

**INFLUENCE OF THE NUMBER OF ANC VISITS ON  
PREGNANCY OUTCOMES OF MOTHERS DELIVERING AT A  
RURAL HOSPITAL, LONGISA DISTRICT HOSPITAL.**

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# TABLE OF CONTENTS

	Page
TABLE OF CONTENTS .....	ii
DECLARATION .....	iv
CERTIFICATE OF SUPERVISION .....	v
CERTIFICATE OF AUTHENTICITY .....	vi
ACKNOWLEDGEMENTS.....	vii
DEDICATION.....	viii
LIST OF ABBREVIATIONS.....	ix
LIST OF FIGURES AND TABLES .....	x
LIST OF FIGURES .....	x
LIST OF TABLES .....	x
ABSTRACT .....	xi
1. INTRODUCTION AND LITERATURE REVIEW .....	1
2. CONCEPTUAL FRAMEWORK.....	5
3. STUDY JUSTIFICATION .....	6
4. RESEARCH QUESTIONS.....	6
5. NULL HYPOTHESIS.....	6
6. OBJECTIVES.....	6
6.1 Broad objective.....	6
6.2 Specific objectives .....	7
7. METHODOLOGY .....	8
7.1 Study design .....	8
7.2 Study site.....	8
7.3 Study population.....	8
a) Inclusion criteria .....	8
b) Exclusion criteria.....	8
7.4 Study period .....	9
7.5 Sample Size Determination.....	9
7.6 Sampling procedure .....	10

7.7 Source and recruitment of study participants .....	10
7.8 Data variables .....	10
7.9 Data management .....	11
7.10 Data analysis.....	11
7.11 Ethical Considerations .....	11
8. RESULTS.....	13
9. DISCUSSION.....	20
10. CONCLUSIONS .....	23
11. RECOMMENDATION .....	23
12. TIME LINES .....	24
13. BUDGET.....	25
14. REFERENCES.....	26
15. APPENDICES .....	29
a) Questionnaire .....	29
b) Consent Form .....	34
c) Glossary.....	36
APPROVAL BY KNH/UON ERC.....	38

## **DECLARATION**

I do declare that this research was undertaken by me in part fulfillment of the Masters of Medicine in Obstetrics and Gynaecology of the University of Nairobi, it is my original work and has not been undertaken and presented for a degree in any other university.

Signed:.....DR. MICHAEL ODWORY.

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To my fellow colleagues in the department, it was a pleasure working with you, thank you.

## **DEDICATION**

With great affection this book is dedicated to my colleagues, young and old in the field of medicine.



## **LIST OF ABBREVIATIONS**

**ANC-** Ante-Natal Care.

**WHO-** World Health Organization.

**MDGs-** Millennium Development Goals.

**KDHS-**Kenya Demographic Health Survey.

**UNICEF-** United Nations Children’s Fund.

**STI-** Sexually Transmitted Infection.

**HIV/AIDS-** Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome.

**FANC-** Focused Ante-Natal Care.

**KNH -** Kenyatta National Hospital.

**IUFD -**Intra-Uterine Fetal Demise.

**NBU-** NewBorn unit.

**MMR-** Maternal Mortality Ratio.

**UN-** United Nations.

**TBAs-** Traditional Birth Attendants.

**NGO-** Non-Governmental Organization.

**APGAR score-** Appearance, Pulse, Grimace, Activity, Respiration- used to quickly assess newborn status at birth, to determine whether a newborn needs immediate medical attention.

**PROM-** Premature rupture of membranes.

# LIST OF FIGURES AND TABLES

Page

## LIST OF FIGURES

Figure 1: Study flow .....	13
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## LIST OF TABLES

Table 1: Socio-demographic factors of study participants and the number of ANC visits .....	14
Table 2: Past obstetric and medical history and the number of ANC visits .....	15
Table 3: Perinatal outcomes and the number of ANC visits .....	17
Table 4: Maternal outcomes and the number of ANC visits .....	18

## ABSTRACT

**Background:** Antenatal care (ANC) is the care that a woman receives during pregnancy. ANC improves maternal and fetal outcomes. Focused antenatal care (FANC) emphasizes on quality rather than quantity of ANC visits and is the recommended approach. It is unknown if visits fewer than the recommended minimum of four in FANC can have the same effect on maternal and perinatal outcomes. This may be important in Africa given the never ending shortage of human resource and infrastructure for health.

**Objective:** To determine the number of ANC visits and their influence on maternal and perinatal outcomes at a rural Kenyan hospital.

**Study design:** Retrospective cohort.

**Study population:** Women admitted in Longisa District Hospital postnatal ward after delivery at or above 28 weeks gestation and had ANC.

**Study site:** Postnatal ward, Longisa District Hospital, Bomet County, Kenya.

**Study procedure:** Eligible women were enrolled and data was collected on parity, age, marital status, economic status, number of ANC visits, gestation age at delivery, onset of labour, mode of delivery, maternal complications and mortality, 5 minute APGAR score, birth weight and fetal death. Data analysis was carried out using the Statistical Package for Social Sciences version 17.0 (SPSS Inc, Chicago, IL, USA). Chi-square and Student's t-test were used to test for association.

**Results:** Of the screened postpartum women, two hundred (98.0%) were eligible. Most, 122(61.0%) of the eligible women had <4 ANC visits. Majority, 167(83.5%) of the participants were married; 101(50.5%) were para 2 to 4; 131(65.5%) were housewives; 133(66.5%) had primary level of formal education; 186(93.0%) had live births; 165(82.5%) had spontaneous vertex delivery; 192(96.0%) had spontaneous onset of labour, and 175(87.5%) had no complication at or post partum. Of the neonates delivered, 176(88.0%) had 5 minute APGAR score >7; 185(92.5%) weighed between 2500 and 3999 grams, and 163(81.5%) were with their mothers after 24hours postpartum. Of the maternal demographic characteristics, only parity showed a significant association with the number of ANC visits. High parity,  $\geq 5$  was associated with a lower frequency of ANC visits (OR=0.29, 95% CI 0.1-0.87, p=0.027). Mothers with pre-existing medical conditions were 3.9 times as likely as those with no pre-existing medical condition to make  $\geq 4$  visits (OR=3.9, 95% CI 0.85-24). None of the past obstetric parameters analyzed (miscarriage, still birth, live birth, mode of delivery) showed significant association with the number of ANC visits. Perinatal outcomes (state of neonate at birth, 5 minute APGAR score, birth weight, state of neonate after 24 hours postpartum) were not significantly associated with the number of ANC visits. Likewise, maternal outcomes (mode of delivery, onset of labour, morbidity and mortality) analyzed did not show any association with the number of ANC visits.

**Conclusion:** In this rural Kenyan hospital, a smaller proportion of women had  $\geq 4$  ANC visits. Parity  $\geq 5$  was significantly associated with likelihood of <4 ANC visit. Early perinatal and maternal outcomes were comparable between mothers with <4 ANC visits and those with  $\geq 4$  visits.

## **1. INTRODUCTION AND LITERATURE REVIEW**

Antenatal care (ANC) program originated in Boston in the first decade of the 20th century. Before then, women who thought they were pregnant visited a physician for confirmation but did not visit again until delivery.<sup>1</sup> In their study on history of prenatal care and new perspectives of prenatal care, Thompson et al reported that concerns about eclampsia and the complications of toxemia shaped the contents of ANC. They also noted that when ANC was introduced, the main focus was on reducing low birth weight and preterm births.<sup>2</sup> Antenatal care is an entry point for a pregnant woman to receive a broad range of health promotion and preventive health services, including nutritional support and prevention and treatment of anaemia; prevention, detection and treatment of malaria, tuberculosis and sexually transmitted infections (STIs) including Human Immunodeficiency Virus and Acquired Immunodeficiency Syndrome (HIV/AIDS). Antenatal care helps the patient together with the caregiver develop a birth plan, birth preparedness and complication readiness; promote the benefits of skilled attendance at birth. It is also an opportune time to counsel women on contraception. In Kenya, ANC was introduced in the year 1972 by the Ministry of Health. The ANC in public facilities in Kenya is standardized and mothers receive more or less the same kind of care. A mother-bay booklet is issued to them during the first ANC visit. The booklet is produced by the Ministry of Health, Kenya and captures the socio-demographic profile, obstetric and medical history of the mothers, and progress of pregnancy, delivery report, postnatal assessment of mothers, postpartum screening for cancer of the cervix information. It also gives the antenatal profile, tetanus immunization, malaria prophylaxis and deworming, haematinic supplementation, child growth monitoring, immunization and micronutrient supplementation schedule. The booklet also gives information on infant feeding recommendation during illness, management of infant diarrhea, identification of danger signs in infants and when to seek medical attention, identification of eye problems in infants and identification of HIV exposed infants, prophylaxis and subsequent follow-up. Mothers attending ANC benefit from the above services in Kenya.

Okunlola et al., 2008 in their retrospective study on gestation age at antenatal booking and delivery outcomes found that late booking and fewer number of ANC visits is still a problem in Nigeria.<sup>3</sup> In this study, most patients had their first ANC visit in the late second trimester. In the Kenya Demographic Health Survey (KDHS), 2008/2009, ANC coverage was 92 percent but

about 47 percent of women in Kenya reported four or more ANC visits.<sup>4</sup> This represented a continuing decline in the number of women attaining at least four ANC visits from 52 percent in 2003. Most visits occurred in the second trimester (43%) or third trimester (42%).<sup>4</sup> The traditional approach of ANC involves monthly visits during the first and second trimester, fortnightly from week 28 to 36 of pregnancy then weekly after week 36. This approach uses a risk approach to classify which women are more likely to experience complications, and assumes that more visits translates to better outcomes for the mother and baby. However, many women with risk factors will not develop complications, while women without risk factors may do so.<sup>5</sup> Updated approach to antenatal care stresses on quality over quantity of visits.<sup>6-8, 27</sup> The World Health Organization (WHO) recommends four antenatal care visits for women whose pregnancies are progressing normally, with the first visit in the first trimester (before 12 weeks but no later than 16 weeks), and at 24-28 weeks, 32 weeks and 36 weeks. This model places emphasis on quality of care rendered rather than quantity. Appropriate care should be accorded to the women with regard to her general health and stage of pregnancy. Where complications are detected, the frequency and scope of visits is increased.<sup>9</sup> The reduced-visit approach or Focused Antenatal Care (FANC) has outlined key elements of the visits and their timing. This is intended to save on resources that can be channeled into other areas of the economy especially in developing countries. This would also remove strain on health workers and health facilities that offer antenatal care. Focused antenatal care was introduced in Kenya by the Ministry of Health in the year 2001.

Socio-demographic factors including marital status, maternal age, first pregnancy/parity, wealth quintile, distance from a health facility, level of education are commonly cited as factors influencing ANC use and the number of ANC visits.<sup>10-13</sup> For instance, Beeckman et al., 2010, in their multicentre prospective observational study on determinants of the number of antenatal visits in Brussels, reported that women with higher education, income and social status, with health insurance and low parity attained a higher number of ANC visits.<sup>14</sup> In his cross-sectional study on effect of education on antenatal care visits in Bangladesh, 2012, Ruhul Kabir noted that 40 percent of mothers who had completed secondary education or higher and less than 10 percent of those who were illiterate attained at least four ANC visits.<sup>15</sup> In Tanzania, a survey on factors associated with four or more ANC visits and its decline among pregnant women between 1999 to 2010, by Gupta et al., 2014, noted that women who were aged below twenty years, with

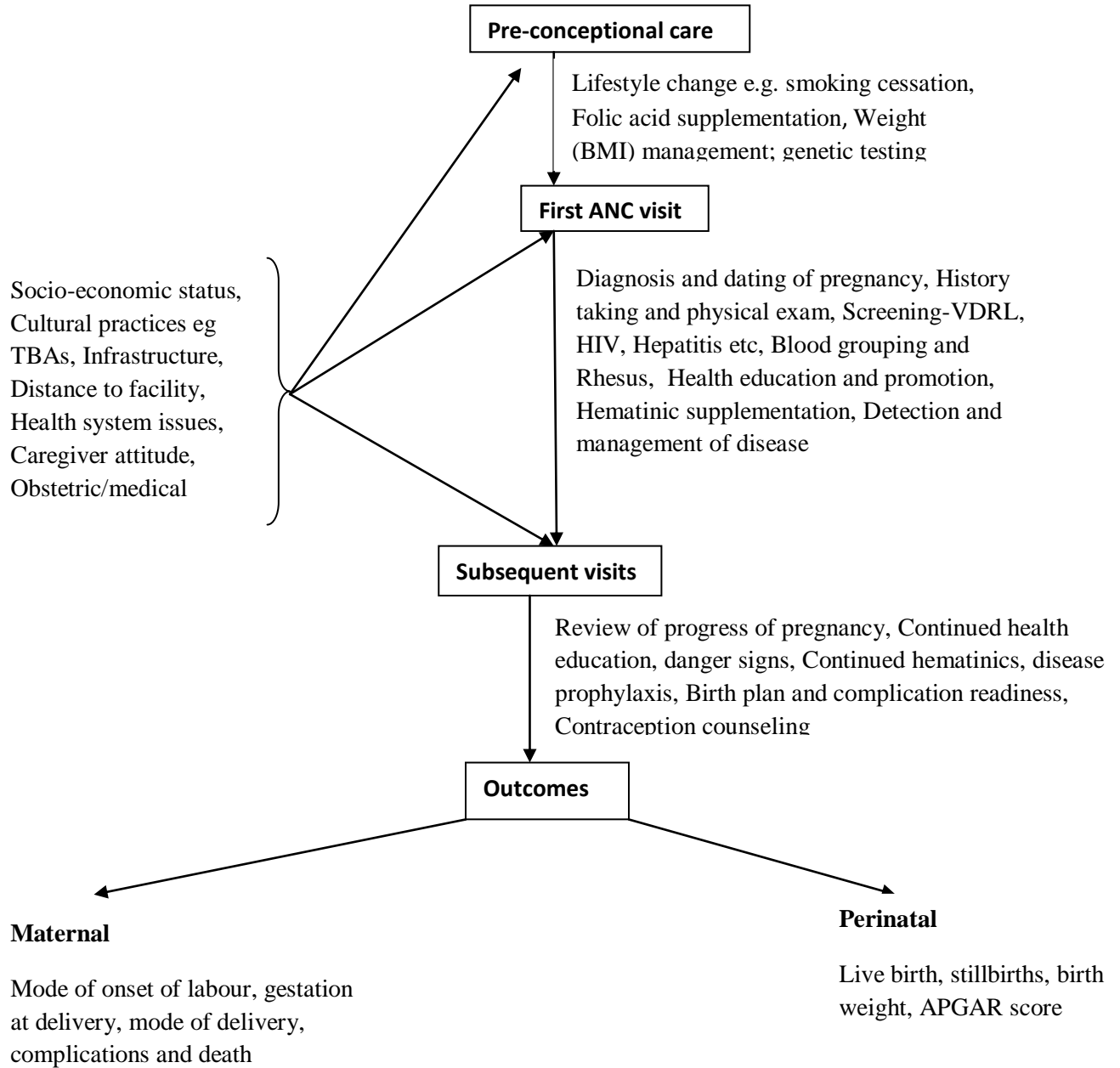
higher education and those who started ANC before sixteen weeks of gestation were more likely to have at least four ANC visits. However, those with a higher parity or never married had less odds of attending ANC at least four times.<sup>16</sup> A Centre for Disease Control (CDC) population based cross-sectional study done in rural Western Kenya, Gem and Asembo by van Eijk et al., 2002, on the use of antenatal services and delivery, it was pointed out that mothers who had less than three ANC visits were single, aged above thirty four or below eighteen years, had a parity of at least five, less than eight years of formal education and were of low economic status. They also noted that ANC attendance in primigravidae was higher.<sup>17</sup> In his cross-sectional study to compare outcome of labour between booked and unbooked parturients in Kenyatta National Hospital (KNH), 1999, Wanyoro found that patients with fewer ANC visits besides other characteristics, were in no gainful employment.<sup>18</sup> In a cohort survey on antenatal care and perinatal outcomes in Kwale District of Kenya, by Celia et al., 2004/2005, only 32% of women reported having any ANC. They also reported that, women with secondary education or above were more likely to attend ANC, while those living further than 5 kilometres from a dispensary were less likely to attend.<sup>19</sup>

The provision of antenatal care is one of the interventions geared towards the attainment of Millennium Development Goal five (MDG 5) i.e. reduction of maternal mortality by 75 percent between 1990 and 2015.<sup>20</sup> According to a Kenya Demographic Health Survey (KDHS) of 2008/2009, the maternal mortality was noted to be 488 per 100, 000 live births against a target of 144 per 100, 000 live births in the year 2015. Therefore, MDG 5 seems unrealizable in Kenya. An article analyzing trends, levels and differentials of antenatal care by World Health Organization (WHO)/United Nations Children's Fund (UNICEF), 2003, noted that antenatal care improves maternal and perinatal outcomes.<sup>21</sup> WHO systematic review of randomized controlled trials for routine antenatal care, by Carroli et al, Lancet, 2001, reported that most clinical outcomes i.e. pre-eclampsia, urinary tract infection, severe postpartum anaemia, maternal mortality and low birth weight were comparable between the traditional ANC and reduced-visit-groups but compared with the women who received traditional antenatal care, women in low and middle-income countries who received goal-oriented antenatal care through the reduced-visits approach experienced a 15% higher risk of perinatal mortality. Perinatal mortality was comparable between the groups in trials from high-income countries. Women in all these settings

showed some dissatisfaction with the reduced-visits schedule especially with the timing of visits. However, fewer visits model may be associated with low cost to the health-care system.<sup>22</sup> WHO multicenter (conducted in clinics in Argentina, Cuba, Saudi Arabia and Thailand) randomized controlled trial comparing traditional model to the reduced-visit-model of ANC and in the systematic review of randomized controlled trials of routine ANC in 2001, Villar et al. found no difference in the rates of low birth weights, postpartum anaemia, urinary tract infection, maternal and perinatal mortality. However, those in the reduced-visit model reported slightly higher rates of pre-eclampsia/eclampsia.<sup>23</sup> The WHO recommended that reduced-visit-approach could be adapted without major resistance from the women, care provider and may reduce the cost of care.

Other studies on pregnancy outcomes in patients with fewer visits (less than four ANC visits) have reported varying findings with some noting an increase in unfavorable outcomes (operative deliveries, PPH, APH, pre-eclampsia, eclampsia, low birth weight and APGAR score of babies, high maternal and perinatal mortality).<sup>3, 14, 24-26, 28,29</sup> In her retrospective cross-sectional study on comparison of pregnancy outcomes between booked and unbooked mothers at Van Velden Hospital, South Africa, 2010, Madike noted no difference in terms of maternal complications though those with two or less ANC visits (unbooked) had higher rates of cesarean and preterm deliveries.<sup>26</sup> In his cross-sectional study to compare outcome of labour between booked and unbooked parturients in KNH, 1999, Wanyoro found out that patients with fewer ANC visits or those who were unbooked (did not attend ANC at KNH but delivered at KNH), had higher rates of IUFD, NBU admissions, perinatal mortality and meconium stained liquor. He concluded that patients with fewer ANC visits or unbooked are a high risk-group for perinatal and maternal mortality.<sup>18</sup> A cohort survey on antenatal care and perinatal outcomes in Kwale District of Kenya, by Celia et al., (2004/5) found out that women attending ANC at least twice were more likely to have a live birth versus stillbirth.<sup>19</sup>

## 2. CONCEPTUAL FRAMEWORK SCHEMA



Various activities are carried out during ANC visits that have an influence on maternal and perinatal outcome. A number of factors that affect mothers' antenatal care seeking behavior as depicted above.



### **3. STUDY JUSTIFICATION**

Antenatal care is thought to influence maternal and perinatal outcomes. ANC visits, provides an opportunity for screening, and management of conditions that may adversely influence pregnancy outcomes. Since the inception of FANC, few studies have evaluated the influence of the number of antenatal care visits and pregnancy outcomes (maternal and perinatal outcomes) in this country, Kenya and Bomet County in particular. Although the WHO and Ministry of Health (MOH) recommend four visits in the focused antenatal care (FANC) model, it is unknown if visits fewer than those recommended by FANC can have an influence on pregnancy outcomes. This study seeks to determine the influence of the number of ANC visits (<4 versus ≥4) on pregnancy outcome. This study seeks to address this research question and contribute towards idealizing the minimum number of ANC visits in relation to pregnancy outcomes.

### **4. RESEARCH QUESTIONS**

Does the number of ANC visits influence pregnancy outcomes of mothers delivering at a rural hospital, Longisa District Hospital?

### **5. NULL HYPOTHESIS**

There is no difference in pregnancy outcomes (maternal and perinatal outcomes) of mothers who attend four or more ANC visits and those who attend less than four ANC visits at a rural Kenyan (Longisa District) Hospital

### **6. OBJECTIVES**

#### **6.1 Broad objective**

To determine the influence of the number of ANC visits on pregnancy outcomes (maternal and perinatal outcomes) of mothers delivering at a rural hospital, Longisa District Hospital.

## **6.2 Specific objectives**

- a) To determine the number of ANC visits and the factors (socio-demographic, past obstetric and medical history) that influence the number of ANC visits among postpartum women who deliver at Longisa District Hospital.
- b) To determine the association between number of ANC visits and perinatal outcomes including low infant birth weight, stillbirth, birth asphyxia or APGAR score of babies born to postpartum women at Longisa District Hospital.
- c) To determine the association between number of ANC visits and maternal outcomes including operative delivery, postpartum hemorrhage, perineal tears, preeclampsia/eclampsia, infection, anemia, referral for intensive care, death among postpartum women who deliver at Longisa District Hospital.

## **7. METHODOLOGY**

### **7.1 Study design**

This was a retrospective cohort study. The main exposure variable was the number of antenatal care visits (<4 versus  $\geq 4$  ANC visits) while the outcomes were maternal and perinatal outcomes ascertained after delivery.

### **7.2 Study site**

The study was conducted at Longisa District Hospital postnatal ward. Longisa District Hospital is in Bomet East Constituency, Bomet County. The hospital acts as a referral centre for five health centers and twenty four (24) dispensaries in the constituency and the Sigor Sub-district Hospital in Chepalungu constituency. The hospital was suitable for this study as it is the only public referral facility in this county serving many rural facilities. The hospital is situated on the Sotik-Narok Highway, about two hundred (200) kilometers from Nairobi, the capital city of Kenya. It has a bed capacity of 150 beds; with an average of sixty (60) normal deliveries and thirty (30) caesarian deliveries per month. It has five medical officers, fourteen clinical officers and thirty six nurses. Mothers attending ANC at this facility start their ANC after the first trimester. The traditional approach to ANC is still in use at this facility. Most of the mothers referred from traditional birth attendant (TBAs) to this facility present with prolonged labour, obstructed labour, postpartum hemorrhage and at times ruptured uterus.

### **7.3 Study population**

Postpartum women admitted in Longisa District Hospital postnatal ward immediately after delivery at or above 28 weeks gestation and had at least one ANC clinic visit.

#### **a) Inclusion criteria**

- a). All consenting mothers who had delivered at or above 28 weeks gestation.
- b). Those mothers who attended ANC clinic at least once.

#### **b) Exclusion criteria**

- a). Those who had abortions or delivered before 28 weeks gestation.

- b). Those who did not provide informed consent.
- c). Those who had no antenatal care.

## 7.4 Study period

The study was carried out within a period of 2 months, from July through August, 2014.

## 7.5 Sample Size Determination

The formula for comparison of two populations was used to calculate the sample size for comparing the two groups based on number of ANC visits:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times 2 \times \bar{p}(1 - \bar{p})}{(p_1 - p_2)^2}$$

Where

$n$  = Desired sample size for each group.

$Z_{\alpha/2}$  = Critical value of the confidence interval for standard normal deviation. At 95% confidence interval, this will be 1.96.

$Z_{\beta}$  = 0.84 representing study power, set to detect desired difference between groups

$p_1$  = The percentage of women who are likely to attend <4 ANC visits is estimated at 70%

$p_2$  = The estimated percentage of women who are likely to attend  $\geq 4$  ANC visits is at 47% (KDHS, 2008/2009)

$p_1 - p_2$  = 23% difference in number of ANC visits between groups to be detected at 95% confidence interval and 80% power

$\bar{p}$  = The average of  $p_1$  and  $p_2$

$$n = \frac{(1.96 + 0.84)^2 \times 2 \times 0.6(1 - 0.6)}{(0.70 - 0.47)^2}$$

$$n=71$$

Therefore, the total sample size in the study was determined at 142 mothers.

## **7.6 Sampling procedure**

Every consecutive mother meeting the inclusion criteria was recruited into the study.

## **7.7 Source and recruitment of study participants**

Women who fulfilled the inclusion criteria were identified from the postnatal ward admission register. Subsequently, an informed consent was sought from the patient or partner/guardian for those who were not stable for recruitment into the study. The participants or their guardians signed a written informed consent form upon agreeing to participate in the study. Using a questionnaire, data was collected on parity, age, marital status, level of education, economic status, number of ANC visits, source and provider of ANC, gestation age at delivery, labour onset, mode of delivery, complications at and post delivery, 5 minute APGAR score of infants, birth weight of infants, NBU admissions, perinatal deaths and maternal morbidity and mortality. ANC card, referral letters, hospital records (admission/progress notes, referral or death, labour and delivery/theatre records) of the study population were requested for extraction of information. Data was collected after twenty four (24) hours of delivery.

## **7.8 Data variables**

**Exposure variables;** Four or more antenatal care visits and less than four antenatal care visits.

**Outcome variables:**

**a) Maternal Outcome;** Maternal outcomes of interest were gestation age at delivery, mode of labour onset and delivery, complications at and post delivery, and maternal death.

**b) Perinatal Outcome;** were birth weight, APGAR score, NBU admissions, fetal state at birth and 24 hours after birth, and fetal death.

## **7.9 Data management**

Questionnaires were checked for completeness and then entered into a Microsoft Access database. Data was coded. All the data in this study was filed in a suitable box file which was stored in a lockable drawer accessible only to the principal investigator and his assistants. All forms were identified by a coded number and local databases secured with password-protected access systems.

## **7.10 Data analysis**

Data analysis was carried out using the Statistical Package for Social Sciences version 17.0 (SPSS Inc, Chicago, IL, USA). Chi-square and Student's t-test was used to test for association between socio-demographic (age, parity, marital status, level of education, occupation, past obstetric and medical history) characteristics of mothers and the number of ANC visits.

Proportions of relevant perinatal (birth weight, APGAR score, NBU admission, fetal death) and maternal outcome (alive and healthy, alive with complications e.g. postpartum hemorrhage, ruptured uterus, haematoma, tears, eclampsia, postpartum psychosis, ICU admissions, etc, and death) indicators were determined and compared between those who had <4 and those who had  $\geq 4$  ANC visits using Chi-square tests. Binary logistic regression was carried out to assess the relationship between the maternal and perinatal outcomes of the pregnancy and the number of ANC visits. The strength of associations was determined through calculating odds-ratio (OR) with 95% confidence interval (CI). Associations were considered to be significant at p-value < 0.05.

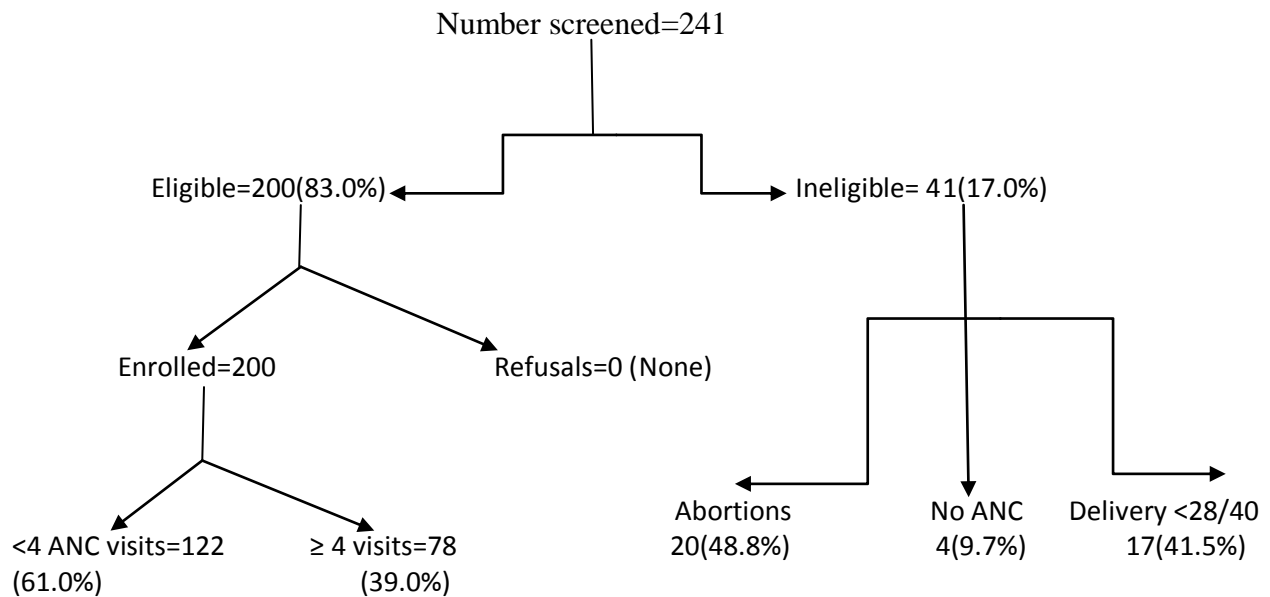
## **7.11 Ethical Considerations**

The study was carried out following approval and permission from the department of Obstetrics and Gynaecology, Kenyatta National Hospital/University of Nairobi Ethics and Research Committee and the Longisa District Hospital Health committee. Patients were informed of the nature and purpose of the study. Informed consent was sought in writing or finger printing for those who were illiterate. Those who did not consent were not discriminated against. The

questionnaire did not carry participants name or identification but was coded. All patients' data was treated with utmost confidentiality at all stages of the study. There was no additional cost, or any direct financial reward to the participants. There was no intervention and standard care had been given to all participants. Postpartum women below 18 years of age with no guardians at the time of recruitment were enrolled as emancipated minors. Confidentiality was ensured through coding of participant information and secure storage of all participant information. Participation was voluntary and withdrawal was permitted without compromising the care the women received.

## 8. RESULTS

**Figure 1: Study flow**



During the study period, two hundred and forty one (241) mothers were admitted in the postnatal ward (figure 1). Among those admitted, 41(17.0%) were ineligible, out of whom 20 (48.8%) had first trimester and early second trimester abortions while 17 (41.5%) had deliveries before 28 weeks of gestation. Four (9.7%) mothers of those who were ineligible had no antenatal care (ANC).

As shown in figure 1 above, two hundred (200) postpartum women were eligible for study participation and were all enrolled. One hundred and twenty two (61.0%) of the participating women had less than four (<4) ANC visits whereas 78 (39.0%) had four or more ( $\geq 4$ ) ANC visits. On further analysis, 27 (13.5%) of the participating postpartum women had one ANC visit; 47 (23.5%) had 2 ANC visits; 47 (23.5%) had 3 ANC visits; 57 (28.5%) had 4 ANC visits; 15 (7.5%) had 5 ANC visits and the remaining 7 (3.5%) attended between six to eight ANC visits.



## FACTORS INFLUENCING THE NUMBER OF ANC VISITS

**Table 1: Socio-demographic factors of study participants and the number of ANC visits**

Socio-demographic characteristic	Number of ANC visits		OR(95% CI)	P-value
	≥4visits n=78(%)	<4 visits n=122(%)		
<b>Marital status</b>				
Single	9(11.5)	23(18.9)	1.00	
Married	68(87.2)	99(81.1)	1.76(0.77-4.03)	0.184
Divorced/ separated	1(1.3)	0(0.0)	NA	NA
<b>Parity</b>				
Para 1	34(43.6)	40(32.8)	1.0	
Para 2 -4	39(50.0)	62(50.8)	0.74(0.4-1.36)	0.332
Para 5 or above	5(6.4)	20(16.4)	0.29(0.1-0.87)	0.027
<b>Level of education</b>				
None	3(3.8)	3(2.5)	1.0	
Primary	53(67.9)	80(65.6)	0.66(0.13-3.41)	0.622
Secondary	19(24.4)	32(26.2)	0.59(0.11-3.24)	0.547
College/ University	3(3.8)	7(5.7)	0.43(0.05-3.48)	0.428
<b>Occupation</b>				
Student	9(11.5)	16(13.1)	1.0	
Housewife	49(62.8)	82(67.2)	1.06(0.44-2.59)	0.894
Civil servant	3(3.8)	5(4.1)	1.07(0.21-5.54)	0.939
NGO/ private firm employee	0(0.0)	1(0.8)	NA	NA
Business	17(21.8)	18(14.8)	1.68(0.59-4.81)	0.334

**Table 1** above shows the socio-demographic characteristics of the postpartum women who participated in the study. Overall, majority, 167(83.5%) of the study participants were married, 101(50.5%) had parity of two to four, 133(66.5%) primary level of formal education, and 131(65.5%) were housewives.

Out of the maternal demographic characteristics, only parity showed a significant association with the number of ANC visits. High parity (5 or above) was associated with lower frequency of the recommended number of ANC visits with only five (6.4%) of mothers in this group having 4 or more ANC visits compared to 43.6 percent of primiparous mothers (OR=0.29, 95% CI 0.1-0.87, p = 0.027). Thus, grandmultiparous postpartum mothers were 71% significantly less likely to attend ANC  $\geq$ 4 times compared to primiparous women. Maternal education, occupation, and level of formal education were not significantly associated with number of ANC visits.

**Table 2: Past obstetric and medical history and the number of ANC visits**

	Number of ANC visits		OR(95% CI)	P- value
	$\geq$ 4visits	<4 visits		
<b>Outcome of previous pregnancy</b>				
Miscarriage	3(33.3)	6(66.7)	1.0	NA
Still birth	5(83.3)	1(16.7)	10.0(0.78-128.77)	0.077
Live birth	40(34.8)	74(64.3)	1.08(0.26-4.56)	0.915
<b>Mode of delivery</b>				
Spontaneous vertex delivery	37(34.3)	70(64.8)	1.0	NA
Caesarean section	7(50.0)	7(50.0)	1.89(0.62-5.8)	0.265
Assisted vaginal delivery	2(50.0)	2(50.0)	1.89(0.26-13.98)	0.532
<b>Pre-existing medical condition</b>				
None	71(38.7)	119(61.3)	1.0	
Pre-existing medical condition	7(70.0)	3(30.0)	3.9(0.85-24)	0.05
HIV/ AIDS	3(60.0)	2(40.0)	2.51(0.41-15.41)	0.319
Diabetes mellitus	1(100.0)	0(0.0)	NA	NA
Cardiac disease	1(100.0)	0(0.0)	NA	NA
Others	2(66.7)	1(33.3)	3.35(0.3-37.64)	0.327

**Table 2** above shows the obstetric factors that were evaluated for any association with the number of ANC visits. As shown, most, 114(88.4) women had previous live births, 107(85.6%) had spontaneous vertex delivery, and 190(95.0%) had no pre-existing medical condition.

On further analysis, pre-existing medical condition was not significantly associated with number of ANC visits (p = 0.05) but overall, mothers with pre-existing medical condition were 3.9 times as likely as those with no pre-existing medical condition to make 4 or more ANC visits (OR =

3.9, 95% CI 0.85-24). Despite this, no specific medical condition was significantly associated with four or more visits: HIV/ AIDS ( $p = 0.319$ ), other conditions ( $p = 0.327$ ). Past obstetric history did not show significant associations with the number of ANC visits during the index pregnancy. Five mothers who had previously had a still birth had at least four ANC visits compared to three mothers ( $p = 0.077$ ) and forty mothers whose previous pregnancies resulted in miscarriages or live births ( $p=0.915$ ), respectively. Mode of delivery in previous pregnancy was not associated with number of ANC visits: 2, 37, and 7 mothers who delivered through assisted vaginal delivery, spontaneous vertex and cesarean delivery, respectively had at least 4 or more ANC visits.

## ASSOCIATION BETWEEN NUMBER OF ANC VISITS AND PERINATAL OUTCOMES

**Table 3: Perinatal outcomes and the number of ANC visits**

Perinatal outcome	Number of ANC visits		OR (95% CI)	P- value
	≥4visits, n=78(%)	<4 visits n=122(%)		
<b>State at birth</b>				
Live birth	71(91.0)	115(94.5)	1.0	
Still birth	4(5.1)	3(2.5)	1.2(0.26-5.54)	0.811
Live with malformation	3(3.8)	4(3.3)	1.0	
<b>APGAR score at 5 minutes</b>				
3 or less	3(3.8)	2(1.6)	1.0	
4 to 7	7(9.0)	12(9.8)	0.39(0.05-2.92)	0.359
Above 7	68(87.2)	108(88.5)	0.41(0.07-2.54)	0.34
<b>Birth weight (grams)</b>				
4000 or over	2(2.6)	2(1.6)	1.0	
2500-3999	72(92.3)	113(92.6)	1.27(0.11-14.31)	0.844
1500-2499	4(5.1)	5(4.1)	1.6(0.1-24.7)	0.736
1000-1499	0(0.0)	1(0.8)	NA	NA
Below 1000	0(0.0)	1(0.8)	NA	NA
<b>State after 24 hours</b>				
With mother	65(83.3)	98(80.3)	1.0	
Admitted in NBU	7(9.0)	7(5.7)	0.68(0.17-2.7)	0.58
Fetal death	2(2.6)	3(2.5)	1.05(0.17-6.45)	0.957

**Table 3** above shows the perinatal outcomes according to the number of ANC visits. Of the participating mothers, 186(93.0%) had live births with 176(88.0%) of the neonates having 5 minute APGAR scores above 7; 185(92.5%) weighing between 2500 and 3999 grams; and 163(81.5%) of the neonates were with their mothers after 24 hours post delivery.

On further analysis, perinatal outcomes i.e. stillbirth, APGAR score, birth weight and state of babies after 24 hours were not significantly associated with number of ANC visits during pregnancy.

## ASSOCIATION BETWEEN THE NUMBER OF ANC VISITS AND MATERNAL OUTCOMES

**Table 4: Maternal outcomes and the number of ANC visits**

Maternal outcome	Number of ANC visits		OR(95% CI)	P –value
	≥4visits, n=78(%)	<4 visits n=122(%)		
<b>Mode of delivery</b>				
Spontaneous vertex delivery	63(80.8)	102(83.6)	1.0	
Assisted vaginal delivery	2(2.6)	2(1.6)	1.61(0.1-26.26)	0.737
Caesarean section	13(16.7)	18(14.8)	1.21(0.54-2.73)	0.646
<b>Mode of labor onset</b>				
Spontaneous	74(94.9)	118(96.7)	1.0	
Induced	4(5.1)	4(3.3)	0.8(0.14-4.46)	0.797
<b>Complications at delivery</b>				
None	67(85.9)	108(88.5)	1.27(0.49-3.2)	0.584
PPH	7(9.0)	4(3.3)	2.9(0.71-14)	0.084
Retained placenta	0(0.0)	3(2.5)	NA	NA
Perineal/ cervical tear	1(1.3)	5(4.1)	0.3(0.01-2.8)	0.255
Others	3(3.8)	2(1.6)		
<b>Complications within 24 hrs of delivery</b>				
None	69(88.5)	106(89.9)	1.0	
PPH	2(2.6)	2(2.5)	0.57(0.1-2.47)	0.412
Anaemia	1(1.3)	0(0.0)	NA	NA
Fever	0(0.0)	3(2.5)	1.0	
Eclampsia	2(2.6)	0(0.0)	NA	NA
Death	2(2.6)	1(1.6)	1.0	

**Table 4** above shows the association between maternal outcomes and the number of ANC visits. Most participating mothers, 165(82.5%) had spontaneous vertex delivery; 192(96.0%) had spontaneous onset of labour; 175(87.5%) had no complication at delivery and 175(87.5%) had no complication at 24 hours post delivery.

Maternal outcomes did not show significant associations with number of ANC visits. Assisted vaginal delivery (OR = 1.61, 95% CI 0.1-26.26) or caesarean section (OR = 1.21, 95% CI 0.54-2.73) were not associated with higher frequency of ANC visits. Onset of labour was not associated with number of ANC visits, (OR = 0.8, 95% CI 0.14-4.46, p =0.797).

## 9. DISCUSSION

World Health Organization (WHO) recommends focused antenatal care (FANC) for women with no known medical or any other complication in resource limited countries. For pregnancies that are progressing without complications, four antenatal care (ANC) visits are recommended in this FANC model. In this study, we found that fewer women (39%) had at least four ANC visits. This number is lower than the national estimate of 47% for all women and 44% in rural areas of Kenya according to the Kenya demographic health survey (KDHS) carried out by the Kenya National Bureau of Statistics (KNBS), 2008/2009.<sup>4</sup>

In this study on the influence of number of visits on pregnancy outcomes at Longisa District Hospital, there was no significant association between the marital status, education level, economic status and the number of ANC visits. The level of education, marital and economic status of women in this rural area does not vary a lot among the populace. As noted in the study, the proportion of women who were married, housewives or with primary level of formal education was similar in the two groups (<4 or  $\geq 4$  ANC visits). This is due to the fact that, in this rural setting, the socio-economic status is likely to be the same among the inhabitants. Majority of people in this county are peasant farmers, small scale traders whose level of income does not vary a lot. ANC services attract a fee and this affects the number of ANC visits. Most girls in this county start child bearing early and this account for their low level of formal education. Those who get pregnant do not continue with their education. Majority of participants are married. In this rural setting, single motherhood is still considered uncultural. On the contrary, in his retrospective cross-sectional study on the effect of mother's education on ANC in Bangladesh, 2012, Ruhul found that <10% of illiterate mothers compared to >40% of mothers who had completed secondary education or higher, attended at least four ANC visits.<sup>15</sup> Beeckman et al. in their multicentre prospective observational study on determinants of the number of antenatal visits in Brussels, reported that women with higher education, income and social status; with health insurance, attained a higher number of ANC visits.<sup>14</sup> The KDHS by the KNBS, 2008/2009, in Kenya, also reported that the proportion of women who get ANC increases as the education level of women increase.<sup>4</sup> In his study on the pregnancy outcomes on booked and unbooked mothers at Kenyatta National Hospital (KNH), 1999, Wanyoro had a similar finding that the economic status of women affected the number of ANC visits.<sup>18</sup>

The fewer number of ANC visits recorded by women delivered at this facility as the study found is significantly associated with the parity. In this study, mothers who were para  $\geq 5$  were less likely to attain  $\geq 4$  ANC visits. This group of mothers feels more experienced to deal with their pregnancies based on their previous successful experiences. They also need less assurance about the progress of their pregnancies unlike the first time mothers. This finding compares with findings of a Tanzania survey on factors associated with four or more ANC visits and its decline among pregnant women between 1999 and 2010. In this study, Gupta et al., 2014 that noted that women with a higher parity besides other factors, had less odds of attending ANC at least four times.<sup>16</sup> Similarly, a Centre for Disease Control (CDC) population based cross-sectional study done in rural Western Kenya, Gem and Asembo by van Eijk et al., in 2002 on the use of antenatal services and delivery, it was pointed out that mothers who had fewer ANC visits, among other factors, had a parity of at least five.<sup>17</sup> Kenya demographic health survey (KDHS) carried out by the Kenya National Bureau of Statistics (KNBS), 2008/2009 also found a relationship between parity and the number of ANC visits.<sup>4</sup> The survey reported that women with a higher parity were less likely to attend at least four ANC visits.

In this study, past obstetric history of miscarriage, stillbirth, live birth, cesarean delivery were not significantly associated with the number of ANC visits. Given the low level of education of the majority of women enrolled, they may not have been fully aware that the outcome of a previous pregnancy affects subsequent pregnancies. In her retrospective cross-sectional study on comparison of pregnancy outcomes between booked and unbooked mothers at Van Velden Hospital, South Africa, 2010, Madike also noted no association between miscarriage and the number of ANC visits.<sup>26</sup>

This study found no association between the perinatal outcomes (state of neonate at birth, 5 minute APGAR score, birth weight, state of neonate at 24 hours postpartum and fetal death) and the number of visits. However, mothers with  $< 4$  ANC visits reported more frequency of babies with 5 minute APGAR score of  $< 7$ . This is due to the fact that they also had slightly more babies with low birth weight. WHO systematic review of randomized controlled trials for routine antenatal care, by Carroli et al, Lancet, 2001 reported that birth weights were comparable between the traditional ANC and reduced-visit-groups but compared with the women who



received traditional antenatal care, women in low and middle-income countries who received goal-oriented antenatal care through the reduced-visits approach experienced a 15% higher risk of perinatal mortality. However, perinatal mortality was comparable between the groups in trials from high-income countries.<sup>22</sup> In his cross-sectional study to compare outcome of labour between booked and unbooked parturients in KNH, 1999, Wanyoro found that patients with fewer ANC visits had higher rates of IUFD, NBU admissions, perinatal mortality.<sup>18</sup> A cohort survey on antenatal care and perinatal outcomes in Kwale District of Kenya, by Celia et al., (2004/5) found that women attending ANC at least twice were more likely to have a live birth versus stillbirth.<sup>19</sup>

This study found no significant association between maternal outcomes (mode of labour onset, delivery, complications at and postpartum) and the number of ANC visits in the two groups of mothers (<4 versus  $\geq 4$  ANC visits). Maternal outcomes were comparable between the two groups of women probably because those who were at risk of adverse pregnancy outcome may have been referred during ANC by clinicians or self-referred themselves to the nearby health facility which has better services and critical care. However, mothers who had  $\geq 4$  ANC visits had a higher frequency of postpartum hemorrhage and mortality than their counterparts with <4 ANC visits. This is due to the fact that this group of postpartum mothers also reported a higher frequency of pre-existing medical conditions. Other studies on pregnancy outcomes in patients with fewer visits (less than four ANC visits) have reported varying findings with some noting an increase in unfavorable outcomes (operative deliveries, PPH, APH, pre-eclampsia, eclampsia, high maternal morbidity and mortality).<sup>3, 14, 24-26, 28, 29</sup> WHO multicenter (conducted in clinics in Argentina, Cuba, Saudi Arabia and Thailand) randomized controlled trial comparing traditional model to the reduced-visit-model of ANC and in the systematic review of randomized controlled trials of routine ANC in 2001, Villar et al. found no difference in the rates of postpartum anaemia, urinary tract infection, maternal mortality. However, those in the reduced-visit model reported slightly higher rates of pre-eclampsia/eclampsia.<sup>23</sup> In her retrospective cross-sectional study on comparison of pregnancy outcomes between booked and unbooked mothers at Van Velden Hospital, South Africa, 2010, Madike noted no difference in terms of maternal complications though those with two or less ANC visits (unbooked) had higher rates of cesarean and preterm deliveries.<sup>26</sup> In his cross-sectional study to compare outcome of labour between booked and unbooked parturients in KNH, 1999, Wanyoro concluded that patients with fewer ANC visits or unbooked are a high risk-group for maternal mortality.<sup>18</sup>

## **Study limitations**

- a). This being a retrospective study, mothers who were at risk of complications during the ANC visits may have been referred by clinicians or self-referred themselves before labour and delivery to the nearby facility which has better services.
- b). Incomplete documentation of patient records. This was improved by direct interviews.

## **10. CONCLUSIONS**

- a). In this study, there was low attendance of  $\geq 4$  ANC visits.
- b). Parity is significantly associated with the number of ANC visits. Highly parous women are less likely to attend ANC at least four times.
- c). Mothers with pre-existing medical condition report more ANC visits than those without pre-existing medical conditions.
- d). Early perinatal and maternal outcomes are comparable between mothers with  $< 4$  ANC visits and those with  $\geq 4$  ANC visits.

## **11. RECOMMENDATION**

- a). Larger prospective studies are required to determine and evaluate the influence of fewer ANC visits (e.g. 3 visits than that recommended by the WHO and the Ministry of Health) on perinatal and maternal outcomes.
- b). Target interventions e.g. free ANC to increase ANC visits among women with higher parity,  $\geq 5$ .

## 12. TIME LINES

<b>ACTIVITY</b>	<b>TIME (YEAR, 2014)</b>
Proposal development	Oct., 2013 through March
Departmental presentation	January- 24/1/14
Submission to Research and Ethics Committee	March
Presentation to Longisa Hospital Health Committee	April
Data collection	July through August
Analysis, presentation/submission of thesis and feedback	September through November

### 13. BUDGET

	<b>Item</b>	<b>Cost(KES)</b>
1.	Stationery	4,000
2.	Printing and binding costs	18,500
3.	Transport	25,000
4.	Research assistants (2)	30,000
5.	Statistician	20,000
5.	Miscellaneous	20,000
	<b>Total</b>	<b>112,500</b>

The study cost 112, **500** Kenya Shillings.

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## 15. APPENDICES

### a) Questionnaire

Name of investigator/Assistant:.....

#### **Identification and socio-economic profile**

1. Participants code number:.....

2. How old are you?.....

3. What is your marital status? (Choose one)

- i) Single.    ii) Married.    iii) Separated/divorced.    iv) Widowed.

4. What level of schooling have you attained? (Choose one)

- i) None            ii) Primary            iii) Secondary            ii) College/University

5. What is your current occupation? (choose one)

- i) Student            ii) Housewife            iii) Civil servant

iv) NGO/Private firm employee    v) Business

#### **obstetric profile**

#### **current pregnancy**

6. Do you have any medical condition of which you are on follow-up? (choose one)

- i) None    ii) HIV/AIDS    iii) Diabetes mellitus    iii) cardiac disease

iv) Others (specify).....

7. Parity..... LMP.....EDD.....Gestation by  
dates.....weeks

8. Have you attended antenatal clinic in this pregnancy? (choose one)



i) Yes. ii) No.

9. Where did you attend ANC clinic? (Choose one)

- i) private clinic. ii) dispensary/health centre. iii) government hospital.  
v) mission hospital. iv) others (specify).....

10. Who normally attended to you at the ANC clinic? (Choose one)

- i) Obstetrician. ii) general practitioner. iii) clinical officer. iv) nurse. v) not sure

11. At what gestation did you begin the ANC visits? .....weeks.

(Specify if ANC card is available)

12. How many times did you attend the ANC clinic? .....

(Specify if ANC card is available)

**Past obstetric history**

13. What was the outcome of your last pregnancy? (Choose one)

- i) miscarriage . ii) ectopic pregnancy. iii) still birth.  
iv) live birth.

14. What problem did you suffer in your last pregnancy? (Choose all that apply)

- i) None.  
ii) Anaemia.  
iii) Malaria.  
iv) Hypertensive disease/pre-eclampsia/eclampsia  
v) Cardiac disease.  
vi) Premature rupture of membranes.

- vii) Preterm delivery.
- viii) Deep venous thrombosis.
- ix) Bleeding –APH,PPH
- x) Obstructed labour.
- xi) Ruptured uterus.
- xii) Perineal tear.
- xiii) Retained placenta.
- xiv) Puerperal sepsis
- xv) Others (specify).....

15. How did you deliver your babies previously? (State the number)

- i) Spontaneous vertex delivery.....times.
- ii) Assisted vaginal delivery.....times.
- iii) Caesarian section.....times.
- iv) Hysterotomy.....times.

**Maternal obstetric outcome(for this section refer to patient’s hospital notes)**

16. Mode of onset of labour (choose one)

- i) Spontaneous    ii) Induced

17. Mode of delivery (choose one).

- i) Spontaneous vertex delivery.
- ii) Assisted vaginal delivery e.g in breech; vacuum extraction
- iii) Caesarian section.

iv) Hysterotomy.

18. Complication at delivery (choose all that apply).

i) PPH.

ii) Perineal tear.

iii) Retained placenta.

iv) Cervical tear.

v) Convulsion/eclampsia.

vi) Ruptured uterus.

vii) Vulval haematoma.

viii) Others (specify).....

ix) None

19. Complication after delivery; in current pregnancy. (choose all that apply)

i) PPH.

ii) Postpartum blues/psychosis.

iii) Convulsion/eclampsia.

iv) Anaemia.

v) Febrile illness (temperature  $\geq$  38 degrees Celsius).

vi) Bleeding from incision site (for C/S cases).

vii) Obstetric palsy (Lower limb weakness/paralysis).

viii) Referral for ICU/further care.

ix) Death.

x) Others (specify).....

**Fetal outcome**

20. Condition at birth

i) Alive and healthy

ii) Stillbirth.

iii) Malformed.

21. Birth weight (in grams)

i) More than 4000.

ii) 2500 to 3999.

iii) 1500 to 2499.

iv) 1000 to 1499.

v) Less than 1000.

22. APGAR Score at 5 minutes

i) 3 or less.

ii) 4 to 7.

iii) Above 7.

23. Outcome of live birth at discharge, referral or mother's death.

i) With the mother.

ii) Admitted in NBU.

iii) Fetal death.

## **b) Consent Form**

### **INFLUENCE OF THE NUMBER OF ANC VISITS ON PREGNANCY OUTCOMES OF MOTHERS DELIVERING AT LONGISA DISTRICT HOSPITAL.**

#### **Introduction**

I **Dr. Odwory Michael**, a postgraduate student in the department Obstetrics and Gynaecology at the University of Nairobi is undertaking a study on the *Influence of the Number of ANC Visits on Pregnancy Outcomes of Mothers Delivering at Longisa District Hospital*.

**Purpose of the study:** To determine the influence of the number of ANC visits on pregnancy outcomes (maternal and perinatal outcomes) of mothers delivering at a rural hospital, Longisa District Hospital.

#### **Voluntarism and procedure of study**

I understand that my participation in the study is voluntary and attracts no financial benefits and am free to opt out at any period of study. It has been explained to me that a questionnaire will be administered and my ANC card, hospital records and/or referral letters will be scrutinized as part of this study.

**Confidentiality;** Any information volunteered to the researcher will be treated in confidence at all times.

#### **Persons to contact**

If you have any questions regarding the study, you can contact Dr. Odwory Michael through telephone number 0721572909; email: [odworym@gmail.com](mailto:odworym@gmail.com). You may also contact the KNH/UoN/ERC Committee; 0735-274288/0721-665077. Your participation in the study is highly appreciated

#### **Declaration**

I,.....do hereby agree voluntarily to participate in this research on *Influence of the Number of ANC Visits on Pregnancy Outcomes of Mothers Delivering at Longisa District Hospital*.

The details of the study have been explained to me by researcher/his assistant.

Signed..... (Participant)

Witness/researcher.....

Dated: .....

### c) Glossary

For the sake of this study the following words would be taken to mean the following;

**Labour-** process of regular uterine contractions associated with cervical change-effacement and dilation.

**Hysterotomy** - incision of the uterus through the abdomen to remove a non-viable fetus.

**Assisted vaginal delivery** – when there is an intervention by the health care provider to effect a delivery through the vagina e.g. breech or vacuum extraction.

**Spontaneous vertex delivery** – vaginal delivery, with minimal health care provider intervention, with the fetal head as the leading part.

**Excessive per vaginal bleeding** – blood loss of 500mls or more following completion of the third stage of labour or blood loss of 1000mls or more for those undergoing cesarean delivery. The researcher will rely on the estimation given by the midwife or documented.

**Perineal tear** – tear that involves the vaginal mucosae , with or without the vaginal muscles and the anal sphincter.

**Retained placenta** – placenta that remains undelivered after 30 minutes of childbirth/second stage of labour.

**Cervical tear-** disruption of the continuity of the cervical tissue following delivery.

**Vulval hematoma** – bleeding into the vulva with clot formation and swelling of the vulva.

**Febrile illness** – an illness associated with an elevated temperature of at least 38 degrees Celsius.

**Postpartum psychosis** – mental illness following childbirth, the sufferer loses touch with reality and has altered thought process, delusions and hallucinations.

**Eclampsia** – generalized tonic clonic seizures in a patient with pre-eclampsia which is not attributable to any other medical cause.

**Maternal death** – maternal demise during childbirth or within the study period arising from or aggravated by pregnancy or delivery.

**Still birth-** birth of a non-viable fetus, with no signs of life e.g. heartbeat, respiration or independent movements at or after 28 weeks of gestation.

**Fetal Malformation** – fetus born with congenital deformities.

**Alive and healthy fetus-** a fetus with no abnormality and with an APGAR score of at least seven and is with the mother.

**Fetal death** – fetal demise during during delivery or the study period.



**APPROVAL BY KNH/UON ERC**