FACTORS CONTRIBUTING TO ANEMIA AMONG ANTENATAL MOTHERS IN GARISSA COUNTY, KENYA

BY

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Declaration

I, Mohamed A. Abdille hereby declare that this is my original work and it has never been presented before by any other person in any other institutions for any academic award or commercial purpose.

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MOHAMED A. ABDILLE   **DATE**

<u>SUPERVISOR</u>

This project has been submitted for review with my approval as university supervisor

…………………………………..   **DATE** ………………

 MR. BARASA M. AMBROSE

DEDICATION

This work is devoted to my Grandmother

Acknowledgement

I am indebted to all the academic staff in Kampala International University Western Campus and classmates who assisted me in the preparation of this research. Special appreciation goes to my supervisor, Jamal, Guyo (the serikal), Godana (1st in command), Mohamud (2nd in command), Wilber (Citizen center), Manal (Vanilla) and Fauzia (Fozz). Finally I am grateful to all the women who participated in the study.

Abstract

The objective of the study was to determine factors contributing to anemia among antenatal mothers in Garissa County, Kenya.

It was a cross-sectional study carried out in the study area and one hundred respondents were interviewed and the majority (62%) were in the age group between 18-27 years with 95% married and the major religion being Islam.

The study finding shows that 54% and 12% had moderate and severe anemia respectively with 38% having a positive malaria parasite on slide examination and anaemia was common in the second and third trimester, 42%.

Poverty and illiteracy was at an alarming rate as most of the respondents (82%) had no formal education while 83% had no major source of income.

Most of respondents, 98% received ferrous and folate supplements and insecticide treated nets (52%) during their antenatal visits and net use rate stood at 69%.

Chapter one

1.0 Introduction

1.1 Back ground information

Anaemia is an important public health problem worldwide and the most vulnerable groups are pregnant women and children. The causes of anaemia include genetic factors, nutritional deficiencies, and infectious agents. Of the nutritional causes of anaemia, iron deficiency is probably the most common and important because the physiological changes associated with pregnancy exert a demand for additional iron needed for transfer to the fetus. Infection, including malaria, hookworm and other helminthes are also involved in the pathogenesis of anemia in pregnancy. Pregnant women are particularly susceptible to malaria in endemic populations and often have higher prevalence as well as severity including anemia. The changes in the immune system associated with pregnancy have been suggested as the reason for this (**Van den broek, 1996**).

Hookworm infections on the other hand impair micronutrient absorption thus increasing the susceptibility of pregnant women to anemia. Recently infection with HIV has emerged as an additional important risk factor for anemia in pregnancy. Most studies aimed at identifying the causes of anemia in pregnancy have focused on the specific categories of factors. This study is designed to define anemia in pregnancy in Garissa county of North Eastern province located within arid and semiarid regions of Kenya. The County is mainly inhabited by Somali pastoral community who depends on livestock for livelihood. These are communities that experience periodic drought and water shortage leading to food insecurity(**Stephenson J.N, et al-1995**).

1.2 Statement of the problem

Anaemia associated with pregnancy is a serious health problem and its control requires the initial identification of the major factors responsible. The study is intended to determine the consequences of poor pregnancy Health Care, illnesses during pregnancy, and socio-economic conditions of the mother in developing anaemia during pregnancy. Antenatal mothers in Garissa County have very poor health seeking behaviour, coupled with harsh nomadic lifestyle and inaccessible health facilities in the region, since the area is high malarial endemic zone, this may also contribute to severity of anaemia in pregnancy. The high endemicity of malaria in the county combined with the harsh weather, poverty, negative cultural practices and poor health seeking behaviour seems to be augment the cause of anemia in pregnancy in the county, therefore the study intends to uncover the factors that contribute to the cause of anemia in pregnancy in Garissa County.

1.3 Purpose of the study

The goal of the study is to identify gaps in preventing and managing anemia in pregnancy and to educate the community, government, non-governmental organization and other stakeholders about the factors contributing to anemia in pregnancy and recommend some intervention strategies.

1.3.1General objective

To identify causes and determinants of anaemia in pregnancy in Garissa in Kenya.

1.3.2 Specific objectives

➢ To evaluate utilization of Health Services by the antenatal mothers in Garissa a district.
➢ To Identify socio-cultural and economic factors that influence dietary intake by antenatal mothers in Garissa district
➢ To determine the Common illnesses that might lead to anaemia in pregnancy.

1.4 Hypothesis

Social cultural, demographic factors have no effect on maternal hemoglobin level

There is no relationship between maternal illness and her hemoglobin level.

1.5 Significance of the study

The study was addressing health, socio-economic and environmental issues that affect antenatal mothers in Garissa District. The information obtained from this study will be used by government and the non-governmental organization to design appropriate nutritional interventions and make policies that will reduce the morbidity and mortality of antenatal mothers due to anaemia.

2.0   **Chapter two**

2.1   **LITERATURE REVIEW**

Anaemia is one of the world most common and serious tropical disease that causes at least a third million death every year, the majority of which occurs in the most resource poor countries.

More than a quarter of the world's population is at risk of acquiring anaemia in pregnancy and the proportion increases each year because of deteriorating health systems, drugs and insecticide resistance, climatic changes, natural disasters and armed conflicts that lead pregnant women into anaemia (**WHO 2005**).

In developed countries it is estimated that approximately 2% of women are anemic, in developing world this figure may be as high as 50% and this contributes to high rate of maternal mortality. Iron, folic acid and vitamin B12 deficiencies are more common causes of anemia though availability of correct food, food taboos, eating and cooking customs all plays a part.

In order to help prevent anaemia, one must not only understand the medical implications but also any social circumstances that give rise to it. Contributory causes to the high incidence of anaemia include: infections such as amoebic dysentery, malaria, particularly plasmodium falciparum and hook worm (Ancylestomaduodenale) which is in the duodenum and liver and gains nutrition from host's blood causing anaemia. The ova of the worm may be found in the woman's stool.

Since anaemia is a reduction in the oxygen carrying capacity of the blood which may be reduced number of red blood cells, a low concentration of hemoglobin or a combination of both. During pregnancy maternal plasma volume gradually expands by 50%, an increase of approximately 1200mls (most of the rise takes place before 32-34 weeks gestation and thereafter there is relatively little change- (**Letsky1997**). The total increase in red blood cells is 25% approximately 300mls which occurs in late pregnancy. This relative haemodilution produces a fall in HB concentration thus presenting a picture of iron deficiency anaemia, however it has been found these changes are NOT pathological but rather a physiological alteration of pregnancy necessary for the development of the fetus.

Normal changes occurring in the blood during pregnancy are the red blood count (RBC) the concentration of red blood cell fall from 4.2 x 10 12 to 3.8 x 1012 and mean cell volume (MCV), the average volume of a red cells fluctuate with in the non-regnant range 77-93 femtolitres (one thousand-million-millionth of amount of hemoglobin (HB) in red cell falls with the non-pregnant range of 26-32 pictograms mean all hemoglobin concentration (MCH) indicated how well filled with HB the cell are. This remains with the non-pregnant range of 32-36g/dl. Packed cell volume (PCV) or haematocrit (HCT) may fall from 0.45-0.33 liters (45-33%. Iron requirement in pregnancy is that during pregnancy approximately 1500mg iron is needed for the increase in maternal hemoglobin (400-500mg) the fetus and placenta (300-400mg), replacement of daily loss through stools, urine and skin (25mg) and replacement of blood lost at delivery (200mg) lactation (1mg/day).

The world health organization (**WHO-1992**) defined HB level of less than 11g/dl but anemia when the HB falls below 10.5g/dl. Study in the developing world has demonstrated 10g/dl. (**Murphy et al** 1986) suggests that the optimal booking hemoglobin is between 10.4 and d13g/dl.

Attempts to detect iron deficiency in pregnancy however are not confined to measuring hemoglobin concentration. This is because the normal indices used in laboratory investigation are unreliable in pregnancy. (**Enkit et al 2005**) state that mean cell volume may be the most useful as it is not closely related to how hemoglobin concentration and declines quite rapidly in the presence of iron deficiency. It is suggested that parameters which do not rely on relationships to the plasma volume are more useful guides to the iron deficiency, for example total body iron stores (**Ramble et al1993**).

These can be estimated by measuring serum ferrite which is the body's major iron store protein. Serum ferrite concentration falls in proportion to decrease in iron stores. Non pregnant serum ferritin levels are 30ug/l in women with the following variations found in pregnancy, 90 ug/l in the first trimester, 30ug/l in the second trimester falling to 15ug/l in the third trimester (**Torrance,1992**).

Pregnant women are usually screened at their first antenatal visit and therefore at monthly internals form the 28th week. Some doctors prescribe iron supplement for all pregnant women although there is little in evidence to support this practice, some gives it to those at risk of anemia while some only use iron to treat anemia if it occurs. Many doctors avoid giving iron during the first trimester of pregnancy owing to the gastro intestinal side effects. It may be more appropriate to administer prophylactic iron therapy in the third trimester of pregnancy. During this time the maternal iron stores become depleted due to the increasing fetal demand. Indication for prophylactic iron therapy included such as previous anemia, dietary conditions, chronic blood loss, and low hemoglobin on booking, close family spacing. Iron deficiency anemia in pregnant women is usually due to blood loss resulting from excessive or iron deprivation form previous pregnancy about 95% of pregnant women with anemia have the iron deficiency type (**Benson,2003**).

In may societies including some in developed countries, even where health diet were affordable, eating patterns and other factors unrelated to diet resulted in high level of anemia, especially young children, adolescent girls and pregnant women of age bearing. In other societies in equitable practices in household food distribution resulted in nutrition problems even when the in gradient necessary for health diet were available in the home. Due to the under-educate people were less likely to learn form education material and typically displayed at heath institution and used in health related community education activities more over (**Haddad and Kennedy 1991**) in their study found out that anemia in pregnancy is common to the low social status of women reflected their low level of education contributed to the persistence of female malnutrition. There was, therefore the need to continuously educate the mothers on the importance of consumption of in rich food and their benefits to both the mothers and fetus.

According to **Edward 1996** different climatic condition in the world favoring different type of food production had contributed anemia in pregnancy in the province as well as the district therefore deficiency of iron rich food is the lacking factors, hence people relied very much on what was in addition, the natural disasters and famine had contributed to scarcity of the required food. The clinical impression gained during famine lead the pregnancy women to anemia, pre-mature babies and underweight. It was found that the nutritional condition of the women was poor due to availability of food.

stated that, illiteracy and poverty were socio-economic factors low income countries, a women working days was longer than that of a man (**Dyre et al 1995**), food consumption was worsen with pregnant women because she still carried a full workload such as fetching water and firewood from a distance and till the land. The author proceeds to say that in some place food might be available at commercial outlets but majority of the people were financially disadvantage including pregnant women.

The extra prevalence of anemia that iron deficiency anemia among pregnancy women is uncertain, but national data suggest that <2% of non pregnancy women aged 20-24 years have iron deficiency anemia among low-income pregnant population, a low HB level and low hematocrit was present in 6% of white women and 17% of black women during the 1st trimester and 25% of white women and 46% of black women during the 3rd trimester. However the high rate of anemia in pregnant women might not be attributed to pregnancy (**Edington 1976**) say major cause is iron deficiency anemia supported by **chamberlain 1989** and **Jean 1963** they lament that iron deficiency in the tropical caused by an inadequate dietary iron content, excessive loss of iron form the body, disturbance of iron metabolism by bacterial and other infection as well as growing fetus, interference with absorption of iron form the intestine and increased demands during pregnancy.

Iron deficiency is the commonest cause of the anemia in the world that it usually result form a combination of inadequate intake and excessive lose during pregnancy **(Read et al 2006).** They also found that premenopausal women and pregnant women and children are particular susceptible and in some under developed countries, it is almost universal, due to a combination of poor diet and chronic blood loss from parasitic infection principally hookworm.

Good man et al 1999 and **Jones 2001** reveal that anemia is the most widely recognized consequence of iron deficiency. Jones is however fast to add that iron deficiency need not to be accompanied by anemia. It can be without or can co- exist with anemia. Severe anemia can cause death in young children and pregnant women in mild to moderate anemia, the most important consequence for adult is reduced work capacity, which can adversely affect the economic output of both families and countries, while in count children reduced mental development and cognitive function. Potentially aggravated by an increase tendency to absorbed lead and in pregnant women iron deficiency anemia is associated with an increase risk of preterm births which in turn affects child survival and development.

Welch and combs 1996 add that iron deficiency is the most prevalent micronutrient deficiency, affecting over 21000 million people particularly women of reproductive age and pre-school children living in tropical and sub- tropical area and as well as school aged children and working men in many area. In this respect, they estimated the prevalence of 51% of children less than five years of age in developing countries to be iron deficient. Benthy and Passmore 1969 found that iron deficiency is by far the most common cause of anemia in every part of the world at the present and they also noted that in Britain a lone, very large numbers of people suffer from varying degrees of iron Deficiency anemia. They concluded that about 85% of the anemia encountered among rural laborers n hot, damp, tropical region respond to iron therapy.

Goodman et al1998 supports **Benthley**and Passmore 1969 by contending that iron deficiency is a global nutritional problem affecting primarily infants, children and reproductive aged women, especially during pregnancy. Goodman et al add that an estimated 5—60% of young children, 20-35% of non pregnant women and 50-60% of pregnant women in developing countries are iron deficiency 5% of young children and 5-10% of reproductive age group women are affected. Anemia in pregnancy is considerably more prevalent in the developing than in the industrialized world 36% or about 140 million out of an estimated population 3800 million in developing countries verses 8% or just under 100 million persons out of an estimated population of 1200 million in developed countries. **(Demaeyer 1989)**

Anemia in pregnancy is also caused by lack of control over income and decision making in the community or within the household this was likely to deprive women of economic social power and ability to take action that could benefit their own well being. It undertakes their ability to control selection, purchase and distribution of food and related resources. Several studies in Africa indicated

Chapter Three

3.0 Study area and Study Methodology

3.1 Study Area

The study was carried out in Garissa county of North Eastern province of Kenya. The area has a wet season October-January and a dry season February-September with a mean rainfall of< 5 cm. The population of the district is 329,939 with 3500 expected pregnancies (2009 census) and Antenatal coverage is 26.2%. It is an area of hyper endemic transmission of malaria.

3.2 Study Design

The study design was across-sectional analytical where all pregnant women reporting for Antenatal Care at the selected Health Centres were recruited and questionnaires were administered after signing informed consent form during The data include antenatal care, infection, Knowledge on anaemia, intake of iron reach foods, and the demography and laboratory report on haemoglobin and parasitaemia levels.

3.3 Population

The target population was all pregnant women within the catchment area of the selected Health Centres in Garissa District. The study targeted 346 antenatal mothers from Garissa provincial hospital, Iftin sub district hospital and Raya dispensary.

3.4.1 Inclusion criteria

Pregnant mothers who attended the selected Health Centres with HB of less than 10g/dl and voluntarily accepted to participate in the study and verbally consented.

3.4.2 Exclusion criteria

Pregnant woman who attended the selected Health Centres but decline to participate in the study and those with HB of more than 10g/dl was excluded in the study and did not consent.

3. Sample Size/Sample determination Method

The sample was determined by using D.W. Morgan table (1970).

The expected number of pregnant is estimated to be 3500 (census 2009), therefore using D.W. Morgan table, the sample size was calculated at 346 pregnant mothers.

3.6 Sampling Technique

All the pregnant mothers who qualified for the inclusion criteria were randomly selected and interviewed using the questionnaires.

3.7 Data Collection Tool

Questionnaires, observation checklist and laboratory report was used to collect data in the study.

3.8 Data Collection procedure

 Questionnaire was used to collect the data. The interviewer introduce him/her self and explained the objectives of the study to the participant and obtained consent.

3.9 Data analysis and presentation

The data was entered directly into EpiInfo version 6 and analyzed with the same software, in addition to excel sigma plot and SPSS. And presented in form of Tables, Pie charts and Bar graphs

3.10 Study Variables

3.11 Dependent Variables

> ➢ Knowledge
> ➢ Age
> ➢ Educational levels

3.12 Independent Variables

> ➢ Community tradition and Practice
> ➢ Culture
> ➢ Resources
> ➢

3.13 Ethical Consideration

➢ The study was approved by Garissa District health management team (DHMT) and informed consent was obtained from all study participants. All procedures followed were in accordance with the ethical standards of the ministry of health.

3.14 study limitations

- Financial constraints

- Time limitations

- Lack of cooperation from the respondents

Chapter Four

4.0   **Research Finding**

4.1 Introduction

This chapter presents the results in form of tables, pie charts and bar graphs. A total of 100 antenatal mother were interviewed

4.1.2 Socio-demographic data

4.1.2.1 Age distribution

Figure 4.1.2.1 *frequency of age distribution*

AGE DISTRIBUTION	<18YEARS	18-27YEARS	28-37 YEARS	38-45 YEARS	Total
NO.	2	62	31	5	100
PERCENTAGE	2%	62%	31%	5%	100%
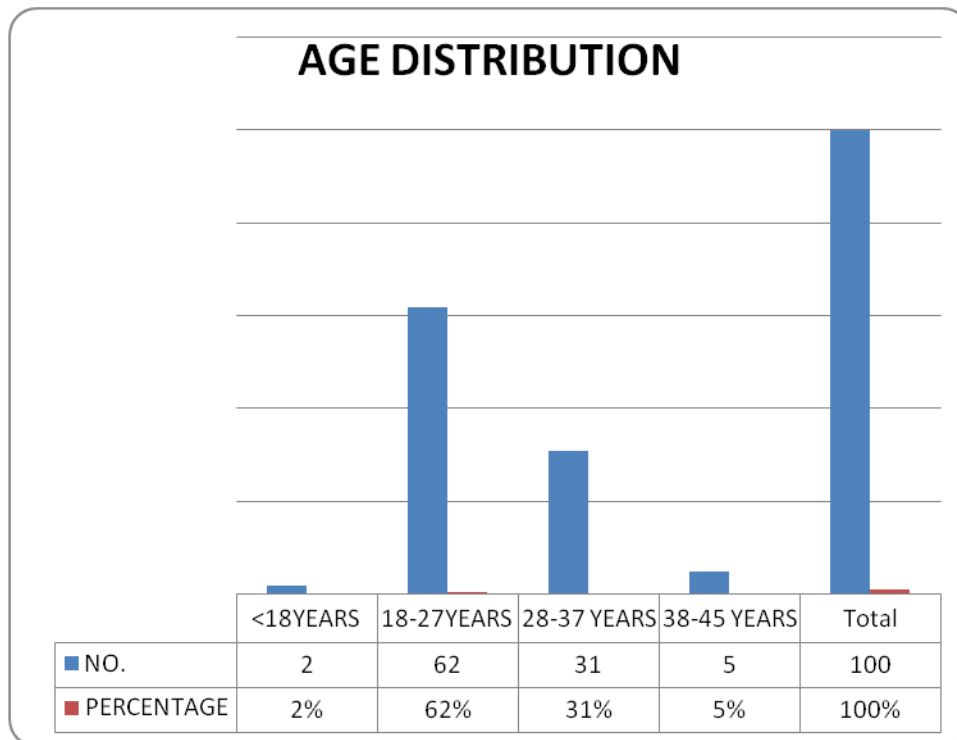
Majority of the antenatal mothers with anemia were between the ages 18 and 27 years which accounted for 62%.

4.1.2.2 Religion and Ethnicity

Figure 4.1.2.2 *Religion and Ethnicity*
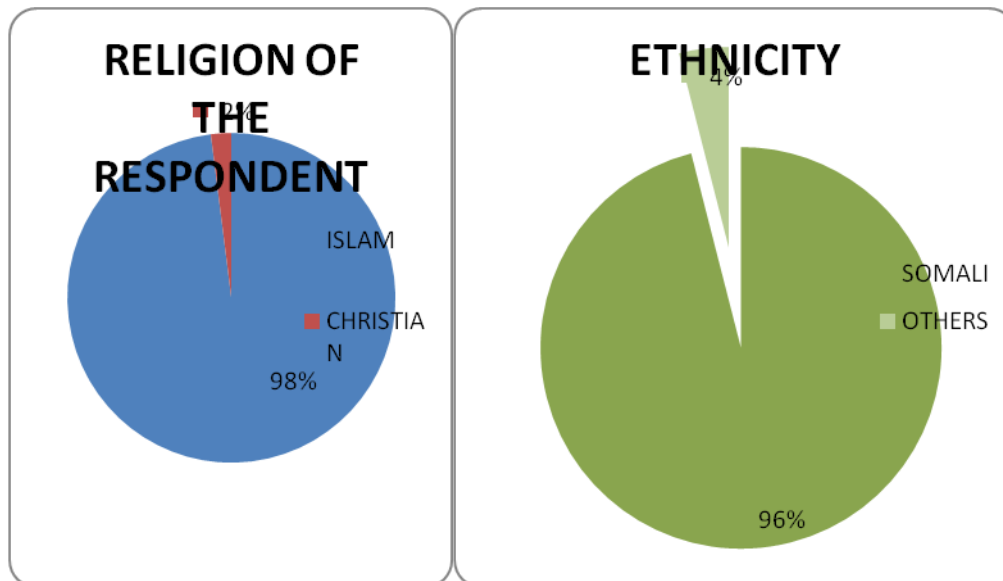
Majority of respondents who attended antenatal clinics were Muslims (98%) and Somali origin (96%)

4.1.2.3 Marital status

Fiqure 4.1.2.3 *marital status of the respondents*
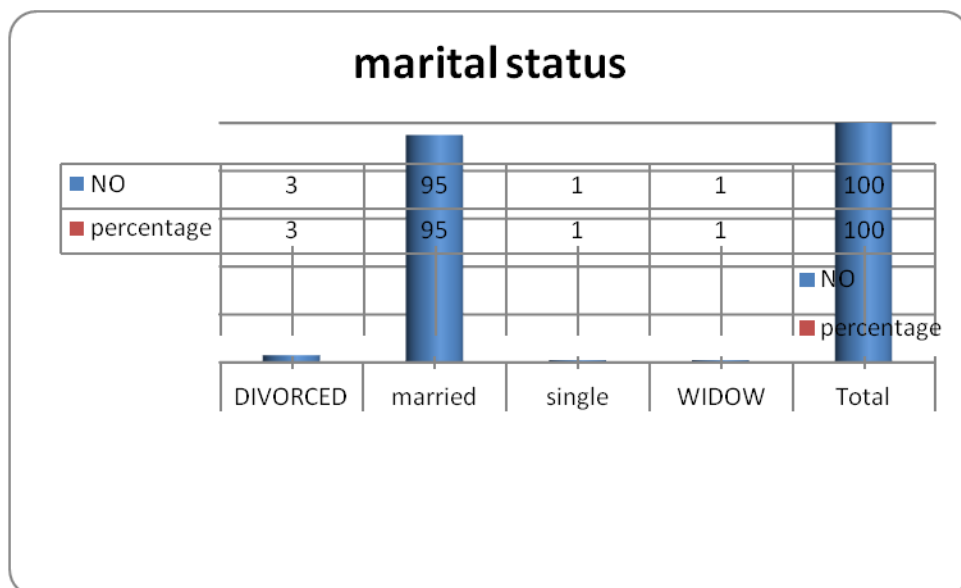
Majority of respondent 95% interviewed in this study area are married, 3% divorced and those who were single and widowed were 1%.

4.1.2.4 Occupation of the respondents

Figure 4.1.2.4 *Occupation of the respondents*

OCCUPATION OF RESPONDENTS

	EMPLOYED(SALARIED)	SELF FMPLOYED(BUSINESS)	UNEMPLOYED(housewife)	Total
■ PERCENTAGE	3%	14%	83%	100%
■ NO.	3	14	83	100
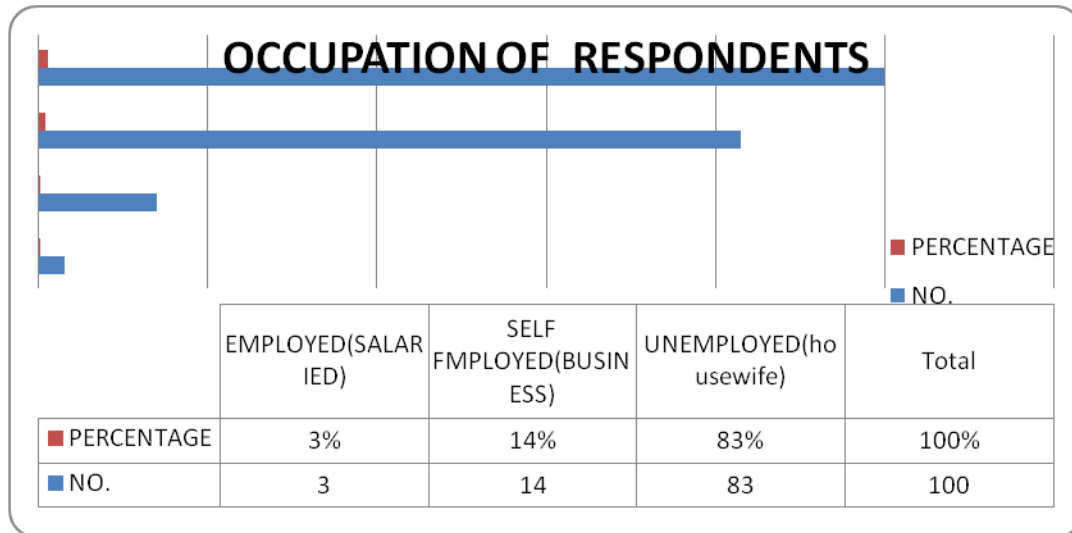
Most of the antenatal mothers had no source of income (83%) while 17% had an income

4.1.2.5 Education level of the respondent

Figure 4.1.2.5 *Education level of the respondent*

	NOT EDUCATED	PRIMARY EDUCATIN	SECONDARY EDUCATION	POST SECONDARY	Total
NO.	82	13	4	1	100
PERCENTAGE	82%	13%	4%	1%	100%
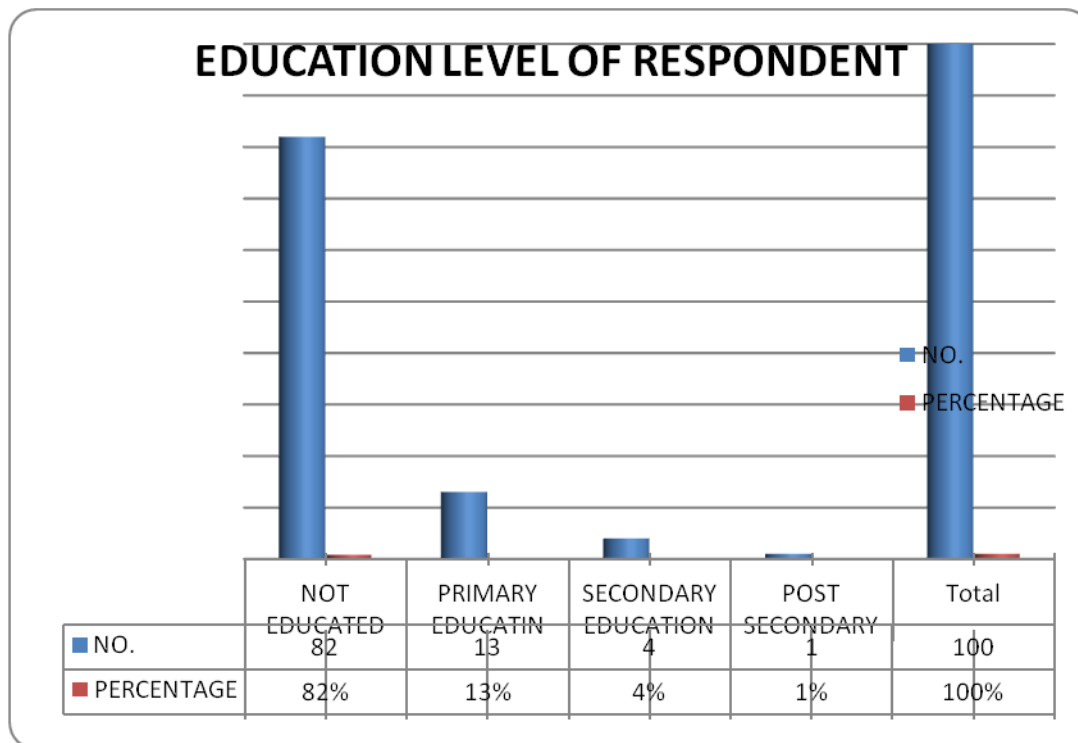
The study shows that majority (82%) of mothers had no formal education

4.1.3 Obstetric data

4.1.3.1 Parity

Figure 4.1.3.1 **Parity**

PARITY

	0	1	2	3	4	5	6	7	8	9	Tota
NO.	21	21	16	16	10	4	4	6	1	1	100
PECENTAGE	21	21	16	16	10	4	4	6	1	1	100

Anaemia was common among mothers with lower parity (primigravida and second pregnancy) which accounted for 42%.
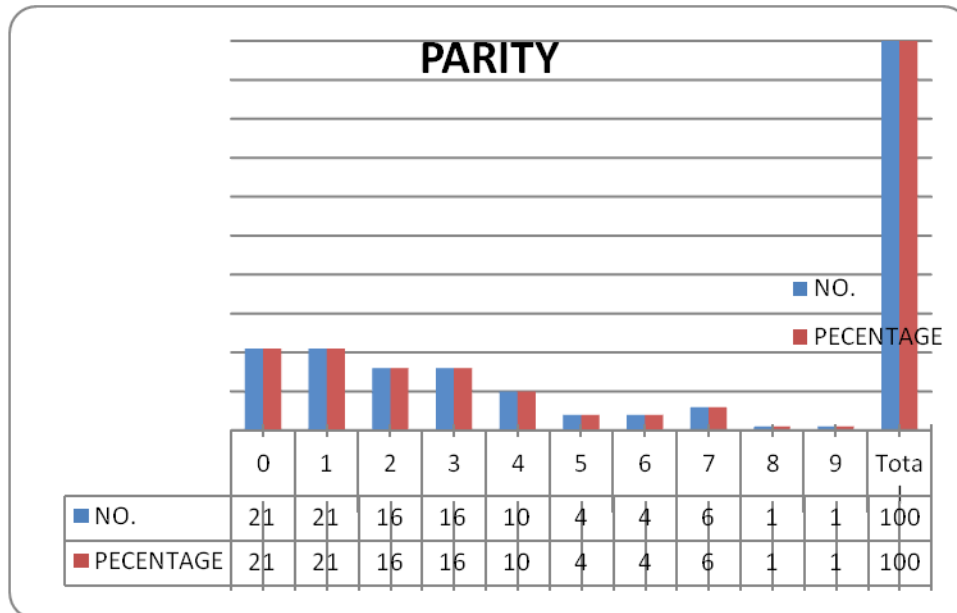
4.1.3.2 Gestation of the pregnancy

Figure 4.1.3.2*Gestation of the pregnancy*

GESTATIONAL PERIOD IN MONTHS

	4	5	6	7	8	Total
NO.	2	17	37	33	11	100
PERCENTAGE	2	17	37	33	11	100
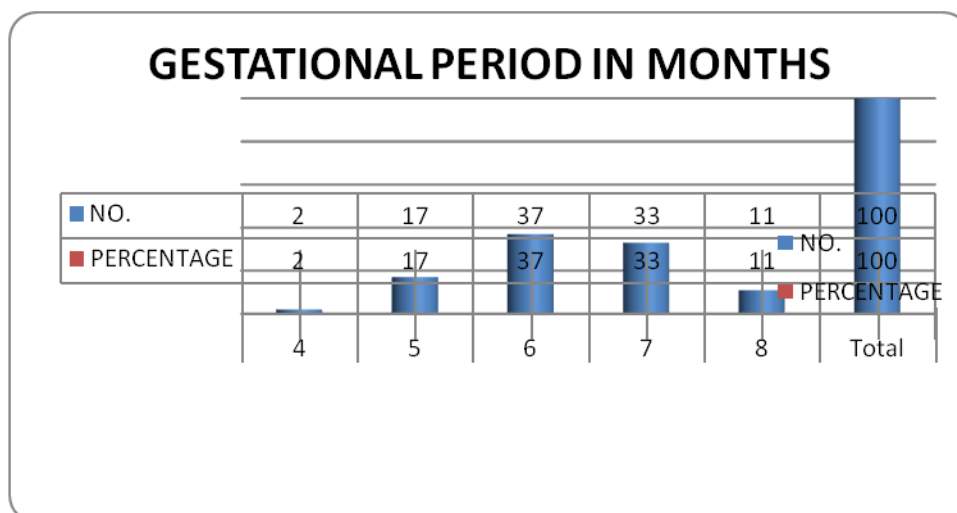
The study indicates that anaemia in pregnancy is common in high gestation especially 6th and 7th months of pregnancy with 37% and 33% respectively.

4.1.3.3 Number of antenatal clinic visits

Figure 4.1.3.3*Number of antenatal clinic visits*

	ONCE	TWICE	THRICE	Total
PERCENTAGE	72	23	5	100
NO.	72	23	5	100
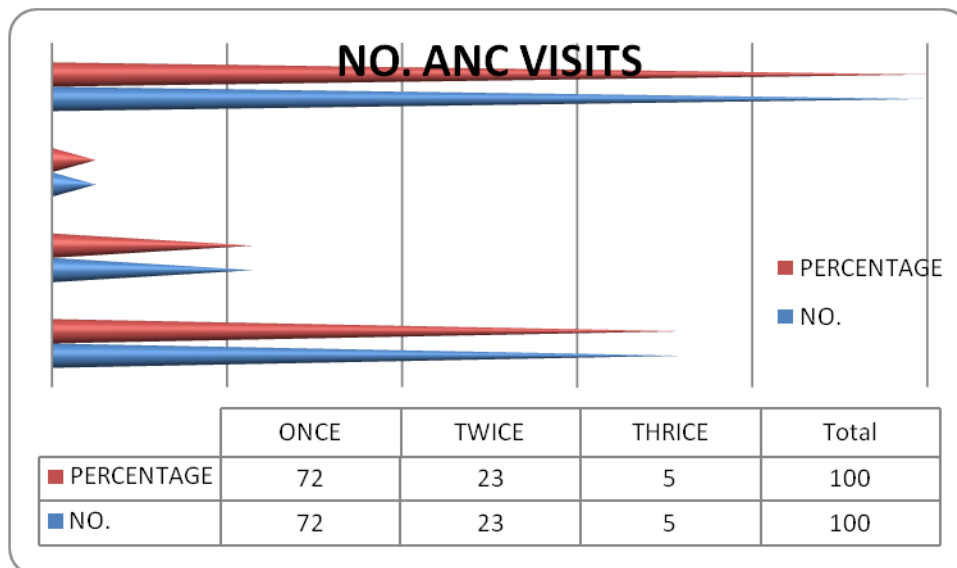
Majority(72%) of mothers with anemia in Garissa district attended maternal and child health(MCH) clinic for the first time.

4.1.4 Nutrition and Health services

4.1.4.1 Nutrition assessment

Figure 4.1.4.1*Nutrition assessment*
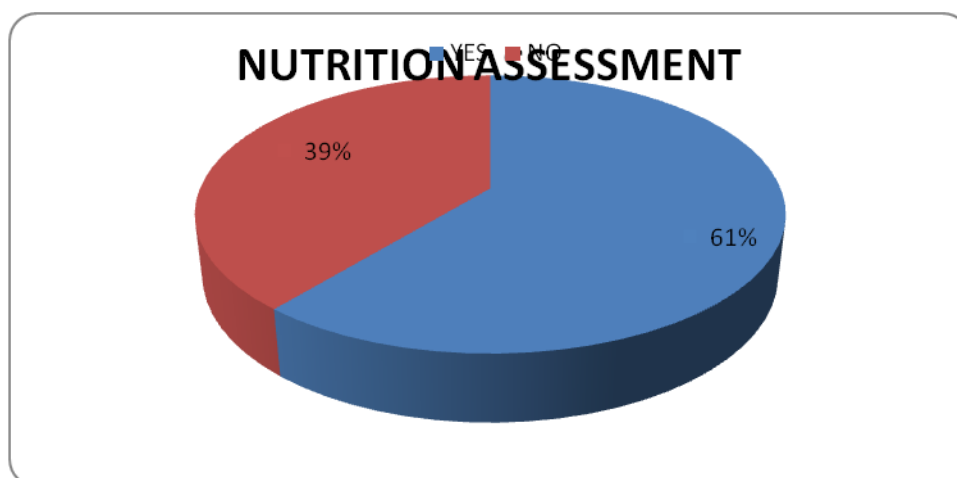
Some levels of nutrition assessment were done 61% of antenatal mothers. This assessment included checking weight and checking for pallor.

4.1.4.2 Nutrition Counselling

Figure 4.1.4.2*Nutrition Counselling*
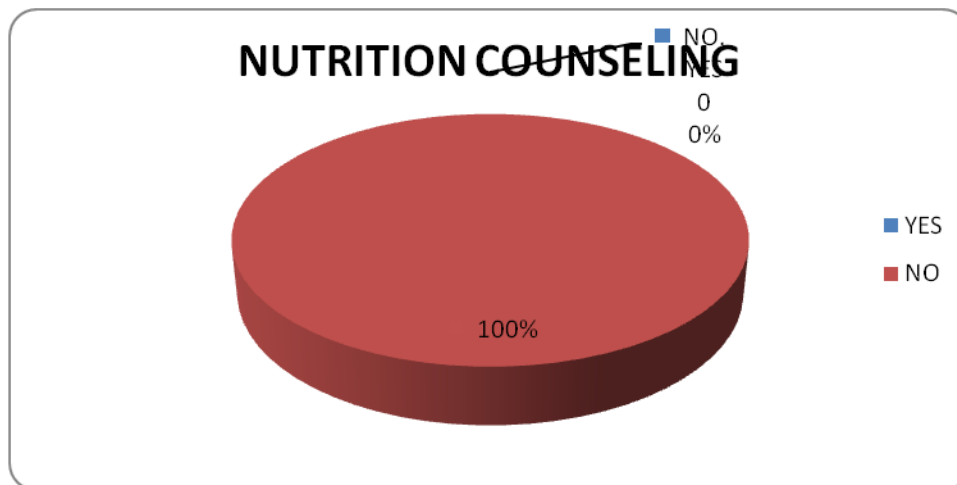
No nutrition counselling services were offered to mothers with anaemia in the health facility

4.1.4.3 Treatment of Ailment

Figure 4.1.4.3*Treatment of Ailment*
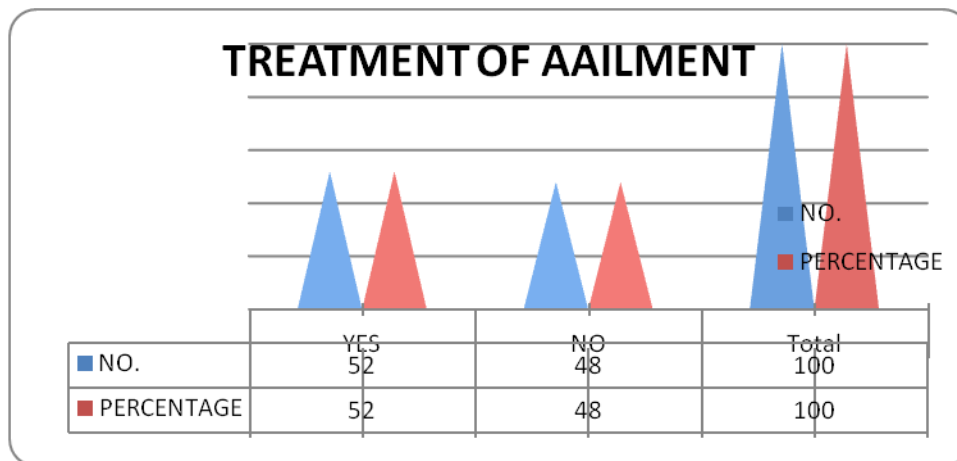
52% of the mothers interviewed came for routine antenatal care while 48% came for treatment common ailment.

4.1.4.4 Vitamin A supplementation

Figure 4.1.4.4*Vitamin A supplementation*

VIT A SUPPLEMENTATION

	NO.
NO	100
YES	0
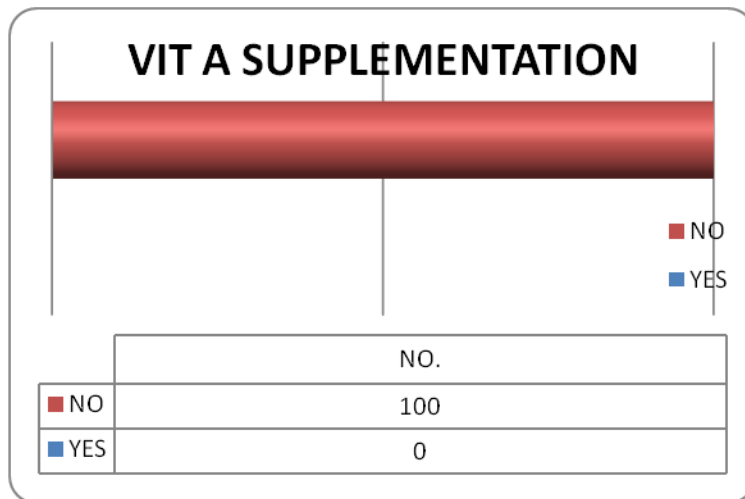
All the mothers attending the antenatal clinic were not given vitamin A supplement.

4.1.4.5 Ferrous and folate supplementation

Figure 4.1.4.5*ferrous and folate supplementation*

FERROUS AND FOLATE SUPPLEMENTATION

	YES	NO	Total
NO.	98	2	100
PERCENTAGE	98	2	100
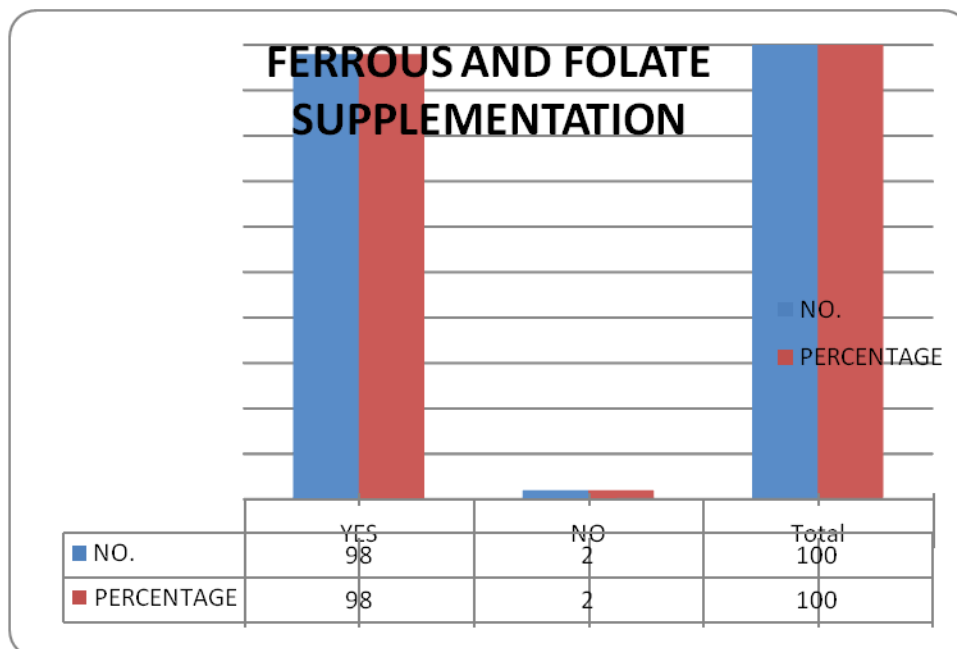
Majority (98%) of antenatal mothers are given routine ferrous and folate supplement the facility.

Figure 4.1.4.6: Presence of symptom(s) of disease

PRESENCE OF A SYMPTOM(S) OF A DISEASE

	ASYMPTOMATIC	SYMPTOMATIC	Total
NO.	39	61	100
PERCENTAGE	39	61	100
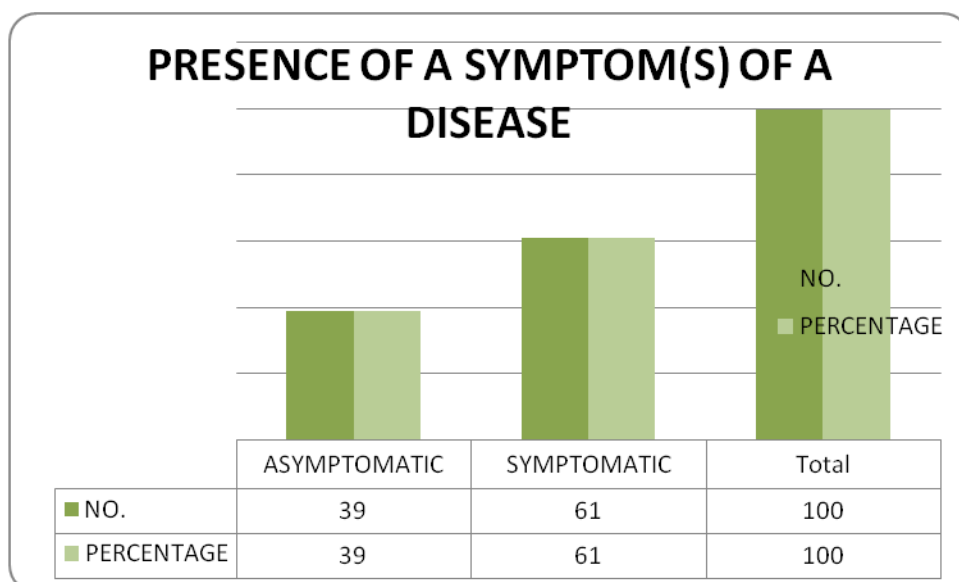
Majority of respondent 61(61 percent) interviewed presented with one or more symptoms of a disease

4.1.4.7 Provision of Insecticide Treated Nets

Figure 4.1.4.6 *provision of insecticide treated nets*

PROVISION OF INSETICIDE TREATED NETS

	YES	NO	Total
Percent	55	45	100
Frequency	55	45	100
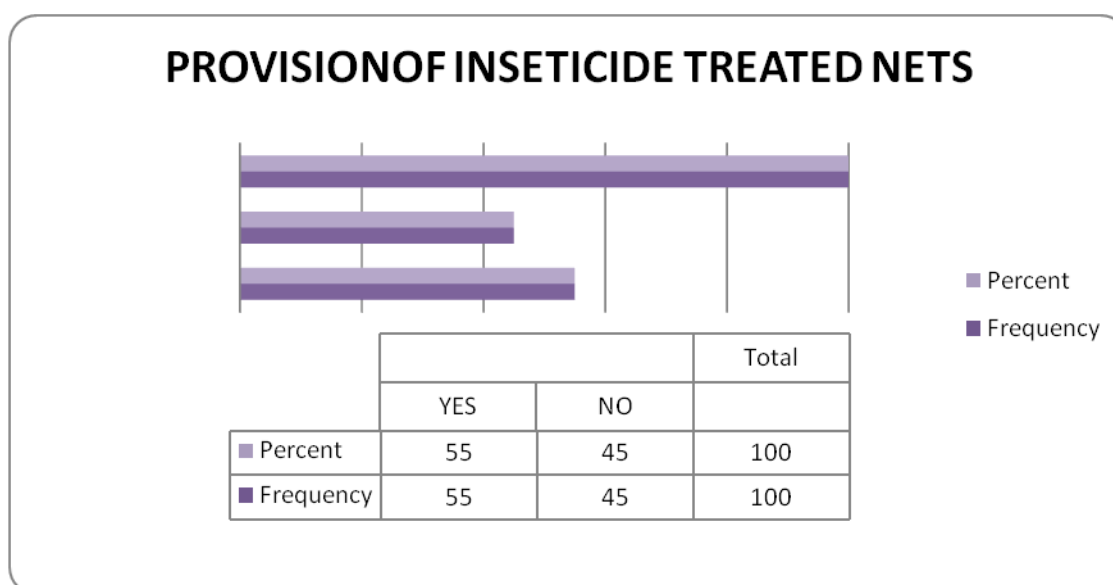
Majority of respondent 55% of the antenatal mothers received insecticide treated nets from the health facility

4.1.5 Malaria Preventive Measures

4.1.5.1 Anti Malarial Preventive Treatment

Figure 4.1.4.7*anti malarial preventive treatment*

	NO.	PERCENTAGE
NO	100	100
YES	0	0
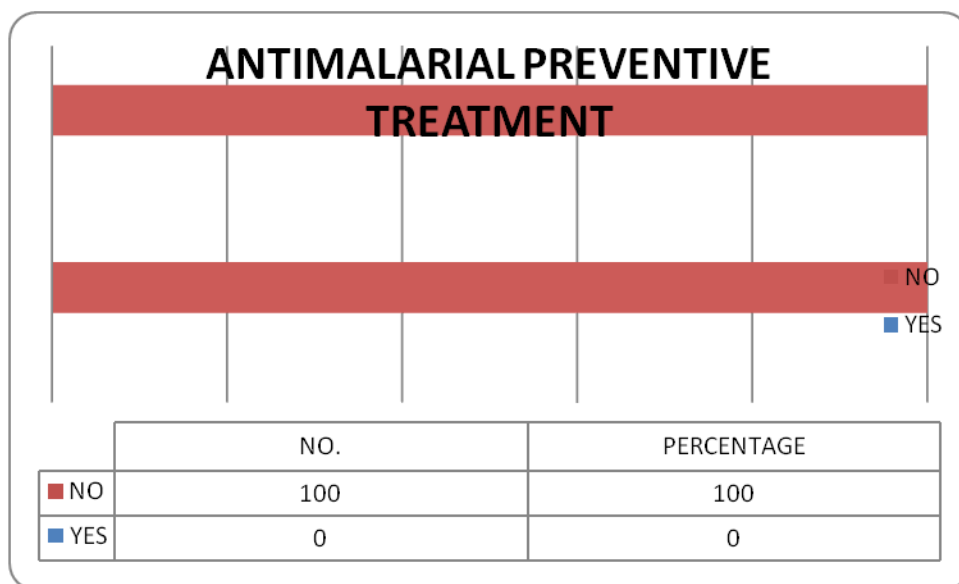
Intermittent preventive treatment were not given to all the mothers interviewed

4.1.5.2 Use of mosquito nets

Figure 4.1.5.2*use of mosquito nets*
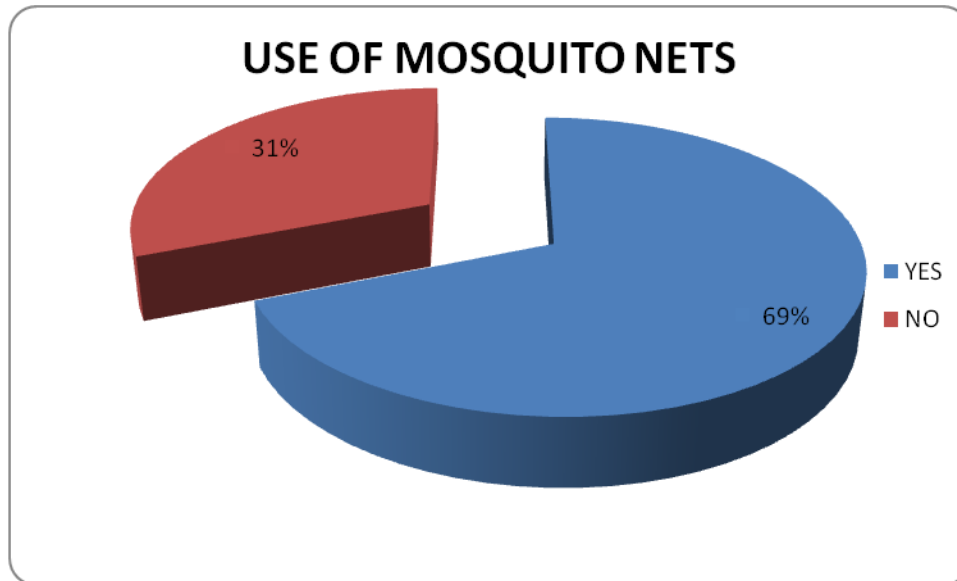
Majority of respondent 69(69%) interviewed reported use of mosquito net at night while 31% did not use.

4.1.6 Laboratory test

4.1.6.1 Haemoglobin level

Figure 4.1.6.1 haemoglobin level

	MILD ANAEMIA(9-11g/dl)	MODERATE ANAEMIA(7-8.9g/dl)	SEVERE ANAEMIA(4-6.9g/dl)	Total
NO.	34	54	12	100
PERCENTAGE	34	54	12	100
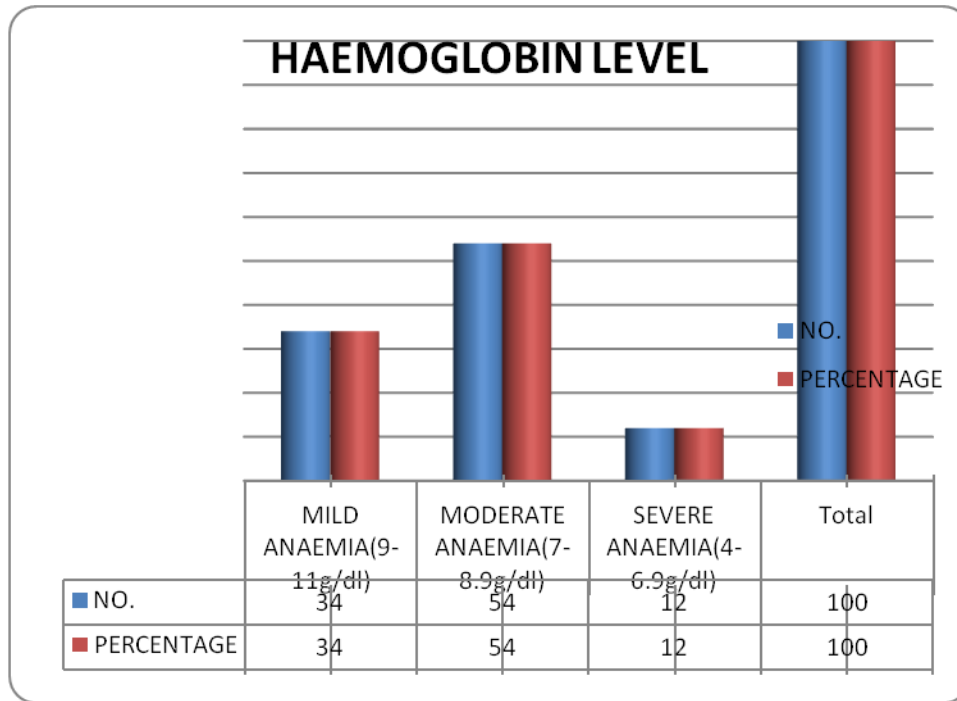
Majority (54%) of antenatal mothers enrolled in the study had haemoglobin level of between 7.0 to 8.9g/dl indicating moderate anemia while 12% had severe anaemia with a haemoglobin level of 4-6.9g/dl.

Table 4.1.6

	MILD ANAEMIA 9-11g/dl	**MODERATE ANAEMIA 7-8.9g/dl**	**SEVERE ANAEMIA 4-6.9g/dl**
GARISSA PGH	19 (38%)	26 (52%)	5 (10%)
IFTIN SUBDISTRICT HOSPITAL	11 (36.6%)	16 (53.3%)	3 (10%)
RAYA DISPENSARY	5 (25%)	11 (55%)	4 (20%)
TOTAL	35 (33%)	53 (53%)	12 (12%)

Antenatal mothers from rural setup suffered severe anaemia (20%) more than their urban counterpart (10%).

4.1.6.2 Malarial blood test

Figure 4.1.6.2*malarial blood test*

MALARIA BLOOD TEST

	NEGATIVE	POSITIVE	Total
NO.	62	38	100
PERCENTAGE	62	38	100
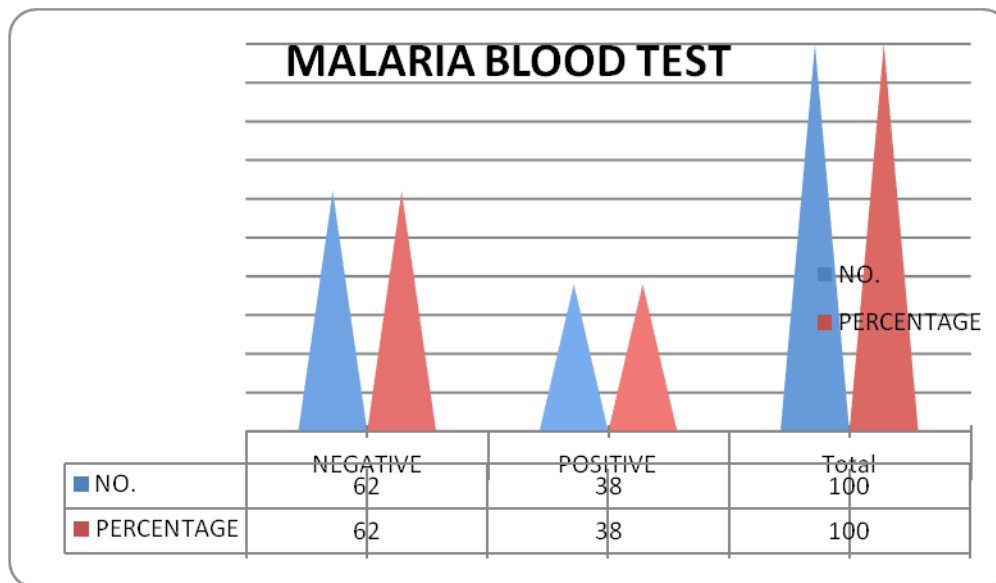
Most of respondents 38(38%) with anaemia tested positive for malaria parasite.

<h1 style="text-align:center">Chapter five</h1>

<p style="text-align:center">Discussion, conclusion and recommendation</p>

5.1 Introduction

Anaemia is an important public health problem worldwide and the most vulnerable groups are pregnant women and children. The causes of anaemia include genetic factors, nutritional deficiencies, and infectious agents. Of the nutritional causes of anaemia, iron deficiency is probably the most common and important because the physiological changes associated with pregnancy exert a demand for additional iron needed for transfer to the fetus. Infection, including malaria, hookworm and other helminthes are also involved in the pathogenesis of anaemia in pregnancy. Pregnant women are particularly susceptible to malaria in endemic populations and often have higher prevalence as well as severity including anaemia. The changes in the immune system associated with pregnancy have been suggested as the reason for this **Van den broek, 1996**.

5.2 Discussion

Anemia in pregnancy is considerably more prevalent in the developing than in the industrialized world 36% or about 140 million out of an estimated population 3800 million in developing countries verses 8% or just under 100 million persons out of an estimated population of 1200 million in developed countries **Van den Broek 1996**.

According to the respondent by age, majority (62%) were in the agegroup between 18-27 years; this could be due to early marriage which is practiced by the community in the study area, 95% were married while the rest were either divorced or widowed as marriage outside wedlock was unacceptable in the community's culture and religion since majority (98%) of respondents were Muslims.

According to the educational level of the respondent most of the respondents (82%) had no formal education while 83% had no major source of income. Poverty and illiteracy could have contributed to anaemia in the antenatal mothers this supported by a study done by **BondevickGt, Eskeland B 2000** in which found out that anemia in pregnancy is common to the low social status of women reflected their low level of education contributed to the persistence of female malnutrition. There was the need to continuously educate the mothers on the importance of consumption of in rich food and their benefits to both the mothers and fetus.

This was also supported by **Brabin B J 1993** which found that poverty and illiteracy deprived a woman in decision making and thus cannot eat food of her choice or go to hospital when she feels most.

The high illiteracy level and low socioeconomic in this contributed in lack of decision making in the family could have contributed to anaemia in pregnancy this is supported by a study done by **Stephenson L S, Latham M C et al, 2000** which found that education empowered women and income controlled by the women was more likely to be used for the immediate benefit of their family and children than income earned by men. Prevalence and severity of iron deficiency decreased as the maternal education increased **Kennedy N O, 2000.**

The study found that 54% and 12% had moderate and severe anemia respectively while 38% had a positive malaria parasite, this could mean there are other possible causes of anemia which was not in the scope of this study this is fairly in support of a study that found in developed countries it is estimated that approximately 2% of women are anaemic, in developing world this figure may be as high as 50% and this contributes to high rate of maternal mortality. Iron, folic acid and vitamin B12 deficiencies are more common causes of anemia though availability of correct food, food taboos, eating and cooking customs all plays a part **Letsky** 1997. **Sifakis S, Pharmakides G 2000** do also compliment the same sentiment.

In the Kenyan coast province, **Kennedy N O, 2000** suggest the iron deficiency anemia was the most common probably due to worm infestation and nutritional factor.

While this study found 54% of the pregnant mothers attending antenatal care had moderate anemia it contradicts another study done western Kenya which found that 24% of the mothers seeking for antenatal services had moderate anaemia **J Okello, 2005.** This disparity could be due to the difference in the sample size.

Interestingly all the respondents did not receive malaria prophylaxis (IPT) from the health facility at the time of the study, which is a national policy that all pregnant mothers should get IPT because majority got prior to the time of the study while 98% received ferrous and folate supplements, this is essential for preventing anaemia and supporting child development. The use of intermittent prevention therapy in malaria averts malaria in pregnancy thus anaemia in pregnancy **Forman E, Cutts F et al 1999.**

The study also found that 52% of the antenatal mothers received insecticide treated nets from the health facility but 69% reported using it; though fair use of ITN those who did not use could have contributed to the anaemia in these mothers.

The was observed that 48% of the mothers came for the treatment of other ailments while 58% came for routine antenatal care as this prevents pregnancy complication through early detection of danger signs this contradicts a study done in Mandera rural in Kenya that found 60% of pregnant mothers attending antenatal care came for the treatment of other ailments than routine antenatal care **Patrick NdunguDida et al 2004**.

The majority of the respondents (72%) had their first antenatal visit during the study, pertaining parityanemia was common in the first and second pregnancy which accounted for 42%, and this is due to physiological changes that occur in pregnancy, the increase in iron demand, iron loss and susceptibility of pregnant mothers to infections like malaria this is agreement with a study done by **Sauté F et al, 2003**.

The gestation in which anemia was common was second and third trimester which accounted for 37% and 33% respectively, this is in agreement with **Shulman C E et al 1996** who found that anaemia was common in the second and third trimester 40% and 36% but contrary to a study done in Turukana Kenya which found that anaemia was more common among pregnant mothers in their first trimester, **L G Ombati et al 2001**.

Concerning cultural practices, 52% of the respondents reported that their culture could hinder their choice of eating food, as they believed that eating nutritious food could make the fetus big hence making delivery difficult. This finding is in support of another study done in Taita in Kenya which indicated that, pregnant women would not eat beans which were good source of iron because this would make their milk watery **WJ, Jillo H et al 19996.**

5.3 Conclusion

The study finding has indicated that anaemia is a result of many factors, most of them revolving around the socio-economic status of the respondents and the quality of health care services. These include: low education levels of the mother; lack of formal employment and economic autonomy; poor health and nutrition services at public facilities, pregnancy at early age; poor health seeking and recurrent malaria infection.

All these factors lead to poor and delayed health care during pregnancy thus by the time such mothers attend for delivery care, they are already in a harsh condition.

In order to reduce the burden of malaria in these women and its impact on anaemia, it may be essential to establish a system of supervised intermittent presumptive treatment with a safe and effective antimalarial so as to eliminate any parasites they may harbour. This will also help eliminate any asymptomatic parasitaemia capable of causing bone marrow suppression as has been reported.

5.4 Recommendation

The current strategy for reducing anaemia includes the provision of iron folate tablets to respondents, advice on dietary intake, diagnosis and treatment of malaria and hookworms among pregnant mothers. Whereas these measures that are purely curative can have an effect in reducing the incidence of anaemia, so far they have not achieved the desired goals.

There is need, therefore, for the government of Kenya, through the relevant ministries, to address the other risk factors by encouraging female education and enhance their autonomy through economic empowerment.

Efforts should be made towards legislating minimum age at marriage so as to reduce teenage childbearing.

The socio-economic conditions of the population could be improved by for example subsidizing the price of food and other basic commodities so as to enable the poor people to meet their basic

needs. Clean piped water for every household; be it in the rural or urban areas should be prioritized. With such measures, the incidence of anaemia would be reduced.

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Appendix 1-Consent Form

Epidemiology of anaemia in pregnancy

Purpose: anaemia in pregnancy is an important and common condition in Kenya and therefore the purpose of the study is to establish how factors like poor pregnancy care in less during pregnancy socio-economic conditions of the mother can contribute to anaemia in pregnancy.

Voluntary participation: you are free to join the study or not to join you may leave the study at any point for any reason if you decide not to join or drop out you will not lose any Healthcare Service you are entitled to a the hospital you will not get any direct benefit or payment for being in the study however you will help us know more about the disease condition.

Benefits: you will not receive any benefits from this study however the information obtained from this study will help the ministry of health in designing policy and interventions in preventing anaemia in pregnancy

The study has been explained to me I have chances to ask questions I've been informed that it is my free choice to be in the study I can drop out at any time without any penalty.

If you agree to participate in the study please sign here………………………

Do you agree to provide a blood sample   yes   no   (circle one)

Date………………………………………

Name of the patient…………………………………………(optional)

Witness signature if the patient can not signed…………………….........

Date……………………………………………….

Appendix 2-Questionnaire form

Patients ID number……………………………………………………………….

Hospital………………………………………………………………………….

Name of interviewer ……………………………………………………………

Socio-demographic data

1. Name…………………………………………………………………………….

2. Age………………………………… **3**. Residence……………………………….

4. Religion …………   **5**. Ethnicity…………

 1 Islam   1 Somali

2 Christian   2 others

 3 others

6. Occupation…………………………………………………………………..

7. Marital status……….

0 single   1 married   2 divorced   3 widows

8. Parity………………………………..

9. Level of education………………….

0 none   1 primary   2 secondary   3 post secondary

10. Gestation of current of pregnancy ……………………………. (Months)

11. For the following symptoms, check "Y" if the client has had the symptoms in their last three months or" N" if they have not. If yes for how long

symptoms	yes	no	duration	symptoms	yes	no	duration
Fever				Malaise			
Muscle pain				Abdominal pain			
Back pain				Vomiting			
Headache				Nausea			
Joint pain				Loss of appetite			
Sweats				fatigue			
Chills				Dizziness			
Palpitations				Swelling of the body			

12. How many times did you visit ANC clinic for Current pregnancy……….

1 Once   2 twice 3 Thrice   4 more than three times

13. What type of Health Services did you receive (please tick)

	yes	no
Nutritional assessment		
Nutrition counseling		
Treatment of ailment		
Vitamin A supplementation		
Ferrous/Folic acid supplementation		
Insecticide treated net		
Drug to prevent malaria		

14. Do you use mosquito net at night   1   yes   2   no

Laboratory assessment

15. HB level……..g/dl

16. Blood slide for malarial parasites   0 negative   1 positive

.

Appendix 3- Time Schedule

week	1	2	3	4	5	6	7	8
Prepare proposal	▓	▓						
Literature review		▓	▓					
Prepare data collection tools			▓					
Pre-test tools				▓				
Data collection					▓	▓		
Data analysis							▓	
Write final report							▓	▓

Appendix 4- Budget

	ITEMS	UNIT	QTY	UNIT PRICE	TOTAL	COMENT
STATIONARIES	Pens	PCS	30	20	600	
	Pencils	PCS	20	15	300	
	Erasres	PCS	10	15	150	
	Sharpeners	PCS	10	20	200	
	Note books	PCS	10	50	500	
	Printing papers	RIM	5	600	3000	
Typesetting,printing & photocopying services					5000	
Assistant allowances	Lunch allowances	5 PERSONS	14	2500	35000	5 STAFFS FOR 2 WEEKS
	transport				6000	
	TOTAL COST				**50750**	

Appendix 5: MAP- KENYA