



**BURDEN AND DETERMINANTS OF POST-PARTUM ANAEMIA IN MARIAKANI
SUB-COUNTY HOSPITAL.**

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**DISSERTATION IN PARTIAL FULFILLMENT OF MASTERS OF MEDICINE IN
OBSTETRICS AND GYNECOLOGY AT THE UNIVERSITY OF NAIROBI.**

STUDENT’S DECLARATION.

This thesis is my original work and has not been presented for course work in this or any other university.

Dr. Rukiya .A. Maawiya. H58/67743/2011.

Date/...../..... Signature.....

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DEDICATION

I dedicate this work to my beloved departed grandmother, Ma-Asiya Shariff Abubakar, who not only raised me but gifted me with Islamic values, morals, taught me the meaning of integrity and honour, love and compassion for all and instilled the virtue of hard work in me. May you rest in peace.

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- ❖ All the women who participated in this research.

ABBREVIATIONS AND ACRONYMS

ANC - Ante-Natal Clinic.

APH – Ante Partum Haemorrhage.

ACTS- Artemisinin-bases Combination Therapies.

ARVS- Antiretroviral treatment.

BS MPS-Blood Slide for Malaria Parasites.

BMI-Body Mass Index.

C/S- caesarean section.

HB- Haemoglobin.

ITN-Insecticide Treated Nets.

IPT-Intermittent Preventive Treatment for malaria.

KDHS-Kenya Demographic Health Survey.

MCV-Mean Corpuscular Volume.

MCH-Mother and child health clinic.

MSH-Mariakani sub-county hospital.

NMS-National Malaria Strategy.

PLT-Platelets.

PNC-Post –Natal clinic.

RBC-Red Blood Cells.

SP-Sulfadoxine-Pyrimethamine.

SVD- Spontaneous vertex delivery.

WHO- World Health Organization.

OBA-Obstretic Aid.

OPERATIONAL DEFINITIONS

Mean corpuscular volume- Measure of the average red blood cell volume that is reported as part of a standard complete blood count.

Haemoglobin- Haemoglobin is the red-pigmented protein in red blood cells that carries oxygen to the brain, muscular system, immune system, and other parts of the body.

Platelets- small, disc shaped clear cell fragments, 2-3micro meter in diameter which is derived from fragmentation of precursor megakaryocytes.

*White blood cells-*cells of the immune system involved in defending the body against both infectious disease and foreign materials.

High risk group- Refer to the nutritionally vulnerable groups, such as children less than five years and women of child bearing age, due to their higher levels of micronutrient requirements for rapid growth and building new cells.

Metabolism- All the chemical and biological processes by which body cells use nutrients to support life.

Mortality- This is the number of deaths that occur in a given place, group and at a given time.

Morbidity- Any symptom or condition resulting from or made worse by pregnancy.

Public Health Measure- An activity aimed at improving the health of a population by preventing diseases, prolonging life or promoting health.

Post partum period- Starts about an hour after delivery of the placenta and includes the following six weeks.

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ABSTRACT

Introduction: Anaemia in the postpartum period is a common public health problem, but there is a paucity of studies regarding anaemia in the post-partum period. This problem has been relatively neglected, yet a new mother may enter the post-partum period having exhausted her iron stores through pregnancy and childbirth. Prevention and treatment of anaemia in post-partum women is essential for reducing maternal mortality and morbidity, improving quality of life, as well as improving work performance.

Objectives: To find out the burden and determinants of anaemia at the post-partum period in Mariakani sub-county hospital.

Methodology: Cross sectional study, where a total of 323 women attending mother and child health clinic about the sixth week post-partum at Mariakani sub-county hospital were recruited in to the study. Their management for anaemia during antenatal period was assessed using antenatal care records followed by a haemoglobin estimation using the prick method; those found to be anaemic by World health organization criteria had further investigations of blood slide for malaria parasites, stool test, and a complete blood count.

Data analysis: Data analysis was conducted to determine strength of association between dependent and independent variables using Chi-square test for categorical variables. All statistical tests were performed at 5% significance level (95% confidence interval).

Results: The prevalence of post-partum anaemia was 16.4%. Longer durations of haematinic use was protective against postnatal anaemia ($p < 0.001$), as was the case for repeated IPT administration ($p < 0.001$). Most anaemic patients (74%) had used haematinics for 1-2 months while 57% of the non-anaemic patients had used haematinic for a longer duration of between 2 and 3 months. The risk of anaemia in mothers with no ANC or delivery complications was 0.2 times lower than that of mothers with complications (OR=0.2; 95% CI 0.04-0.8). The risk of anaemia was twelve fold higher in non-facility delivery (OR=12.1; 95% CI 1.5-99.9) compared to facility delivery. Similarly the risk of anaemia increased ten times in mothers initiating ANC care during third trimester compared to first or second trimester (OR=10.5; 95% CI 5.3-20.9).

Conclusion: The duration of haematinic use in pregnancy, repeated IPT dosing, health facility delivery and early initiation of antenatal clinic have been shown by this study to be important strategies in prevention of Post-partum anaemia.

BACKGROUND AND LITERATURE REVIEW

Anaemia is a condition in which an inadequate number of red blood cells or an inadequate amount of haemoglobin impairs blood oxygen transport resulting in reduced physical and mental capacity.¹ Anaemia is characterized by a blood haemoglobin concentration lower than the expected reference range for a particular age, gender and physiological state. The mean minimum acceptable haemoglobin level during pregnancy by WHO criteria is 11g/dl in the first half of pregnancy and 10.5g/dl in the second half of pregnancy and post-partum period. WHO further divides anaemia into mild, haemoglobin of 10.9-10 g/dl, moderate 9.9-7g/dl, and severe haemoglobin less than 7g/dl².

It is the world's second leading cause of morbidity and thus one of the most serious global public health problems³. Although anaemia in postnatal period is widespread, health care systems have not addressed it effectively and there is a paucity of studies regarding anaemia in the postpartum period. Mothers are at greater risk of post-partum anaemia if they were anaemic during the third trimester of pregnancy, lost large volume of blood during delivery or had multiple births.⁴ Prenatal anaemia is the strongest predictor of post-partum anaemia. Studies show women with post-partum anaemia have more overall symptoms of "maternal blues", reduced sense of well-being and increased risk of postpartum depression compared to non-anaemic mothers.⁵ Prevention and treatment of anaemia in postnatal women is essential for reducing maternal mortality and morbidity, improving quality of life, as well as improving work performance.⁶

Iron, folic acid, vitamin B12, vitamin A and other minerals are required for formation of haemoglobin. Nutritional deficiencies are the most common causes for anaemia and iron deficiency anaemia is a major contributor to the global burden of disease⁷. Among women of reproductive age, adolescent girls and pregnant women are most at risk for anaemia. Based on WHO reviews on national representative samples from 1993 to 2005, forty two percent of pregnant women have anaemia and sixty percent of this anaemia is assumed to be due to iron deficiency in non-malarial areas and fifty percent in malarial areas.⁸

Anaemic women have much lower tolerance for blood loss and less effective functioning of the immune system rendering them more susceptible to puerperal infections² with increased jeopardy of blood transfusion with its related complications. It also increases the risk of developing; sub involution of the uterus, failure to lactate, puerperal venous thrombosis and pulmonary embolism⁹.

The ministry of health in Kenya has recently designed and instigated a register for three targeted post natal visits, one visit within forty eight hours, the next within one to two weeks, and the third visit at around six weeks. However, according to KDHS 2008-2009 shows that fifty three percent of women do not receive post natal care.¹⁰

In East Africa the prevalence of anaemia in pregnancy is forty seven percent, in Kenya it is fifty five point one percent, while coastal Kenya it is seventy five point six percent¹¹. Among indirect causes of maternal deaths are diseases that complicate pregnancy or are aggravated by pregnancy i.e. Anaemia, Malaria, HIV¹². Anaemia also predisposes to the three main causes of deaths namely; haemorrhage, sepsis and pregnancy induced hypertension.

Despite many efforts to treat and prevent anaemia and iron deficiency over the last two decades, they remain both common and widespread. One reason for the failure to reduce the prevalence of anaemia is that most programmes have been based on addressing iron deficiency as the primary cause. This has meant that the role of other factors, such as infectious diseases or deficiencies of other micronutrients, have been underestimated when trying to prevent and treat anaemia.¹²

A key component of the safe motherhood program started by WHO in 1987, was the eradication of anaemia in pregnancy, many years later we are still to achieve this. Maternal health refers to the health of a woman during pregnancy, childbirth and the post-partum period. Maternal health is divided in to two major components, to reduce maternal mortality ratio and to achieve universal access to reproductive health, both targets to be achieved by the year 2015.¹³

In pregnancy, latent anaemia becomes manifest because of the physiologic hem dilution and the demands of the foetus. Undiagnosed anaemia can worsen with each pregnancy. Compensated cases of moderate to severe anaemia can lead to congestive cardiac failure. Also due to increased demand i.e. multiple pregnancies, increases the iron demands by two folds.

Women with rapidly recurring pregnancy within two years following the last delivery need more iron to replenish deficient iron reserve .The demand of iron which accompanies the natural growth before the age of twenty one should not be underestimated, especially where teenage pregnancies are quite prevalent. At the age of seventeen, the additional demand is estimated to be about two hundred and seventy milligrams during the course of pregnancy; the requirement is however brought down to nil at the age of twenty one years.¹⁴

Among some of the causes of anaemia there is good evidence of the effectiveness of simple interventions i.e. iron supplementation, use of long lasting insecticide treated nets, and de-worming and intermittent preventive treatment for malaria. However, some of these measures are underutilized, i.e. in Kenya the insecticide treated nets coverage of pregnant women is only forty percent while intermittent preventive treatment for malaria use is at fourteen percent ¹⁰. Hookworm infection has long been recognized among the major causes of anaemia in developing countries but understanding the benefits of its management has lagged behind the other causes of anaemia.

WHO recommendations on preventive regimen of sixty milligram of iron and four hundred micrograms folic acid daily during pregnancy for all women, beginning as soon as possible during gestation and no later than the third month and where the prevalence of anaemia in pregnancy is more than forty percent, supplementation with iron and folate should continue for three months in the postpartum period¹⁵.The 2008 Copenhagen Consensus panel ranked the provision of micro nutrients including iron and folic acid, as the world's best investment for development ¹⁶.

WHO recommends antenatal deworming prophylaxis for pregnant women where the prevalence of hookworm infestation exceeds 20-30% ³. In Kenya fewer than one in five women reported having taken deworming during the period of their most recent pregnancy ¹⁰.

Malaria prevention and control activities in Kenya are guided by the National Malaria Strategic plan(NMSP) 2005-2010.The NMSP aims to achieve national and international malaria control targets, the core interventions adopted in Kenya are; vector control-using ITNS and indoor residual spraying, case management(using artemisinin based combination therapies and improved laboratory diagnosis),management of malaria in pregnancy, epidemic preparedness and response, and cross cutting strategies including information, education and communication for behaviour change ,as well as effective monitoring and evaluation. The strategic plan is in line with the Ministry Of Health vision to transform Kenya in to “a Nation free from preventable diseases and ill health”.

The government of Kenya policy on IPT states that all pregnant women living in malaria endemic areas should receive sulfadoxine-pyrimethamine combination for prevention of malaria in pregnancy. The first dose should be given at sixteen weeks of gestation and subsequent doses administered with each scheduled visit as long as they are one month apart. ¹⁰

At the National level there has been a notable increase since 2003 in the proportion of women who reported taking iron supplements during pregnancy. A comparison with 2003 KDHS data indicates that the proportion of women who took iron supplements increased from forty one percent to sixty percent in 2008-2009, although this is a sizeable increase, almost all women who took iron supplements took them for less than sixty days during the pregnancy¹⁰.

A study done in Kilifi 1996 on aetiology of anaemia in pregnancy, the prevalence of anaemia was seventy five point six percent, Malaria was identified as the most important cause strongly associated with anaemia.²¹ Another study done in Mombasa, quality of antenatal care and outcome of pregnancy at Coast provincial hospital, found that more than fifty of the mothers who died had no routine Laboratory tests done though they had attended ANC. Anaemia was found to have been the most prevalent complication.²²

A study on Medico legal and social demographic factors associated with maternal mortality at Kenyatta National Hospital, nine point six of those with avoidable deaths died of anaemia. It was not addressed whether the anaemia was the primary contributor or an aggravating factor of another existing condition.²³ While another study on Quality of antenatal care in respect to assessment of anaemia among women delivering at Pumwani maternity, identified these risk factors to have an association with anemia ; lack of investigations to detect and look for causation of the anaemia, age of less than twenty years, not attending ANC in the first trimester, lack of action taken for those found to be anaemic, and lack of follow up of patients.²⁴

A study done in Uganda, Post- natal anaemia on neglected problems and missed opportunities in Uganda, sixty four point four percent of women were anaemic. Only iron supplementation and excessive bleeding during or after delivery emerged as risk factors. ¹⁷ While another study done in North Indian Village, on prevalence of anaemia in the post partum period: The prevalence of anaemia at the postpartum period was seventy percent; lack of iron supplementation in the ante partum period was found to be the contributor to anaemia. ¹⁸

A study done in Vietnam, Anaemia in pregnant, post partum and non pregnant women; the prevalence of post partum anaemia was sixty two percent, factors related to anemia included, having primary education or lower compared to secondary education or higher. Among pregnant women, being pregnant during the third trimester increased anaemia compared to being pregnant during the second trimester, women aged thirty or older were more anaemic compared women aged twenty to twenty nine.¹⁹ Another study done in United States, High prevalence of post partum anaemia among low income women in US; prevalence of post partum anaemia was twenty seven point two percent. Risk factors identified were; being non-Hispanic black women. Prenatal anaemia. Maternal obesity, multiple birth, and not breast feeding, predicted post-partum anaemia.²⁰

A systemic review on Hookworm related anaemia among pregnant women concluded increasing hookworm infection intensity is associated with lower Hb levels in pregnant women in poor countries. There is insufficient data to quantify the benefits of deworming and further studies are warranted. Given that between a quarter and a third of pregnant women in Sub Saharan Africa are infected with hookworm and are at risk of preventable hookworm related anaemia, efforts should be made to increase coverage of antihelminthic treatment among pregnant women.³¹

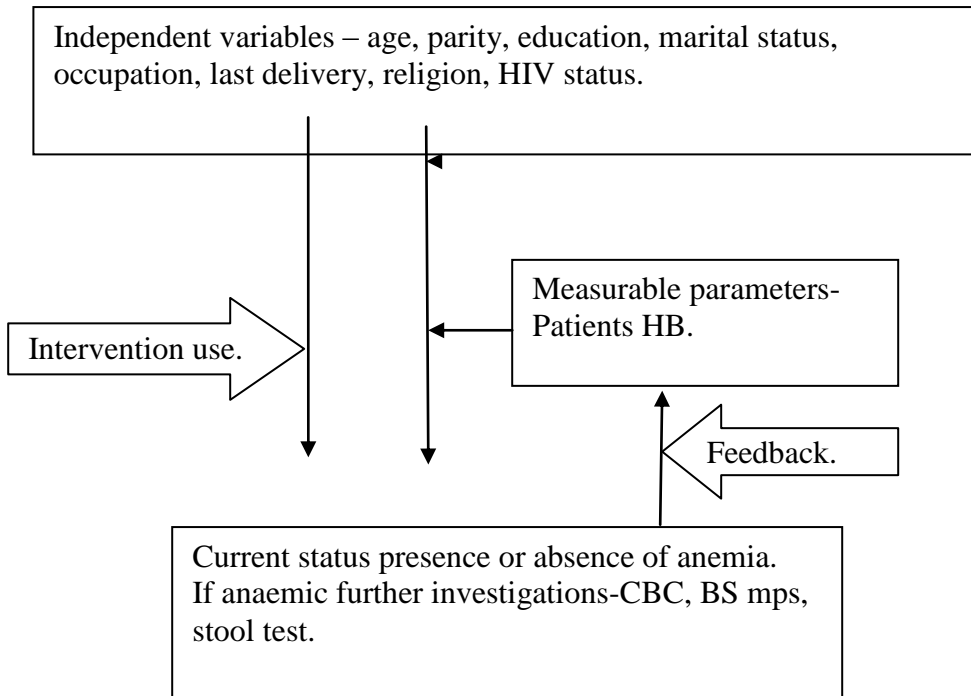
Cochrane reviews, drugs for preventing malaria in pregnant women. Antimalarial reduced antenatal parasitemia when given to all pregnant women. Placental malaria, but no effect was detected with perenatal deaths. In women in their first or second pregnancy, antimalarial drugs reduced severe antenatal anaemia, antenatal parasitemia and perinatal deaths. Mean birth weight was higher and low birth weight less frequent. Proguanil performed better than chloroquine in one trial of women of all parties in relation to maternal fever episode. Sulfadoxine-Pyrimethamine performed better than chloquine in two trails of low parity women.³²

CONCEPTUAL FRAMEWORK

The independent variables included the age, parity, level of formal education, marital status, occupation, last delivery, religion, and HIV status.

Intervention utilization assessment included, duration of haematinics utilization in pregnancy, intermittent preventive treatment for malaria, insecticide treated nets utilisation, deworming medication utilisation, the total number of antenatal clinic visits, the gestation of first antenatal clinic visit, place of delivery ,post-natal follow up and haematinics utilisation at the post natal period.

The definition of anaemia adopted in this study was based on WHO criteria. The study population had prick haemoglobin estimation. Anaemic population had further investigations which included a complete blood count, blood slide for malaria parasites and a stool test.



PROBLEM STATEMENT AND JUSTIFICATION

There is a high prevalence of anaemia in pregnancy at the coastal region of Kenya, and with delivery and post-partum blood loss, anaemia is bound to persist in the post-partum period, and this may be associated with morbidity and mortality. The contribution of malaria and worm infestation as causative or aggravating factors in post-partum anaemia need to be assessed as this will guide treatment protocols. A study to determine the burden and factors associated with post-partum anaemia becomes crucial in order to understand the magnitude of this condition and have a targeted approach in the management of this condition. From the literature search few studies have addressed this issue in Africa; the literature on the Kenyan situation has remained scanty.

RESEARCH QUESTION

What is the burden and determinants of anaemia at the postpartum period in Mariakani Sub-county Hospital?

OBJECTIVES

Broad objective

- To find out the burden and determinants of anaemia at the postpartum period in Mariakani sub-county hospital.

Specific objectives

1. To determine the prevalence of post-partum anaemia in Mariakani Sub county Hospital.
2. To determine the factors associated with anaemia at the post-partum period in Mariakani Sub county Hospital.
3. To determine the point prevalence of Blood slide positive smears for malaria and soil transmitted worm infestation at the post-partum period in Mariakani Sub county Hospital.

STUDY DESIGN AND METHODOLOGY

Study design

Cross sectional study design.

Study site and setting

Mariakani is a town lying on the boundary of Kaloleni and Kinango districts, Coast province of Kenya, 36 kilometres northwest of the port city of Mombasa, along the Nairobi- Mombasa highway.

Mariakani Sub county Hospital is one of the government hospitals in Coast province. Its catchment population is 275,801 of whom, 138,591 are female and 137,210 are male. There are three wards in the hospital, which comprise of; the male ward, female and paediatric ward and maternity ward. The total bed capacity is fifty eight, and a total of three cots. The average annual maternity deliveries for the year 2013 were 1,648, of which caesarean sections were 237 and vaginal deliveries were 1,411.

Standard routine care in Mariakani Sub-county Hospital after discharge from the hospital is follow up of patients at the post natal clinic where the patients who had a caesarean section are booked two weeks post-delivery while those who had vaginal delivery are booked four weeks post-delivery, the PNC runs every Monday. However, upon primary survey in the clinic, it was discovered more than ninety percent of the patients seen at the post natal clinic were those who delivered by caesarean section, the patients who had vaginal deliveries hardly come for review at the hospital. Within the setting of the hospital the Mother and child clinic serves solely for baby immunization and the mothers are not reviewed when they bring their babies for vaccination. After the birth dose, the next vaccination is given at six weeks which includes oral polio, Pentavalent and pneumococcal vaccines. Based on this, decision was made to recruit the study participants from MCH clinic to avoid selection bias.

The hospital has been a beneficiary of the Obstetric Aid funding since 2011, maternity patients are only required to pay 50 Kenya shillings and the remaining hospital fees from antenatal care, and intrapartum to post-partum care is catered for courtesy of the obstetric aid funding. All the investigations carried out in this research were also supported by the Obstetric aid funding.

Study Population

The study population includes mothers around the sixth week post-partum. Entry point was the mother and child health clinic at Mariakani sub-county hospital. The Measurable parameters together with data collection was done at that point in time.

Inclusion Criteria

- ❖ Biological mothers attending MCHC at Mariakani sub-county hospital.
- ❖ Mothers around the sixth week of the post-partum period.
- ❖ Mothers who consented in the study.

Exclusion Criteria

- ❖ Mothers unwilling to participate in the study.

Sample Size

Sample size calculation was based on the following formula for estimating proportions using a given precision around the population estimate:

$$n = \frac{Z_{\alpha}^2 p(1 - p)}{d^2}$$

Where:

$Z_{\alpha} = 1.96$ (Standard normal deviate under the normal distribution representing an area of 0.95)

$p = 0.756$ representing the prevalence of anaemia in pregnancy at the coastal region in Kenya (WHO global data base on anaemia)

$d = 0.05$ representing precision around the estimated prevalence of anaemia

n =desired sample size

$$n = \frac{1.96^2 \cdot 0.7(1 - 0.756)}{0.05^2}$$

$$n = 323$$

Sampling Procedure

The study adopted a simple random sampling technique with every third patient attending MCH at Mariakani Sub county Hospital around the sixth week post-partum recruited in the study. This was done by physically identifying mothers coming at the sixth week at MCH clinic who were then grouped together, after receiving the vaccination for the baby, every third patient recruited, if consent was denied the participant following was taken, with the pattern maintaining its consistency.

Recruitment Process

Patients attending the MCH clinic were recruited in to the study, after consenting. An eligibility criterion was adhered to. The recruitment process was as follows:

Consenting

- ❖ Patients were informed about the study.
- ❖ Every patient keen on participating in the study was given a consent form in a language that they understand either Kiswahili or English in order to read the details.
- ❖ After reading the consent form, any queries were clarified.
- ❖ Once the patient was satisfied and was still keen in participating in the study, they were asked to sign the consent form.
- ❖ No patient was forced to participate in the study.
- ❖ Any participant less than eighteen years of age, ascent was obtained.

Data Collection Process

- ❖ An interviewer administered structured questionnaire was used to get socio demographic details. The antenatal card was used to record patients hematinics use, deworming medication, IPT, and inquiry done on ITN utilization.
- ❖ Personal identifiers were removed from the questioner. And allocation of questionnaire codes was random.

Laboratory Tests

- After data collection, patients were referred to the hospital laboratory with a request form for Hemoglobin estimation.
- The blood was taken in the laboratory by the laboratory technician working for the hospital. Prick HB was done using the mission HB meter. Further tests were only done for those whose HB was below 10.5g/dl, which included stool test using the dilution technique, Complete blood count and a BS for malaria parasites.
- Prior communication to the laboratory technician was made, so that if the HB level was below 10.5g/dl, then additional tests followed.
- The results were then returned to the Principal investigator or Research assistant who guided treatment based on the results after explaining to the patient the findings of the tests done.
- The participants who's HB was above 10.5g/dl were informed about the results and counseling was done on prevention of anemia.
- Mothers found to have a HB below 10.5g/dl, were given hematinics and given a return visit of two days to get the results of the additional tests done, where treatment offered was based on results. Treatment followed the standard of care; those with BS positive slides were treated for malaria with artemether lumifantrine combination. Those with helminthes infestation were given mebendazole.
- The human blood sample was discarded in accordance to the safety human waste discarding regulations.

Data management

Data was collected using a questionnaire. Additional information abstracted from patient's medical records using the antenatal clinic booklet. Data was entered in Microsoft Access data base with in-build consistency and validity checks.

Data analysis

Data analysis was conducted to determine strength of association between dependent and independent variables using Chi-square for categorical variables. Categorical variables are summarized using proportions. All statistical tests have been performed at 5% significance level (95% confidence level). Summarised data has been presented in tables, graphs and charts.

A logistic regression model was fitted to the anaemia data to explain the predicted odds of postpartum anaemia. The model included postpartum anaemia as the dependant variable and four main effects; namely complications during antenatal period, place of delivery, gestational age and maternal occupation, all measured as categorical variables. Inclusion of predictors in the variable was based on statistically significant association (p values <0.05) in the bivariate analysis.

Ethical Considerations

- The study proposal was submitted to ethics review board for consideration.
- Permission from Mariakani Sub-county Hospital was sought and obtained.
- Informed consent signed and translated in Swahili was administered.
- No patient was forced in to the study; unwilling patients were managed appropriately with no discrimination.
- The study is not harmful to participants and those patients found to be anaemic were managed appropriately in line with the hospital protocol. However the participants were explicitly informed on the purpose of the study and the benefits of the study.
- Participants did not receive any form of financial or material inducement.
- Feed back to the hospital shall be given and the findings with recommendations submitted for their review.
- Privacy and confidentiality was ensured by removal of identifiers.
- Study participants in study were treated with dignity.
- Participants did not incur any additional cost as a result of the study. The investigations done in this study were sponsored by Mariakani Sub county Hospital Obstetric Aid project.

LIMITATIONS OF THE STUDY

1. Other potential factors like cultural and nutritional habits were not included in the study.
2. This was a hospital based study, likely to capture the population with good health seeking behaviour, and might not represent the other population in the community.

RESULTS

A total of 323 mothers attending MCH clinic at Mariakani sub-county Hospital between January and June 2014 were eligible and recruited in the study. The average age of the postnatal mothers was 26 years (SD 5.9)

Table 1: Socio demographic characteristics of women attending MCH clinic at Mariakani Sub county Hospital

Socio-demographic characteristics.		
Age Groups	N	Percent (%)
14-19	40	12.4%
20-25	124	38.4%
26-30	84	26.0%
31-35	60	18.6%
> 35	15	4.6%
Marital Status		
Single	63	19.5%
Married	247	76.5%
Divorced/Separated	10	3.1%
Widowed	3	0.9%
Religion		
Christian	179	55.4%
Islam	134	41.5%
Others	10	3.1%
Education Level		
None	41	12.7%
Primary	220	68.1%
Secondary	42	13.0%
University/College	20	6.2%
Occupation		
Housewife	280	86.7%
Employed	15	4.6%
Business	28	8.7%

The characteristics of the study population are summarized in table one above, n = 124 (38.4%) of the participants were aged 20-25 years, and n = 84 (26%) were aged 26-30 years. n=275 (76.5%) participants were married. The main religious affiliations reported by participants were: Christianity n= 179 (55.4%) and Islam n= 134 (41.5%). Most participants had primary education n= 220 (68.1%) and were housewives n=280 (86.7%).

Figure 1: ANC attendance by trimester among post-natal mothers

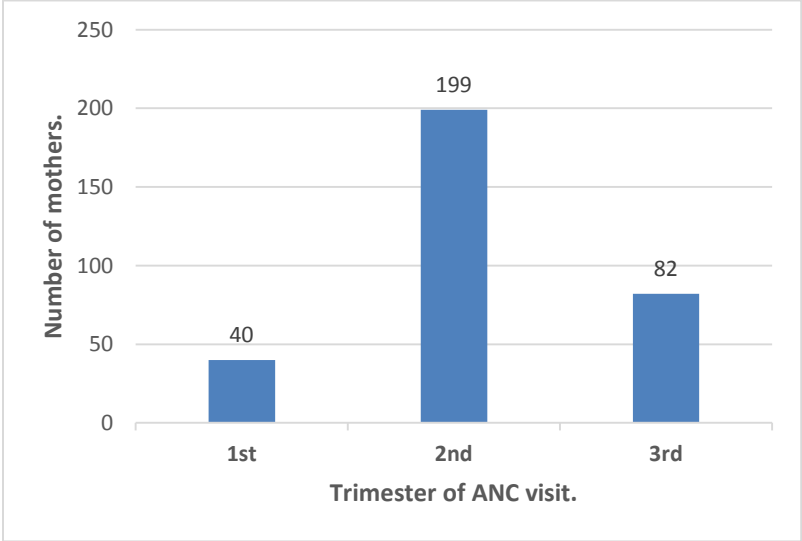
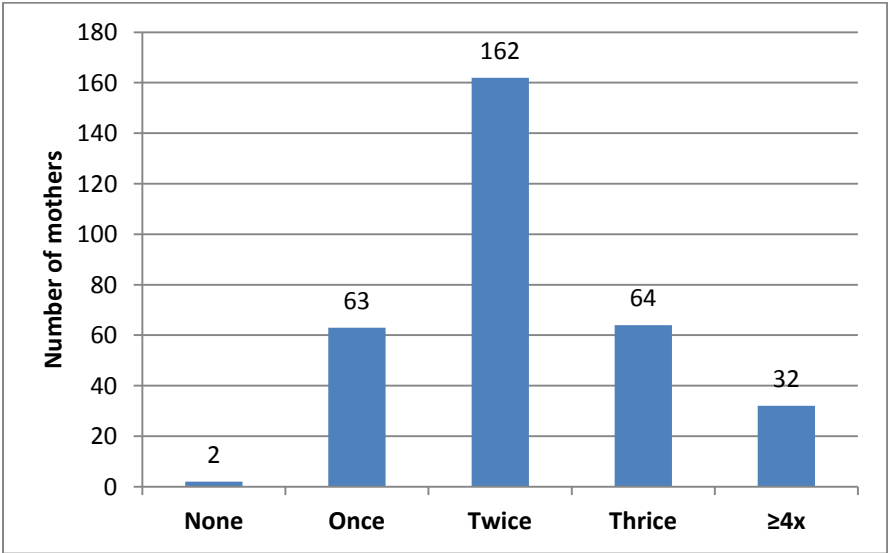


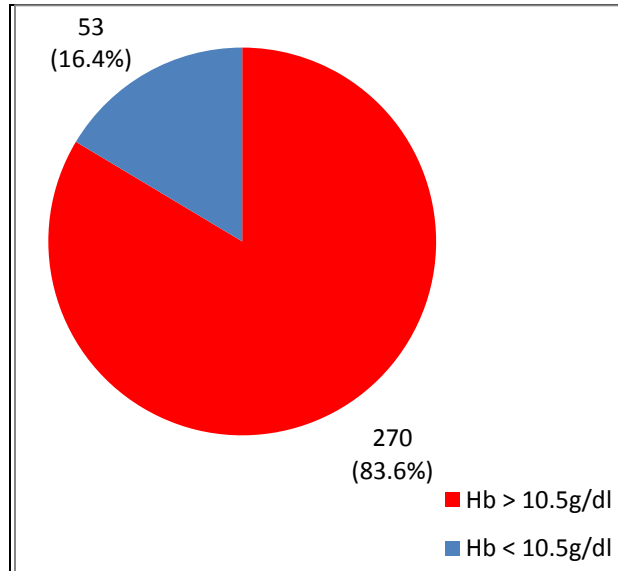
Figure one above shows that most mothers n=199 (61.6%) mothers reported that they attended antenatal care during the second trimester.

Figure 2: Number of ANC attendance.



Majority of mothers n=162 (50.2%), attended antenatal care twice during the immediate past pregnancy.

Figure 3: Prevalence of post-partum anaemia



The point prevalence of post-partum anaemia was 16.4%.

Table 2: Grade of anaemia

Haemoglobin level	n	PERCENT%
10 - 10.5 g/dl	12	22.6%
7 - 9.9 g/dl	37	69.8%
<7 g/dl	4	7.5%
MCV level		
<0.76	26	52%
0.76-0.96	23	46%
>0.96	1	2.0%

Out of the 53 mothers with anaemia in the post natal period, majority n=37 (69.8%) had haemoglobin levels between 7 – 9.9 g/dl. MCV levels were likely to be reported as < 0.76, n= 26 (52%) or 0.76-0.96 n= 23 (46%).

Table 3: Prevalence of post-partum anaemia by socio-demographic characteristics

Socio-demographic characteristics.	Not Anaemic		Anaemic		P value
	n	%	n	%	
Marital Status					
Single	50	79.4	13	20.6	0.059
Married	212	85.8	35	14.2	
Divorced/Separated	6	60	4	40	
Widowed	2	66.7	1	33.3	
Age Group					
14-19	33	82.5	7	17.5	0.346
20-25	102	82.3	22	17.7	
26-30	72	85.7	12	14.3	
31-35	53	88.3	7	11.7	
>35	10	66.7	5	33.3	
Education Level					
None	27	65.9	14	34.1	0.004
Primary	188	85.5	32	14.5	
Secondary	35	83.3	7	16.7	
University/College	20	100	0	0	
Occupation					
Housewife	239	85.4	41	14.6	0.008
Employed	11	73.3	4	26.7	
Business	20	71.4	8	28.6	
Religion					
Christian	152	84.9	27	15.1	< 0.001
Islam	112	83.6	22	16.4	
Others	6	60	4	40	

Maternal education, occupation and religion showed statistically significant association with postnatal anaemia ($P < 0.05$). Regarding formal education tertiary education perfectly predicted protection from post natal anaemia with all ($n=20$) mothers with university/college education being non- anaemic. The remaining demographic factors namely marital status and age group were not significantly associated with anaemia prevalence. ($p > 0.05$).

Table 4: Obstetric history and postpartum anaemia

Obstetric history.	Not Anaemic		Anaemic		P value
	n	%	n	%	
Parity					
1	44	84.6	8	15.4	0.073
2	99	82.5	21	17.5	
3	97	88.2	13	11.8	
4	11	68.8	5	31.3	
>5	17	68	8	32	
Interval between last 2 pregnancies					
Less than 1yr	12	70.6	5	29.4	0.382
1yr	99	82.5	21	17.5	
2-yrs	63	84	12	16	
>3yrs	52	88.1	7	11.9	
Mode of delivery in last pregnancy					
SVD	249	84.4	46	15.6	0.20
C/S	21	75	7	25	
Place of Delivery					
Health Facility	268	84.3	50	15.7	0.01
Home	2	40	3	60	
Complications during/after delivery					
Yes	6	54.5	5	45.5	0.008
No	264	84.6	48	15.4	
Attendance PNC after delivery					
Yes	21	75	7	25	0.20
No	249	84.4	46	15.6	

Among the obstetric risk factors evaluated, the place of delivery and complications during or after delivery were significantly associated with anaemia. Those with complications or home deliveries were strongly associated with post natal anaemia ($P < 0.05$). Complications identified in this study were retained placenta and abruptio placenta there was no significant association between parity, interval between two last pregnancies, mode of delivery, PNC attendance and the prevalence of anaemia. ($P > 0.05$)

Table 5: Medical history and postpartum anaemia

Medical history	Not Anaemic		Anaemic		P value
	n	%	n	%	
History					
Chronic medical condition					
Yes	6	85.7	1	14.3	0.88
No	264	83.5	52	16.5	
HIV Status					
Positive	14	77.8	4	22.2	0.529
Negative	252	84	48	16	
Unknown	4	80	1	20	
Recent history of fever					
Yes	3	100	0	0	0.44
No	267	83.4	53	16.6	
PICA behaviour index pregnancy					
Yes	54	78.3	15	21.7	0.18
No	216	85	38	15	

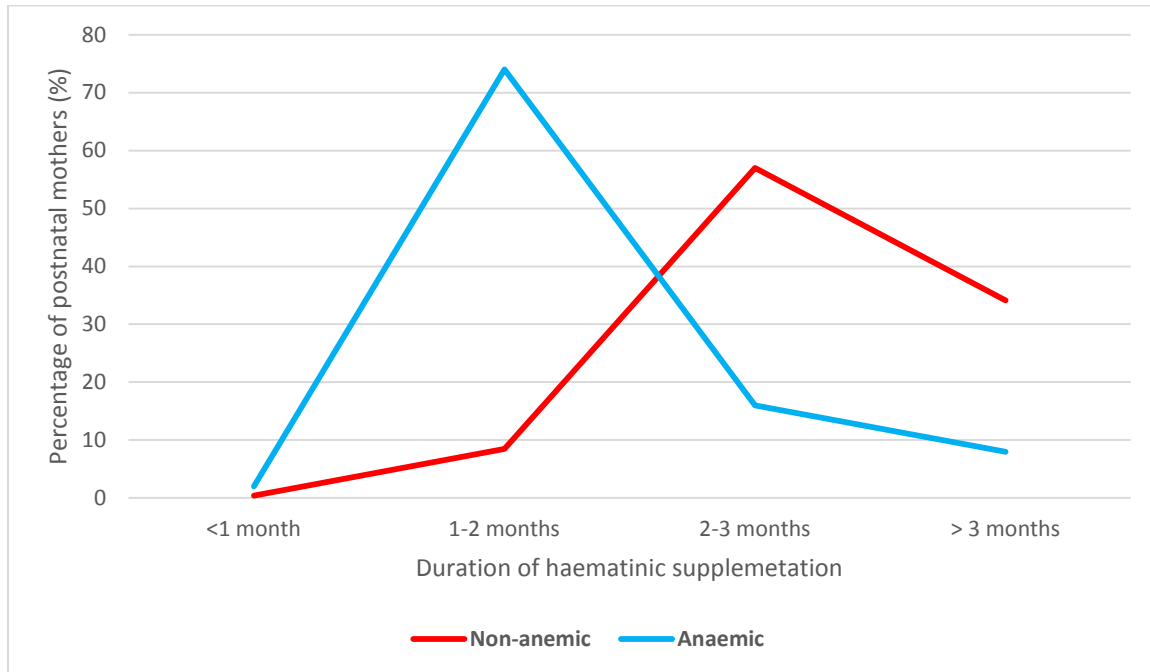
None of the maternal factors documented as part of maternal history including presence of chronic medical condition, HIV status, or history of fever was significantly associated with postpartum anaemia.

Table 6: Interventions utilization in the management of anaemia at the antenatal period and the prevalence of post-partum anaemia

Intervention.	Not Anaemic		Anaemic		P value
	n	%	n	%	
Information about Anaemia					
Yes	10	76.9	3	23.1	0.51
No	260	83.9	50	16.1	
Use of Nets					
Use of ITN.	219	83.6	43	16.4	0.63
Use of untreated mosquito net	13	76.5	4	23.5	
None	38	86.4	6	13.6	
Use of IPT					
No	6	66.7	3	33.3	0.16
No. of times received					
x1	26	41.3	37	58.7	<0.001
x2	153	94.4	9	5.6	
x3	85	95.5	4	4.5	
Use of Haematinics in pregnancy					
Yes	270	84.4	50	15.6	NA
No	0	0	3	100	
Duration of use					
<1 month	1	50	1	50	NA
1-2 months	23	38.3	37	61.7	<0.001
2-3 months	154	95.1	8	4.9	
> 3 months	92	95.8	4	4.2	
Use of post-natal Haematinics					
Yes	4	57.1	3	42.9	0.06
No	260	83.9	50	16.1	
Duration of use					
1-2 weeks	4	57.1	3	42.9	NA
3-4 weeks	0		0		NA
5-6 weeks	0		0		NA
Use of anithelminths					
Yes	264	83.8	51	16.2	0.51
No	6	75	2	25	
Start Dose	264	83.8	51	16.2	NA

Table six above shows longer durations of haematinic use was protective against postnatal anaemia ($p < 0.001$), as was the case for repeated IPT administration ($p < 0.001$).

Figure 4: Duration of haematinic use between anaemic and non- anaemic



There was a statistically significant association between duration of haematinic use and anaemia prevalence. As shown in figure four above, most (74%) anaemic patients had used haematinics for 1-2 months while 57% of the non-anaemic patients had used haematinic for a longer duration of between 2 and 3 months.

Table 7: Antenatal care and post-partum anaemia

	Not Anaemic		Anaemic		P value
	n	%	n	%	
Trimester					
1 st	38	95	2	5	<0.001
2 nd	184	92.5	15	7.5	
3 rd	48	58.5	34	41.5	
No. of Visits					
None	0	0	2	100	<0.001
Once	40	63.5	23	36.5	
Twice	137	84.6	25	15.4	
Thrice	61	95.3	3	4.7	
≥4x	32	100	0	0	

Table seven above shows late ANC attendance and the fewer number of ANC visits strongly associated with post-partum anaemia ($p < 0.001$).

Table 8: Helminthiasis and Malaria parasitisation.

Helminth infestation.	n
Ascaris lumbricoides	2
Hook worms	4
Tape worms	0
Blood slide smear for Malaria parasites	
Positive	4
Negative	49

2 out of 53 participants had positive stool test for Ascaris lumbricoides and 4 out 53 participants had positive stool test for hookworm infestation. The point prevalence of helminth infestation in anaemic post natal mothers was 11.3% (6/ 53). The point prevalence of malaria positive blood slide smear was 7.5% (4 /53).

Table 9-Multivariable regression analysis in relation to post-partum anaemia.

	Odds Ratio	P value	95% CI	
Complication during or after delivery.				
Complications present	1.0 (Reference)			
No complications	0.2	0.02	0.04	0.8
Place of delivery				
Hospital facility delivery	1.0 (Reference)			
Non-facility delivery	12.1	0.021	1.5	99.9
ANC initiation.				
First or second trimester	1.0 (Reference)			
Third trimester	10.5	<0.001	5.3	20.9
Occupation				
Housewife	1.0 (Reference)			
Employed	1.6	0.562	0.3	7.4
Business	2.8	0.047	1.0	7.8

Multivariable regression analysis of the independent predictors of post-partum anaemia as presented above. The findings of the logistic regression model including complications during pregnancy and delivery, place of delivery, pregnancy gestation during initial ANC visits and maternal occupation showed that: non-facility delivery, late initiation of ANC and complications during pregnancy or delivery were independently associated with higher risk of post-partum anaemia.

The risk of anaemia in mothers with no labour or delivery complications was 0.2 times lower than that of mothers with complications (OR =0.2; 95% CI 0.04-0.8). The risk of anaemia increased ten times (OR= 10.5;95% CI 5.3-20.9) in mothers initiating ANC care during third trimester compared to first or second trimester, Similarly the risk of anaemia was twelve fold higher in non-facility deliveries (OR=12.1;95% CI 1.5-99.9) compared to facility delivery

Occupation was not significantly associated with anaemia in the logistic regression suggesting possible confounding effects by occupation in the bivariate analysis. Clients formal education showed significant association in the bivariate analysis with post-partum anaemia but has been excluded in the regression analysis because tertiary education perfectly predicted post natal anaemia with all twenty mothers with tertiary education being non anaemic.

DISCUSSION

The main findings of this study are; the prevalence of anaemia at the six week postpartum is 16.4%, factors associated with post-partum anaemia are; late antenatal clinic initiation, non-facility delivery and delivery complications. Maternal formal education, long duration of haematinic use at the antenatal period and repeated IPT use were found to be protective for post-partum anaemia. The point prevalence of Malaria and worm infestation is 7.5 % and 11.3% respectively.

The prevalence of post-partum anaemia in this study was quite high; however it was much lower in comparison to other studies. A study done in Uganda showed a prevalence of 64.4%¹⁷ while another one done in a North Indian village showed a prevalence of 70%¹⁸. The results obtained from our study showed the lowest prevalence of post-partum anaemia compared to other cited studies, Literature search did not reveal any previous study done at the same setting and therefore we do not have previous results to compare. The low prevalence recorded in our study in comparison to the other studies, may be because majority of the study participants were beneficiaries of the Obstetric aid funding and were captured in the antenatal period where management for anaemia was crucial and directly impacts on post natal anaemia. The study done in the North Indian village was a community based study and showed a high prevalence which may not be comparable to a hospital based study. Another explanation may be due to the variation in haemoglobin cut off used to define anaemia at the post-partum period in the different studies.

The blood slide picture among the majority of anaemic population was microcytic hypochromic and could be due to iron deficiency which is prevalent in pregnancy⁷, attributed to several factors which lead to increased demands and utilization of iron, and if not replenished persists in the post natal period. This was consistent to a WHO/ UNICEF report 2005, in which 50% of all anaemia was attributed to iron deficiency anaemia in Malaria endemic regions and 60% in non-malaria endemic regions.¹²

From this study formal maternal education was protective for post natal anaemia; this could be due to better health seeking behaviour in the group with education. This was consistent with a study done at Vietnam where women who had lower education were more anaemic than women who had higher education.⁶

Health facility delivery was protective for post-partum anaemia in this study, which could be due to effective management and utilization of preventive strategies in labour management as the patient is attended to by a health professional. A study done in Uganda identified complications during delivery which were significantly associated with post natal anaemia as retained placenta and post-partum haemorrhage. This study was consistent with the findings in the Uganda study as it showed retained placenta was the commonest complication .Occurring in four out of the five participants who had home deliveries.¹⁷

Majority of the mothers had taken haematinics in the antenatal period. This upward trend in haematinic supplementation during pregnancy was also reported in the KDHS 2008-2009 with a rise from 41% in 2003 to 60% 2008-2009¹⁰.Our higher value could be due to the benefits in OBA funding in the facility which majority of the study participants were beneficiaries and thus had ready access to haematinics and IPT. The duration of haematinic use and repeated IPT administration during pregnancy were significantly associated with anaemia. Long duration of haematinic use was protective of anaemia, as was the case of repeated IPT administration. Iron supplementation improves the iron status of the mother during pregnancy and the post natal period, even in women who enter pregnancy with low iron stores. The government of Kenya policy on IPT administration emphasizes its prophylactic use in malaria endemic regions.¹⁴

It is interesting to note that majority of the study participants had not attended post natal clinic. As per KDHS 2008-2009 53% of women do not receive post natal care.¹⁰our study recorded a much higher prevalence. WHO recommends on continued supplementation of iron and folic acid three months in the post-partum period where the prevalence of anaemia in pregnancy is more than 40%.¹⁵this study clearly shows post natal follow up is a neglected opportunity. However there was no statistical significance in post natal anaemia and post natal visits in this study.

Late ANC initiation was a risk factor for post natal anaemia compared to early ANC visit, This could be due to longer duration of haematinics use and other interventions in the management of anaemia antenatally which the population who attended clinic early could have benefited from .It is well established that with good antenatal and obstetric care most anaemia related morbidity is preventable.

The point prevalence of helminth infestation was comparable to that of a study done by Khadija at Kakamega Provincial hospital of 11.8%, a study done by Munyalo at Kibera found a prevalence of six point seven of helminth infestation among pregnant women. The key issue for the host is total worm load and total blood loss in causation of anaemia. In this study it was noted that majority of the study participants had been dewormed during pregnancy. Which poses several questions, could this be due to a reinfection or persistence of the infection and hence we need to re-think on our guidelines of single dose use of deworming medication in pregnancy.

Prevalence of BS positive smear was lower compared to a study done in Kisumu and Mombasa by Monica E et al, several factors may explain this including: IPT utilisation in this study population was very high, with 97.2% of the study participants reported having received the medication for protection of malaria in pregnancy. In addition a single blood slide testing for malaria has limitations as it can fail to detect parasitemia when the parasites are at the exo-erythrocytic stage, which the other study had overcome by doing placental parasitemia.

CONCLUSION

The prevalence of post-partum anaemia was quite high. The duration of antenatal haematinic use, repeated IPT dosing and formal education are protective for post-partum anaemia. Late initiation of antenatal clinic, non-facility delivery and complications during delivery are associated with higher risk of post-partum anaemia.

RECOMMENDATIONS

- Vigilance in sustained supplementation with haematinics at the antenatal period, repeated IPT dosing in malaria endemic regions and emphasis on early initiation of antenatal clinic visits.
- Promoting facility delivery and empowering women through formal education should form part of the management in the preventive strategies to combat anaemia.

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CHAPTER 5.APPENDICES.

5.1-Data collection sheet.

SOCIAL DEMOGRAPHIC FACTORS

1. Age in completed years.

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2. What is your religion?

1. Muslim

2. Christian

3. Hindu

4. others, specify.

3. What is your marital status?

1. Married (Monogamous)

2. Married (Polygamous)

3. Single

4. Widowed

5. Cohabiting

6. Divorced/ separated

4. Have you ever attended school?

1. Yes

2. No

5. If yes, what is the highest level of school attended?

1. Primary

2. Post primary/vocational

3. Secondary

4. College/middle level

5. University

6. What is your occupation?

1. Unemployed

2. Self employed

3. Salaried employment

4. Casual labourer

5. Other (specify).....

7. What is your spouse occupation? Where applicable.

1. Unemployed.

2. Self-employed.

3. Salaried employed.

4. Others, specify-----

8. Do you suffer from any medical conditions

1. Diabetes

2. Hypertension

3. Others, specify

10. HIV status

1. Negative

2. Positive

3. Not Known

IF YES

11. Latest CD4 Count Results

12. Which HAART regimen?

13. Did you attend antenatal clinic in this pregnancy? If yes

14. Where did you attend the clinic?

15a. how many times did you attended ANC?

15b. when did you start ante natal clinic?

16a. how many pregnancies have you had?

16b. what is the interval between the last two pregnancies?

17. What was the mode of delivery for the last pregnancy?.....

18. When was your last delivery?.....

19. Where did you deliver?

Health facility

Home.

20. Any complications during or after delivery?

If yes, which ones?.....

.....

21. Have you used insecticide treated net in your current pregnancy?.....
- If yes
- 22a. When did you start using them?
- 22b. how long did you use them?.....
23. How did you acquire the ITNs?.....
24. Have you used untreated mosquito net in your current pregnancy?.....
- if yes
- 25a. When did you start using them?.....
- 25b. for how long have you used them?.....
26. How did you acquire them?.....
- 27a. Have you used any medication for prevention of malaria in this pregnancy?.....
- 27b. If yes, which ones?.....
- 27c. how many times have you received the medication?.....
- 28a. Have you used any medication to increase your blood level in this pregnancy?
- 28b. If yes which one?.....
- 28c. For how long?.....
- 29a. Did you use any deworming medication in your pregnancy? If yes
- 29b. Which ones?.....
- 29c. Duration of use?.....
- 30a. Any Pica behavior during pregnancy?
- 30b. If yes which ones?.....
31. What was your antenatal Hb?
32. Was there any intervention provided during the antenatal period ?
33. Were you given any information about your Hb, its importance in pregnancy, and what to do about it?
- 34a. Did you receive blood transfusion during or after delivery? If yes
- 34b. how many pints?
- 35a. Did you use any hematinic during the post-partum period? If yes
- 35b. How long?
- 36a. Did you attend post natal clinic after delivery? if yes
- 36b. How many times?

Laboratory results.

BLOOD.

HB level.....

If less than 10.5g/dl do the other tests.

CBC.

Hb.....

mcv.....

WBC.....

PLT.....

BS mps.....

PBF.....

HIV.....if status not known.

STOOL TEST.

Ova and cyst.....

5. 2: CONSENT FORM FOR INTERVIEWEES.

DETERMINANTS OF ANAEMIA AT THE POST PARTUM PERIOD IN MARIAKANI DISTRICT HOSPITAL

Principle investigator: Dr Rukiya Abdulrahman Maawiya.

Introduction

I **Dr. Rukiya.A.Maawiya** of the Department of Obstetrics and Gynaecology, University of Nairobi, am conducting a study on **DETERMINANTS OF ANAEMIA AT THE POST PARTUM PERIOD IN MARIAKANI DISTRICT HOSPITAL.**

Purpose

The study seeks to identify the determinants of anaemia at the post-partum period for effective preventive services as well as early intervention in the affected population.

Procedure

If you agree to participate in the study you will be asked questions after you have been attended to by the doctor. The nature of the questions will be about your how you were managed for anaemia in pregnancy. The interviewer will also access your file to identify your management plan. The questionnaires this information will be filled and identifiers shall be removed to protect your confidentiality. Laboratory samples shall then be taken which includes blood samples and urine and stool samples.

Risks/Discomfort

There is no risk in participating in this study. However, you may experience some discomfort when taking the blood sample, however there is no risk attributed to the study.

Benefits

There will be no direct benefit in participating in the study but in case you have any question the interviewer will readily assist you. The study will help in assessing for risk factors associated with anaemia in pregnancy so that preventive services can become a cornerstone in the management of anaemia.

Confidentiality

Your confidentiality will be maintained at all times. There shall be no mention of names or identifiers in the report or publications which may arise from the study.

Compensation

There will be no compensation for participation in the study.

Voluntariness

Participation in the study is voluntary. If you choose not to participate, you will not be denied any service. You will be free to withdraw from the study at any time.

Persons to contact

If you have any questions regarding the study, you can contact Dr. Rukiya .A. Maawiya through telephone number 0725 949377.

You may also contact the KNH/UoN/ERC Committee-0735-274288/0721-665077.

Your participation in the study will be highly appreciated.

I _____ hereby voluntarily consent to participate in the study. I acknowledge that a thorough explanation of the nature of the study has been given to me by Dr/Mr./Mrs._____. I clearly understand that my participation is completely voluntary.

Signature_____Date_____

Signature of Reseacher/Assistant_____Date_____

Signature of Witness_____Date_____

5. 3: SWAHILI VERSION CONSENT FORM FOR INTERVIEWEES.

MUHUMU MKUU: Dr.Rukiya Abdulrahman Maawiya.

KIBALI CHA KUSHIRIKI

Kwa majina naitwa **Dr.Rukiya .A. Maawiya** kutoka chuo kikuu cha Nairobi, idara ya wamama. Hili ni ombi kwako kukubali kushiriki katika utafiti. Lengo la fomu hii ya ridhaa ni kukufahamisha yale utakayohitajika kujua ili kukusaidia kuamua ushiriki wako katika utafiti. Tafadhali isome fomu hii kwa makini. unaweza kuuliza maswali kuhusu yale nitakayo hitaji kufanya, athari zozote, manufaa, haki zako kama mshirika.

LENGO NA MANUFAA YA UTAFITI

Utafiti huu utachunguza mambo kadha ambayo huenda ukamueka mtu kuwa katika athari ya kupungukiwa na damu mwilini wakati wa uja mzito, ni muhimu kujuwa wale ambao wako katika hatari ya kupungukiwa na damu wakati wa uja uzito ndio hatua muwafaka zichukuliwe kuzuia hali hiyo. Baada ya kujifungua dama huenda ikawa iko chini na ni muhimu kuchunguza jambo hili ili hatuwa za kutibu ugonjwa huu kuchukuliwa.

TARATIBU ZITAKAZO FUATWA

Ukikubali kuhusishwa katika utafiti. Utaulizwa maswali baada ya daktari kukuhudumia. Maswali yatagusia juu ya ugonjwa unaotibiwa na matibabu ambayo umepata. Muhujumu atakuwa na kibali ya kuona maktaba yako na mambo ambayo umefanyiwa. Nambari maalum itatumika kukutambulisha wala si majina yako. Baadaye uchunguzi unaohusu kuchukua damu na mkojo utafanywa. Utahisi uchungu kidogo lakini hakuna madhara yanayohusiana na utafiti.

MADHARA NA MATATIZO.

Kushiriki kwako katika utafiti huu ni wa hiari. Unaruhusiwa kutojibu swali/ maswali au kujiondoa kwenye mjadala /mahojiano wakati wowote bila kuhujumiwa.

SIRI

Habari zozote wakati wa mahojiano zitahifadhiwa vyema. Majina ya kwanza pekee ndio yatakayo tumika wakati wa mahojiano. Utatafikana kutomuelezea mtu yeyote yale yaliojiri wakati wa mahojiano. Ingawa mtafiti hawezi kuhakikisha jambo hilo, kila juhudi itatiwa kuhakikisha kuwa yale utakayo yasema yamehifadhiwa kwa siri, Jina lako halitatokea katika

ripoti yeyeote itakayo andaliwa baada ya autafiti isipokua namba ya kutambulisha walio husika katika utafiti.

Fomu na kanda zitahifanyiwa katika sehemu maalum.Mtafiti pekee ndiye atakaye kua na kibali .

GHARAMA

Hutohitajika kulipa chochote cha ziada ili kushiriki katika utafiti huu isipokua wakati wako.

Mimi -----Nimekubali kuhusika na utafiti kuhusiana na utafiti wa upungufu wa dama kwa uja uzito.Nimefahamu ya kwamba kujihusisha ni kwa hiyari.Ninauwezo wakujitoa katika utafiti huu wakati wowote bila kushurutishwa.Kuhusika ni bure. Nimehakikishiwa kwamba mchango wangu utahifadhiwa na kutumiwa kwa utafiti kwa manufaa ya jamiii.

SAHIHI _____

Mimi..... ninadhibitisha ya kwamba nimemueleza kwa uwazi na umakini bwana/bibi.....kuhusiana na utafiti wa upungufu wa damu kwa uja uzito.

SAHIHI _____

SHAHIDI_____

Kwa maswala yeyote kuhusiana na utafiti unaweza kuwasiliana na Dr.Rukiya .A. Maawiya. Kutumia nambari 0725-949377.

Unaweza kuwasiliana na Komitii ya uadilifu kwa utafiti: KNH/UoN/ERC-0735-274288/0721-665077.