1). The targeted study sujects' variables were measured in three subsequent ANC visits at least 4 weeks (one month) apart. Services given and indicators monitored in each visit mirrored the care pregnant women receive in their 1st, 2nd and 3rd Trimester periods of pregnancy (Table 3.3). The study subjects were followed up for a period of 6 months including the 2 weeks post-delivery that was meant to ascertain the health status of the mother and

baby after delivery. Study subjects who developed signs of an illness or complication before subsequent appointment date were allowed to seek consultation in their ANC facility.

The gestation of a pregnancy was established through the Last Menstrual Period (LMP) of a client and for those who could not remember their LMP, the enumerators used their fundal height to estimate the gestation.

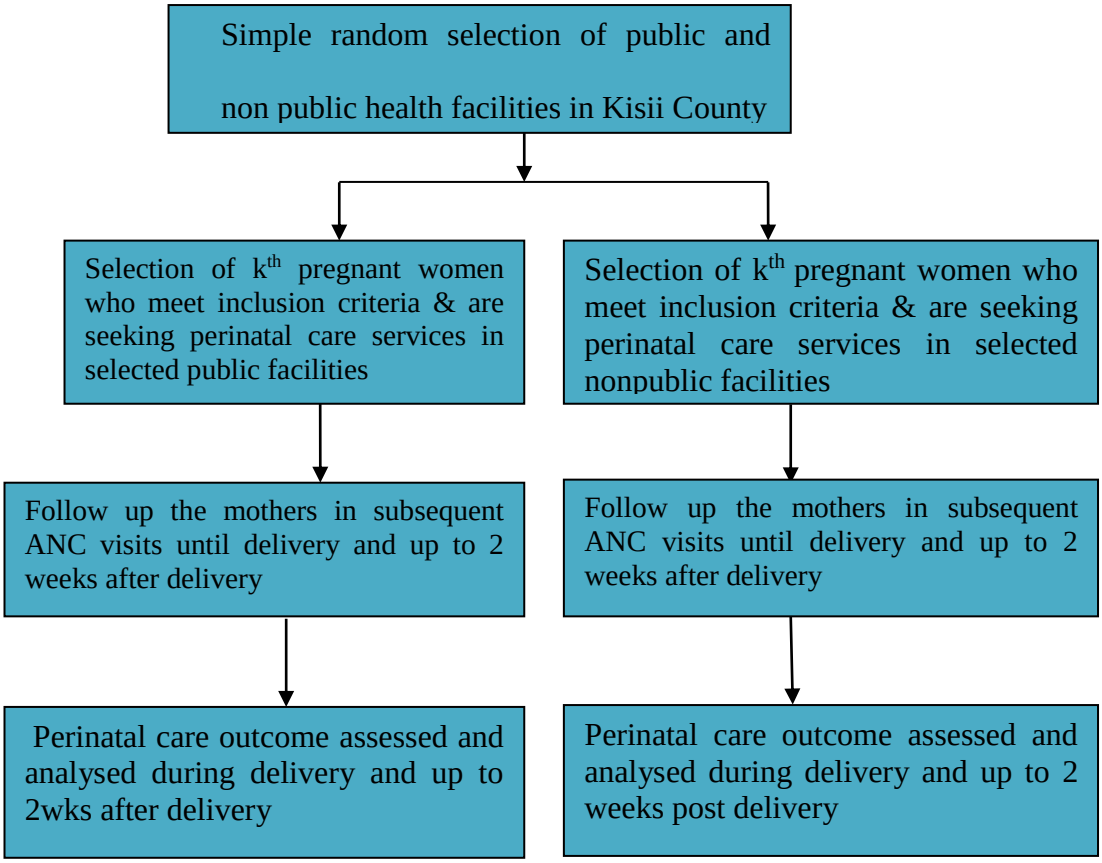


Figure 3. 1: Study subjects selection recruitment framework

Table 3. 1: Number of deliveries in public and non-public facilities in Kisii County

FACILITY	Total deliveries Jan - Jun 2013	Total deliveries Jul – Dec 2013	Total deliveries Jan - Jun 2014	Level	Type of facility
Kisii level 5 Hospital	3461	4137	4548	5	County (public)
Oresi Health centre	469	532	789	3	Sub-county (Public)
Kenyenya hospital	647	538	686	4	Sub-county (public)
Keumbu	601	514	528	4	Sub-county (public)
Marani hospital	387	432	452	4	Sub-county (public)
Nyacheki	349	381	333	3	Public (Health centre)
Masimba	472	522	459	4	Public (Health centre)
Gucha	773	643	758	5	County (public)
Nyamache	625	614	672	5	County (public)
Gesusu	236	255	320	5	County (public)
Iyabe	401	384	552	4	Sub-county (public)
Nduru	177	261	325	3	Sub-county (public)
Nyangena	214	124	110	3	private
Egetuki medical clinic	116	87	47	3	private
Hema Hospital	125	115	54	4	private
RAM hospital	248	336	479	3	private
Getembe hosp	61	35	10	4	Private
Bosongo hospital	83	71	10	4	private
Gucha Nurs. home	56	32	11	3	private
Tabaka mission hospital	431	376	388	4	Faith based
Christamarrianne	457	461	515	4	Faith based
Mosocho health centre	221	165	111	4	Faith based
Sengera H.C	107	98	85	3	Faith based

Source; Kisii county Health records office, Kisii (2014)

3.3 Study population

The study population comprised expectant women seeking perinatal care services in comparable level four public and non-public (mission) health facilities within *Kisii* County; the study subjects were of different parities, social-economic status and demographic profiles. The study unit was an expectant woman seeking perinatal care services in the selected public and non-public health facilities in *Kisii* County.

3.4 Inclusion criteria of study subjects

The study subjects included in the study were,

1. Pregnant mothers from 16 weeks gestation voluntarily seeking ANC services in the selected public and non- Public health facilities

2. Pregnant mothers from 16 weeks gestation who had resided in Kisii County for a minimum period of 3 months

3. Willing and consenting pregnant mothers from 16 weeks gestation

3.5 Exclusion Criteria of study subjects

The study subjects excluded from the study were,

1. Mothers attending Maternal Child Health (MCH) clinics in selected health facilities for follow-up services i.e not attending their first ANC visit.

2. Pregnant women seeking ANC care who were <16 weeks

3.6 Sampling and Sample size determination for the study

The sampling unit for the study was an expectant mother registering for antenatal care in public or non public level 4 health facilities. Although 7 randomly selected facilities were eligible for the study, on the ground, based on clients flow per day, recruitment of study subjects was eventually limited to 4 facilities representing the existing social-economic stratas in Kisii county's health system (rural public, rural non public, urban public and urban non-public level four health facilities). Each of the four (4) facilities was treated as autonomous cluster. Also given that the study was dealing with stratified populations (mothers seeking MNC services in public vs. those seeking same services in non-public health facilities), sample size was calculated using **Lameshow *et al.*, 1990 equation.**

The sample size calculated was proportionally allocated to the selected health facilities (clusters) based on the preceding 6 moths "delivery loads" and other parameters of interest. Oresi health facility substituted the sampled Masimba sub-county hospital (Table 3.2) which had limited equipments for full cycle perinatal care and was far from the nearest referral facility. The study subjects were proprotonately selected from the four (4) health facilities

A study done to assess the prevalence of abnormal perinatal outcomes in Kenya's public health facilities (Ngugi, 2010)) at *Kiambu* District Hospital, found out that **24% of mothers** studied developed abnormal perinatal outcomes. A related study/audit conducted in Uganda's non-public *Nsambya* hospital (Nakiibuka et al., 2012) found out a **6% prevalence** of abnormal perinatal outcomes among pregnant women. The proportion of study subjects in each cluster is thus calculated as

$$p = \sum_{i=1}^{L} \frac{N_i}{N}$$

Where:

Pi = the proportion of individuals in the population that develop an outcome

Ni = the outcome target population size in stratum *i* (delivery load in preceding 6 months for each strata- 7 facilities)

N = the total outcome target size (i.e. the population proportion as a weighted average of the stratum-specific proportions, where the weights are the relative sizes of the strata)

p= Confidence interval level (95%)

d = Confidence limit (assumed to be 3.5 % of the true value)

w_i= Proportional allocation for the i^{th} stratum.

n= sample size

$$n = z^2 \sum_{i=1}^{L} \frac{N_i^2 p_i (1 - p_i)/w_i}{N^2 d^2}$$

$$w_i = \frac{N_i}{N}$$

$N^2 = (Ni)^2$ and $d2 = (0.35)^2$

n = 412. To cater for 20% drop out (0.2 x 412 = 82)

n = 494 study subjects

3.7 Sampling procedures and recruitment of participants

Ultimately two public and two comparable non-public facilities were randomly sampled from an existing list of level 4 health facilities in *Kisii* County. Table 3.1 presents the number of pregnant women who accessed the health facilities in *Kisii* County for 6 months (January to June 2014). A sampling frame was developed at each facility based on the daily clients turnover multiplied by number of days planned to be in the field (study duration). Probability Proportional to Size (PPS) allocation was applied to distribute the sample size across the sampled facilities as presented in Table 3.2. The study adopted a systematic sampling approach in selecting the women. A sampling interval was determined at each facility by dividing the sampling frame size by the distributed sample size. The 1st woman was selected using Simple Random Sampling (SRS) procedure; subsequently, every eligible woman (guided by sampling interval) in public and non-public facilities was selected in a queue system i.e. systematic sampling until the desired sample size is attained.

Table 3.2: Probability Proportional to Size (PPS) allocation for sampled public and non public health facilities

Partner	N_i	w_i	N_i^2	p_i *	$(1-p_i)$	$N_i^2 p_i(1-p_i)/w_i$	**Sample size**
Gucha	758	0.20	574,564	24%	0.76	523,520	98
Kenyenya	686	0.18	470,596	24%	0.76	473,793	88
Iyabe	552	0.14	304,704	24%	0.76	381,244	71
Masimba	459	0.12	210,681	24%	0.76	317,013	59
RAM	479	0.12	229,441	6%	0.94	82,707	62
Tabaka	388	0.10	150,544	6%	0.94	66,994	50
Christamarrianne	515	0.13	265,225	6%	0.94	88,922	66
Total	3837	1				1,934,193	494

3.8 Data collection

Data was collected using quantitative and qualitative approaches. Enumerators were midwives (study staff) selected and trained from other facilities in the county to assist in data collection. For quantitative data, a semi-structured questionnaire and observation check list derived from the operational framework variables and WHO safemotherhood guidelines was used to obtain data from the study subjects receiving care in the selected/sampled health facilities. The questionnaire comprised of sections thatemployed observational audit of safe motherhood clinical practices and self reported sections that were conducted through exit interviews in every ANC visit. The baseline information for each subject including age, parity, pregnancy order (parity), distance travelled to the facility, employment status, whether pregnancy was timed/planned or not, marital status and education level will be obtained during the first visit (recruitment day).Baseline information also included number of midwives in a facility *vs.* Client flow, type of facility (public vs. private) and perinatal care equipments available. Data collection was also carried out in all subsequent visits until 2 weeks post delivery.

In subsequent visits, the variables/exposures (Tables 3.3 and 3.4) that were monitored included the skills level of the "midwife "providing care (skilled or unskilled), Blood pressure reading (BP), MUAC, Maternal BMI, the cost of care (total expenses incurred at the facility), urinalysis results (proteins level an indicator for placenta sufficiency), Hemoglobin (HB level) and iron (Ferritin) levels. The observation checklist (clinical audit tool) were also used to keep track of any illness suffered by the mother during pregnancy (minor and major), weight gain changes, Quality of care i.e infection control practice, immunizations and drugs given to a mother and if she was "male partner" accompanied or not during the visits (male/partner involvement). A blood sample of 3ml was taken in each visit for measuring the Hemoglobin (HB), Zn++, Fe^{++} levels and HbsAg, HIV as well as VDRL reactivity. However, due to cost implicatios (refer ammendments aproval in **appendix 11**) some micronutrients were not assessed in the 2^{nd} visit. Analysis for Zn++ and Fe++ was conducted using atomic absorption spectrophometer (AAS) &

Mini-Vidas Radioimmunoassay technology respectively (Caulfield et al, 1998). However, considering most of the mothers came late for the first ANC visit and the time interval between 1st and 2nd visit, the micronutrient assay was skipped in the 2nd visit and samples were taken in a visit that was scheduled during the 3rd trimeester. This was to allow for any significant changes in serum micronutrient levels

To avoid repeated pricking of mothers, the specimen taken for full haemogram (FHG) at the facility level was also used for Ferritin (Fe^{++}) assay, HbsAg and VDRL tests. The HB levels were also assessed as a proxy indicator for Ferritin levels. The qualitative data was collected using a key informant interview (KII) and Focus Group Discussion (FGD) guides. Five Key informants mainly comprising of maternal newborn and child health services managers in Kisii County were interviewed. To further asess midwives and mothers perceptions of MNC services in public abd non public health facilities, five separate FGDs were conducted; 3 for mothers and 2 for midwives. The discussants excluded those women were already in the prospective cohort groups.

Table 3.3: Baseline exposures assessed only once

	Baseline Exposure	Description
1	Co-morbidities	Assessed whether the mother had any underlying medical condition
2	Pregnancy order	Assessed order of the current pregnancy relative to the preceding ones (as applicable). Also called parity
3	Employment	Assessed whether employed or unemployed
4	Pregnancy gestation	Pregnancy gestation during the first visit made to the health facility
5	Number of dependants	Assessed No. of dependants under the mothers' care at nuclear level
6	Type of facility attended	Will categorise facility attended as private Vs. Public
7	Age	The age will be taken in complete years
8	Education level	Assessed completed level of education by the study subject
9	Marital status	Will be assessed whether the study subject is married or single
10	Timing of the pregnancy	To be assessed whether the pregnancy was planned or unplanned
11	Drug and substance abuse	Assessed if subject smoked or drunk alcohol or related substances
12	Attitude towards pregn.	To be assessed whether the pregnancy is intended or not
13	History of being on any treatment at the time of enrolment into the study	To be assessed whether the study subject is on any treatment and its duration

Table 3.4: follow up exposures that were assessed every visit

Exposure	Normal exposure	Abnormal exposure
Haemoglobin level	≥10 g/dl	At least one exposure to HB of <10g/dl during pregnancy
Blood pressure (BP) changes	120/80 mmHg	any event of BP > 120/80 mmHg during perinatal care
Adherence to ANC visits	≥4 visits or more	< 4 visits
Placental & renal sufficiency	No urine proteins detected via urinalysis (to be done in all visits)	Any detection of proteins in urine
Mid upper arm Circumfrence (MUAC)	22 to 23 cm	Exposure to MUAC <22cm or >23cm
Availability of essential MNCH for equipments	Facility with minimum requirement of equipments and trained midwives (HRH)	Exposure to deficiencies in minimum equipments & midwives who were trained for a minimum of 18 months (HRH)
Weight gain during perinatal care	gaining 1kg per week	gaining > 1kg per week
HIV infection	Mother tests negative to HIV test (to be done twice during ANC period)	Mother tests positive to at least one of the HIV screening tests
Hepatitis B infection	Tests negative (test to be done twice during ANC period)	at least one episode with a positive hepatitis B test
Serum Iron levels	50 -170 µg/dl	at least one episode with levels < or > normal levels
Availability of facility perinatal care equipments	Facility has all recommended perinatal care sets for every visit specific care	lack of at least one of the recommended complete perinatal care sets for any visit specific care
Counseling on pregnancy self care	Mother counseled on trimester specific/focused information	Mother missing any single visit specific counseling
Male involvement	Mother accompanied by spouse in all visits	Exposure to any unaccompanied perinatal care facility visit by spouse
Immunization given	All visit specific vaccines given	Misses any visit due immunization
Prophylactic treatment	All visit due prophylactic treatment given	Misses any visit due haematinic supplement
Cost of care (total cost to be obtained for all visits)	Mother receives free care in all visits	Any event/visit the mother meets any cost of care out of her pocket (excluding costs for additional tests done by the researcher)
Quality of care	Attended to by qualified midwife in all visits including delivery	Any visit a mother is attended to by unqualified midwife
Routine ANC profile diagnostic tests	Has all visit/trimester due diagnostics done	Misses any due routine diagnostic test
Stool microscopy	Mother tests negative to common the stool microbes ,ova and cysts (to be done at least twice -1st and 2nd trimester)	Testing positive to the common stool microbes, ova and cysts
Zinc (Zn++) levels	0.66-1.10 mcg/Ml	< 0.66 or > 1.10mcg/ml

3.9 Quality assurance of study results

To ensure data quality, questionnaires equivalent to 10% of the total sample size were pre-tested in one of the facilities level 4 facilities in *Nyamira* County. This was to ensure that the questions were well understood and to correct any ambiguous questions before using them in the main study. Data will be collected by qualified and trained research assistants to ensure uniformity in the administration of the questionnaires. Data was double entered by two different clerks to ensure proper transcription of the study questionnaires details to the electronic database.

3.10 Data management and Analysis

An MS Access database for quantitative data was used to double enter the field questionnaires. File back-up were regularly done to avoid any loss or tampering. Data cleaning and validation was performed in order to achieve a clean dataset that will then be exported into a Statistical Package format (IBM SPSS version 21.0) ready for analysis. All the questionnaires were stored in a lockable drawer for confidentiality. Data was stored in external hard discs, memory sticks and writable CDs for easy retrieval when need arises.

Data analysis was conducted using IBM SPSS version 21.0 statistical software. Standard exploratory data techniques to determine will be employed at the initial stage of analysis to uncover the structure of data and identify outliers or unusual entered values. Descriptive statistics such as proportions were used to summarize categorical variables while measures of central tendency such as mean, standard deviations, median, and range were used to summarize continuous variables.

The dependent variables for all analyses conducted in this study were the perinatal outcome:

a. A normal perinatal care outcome (normal pregnancy, normal labour, normal puerperium (post delivery period)) and
b. An abnormal perinatal outcome (stillbirth, neonatal ill health, maternal death, maternal ill health, maternal disability, birth injuries & trauma, normal baby/neonate).

The independent variables were broadly categorized into:

c. Client/Mothers'factors that were serially monitored in various visits and others taken at baseline; HB levels, Ferritin (Fe++) levels , Zinc (Zn++), Cummulative Dietary Diversity Score (DDS), MUAC, mental health status HIV satus, Hepatitis B status , knowledge on various pregnancy trimesters, age, mother's cultural background, mothers' employment status, mothers' education level, mothers' marital status, client past experiences, mothers' parity (order of pregnancy), vital health outcomes during ante natal visits (weight gain/loss, BMI, etc)
d. Health facility factors (customer care quality (privacy, client satisfaction with services in each visit, confidentiality), quality of care (partographing, diagnostic care, Health Education and skills building, infection prevention), duration of service delivery (time taken), infrastructure including equipment (private vs. public), counseling care, skills level of service provider (midwife), cost of services (cost of care/user fee charged, distance to nearest health facility, coverage of maternity services, insurance coverage,)
e. Client and service provider perceptions of Maternal and newborn care services at public and non-public facilities in Kisii County.

All statistical results were considered significant for $p<0.05$ at a 95% confidence level.

Objective 1: To determine the client-level factors that affect perinatal outcomes among women attending public and non-public health facilities in *Kisii* County

To respond to the 1st research question which sought to determine which client exposure factors determined perinatal care outcomes for pregnant women in Kisii County, proportions of normal and abnormal outcomes by specific client factors, Chi-square tests, Logistic Regression tests, Paired t-tests and McNemar's tests were used to determine differences between client factors and perinatal outcomes. The exposure variables were any client related factors (mothers' age, timing of pregnancy, mother's cultural background, mothers' employment status, mothers' education level, mothers' marital status, client past experiences, mothers' parity (order of pregnancy), vital health outcomes during ante natal visits (weight gain/loss, BMI, MUAC etc). The primary outcome was the final perinatal outcome (i. normal perinatal care outcome (normal pregnancy, normal labour, normal puerperium (post delivery period)) or ii. an abnormal perinatal outcome (stillbirth, neonatal ill health, maternal death, maternal ill health, maternal disability, birth injuries & trauma, normal baby/neonate). The secondary outcome was weight at birth. Analyses results were categorized by the type of facility: public hospitals (providing free maternal services) and non-public hospitals (not providing free maternal services). Frequency of factors in mothers with normal vs abnormal perinatal outcomes was compared by $\chi 2$ testing. Logistic regression was conducted to compare odds of having a normal or abnormal perinatal outcome. Paired t-tests and McNemar's tests were used to compare relative means (of numeric variables) of different factors at different ANC visits for parametric and non-parametric data respectively.

To get the cumulative Dietary Diversity Score (DDS), the Food items were reconstructed into a 10 food group's Dietary Diversity as shown in the table 3.5. Each food group consumed in every follow-up visit scored a score of 1 translating to a total possible score of 10 per respondent. The cumulative diversity scores where then converted to DDS either as adequate or inadequate. The cut off points for each visit was determined by calculating the mean score of the cumulative diversity score of the upper tercile (33% with the highest diversity score). Any respondent scoring

above the calculated mean was categorised as having an adequate DDS while those with the mean and below categorised as having in adequate DDS.

Table 3.5: Food Dietary Diversity

	Commodity	**Responses Write: [0]=No [1]=Yes**
D1	**Grain Foods:** *Ugali* (made of maize, millet, sorghum flour), Bread, Rice, Spaghetti/noodles/pasta, *Chapati* Boiled/roasted maize, Pancakes, Biscuits, Cake, Donut/fried dough, Rice cake (*vitumbua*), Plantain (*matoke*)	
D2	**Roots/Tubers:** Irish Potatoes, Cassava, Taro/arrow roots, White Yams Carrot, Pumpkin, Squash with orange inside, Yams with orange inside	
D3	**Vegetables:** Lettuce (dark green), Pumpkin leaves, Spinach Amaranthas/mchicha, Bitter tomatoes, Cabbage, Cassava leaves, Chinese cabbage, Cow peas leaves, Cucumber, Eggplant, Green pepper, Lettuce	
D4	**Fruits**: Orange Mango, Papaya, Tangerine, Lemon, Ripe banana, Plums, Avocado, Passion fruits, Grapefruits, Apples, Peaches, Guava, Watermelon, Pears, Pineapple, Pormegranate, Jackfruit, Wild fruits	
D5	**Eggs: (**Any Eggs - hens, duck etc)	
D6	**Meat (beef, poultry, pork etc):** Beef (including from wild animals), Pork, Chicken, Goat meat, Lamb, Rabbit meat, Duck, Turkey Liver **Organ meats:**, Kidney, Hearts, Intestines	
D7	**Dried or Fresh Fish:** Fresh, smoked, tinned or Dried fish	
D8	**Legumes and Nuts:** Beans, Cow peas, Chick peas, Green mung, Green peas, Pigeon peas, Bambara nuts, Ground nuts (peanuts), Cashew nuts/ macadamia, Soya beans	
D9	**Milk and Dairy Products:** Cow's milk (include maziwa mala), Goat's milk, Ice cream, Cheese, Yogurt	
D10	**Foods made with Fats and Oil:** Margarine spread, Butter spread, Foods made with vegetable oil, Foods made with palm oil, Foods made with ghee, (Examples of foods made with oils/fats: Fried eggs, Fried potatoes/ chips, Fried cassava, maandazi	

Objective 2: To determine the facility-level factors that affect perinatal outcomes among women attending public and non-public health facilities in *Kisii* County

The 2nd research question sought to establish the facility level factors that affected perinatal outcomes among women attending public and non-public health facilities. The independent variables in this objective were customer care quality (privacy, client satisfaction, confidentiality), quality of care (partographing, diagnostic care, H/E and skills building, infection prevention), duration of service delivery (time taken), infrastructure including equipment (private vs. public), counseling care, skills level of service provider (midwife), cost of services (cost of care/user fee charged, distance to nearest health facility, coverage of maternity services, insurance coverage). The primary outcome was the final perinatal outcome (i. normal perinatal care outcome (normal pregnancy, normal labour, normal puerperium (post delivery period)) or ii. an abnormal perinatal outcome (stillbirth, neonatal ill health, maternal death, maternal ill health, maternal disability, birth injuries & trauma, normal baby/neonate). The secondary outcome was weight at birth. Analyses results were categorized by the type of facility: public hospitals (providing free maternal services) and non-public hospitals (not providing free maternal services). Facility level data were gathered from the questionnaire, separate whole perinatal outcome data from facility in-charges/MNCH in-charges and key informant discussions at the facilities. Data from the facilities was triangulated by reports in the DHIS 2 (the MOH central reporting platform) for accuracy and reliability.

Frequency of facility factors against normal vs abnormal perinatal outcomes was compared by $\chi 2$ testing. The odds of having a normal or abnormal perinatal outcome versus specific facility indicators were calculated using Logistic Regression tests. McNemar's tests were used to compare relative means (of numeric variables) of different factors at different ANC visits.

Objective 3: To determine the relationship between facility and client factors on perinatal outcomes among women attending public and non-public health facilities in *Kisii* County

In the 3rd objective, this study sought to establish if there existed a relationship between facility and client-level factors. In this objective, analyses were done between a facility and client factor while controlling for type of facility (public or non-public). Differences between client and facility were measured using $\chi 2$ tests. For instance, a mother's zinc or ferritin levels were correlated against normal or abnormal outcomes by type of facility (public vs non-public). Logistic regression statistics were conducted to compare odds of having a normal or abnormal perinatal outcome. Paired t-tests and McNemar's tests were used to compare relative means (of numeric variables) of different factors at different ANC visits for parametric and non-parametric data respectively.

Objective 4; Midwives and mothers 'perceptions of MNC services in public and non-public health facilities in Kisii County.

The recorded focused group and key informant interviews were transcribed and typed using word processor. A thematic code book was then developed in Atlas.ti (Qualitative data analysis software). The transcribed documents were imported into the atlas.ti software then coded thematically and analysed. The themes were then queried and extracted for synthesis and reporting.

3.11 Ethical Considerations and approval

Prior to embarking on data collection, the proposal was submitted to KEMRI Scientific Steering Committee (SSC) and then to KEMRI Scientific and Ethics Review Unit (SERU), as well as the National Council for Science and Technology (NACOSTI) for further approval. The study subjects were required to sign a consent form prior to participating in the study (appendix 2). All data obtained from the study was handled in confidentiality by the principal investigator and the study questionnaires didn't contain information linking the data to individuals. For

anonymity of respondents, the questionnaires contained unique numbers/codes and no names will be put on the questionnaires. During data collection no study subject was put at risk of harm, none was coerced and the subjects were allowed to withdraw without giving prior notice and their continued access to MNC services was guranteed without any victimisation. The confidentiality study subject's data was ensured through pass wording of data collected so that there is limited access to the privileged information obtained from them

Further authorization to conduct the study was also obtained from relevant administrative authorities in various health facilities.The participants will be interviewed in a private room within the health facilities to ensure privacy and confidentiality. Additionally, after consenting, the witnesses of persons who cannot read and write were excused to ensure un-biased responses.

Given that the study was only establishing pregnancy outcomes for study subjects who have been exposed to various parameters of study variables, in the event a study subject is found to have lower levels of micronutrients or haemoglobin, appropriate intervention was taken to protect the mother and the foetus.

3.12 Study Limitations

The prospective cohort study design employed is known to require long follow-up periods and potential engagement of large sample sizes. The exposure status also may change during the follow-up period in addition to the potential losses to follow up. In this longitudinal cohort study, 73 study subjects were lost to followup leaving only 287 mothers.

CHAPTER FOUR

RESULTS

4.1 Distribution of respondents and perinatal outcomes

A total of 287 expectant mothers (referred to in this study as clients) seeking MNCH services at 2 public (Oresi Health Centre and Kenyenya Hospital) and 2 non-public (CMMH and Tabaka Mission Hospitals) health facilities in Kisii County were recruited over the period January to August 2016. The recruitment and follow-up process is as summarized in figure 4.2. The number of study subjects recruited per facility was proportionate to the number of deliveries each of the facility had handled in a preceding period of 6 months. Figure 4.1 shows the respondent distribution across the four (4) health facilities. At recruitment, 44% (127) of the study population were drawn from Oresi, 21% (60) were drawn from Kenyenya and Christamarriane mission hospital respectively, while 14% (40) were drawn from *Tabaka* mission hospital. Tabaka recorded 15% abnormal perinatal outcomes, CMMH recorded 14%, and Kenyenya had 11% while Oresi had the lowest abnormal perinatal outcomes (8%).

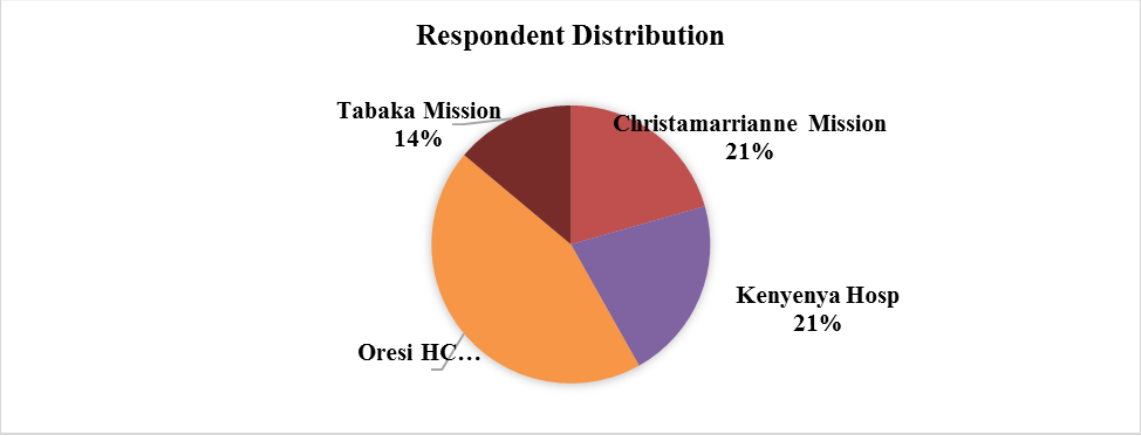


Figure 4. 1: Distribution of respondents with reference to type of health facility

There was 11% cummulative incidence of adverse perinatal outcomes. Out of 21 babies who had abnormal birthweight at the point of delivery, 19 of them (90%) were

born to mothers with low zinc levels. Distribution of normal and abnormal perinatal outcomes in each of the facilities at the end of the follow-up period is as shown in Table 4.1. The distribution of the various forms of abnormal perinatal outcomes is as shown in Table 4.2

Table 4. 1: Distribution of perinatal outcomes in selected facilities (n=287)

Facility Name	Perinatal Outcome	
	Abnormal	**Normal**
Oresi	10 (8%)	116 (92%)
Kenyenya	7 (11%)	54 (89%)
CMMH	8 (14%)	51 (86%)
Tabaka	6 (15%)	34 (85%)

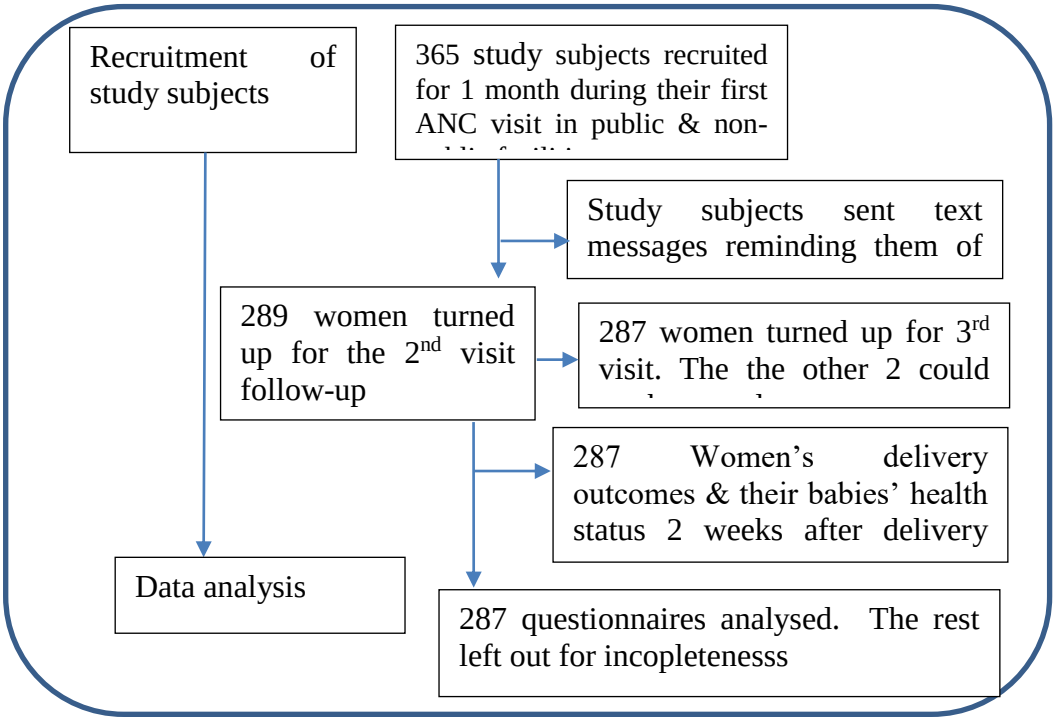


Figure 4.2: Recruitment and follow-up process

Table 4.2: Distribution of various forms of abnormal perinatal outcomes (n = 287)

Forms of abnormal perinatal outcomes	Frequency of occurrence (#)	%
Developed APH	7	2.4
Developed prolonged labour	11	2.4
Developed obstructed labour	5	1.7
Episiotomy done	22	7.6
Maternal distress occurred	3	1
Foetal distress occurred	5	1.7
Developed pre-eclampsia	2	0.7
Developed eclampsia	2	0.7
Ended up with caeserean section	6	2.1
Fresh still births	6	2.1
Ended up with a preterm delivery	2	0.7
Developed malpresentations	7	2.4
Ended up with unduced labour	5	1.7

4.2Client-level factors that affect perinatal outcomes among women attending public and non-public health facilities in Kisii County

The client characteristics examined to determine their effect on perinatal outcomes were mother's age, timing of pregnancy, mother's cultural background, mothers' employment status, mothers' education level, mothers' marital status, mothers' parity (order of pregnancy), drug and substance abuse, attitude towards pregnancy (intended or not) and history of being on any treatment at the time of enrolment into the study.

4.2.1 Client demographic factors during pregnancy

At the point of study subjects' recruitment, 20% (58) subjects were less than 16 weeks pregnant, 20% (58) were between 17 and 20 weeks, 50% (143) were between 21 and 27 weeks. The remainder 6% (17) was above 28 weeks. Chi-square test statistic result didn't show any statistical relationship between the time of commencing ANC care and associated perinatal outcomes. However, 74% (23/31) of the total abnormal outcomes were registered among mothers who initiated ANC care after 20 weeks. At the time of the study, 19% of the respondents reported having had primary education, 38% and 29% had completed secondary and tertiary education respectively and 14% had university degree education.

A majority of the respondents (92%) were married, 8% were single while 1% were partnered (Table 4.3). Marital status was also reflective of the 2:1 public vs non-public respondent ratios respectively: 64% of respondents were married and single at public and non-public facilities respectively

Table 4. 3: Marital status by facility

Facility type	Marital Status			Total
	Married	Partnered	Single	
Public	174 (66%)	(0%)0	14 (64%)	188 (66%)
Non-public	89 (34%)	2 (100%)	8 (36%)	99 (34%)
Total	263	2	22	287

The age range of the respondent was 31 (13-44 years). The median age of the respondents was 23 years (interquartile range-IQR 21-27.5 years). The median age at marriage was 21 (IQR 19-23). The age distribution was, below 20 years-16%, 20-34 years-79%, 35-39 years 4% and 40 years and above-1%. Results in table 4.4 shows that the number of clients from public facilities was higher across all age groups. 36

mothers attending public facilities were aged < 20 years compared to 7 in non-public; 133 against 82 mothers in age group 20-34 years for public versus non-public respectively, 8 against 4 in age group 35-39 in public versus non-public respectively and 2 against 1 for individuals 40 years or older. Two thirds (66%) of total study participants were drawn from public facilities while the remainder (34%) was from non-public facilities.

Table 4.4: Age category by site type

Facility type	Age Category				Total
	< 20 years	20-34 years	35-39 years	40 and above	
Public	36 (20%)	133 (74%)	8 (5%)	2 (1%)	179 (66%)
Non-public	7 (7%)	82 (88%)	4 (4%)	1 (1%)	94 (34%)
Total	43 (16%)	215 (79%)	12 (4%)	1 (1%)	273 (100%)

39% of the respondents reported being accompanied by their male partners during the 1st visit, 24% were accompanied at the 2nd visit and 28% were accompanied at the 3rd visit. McNemar's test results show a significant decrease in the proportion of males accompanying their spouses for ANC ($p<0.001$) between 1st and 3rd visit.

Almost half of the respondents (46%) were expecting their first baby while 29% already had one birth, 15% had given birth twice before the current pregnancy, 7% had 3 births and 3% had between 4 and 6 births at the time of the study.

At the 1st visit to the MCH, 59% of the respondents reported being accompanied while 41% were not. No respondent had smoking or alcohol consumption habits. However, on inquiry into their family history of chronic illnesses, 67% reported no family history, 3% reported allergies to pollen, milk, meat, cold and dust, 2% reported chronic illnesses like diabetes and asthma, 1% reported mental illness and 27% reported twinning within their family tree (themselves, parents, uncles & aunts and other relatives).

All the expectant mothers (100%) interviewed said they would deliver at a health facility. Only 58% of the expectant mothers reported that they had planned their pregnancy while 42% did not plan for their current pregnancy. Nine out of ten (90%) respondents had no history of having used any therapy to aid conception. The 10% who had tried use of other therapies to aid conception including herbal medicines and hormonal fertility drugs. Eighty eight (88%) of the study participants had not suffered an abortion prior to the current pregnancy while 12% had had an abortion. Some of the causes of the abortions as cited by the mothers were ectopic pregnancies and fibroids. Notably 54% of the respondents had used family planning (FP) methods before conception (fig. 4.3) while the remainder hadn't. The FP methods cited were IUCD (3%), implants (26%), depo provera (67%), condoms (0.6%), emergency pills (2%) and natural methods (1.4%).

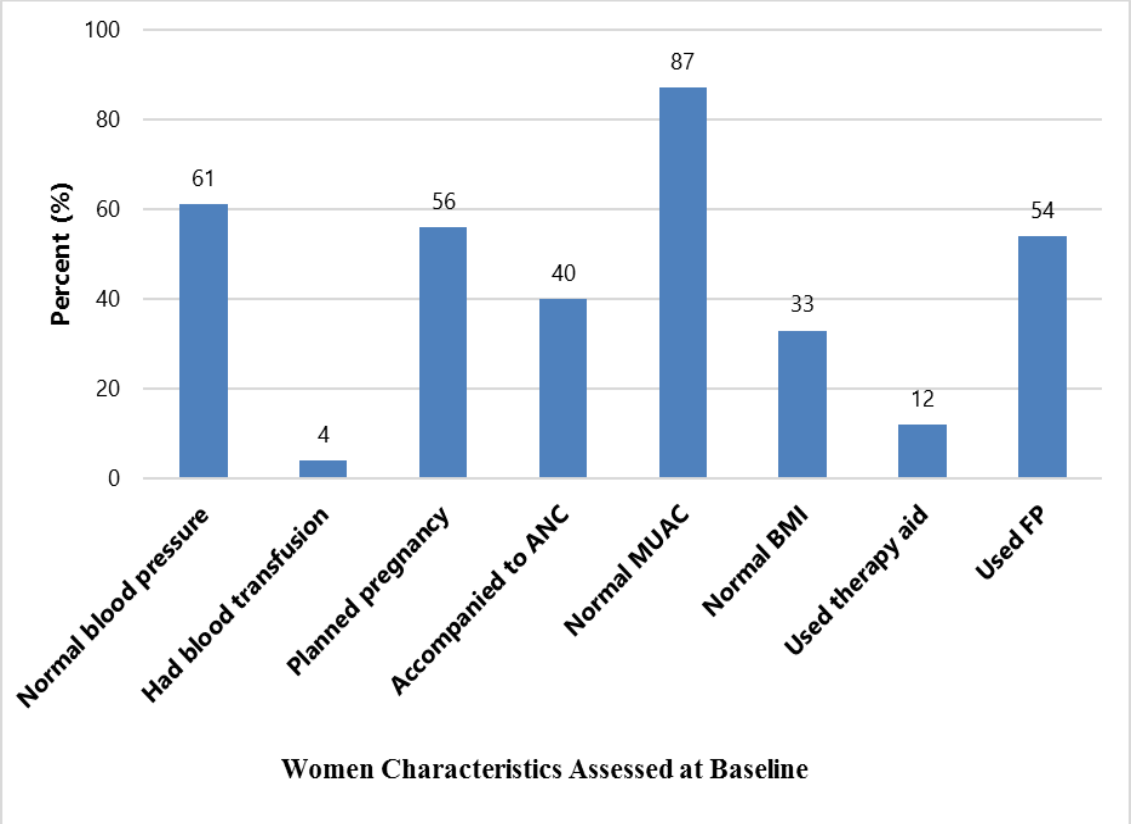


Figure 4.3: Women Characteristics assessed at baseline

Only 4% of the study participants had had blood transfusion before. At the time of the study, the range of time between the last delivery and current pregnancy for mothers who were not primi-gravida was 14 years (1-15 years)-with a mean time of 5.5 years (SD 2.9 years). At their last delivery, 7.8% (1/154) had delivered through a CS mode, 92% through SVD and 0.2% were assisted. The median age at the delivery of the 1st baby was 21 (IQR 10-24 years). The mean delivery weight at that birth was 3.54kgs (SD 2.81). Based on the birth weight, 13% were delivered with low birth weight (<2.7kgs), 80% were born with normal weight (2.7kgs-4.0kgs) while 7% were born with "above the normal" weight. 61% of the expectant mothers had normal BP readings (between (90/60-120/80), 37% had abnormal (high) blood pressure (120/80-140/90) and % had abnormal (low) blood pressure (90/60) or less. 67% of all mothers with normal BP were drawn from public facilities while 33% were from non-public. Similarly, 64% of individuals found to have abnormally high blood pressure were from public health facilities while the remainder (36%) were

from non-public.The mean BMI of respondents was 26.8 (standard deviation-SD 4.5). Only 34% of the respondents were categorized as having a normal BMI (18.5-24.9), 2% were underweight (<18.5), almost half (49%) of the expectant mothers were overweight while 19% were classified as obese.

BMI results by facility type showed that 72% and 63% of overweight and obese cases were recorded at public facilities while 59% of normal weight cases were drawn from public facilities.

The median MUAC reading was 26.1 (IQR 24-28). 87% of respondents had normal MUAC while 13% had abnormal MUAC readings. Eight out of every ten (80%) of the study participants had undergone FGM while 20% had not. 84% of mothers attending public facilities had undergone FGM while 74% of mothers attending non-public facilities had undergone FGM.

Table 4. 5: Demographic factors and perinatal outcomes-bivariate analysis n=287

Predictor variable	Predictor variable	Perinatal outcome (%)		d.f	Chi-Square	P-values (95% CI).
		Abnormal	Normal			
A. Age of respondents	< 20 years	3*	17	2	4.81	0.186
	20-34 years	94	77			
	≥ 35 years	3*	6			
B. Education level	Primary	19	19	3	10.123	0.072
	Secondary	30	38			
	Tertiary	32	29			
	University	19	14			
C. Parity	0 child	55	45	3	13.232	0.039
	1 child	14	30			
	2 children	21	15			
	3-6 children	10	10			
D. Marital status	Single	3*	8	2	4.09	0.129
	Married	94	91			
	Separated/Divorced	3*	1*			
E. Expectant mother accompanied	Yes	61	59	1	0.07	0.792
	No	39	41			
F. Blood pressure	Normal	68	62	1	1.5	0.472
	Abnormal	32	38			
G. Maternal BMI	Underweight	0*	2*	3	8.9	0.031
	Normal	13	37			
	Overweight	53	44			
	Obese	33	18			
H. Planned pregnancy	Yes	58	56	1	0.621	0.733
	No	42	44			
I. Therapy aid to conceive	Yes	7	10	1	0.097	0.616
	No	93	90			
J. Ever used family planning	Yes	55	55	1	0.123	0.94
	No	45	45			
K. Underwent FGM	Yes	74	81	1	1.288	0.525
	No	26	19			

** cell contains less than 5 observations which was not considered in analysis.*

82% of the respondents reported earning less that Kshs. 10000 per month, 13% earned between Kshs. 11000 – Kshs. 30000, 4% reported earning between Kshs. 31000 – Kshs. 50000 while 0.8% earned Kshs. 50000 and above per month. 24% of the study participants were employed, 65% were unemployed while 11% cited other sources of employment like business, self-employment and being students. A total of 187 mothers reported that they were unemployed: 148 (79%) of whom were from public facilities. 52% of the 64 mothers who reported being in employment were from non-public facilities. 81% of the 32 mothers who reported being in other types of income generating activities visited non-public facilities.

Analysis results of using Pearson's Chi Square tests in table 4.5 show that there was no statistical association between perinatal outcome and baseline variables of age, level of education of the expectant mothers, marital status, whether a mother had been accompanied or not, whether the pregnancy was planned or not, whether a mother had sought therapy aid to conceive, whether a mother had used FP or not and whether a mother had undergone FGM or not.

However, there existed a statistically significant association (Table 4.5) between maternal BMI and the likelihood of a normal or abnormal perinatal outcome (χ^2= 8.900, d.f =3, p=0.031). Similarly, a mother's parity was significantly associated with the likelihood of them having normal perinatal outcomes (χ^2= 13.232, d.f =4, p=0.039).

Results of multivariate logistic regression analysis tests for client characteristics and perinatal outcome were indicative that when binary logistic regression tests were run to determine which specific parity groups were more likely to be associated with normal or abnormal perinatal outcomes, holding for mothers who had between 3-6 children as reference, 0 child parity-mothers who had not had a child before (OR =0.113, 95% CI 0.080-0.930, *p=0.038* where OR refers to the Odds Ratio, C.I is Confidence Interval and p is probability), had a 13% higher chance of having an abnormal perinatal outcome while mothers with 1 parity (OR =4.5, 95% CI 2.25-14.29, *p=0.012*) were 4.5 times more likely to have normal perinatal outcomes

(Table 4.6). Results also showed that the perinatal outcomes of mothers who had had 2 births were not statistically different from those who had had between 3-6 births.

While there was overall significant relationship between ***"maternal BMI"*** and perinatal outcome, logistic regression analysis show that in actual sense, when compared to mothers classified as obese, those who were overweight did not register any statistically different perinatal outcomes to individuals who were overweight. However, study participants with a normal BMI were 5 times more likely to have a normal perinatal outcome compared to those classified as obese (OR =5.23, 95% CI 1.55-17.50, *p=0.008*).

Table 4. 6: Demographic factors and perinatal outcomes-multivariate analysis

Variable	**Levels**	**OR**	**95% CI OR**		**P-value**
			Lower	**Upper**	
Parity	0 child	0.113	0.080	0.930	0.038
	1 child	4.521	2.245	14.289	0.012
	2 children	0.301	0.059	1.544	0.150
	3-6 children	Ref	-	-	-
BMI	Normal	5.227	1.552	17.598	0.008
	Overweight	1.548	0.652	3.674	0.321
	Obese	Ref	-	-	-

4.2.2 Client pregnancy knowledge trends during ANC period

During the three ANC visits at the study sites, mothers were asked 5 (five) pregnancy-related questions to assess their knowledge as their pregnancies progressed. The questions were therefore related to the corresponding trimester of their visits to the ANC. Table 4.7 presents the proportion of correct responses for each question. At trimester one, the mothers were asked relating to sexual intercourse, support from male partners and other risks like UTIs. The most popular response from them was that male partners should accompany their spouses to the ANC clinic (94%) while only 36% of them knew that vomiting during pregnancy was normal. The average score of 1st trimester questions was 73%. In the 2nd trimester, 92% of the respondents correctly answered 3 questions while the least known question was whether eggs and chicken should be avoided during pregnancy (76%). The average score of the 5 questions in the 2nd trimester was 86%. A Chi Square test on the difference of knowledge scores between the 1st and 2nd trimester showed a significant increase in knowledge (OR =5.2, 95% CI 0.215-0.902, p=0.023). In the 3rd trimester, the question that had the least correct responses concerned whether delivery by caesarean section was better than a normal delivery (62%) while the most known question regarded whether breastfeeding should start immediately after delivery or not-95% of the respondents correctly answering it should. The average score at the 3rd trimester was 81%.

Table 4. 7: Expectant mother's knowledge on pregnancy and labour related issues

Mother's knowledge of pregnancy	1st ANC (correct)	2nd ANC (correct)	3rd ANC (correct)
Sexual intercourse is prohibited during pregnancy	74%	-	-
Male partners should accompany their spouses to ANC clinic	94%	-	-
ANC care starts immediately a woman conceives	89%	-	-
Vomiting during pregnancy is normal	36%	-	-
Pregnancy increases the risk of urinary tract infections	71%	-	-
It is normal to miss fetal movements for 24 hrs.	-	92%	-
Is not safe to deliver firstborns in hospital	-	92%	-
Eggs and Chicken should be avoided during pregnancy	-	76%	-
It is safe to deliver at home	-	92%	-
Frequent coffee intake causes abortion	-	80%	-
Male partners should accompany spouses to labor ward	-	-	73%
Breast feeding starts immediately after delivery	-	-	95%
Skin to Skin care for a baby starts immediately after birth	-	-	85%
Caesarean section is better than a normal delivery	-	-	62%
It is safe for a mother to deliver in any health facility	-	-	83%

To test a mother's knowledge on pregnancy related issues, each respondent was asked a set of 5 questions at 1st, 2nd and 3rd trimesters. Each question was relevant to the time of pregnancy to avoid recall biases among the participants. A total possible score of 15 points could be received. Mothers who got 12 or more correct answers to the questions were considered to have adequate knowledgeable on pregnancy.

Analysis results show that 63% of mothers at public facilities and 49% of mothers at non-public facilities were deemed adequately knowledgeable.

4.2.3 Client self-care health practices during pregnancy

A summary of the self-care health practices and other indicators that the expectant mothers were assessed for during the study.

The mean pre-pregnancy weight of the study respondents was 62.7kgs (SD 12.3), mean weight at the 1st ANC visit was 67.1kgs (SD 12.1), mean weight at 2nd ANC visit was 69kgs (SD 12) and at the 3rd ANC visit the mean weight was 69.5kgs (SD 11.6). Paired t-test results show a statistically significant positive weight change between the 1st and 2nd trimesters ($p<0.001$, t=9.042, d.f. 279). Similarly, significant positive weight gain was recorded between the 2nd and 3rd trimesters ($p<0.001$, t=-4.91, d.f. 247).

On Dietary Diversity scores: participants at non-public facilities recorded a 15% (from 94% to 79%) drop in DDS between the 1st and 3rd visits whilst those at public facilities recorded a 3% increase in DDS (from 91% to 94%). Table 4.8

Table 4.8: Normal dietary diversity scores variation between public and non-public facilities (n=287)

DDS	Public facilities	Non-public facilities
1st visit	91%	94%
2nd visit	93%	94%
3rd visit	94%	79%

The mean MUAC during the 3 ANC visits were 26.1 (SD 3.2), 26.1 (SD 3.3) and 26.0 (SD 3.5) respectively. Half (50%) of mothers at public hospitals had been exposed to abnormal MUAC compared to 62% of mothers attending ANC at non-public facilities who had been exposed to abnormal MUAC. The differences in

average MUACs using paired t-test statistics showed no significant changes over the 3 trimesters (Table 4.9).

Table 4.9: Client self-care health practices during ANC visits-paired t-tests

Self-care health practices	1st ANC	2nd ANC	*P-value*	3rd ANC	*P-value*
Weight (Mean-SD)	67.1 (12.1)	69 (12)	<0.001 (*t=9.042, d.f.279)*	69.5 (11.6)	*p*<0.001, t=-4.91, d.f. 247
MUAC (Mean-SD)	26.1 (3.2)	26.1 (3.3)	0.779 (*t=0.281, d.f.180)*	26.0 (3.5)	0.660 (*t=-0.441, d.f.228)*
Engage in Pica practice (yes)	33%	21%	0.079	14%	0.002
Engage in physical exercise (yes)	98%	99%	0.821	99%	0.999
Special diet (yes)	2%	1%	-	0.3%	-
Drink water daily (yes)	99%	94%	0.118	79%	0.003

A third (33%) of the expectant mothers engaged in a pica practice during the 1st trimester: with 50% of those craving for stones and/or bricks, 20% yearning for clay soil and bananas/matoke, 10% charcoal, 10% craved for ash while the remaining 10% carved for sugarcane, meat, sand and honey. At the 2nd trimester, 20% of the mothers engaged in pica: 75% craving for stones, 15% soil, 5% charcoal and the remainder githeri, meat, potatoes and tea. At the 3rd trimester, only 14% still had cravings: 92% of it for stones/soil and the remainder for honey, sugar, matoke. The difference in the number of mothers engaged in pica practice between trimester 1 and 2 was not statistically significant. However, there was a statistically significant difference between the number of mothers engaged in pica between the 1st and 3rd

trimester (χ^2 =10.04, d.f. 1, p= 0.002). Almost all the mothers reported that they were involved in some form of exercise at the 3 ANC visits-98%, 99% and 995 respectively. Inversely, almost all mothers reported that they were not on any form of special diet-2%, 1% and 0.3% respectively. All those who reported being on special diet had no special prescription from a doctor or nutritionist. Whilst there was a slight decline in the number of women who reported drinking water daily-99% at 1st visit and 94% at 2nd visit, by the 3rd ANC visit, a significantly low 79% of the mothers were taking water daily (χ^2 =9.63, d.f. 1, p= 0.003).

As part of mothers' self-care practices, the exposure of the study subjects to adverse mental health indicators suggestive of mental stress was assessed. A steady decrease in the proportion of mothers who reported exposure to mental stress: at public facilities, the proportions reduced from 37% to 11% to 8% while at non-public facilities, the proportions reduced from 37% to 23% to 5% at 1st, 2nd and 3rd visits respectively (Table 4.10).

Table 4.10: Exposure to indicators of mental distress (n =287)

Mental stress	Public	Non-public
1st visit	37%	37%
2nd visit	11%	23%
3rd visit	8%	5%

Both public and non-public facilities recorded steady and declining number of mothers who exhibited signs of mental distress: 70 to 20 to 15 at 1st, 2nd and 3rd visits in the public hospitals and 37, 23 and 5 cases at 1st, 2nd and 3rd visits at non-public facilities respectively (fig. 4.4). Cummulatively 24% of the study subjects exhibited signs of mental distress in all the visits.

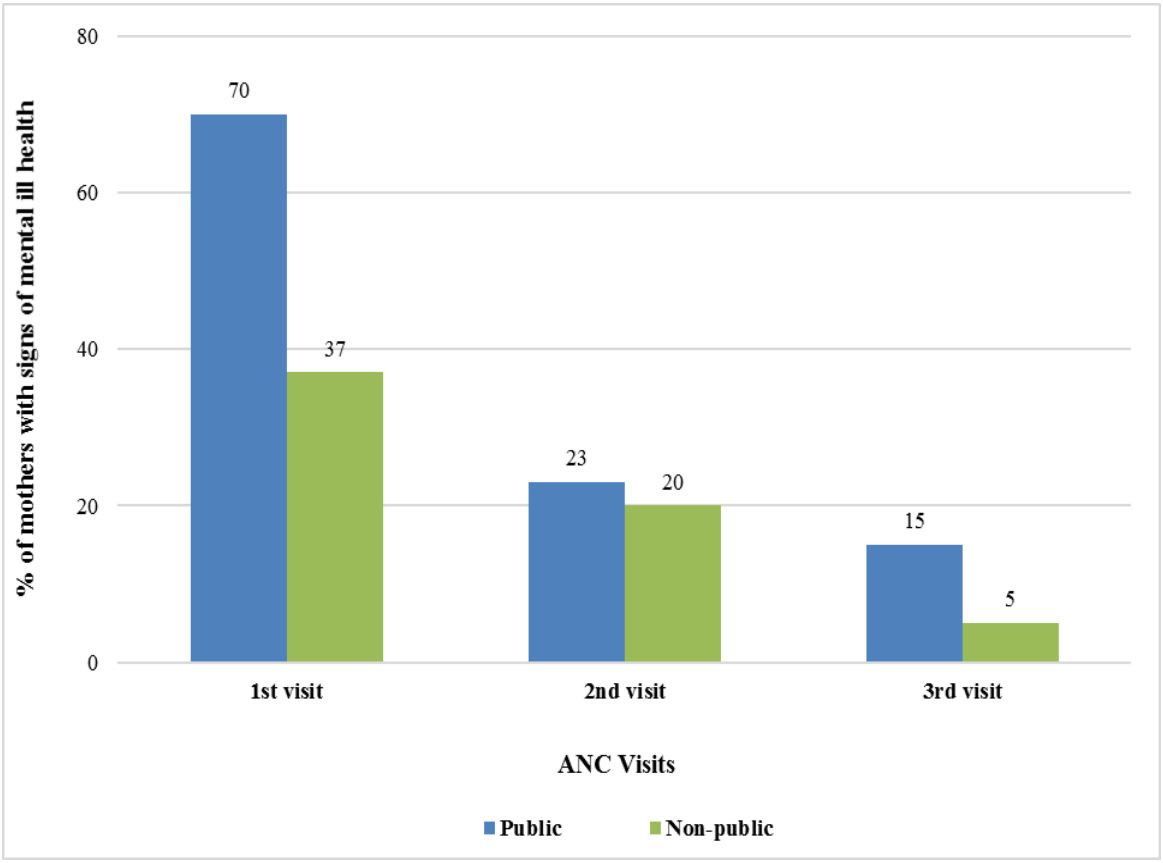


Figure 4.4: Mothers exposed to signs of mental distress

At the 1st, 2nd and 3rd ANC visits, the mothers were assessed for some mental health indicators as shown in table 4.10. At the 1st visit, the mean number of hours the mothers slept in a day was 9.07 (SD 2.5), during the 2nd ANC visit, the average sleep time was 9.22 hours (SD 1.4) while during the 3rd ANC visit, there was an increase to a mean sleeping time of 9.89 hours (SD 1.1). Paired t-test results show a significant comparative increase in the average time in hours the expectant mothers slept between the 1st and 3rd ANC visits (p= 0.003, t=0.305, d.f. 212). 94% of the respondents stated that they engaged in mild exercises like basic household chores, climbing stairs and walking, 2% reported engaging in occasional and regular vigorous exercises respectively while a further 2% remained sedentary. 8 out of every 10 respondents (80%) cited the support received from family as satisfactory, 15% reported fair support while 5% were unsatisfied with support received from family. 90% of mothers at non-public facilities were engaged in mild classes compared to 94% at public facilities. The remaining respondents were involved in

either occasional or regular vigorous exercises or remained sedentary. At 2nd visit, more mothers (95%) from non-public facilities were engaged in mild exercise classes compared to 89% at public facilities. By the 3rd ANC visit, 84% of the clients at non-public facilities were still doing mild exercise classes compared to 73% at public facilities.

During the 3 ANC visits, the results also show a steady decline in the number of study participants who cited feeling stressed as the pregnancy progressed. An exact McNemar's test determined that there was a statistically significant difference in the proportion of expectant mothers with stress reduction between the 1st and 2nd ANC visits; p=0.002-a 9% (from 21% down to 12%). No significant difference in stress among the clients was reported between the 2nd and 3rd visits. McNemar's test results also showed that there was a statistically significant reduction in the proportion of expectant mothers between the 1st and 2nd ANC visits who still lacked interest in the pregnancy, p<0.001. during the time lapse between the 1st and 3nd trimester, using McNemar's tests, a significant reduction in mothers who felt lonely was also reported, p<0.001-from 17% to 5%. No differences were noted between the 2nd and 3rd ANC visits. However, McNemar's tests showed a statistically significant reduction in expectant mothers who experienced problems with eating and/or lack of appetite at the 1st, 2nd and 3rd ANC visits-38%, 12% and 5% respectively. This represented significant drops in eating complications of p<0.001 and p=0.014 between the 1st & 2nd and 2nd & 3rd ANC visits respectively.

Table 4.11: Expectant mother targeted mental health assessment (n= 287)

Mental health indicator	1st (Yes)	2nd (Yes)	*P-value*	3rd (Yes)	*P-value*
Number of hours slept (mean-SD)	9.07 (2.5)	9.22 (1.4)	0.421 (*t=-0.805, d.f. 253)*	9.89 (1.1)	0.003 (*t=-0.305, d.f. 212)*
Feel stressed	21%	12%	0.002	11%	0.311
Lack of interest in the pregnancy	30%	15%	<0.001	13%	0.833
Feel lonely	17%	5%	<0.001	5%	0.664
Problems eating/appetite	38%	12%	<0.001	6%	0.014
Cry frequently	9%	3%	<0.001	1%	0.289
Thought of hurting oneself	4%	1%	0.016	1%	0.999
Trouble sleeping	24%	8%	<0.001	7%	0.618
Seen a counselor	19%	13%	0.02	13%	0.999

In table 4.11 McNemar's statistics revealed a significant reduction in mothers who experienced frequent crying between 1st and 2nd ANC visits ($p<0.001$) but not between the 2nd and 3rd visits. A statistically significant reduction from 24% to 8% ($p<0.001$) during the 1st and 2nd ANC visits in mothers who had experienced trouble sleeping was also cited but none between the 2nd and 3rd trimester visits. 4% of mothers interviewed during the 1st ANC visit harbored thoughts of hurting themselves, this significantly reduced to 1% at the 2nd ANC visit ($p=0.016$). At the start of the current study, 19% of the respondents reported having seen a counselor, by the 2nd visit, only 13% had seen a counselor-a 6% significant reduction ($p=0.02$).

4.2.4 Client commobidity indicators during pregnancy

The mothers were also monitored for several illnesses and conditions at the 1st and 3rd trimesters-HIV status, mean HB, urinalysis, syphilis screening, Hepatitis B screening and zinc levels. The proportion of mothers testing negative for HIV at 1st

and 3rd visit was 94% and 97% respectively. This increase can be attributed to more mothers who were HIV positive dropping from the study. Paired t-test results show that there wasn't any statistically significant change in the mean HB levels of the mothers between the 1st and 3rd ANC visits (Table 4.12). Three quarters (75%) of total respondents recorded normal urinalysis results at the 1st trimester with a statistically insignificant increase to 81% at the 3rd trimester. All the mothers (100%) screened for syphilis recorded negative VDRL results and for hepatitis B at 1st and 3rd ANC visits respectively. Using paired t-test statistic, an insignificant drop in the mean zinc levels at trimester 1 and 3 was recorded (55.4 SD 43 to 51.9 SD 14.9) respectively.

Notably, 84% of all the study participants had low zinc levels (normal range 60-90, abnormal range <60 and >90). The results show that out of the 31 abnormal perinatal outcomes, 29 mothers (94%) had recorded abnormal zinc levels. McNemar's and paired t- tests did not show a statistical significance between zinc levels and final perinatal outcome due to one cell containing less than 5 observations. 82% of mothers interviewed at public facilities had been exposed to abnormal zinc levels while 87% of those attending private hospitals had been exposed.

However, out of the 214 babies whose birth weight was recorded, 21 had abnormal birth weight; 19 out of 21 babies (90%) born with abnormal birth weight belonged to mothers with low zinc levels. Out of the 20 children born with low birth weight (<2.7kgs), 13 (65%) were at public facilities while 8 of the 10 children born overweight (>4.0kgs) were also from public facilities. 66% of the 123 children born within the normal birth weight (2.7-4.0 kgs) were reported at public facilities.

It was also found that 24% of the study participants had low ferritin levels while 28% had low HB levels. There existed a statistically significant relationship between ferritin and HB levels (χ^2= 21.1, d.f =4, p=0.005). The proportion of those exposed to abnormal ferritin levels was, however, much higher (24%) in public hospitals compared to 4% at non-public hospitals.

Analysis results show that there was no correlation between ferritin levels and dietary diversity scores of the expectant mothers. Similarly, no statistical association was reported between a mother's zinc levels and the dietary diversity scores. However, there was no significant relationship was noted between DDS and MUAC.

Table 4. 12: Expectant mother's illness assessment-comparative analysis

Illness during pregnancy	**1st ANC visit**	**3rd ANC visit**	***P-value***
HIV (negative), n=287	94%	97%	-
HB (mean-SD)	12.32 (1.48)	12.81 (3.62)	0.407 (*t=-0.831, d.f.180)*
Urinalysis (normal), n=287	75%	81%	0.394
VDRL (negative), n=287	100%	100%	0.999
HBsAg (negative), n=287	100%	100%	0.999
Zn ++ levels (mean-SD)	55.4 (43)	51.9 (14.9)	0.402 (*t=0.840, d.f. 136)*
Blood sugar (mean-SD)	5.40 (0.82)	5.39 (1.07)	0.881 (*t=0.150, d.f. 210)*
Ferritine levels (mean-SD)	16.97 (2.31)	13.06 (1.15)	0.052 (*t=1.974, d.f. 72)*

4.3 Facility-level factors that affect perinatal outcomes among women attending public and non-public health facilities in Kisii County

Although the 287 study subjects were recruited proportionate to the number of delivereies each facility had conducted in the preceding 6 months, during the follow-up period, enumerators were also tasked to keep track of the total (absolute) number of ANC bookings and deliveries recorded in each of the facilities. This was necessitated by the dynamics observed that a number of clients were being referred to Christamarriane (faith based) hospital from Oresi (nearby public health facility) due to resource challenges.

Table 4.13 shows the total number of ANC clients booked at each health facility between Jan-Aug 2016, the number of deliveries (including the proportion against the total booked), the number of MNCH referrals (including the proportion against deliveries), number of maternal deaths recorded, number of neonatal deaths

(including the proportion against deliveries) and the number of abnormal outcomes (including the proportion against deliveries).

Table 4.13: Facility ANC and perinatal outcome distribution Jan-Aug 2016

Deliveries Jan-Aug 2016	# of ANC clients booked	# of deliveries	# of referrals (MNCH)	# of Maternal deaths	# of Neonatal deaths	# of abnormal outcomes
Oresi HC	1739	681 (39%)	73 (11%)	0	8	54 (8%)
Kenyenya Hosp	885	722 (82%)	63 (9%)	0	1	81 (11%)
Christamarrianne MH	295	483 (164%)	0 (0%)	0	0	46 (10%)
Tabaka MH	829	537 (65%)	57 (11%)	0	8	11 (2%)

Oresi health center had the lowest transition rate (39%) of clients booked at ANC to those that delivered at the same facility. Christamarrianne MH had more clients delivering at the facility compared to those that had been initially booked (164%), probably because it is a referral facility for Oresi. Kenyenya Hospital and Tabaka MH had 82% and 65% transition rates respectively. Oresi HC and Tabaka MH had the highest MNCH referrals with each reporting 11% of total client deliveries being referred; Kenyenya Hospital recorded a 9% MNCH referral rate while Christamarrianne MH had 0%. Tabaka MH recorded a 2% abnormal outcome rate while Kenyenya Hospital, Christamarrianne MH and Oresi HC reported 11%, 10% and 8% abnormal outcomes respectively. There were no reported maternal deaths at all the 4 facilities during the period of data collection.

In Figure 4.5, the ratio of pregnant mothers to midwives at ANC in public health facilities (Oresi and Kenyenya) were 1:40 and 1:30 respectively while at non-public

facilities (Tabaka and CMMH) were 1:15 and 1:30 respectively. At the point of delivery, the ratio of mothers to midwives in public facilities was 1:4 and 1:2 for Oresi and Kenyenya respectively while for non-public facilities, the ratio was 1:5 and 1:7 for Tabaka and CMMH respectively.

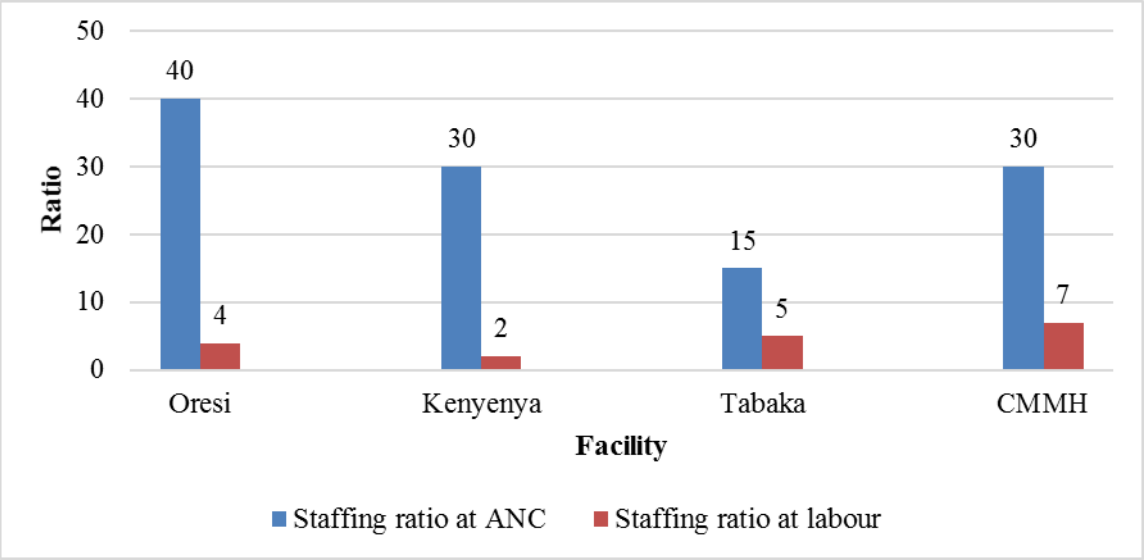


Figure 4.5: Ratio of clients to midwives at ANC and delivery

A vast majority of the clients (85%) reported that the health facilities they attended ANC clinics at were less than 5 kms from their homes, 11% reported a distance of between 6-10 kms, and 4% reported an 11-20 km distance while 0.3% of the clients reported a distance of over 21 kms (fig 4.6)

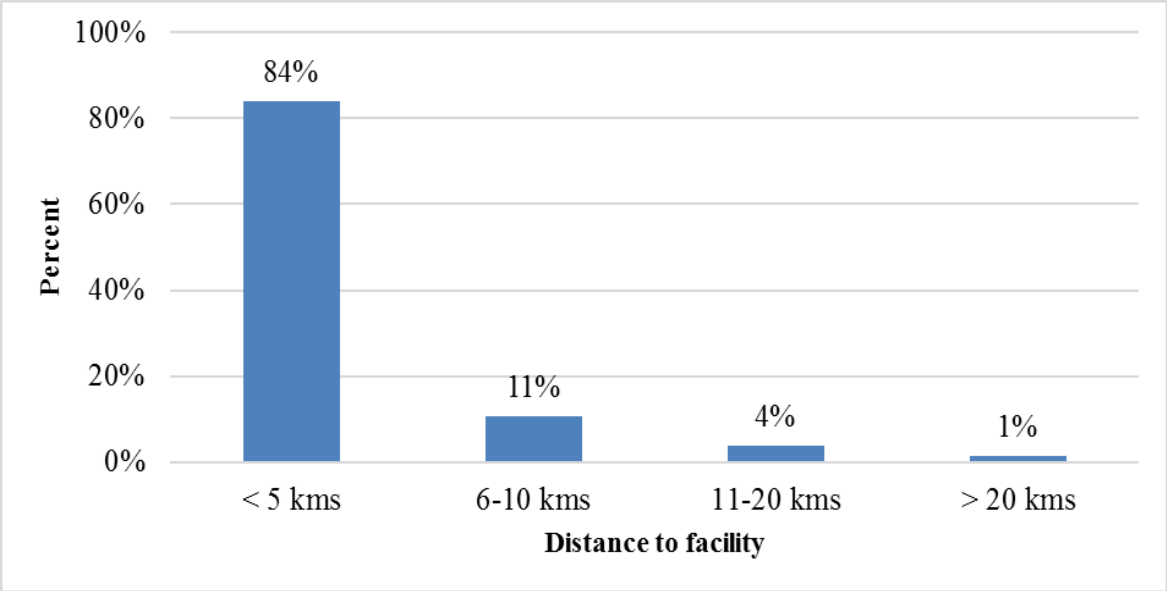
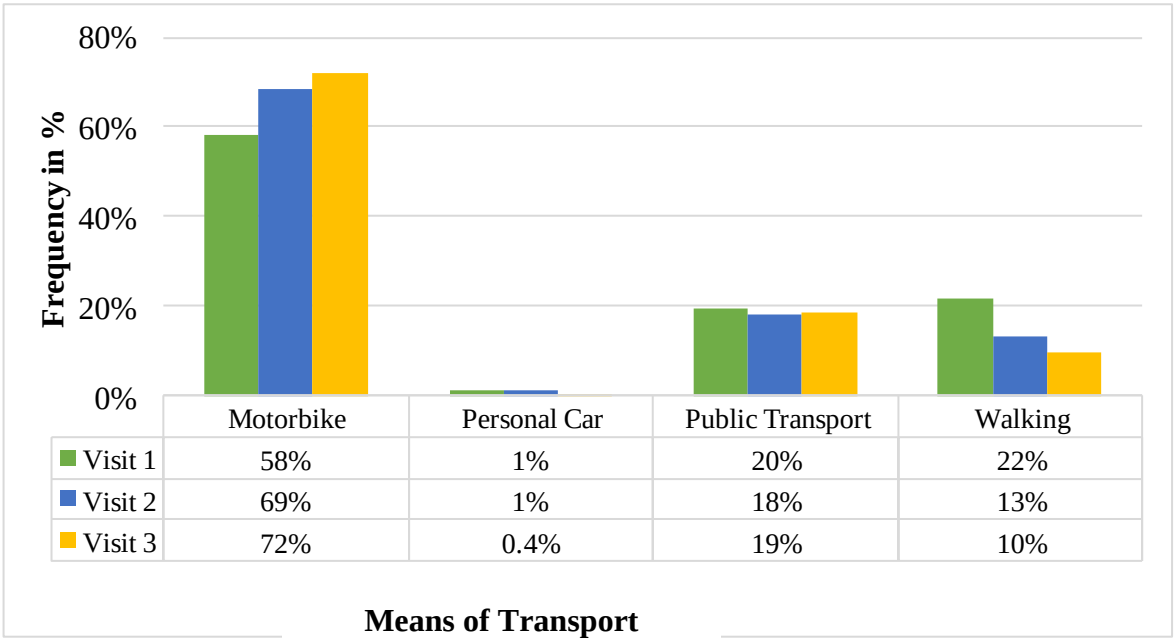


Figure 4.6: Distance to health facility

The mothers were also asked about the means of transportation used to visit the ANC; 60% (113) and 49% (48) of mothers visiting public and non-public facilities respectively had used motorbikes; 23% of public attendants had walked while 17% of non-public clients had walked (fig 4.7); 13% of mothers who went to public facilities had used public means compared to 29% who visited non-public facilities. Further, 59% of the study respondents cited motorbikes as the means of transport they had used to reach the ANC, 21% had walked, 19% had used public service vehicles and only 1% had used private/personal cars to the ANC clinic.



	Motorbike	Personal Car	Public Transport	Walking
Visit 1	58%	1%	20%	22%
Visit 2	69%	1%	18%	13%
Visit 3	72%	0.4%	19%	10%

Figure 4. 7: Means of transport to ANC clinic

4.3.1 Comparison on Quality of facility-provided services in 1st, 2nd and 3rd visits

The quality of services provided by the health facilities was assessed by asking the study participants to respond to questions relating to specific indicators of service delivery as shown in Table 4.13. At the 1st visit, all study participants (both at public and non-public) reported that they had been attended to by skilled midwives, at the 2nd visit, 98% and 94% of mothers at public and non-public facilities respectively reported being attended to by skilled midwives. At the 3rd visit all (100%) mothers at public facilities were attended to by a skilled midwife while 92% at non-public facilities reported receiving services by a skilled midwife. At the 1st ANC visit, 98% and 96% of mothers at public and non-public facilities respectively knew their blood groups. 100% of the respondents reported that they had been attended to by a skilled midwife during their 1st visit, 97% at the 2nd visit and 95% at the 3rd visit. Even though there wasn't a statistically significant difference in respondent feedback between the 1st and 2nd trimesters, McNemar's test statistics showed that a significant

drop in the proportion of mothers attended by a skilled midwife was noted (*p<0.001).* 100%, 98% and 99% of the expectant mothers reported that abdominal assessment had been conducted at the 1st, 2nd and 3rd ANC visits respectively. Between the 2nd (60%) and 3rd (34%) trimesters, a significant number of respondents (*p<0.001)* noted that eligible vaccines had not been administered. Half (51%) of the mothers also reported that they had been treated for adverse symptoms at the 1st visit, 44% at the 2nd visit and 51% at the 3rd visit. All the mothers also reported being started on routine Fe++ and folate medication at the 1st visit while 98% reported being on the routine haematinics at the 2nd ANC visit. Further, a statistically significant drop in haematinics compliance was recorded between the 2nd and 3rd trimester visits (*p=0.004).* Client confidentiality was noted by 99% of the respondents at the 1st visit and 95% of the respondents at the 2nd visit. Good documentation of the mother child booklet was cited by 97% and 99% of the respondents at the 2nd and 3rd visits respectively.

Table 4.14: Variation in facility quality of service indicators in various visits (n=287)

	1st (Yes)	**2nd (Yes)**	***P-value***	**3rd (yes)**	***P-value***
Mother attended to by a skilled midwife	100%	97%	0.821	95%	<0.001
Abdominal assessment conducted	100%	98%	0.883	99%	0.5
Eligible vaccines administered	67%	60%	0.173	34%	<0.001
Mother on IPT regimen	16%	4%	0.327	10%	0.212
Mother treated for adverse symptoms present	51%	44%	0.142	51%	0.9999
Mother put on routine haematinics (Fe++,Folate)	100%	98%	0.999	-	-
Confidentiality was observed during care	99%	95%	0.289	-	-
Mother child booklet well documented	-	97%	-	99%	0.5
Haematinics compliance	-	98%	-	92%	0.004

The quality of information provided by the service providers to mothers in each visit was also assessed by asking the study participants to respond to questions relating to information dissemination during their ANC visits as shown in tables 4.14 and 4.15

At the 1st and 2nd ANC visits, 96% and 95% of the respondents said they had received counseling on danger signs during pregnancy respectively and a further 89% reported counselling on danger signs at the 3rd visit-a significant drop in the proportion of mothers being counselled as per McNemar's comparative test (*p=0.004)*. 97%, 98% and 98% of the study participants reported getting feedback on their pregnancy status at the 1st, 2nd and 3rd visits respectively. Over 93% of the expectant mothers were also counselled on diet and skilled birth attendants at the 3 ANC visits respectively. Mothers were also provided with information regarding signs of labor, date of the next return, birth planning and personal hygiene. More mothers (98%) at public facilities reported receiving counseling on birth plan during their 1st visit compared to 83% from non-public facilities. 98% and 80% had received counseling on labour signs at public and non-public facilities. They were also provided with pre-conception counselling, their blood groups and Rh status as well as post-partum counselling.

Table 4. 15: Facility level health education -related indicators (n=287)

	1st (Yes)	2nd (Yes)	*P-value*	3rd (yes)	*P-value*
Mother counselled on danger signs	96%	95%	0.804	89%	0.004
Feedback on pregnancy status given	97%	98%	0.25	98%	0.25
Mother counselled on diet	97%	97%	0.999	94%	0.359
Mother counselled on skilled birth attendance	96%	97%	0.057	93%	0.307
Mother counselled on signs of labour	92%	94%	0.014	93%	0.418
Mother given the return date for next visit	100%	97%	0.996	98%	0.822
Mother counselled on birth planning	93%	-	-	-	-
Client counselled on personal hygiene	99%	-	-	-	-
Mother received pre-conception counselling	66%	-	-	-	-
Mother knows her blood group & Rh status	97%	93%	0.18	89%	<0.001
Advised post-partum	-	-	-	96%	-

In this study, a logistic regression analysis of facility midwives to client staffing ratios (Table 4:16) at delivery and final delivery outcome at health facilities show a statistically significant relationship between a low midwife to client ratio (average 1:3) and higher proportion of normal perinatal outcomes as compared to higher midwife to client ratio (average 1:6). Individuals who delivered at facilities with low midwife-client ratio had a 5% higher likelihood of having a normal perinatal outcome as compared to those delivering in facilities with high staffing ratios (OR=0.05,95% CI 0.046-0.055, p=0.006).

Table 4.16: Facility type, average staffing ratio and delivery outcome

4.3.2 Safe motherhood services

An assessment of availability of specific safe motherhood services was also conducted.

All the 4 selected health facilities (100%) were observed to be offering BeMONC services. Findings revealed that only 35% of the facilitis were offering caesarian section services.

In addition, a checklist of basic emergency obstetric and neonatal care services was used to assess for availability of certain equipment/drugs.

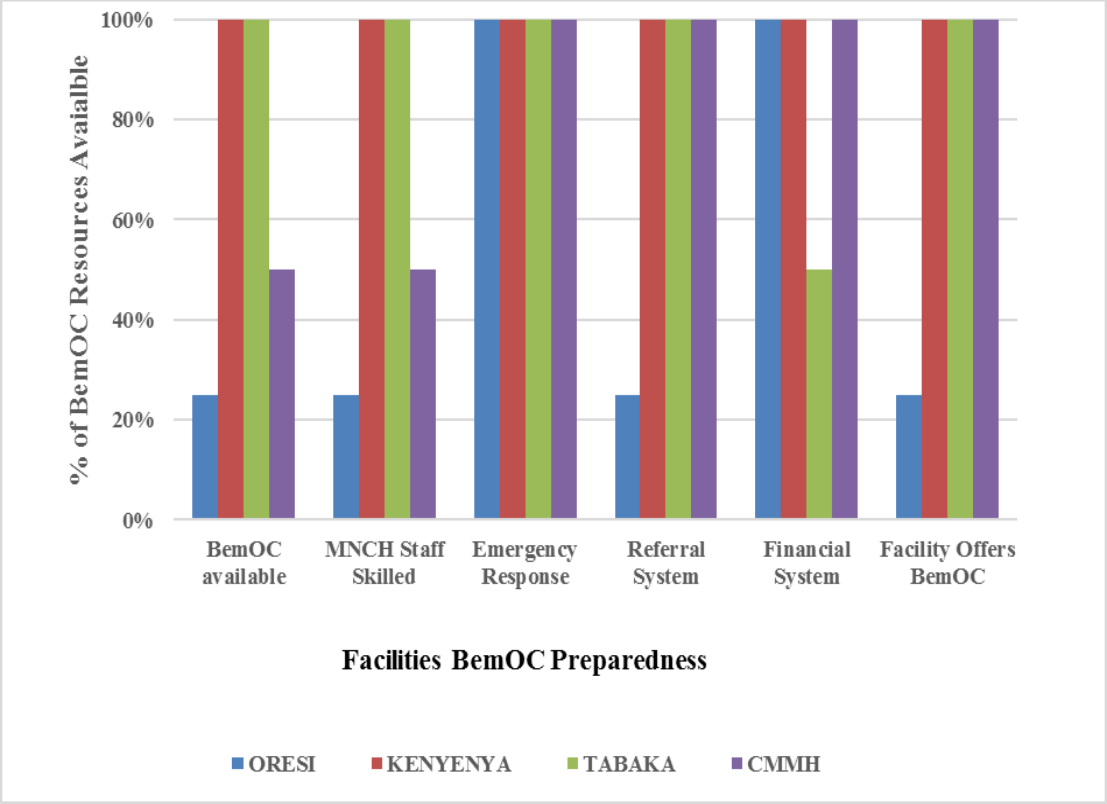


Figure 4. 8: Capacity to offer BemOC services

Out of the selected 4 facilities, 50% of them had all (100%) of BeMONC equipments available. One facility had 20% availability and the other 44%. Two of the selected facilities had all their midwifery staff BeMONC trained (100%). The other remaining two facilities reported that 19% and 45% of their staff were BemOC services compliant respectively. All the selcected facilities (100%) were prepared for emergency response and the same applied for financial system preparedness to respond to emergencies except for one facility (Tabaka) that rated its financial preparedness at 45%. Except for Oresi health facility that had 23% uterotonics availability, the rest of the selected health facilities had 100% supply for the same category of drugs.

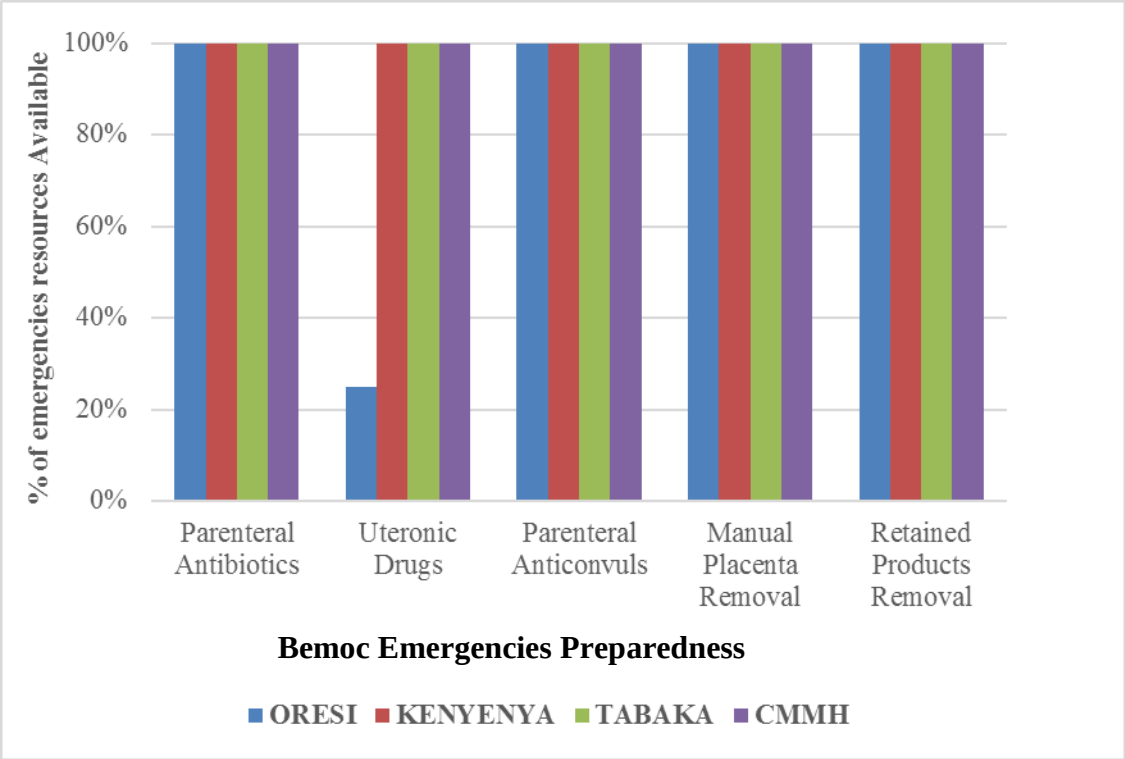
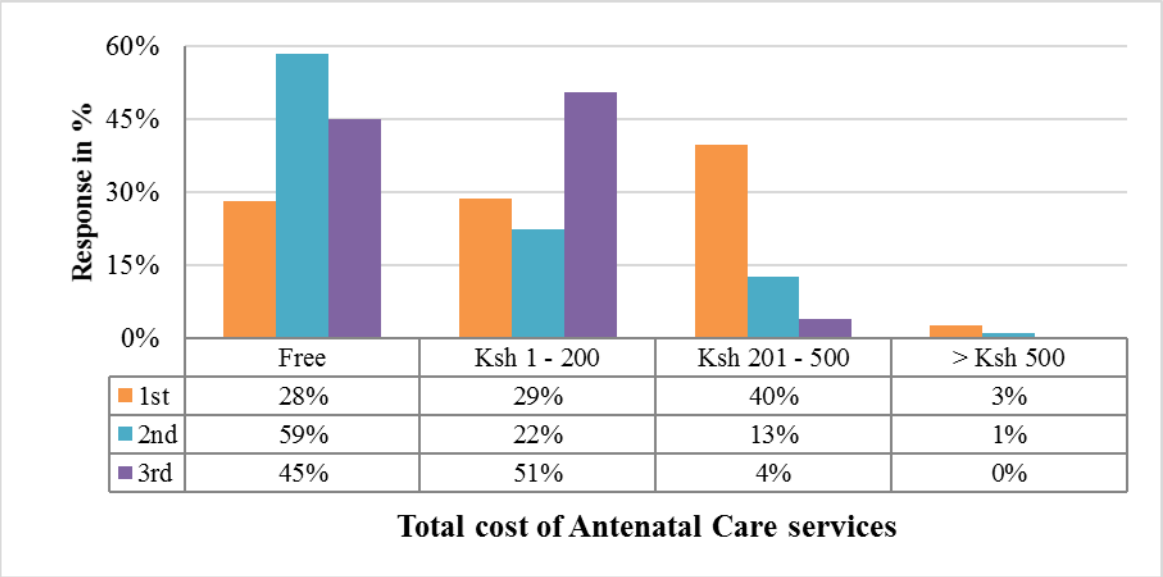


Figure 4.9: Availability of BemOC Resources

In Figure 4.10, at the 1st visit, 40% of the respondents reported paying between Ksh 201-500 for ANC services with 28% and 29% reporting accessing free ANC services and paying Ksh 1-200 respectively. Only 3% paid more than Ksh 500 for ANC services during their 1st visit. At the 2nd visit, 59% of the study participants reported accessing ANC services free of charge, 22% paid Ksh 1-200, 13% paid Kshs 201-500 while 1% paid over Ksh 500. At the 3rd visit, 45% of the mothers reported receiving ANC services for free, 51% had spent between Ksh 1-200 and 4% had spent between Ksh 201-500. No mother had paid more than Ksh 500 at the 3rd visit.



	Free	Ksh 1 - 200	Ksh 201 - 500	> Ksh 500
1st	28%	29%	40%	3%
2nd	59%	22%	13%	1%
3rd	45%	51%	4%	0%

Figure 4. 10: Cummulative cost ANC services among women who attended public and non-public facilities

The median amount of cash spent by the clients at the 1st visit was Ksh 205 (IQR 200-500), at the 2nd visit Ksh. 50 (IQR 30-300) and at the 3rd visit Ksh. 100 (IQR 50-100). Additionally, the clients were asked to state the sources of funding (fig.4.11) for their ANC visits: during their 1st visit, 73% said they had self-funded their visits, 10% cited insurance as the funder while 17% stated that others had funded them. 85% of those who cited funding from other sources had used the free GOK maternity package, 10% had been paid for by their spouses while 5% had received free medical care at the CCC. At the 2nd visit, 65% of the respondents had self-funded their ANC costs, 6% was funded by insurance while 28% had been funded by other sources. 46% of those who cited other sources (n=100) had received medical attention through the free GOK maternity program, 51% had received financial support from their spouses while 3% had received help from relatives. At the 3rd visit, 64% were self-financed, 7% were insured and 29% cited other sources. Further, the results show a steady increase in spousal financial support during the 3 ANC visits: 10% at trimester 1, 51% at trimester 2 and 66% at trimester 3. Two thirds (66%) of those who cited other sources were funded by their husbands, 32% by the GOK and 2% by relatives. The change in proportion of those who had self-funded between the 1st and 2nd visits was not statistically significant as well as between the 2nd and 3rd visits.

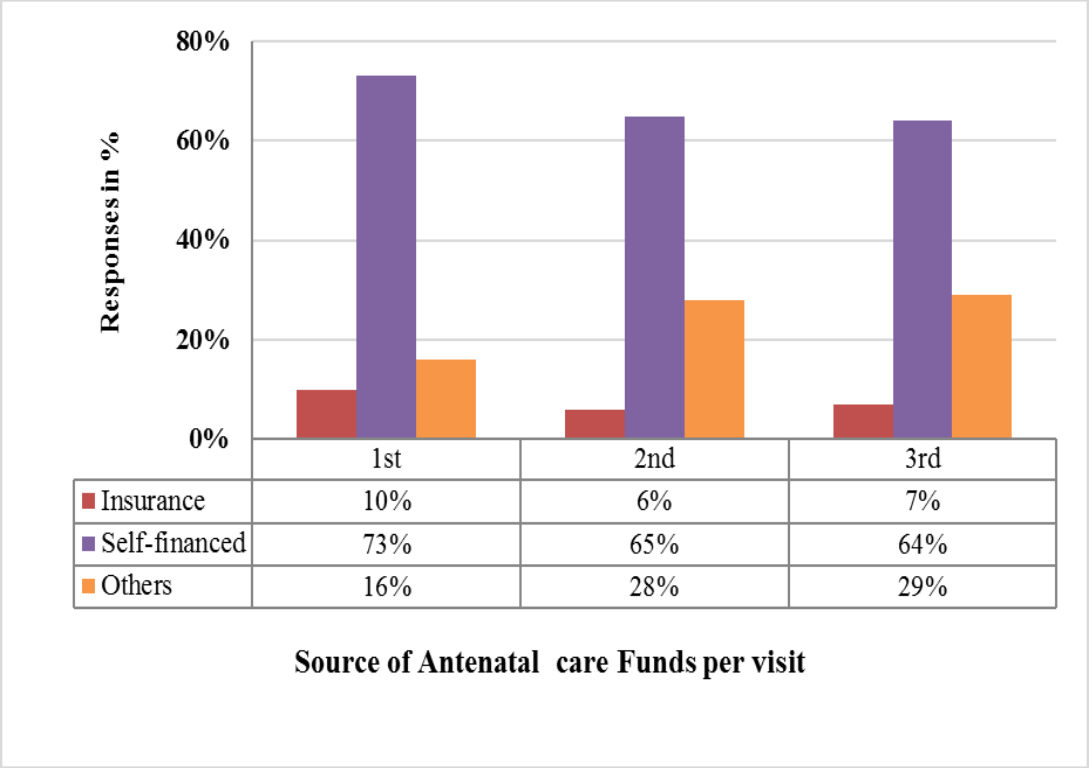


Figure 4.11: Source of funding for ANC care

The median time taken by the clients to receive service at the 1st visit was 120 minutes (IQR 40-240), at the 2nd visit 30 minutes (IQR 28-60) and at the 3rd visit 40 minutes (IQR 30-60). Table 4.17 shows the times taken by clients at both public and non-public facilities at the 1st, 2nd and 3rd visits. At the 1st visit, 18% of clients in public facilities took less than 30 minutes to receive ANC services compared to 23% at non-public facilities; 14% at public facilities took between 310-60 minutes compared to 40% at non-public; 29% from non-public hospitals had taken 61-120 minutes to be attended to compared to 12% at public facilities and; 62% of all cases at 1st visit in public facilities had taken over 129 minutes to be attended to compared to 9% at non-public facilities. As at the 3rd visit, a much higher proportion of mothers were taking shorter times to receive services at ANC: 54% and 47% of mothers seen at ANC spent less than 30 minutes to be attended to whilst only 2 mothers spent more than 2 hours at the ANC. The table shows a steady increase in the numbers/proportions of mothers served in shorter times as their pregnancies wore on.

Table 4.17: Time taken to attend to the mothers per visit in public and non-public facilities

The duration mothers waited	Facility type	1st ANC visit	2nd ANC visit	3rd ANC visit
Up to 30 min	Public	34 (18%)	83 (59%)	53 (54%)
	Non-public	21 (23%)	57 (41 %)	46 (47 %)
31 to 60 min	Public	25 (14%)	45 (52 %)	85 (65%)
	Non-public	36 (40%)	41 (48%)	45 (35%)
61 to 120 min	Public	12 (7%)	37 (100%)	15 (79%)
	Non-public	26 (29%)	0 (0 %)	21 (21%)
>120 min	Public	114 (62%)	17 (100%)	2 (100%)
	Non-Public	8 (9%)	0 (0 %)	0 (0%)

4.4 The relationship between facility and client factors on perinatal outcomes among women attending public and non-public health facilities in Kisii County

Only one out of the 16 mothers who were positive for HIV had an abnormal delivery outcome (6.3%). Similarly, only 2 mothers who were HIV positive had an abnormally low birth weight (2kgs and 2.3kgs).

Whether they were attending a public or non-public health facility, a mother's zinc levels (linear regression) or classification (binary logistic-normal vs abnormal) were neither statistically associated with normal or abnormal delivery outcome nor the new borne's birth weight. There were no statistically different outcomes (OR 1.8, 95% CI 0.224-14.99, p=0.572). Ferritin levels were also assessed during the follow-up visits but no statistical association was determined to exist between a normal and abnormal delivery outcome and ferritin levels. Neither was there a significant difference between ferritin levels and birth weight both at public and non-public health facilities (OR 0.87, 95% CI 0.13-8.61, p=0.376). Results from linear regression analysis did not show any statistical difference among mothers who

attended public and non-public health facilities regarding the overall weight change (from 1st and 3rd visits- Table 4.18) and the birth weight (p=0.650).

Table 4. 18: Womens' cumulative weight changes between first and third ANC visit

	Delivery outcome	Weight change		Total
		Weight loss	Weight gain	
Non-public		4	72	76
	Normal			
	Abnormal	1	11	12
Total		5	83	88
Public	Normal	22	119	141
	Abnormal	2	10	12
Total		24	129	153

Regardless of whether a mother attended a public or non-public health facility, mothers who were accompanied by their spouses to the ANC had a 26% higher chance of normal delivery compared to mothers who were unaccompanied for all the 3 ANC visits (OR 0.26 95% CI 0.08-0.792 p=0.02). The proportion of mothers accompanied at non-public facilities was 86% in comparison to 43% at public health facilities. However, no statistical association existed between male accompaniment to the ANC and the baby weight at birth. McNemar's test results show that there neither existed a statistically significant relationship between the final overall DDS scores and birth weight nor DDS scores and delivery outcome (p=0.702) both at the public and non-public health facilities. Results of McNemar's test also showed no relationship between pregnant women's sleeping duration and birth weight (secondary measure of a perinatal outcome) outcome in both public and non-public hospitals. Paired t-test was performed on women's knowledge on pregnancy related issues (overall score of knowledge questions at 1st, 2nd and 3rd ANC visits) and the baby weight at birth; a significant relationship existed between the mother's knowledge of pregnancy related issues and the baby's weight (t=-67.8 d.f. 213 $p<0.001$). Further, there wasn't any difference in the mean scores on pregnancy knowledge between mothers attending public and non-public health facilities.

An analysis of how facility-related factors correlated with final perinatal outcomes was also done:

There did not exist a significant statistical difference in perinatal outcomes between individuals who paid vs those who did not pay for ANC services either at the public or non-public health facilities. A newborn's weight was also not associated with whether an expectant mother had paid or not paid for ANC services. Similarly, no statistically significant differences were observed in public vs non-public hospitals among mothers who were served and delivered by skilled (professionally trained) midwives and those who were attended to by non-skilled midwives (only 12 individuals were attended to by non-skilled midwives). McNemar's test statistic to check for the relationship between the distance to a facility and perinatal outcome show that perinatal outcomes were neither associated with individuals who stayed up to 5kms from a health facility or those who stayed further. Distance to the health facility was also not associated with the birth weight. Even though only 1 of the 23 babies born whose mother had attended counseling had an abnormal perinatal outcome, there wasn't any statistically significant association between counseling and perinatal outcome.

Facilities that had BemOC equipment did not record any significantly different perinatal outcomes as compared to those that did not have BemOC equipment. McNemar's tests did also not show any differences between perinatal outcomes among mothers who were attended to by MNCH staff skilled in BemOC and those not trained either at public or non-public hospitals. The means of transport to the health facility were also analyzed to determine if they had any relationship with perinatal outcomes: the means of transport were grouped thus-motorbike use and private/public/personal/walking. McNemar's statistics did not show any difference in birth weight or perinatal outcomes between mothers who used motorbikes to attend ANC and those who used other means of transportation.

4.5 Mothers and midwives perceptions of Maternal and Neonatal Care (MCN) services in public and non-public facilities

Theme 1: Knowledge on perinatal care and perinatal outcomes

The qualitative data analysis from both midwives and their clients indicated that there was a knowledge gap among mothers on what perinatal care entailed yet this is part of the health education they are meant to receive in antenatal clinics. Although the mothers understood the relevance of receiving antenatal care services vis-à-vis perinatal outcomes, they didn't demonstrate clear understanding on the scope of perinatal care services. For the mothers antenatal care mainly helps reveal whether the pregnancy is normal or not. From the mothers'feedback, they were of the opinion that health talks don't receive adequate attention; otherwise the available midwives are too busy to answer all questions. However, the mothers' midwives had the right information on perinatal care and its outcomes thus raising concern on the quality of health education the mothers were receiving.

R_3 (a midwife); *perinatal care outcome…….I understand it is the care given during and after delivery.monitoring key parameters such as weight,height,BP,ruling out infections, anaemia, malaria and other pregnancy related complications* ***M: Ok, a you saying ……care given during and after delivery? R_3 (midwife)****; the outcome of a pregnancy may be e.g the pregnancy ending with healthy baby and mother.*

R_2 (pregnant woman*); In antenatal clinic we are told whether the baby is normal or abnormal……also nurses tell us the food to eat for the baby to grow well.* ***M: is that all you are taught? R_2 (pregnant mother);*** *nurses here are very busy, the teachings are quite brief and sometimes they don't even get time to answer all questions that mothers have.*

Midwives and mothers'opinions were sought on what they considered as factors that affected the outcome of a pregnancy type of facility offering services notwithstanding. The midwives were of the opinion that whether a mother is being attended to in a public or non-public health facility, her pregnancy outcome is subject

to the cost of care, her personal health status, quality of family support, nutritional support, availability of supplies and relevant equipments in health facilities. They also linked perinatal outcomes to the distance mothers travel before accessing services and the quality of health education they receive in health facilities. They particularly voiced a concern that although the county governments have availed ambulances under the free maternity care, those ambulances are not usually readily available especially in times of emergencies. The mothers too had quite similar opinions on what determines the outcome of a pregnancy but they added that, the skills of nurses and how they treat mothers does impact on a pregnancy outcome too.

R1 (midwife)"…*number one is the health of the mother, if we don't talk of nutrition we will expect a malnourished mother and that might even lead to fetal malformation… and even … yes, that one.* ***M: Which one? … (all laughs)... You are still telling us about it.*** *R1: …there are things like quality of family support, diseases; malaria, anemia…that is why we screen first so that we can check the hemoglobin level…when it is low you we can advice her on how to boost it… so that we avoid this anemia that will affect the mother and the baby".*

R_6 (pregnant woman); *"Outcome of a pregnancy can be good or bad depending on the food the mother eats and the care being given at the clinic by nurses and doctors……if mothers are not handled well, they will not return to the clinic and they will end up with a poor outcome….."*

Theme 2: Midwives and mothers' rating of public and non-public Maternal and Newborn Care (MNC) services

On comparison of perinatal care in public and non-public facilities, both midwives and pregnant women interviewed were in agreement on various issues. Non-public facilities were said to be associated with better perinatal care because they have adequate supplies, they offer total quality care in hygienic environments. However, despite the free maternity care, public facilities have shortage of supplies, service providers are overworked and clients are not accorded their right to privacy during service delivery. On a positive note, some pregnant women in their response to the

comparative question were of the opnion that, while non-public facilities at times hire cheap (easy to hire) service providers such as nurse aids, the public facilities always engage only qualified care givers. The pregnant women interviewed, also pointed out that non-public facilities have a tendency to perform unnecessary caesarean sections just for the sake of increased revenue; in public health facilities caesarean sections are only performed when it is absolutely necessary. The midwives from non-public facilities were also of the opinion that, they are usually understaffed and because of this they work for long hours to compensate for the shortage. This eventually affectes the perinatal outcomes in those facilities. The service providers in public facilities (free maternity care settings) were said to be suffering from burnouts because of the high clientale flow against few staff members (midwives) and this was contributing to the poor attitude caregivers displayed towards the pregnant women they were handling.

R1(pregnant woman); *"I think in non-public hospitals to me I can say it is better than the public hospitals… because you know in non-public hospitals, sometimes you will find that in government hospitals, the workload is so high, the sisters have burnouts… they have attitude and sometimes they will make the client feel like she can't go there. But in non-public hospitals, they know that if they… I mean they try to keep to themselves those burnouts so that they don't treat patient badly… because they know that when they are reported they can lose their job"*

R5 (midwife)*: "In-fact in private hospitals we are few... and we work longer hours to compensate for fewer numbers.* ***M: To compensate for the numbers?*** *R5: Yeah... for the compensation of the fewer staffing numbers available"*

R2 (Pregnant woman); "*Me I have a different opinion……Public hospitals I think the care is even perfect for the clients, unlike for the private hospitals. I am saying this because; in private hospitals we get quacks working there. So they end up mismanaging our mothers. Like I had a case one time in one of the private hospitals, there is a mother who was given oxytocin with a closed cervix and she was a mother who could deliver normally but ended up going for operation. So I think a case like that you cannot find them in public facilities."*

R3 (Pregnant woman); *"If I may add, for me I usually say that everything has advantages and disadvantages…… Ok first I said that the non-public hospitals are good but again I can say they are bad…because they are after money... You may find that a mother can be able to deliver normally, but because they want money and a Caeserean Section pays more, they can tell that mother to go for CS which she was not supposed to undergo."*

R4 (pregnant woman); *"Yes there is at times there is confidentiality in public facilities but it depends with the provider you are with.* ***M: When you say, it depends… how?*** *R4: There are those that just speak loudly and there are those that speak low* ***M: So what would the mothers like?*** *R4: They would like to be talked to in low voices so that the neighbour doesn't hear you problems… because maybe you problem is private and she is there shouting at you maybe she has her own*

issues…and you are feeling bad. When you come out… others have heard and maybe you get them laughing… you really feel hurt"

Theme 3: Midwives and clients perceptions of Free Maternity services

Although in general the mothers welcomed the free maternity services, there were mixed reactions/responses on causes of adverse perinatal outcomes in public vis-à-vis non public facilities in the context of free maternity care services policy. In general free maternity services had increased mothers's access to health facilities thus increasing access to skilled care but the programme has many challenges. Both midwives and pregnant mothers concurred that the public facilities were having high client flow midst acute staff shortages. The public facilities are not prepared in supplies and equipments to provide quality services. Lack of supplies creates "frustration" among workers leading to poor attitude towards service delivery. The mothers and midwives also complained that some of the services "supposedly free" aint free at all; they end up being referred to private facilities where they can't afford e.g lab tests. Mothers and midwives also raised concern that under the free services programme, resources have been overstretched to the extent mothers shared beds even after ceasarean section. Other participants in a mothers' FGD were concerned that health education sessions are too generalized with all mothers being taught together. Sometimes the topic being covered may not be relevant to everyone.

R2 (midwife): *"If something is said to be free… let it be available in the hospital and it be given to the pregnant women for free. But you find it reaches a moment they tell a pregnant mother to go bring something yet she came from home with no money to buy anything because in her mind she knows everything is free. So, that can affect the outcomes of her pregnancy…"*

R4 (pregnant woman); *"……the nurses are stressed… you even get worried get services from them……a mother cant easily open up to a tressed nurse … and in the process the mother might end up losing that baby. At least you need somebody approachable…to explain to you what's expected of you and maybe tell you that what you are undergoing is normal..."*

R_3 (pregnant woman): *"Yes there is a problem in the public facilities….because only one person works at the lab. They have a problem there… because he is serving people with malaria…he has to test them and he is alone… You can come today and you are told to go and come back tomorrow… when you come tomorrow you can again be told to go. You can lose hope and decide 'no' let it be"*

R 9: *"For the first time… the teaching I got was very general for all the patients before they started services… and they were teaching about diabetes… it is not applicable to all pregnant mothers. So I don't think they offer specific education…… if you are accompanied by your husband you are given just a five minute talk… "*

T**heme 4: Interventions proposed by Mothers and midwives to mitigate on the challenges of free maternity care.**

To address the discrepancy of care between public and non-public maternity services, both mothers and midwives proposed to have the government increase the National Hospital Insurance Fund (NHIF) capitation rates. Although the NHIF cover plays a very significant role in provision of in-patient services which are not included under the free maternity care package, not all mothers are able to raise the monthly premium. To mitigate on the discripancies in perinatal care and associated outcomes in public and non-public facilites, the midwives proposed to have county

governments increase collaborative working relationships between public and non-public facilities for the benefit of mothers, train midwives on respectable maternal care, appropriate staffing, involvement of service providers when formulating health care policies and organizing of collaborative workshops to allow midwives from both sides of the divide learn from each other on the emerging best practices. Developing of Standard Operating Procedures (SOPs) in MNC and strengthening of supportive supervision were also among the solutions proposed by the intervewees.

R_4 (midwife*); "…… *I also think it's the motivation of the workers of a place matters. You will find that in most public facility staff …lack that motivation unlike in non-public facilities facilities; some of the best non-public facilities in Kisii county at least give some motivation to their workers and therefore the workers tend to know how they are supposed to be doing certain jobs and therefore they become lenient and they get more clients."*

R_2 (midwife); *"In non-public facilities nowadays… first the current premium of 500 shillings is a problem… for those who are not government employed. They are unable to afford the 500 shillings… because earlier when I was in a special clinic out of every 15 mothers only 2 had NHIF cover…others defaulted because they could not afford the 500…so it is costly* ***I: So what you are saying is that mothers don't buy into this policy?*** *R: Yes and It is because of the cost... 500 per month, they are not able to get that money. Even those who were already in NHIF when they were contributing 160 have defaulted"*

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Dsscussion

5.1.1 Perinatal outcomes in Kisii county public and non-public health facilities

Pregnancy outcomes rank among the most pressing reproductive health problems in the world. The care a mother receives during the perinatal period (from 22 weeks gestation and ends 7 days after birth) is quite essential for it determines whether a mother will end up with a normal pregnancy outcome or not. A successful pregnancy outcome therefore is a product of all that happens during pregnancy, the care given during delivery/birthing process and the immediate post delivery care (Lawn et al., 2005). Access to skilled care has been a challenge in developing countries and this has led to initiation of free maternity policies in public health facilities, yet it is not well documented if there is any significant difference on perinatal outcomes between "free" settings and those that charge a user/service fee.

The Safe Motherhood Initiative (SMI) launched in 1987, has continued to emphasize the importance of every pregnant mother being cared for by a Skilled Birth Attendant (SBA) i.e someone with midwifery skills so as to mitigate on the adverse outcomes related to pregnancy and childbirth. This is the drive that informed the Kenyan government to initiate Free Maternity Care Services (FMCS) policy in the year 2013.

This study recorded a cumulative incidence of 11% in adverse perinatal outcomes in a population of 287 study subjects. However, this study sampled study subjects from a county level as compared to individual cross-sectional hospital based studies conducted in Kiambu district hospital in Kenya (Ngugi, 2010) and Nsambya hospital Uganda that recorded a cumulative incidence of 24% and 6% respectively. A related study conducted in Tanzania (Mitao et al, 2015) established an incidence of 10.6% but in contrast to the Kisii county study, the design employed in Northern Tanzania

was a registry based retrospective cohort and it only focused on one particular adverse perinatal outcome (Low birth weight).

The Kisii county study didn't record a significant difference in incidence of the adverse perinatal outcomes in Kisii county public and non-public facilities, although a previous related study from an Asian setting (Li chen et al,2013), established that perinatal outcomes in non-public facilities were worse than those in public facilities because the former offered less comprehensive care to pregnant women due to their commercialized nature of care i.e each service is pegged on payment. The Asian study also established that non-public facilities are prone to staff shortages and demotivated service providers both of which are potential contributors to more adverse perinatal outcomes in non-public facilities. Findings from a comparable though cross-sectional study in Tanzania (not based in free maternity care setting), found out that non-public facilities had a better quality of perinatal care than public facilities (Boller et al., 2003).

5.1.2 Client factors and perinatal outcomes in free vs. User fee maternity care settings

Notably, from the study conducted in Kisii county with study subjects' representation from public (free maternity care setting) and non-public (user-fee care setting), Maternal BMI that got monitored all through the 3 follow-up visits had a significant influence on the perinatal outcomes. The research also revealed that 24% of the study subjects by the end of pregnancy had displayed signs of mental distress (without significant association with perinatal outcomes). It was further observed that as pregnancy advanced through the 3 visits, there was significant reduction in stress levels among the study subjects accompanied by their spouses. Also with advancement in preganancy, there was significant reduction in study subjects who reported a need for counselling services; probably this can be alluded to mothers' psychological adjustment to accept the physiological changes that are associated with pregnancy.

Although there was a significant drop in the numbers of women who had spousal accompaniment as pregnancy advanced; there was 26% higher chance for women who were accompanied by male partners to have a normal pregnancy as compared to women who had no spousal accompaniment. The drop in the number of men who accompanied spouses as pregnancy advanced, is associated with lack of clear male involvement policy in antenatal clinics (Matiangi et al., 2013) ; men are usually left outside and asked to wait for their wives to be examined and this discourages them from turning up in subsequent visits. Nevertheless, women who have their husbands involved all through antenatal care (Britta et al, 2006), have shown favourable ANC practices and outcomes compared to those who are not accompanied or lack spousal support during the confinement period.

Notably, mothers who displayed adequate knowledge on pregnancy related issues throughout the 3 visits had a higher chance of getting newborns with normal birthweight as compared to their counterparts who displayed limited knowledge on pregnancy related issues. A related study conducted in Nigeria (Eni-Olorunda et al., 2015), established that women who had adequate knowledge on pregnancy , not only had a better attitude towards their preganancy but it also led to better outcomes. The only challenge identified from the Nigerian study is that the health education given during ANC visits, it isn't explicit enough to cater for mothers of various education stratas.

Despite previous studies done in Istanbul (Ertigrul et al., 2016 and Zapata-Masias et al, 2016) found a significant association between perinatal outcomes and women's age, the study done in Kisii county under a free maternity care context did not reveal any association .

Although there wasn't a direct association between womens' DDS and micronutrient levels (Zn ++ and Fe++) with perinatal outcomes, it is worth noting that Out of the 214 babies whose birth weight was recorded, 21 had abnormal birth weight and 19 of those 21 babies (90%) born with abnormal birth weight belonged to mothers with low zinc levels. The finding of 74% of the study subjects (women) having zinc deficiency, nearly concides with ross-sectional study findings from arelated study

(Kombe et al., 2014) conducted in kenya that diagnosed 68% of the study subjects to be having zinc deficiency at national level. Although the latter study didn't establish associated perinatal outcomes, the results are a pointer to the fact that zinc levels among women of reproductive age in Kenya could be low.

Literature review of other related studies on client factors and pregnancy outcomes have comparable results with the study conducted in kisii county health facilities. Although conducted in a developed country setting (USA and Sweden), excessive weight gain during pregnancy which correlates with high maternal BMI, has been associated with adverse perinatal outcomes (Wallace et al., 2014). High maternal BMI is a risk for hypertension, eclampsia and gestational diabetes among others which leads to adverse perinatal outcomes. Globally, Obesity among pregnant women is highly prevalent (Nelson et al, 2010) and is being associated in a linear manner with markedly increased risk of adverse outcomes for mothers and infants. Although, it is documented that as pregnancy advances the zinc demands in the woman's body increases, a systematic review conducted in UK and USA (Wilson et al, 2016), found out those pregnant women who had low Zinc levels had a risk for delivering babies with a Low Birth Weight (LBW). Other than the variable on parity, most of baseline variables taken at baseline e.g education level, employment status, FGM status among others didn't have any significant effect on perinatal outcomes; women with higher parity (multiparous) had a higher chance to have a better perinatal outcome compared to lower parity women especially those who were delivering for the first time (nulliparous). However, a related study done in Finland (Ratikainen et al,2006), in a setting of free maternity care, found out that free maternity care was unable to overcome adverse pregnancy outcomes associated with factors such as unemployment; in this study, unemployed women in free maternity care settings were prone to delivering small for Gestational Age (SGA) babies.

5.1.3 Health facility services and perinatal outcomes in public and non-public facilities

In the kisii county longitudinal study amongst comparable public and non-public facilities a number of facility based variables were monitored in each visit to assess

how they ultimately influenced perinatal outcomes of mothers; each visit mothers were interviewed on whether they paid or not and amounts paid if any. The enumerators also assessed whether the caregiver in each visit was a Skilled Birth Attendant (SBA) or not, whether counselling services were being accorded in each visit and duration of service among other factors. Although most of the study subjects were from public facilities, women who financed themselves to receive services from 1st to 3rd visit ranged 73-74% while those who had insurance cover ranged 7-10%, implying that only an estimated 10-15% of the mothers received Free Maternity Care (FMC) and another range of 4-5% were funded by spouses.

Although the cost of care in this study didn't have a significant correlation with neither normal or abnormal perinatal outcome, a related study in Massachusets (Haas et al., 1993) established similar findings ; women of low social-economic status got insured to access perinatal care services but this didn't have statistical significance with either normal or abnormal perinatal outcome.

Although from analysis there was a significant drop in haematinics compliance between 1st and 3rd visit ($p=0.004$) and administration of eligible vaccines ($p< 0.001$), this is normal considering most vaccines are given in first trimester and the same applies with haematinics supplementation. The significant drop in mothers who accessed skilled care from qualified midwives ($p< 0.001$) and the drop in proportions of women counselled on danger signs of pregnancy between 1st and 3rd visits could be a result of an assumption health workers make that once a health message or a thorough physical examination has been done in the first visit the same doesent need to be repeated comprehensively in subsequent visits. Logistic regression analysis on how cummulatives in all visits' perinatal outcomes related with staffing levels i.e midwives: mothers ratio, it was established that there was a significant association between facilities with low midwife: mother ratio and normal perinatal outcomes as compared to facilities with high midwife: mother ratios.

The findings on staffing ratios from this study do concur with findings from a related study (Sloan et al., 2001) that established an inverse relationship between adverse perinatal outcomes and the proportion of skilled care givers or Skilled Birth

Attendants (SBA).Given that non-public facilities serve as referral centres for complicated cases from public facilities (Table 4.16), there is a need for them to have even higher numbers of qualified staff so as to cope with the care demands for cases of complicated referrals. It is worth noting that in this study, non-public facilities had high midwife: mother ratios as compared to non-public facilities.

5.1.4 Midwives and mothers perceptions of perinatal outcomes

Free maternity care is largely seen as a good development because the women don't have to wait at home for long hours especially when labour begins; which inversely increases early diagnosis and management of complications that arise in pregnancy and labour. Women perceive the quality of care to be good when they have positive opinion about the competencies of the health care provider. When required services such as physical examination, availability of drugs and clean environment serve as a motivation to attend Maternal Health Services (Shiferaw et al., 2013)

The womens' and midwives perceptions in this study depict a picture of a policy that has "hidden costs" in its implementation. Nevertheless, the cited challenges are similar to other studies that have carried out in various country specific contexts

A longitudinal study conducted in Nepal on womens'perception of the quality of maternity care in private and public facilities (Karkee *et al*, 2014) found out that private (user-fee based) hospitals were rated higher than public facilities because of the high quality of client education and individualised care as compared to the public health facilities. This trend was observed in nearly all aspects of maternity care except for post-natal care where public facilities rated favourably.

A related study from Enugu state in Nigeria on a community and care providers' perception of free maternity care (Uzochukwu *et al*, 2015), found that although free maternity care increases demand for services, the workload of clients overwhelms the resources available. The Nigerian study recommended scaling up of infrastructure and personnel prior implementing a free maternity care policy in a developing country context.

The findings in the Kisii county study are also comparable to those from a cross-sectional survey in a county referral hospital (Murima, J.M, 2016) on mothers' perceptions of quality care under Free Maternity Services (FMS) policy. The findings revealed that free maternity care had increased utilization of services but the quality of care had challenges due limited number of key human resource for health. Although mothers had access to basic facilities like beds and bathrooms, critical diagnostic facilities were lacking. Such gaps lead to mothers incurring extra costs for diagnostics in private facilities thus the perception that free maternity care services have hidden costs. This mimics the context in which free maternity services were implemented in Bangladesh with low returns in mothers 'utilisation of skilled services because they felt there were hidden costs among other challenges such as the service provider to clients' mismatch in the public health facilities (Nahar & Costello,1998).

A comprehensive assessment report on devolved health care in Kenya (MOH report, 2015), key informants among them midwifery managers expressed their concerns that under Free Maternity Services (FMS), the funds being reimbursed by the central governments to the health facilities were not only inadequate but they also delayed too much. This had led to county governments losing millions of shillings. The key informants who also included clients raised concern that mortality rates were increasing in referral hopitals because of poor staffing and shift of attention to complicated cases leaving the uncomplicated ones unattended to. In the MOH report, the clients expressed concern that they were paying for services which they otherwise expected to be offered for free. The estimates the MOH had made that only 15% of mothers may develop complications under free maternity care was observed to be a gross under-estimation. The same with the projection that majority of the mothers were to spend only 24hrs in hospital post-delivery. The midwifery service managers also expressed concern that the quality and standards of services in MNCH had plummeted under the FMS program. However, in Srilanka a non-industrialised country with limited resources like kenya, a Skilled Birth Attendance (SBA) coverage of 98% got achieved (Haththotuwa et., al, 2012). The main challenge seems to be the fact that Kenya took the initiative of free maternity

care in public health facilities in an environment that was void of adequate infrastructure (Wesson et al., 2013).

5.2 Conclusion

5.2.1 Client factors and perinatal outcomes

From the present study it is demonistrated that,

- Perinatal outcomes at public or non-public facilities are not associated with mothers' age, level of education, marital status of the expectant mothers.
- Women who have delivered at least once stood a 4.5 times higher chance of a normal delivery compared to those who had never delivered before or those who had had 2 or more deliveries.
- Mothers, who have a normal maternal BMI, are 5 times more likely to have normal perinatal outcome compared to those who were obese.
- Mothers' knowledge on pregnancy increases as pregnancy advances and the levels of knowledge a mother has a direct influence on the perinatal outcomes.

5.2.2 Facility factors and perinatal outcomes

From the present study, it is demonistrated that,

- The Perinatal outcome of a pregnancy is not subject to the type of facility a woman delivers; public or private.
- Perinatal outcome is not subject to the cost of care. This implies that free maternity care may increase demand for antenatal services but this does not directly impact on the perinatal outcome of a pregnancy.
- The staffing ratios in a health facility have a direct effect on the perinatal outcomes of women seeking care in the facility. High staffing ratio of qualified midwives to clients is a risk factor for incurring adverse perinatal outcomes.

5.2.3 Relationship between facility and client factors on perinatal outcomes

From the present study, it is further deministrated that,

- Whether a woman seeks care in a public nor a non-public facility, her serum zinc levels, ferritin levels, Haemoglobin (HB) levels do not significantly influence the ultimate perinatal outcome. Neither is there is significant diference in birth weights of babies from the two settings taking into consideration the aforementioned variables.
- Mothers who adequate knowledge on pregnancy had related issues had a higher chance to get a baby with normal weight as compared to those mothers who had limited knowledge.

5.2.4 Midwives and mothers' perceptions of non-public and public health facilities antenatal care services in the context of free maternity care.

From the qualitative findings of the current study, it can also be concluded that,

- Public health facilities are resource constrained to offer free maternity care. On the contrary, public health facilities are better staffed compared to the non-public facilities.
- The services that are expected to be accessed for free by mothers they are not free as such; mothers end up buying some of the basic consumables and even pay for the routine antenatal profile tests. The study concludes that the free maternity care has attracted mothers to the facility but there is no matching preparedness for quality service delivery.

5.3 Reccomendations

It is therefore recommended that:

1. There is need to build capacity of health facilities for them to effectively implement free maternity services. Capacity building here includes ensuring there is adequate staffing

2. Health education of mothers during pregnancy needs to be given more emphasis in order to achieve normal perinatal outcomes through improved self care and early seeking of ANC care.
3. Health facilities need to strengthen advocacy for male involvement and put in mechanisms to ensure male partners are involved in perinatal care.
4. Increasing staffing levels in both public and public health facilities is necessary in order to achieve normal perinatal outcomes
5. A similar study needs to be done on a wider scope (population study) to establish the effects of serum zinc and mothers' mental health status on perinatal outcomes.

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APPENDICES

Appendix 1: Roles of every participating investigator

Principal Investigator: **Micah Matiang'i**

This was the PI proposal for his PhD work under the supervision of the co-investigators/supervisors below.
His role is to:

- Be the key person in carrying out the research and all aspect of it.
- Have the proposal approved by SSC and ERC
- Visit every selected health facilities, with assistance from the facility based research assistants, the PI will seek the permission to recruit and follow up study subjects through consent, collect relevant samples, enter and analyze the data
- write up the Thesis report
- Seek the guidance of the co-investigator/supervisors and associate investigators on carrying out the research.

Co – Investigators/ Supervisors:
Dr. Peter Wanzala, Dr. Simon Karanja and Dr. Kenneth Ngure (Itromid & JKUAT lecturers)

- Supervise proposal writing and submission to SSC and ERC
- Supervise in recruitment of study subjects
- Provide guidance in data analysis and thesis writing

Research assistants/Enumerators:

Experienced midwives recruited and trained from health facilities in Kisii County to support data collection process

Appendix 2: Informed Consent form Document (ICD)

Determinants of perinatal outcomes among mothers attending antenatal care (ANC) services in Kisii County health facilities.

Introduction

We are conducting this study to investigate the issues that determine perinatal care outcomes for pregnant mothers in Kisii County. In order to be sure that you are informed about being in this research, we are asking you to read (or will read to you) this consent form. The purpose of this consent form is to give you the information you will need to help you decide whether or not to participate in the study. Feel free to ask any questions wherever you need clarifications. When we have answered all your questions, you can decide if you want to participate in the study or not. Once you understand the study, and if you agree to take part, you will be asked to sign your name or make your mark on this form in the presence of a witness. We will give you a copy of this form for your records

Purpose of the research;

We are asking you to participate in this study to help us assess the determinants of perinatal care outcomes in Kisii County health facilities; we would also like to get information on the cost being incurred by pregnant women to access perinatal care services. We would also like to know the quality of care expectant/pregnant mothers is getting in the health facilities. In addition, we would like to establish the various pregnancy outcomes for expectant mothers in Kisii county health facilities up to 6 weeks after delivery.

Study groups

The study groups will comprise of pregnant women who are seeking perinatal care services in private and public health facilities. The key perinatal care service providers shall also be interviewed in this study.

Procedures

If you agree to participate in this study by signing at the end of this form, you will participate in the following activities: You will be questioned about your personal life related to this study such as your education background, marital status, income and sources of income as well as your knowledge on perinatal care. In your follow up visits to the clinic we shall also request you to provide us with a small specimen of urine and 3ml of blood to have them assessed for any abnormalities that might endanger your pregnancy. Also you will be requested to provide us with details on the quality of services you are receiving in the facility; such interview sessions will take not more than 30-45 minutes in every follow up visit. In follow up visits you will receive results for any preceding tests done on you. You will also be contacted on phone at least once prior the follow up visit to monitor your progress.

Possible Risks and precautions

There are no disturbing procedures that will be carried out on you. You may feel a little uncomfortable when being taken a blood specimen and during the interview due to the sensitive nature of some questions but safeguards will be implemented to minimize this risk. We will minimize risk and discomfort from the interview by using a trained staff to place you at ease during the interview. You may skip any questions that you do not want to answer and may terminate the interview at any time without consequence. You will also be free to withdraw from the study any time you feel like. Your withdrawal won't affect the subsequent care you will receive.

Data security and Confidentiality

All the information gathered by the research team will be used in confidence for the sole purpose of this research only. Any records relating to your identity and test results will remain confidential. Your name will not be disclosed in any report of the

results, and you will receive a copy of this consent form. No one will have access to the interviews except the researchers and supervisors.

New findings and benefits

Study findings will be shared with relevant stakeholders in health sector to provide information for improving management of pregnant mothers in health facilities to minimize poor outcomes such as maternal deaths and neonatal/newborn deaths.

Costs to you

There is no cost to you for participating in the study. However cost incurred personally for the sake of this study will be reimbursed.

Your rights as a Participant

This research has been reviewed and approved by the Ethical Review Committee of the Kenyan Medical Research Institute (KEMRI), if you have any questions about your rights as a research participant you may contact the secretary of the KEMRI ERC (a group of people who review the research to protect your rights) at **020-272-2541, or 020-272-6781**. Email; erc@kemri.org OR the principal investigator on **0723 727 325**.

Your statement of consent and signature

I have been explained about this research; the risks and benefits involved. I have also been given a chance to ask all questions I had and am satisfied with answers given. I am also assured confidentiality will be observed. I agree to take part in this study as a volunteer, and I have been given a copy of this informed consent form to keep.

_____

Tel……..
Participant's Name (printed)

_____
Signature or Participant or thumb print (for those who cannot sign) Date

If volunteers cannot read the form themselves, a witness must sign here:

I was present throughout the entire informed consent process with the participant. All questions from the subject were answered and the participant has agreed to take part in the research.

_____
Printed Name of Witness

_____ _____
Signature of Witness Date

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____
Printed Name of Person Who Obtained Consent (Study staff)

_____ _____
Signature of Person Who Obtained Consent Date

NOTE: You are not giving up any of your legal rights by signing this informed consent document.

Appendix 3 : Swahili Translation of consent form

Determinants of perinatal care outcomes among mothers attending antenatal care (ANC) services in Kisii County health facilities.

Utangulizi

Tunafanya uchunguzi juu ya masuala yanayoamua huduma anayopewa mama mjamzito wakati wa kujifungua katika Kaunti ya kisii. Ili tuwe na hakika kwamba ulijulishwa juu ya utafiti huu tunakuomba usome (au usomewe) fomu hii ya kuomba idhini ambayo lengo lake ni kukufahamisha na kukusaidia kuamua kushiriki au kutoshiriki katika utafiti huu. Tafadhali isome kwa makini na unaweza uliza maswali juu ya jambo lolote lisilowazi kwako kama vile faida au hatari za kushiriki, haki zako kama mshiriki, gharama na au neno lolote usilolifahamu/usilolijua.

Kuwa katika utafiti ni kwa hiari yako

Baada ya kujibu mawsali yako yote unaweza amua kushiriki au kutosiriki. Utaratibu huu inaitwa “ridhaa”, inakupa maelezo juu ya utafiti na hatari zake, utakapoelewa utafanya uamuzi wako. Iwapo utaamua kushiriki, unaulizwa utie sahihi, au alama ya kidole katika fomu hii mbele ya shahidi. Tutakupa nakala ya fomu hii kwa ajili ya kumbukumbu yako. Yafuatayo ni ya umuhimu sana:

- Kushiriki katika utafiti huu ni kwa hiari yako.
- Unaweza amua kutojibu swali, au kupeana sampuli *(Specimen*) au hata kujiondoa kutoka kwa utafiti wakati wowote.

Madhumuni ya utafiti;

Tunakuomba ushiriki katika utafiti huu ili kutathmini au kukadiria viamuzi vya huduma anayopewa mama mjamzito wakati wa kujifungua na matokeo yake katika vituo vya afya, kaunti ya Kisii County. Pia tungependa kupata habari juu ya gharama wanayodaiwa wamama wajawazito ili wapate hizo huduma wakati wa kujifungua. Tungependa kujua ubora wa huduma hizo wanazopata akinamama wajawazito na hatimaye matokeo mbalimbali ya mimba kwa akinamama wajawazito (na hadi majuma sita baada ya kujifungua) katika kaunti ya Kisii.

Makundi ya utafiti

Utafiti huu unahusisha akina mama wajawazito wanaotafuta huduma za kuzaa katika vituo vya afya vya kibinafsi au vya umma. Wahusika wakuu wanaotoa huo huduma pia watahojiwa. Makundi haya yote yaliyotajwa ni ya muhimu sana katika utafiti huu

Utaratibu

Ukikubali kushiriki katika utafiti huu kwa kutia sahihi mwisho wa fomu hii: utaulizwa maswali kuhusu maisha yako ya kibinafsi yanayohusu utafiti huu, kama vile, kiwango cha elimu, hali yako ya ndoa, mapato yako, kutathmini ujuzi wako juu ya huduma ya kujifungua mimba. Katika ziara zifuatazo kwa kiliniki, tutakuomba utoe sampluli ya Mkojo na milimita nne ya damu ili zitukike kupima madhara yeyote yanayoweza kudhuru mimba yako. Utahojiwa na mnoja wetu ili kujua ubora wa huduma unazopokea katika kituo cha afya, mahojiano haya yatachukua muda usiozidi dakika 45 (arobaini na tano). Pia katika ziara zifuatazo kwa kiliniki, utapokea majibu ya vipimo vyote na kama kuna haja ya kuchukuwa tahadhari, basi utajulishwa. Mambo haya yote yatafanywa na mkunga aliyeitimu na ambaye ataangalia ubora wa huduma utakayopokea wakati wa kujifungua mimba.

Tahadhari:

Hakuna masumbuko, matatizo au madhara yeyote yanayotarajiwa katika zoezi hili isipokuwa uchungu kidogo tu wakati wa kutolewa damu. Kundi la wataalamu wenye

mafunzo na uzoefu wataongoza zoezi hili na kuchukua tahadhari zote kupunguza madhara.

Hatari/masumbuko yanayotarajiwa

Hautafanyiwa utaratibu wowote wa kusumbua. Uaweza kuulizwa maswali nyeti na ya kibinafsi. Hatua zifaazo zimechukuliwa kama vile kutumia wataalamu wenye mafunzo na uzoefu, ili kulinda siri zako za maisha. Unawezaruka swali lolote ambalo unaona ni ngumu kujibu, pia unawezahitimiza zoezi lote la mahojiano wakati wowote pasipokuwa na mathara ya kufanya hivyo.

Usalama na usiri wa data

Habari zote zitakazokusanya na wataalamu kwenye utafiti huu zitatumika kwa njia ya uaminifu kwa utafiti pekee. Tarakimu zozote zenye habari zinazohusiana na utambulisho wako au matokeo ya vipimo itawekwa kwa njia ya siri. Hakuna yeyote atakuwa na ruhusa ya mahojiano au matokeo ya vipimo isipokuwa watafiti na wasimamizi. Jina lako halitatumika kokote kwenye ripoti na utapokea nakala ya fomu hii. Hatua kali za kusimamia data zitatumika kulinda siri zako.

matokeo ya utafiti

matokeo ya utafiti huu yatazambazwa kwa idara huzika za afya nchini Kenya na kwa counti na kwa washikadau. Matokeo haya yatatumika katika kutoa habari za kuboresha usimamizi wa mama wajawazito katika vituo vya afya na kupunguza maafa (ya mama au mtoto) wakati wa kuzaa.

Faida

Matokeo haya yatatumika kupendekeza hatua ya mbinu mpya ya afya ya kupunguza vifo vya akina mama na watoto wachanga.

Gharama

Hakuna gharama ya kushiriki

Kurudishiwa malipo

Kama mushiriki, utarejeshewa gharama zozote utakazotumia kufanya vipimo Fulani (kwa minajili ya utafiti huu) iwapo havitapatikana katika kituo chako cha afya.

Iwapo utaamua kutoshiriki

Iwapo utaamua kutoshiriki, uamuzi wako hautadhuru uhusiano wako, au huduma utakayopata katika kituo cha afya.

Kutoka kwa utafiti

Iwapo utaamua kutoka kwa utafiki kabla kukamilika ua uhuru wa kufanya hivyo. Utakachoitajika kufanya ni kumjulisha anayekuhoji ili habari hiyo itumike kuboresha hatua ya mahojiano

Maswali ua shida

Ukiwa na swali au shida yeyote juu ya utafiti huu unapaswa kuwasiliana na: Mtafiti Mkuu **Micah Matiang'i,** nambari ya simu **+254 723 727 325**

Haki zako kama muhusika

Utafiti huu umepitishwa na kamati ya maadili (Ethical Review Committee) ya shirika la utafiti la Kenya (Kenyan Medical Research Institute (KEMRI)) na iwapo una swali lolote kuhusu haki yako kama muhusika unaweza kuwasilina **na karani wao: at 020-272-2541, au 020-272-6781**

Kauli yako ya ridhaa na sahihi

Iwapo umesoma na kuelewa hii fomu ya ridhaa, na umekubali kushiriki utafiti huu tafadhali soma maagizo yafuatayo na ufikirie tena kauli lako kabla haujaandika ina lako na kutia sahihi. Haijalishi utakaloamua, kwa kuwa haitadhuru haki zako kwa njia yeyote.

- Umeelezewa Faida na hatari za zushiriki katika utafiti huu.
- Nimepewa nafasi ya kuuliza maswali na nimerithika na majibu yote niliyopewa/kuelezewa
- Najua kuwa recodi yangu itawekwa kwa njia ya siri, na naweza kutoka katika utafiti huu wakati wowote.
- Najua jina, nambari ya simu na anwani ya yule nitawasiliana naye wakati wa dharura na mimepewa nakala ya habari hizo.

Kwa hivyo nakubali kwa hiari kushiriki katika utafiti huu na nimepewa nakala yangu ya fomu hii ya kuomba idhini

_____ Tel…….
Jina la Mshiriki (chapisha)

_____
_____
Sahihi au alama ya kidole (wale wasioweza kutia sahihi) Tarehe

Ikiwa muhusika hawezi kujisomea mwenyewe, shahidi lazima atie sahihi hapa

Nilikuwapo tangia mwanzo hadi mwisho wa zoezi la kuomba idhini, maswali yote yalijipiwa na muhusika amekubali kushiriki katika utafiti huu

_____
Chapisha jina la shahidi

_____ _____
Sahihi ya shahidi Tarehe

Nadhibitisha kuwa nimemueleza mshiriki faida na adhari zozote za kushiriki katika

utafiti huu

_____

Jina la mwenye kuchukuwa idhini (Study staff)

_____ _____

Sahihi ya mwenye kuchukuwa idhini tarehe

Jambo la kuzingatia: hautapoteza haki zako za kisheria kwa kutia sahihi katika fomu hi

Appendix 4: Kisii Translation of consent form

Efomu Yobomanyi Nogwancherana Kwo'mounenkigwa Gosanga ase Obotuki. (Informed Consent form Document (ICD)

Okogani komanya aria abasubati bebwateraneti bagoetera ase chinyagitari ime ye ekaunti ya Kisii; ekero bakorigia obokonyi bwe ekliniki chingaki babwate oborito; bataraibora na magega yokoibora.

<u>Omochakano(Introduction)</u>

Ekerenga kiobotuki obo nokogani komanya aria abasubati bebwateraneti bagoetera ime ye ekaunti ya Kisii.

Erio kwemanyia igoro yobotuki obo boikeranu; nigo togokoboria osome efomu eye gose togosomere. Ekerenga gie efomu eye nokogokonya konacha gose ingosanga ore ase obotuki obo gose yaya. Koranche yesome. Imbwancheire koboria amabori igoro ya aria otaraigwa buya ase efomu eye; buna bono ekerenga kiobotuki obo, keria torakogani gokora ase obotuki obo, obuya nobobe, oboene bwao buna oyomo bwa baria berure kobwaterana naintwe, na igoro ya kende gionsi oragani komanya.

Otarancherana kobwateranigwa ase obotuki obo, nigo obwenerete kwemanyia igoro ya amang'ana ande onsi; amabe gose amaya, ayio arabwatie korwa ase obotuki obo. Efomu eye nigo egokomanyia ase oboime igoro yobotuki obo. Nabo efomu eye eratware amarieta amakong'u otamanyeti, koranche toborie tokoeresere.

Ogosanga ase obotuki obo nogwancha kwao(Being in the study is your choice)

Magega yokoiraneria amabori ao onsi, nabo okonacha gose inkogenderera ore gosanga ase obotuki obo gose yaya. Ekero oranche kobwatanigwa ase obotuki obo buna omounenkigwa, nigo oraganerigwe korika erieta riao gose earama ye ebiara ase efomu eye bosio bwa kirori(omosaiti). Korwa abwo nigo togokoa e-copy ye efomu eye ogende kogacha ase chirekodi chiao.

Nyuma otaremanyia amange igoro yobotuki obo, mbuya kwemanyia aya akobwatia:

- Ogosanga kwao ase obotuki obo nogwancha kwao omonyene.
- Nobwate okobua gwokwanga koiraneria amabori, gose korwa kende gionsi orasabwe gokonya ase obotuki naboigo nabo kwerusia ase obotuki obo ingaki ende yonsi oragani.

Ekerenga kiobotuki obo (Purpose of the research)

Nigo togokoboria osange ase obotuki obo erio gotokonya komanya aria abasubati bebwateraneti bagoetera ase chinyagitari ime ye ekaunti ya Kisii; ekero bakorigia obokonyi bwe ekliniki; ase toganeti boigo komanya ekerengo gie chibesa bagoakanera konyora obokonyi bwe ekliniki.

Boigo nigo tageneti komanya ekerengo kiobokoreri bakonyora korwa ase abateresa (nurses) ase chinyagitari echi. Komenta na ayio nigo toganeti komanya igoro aria akobwatia na koobanyora abasubati bebwaterani ase chinyagitari chie ekaunti ya Kisii magega ye chiwiki 6 ekero baiboire.

Ebiombe biogosanga ase Obotuki obo (Study groups)

Ebiombe togokorera obotuki ng'amo na biria bia abasubati bebwateraneti abwo bakorigia obokonyi bwobogwenia ase chinyagitari chie eserikari amo na chiria chia abantonyene.
Chinyagitari echio boigo ngochia koborigwa chire amabori ase obotuki obo. Ebiombe bia abanto bonsi bakwanire igaa nigo bare ne'ng'encho enene ase obotuki obo.

Omochoko tokobwatia ase obotuki (Procedures)

Onye kogwancherana kobwatanigwa ase obotuki obo ase okobeka esei omoerio bwe efomu eye, nigo ogochia gosanga ase aya akobwatia:
Nigo togochia gokoboria amabori igoro yobogima bwao, aria arengete obotuki obo buna kerengo kiao gie chisemi, enywomo, eng'eria yao ne emeremo ogokora.
Boigo ntokoborie amabori igoro ye ekerengo kiobomanyi obwate igoro yobogwenia okonyora chingaki okogenda ekliniki. Chingaki orabe gokogenda ekliniki boigo nigo torakoborie otoe ensemo ya amache ao ekero okogenda gwekonya amo na amanyinga gopimwa korora gose nobwate bobe bonde borabaise kobeka oborito bwao ase abe.

Nigo boigo torakogani otoeresere igoro ye ekerengo kiobokoreri okonyora ase ekliniki, na amabori aito nigo araire egeka gie chidageka 30-45. Nigo oramanyigwe amachibu yobounenki bwaito goetera amanyinga na amache, ekero orairane ase ekliniki entunda yende gose orangerigwe komanyingwa onye bokong'u bonde bwensi bokororekana boragani richibu ria bwango.

Obokong'u oranyore (Possible Risks/discomfort/Precautions)

Bokong'u bonene tiboiyo ase obotuki obo, korende nabo orabaise gotwara obwoba chingaki okorusigwa amanyinga naboigo amabori ande nabo aragochande ase engencho arakune obogima bwao bwa bobisi. Korende obobisi bwao nigo borarendwe tibosoka gochia isiko.

Nigo tobwate abaobisa babwate obomanyi boisaine na igo totwara bwoba. Korende nabo oragani gotuma amabori ande toyairaneria gose gotigana nobounenki bwaito ingaki ende yonsi oragani.

Okorendwa kw'obobisi bwao (Data security and Confidentiality)

Amang'ana onsi toranyore korwa ase ore nigo aratumeke nobobisi noborendi bwe ekerengo kia igoro ase obotuki obo bwoka erio gotanga tamanyekana gochia isiko.

Erieta riao nigo rirarendwe na tirigotumekwa ase ripoti ende yonsi ya amachibu yoboringori, naboigo nigo ogochia koegwa ecopy ye efomu eye. Onde taiyo ogosoma chiroboti chiobotuki obo otatiga abateneneri bobotuki obo boka.

Amachibu yobotuki (New findings)

Amachibu yobotuki obo nigo agochia koenanwa gochia ase chiwizara chiobochenu aiga Kenya, ekaunti ya Kisii amo na ababwatani bande aiga Kenya. Nigo amachibu ayio aratumeke ase ogokinia obokoreri ase chinyagitari chikorwa obogwenia gochia ase abasubati bare morito erio gotanga amakong'u gochia ase abasubati bare morito buna amakweri.

Obuya bwobotuki obo (Benefits)

Amachibu yobotuki obo nigo agochia gotumekwa gokonya gochakia chinchera ching'ao chingiya ase ogotanga ogokwa kwa abasubati bebbwateraneri amo na abana chingaki chiokoiborwa.

Rigori ogoakanera obotuki obo (Costs to you)

Obotuki obo imbosa. Torigoakana kende gionsi.

Okoiranerigwa chibesa (Reimbursement)

Nigo orairanerigwe chibesa chinde chionsi oratumeke ase okorengwa konde gwensi koraganerigwe gotumekwa ase obotuki obo, mono onye kogokorwa ase enyagitari eng'ao.

Ninki kerabe onye totageti gosanga ase obotuki obo (If You Decide Not to Be in the Research)

Nobwate obosibore bwogokana tosanga ase obotuki obo. Okonacha kwao tikogoturubania obokoreri bwobogwenia okonyora korwa ase ekliniki okogenda nonya ng'ake.

Ninki kerabe oratigera obotuki obo inchera (Leaving the Research)

Onye gwanchire gosanga ase obotuki obo; boigo nobwate obosibore bwokwerusia aroro na gotigera inchera. Korende onye gokwerusia, koranche omomanyie omoobisa okobokora esababu yokwerusia aroro erio amangana ayio atokonye ase ogokinia obokoreri bwaito.

Obokong'u na amabori(Problems and questions)

Onye kobwate obokong'u gose ribori rinde rionsi, moakere esimi omoteneneri bwobotuki: Micah Matiang'i, (Study Principal Investigator) (Mobile: +254 723 727 325)

Oboene bwao (Your rights as a Participant)

Obotuki obo nigo boetirie na gwancherwa gokorwa ne ekeombe gie ching'encho-Ethical Review Committee kiobotuki bwobogwenia Kenyan Medical Research Institute (KEMRI). Onye kobwate ribori igoro yoboene bwao ekero ogosanga ase obotuki obo, aka esimi ase ekeombe ekio gia KEMERI ERC: **020-272-2541, or 020-272-6781.**

Eng'ana yogwancha na kobeka esei (Your statement of consent and signature)

Onye gwasomire gose gosomerwa aria oganeiri gokora ase obotuki obo na gwanchire kobwaterana naintwe, koranche soma amangana akobwatia, na orengererie igoro yegetambokero ekio kwaimokirie otararika erieta riao gose kobeka esei.

Inyora ng'a okonacha kwao tigokouneneri boene bwao nonya ng'ake:

- Nasomeirwe na komanya obuya bwogosanga ase obotuki obo na bokong'u bonde bwensi borabe aroro.
- Nairwe ribaga riokoboria amabori ande onsi imbwate na ning'isanegete na amachibu ya amabori ane onsi.
- Nimanyete ng'a chirekodi chiane chionsi inchiarendetwe buya na nabo inkwerusia ase obotuki obo ngaki ende yonsi indaganie.
- Namanyigwe ase amariko; amarieta, chinamba chie esimi na ase indanyore abanto barang'e obokonyi ekero indagani obokonyi bwa bwango.
- Nanchire kobwaterana ase obotuki obo, naboigo nairwe ecopy ye efomu eye yogwancherana, erio kwegachera ase chirekodi chiane.

_____

Tel_____

Erieta riomounenkigwa (Participant's Name (printed) Enamba ye esimi

_____

Esei yomounenkigwa/earama ye ebiara (Signature or Participant or thumb print (for those who cannot sign)

Chitariki (Date) _____

Onye omounenkigwa takonyara gwesomera, Kirori goika abe aroro na abeke esei igaa (If volunteers cannot read the form themselves, a witness must sign here :)

Noo narenge chingaki chionsi ekero omounenkigwa arenge gosomerwa aria abwenerete komanya igoro yobotuki obo. Amabori onsi nairaneretigwe buya na bwancheranire kobwatanigwa ase obotuki obo.

_____

Erieta ria Kirori riakire echaba (Printed Name of Witness)

_____

_____

Esei ya Kirori (Signature of Witness) Chitariki/Date

Naenekiri buna kera egento igoro yobotuki obo, obuya nobobe borabaise kobwatia biaereseirwe na kobekwa maiso marore gochia ase omounenkigwa. (I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual).

_____

Erieta riomoobisa bwobotuki riakire echaba (Printed Name of Person Who Obtained Consent (Study staff)

_____

Esei yomoobisa bwobotuki (Signature of Person Who Obtained Consent)

_____Date

INYORA(NOTE): Tori kobwatoka boene bwao bwe richiko ase okobeka esei efomu eye. (You are not giving up any of your legal rights by signing this informed consent document)

Appendix 5: The Study Questionnaire

Determinants of Perinatal Care outcomes among mothers seeking antenatal Care services in selected Kisii county health facilities

The Principal Investigator (PI)

Mr.Micah Matiangí

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Email: miconyiego@gmail.com

Tel; 0723 727 325

Contact Person

The Secretary Kenya Medical Research Institute (KEMRI), Nairobi

P.O.Box 54840-00200 Nairobi.

Tel; 020 27222541,0722 205 901, 0733 400 003

Email; erc@Kemri.org

DETERMINANTS OF PERINATAL CARE OUTCOMES AMONG WOMEN SEEKING ANTENATAL CARE SERVICES IN PUBLIC AND NON-PUBLIC HEALTH FACILITIES IN KISII COUNTY	**Date:**	
	Client Code	
	Facility Name…… **Facility level/type……** **Contact……**	

STUDY SUBJECT AND FACILITY PROFILE (1ST ANC VISIT)

All information given in this questionnaire is strictly confidential

Name *(optional)*			**DOB:**	
Marital status:	**☐ Single ☐ Partnered ☐ Married ☐ Separated ☐ Divorced ☐ Widowed**			

PERSONAL HEALTH HISTORY

At what age did you get married? _____years

Comorbidities:	**☐ Diabetes ☐ Hypertension ☐ Arthritis ☐ Kidney disease ☐ others (specify)_____**	
Habits:	**☐ Smoking ☐ Alcohol use ☐ Other drugs used (specify)_____**	
Family History	**☐ Twinning**	**☐ Mental illness**
	☐ Chronic illness (specify)_____	**☐ Allergies**

Vitals	**Blood pressure**		**Current weight (kg)**		**Height (ft)**
	Pre-pregnancy weight		**Temperature (o_C)**		**MUAC (cm)**
	Pulse rate		**RR(B/min)**		**Fundal height**

Pregnancy was planned	**☐ Yes**	**☐ No**
History of having used any therapy to aid conception	**☐ Yes specify……**	**☐ No**

Where is she planning to deliver?_____	
History of mother having suffered an abortion? □Yes □No specify type_____	
History of having used FP method □Yes □No specify method used_____	
How many children do you have? Specify number_____	
Have you ever had a blood transfusion?	**□Yes □No**
If not a primi-gravida, when did she last deliver? Month and year_____mode of delivery_____Baby weight_____	
At what age did you get your first baby (if not a primi-gravida)_____	
Completed Education level:	**☐ primary ☐Secondary ☐ Tertiary ☐ University ☐ others(specify)**

Distance to facility:	☐ ≤5km ☐ 6-10km ☐ 11-20km ☐ 21-30km ☐ ≥ 30km

Monthly income:	☐ ≤ksh 10,000 ☐ ksh 11,000- 30,000 ☐ ksh31,000-50,000 ☐ ≥ ksh 50,000

Employment status:	☐ Employed ☐ unemployed ☐ Others (specify)_____

History of having undergone FGM □Yes □No

Pregnancy health practices					
Do you engage in Pica practice? ☐Yes ☐No specify item craved for?					
Means of transport to ANC clinic ☐ Public transport ☐ Motorbike ☐ walked					
Who gives you information on self-care during pregnancy? _____					
Exercise	☐ Sedentary (No exercise)				
	☐ Does she attend *Lamaze* classes? ☐Yes ☐No				
	☐ Mild exercise (i.e., climbing stairs, basic household chores)				
	☐ Occasional vigorous exercise (i.e., work or recreation, less than 4x/week for 30 min.)				
	☐ Regular vigorous exercise (i.e., work or recreation 4x/week for 30 minutes)				
Diet	Are you currently on any special diet?	☐	Yes	☐	No
	If yes, are you on a physician prescribed medical/therapeutic diet?	☐	Yes	☐	No
	History of food eaten for the last 24 hrs				
	Type of food (name of food)	**Amount eaten**	**Frequency**	**Timing (time the food was eaten)**	
	1				
	2				
	3				
	4				
	Do you drink water daily? Specify #glasses if yes……	☐Yes ☐No			

MENTAL HEALTH				
Number of hours the mother sleeps in a day (estimate)_____hrs.				
How do you rate the level of family support being accorded to you in pregnancy? ☐ satisfactory ☐ fair ☐ unsatisfactory				
Do you feel stressed?	☐	Yes	☐	No
Do you feel like you lack interest in carrying out activities of	☐	Yes	☐	No

daily living?				
Do you feel lonely?	☐	Yes	☐	No
Do you have problems with eating or your appetite?	☐	Yes	☐	No
Do you cry frequently?	☐	Yes	☐	No
Have you ever thought about hurting yourself?	☐	Yes	☐	No
Do you have trouble sleeping?	☐	Yes	☐	No
Have you ever been to a counselor?	☐	Yes	☐	No

If any, List signs and symptoms of ill health the mother may be having at the time of visit and action taken

……
……..……
……

☐	HIV	☐	Urinalysis	☐	HBsAg
☐	HB	☐	VDRL	☐	Zn++ levels
☐	Stool microscopy	☐	Vit. D levels	☐	Blood sugar
Comments					

LAB TESTS DONE AND THEIR RESULTS

Assessment of Care received by the client in the facility (QoC) –Be very observant and objective

	expected service at the facility	Yes	No	N/A	Comment
1	Mother attended to by a skilled midwife				
2	Abdominal assessment conducted				
3	Eligible vaccines administered				
4	Mother on IPT regimen				
5	Mother counselled on danger signs				
6	Feedback on pregnancy status given				
7	Mother counselled on diet				
8	Mother cancelled on skilled birth attendance				
9	Mother treated for adverse symptoms present				
10	Client accompanied by male partner				
11	Mother counselled on signs of labour				
12	Mother given the return date for next visit				
13	Client satisfied with services received				
14	Mother cancelled on birth planning				
15	Client cancelled on personal Hygiene				
16	Mother put on routine haematinics (Fe++,Folate)				
17	Mother received pre-conception counselling				
18	Mother knows her blood group & Rh status				
19	Confidentiality was observed during care				

Mothers' knowledge on pregnancy (1st trimester)

Knowledge assessing statement	**Response**		**Rating**
	Yes	**No**	**0------Wrong** **1-----Correct**
Sexual intercourse is prohibited during pregnancy			
Male partners should accompany their spouses to ANC clinic			
ANC care starts immediately a woman conceives			
Vomiting during pregnancy is normal			
Pregnancy increases the risk of urinary tract infections			

Total cost of services received –consider any items purchased or services paid for during ANC visit. Total in Ksh._____	☐ Free ☐ ksh 1 – 200 ☐ ksh 201- 500 ☐ > ksh 500

Is mother willing to return for 2nd visit	☐ Yes ☐ No ☐ others(specify)

Source of funds used for ANC services:	☐ self-financed ☐ Insurance ☐ others(specify)

Time taken to be served (in min)	_____Min

Outline any aspects of antenatal care given that the mother wishes to be improved

……
……
……..

Comments

Health facility Profile on provision of safe motherhood services

Type of facility		
☐ Public	☐ Non-public	
Maternal child health services offered by the facility		
☐ ANC	☐ Caesarian section	☐ labor and delivery
☐ ☐ MCH	☐ post natal care	☐ others(specify)
Facility ratio of midwives to clients seeking i)ANC services _____ii) Delivery services_____		

Category of equipment/drugs	**1**	**2**	**3**
BemOC equipment available			
MNCH staff are skilled in BemOC			
Emergency response system in place including checklists			
Referral system in place and well known by staff			
Financial system in place to avoid delayed referral			
Facility offers BemOC services			

Availability of BemOC equipment/resources (scale 1-3)-*refer separate list of BemOC equipment*	**1**	**2**	**3**
Parenteral or intramuscular antibiotics			
Uterotonic drugs (Oxytoxics)			
Parenteral anticonvulsants			
Equipment for manual placenta removal			
Equipment for removal of retained products of conception			

Availability of Basic Emergency Obstetric and Neonatal care services (in a scale of 1-3-refer key below-next page)

Key

1 100% requirement present/available
2 About 50% requirement available/present
3 Most of the essential equipment/resources/services in the category are not available

The number of essential MNCH HRH resource persons available (clarify from HRH returns)

The Human resource for health category	**Available**		**How many?**
	Yes	**No**	
Skilled midwives (those registered as midwives)			
Pharmacist			
Ambulance driver			
Physician			
Obstetric surgeon			
Midwives trained in BemOC			
Staff trained in CemOC			

NB; a skilled midwife is one who has trained in-service for 18 months or pre-

Self care health practices						
Do you engage in Pica practice? ☐**Yes** ☐**No** **specify item craved for?** _____						
Means of transport to ANC clinic ☐ **Public transport** ☐ **Motorbike** ☐ **walked** ☐ **persona**						
Exercise	☐ Sedentary (No exercise)					
	☐ Does she attend *Lamaze* classes? ☐ Yes ☐ No					
	☐ Mild exercise (i.e., climbing stairs, basic household chores)					
	☐ Occasional vigorous exercise (i.e., work or recreation, less than 4x/week for 30 min.)					
	☐ Regular vigorous exercise (i.e., work or recreation 4x/week for 30 minutes)					
Diet	Are you currently on any special diet?	☐	Yes	☐	No	
	If yes, are you on a physician prescribed medical/therapeutic diet?	☐	Yes	☐	No	
	History of last 24hrs feeding					
	Type of food (Name)	**Amount eaten**	**Frequency**			**Timing**
	1					
	2					
	4					
	Do you drink water daily? Specify #glasses if yes…….	☐	Yes	☐	No	

service for 3 years ***(Refer ICM definition of a midwife).***

Did mother receive Vit A suplimentation?	☐ Yes ☐ No
Does the mother have swelling of lower limbs?	☐ Yes ☐ No
Is the mother eating one extra meal a day?	☐ Yes ☐ No

Baseline information on selected facility pregnancy & labour complications (refer records)

MNCH indicator	# per month	#per year
Normal deliveries (SVD)		
Caesarian sections done		
Number of referrals		
Number of neonatal deaths		
Cases that developed labour related complications		
Cases that developed pregnancy related complications		
Number of newborns that developed complications		

STUDY SUBJECT ASSESSMENT IN THE SECOND (2nd) VISIT

Pregnancy self health care practices					
Do you engage in Pica practice? ☐Yes ☐No specify item craved for?					
Means of transport to ANC clinic ☐ Public transport ☐ Motorbike ☐ walked					
Who gives you information on self-care during pregnancy? _____					
Exercise	☐ Sedentary (No exercise)				
	☐ Does she attend *Lamaze* classes?				
	☐ Mild exercise (i.e., climbing stairs, basic household chores)				
	☐ Occasional vigorous exercise (i.e., work or recreation, less than 4x/week for 30 min.)				
	☐ Regular vigorous exercise (i.e., work or recreation 4x/week for 30 minutes)				
Diet	Are you currently on any special diet?	☐	Yes	☐	No
	If yes, are you on a physician prescribed medical/therapeutic diet?	☐	Yes	☐	No
	History of food eaten for the last 24 hrs				
	Type of food (name of	**Amount eaten**	**Frequency**		**Timing (time the food was**

	food)			**eaten)**
	1			
	2			
	3			
	4			
	Do you drink water daily? Specify #glasses if yes……		☐Yes ☐No	

Did mother receive Vit A suplimentation?	☐ Yes ☐ No
Does the mother have swelling of lower limbs?	☐ Yes ☐ No
Is the mother eating one extra meal a day?	☐ Yes ☐ No

Vitals	Blood pressure	Current weight (kg)	Height (ft)
	Last visit weight	Temperature (o_C)	MUAC (cm)
	Pulse rate		Fundal height (cm)

Calculate the amount of weight gained/lost ☐ gained…… ☐ lost……☐ still the same

Calculate the increase/decrease in FH ☐ increase…… ☐ decrease……☐ still the same

MENTAL HEALTH				
Number of hours the mother sleeps in a day (estimate) _____hrs.				
How do you rate the level of family support being accorded to you in pregnancy? ☐ satisfactory ☐ fair ☐ unsatisfactory				
Do you feel stressed?	☐	Yes	☐	No
Do you feel disinterested in carrying out your activities of daily living?	☐	Yes	☐	No
Do you feel lonely?	☐	Yes	☐	No
Do you have problems with eating or your appetite?	☐	Yes	☐	No
Do you cry frequently?	☐	Yes	☐	No
Have you ever thought about hurting yourself?	☐	Yes	☐	No
Do you have trouble sleeping?	☐	Yes	☐	No
Have you ever been to a counselor?	☐	Yes	☐	No

If any, List the signs and symptoms of ill health the mother may be having at the time of visit and action taken

……
……

☐	HIV	☐	Urinalysis	☐	HbsAg
☐	HB	☐	VDRL	☐	Zn++ levels
☐	Blood sugar	☐		☐	

LAB TESTS DONE AND THEIR RESULTS

Assessment of Care received by the client in the facility (QoC) –Be very observant and objective

	service given in facility	**Yes**	**No**	**N/A**	**Comment**
1	Mother attended to by a skilled midwife				
2	Abdominal assessment conducted				
3	Indicated vaccines administered (specify) ……..				
4	Mother put on IPT regimen				
5	Mother counselled on danger signs				
6	Feedback on pregnancy status given to the mother				
7	counselled on diet				
8	Mother cancelled on skilled birth attendance				
9	Mother treated for adverse physical symptoms present				
10	client is accompanied by male partner				
11	Mother counselled on signs of labour				
12	Mother given the return date for next visit				
14	Mother on routine haematinics (Folate,Fe++)				
15	Mother knows her blood group & Rhesus status				
16	Mother has haematinics compliance				
17	Mother child booklet well documented				
19	Mother satisfied with services in the facility				
20	Confidentiality was observed during care				

Outline any concerns the mother may raise on quality of care given.

……
……
……

Mothers 'knowledge on pregnancy (second trimester)

Knowledge assessing statement	Response		Rating 0-------Wrong 1------- Correct
	Yes	No	
It is normal to miss foetal movements for 24 hrs.			
Is not save to deliver firstborns in hospital			
Eggs and Chicken should be avoided during pregnancy			
It is save to deliver at home			
Frequent coffee intake causes abortion			

Total cost of services received. Factor any item bought or service paid for during ANC Visit. Total in Ksh._____	☐ Free ☐ ksh 1 - 200 ☐ ksh 201- 500 ☐ > ksh 500

Source of funds used for ANC services:	☐ self-financed ☐ Insurance ☐ others(specify)

Time taken to be served (in min)	_____Min

Is mother willing to return for 3rd visit	☐ Yes ☐ No ☐ others(specify)

Comments

STUDY SUBJECT ASSESSMENT IN THE THIRD (3rd) VISIT

HEALTH practices						
Do you engage in Pica practice? ☐Yes ☐No specify item craved for? _____						
Means of transport to ANC clinic ☐ Public transport ☐ Motorbike ☐ walked ☐ perso						
Exercise	☐ Sedentary (No exercise)					
	☐ Does she attend Lamaze classes? ☐ Yes ☐ No					
	☐ Mild exercise (i.e., climbing stairs, basic household chores)					
	☐ Occasional vigorous exercise (i.e., work or recreation, less than 4x/week for 30 min.)					
	☐ Regular vigorous exercise (i.e., work or recreation 4x/week for 30 minutes)					
Diet	Are you currently on any special diet? Specify_____	☐	Yes	☐	No	
	If yes, are you on a physician prescribed medical/therapeutic diet?	☐	Yes	☐	No	
	Diet History for 24 hrs.					
	Type of food eaten (list-by name)		**Amount taken**	**Frequency**		**Timing**
	1					
	2					
	3					
	4					
	Do you drink water daily? Specify #glasses if yes…….	☐	Yes	☐	No	

Did mother receive Vit A suplimentation?	☐ Yes ☐ No
Does the mother have swelling of lower limbs?	☐ Yes ☐ No
Is the mother eating one extra meal a day?	☐ Yes ☐ No

Vitals	Blood pressure (BP)_____	Current weight (kg)		Height (ft)
	Weight, last visit_____kg	Temperature (o_C)		MUAC (cm)
	Pulse rate	RR(B/min)		Fundal height (cm)

Calculate the amount of weight gained/lost ☐ gained…… ☐ lost……☐ not changed

Calculate the increase/decrease in FH ☐ increase…… ☐ decrease……☐ not changed

MENTAL HEALTH				
Averagely how many hours do you sleep in 24 hrs._____?				
How do you rate the level of family support being accorded to you in pregnancy? ☐ satisfactory ☐ fair ☐ unsatisfactory				
Do you feel stressed?	☐	Yes	☐	No
Do you feel disinterested in carrying out your daily activities of daily living?	☐	Yes	☐	No
Do you feel lonely?	☐	Yes	☐	No
Do you have problems with eating or your appetite?	☐	Yes	☐	No
Do you cry frequently?	☐	Yes	☐	No
Have you ever thought about hurting yourself?	☐	Yes	☐	No
Do you have trouble sleeping?	☐	Yes	☐	No
Have you ever been to a counselor?	☐	Yes	☐	No

If any, List the signs and symptoms of ill health the mother may be having at the time of visit and action taken

……
……
……

LAB TESTS DONE

☐	HIV	☐	Urinalysis	☐	HBsAg
☐	HB	☐	VDRL	☐	Zn++ levels
☐	Stool microscopy	☐		☐	Blood sugar

	service given in facility	**Yes**	**No**	**N/A**	**Comment**
1	Mother attended to by a skilled midwife				
2	Abdominal assessment conducted				
3	Indicated vaccines administered				
4	Mother put on IPT regimen				
5	Mother counselled on danger signs				
6	Feedback on pregnancy status given to the mother				
7	counselled on diet				
8	Mother cancelled on skilled birth attendance				
9	Mother treated for adverse physical symptoms present				
10	client is accompanied by male partner				
11	Mother counselled on signs of labour				
12	Mother given the return date for next visit				
14	Mother on routine haematinics (Folate,Fe++)				
15	Mother knows her blood group & Rhesus status				
16	Mother has haematinics compliance				
17	Mother child booklet well documented				
19	Mother satisfied with services in the facility				
20	Advised on post-partum care and expectations				

Outline any concerns raised by the mother on quality of care received
……
……

Total cost of services received. Consider any items bought or service paid for during ANC visit. **Ksh_____**	☐ Free ☐ ksh 1 – 200 ☐ ksh 201- 500 ☐ > ksh 500

Source of funds used for ANC services:	☐ self-financed ☐ Insurance ☐ others(specify)

Time taken to be served (in min)	_____Min

Is mother willing to return deliver in hospital	☐ Yes ☐ No ☐ others(specify)

Mothers ' knowledge on third (3rd visit)

Knowledge assessing statement	Response		Rating 0------ Wrong 1----Correct
	Yes	No	
Male partners should accompany spouses to labor ward			
Breast feeding starts immediately after delivery			
Skin to Skin care for a baby starts immediately after birth			
Caesarean section is better than a normal delivery			
It is safe for a mother to deliver in any health facility			

DELIVERY /PREGNANCY OUTCOME

	Labour/delivery practices (to be observed)	Yes	No	N/A	Comment
1	Mother accompanied by male partner				
2	Physical examination done				
3	Vaginal examination performed				
4	Individualised care given through first stage of labour				
5	Pain control achieved				
6	Due PMTCT care given (where applicable)				
7	Partograph charting done correctly to monitor labour				
8	Universal infection prevention observed				
9	Mother prepared for second stage of labour				
10	Complete delivery kit prepared & available				
11	Delivery conducted by skilled midwife				
12	Immediate new-born care given				
13	Active management of 3rd stage of labour done				
14	Monitoring in 4th stage done (every 15min)				
15	Kangaroo baby care practised				
16	Breastfeeding initiated in 5 min				
17	Mother counselled on Breastfeeding				
18	Mother counselled on postpartum self-care				

Duration of 1st stage	☐ **< 1 hour** ☐ **1hr to 2 hrs** ☐ **> 2 hrs** ☐ **others (specify)**

Duration of 2nd stage	☐ **< 15 min** ☐ **15min to 30 min** ☐ **> 30min** ☐ **others (specify)**
Duration of 3rd stage	☐ **< 15 min** ☐ **15min to 30 min** ☐ **> 30min** ☐ **others (specify)**

Indicate if the mother developed any of the following outcomes listed below (a mother may have more than one of the listed outcomes)

☐	Normal SVD	☐	Underwent caesarian section	☐	Developed a fistula
☐	Prolonged labor	☐	Fresh still birth	☐	Developed uterine rapture
☐	Obstructed labor	☐	Developed PPH	☐	Mother referred to another facility
☐	Baby died	☐	Preterm delivery	☐	Induced labor
☐	Episiotomy given	☐	LBW baby	☐	APH
☐	Developed lacerations	☐	Placenta retained	☐	Malpresentation
☐	Pre-eclampsia	☐	Eclampsia	☐	Congenital malformation
☐	Cord prolapse	☐	Foetal distress	☐	Vacuum delivery
☐	Maternal distress	☐	Referred	☐	Others (specify)

Indicate status of the baby and mother 1st visit after delivery

Mother status	☐ Normal ☐ developed complications (specify)
Baby status	☐ Normal ☐ developed complications (specify)

Appendix 6: Key informant interview guide

Interviewee name (*Jina la mhojiwa*)……Date(*Tarehe*)……

Name of interviewer_____

Dear informant,

I am Micah Onyiego, a PHD student from the Jomo Kenyatta University of Agriculture and Technology (JKUAT). I am interested in conducting a study on assessing the determinants of perinatal care outcomes. The findings shall be used to guide formulation and implementation of maternity care policies in Kenya. The session shall at most take 30 min. Your participation and co-operation is most welcome and appreciated. At the end of the session you are welcome to share any other opinions you may have on the subject under discussion.

Thanks in advance

Mpendwa mwelezaji,

Mimi ni Micah Onyiego, mwanafunzi wa PHD kutoka Jomo Kenyatta chuo kikuu cha Kilimo na Teknolojia Nina nia ya kufanya utafiti katika kuchunguza vielekezo vya matokeo ya huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa. Matokeo ya utafiti huu yatatumika kama kielelezo cha uvumbuzi na utimizaji wa sera za huduma ya uzalishaji na kizazi nchini Kenya. Muda wa zaidi sana kipindi hiki chaweza kuchukua ni dakika thelathini. Ushirikiano wako unakaribishwa na tutashukuru. Mwisho wa kipindi hiki cha mahojiano utaruhusiwa kushiriki maoni yako mengine ambayo waweza kuwa nayo kuhusu mada hii.

Asante ya mbeleni.

Theme one: Maternity care services

1. How do you compare free maternity and user fee based maternity services delivery?

   Unalinganishaje huduma za bure katika uzalishaji wa kina mama na utozaji ada katika kupeanwa kwa huduma hizi za uzalishaji wa kina mama?

2. What is your opinion how do you compare maternal care outcomes in each of the modalities?

   Toa maoni yako. Je unalinganishaje matokeo ya ulinzi wa kina mama wahusika katika kila ya aina hizi mbili za huduma za uzalishaji?

Theme two: Health facilities capacity

1. How are health facilities in Kisii County are prepared for quality perinatal care outcomes? Explain

   Je vituo vya afya katika kaunti ya Nairobi vimejiandaa vipi kwa kupeana huduma zenye matokeo bora kwa kina mama na watoto wao muda mfupi kabla ya kujifungua na muda mfupi baada ya kujifungua? Jieleze

2. What do you propose to be improved in facilities for better perinatal care outcomes?

   Je Wapendekeza nini kuboreshwa katika vituo vya afya kwa ajili ya heri kwenye matokeo ya huduma zinazopewa *kina mama na watoto wao muda mfupi kabla ya kujifungua na muda mfupi baada ya kujifungua?*

Theme three: Utilization of maternity services

1. Do you think free maternity care has improved utilization of maternity services? Explain

   Je unafikiri huduma za bure katika uzalishaji wa kina mama zimeboresha matumizi ya huduma hizo? Fafanua/Jieleze zaidi

2. What challenges are you experiencing in utilization of maternity services under free maternity care (FMC) policy?

Unakabiliwa na changa moto zipi katika matumizi ya huduma za kujifungua na uzazi wa kina mama katika sera ya huduma ya bure za uzalishaji/uzazi wa kina mama (FMC)?

Theme four: Perinatal care risks in Kisii county health facilities.

1. From your experience does FMC expose clients to any maternity care outcome risks?

   Kutokana na uzoefu wako, Je FMC huwaweka wateja wahusika katika hali ya kuhatarisha matokeo yao ya huduma za uzalishaji/uzazi?

2. What are your proposals to mitigate the aforementioned risks?

   Unamapendegezo yapi kuzuia hatari ulizozitaja mbeleni?

Thank you very much for the time dedicated.

Asante sana kwa muda wako na kwa kujitolea kwako.

Appendix 7: FGD tool for women receiving Free maternity care (FMC) services

Date of interview:_____

Start time: _____

End time: _____

Number of participants_____

Name of moderator_____

Name of assistant moderator_____

Name of note takers;

Note taker 1_____

Note taker 2_____

Dear discussants,

I am Micah Onyiego, a PHD student from *Jomo Kenyatta* University. I am interested in conducting a study in this county on the determinants of perinatal care outcomes in Kisii County. The findings shall be used to improve on the quality of care expectant mothers receive and more especially in regard to formulation and implementation of perinatal care policies. The session shall at most take 1 hour. Your participation and co-operation is most welcome and appreciated. At the end of the session you are welcome to share any opinions you may have on the subject under discussion

Thanks in advance.

Wapendwa wajadala,

Mimi ni Micah Onyiego, mwanafunzi wa PHD kutoka Jomo Kenyatta chuo kikuu cha Kilimo na Teknolojia Nina nia ya kufanya utafiti katika kuchunguza vielekezo vya matokeo ya huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa. Matokeo ya utafiti huu yatatumika kama kielelezo cha uvumbuzi na utimizaji wa sera za huduma ya uzalishaji na kizazi nchini Kenya. Muda wa zaidi sana kipindi hiki chaweza kuchukua ni dakika thelathini. Ushirikiano wako unakaribishwa na tutashukuru. Mwisho wa kipindi hiki cha mahojiano utaruhusiwa kushiriki maoni yako mengine ambayo waweza kuwa nayo kuhusu mada hii.

Asante ya mbeleni.

Theme one: perinatal care services.

Icebreaker: Each of you to tell us something about herself

Kila mmoja wenu tuelezeni kitu fulani kujihusu mwenyewe

Sub theme one: perinatal care services.

1. What does perinatal care mean to you?

   Perinatal care au *huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa inamaana gani kwako?*

   Probe: What is the importance of such services?

Ni nini umuhimu wa huduma za aina hii

Probe: what should be the standard of such services from consumers' perspective?

je kiwango cha huduma za aina hii chapaswa kuwaje kulingana na mtazamo wa wateja?

2. How how do you rate perinatal care services in the facility you are attending in the county?

Unaweza kuorodhesha vipi huduma za 'Perinatal care' au huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa katika kituo cha afya ambacho wewe huhudhuria nchini?

Probe: Affordability of maternity services

Uwezo wa kununua huduma za uzazi/uzalishaji

Probe: quality of perinatal care services.

ubora wa huduma za 'Perinatal care' yani huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa

Theme two: Outcomes of perinatal care services in Kisii County

Sub theme one: determinants of perinatal care outcomes

Probes:

1. What do you think determines the outcome of perinatal care?

   Unafikiri ni nini huchangia kama vielekezo kwa matokeo ya 'perinatal care' yani huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa. ?

2. Which one plays a major role compared to others? Why?

Ni nini huchangia pakubwa zaidi ukilinganisha na zingine zote? Kwanini?

2. Do you think free maternity care has any effect on perinatal care outcomes? Which one?

   Je unafikiri *huduma za bure katika uzalishaji wa kina mama huathiri matokeo ya 'perinatal care' yani huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa. ? Athari zipi?*

Sub theme two: perinatal care outcomes

Probes:

1. Which good perinatal care outcomes that each mother should experience ?

   Ni matokeo yapi mema ya 'perinatal care' ambayo kila mama anapaswa kupata fursa kupitia?

2. What are the bad perinatal outcomes that mothers should not experience?

   Ni matokeo yapi maovu ya 'perinatal care' ambayo kila mama anapaswa kuhepuka?

Theme three: Health facilities' Capacities

Sub theme one: Human resource for health in maternity facilities

Probe:

1. In your opinion do we have adequate staffing in maternity care facilities? Why?

   Kwa maoni yako je tuna wahudumu wa kutosha katika vituo vya kupeana huduma za uzalishaji ? Mbona?

   Probe: How long does it take to be served?

Huchukua muda gani kuhudumiwa?

Probe: in addition to staffing, what else is affecting perinatal care service delivery?

Kuongezea kwa wahudumu, ni mambo gani mengine ambayo huathiri huduma zinazotolewa katika *'perinatal care' yani huduma za uzazi zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa. ?*

2. In your opinion, how do you rate customer care services in your perinatal care facility?

   Kwa maoni yako, unaweza kuorodhesha vipi huduma kwa wateja katika kituo chakocha 'Perinatal care' yani kituo chako cha huduma za uzazi

zinazopeanwa muda mfupi kabla na muda mfupi baada ya mototo kuzaliwa.

Probe: quality of communication between mothers and service providers?

Ubora wa mawasiliano kati ya kina mama na wahudumu?

Probe: Confidentiality of services?

Usiri wa huduma

Probe: Mothers' health education?

Mafunzo ya afya kwa mama wahusika

Laboratory/diagnostic services?

Maaabara na huduma za utambuzi wa magonjwa?

Thank you very much for your participation in this discussion

Asante sana kwa ushirika wako kwenye majadiliano haya

Appendix 8: letter of approval from SERU

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website:www.kemri.org

KEMRI/SSC/103530 15th February, 2015

Matiang'i Micah

Thro'
Director, CPHR
NAIROBI

Forwarded
17/02/2015

REF: SSC No. 2989 (Revised) – Determinants of Perinatal Care Outcomes among Pregnant Women Attending Health Facilities in Kisii County

I am pleased to inform you that the above mentioned proposal, in which you are the PI, was discussed by the KEMRI Scientific Steering Committee (SSC), during its 223rd meeting held on 4th February, 2015 and has since been approved for implementation by the SSC.

Kindly submit 4 copies of the revised protocol to SSC within 2 weeks from the date of this letter, i.e, 27th February, 2015 for onward transmission to the ERC.

We advise that work on this project can only start when ERC approval is received.

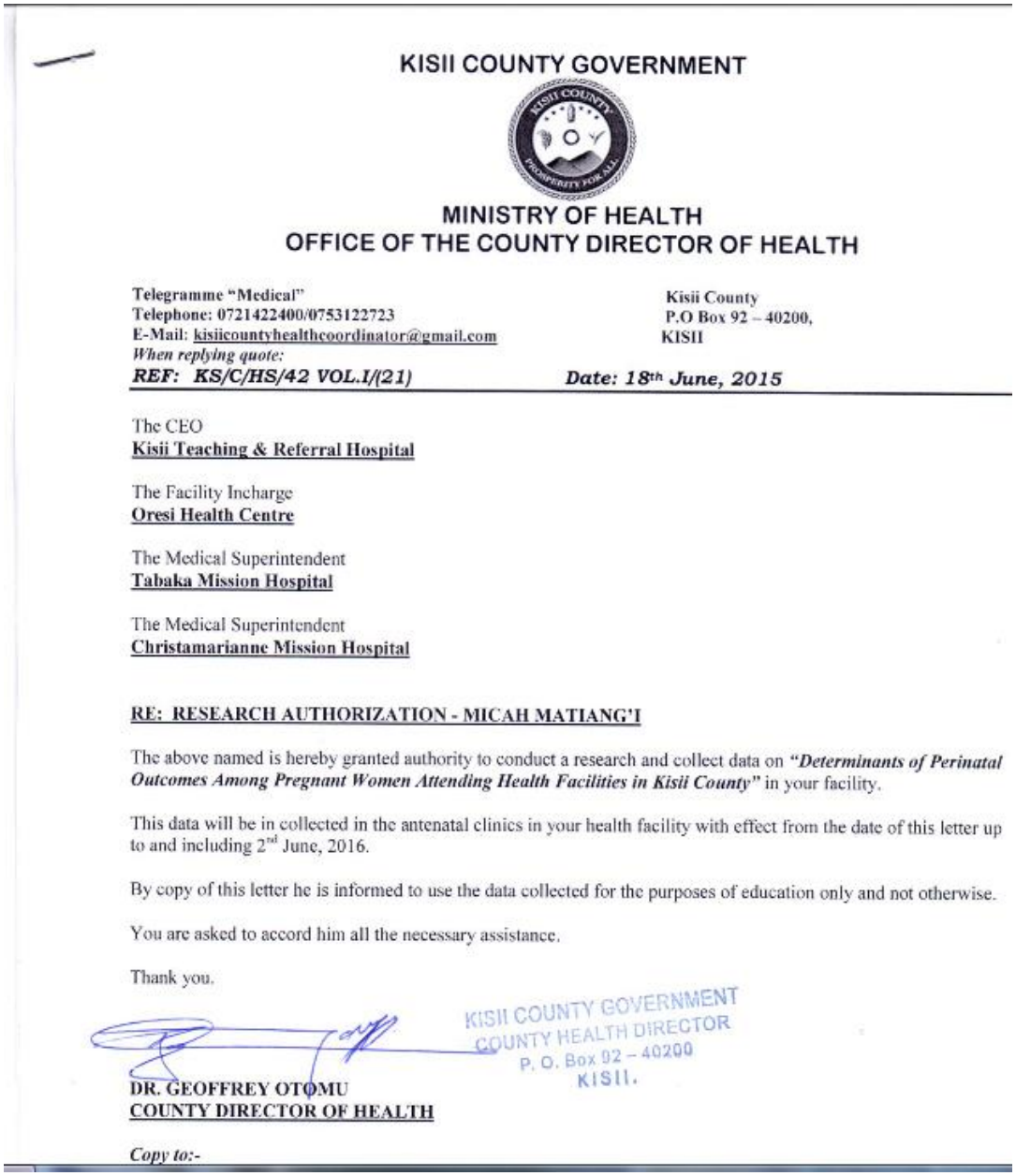
Sammy Njenga, PhD
SECRETARY, SSC

Encl(s)

17

In Search of Better Health

Appendix 9: Letter of authorization, Kisii County



KISII COUNTY GOVERNMENT

MINISTRY OF HEALTH
OFFICE OF THE COUNTY DIRECTOR OF HEALTH

Telegramme "Medical"
Telephone: 0721422400/0753122723
E-Mail: kisiicountyhealthcoordinator@gmail.com
When replying quote:
REF: KS/C/HS/42 VOL.I/(21)

Kisii County
P.O Box 92 – 40200,
KISII

Date: 18th June, 2015

The CEO
Kisii Teaching & Referral Hospital

The Facility Incharge
Oresi Health Centre

The Medical Superintendent
Tabaka Mission Hospital

The Medical Superintendent
Christamarianne Mission Hospital

RE: RESEARCH AUTHORIZATION - MICAH MATIANG'I

The above named is hereby granted authority to conduct a research and collect data on ***"Determinants of Perinatal Outcomes Among Pregnant Women Attending Health Facilities in Kisii County"*** in your facility.

This data will be in collected in the antenatal clinics in your health facility with effect from the date of this letter up to and including 2nd June, 2016.

By copy of this letter he is informed to use the data collected for the purposes of education only and not otherwise.

You are asked to accord him all the necessary assistance.

Thank you.

KISII COUNTY GOVERNMENT
COUNTY HEALTH DIRECTOR
P. O. Box 92 – 40200
KISII.

DR. GEOFFREY OTOMU
COUNTY DIRECTOR OF HEALTH

Copy to:-

Appendix 10: Approval Letter from JKUAT

S/F
0723727825

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY

DIRECTOR, BOARD OF POSTGRADUATE STUDIES

P.O. BOX 62000
NAIROBI – 00200
KENYA
52711/52181-4
Email: director@bps.jkuat.ac.ke
602225

TEL: 254-067-

MOBILE: 0708-

OFFICE OF THE GRADUATE
RECEIVED
09 AUG 2016
PROGRAM COORDINATOR
ITROMID

REF: JKU/ 2/11/TM410-1466/2012

11th April, 2016

Mr. Matiang'i Micah
C/o SPH
JKUAT

Dear Mr. Matiang'i,

RE: APPROVAL OF Ph.D. RESEARCH PROPOSAL AND SUPERVISORS

Kindly note that your research proposal entitled: **"(Determinants of perinatal outcomes among pregnant women attending health facilities in Kisii County, Kenya)"** has been approved. The following are your approved supervisors:-

1. Prof. Simon Karanja
2. Dr. Kenneth Ngure
3. Dr. Peter Wanzala

Yours sincerely

PROF. MATHEW KINYANJUI
DIRECTOR, BOARD OF POSTGRADUATE STUDIES
Copy to: Dean, SPH
/rl

JKUAT is ISO 9001:2008 &14001:2004 Certified
Setting Trends in Higher Education, Research and Innovation

Appendix 11: Approval of ammendments

30

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840 - 00200 NAIROBI - Kenya
Tel: (254) (020) 2722541, 254 (020) 2713349, 0722-205901, 0733-400003 Fax (254) (020) 2720030
Email: director@kemri.org info@kemri.org Website:www.kemri.org

KEMRI/RES/7/3/1 **May 19, 2016**

TO: **MR. MICAH MATIANG'I,**
PRINCIPAL INVESTIGATOR

For **THROUGH:** **DR. CHARLES MBAKAYA,**
THE DIRECTOR, CPHR,
NAIROBI

Forwarded
30/5/2016

Dear Sir,

RE: **PROTOCOL No. SSC 2989 *(RESUBMITTED 1ST AMENDMENT):* DETERMINANTS OF PERINATAL OUTCOMES AMONG PREGNANT WOMEN ATTENDING HEALTH FACILITIES IN KISII COUNTY**

Reference is made to your letter dated 10th May, 2016. KEMRI/Scientific and Ethics Review Unit (SERU) acknowledges receipt of the revised documents on 16th May, 2016.

This is to inform you that the Committee determines that the issues raised at the 250th Committee A meeting of the KEMRI/SERU held on 12th April, 2016 are adequately addressed.

You are therefore **authorized** to implement the following Amendments accordingly:

1. Assessment of subjects' exposure to low/high haemoglobin (HB) levels as a proxy indicator of the haematinics levels (Fe++, Folate and Vitamin B12) in their circulation.
2. Inclusion of procedure of checking the study subjects' abnormal Zinc (Zn++) at least two out of three pregnancy trimesters in order to identify a mother with Zinc imbalance.

Please note that you are responsible for submitting any further changes to the approved version of the study protocol to SERU for review and the changes should not be initiated until written approval from the SERU is received.

Yours faithfully,

For: **DR. EVANS AMUKOYE,**
ACTING HEAD,
KEMRI/SCIENTIFIC AND ETHICS REVIEW UNIT

Appendix 12: Evidence of conference presentations

	Evaluation of Human Epidermal Growth Factor Receptor-2 and Hormonal Receptor Expression Patterns in Breast Cancer from Fine Needle Aspiration Cytology.	pattern of severe maternal and neonatal outcomes at Kenyatta National Hospital, before and after the introduction of Free Maternity Services.	
2:20 to 2:30pm	**Abstract 33: Joshua Muithya Munywoki**[1] Enhancing Cancer Control in Kenya through Knowledge Translation.	**Abstract 56: Claire Luseno Otunga**[1] Assessment of Utilization of Postpartum Care Services Among Women in Webuye West, Bungoma County, Kenya.	Correct treatment matters – the example of dehydration **(Dr. Sam Akech)**
2:30 to 2:40pm	**Abstract 61: Ojwang Athoka Joshua**[1] Utility of Brush Cytology in Evaluation of Pre-Malignant and Malignant Oral Mucosal Lesions among Dental Patients Attending Kenyatta National Hospital.	**Abstract 76: Micah Onyiego Matiang'i**[1] Perinatal Outcome Determinants in public and non-public health facilities in the context of free maternity care in Kisii County.	Can feedback improve policy adoption **(Dr. Philip Ayieko)**
2.40 to 3:00pm	**Discussion**	**Discussion**	
	Track 10 (Lecture Theatre 3)	**Track 11 (Surgery B/Room)**	**Track 12 (Paediatrics ACTS) Symposium "Common Data, a huge**

Abstract 76

Perinatal Outcome Determinants in public and non-public health facilities in the context of free maternity care in Kisii County

Micah Onyiego Matiang'i[1] Simon Karanja, Peter Wanzala, Kenneth Ngure

[1]*Amref Health Africa*

Background: It is estimated 90% of maternal moralities are from developing countries, where access to skilled care is limited. Despite adoption of universal health care for maternity services in SSA countries Kenya included , implementation of "free maternity" care has been relative thus there is need to understand the determinants of perinatal outcomes in comparable public and non-public facilities.

Study Objectives:The study sought to assess client & facility-level factors & the relationship between the two in determining perinatal outcomes among women seeking ANC care in Kisii County Health facilities.

Methodology: A prospective cohort study with study subjects drawn from 4 comparable public non-public level 4 health facilities. At the start 365 mothers were recruited. However, 287 (public=187, non-public=100) mothers were followed up to 2 weeks after delivery. Targeted variables were measured at baseline (1st), 2nd and 3rd follow up visits. Mixed methods were employed in data collection. Chi-square tests were used to determine differences between client/facility factors and perinatal outcomes; Paired t and McNemar's tests were used to compare relative means of different factors at different ANC visits for parametric and non-parametric data respectively while Logistic Regression tests were used to measure odds of a normal or abnormal perinatal outcome versus specific study indicators.

Results: At the end of the follow-up 31/287women (11% cumulative incidence in a period of 6 months) developed abnormal perinatal outcomes. Overall, no statistically significant differences were noted in perinatal outcomes between public and non-public facilities. However, higher maternal BMI was significantly associated with abnormal perinatal outcome ($\chi 2$= 8.900, d.f =3, p=0.031) while higher parity was associated with normal perinatal outcome ($\chi 2$= 13.232, d.f =4, p=0.039). A significant relationship existed between a mother's knowledge of pregnancy related issues and the baby's weight (t=-67.8 d.f. 213 p<0.001). Mothers who were accompanied by their spouses at each visit to the ANC had a 26% higher chance of normal delivery compared to mothers who were unaccompanied for all the 3 ANC visits (OR 0.26 95% CI 0.08-0.792 p=0.02). Individuals who delivered at facilities with low midwife-client ratio

June 21, 2017

Sara Harris, MSPH
Population Reference Bureau (PRB)\
1875 Connecticut Ave NW, Suite 520
Washington DC 20009

To whom it may concern,

We are writing this letter on behalf of Micah Matiang'i. He successfully completed the Policy Communication Fellows Summer Institute, held in Dar es Salaam Tanzania, from June 11-17, 2017. Micah was an outstanding participant and contributed his policy expertise and research background to the institute proceedings. His contributions were consistently thoughtful and of high-quality. Micah presented a thorough, convincing, and evidence-based final presentation, entitled "The Hidden Cost in Free Maternity Services Policy." As a facilitator, I was impressed by how he incorporated many of the lessons learned throughout the week on effective policy communication strategies. We look forward to his participation in the remaining program year through online coursework.

Kind Regards,

Sara Harris
Policy Analyst

Barbara Seligman
Vice President, International Programs

Appendix 13: First publication

pagepress

Journal of Public Health in Africa 2017; volume 8:689

Effects of mother related factors on perinatal outcomes-a study of mothers seeking antenatal care at public and non-public health facilities in Kisii County, Kenya

Micah Matiang'i,[1] Simon Karanja,[1] Peter Wanzala,[2] Kenneth Ngure,[1] Albino Luciani[3]

[1]School of Public Health-Jomo Kenyatta University of Agriculture and Technology; [2]Centre for public health research, Kenya Medical Research Institute (KEMRI); [3]Center for Global Health Research, Kenya Medical Research Institute, Kisumu, Kenya

Abstract

The study sought to determine client-level and facility-level factors that affect perinatal outcomes among women attending comparable public (government owned) and non-public health facilities (non-government owned) in *Kisii* County-Kenya in the context of free maternity care. A total of 365 pregnant mothers recruited in 4 health facilities during their ANC visit and followed up to 2 weeks post-delivery but only 287 attended all follow-up visits. Study subjects were recruited proportionate to number of deliveries each of the facilities had conducted in the preceding 6 months. The dependent variable was perinatal outcome; independent variables were demographic and clinical factors. Analysis was done using χ^2, logistic regression, paired t and McNemar's tests. Maternal BMI and a mother's parity were statistically correlated

Introduction

Through various Maternal and Child Health (MNCH) commitments, WHO member developing countries[1,2] introduced free and universal access to maternity care services in public health facilities to improve perinatal care outcomes. While this is commendable, evidence shows that neonatal health outcomes among other perinatal outcomes are subject to the effectiveness of antenatal care given to mothers.[3]

The Government of Kenya (GOK) introduced Free Maternity Care (FMC) services for Primary Care[4] to address critical barriers to quality Antenatal Care (ANC) and associated perinatal outcomes. It is documented that risks for adverse perinatal outcomes includes maternal age, parity, race, smoking, birthweight and labor complications.[5] However, there is need to understand whether free maternity care contexts have any effect on some of these determinants.

Materials and Methods

A prospective cohort study design where a total of 365 mothers were recruited from 2 public (Oresi and Kenyenya) and 2 non-public (christamarrianne and Tabaka) health facilities based on the volume of deliveries in the preceding 6 months in each of the facilities. Oresi had conducted 789 deliveries in 6 months, Kenyenya 686, Christamarrianne 515 and Tabaka 388 deliveries. Analysis was done using 287 mothers who attended 3 follow-up ANC visits including the follow-up 2 weeks after delivery. A mother's social-demographic data was collected. Variables measured during follow-up were weight gain, mid-upper arm circumference (MUAC), blood pressure (BP) and urinalysis checks. Also tests

Correspondence: Micah Matiang'i, School of Public Health-Jomo Kenyatta University of Agriculture and Technology, Kisumu, Kenya.
Tel.: +254.723.727.325.
E-mail: miconyiego@gmail.com

Key words: Perinatal; pregnancy; maternal child health; free maternity care.

Acknowledgments: we would like to thank the study participants for their participation in the study and the staff at the participating health facilities for supporting data collection.

Funding: 90% of the work was self-funded and 10% funded by a Social Innovations Committee (SIC) under Danone ecosystem.

Contributions: MM conceptualized the study design, study implementation, conducted data cleaning, literature review and drafted the manuscript. SK, PW and KN reviewed the analysis and manuscript and provided key technical comments on manuscript revision. AL assisted in data management and manuscript review.

Conflict of interest: the authors declare no conflict of interest.

Conference presentation: June 2017, University of Nairobi, College Of Health Sciences and Population Reference Bureau (PRB), policy communication fellows summer institute in Dar-es-salaam Tanzania.

Received for publication: 27 April 2017.
Revision received: 5 July 2017.
Accepted for publication: 5 July 2017.

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Journal of Public Health in Africa 2017; 8:689
doi:10.4081/jphia.2017.689

Appendix 14: Second publication

Asian Pac. J. Health Sci., 2017; 4(2):183-190 e-ISSN: 2349-0659, p-ISSN: 2350-0964

Document heading doi: 10.21276/apjhs.2017.4.2.30 Research Article

The effects of facility-related factors on perinatal outcomes-a study of mothers attending antenatal services at public and non-public health facilities in Kisii County in the context of free maternity care services

Micah Matiang'i[1*], Simon Karanja[2], Peter Wanzala[2], Kenneth Ngure[3], Albino Luciani[4]

[1*] School of Public Health-Jomo Kenyatta University of Agriculture and Technology, Kenya
[2] School of Public Health -Jomo Kenyatta University of Agriculture and Technology, Kenya
[3]Centre of public health research, Kenya Medical Research Institute (KEMRI), Kenya
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ABSTRACT

Background: To improve perinatal outcomes, many countries in Sub-Saharan Africa are introducing universal access to maternal and newborn care. In June 2013the government of Kenya introduced free maternity services in all public health facilities to increase skilled birth attendance. Facility-related determinants of perinatal outcomes in the context of free maternity care have not been well documented in the study area. **Methods**: Data based on biological variables, access to and quality of services was collected from mothers attending antenatal clinic (ANC) at the 1st visit, 2nd and 3rd visits (which coincided with the 1st, 2nd and 3rd trimesters) up to 2 weeks post-delivery. Some variables such as distance to the facility were measured only at baseline while biological variables were monitored in each of the subsequent visits. Enumerators for the study were midwives at the selected facilities. The primary outcome was the final perinatal outcome (i. uneventful pregnancy, delivery and puerperium or ii).An abnormal perinatal outcome (stillbirth, neonatal ill health, maternal death, maternal ill health, maternal disability, birth injuries & trauma, normal baby/neonate). The secondary outcome was weight at birth. Frequency of facility factors against normal vs abnormal perinatal outcomes was compared by χ^2 testing, the odds of perinatal outcome versus specific facility indicators were calculated using Logistic Regression tests and McNemar's tests were used to compare relative means (of numeric variables) of different factors at different ANC visits. **Results**: Data from 287 mothers who attended all the 3 follow-up ANC visits was analysed out of the 365 mothers recruited during the first visit. Out of the 287 study subjects, 65% (187) of were drawn from public health facilities (Oresi & Kenyenya) while 35% (100) were drawn from non-public facilities (Christamarriane/CMMH and Tabaka). McNemar's test statistic to check for the relationship between the distance to a facility and perinatal outcome show that perinatal outcomes were not with distance to facilities. No statistically significant differences were observed in public vs non-public hospitals among mothers who were served and delivered by skilled midwives and those who were attended to by non-skilled midwives (only 12 individuals were attended to by non-skilled midwives). Individuals who delivered at facilities with low midwife-client ratio had a 5% higher likelihood of having a normal perinatal outcome as compared to those delivering in facilities with high staffing ratios (OR =0.05, 95% CI 0.046-0.055, p=0.006)**Conclusion**: In free maternity care contexts, facility-level factors play a crucial role in positive perinatal outcomes. There is need to strengthen information dissemination by health workers, training and in-service support for midwives and ensure optimal staffing levels at health facilities.

Key Words: Public and Non-public Hospitals,, perinatal outcome, Skilled Birth attendance, , Caesarean section,

Introduction

To reduce under-five mortality by two thirds and reduce maternal mortality by three-quarters between 1990 and 2015, United Nations member countries agreed to implement the Millennium Development Goals (MDGs) 4 and 5 [1,2].This was followed with some countries implementing universal free maternity care policies regardless of cardinal elements such as the effectiveness of care being offered at health facility level to reduce maternal and neonatal mortalities [3]. In

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Appendix 15: Third publication- policy brief

Opinion Article | SOJ Nursing & Health Care | Open Access

Are Free Maternity Services in Kenya really free?

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Received: January 25, 2018; Accepted: March 19, 2018; Published: March 20, 2018

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Introduction

In developing countries where inequalities to health care are common, providing universal access to health care for all women is important to reduce birth related complications. Evidence shows that poor outcomes for mothers and babies during the perinatal period – the few weeks immediately before and after birth are linked to limited use of skilled care in health facilities. Among the barriers to using skilled birth attendance services in developing countries is the cost of care [1]. In June 2013, Kenya introduced a free maternity care policy to improve on the poor maternal and neonatal health outcomes that were being experienced. At that time, Kenya's maternal mortality rate was 488 per 100,000 live births compared to developed countries such as Switzerland which by then had a maternal mortality rate of 5 per 100,000 live births [2].

This policy was meant to enable Kenya increase use of health facility based services by mothers, achieve national development goals (Vision 2030) and global health development targets (SDGs 3, 5 and 10). However, this policy was implemented oblivious of other factors that also directly affect pregnancy outcomes such as the number of health care workers available, availability of supplies and equipment, access to quality of health education in health facilities. At the time of policy implementation, the staffing ratios in facilities stood at 159 nurses for every 100,000 population and 21 doctors for every 100,000 population [2].

Although the Free Maternity Services (FMS) policy is being implemented in Kenya, it is facing challenges from other factors such as availability of staff, inconsistent disbursement of funds to counties, limited supplies and lack of personalized care at facility level. There is an urgent need to review the policy, otherwise quality health care for mothers and their new-borns is at risk.

access to health care, only 44% of mothers in Kenya were able to access skilled birth attendance (SBA) [4, 5, 6]. The cost of receiving antenatal and delivery services has been observed as one of the barriers that hinder mothers using skilled services in Kenya's public health facilities [7, 8].

Prior to FMS implementation, the Ministry of Health was supposed to employ additional 19,515 nurses and establish 3,091 health facilities in order to meet the national demand for quality maternal services [9, 10]. Due to resource constraints the government was only able to implement the policy at an estimated cost of $25-$50 per mother against the world bank estimated figure of $148-$170 per mother for the full cycle of pregnancy including maternity care[11]. The FMS policy was also implemented in a context where public facilities had a perennial history of limited infrastructure; by the time of implementation, only 36% of public health facilities had the basic minimum requirements to handle deliveries and associated emergencies during deliveries [12].

A cost free policy yet costly on implementation

Increased workload on service providers

Implementation of the FMS policy under the devolved health care system in Kenya has seen use of facility based services increase by a range of 50-90% at county level [13, 14]. With the increased use of facility services under FMS policy, the number of caesarean sections, referrals and preterm babies also increased (Table 1 & Figure 1) thus putting pressure on the existing human resource for health.

Extra hidden costs to implement FMS

A couple of surveys that have been carried out show that since implementation of the FMS policy, health facilities are hav-

Appendix 16: The map of Kisii County