THE MOMBASA POLYTECHNIC
DEPARTMENT OF APPLIED SCIENCES

COURSE:

DIPLOMA IN APPLIED SCIENCE III
MEDICAL LABORATORY TECHNOLOGY

TRADE PROJECT (HAEMATOLOGY)
TITLE:

Occurrence Of Anaemia In Msambweni Division

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DECLARATION FORM FOR POST SCHOOLS TECHNICAL AND BUSINESS EXAMINATION

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(Name of Candidate)
declare that:

(I) The project named above was approved by the KNEC and supervised by

______________________________________________________________

Supervisor's name

(ii) I personally carried out the project whose report follows after this declaration.

(iii) I received no undue help form unauthorised persons other than the normal guidance from

my supervisor.

(iv) I wrote the project report unaided.

(v) The report submitted to the Council is the original work.

Signature of Candidate ___________________________ Date ______________________

SUPERVISOR

I, ___________________________________________ declare that I supervised

(Name of Supervisor)

the above candidate's project and the report contained here-in is the genuine work of the

candidate.

Signature of Supervisor ___________________________ Date: ______________________

NB
To be attached to the first page of the project.
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DEDICATION

I dedicate this project to my beloved sister and my mother who worked hand in hand to ensure the completion of my project and my course.

*ACKNOWLEDGEMENT*

I would like to take this opportunity to thank my beloved guardian Mr. Mohammed Chiyuge for his financial support towards my education and writing this project.

I would like also to give thanks to my supervisor Mr. Mohamed O. Mboga for assisting me in pointing out some mistakes and guiding me to write this project. I would like also not to forget the laboratory incharge of Msambweni Hospital Mr. Raphael Ngando who permitted me to collect relevant data from his department.
DESCRIPTION OF THE STUDY AREA.

Msambweni Division is one of the five Divisions of Kwale District which is one of the Six Districts of Coast Province.

Msambweni Location is the headquarter of Msambweni Division, which is situated along the Coastal Strip about three kilometres from the main Lunga-Lunga - Mombasa road. It lies in the Southern - Eastern part of Kenya between the latitude 3° 30' and 4° 45' South and longitude 38° 31' and 39° 31' East.

Msambweni Division covers an area of approximately to 3,331km². There exist plenty of Seasonal rivers with R. Mkurumudzi being the largest and permanent river. On its Eastern part is boarded by the Indian Ocean. There exists bush-thickets with no mountains, instead they have hills.

CLIMATE:

The Division has a monsoon type of climate which is hot and dry from January to April or May. The rainfall is bimodal with the long rains usually starting around March or April and continuing up to July. The short rains comes in October and November. The amount of rainfall diminishes from coastline to the hinterland with annual precipitation varying from 900 - 1500mm per annum along the Coastal line to 500 - 600mm in the hinterland with 60% reliability. The short rains are significant on the Coast, slightly for about 15 - 20 km into the hinterland. (as indicated).

The average annual temperature ranges from 26.3° - 26.6°C in coastal lowlands to 25 - 26.6°C in Shimba hills and 24.5° - 27.5°C in the hinterland. Mean temperatures are highest in the months of November - April. Evapo-transpiration ranges from 1,800 - 2,000mm in Shimba hills region to 2,000 - 2300mm in hinter lands. Relative portions of annual transpirations fluctuate around 25% varying along the Coast from 22% during April - June to 29% during January - March and in the hinterland from 24% - 27% during the same periods. Due to this high evapo-transpiration, the District experience water shortages considerable.

Source: Annual reports District Agriculture Office, Kwale.

COMMUNICATION:

The Division has a communication network basically of roads, Air and Telephones only. There are many weather roads with only three tarmac roads, the Mombasa - Lunga-Lunga road, the road to Msambweni District hospital and the other to Diani beach hotel, the later two are feeder roads from the main Mombasa - Lunga - Lunga road. Telephones are evenly distributed in the Division especially in the Town centres and several home telephone lines. This is a single airstrip in Ukunda which operates within the Coast Province.
AGRICULTURE:

This is done largely on small-scale basis, with very little consideration on hot-culture production. The residents keep cattle, goats, sheep, Chicken and ducks in small-scale basis. Chicken are reared up to 10,000 mostly by women groups such as the Nganja Women Group and Kwaks, the Kwaks is owned by a private individual. The staple food of community is mainly maize, cassava, Rice and Fish, which are less nutritious for being taken daily. It is also evident that for every home there must be a chashewnut and coconut trees which are the main cash crops, with little bixa grown in some places like Shimba hills and Kikoneni.

DIETARY:

Basing on agriculture, the food grown restrict the people from taking some foods like Sukumawiki and beans, which they are normally purchased commercial and this goes only to those willing and who can afford.

TOURISM INDUSTRY AND ECONOMY:

This industry is the main contributor of the economical growth of the Division. Some are working in hotels whilst others are small traders targeting the tourists. Fishing which at least every individual it, has dominated the area, though its not being done as a source of food but as a way of earning a living that is, they do sell the fish both to local people and tourists. There are very few individuals who are employed as civil servant, though there are a small number of trained teachers and few who took medical practices such as nursing, technicians, and Doctors as careers. Most of the people are jobless.

EDUCATION:

Primary Schools are evenly distributed, that is at least each village has a Primary School. Comparing the Primary School and Secondary Schools, primary schools are many, but in each Location there must be a Secondary School. There are eight Secondary Schools out of which four of them have boarding facilities. There is only a single village polytechnic that is situated in Ukunda. There is no high education institute in the Division.
MEDICAL SERVICE:

There is only a single hospital in the Division which is the Msambweni District Hospital which is about 3 km from the main Mombasa - Lunga- Lunga Road and about 200 metres from the Indian Ocean. Others are dispensaries which are five in the Division and 15 Private Health Centres. There is a hospital that deals with infectious diseases, as a programme of Leprosy and Tuberculosis control known as Tumbe. There are some trained people who make drugs access to people in villages named Bamako. This was named after the conference which took place in City of Bamako in Mali, which suggested to make drugs access to people in villages.

TRADITION AND RELIGION:

Traditionally people of the area are largely base their believes in superstition and a strong belief in witchcraft. Religion largely is dominated by Islam with a few Christians and some who are strictly traditionalist.
INTRODUCTION

The major question related to anemia control is not whether it can be done, but rather how it will be implemented within the available human and financial resources of the endemic region in question.

Anemia exists when a person's level of circulating hemoglobin is lower than the level in healthy subjects of the same sex and age group in the same environment. The most common kinds of anemia are due to nutritional deficiencies of iron, folic acid, and, less commonly, vitamin B₁₂ and protein. Other common causes of anemia are congenital defects of hemoglobin production namely sickle cell anemia, other haemoglobinopathies, and thalassemia. Protozoal infections and infestation, particularly malaria and hook worm, are also important direct causes of anemia, and bacterial infections may aggravate an existing anemia and prevent optimal response to hematins. Anemia is a chronic disease surrounded by controversy as to its precise contribution to the overall morbidity, mortality and effects on productivity in the endemic region.

Anemia is rarely a high public health priority in the endemic region, human and financial resources are not allocated specifically for its control. A national plan of action utilizing the existing health infrastructure training of staff, a national chemotherapy policy in reference to anti-anemia drug procurement of supplies and equipment, support of peripheral laboratories effective data collection, reporting and evaluation through decentralized supervision will all contribute to successful contribution.

The probable method that could help such people is the presentation of trained staff to educate the people in the endemic region in question so as to uplift the standard of living in order to control the occurrence of anemia by eradicating the factors that contribute mostly to anemia.

On the other hand, in the vast majority of cases anemia can be correctly diagnosed and the underlying causes determined with provision of a practical approach with maximal use of simple tests with minimal resources. Thus by doing so cases of anemia will be controlled and hence eradicated.

There are several ways which can be used to determine the level of haemoglobin in an individual which will be a guide to know who is anaemic and who is not. The methods which are normally used are namely:

1. Cyanment haemoglobin method
2. Sahl method
3. Oxyhaemoglobin
4. Alkaline haematein
5. Sponsor haemoglobinometer

The choice of the method depends on the preference of the staffs undertaking the test.

The tests show the amount of haemoglobin which will guide the staff involved to carry out other investigations to come up with a conclusion as to what type of anaemia is it and also to find the possible causes of the condition and how to control it.
OBJECTIVES:

1. To find the prevalence of Anaemia in the study area.

2. To find the direct effects and indirect effects of Anaemia to the inhabitants in terms of economical, social and Manpower.

3. To try to identify the common causes of the condition, so as to identify the types of Anaemia which dominates in the area of study.

4. To try finding diagnosing methods to come up with the conclusion of the correct type of Anaemia existing.

5. To find possible ways of reducing the chances of Anaemia.

6. To identify which age groups are mostly affected and the reasons in the study area.

7. To identify which sex is mostly affected by the conditions and the reasons.
TYPES OF ANAEMIAS

Anaemia is Classified into two.

(A) Morphologically    (B) Aetiological
Morphological Classification is based on the shape, size and
haemoglobin content of the Red blood cells (Rbc's).

Examples of Morphological Classification of anaemia are:-

(1) Microcytic hypochromic anaemia. - Where the cell size is small
Microcytic and haemoglobin content is low such that the central
area of the cell is clear.

(2) Macrocytic anaemia. - Here the cells are abnormally large.

(3) Normocytic normochromic. - In this one the size of the cells and
Haemoglobin content of the cell is normal but the cells number
is low.

(B) Aetiological Classification, its based on the cause of anaemia.
Examples include Iron deficiency anaemia, megaloblastic anaemia,
Aplastic anaemia and haemolytic anaemia.

1. ION DEFFICIENCY ANAEMIA.

This is a condition where by there is deficiency in ion concentration
in the body for the production of haemoglobin. The resultant
Red blood cells which are produced are Microcytic (small) and
hypochromic (low haemoglobin content.

This type of anaemia is caused by a number of factors:-

(i) Difficient diet:-- by taking diet lacking iron eg vegetarian,
cultivating in a soil lacking iron.

(ii) Excessive blood loss - This can be due to parasitic infection
where there is gradual loss of blood eg helminths, or from ulcers,
bleeding tumours, menstruation.
(iii) Increased demand of ion - This can be due to pregnancy growing children.

(iv) Defective absorption - This can be due to diseasles on the site of absorption eg surgical operation on the site of absorption.

2. MEGALOBLASTIC ANAEMIA

It's a condition whereby the produced Red blood cells are abnormal large and the young cell nuclear cromatin is big. This is caused by the deficiency of Vitamin B12 or folic acid. As a result the produced Rbc's are abnormal large.

In the bone marrow megaloblasts are present and in the periferal blood Macrocytes are present.

This condition is caused by:-

(i) Deficient diet - vegetarian, children feeding on milk alone, cultivating in soil lacking cobalt.

(ii) Increased demand eg pregnant mokes, growing children.

(iii) Defictive absorption - This can be due to diseasles on the site of absorption eg surgical operation on the site of absorption.

(iv) Alcoholism.

3. HAEMOLYTIC ANAEMIA.

It's a condition where by their is increased destruction of Red blood cells such that the bone is unable to replace the destroyed cells.

The normal life span of Rbc's is 100 - 120 days. When reduced to 20-24 days, the bone marrow can still replace them, but when reduced to 10 - 12 days the bone marrow can not cope with.
Causes of the Condition:

(a) Drugs: examples of drugs are sulphonamides, oxidants drugs which contain nitrates that lead to the break down of globulin aerobically and release Haemoglobin.

(b) Hereditary: This can be due to Haemoglobin pathies, Hbs (sickle cell disease), thallasemia, Hereditary eliptocytosis, Hereditary Spherocytosis.

3. Extrinsic causes of haemolytic anaemia
(a) Bacterial toxins e.g Chlostridium species and streps
(b) Antibodies e.g. Auto antibodies
(c) Parasitic infection e.g. Malaria parasites.

4. APLASTIC ANAEMIA
A condition whereby the bone marrow is depressed and as a result few Red blood cells are produced.

There are tow types of aplastic anaemia due to the causes.
i. Hidiopathic aplastic anaemia - its of unknown origin.
ii. Secondary aplastic anaemia - its of known cause e.g. physical and chemical cause.

Examples of physical causes are radotherapy treatment.
Examples of chemical causes are;
- Drugs e.g. cytotoxic drugs
- Industrial chemicals that include benzene, mercury and sulphur.

5. SICKLE CELL ANAEMIA
Its an inherited condition where by the abnormal Hb is Hbs. The abnormality is on the beta chain of Hb after substitution of glutamic acid by valine at the sixth position of the amino acid chain. There are two types of sickle cell anaemia e.g. sickle cell trait and and true sickle.
(a) Sickle cell trait.
This is due to Hb As which is a heterozygous heritage of Hbs. People with this type of anaemia can stay normal unless they go to areas of reduced oxygen tension e.g. mountaineering and flying.

(b) True Sickler.
These are people who have inherited the homozygous Hbss i.e. from both parents. This is fatal and a child would die at an early age. But with medical care they can survive at an adult age.
METHOD OF DIAGNOSING ANAEMIA

Before the condition of a patient suspected of having anaemia is evaluated, the haematology laboratory must first establish the presence and severity of anaemia. The PCV and the Hb level are used to make this determinations. Because each of these measurements provides slightly different information, both, preferable, should be measured, but measuring I or the other usually suffices at least to establish the presence and the severity of anaemia.

PACKED CELL VOLUME DETERMINATION (PCV)

The PCV is expressed as the fractional volume of red blood cells per volume of blood, it is obtained by centrifuging anticoagulated venous or capillary blood and measuring the relative amounts of packed red cells and plasma. When the packed cell volume level is below the normal range, the patient may be termed as anaemic.

Examination of the plasma above the PCV in the PCV tube may sometimes provide valuable information concerning the underlying cause of the anaemia. Elevated serum bilirubin, as seen in patients with haemolytic and megaloblastic anaemia, will be noted as deep yellow plasma. In iron deficiency or inflammation, th plasma may be paler than normal.

HAEMOGLOBIN DETERMINATION

This test is also used to assess the presence and severity of anaemia. Numerous methods have been proposed for estimating the haemoglobin concentration of blood. The degree reliability varies with the methods, and the choice of the method is frequently based on the availability of equipment and the degree of accuracy needed for a particular application. The most reliable method, and the one recommended when it is available, is the cyanmethaemoglobin method. This method has many advantages, such as the availability of as a satisfactory standard and the ability to measure all forms of clinically significant haemoglobin. It is the essential method for scientific studies and especially for establishing the prevalence of anaemia in public health surveys. Other methods used are:-
- Sahli method
- Sponser haemoglobinometer

Diagnosis of Anaemia: Practical Approach

The diagnosis of the cause of anaemia should be approached on a step - by - step basis, incorporation obtained from the initial clinical and laboratory evaluation.

The basic steps are:-
1) Evaluation of clinical information obtained from a review of the history and physical examination.
2) Evaluation of the basic blood studies, which include Hb, PCV, reticulocyte count, and examination of the peripheral blood smear.
3) Determination of serum iron
4) Examination of aspirated bone marrow, when necessary.
5) Specialized laboratory procedures when necessary for making a definite diagnosis. Some of these procedures may require referral to a central laboratory.

It is often difficult to find the cause of anaemia because the patient may have a combination of conditions, each of which may contribute to the anaemia e.g a patient with thalassemia may also have nutritional anaemia and/or infection, megaloblastic and iron deficiency anaemia often occur together.

LABORATORY DIAGNOSIS OF MACROCYTIC ANAEMIA

Blood Smear:

If a patient's red cells are macrocytic, that is, they are predominantly larger than the nucleus of the small mature lymphocyte in the peripheral blood, the laboratory worker should consider 3 main causes:

(i) megaloblastic anaemia (due to vitamin B₁₂ deficiency or folic acid)

(ii) liver disease

(iii) conditions with a large number of reticulocytes.

Other features in the peripheral blood are useful in distinguishing these causes Macrocytosis. For example, if a deficiency of folic acid or Vitamin B₁₂ is the cause, the blood smear may show thrombocytopenia and lenkopenia.

Characteristically, there will be hypersegmented polymorphonuclear lenkocytes containing 6 or more nuclear lobes. The red cells show great variation in size and shape; may have a distorted and abnormal appearance. Howelsolly bodies may be seen. The other cause of Macrocytic red cells is marked reticulocytosis.

DIAGNOSIS OF HYPOCHROMIC MICROCYTIC ANAEMIA.

Blood film:

If, during the initial evaluation of the peripheral blood film, the laboratory worker finds the red cells are paler or smaller than normal, he or she must consider the common causes of Hypochromic Microcytic anaemia:

- Iron deficiency
- thalassemia
- Abnormalities of iron metabolism

Although the blood film can give some clues to the probable causes, the morphological abnormalities are not as helpful as with the Macrocytic Anaemia. For instance, in Iron deficiency anaemia the red cells are characteristically hypochromic and microcytic, but the extent of these abnormalities depends on the level of Hb or PCV - a patient may have a normal blood smear in iron deficiency anaemia until his or her PCV falls below about 0.34 or 0.35 and the Hb below 100 to 110g/L. At that point the careful observer may detect mild microcytosis. At PCV values of 0.30 and Hb of less than 100g/L, microcytosis becomes clearly evident and hypochromasia may be noticed.
A useful indication is that hypochromic cells have a central pale area larger than half the diameter of the cell. Hypochromasia and microcytosis will be prominent with increasing anisocytosis, poikilocytosis, a few target cells, and elongated and elliptical forms.

LABORATORY DIAGNOSIS OF NORMOCYTIC ANAEMIA

This kind of anaemia should be separated into 2 categories, those with increased red cell production and those with decreased red cell production. The blood smear provides useful information, since increased red cell production is often associated with large polychromatophilic red cells. The reficulocyte count is the Primary test for separating the patients into the 2 groups.

The Peripheral blood film should be examined for the presence of "Microspherocytes" red cells which appear small, dense and spherical. The causes associated with normocytic anaemia are:-

- **Acute Blood Loss** - Blood loss which occurs suddenly or over a relatively short period of time (2 - 6 weeks) can be associated with normocytic normochromic anaemia and reticulocytosis provided that the marrow has a normal ability to increase production.

- **Haemolytic Anaemia**

  This type of anaemia result if there is an increased rate of red cell destruction (haemolysis) which cannot be compensated for by the increased red cell production. The destruction may be due to defects within the cell (intrinsic cell defects) or to external sources (extrinsic causes). Often, other clinical data on the patient will give clues to the proper diagnosis, for instance, a past family history of haemoglobinopathy or hereditary spherocytosis, a recent blood transfusion, malaria, splenectomy, or a known metastatic tumor.
METHODS OF DETERMINING HAEMOGLOBIN

Anaemia is a condition whereby there is reduced oxygen carrying capacity of blood which is caused by reduction of Haemoglobin level in circulation.

There are several methods which are used to determine the level of haemoglobin in an individual.

1. **SAHLI METHOD (ALID HAEMATIN)**
   
   **APPARATUS AND REAGENTS.**
   
   i) Sahli graduated tube and standard
   ii) 0.1N hydrochloric acid
   iii) 0.02ml pippette.
   
   **PRINCIPLE.**

   Hb is converted to acid haematin by the action of hydrochloric acid.

   **METHOD**
   
   - Fill the graduated tube to the 20 mark with 0.1N hydrochloric acid.
   - Add 0.02 m/s of blood, mix well and leave for 5 - 10 minutes.
   - Add 0.1N Hcl drop by drop mixing between each additional drop until the colour matches with the standard.
   - Read the amount of solution in the graduated tube. The calibration gives the Hb concentration as a percentage.

   Calculation of Hb content in grams/100m/s is done as follows:-

   If the reading is 90% and Sahli standard is 17.2gms/100m/s which is equivalent to 100%.

   \[
   100\% = 17.2 \\
   90\% \times \frac{7}{100} \times 90 = 15.48\text{gms}/100\text{m/s Hb}
   \]

2. **CYANMET HAEMOGLOBIN METHOD**

   **APPARATUS AND REAGENT**

   i) Photo electric absorptionmeter with a green filter.
   ii) Drabkin solution
   iii) 0.02 ml pippete
   iv) Test tubes
   v) Standard solution of cyanmethaemoglobin.
METHOD.

The blood is placed on the glass plate and haemolysed, then it is placed in the meter and the knob adjusted until the colours match. The Hb concentration is read from the graduation on the meter in grams/100 m/s.

The conversion into % is obtained by using the standards Hb content %.

Example:-

If the amount of Hb is 28 gms/100 m/s;
The actual percentage Hb content

\[
\frac{14.6}{28} \times 100 = \frac{100}{14.6} = 191.78\% Hb.
\]

4. SICKLING TESTS

This is a test done to demonstrate presence of sickle cells in the peripheral blood. These abnormal red blood cells have very low oxygen carrying capacity; these presence lead to anaemia sickle cell anaemic.

There are two methods to screen sickle cells.

(a) STASIS METHOD (DIRECT METHOD)

Apparatus and reagents
- glass slide
- cover glass
- lancents
- microscope
- incubator at 37°C
- molten parafin wax
- rubber band and spirit swabs
- specimen (peripheral blood)

METHOD

Tie the forefinger for 5 minutes with a rubber band to stop oxygen supply. Clean and disinfect a finger with a spirit swab. Use the lancent to prick the finger. Put a drop of blood on a glass slide, cover with a cover glass, seal the sides of the cover glass with molten parafin wax. Incubate at 37°C for 30 minutes and examine under the Microscope.

If negative, incubate for further 24 hours.
PRINCIPLE.

Hb is converted by action of ferrocyanide to methaemoglobin. Methaemoglobin is then converted to cyanmethaemoglobin by the action of pottassium cyanide.

METHOD
- Add 0.2ml/s of blood to 5ml/s of drabkin solution
- Allow to stand to 10 minutes for colour to develop.
- Read the electrophotometer using a tube of drabkins solution as a blank.
  Read the standard of cyanmethaemoglobin.

Calculate the concentration of Hb as follows:-

\[
\text{Test reading} \times \frac{\text{Concentration of standard}}{\text{x dillution}}.
\]

Example:

STD Solution = 50mgHb/100 ml/s.

If the test reading is 28 and standard reading is 35

\[
\frac{28}{35} \times 50 \times 250 = 10,000 \text{ mgHb/100 ml/s}
\]

\[
= 10 \text{ gHb/100 ml/s}
\]

But % Hb = 14.6 gHb/100 ml/s.

\[
= \frac{10}{14.6} \times 100 = 68\%
\]

3. SPENSOR HAEMOGLOBINOMETER

APPARATUS AND REAGENTS.

i) Glass plates for the specimen.
ii) Blood Specimen.
iii) Haemolysing stick.
iv) Haemoglobinometer.

PRINCIPLES.

Read blood cells are lysed with haemolysing stick and then matched with the standard where estimated values of Hb in grams/100 ml/s is given by apointer.
RESULTS.

1. If positive after 30 minutes, that is a true sickle, ie HbSS.

2. If positive after 24 hours incubation, report Hb AS or sickle cell.

(b) SODIUM METABISULPHATE METHOD

APPARATUS
- Microscope
- Glass slide
- Incubator 37°C
- Paraffin wax
- Lancent and cover slips

REAGENTS.

2% Sodium metabisulphite

PRINCIPLE OF THE TEST.

Sodium metabisulphite is oxygenated by reducing oxygen from Haemoglobin to become sodium metabisulphate.

The oxygen reduced Red blood cells sickles when the individual is a sickler.

PROCEDURE

- On a clean slide mix equal volume of blood and sodium metabisulphite.
- Cover with a cover glass.
- With the aid of a paraffin wax or catex seal the sides of the cover glass.
- Incubate for 30 minutes
- Observe under the microscope.
- If negative re-incubate for 18 - 24 hours and look for sickle cells.

RESULTS

1. If positive after 30 minutes, that is a true sickler, that is Hb ss.

2. If positive after 24 hours incubation, report HbAs or Sickle cell trait.
DISCUSSION

Anemia is a condition where by there is reduced oxygen carrying capacity of blood. This condition bring about various complications to the patient suffering from the condition. Among the complications associated with anemia are Jaundice, oedema, Tachycardia, weakness, paleness of the skin, oliguria, weight loss, joint pains, renal failure. Hypertension due to heart failure.

According to the investigations and the data collected it shows clearly that this condition is disturbing a number of individuals in the study area. There are several factors which favour the harbouring of this condition in the study area according to the study which was carried out. Due to the fact that most of the study area are not well off economically, the most common cause of anemia is due to Malnutrition. Most of the people are not well fed i.e. they do not take balance diet food. Due to this fact of malnutrition, it is found that the most common types of anemias are due to nutritional deficiencies e.g. iron deficiency anemia and megaloblastic anemia.

When an individual feed on a diet which has little iron or absent completely, will suffer from iron deficiency anemia. Since for the formation of normal haemoglobin pigment, there must be iron, so absence of it will lead to formation of abnormal haemoglobin pigment which will not carry the required amount of oxygen hence leading to Anemia. The patient suffering from this condition will have its Red blood cells which are smaller than the normal size and little amount of haemoglobin concentration i.e. microcytic hypochromic.
The other Anemia due to nutritional deficiencies is megaloblastic anemia. This type of anemia is due to deficiencies of Vitamin B12 and folic acid. Vitamin B12 and folic acid are among the necessary requirements for the formation of normal haemoglobin pigment. Therefore their absence will lead to formation abnormal haemoglobin pigment which will not carry out its normal function of carrying oxygen, which will lead to anemia. The patient suffering from this type of Anemia will have its Red blood cells abnormally large and little haemoglobin concentration i.e Macrocytic hypochromic.

The other cause of anemia affecting individuals in the study area is due to parasitic infection. Due to low standard of living of the people, they are highly exposed to parasitic infection which lead to anemia. Another factor which contribute to parasitic infection is ignorance where by most individuals do not have toilets in their homes, this lead to disposing of feacal matter anyhowly which lead to transmission of parasitic infection.

The most common parasites which affect individuals in the study area are Hook worms, Ascaris lumbricoides, strongloides stercoralis, Trichuris trichiura and Malaria parasites. When individuals walk bare feet on the ground, the filariform lavae of Hook worm and strongloides stercoralis penetrate the body. The lavae develops to adult worms in the body. The adult worms sucks blood from an individual hence causing anemia.
Trichuris trichiura and Ascaris lumbricoides develop in the body after eggs of respective parasites are ingested from fecally contaminated food or water. Trichuris trichiura lead to drawing of blood from the patient which lead to Anemia whereby Ascaris lumbricoides accumulates in the small intestines which lead to Malabsorption of food nutrients via the small intestines which contribute to anemias due to malnutrition. Another parasite which lead to anemia due to malnutrition is Giadia lamblia, whereby many of them attaches on the small intestines reducing the surface area for absorption of nutrients.

The other parasite which lead to anemia is Malaria Parasite. When the parasite enter the body through abite of an anopheles mosquito, the sporozoites move to the liver to infect the liver cells, then the cryptozoites released, infect Red blood cells (Erythrocytic schizogony). The infected Rbc's are seen as abnormal by the reticel endothelial system leading to their clearance, so this massive clearance of infected Red blood cells lead to Anemia.

The other causes of anemia which are not very common in the study area are congenital defects of haemoglobin pigment namely sickle cell anemia and thallasemia. These types of anemias are not commonly found in the study area though there are some individuals who suffer from them.

According to the data collected and analysis which was conducted, it shows that age and sex are factors as far as the prevalence of anemia is concerned. Individuals of ages 0 - 15 are found to be having highest prevalence of anaemia, this is due to the fact that the children are normally underfed, they do not get the right diet, another factor is that, these children are mostly exposed
to the parasites mentioned earlier due to the fact that they spend
most of their time playing with sand and most of them have no protective
items like shoes; so this lead to high chances of them being infected
through penetration of lavae from the sand. Most of these young
children preffer eating sand, so this lead to Ingestion of infective
eggs of the parasites.

From the age of 15 years and above the preverlences are relatively
low. This reason is that most of them know how to take care of
themselves eg protecting themselves by wearing foot wears reducing
chances of some parasites to penetrate their body to cause anemia.
The individuals of this group are grown up so some can take care
of themselves by washing hands before eating, washing hands after
defaecation and washing fruits before eating; unlike the children
wereby the reverse is true.

Apart from age group, sex is also a factor to the prevalence of
anemia as seen from the data collected.

At the age of 0 - 10, the prevellence of anemia of bothe male and
female is seen to have no significant defference since whether
male children or female children, they face the same problems.
From the data collected the age groups 11 - 20, 21 - 30 and 31
and above, the prevellences of female are higher as compared to
female. This is because at this age groups the females from the
study area have atendancy of eating sand which lead to high exposure
of parasitic infection. In the study area it was found that women
are the ones who are active in cultivating, so this act of going
to the shamba without proper protective clothing lead to exposure
for parasitic infection.
Another problem contributing to the prevalence of anemia to the study area is lack of education to most of individuals especially the aged, whereby this lead to poor feeding and poor sanitation. The major problem being poverty whereby most individuals can not buy good nutritious food eg meat, beans, liver etc instead they depend on food from their shambas mostly cassava and maize.
CONCLUSION

Anaemia is a condition which is giving a lot of problems economically and socially to the study area among others. According to the analysis from the data collected, it was found that children are prone to this condition than adults, this is because children have got low level of immunity, so they are highly susceptible to disease which many of them lead to anaemia.

It was found that women are more affected to this condition than men. The most common kinds of anaemia are due to nutritional deficiencies of iron, folic acid and less commonly, vitamin B12 and protein. Other common causes of anaemia are due to parasitic infection e.g. Malaria, hook worms, ascaris lumbricoides and other parasites; also bacterial infections contribute to the existence of the condition.

Economic status of the inhabitants contribute mostly in the occurrence of anaemia. Many individuals in the area are poor so they do not take the required diet or treatment to individuals who have got parasitic infection is a problem.

Most of the inhabitants are not educated i.e. the standard of education is very low, so many individuals do not know preventive measures to parasitic infections so many of them are exposed to them which form a direct cause of the condition. Due to the fact that most of the people are not educated, they normally visit witch doctors whenever they have infections, so they waste time by the time they are taken to hospital the condition has worsened.