

FACTORS RELATED TO ANAEMIA IN PREGNANCY AND THE COMMUNITY'S PERCEPTION OF ITS CAUSES, IDENTIFICATION PREVENTION AND TREATMENT

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**A dissertation submitted as part of the requirements for the degree
of Master of Science in Mother and Child Health
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DEDICATION

This piece of research is dedicated to better health
among pregnant women in developing countries

A group of pregnant women waiting to
be seen at the antenatal clinic



ABSTRACT

The objectives of this study were to review factors related to anaemia in pregnancy and to explore the community's views regarding its causes, identification, prevention and treatment.

A descriptive cross-sectional study was carried out between July and September, 1991, in Amukoko, a peri-urban slum area in Lagos.

The main outcome measure was hemoglobin concentration less than 11g/dl.

Of 300 pregnant women attending the clinic, 68.3% were found to be anaemic ($Hb < 11g/dl$) and 8% were severely anaemic ($Hb < 8g/dl$). The prevalence of anaemia was higher in the third trimester (50.9%).

Anaemia in pregnancy was found in eighty percent of primiparas aged ≤ 18 years, seventy percent of women aged ≥ 35 years. Women without formal education and 83.3% ($n=5$) of women with a history of anaemia in their last pregnancy were also more likely to be anaemic.

Compliance with hematinics and anti-malarial chemoprophylaxis were remarkable. However, frequency of antenatal clinic attendance was not associated with differences in mean hemoglobin value and possible reasons for this are discussed.

Traditional birth attendants were frequently consulted and the potential benefits of integration of their activities into the health care delivery systems are considered.

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GLOSSARY OF TERMS

Hb	Hemoglobin
PCV	Packed Cell Volume
AIDS	Acquired Immune Deficiency Syndrome
WHO	World Health Organisation
PHC	Primary Health Care
GNP	Gross National Product
UNICEF	United Nations International Children's Emergency Fund
EDTA	Ethylene Diamine Tetracetic Acid
TALC	Teaching Aids at Low Cost

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Glossary of terms

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Chapter 1

INTRODUCTION

Anaemia is a well-recognised public health problem affecting women and children in developing countries of the world (De Maeyer, 1985). Pregnant women are particularly vulnerable as a result of the increased demand for nutrients required for fetal growth, as well as the expansion of maternal red cell mass. Usually, these requirements exceed the dietary supply of nutrients and the available nutrient stores.

According to the World Health Organisation (1985), 'anaemia' is a term used to describe the condition in which the quantity or quality of circulating red cells is reduced below the normal level. The most common way of diagnosing anaemia is by measuring the hemoglobin concentration in the blood. Some normal values have been defined, viz.:

	<u>Hemoglobin in g/l</u>
Children, 6 months - 6 years	110
Children, 6 - 14 years	120
Adult males	130
Adult females (non-pregnant)	120
Adult females (pregnant)	110

The prevalence of anaemia during pregnancy in Africa is estimated to be 63%, compared with 14% in European women (WHO, 1985). In non-pregnant women, the prevalence of

anaemia is estimated to be 44%. With such a high prevalence of anaemia among non-pregnant women, the high prevalence of anaemia among pregnant women is not unexpected.

The causes of anaemia in pregnancy are multiple.

Major causes of anaemia include:

- (i) nutritional deficiency of haematopoietic factors;
- (ii) infections, including malaria;
- (iii) genetic disorders causing haemolytic anaemias, e.g. sickle cell disease;
- (iv) blood loss from intestinal parasites, e.g. hookworm.

1.1 Nutritional Anaemia

The main haematopoietic factors are iron, folic acid, vitamin B12 and some trace elements which are normally ingested from food. These factors are usually stored within the body to meet its needs in times of stress under conditions of adequate dietary intake.

Body stores may be reduced by increased losses, increased requirements, decreased dietary intake, decreased absorption and decreased utilization. This results in a deficiency state which can manifest as:

- (1) reduced capacity of the individual to cope with increased demand for nutrients or to withstand nutrient deprivation without any clinical or biochemical evidence of deficiency;

- (2) biochemical and/or clinical abnormality in the absence of anaemia; and
- (3) overt deficiency resulting in anaemia.

There is a state of balance in healthy individuals in which nutrient intake is equal to nutrient breakdown or nutrient loss from the body.

1.1.1 Iron - basal physiological losses

The main physiological routes of iron loss from the body are the gastrointestinal tract, the skin and the urine in non-menstruating females and males. Women of childbearing age have an additional route in the form of menstruation. The loss of iron in sweat is a well recognized cause of iron deficiency in tropical countries.

1.1.2 Pathological loss

The main pathological cause of iron loss in tropical countries is hookworm infestation. These worms usually reside in the duodenum, which is the site of iron absorption. The estimated blood loss per day caused by *Necator americanus* is about 0.03ml, while *Ancylostoma duodenale* causes a loss of 0.02ml.

1.1.3 Iron requirements

The estimated daily iron requirements for adult men is 1.0mg. Between the ages of 18 and 30 years, it is 1.2mg.

Women in the reproductive age group require about 2.0mg iron per day, to cover for the extra amount of iron lost through menstruation, which is equivalent to about 0.45mg.

In pregnancy, iron requirements increase tremendously. An initial store of 500mg of iron is required for the increased red cell mass which occurs after 12 weeks, which must be supplied either from the body stores or by enhanced iron absorption. Despite the fact that some iron is saved during the nine months of pregnancy, the overall iron costs of pregnancy have been found to exceed the costs of the non-pregnant life. The total estimated iron requirement in pregnancy is about 1000mg. This is concentrated mainly in the second half of pregnancy due to the transfer of iron to the fetus and placental structures, requiring about 510mg of iron. For the expansion of maternal red cell mass, about 450mg of iron is required. This is eventually returned to the body stores after delivery.

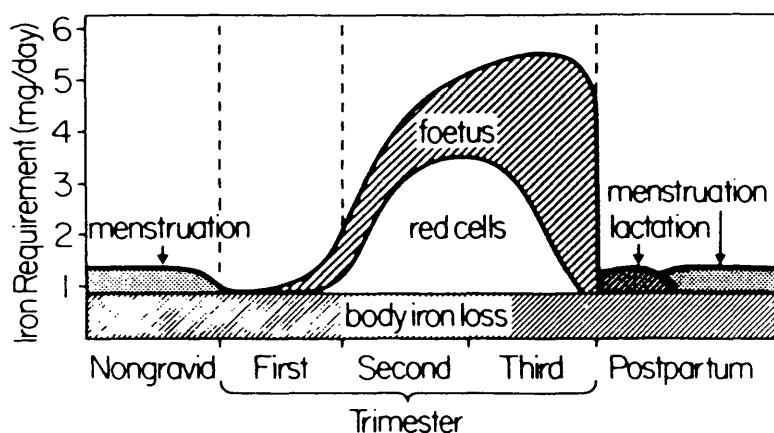
Women with adequate iron stores prior to pregnancy require about 740mg of iron throughout pregnancy, which is equivalent to about 2.6mg/day. Women with inadequate iron stores, however, require about 1,190mg iron, equivalent to about 4.0mg/day (Bothwell and Charlton, 1979).

Iron Cost of Pregnancy (mg)

	<u>Amount of iron</u>
Gross losses	
Foetus	270
Umbilical cord and placenta	90
Maternal blood loss	<u>150</u>
	510
Obligatory losses from gut during gestation	230
Expansion of maternal red cell mass	<u>450</u>
GROSS TOTAL	1190
Net losses	
Contraction of maternal red cell mass after delivery	450
NET TOTAL	<u>740</u>

The distribution of iron requirements in pregnancy is shown schematically below:

Daily Iron Requirements during Pregnancy



Daily iron requirements during pregnancy. These requirements are needed to meet the normal losses from the body and to provide iron for the enlarging red cell mass, the foetus and for lactation after the birth of the child.

Pregnant women would require therapeutic iron supplementation if the high level of iron absorption that is needed to achieve the additional iron requirements of pregnancy is to be achieved.

1.1.4 Dietary iron absorption

Although iron is present in many foodstuffs, e.g. cereals, meat, vegetables, its bio-availability differs considerably depending on the dietary source and the presence of other substances in the diet.

The two main forms in which iron is present in food are: (i) haem iron, which has a high bio-availability; and (ii) non-haem or inorganic iron, with a lower bio-availability. This can be obtained from either animal or vegetable sources. Its absorption is enhanced by the presence of ascorbic acid, fish, meat and inhibited by tannin, phytates, phosphates and egg yolk. Sugars such as fructose have also been noted to serve as ligands which improve its bio-availability (Bothwell and Charlton, 1981). With the exception of soya beans (with an absorption of 10%), most vegetable source are poor sources of iron, despite their rich iron content. Food of animal origin increases the bio-availability of iron from vegetable sources.

1.1.5 Storage iron

This exists in the form of ferritin and haemosiderin in the cells of the reticulo-endothelial system, with a distribution of approximately one-third in the liver, one-third in the bone marrow and another third between the spleen, muscle and other tissues (Ebrahim, 1989).

Depletion of iron stores results in a microcytic, hypochromic anaemia with anisocytosis and poikilocytosis.

1.1.6 Folate

The word 'folate' is derived from the Latin word 'folia' ('leaf'), because it was first found in spinach. It is very important in the synthesis of deoxyribonucleic acid. The liver has a particularly high content of folate. It is also present in most body tissues.

1.1.7 Folate losses

Although folate is excreted in bile, it is reabsorbed again. It is also synthesised by bacteria in the intestines and can be lost from the stool and urine.

1.1.8 Folate requirements

The recommended daily folate intake for the non-pregnant woman is 400mg. The pregnant woman requires double this amount and demands are particularly higher towards the end of pregnancy, with the result that a substantial number of

women develop some degree of megaloblastic change in late pregnancy. Conditions resulting in increased folate requirements are multiple pregnancy and haemolytic situations, e.g. malaria and hemoglobinopathies. Pyrimethamine and trimethoprim overdosage can lead to severe megaloblastic anaemia (Fleming et al, 1974).

1.1.9 Dietary folate and its absorption

Food items containing large amounts of folate are dark green vegetables, liver, meat, milk, yams, sweet potatoes, bananas, plantains, nuts, mangoes, egg yolk and fish (Fleming, 1984). Although lentils are a good source of folic acid, their folate content is reduced markedly by the prolonged cooking which they require. Staples, e.g. rice and maize, which constitute a major part of the diet in most developing countries, are poor sources of folate. Fruits are also poor sources.

1.1.10 Seasonal incidence of folate deficiency

There is a marked increase in the incidence of anaemia in pregnancy between April and September in Nigeria. This is thought to be due to the scarcity and expense of yams, a good source of folic acid (Fleming, 1970).

Deficiency of folate results in megaloblastic anaemia with characteristic changes in the nuclear morphology of the neutrophils (hypersegmented neutrophils) and an

increase in the diameter of the red blood cells (macrocytes). Deficiency can go undiagnosed either because it occurs without anaemia or is masked by another haematological disorder, e.g. iron deficiency.

1.1.11 Body stores of folate

These can very easily be depleted and a minor degree of dietary lack or malabsorption can precipitate deficiency. The 2,4 diaminopyrimidines interfere with folic acid metabolism and can cause a deficiency by inhibition of dihydrofolate reductase (Fleming, 1989).

1.1.12 Vitamin B12

The main concentrations of vitamin B12 are found in the liver and kidneys. It is also present in practically all tissues.

1.1.13 Vitamin B12 losses

Some of the vitamin is derived from colonic bacteria and large amounts are detected in the stool. Most of that which is excreted in bile is reabsorbed in the intestines and combines with intrinsic factor.

1.1.14 Vitamin B12 requirements

Exact requirements of this vitamin are not known, although it is known that the vitamin is transferred preferentially

from the mother to the fetus. Requirements are increased by pregnancy and lactation.

1.1.15 Dietary vitamin B12 and its absorption

In nature, this vitamin is derived from bacterial synthesis. In food, it is usually protein-bound and is released by cooking or the action of digestive enzymes. The freed form then combines with intrinsic factor secreted by the gastric parietal cells, forming a complex which is absorbed in the liver. Dietary sources include liver, meat and milk. Fruits, vegetables, cereals and cereal products are devoid of vitamin B12.

1.2 Malaria

Some studies (Morley et al, 1964; Brabin, 1983; Fleming et al, 1989) have shown that malaria in pregnancy has adverse effects both on the mother and the outcome of pregnancy. The effects of malarial infection in pregnancy are most marked in primigravidae (Brabin, 1983) at about twenty weeks of pregnancy. Its major effect on maternal health is anaemia resulting from haemolysis, with megaloblastic changes in the bone marrow.

Several approaches have been explored in an attempt to achieve a reduction of malarial attacks. These include chemoprophylaxis and vector control. Morley et al (1964)

achieved an increase in birth weight of 157g in babies born to mothers receiving 50mg pyrimethamine monthly, compared with the control group. These mothers also achieved a higher weight gain in pregnancy compared with controls. The effects were more pronounced in primiparous mothers compared to multiparous mothers.

More recently, however, there has been much interest in the reduction of man-vector contact by spraying houses with residual insecticides and treatment of mosquito bed nets with insecticides, such as the synthetic pyrethroids (Snow et al, 1988; Alonso et al, 1991).

1.3 Hemoglobinopathies

These constitute an important cause of anaemia in pregnancy in tropical Africa, especially now that a proportion of women with sickle cell disease are surviving to adult life (Fleming, 1989). Pregnant women with sickle cell disease invariably develop folic acid deficiency with megaloblastic anaemia by mid-pregnancy if they are not under medical supervision (Fleming, 1989).

1.4 Bacterial Infections

In bacterial infections, there is a suppression of the normal marrow function, so that hemoglobin synthesis cannot

occur in the marrow, even in the presence of all the essential nutrients, until the infection has been brought under control by the use of appropriate antibiotics. Diarrhoea in pregnancy can be an important precedent of anaemia in pregnancy in the tropics. The possible mechanism for this is interference with the synthesis of vitamin B12 and folic acid by intestinal flora, as well as impairment of absorption of essential factors and iron. The pyrexia of infections can also precipitate an acute megaloblastic arrest of erythropoiesis (Chanarin et al, 1964).

1.5 Interventions for Improvement of Hemoglobin Status

These include:

- (1) therapeutic supplementation with the haematopoietic nutrient or nutrients which are deficient;
- (2) fortification of the diet with the nutrients which are deficient;
- (3) reducing nutrient losses, e.g. hookworm eradication;
- (4) other measures, e.g. provision of absorption promoters.

1.5.1 Supplementation

This refers to the administration of an extra amount of a nutrient in medicinal form, either as a tablet or

parenterally as an injection. It is a very good approach when an attempt is being made to increase the intake of a nutrient on a long-term basis or when a large deficit is to be made up within a relatively short time.

Although oral supplementation has been used widely for pregnant women, it requires a great deal of organization and it is very difficult to guarantee consumption.

The costs involved in parenteral supplementation are rather prohibitive and with the possibility of transmission of hepatitis and even AIDS it does not seem to be of public health value. There is some suggestion that intramuscular iron as total dose infusion is associated with an increased susceptibility to malaria, especially in primigravidae (Oppenheimer et al, 1986).

1.5.2 Fortification

This term refers to the process of adding nutrients to food to improve the quality of diet in the group, community or population. It also involves making decisions regarding the most suitable vehicles.

1.5.3 Reduction of nutrient losses or requirements

Periodic de-worming (usually after the first trimester), improved sanitary measures and appropriate educational campaigns to lower re-infection rates have all been employed to reduce nutrient loss or requirement.

1.5.4 Other measures

Other measures employed include enhancing the absorption of dietary vegetable iron by the addition of animal protein. In practice, however, there may be some difficulties, especially in situations where religious beliefs or harsh economic realities compel people to become vegetarians.

1.6 Pathophysiology of Anaemia

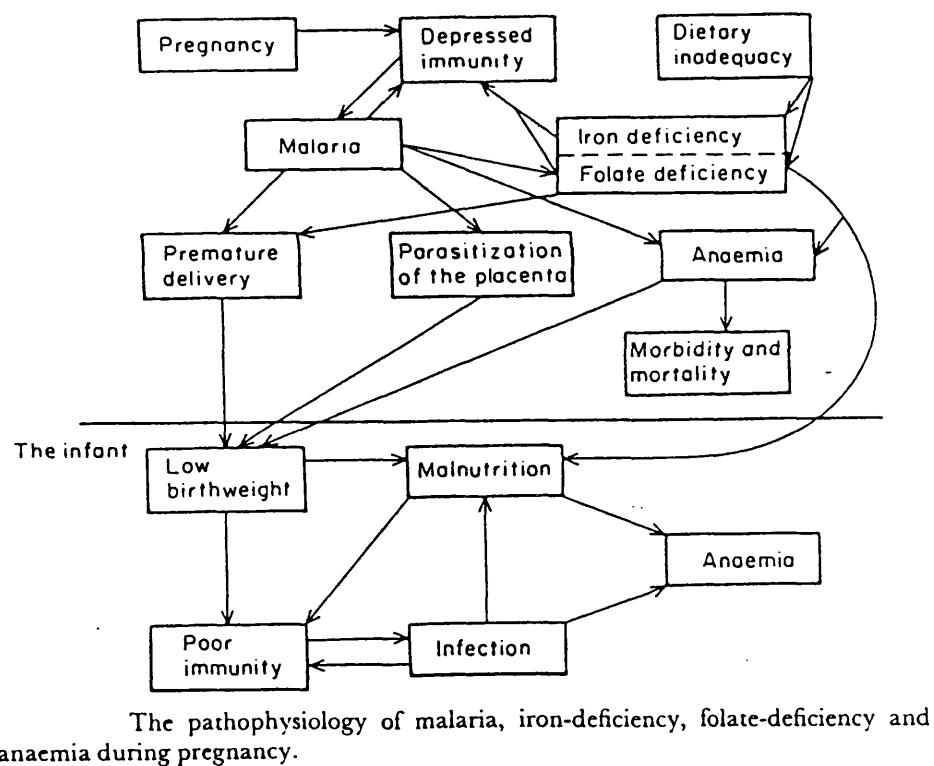
The main aetiological factors responsible for anaemia in pregnant women are believed to interact with one another in a complex manner, producing effects on both mothers and infants, as shown schematically on the following page.

Physiological suppression of immunity, which occurs in pregnancy, results in an increased frequency of plasmodium falciparum parasitaemia from the second trimester onwards, especially in primigravidae women. The malarial infection results in hemolysis, which results in folate deficiency, especially in the presence of inadequate dietary intake. Malaria is itself immunosuppressive and can be very easily complicated by bacterial or viral infections.

In populations with a high consumption of cereals, there is often iron deficiency. When this is present with folate deficiency (resulting from malaria infection), there is a further depression of immunity, causing neutropenia and atypical nuclear division by lymphocytes (Brabin,

1982). The cycle of depressed immunity, malaria and nutritional deficiency ultimately results in anaemia in the mother.

Figure 1



The pathophysiology of malaria, iron-deficiency, folate-deficiency and anaemia during pregnancy.

Malarial infection in the mother can result in the production of a low birth weight baby either as a consequence of pyrexia, causing premature labour, as a consequence of placental infection, or as a result of fetal hypoxia and placental hypertrophy. Low birth weight infants have low total iron stores and can easily expend these stores very fast due to their rapid growth rate, thereby becoming very susceptible to infections, which further depress their immunity, and to malnutrition, which results from the anorexia, malabsorption, high demands, nutrient loss and disturbances of metabolism with infection.

Like the mother, the baby too enters a cycle of poor immunity, infection and malnutrition, although the effects and consequences of this cycle are more severe than in the mother due to the immaturity of the infant's immune system and the demands for nutrition (Fleming et al, 1986).

1.7 Maternal Morbidity in Anaemia

Three stages of maternal morbidity have been identified using the hemoglobin values as cut-off points. Women with hemoglobin values between 7 and 11g/dl are considered to be in a stage of compensation. These usually experience reduced exercise tolerance and diminished ability to work and to care for children.

A stage of decompensation occurs when hemoglobin values fall below 7g/dl. The woman becomes tired and breathless at rest as a result of lactic acid accumulation. At this stage, there is poor tolerance of any blood loss and anaemia can be an important contributory factor to maternal mortality.

At hemoglobin values less than 4g/dl, the woman develops cardiac failure, which can result in maternal mortality.

1.8 Fetal Consequences of Anaemia in Pregnancy

Between hemoglobin levels of 7-11g/dl, there is a reduction in the oxygen tension of amniotic fluid and intrauterine fetal hypoxia (Johnson and Ojo, 1967). Compensatory mechanisms set in, resulting in placental hypertrophy. However, the compensation is inadequate, resulting in reduced oestriol excretion, increased frequencies of premature deliveries, foetal distress and low Apgar scores.

Chapter 2

LITERATURE REVIEW

Anaemia in pregnancy has been strongly associated with maternal and foetal morbidity and mortality (Harrison, 1982; Harrison, 1985; Harrison and Ibeziako, 1973). It lowers the body's resistance to infections, reduces work capacity and has important socio-economic consequences on communities (Royston, 1982). The health problems associated with anaemia may not be recognized or they may be ignored (WHO, 1990).

Several studies (Morley et al, 1964; Gilles et al, 1969; Fleming, 1970; Fleming, 1982; Fleming, 1986) have attempted to investigate some aspects of the possible causes, prevention and treatment of anaemia in pregnancy. The main findings from these studies with regard to the most important causes of anaemia in pregnant women in Africa were hemolysis from plasmodium falciparum malaria, iron deficiency, folate deficiency and sickle cell disease.

Morley et al (1964) showed that monthly administration of 50mg pyrimethamine to pregnant women resulted in a net weight gain of 157g in the birth weight of their babies compared with babies of control mothers.

Harrison et al (1985) and Fleming et al (1986) have illustrated the benefits derived from antimalarial

chemoprophylaxis, folic acid and nutritional supplements on maternal and fetal health, especially in primigravidae. Isah et al (1985), in their study in the Guinea savanna of northern Nigeria, observed that irrespective of social class or maternal age, pregnant women in that region of Nigeria required supplementary iron.

In their review on malnutrition and infection, Tomkins and Watson (1989) suggested that supplementary iron may have a variable effect depending on the underlying nutritional status of the individual, the environment in which s/he lives and the form of therapeutic iron s/he is given.

Concerning the choice of prophylactic anti-malarials, the following facts have emerged:

- (1) Use of chloroquine as chemoprophylaxis is likely to favour the emergence of resistant strains as a result of low blood concentrations from irregular dosage. Chloroquine-resistant strains of *P. falciparum* have already been documented in some parts of Nigeria.
- (2) Pyrimethamine is thought by some workers (Olsen et al, 1983; Fleming, 1986) to be less effective than proguanil in terms of biological efficacy and also because of the ease with which it can be forgotten, especially if a patient had vomiting or diarrhoea.
- (3) The use of sulphonamide-containing mixtures (Fansidar, Maloprim) is not recommended due to

possible effects on the blood-forming tissues of the fetus.

The recommended practice in Nigeria for malaria control in pregnancy (Federal Ministry of Health, 1990) is as follows:

- (1) A curative treatment dose of 1500mg Chloroquine over three days (600-600-300) at the time of first attendance at the antenatal clinic.
- (2) Laboratory-confirmed cases of symptomatic malaria in pregnant women should receive an initial treatment with 1500mg Chloroquine base over three days. If clinical symptoms of parasitaemia persist, treatment with parenteral quinine, 30mg/kg body weight, for 7 days is recommended.
- (3) Treatment of pregnant women with sulfadoxine/pyrimethamine, tetracycline or amodiaquine during pregnancy is not recommended.
- (4) Weekly malaria chemoprophylaxis in the form of pyrimethamine, 25mg.

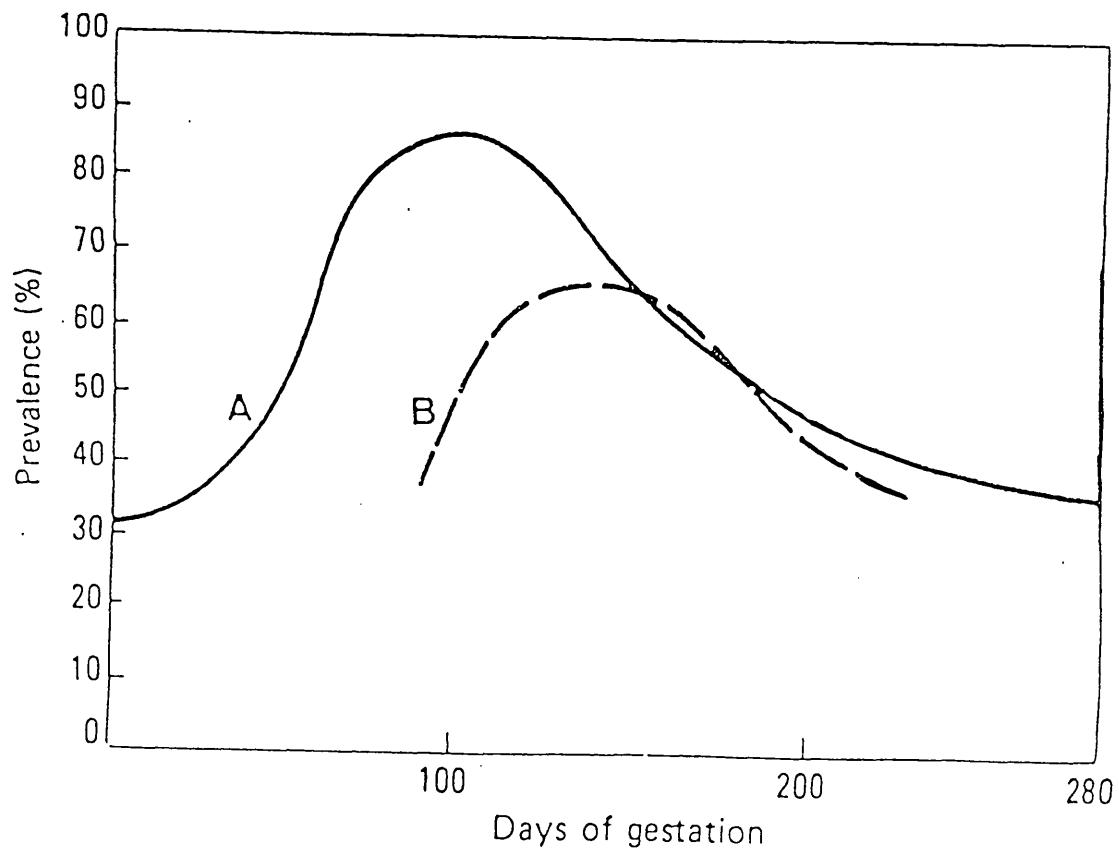
The most recent WHO recommendation regarding malaria prophylaxis is proguanil, 100mg per day, with chloroquine for treatment of acute malaria symptoms (Ross Institute, London School of Hygiene and Tropical Medicine, personal communication).

Gilles et al (1989) reported a 63% incidence of anaemia among primigravidae not receiving anti-malarials and by comparison with a small non-randomised control group

he demonstrated that the haemolytic anaemia was prevented among them by the weekly administration of antimalarial chemoprophylaxis.

The pattern and prevalence of haemolytic anaemia for women experiencing early pregnancy parasitaemias has been shown schematically by:

Figure 2



This figure shows the reason why there is no correlation between hemoglobin levels and parasite density in individuals, since it is possible for an individual to have a high parasitaemia at the time of acute infection with a normal hemoglobin or anaemia with a low parasite count.

Some studies have looked at hemoglobin levels in pregnant women with or without malarial parasitaemia at delivery.

Mean hemoglobin values (g/dl) in pregnant women with and without malarial parasitaemia at delivery

		Parasite Positive PG	Parasite Negative MG	Parasite Positive PG	Parasite Negative MG
Nnatu et al (1987)	Nigeria (Lagos)	-----	8.5	-----	10.8 -----
Brabin et al (1990)	Papua New Guinea*	8.1±1.4	8.7±1.2	8.8±1.9	8.8±1.5
McGregor (1984)	Gambia	10.5	10.7	11.7	10.9
Fleming et al (1986)	Nigeria (Zaria)	--	10.3±1.6	---	11.6±1.5 ---

PG = Primigravidae

MG = Multigravidae

* At antenatal booking

Source: Brabin, B. J. The Risks and Severity of Malaria in Pregnant Women, UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases.

This table shows that the mean hemoglobin values were higher in pregnant women who did not have malaria parasitaemia at delivery compared with those who had.

Primigravidae also tended to have lower hemoglobin values compared to multigravidae.

Studies in northern Nigeria (Fleming, 1989) showed that pregnant Nigerian women have increased folacin requirements due to haemolysis resulting from malaria infection. This haemolysis was found to be greatly reduced with prophylactic pyrimethamine and it was suggested that bone marrow aspiration was required to make a certain diagnosis, particularly when iron deficiency, which invariably accompanies folacin deficiency in pregnancy, makes the diagnosis of megaloblastosis difficult from peripheral blood films (Chanarin et al, 1964).

Studies in western Kenya (Brabin et al, 1986) showed a poor relationship between the red blood cell folacin concentrations and serum folacin levels. Peripheral blood smears in this study too failed to show evidence of megaloblastosis. This was attributed to the low sensitivity of peripheral blood smears in determining megaloblastosis, especially in iron-deficient women. In this study, despite the prevalence of malarial parasitaemia, the women generally remained asymptomatic and it was concluded that they ^{had} ~~has~~ some low-grade haemolytic anaemia.

Some workers (Gilles et al, 1969; Fleming et al, 1986) have stressed the importance of starting malaria chemoprophylaxis early in pregnancy if severe anaemia was

to be prevented. Regular antenatal clinic attendance was also identified as an important factor in the prevention of malaria, as a single missed monthly clinic visit can result in a two-fold increase in malaria incidence.

Despite the successes achieved by using malaria chemoprophylaxis vis-a-vis improved maternal health from reduced maternal anaemia and promotion of fetal growth, as well as a reduction of operative intervention by the enhancement of maternal growth (Harrison et al, 1985), improved fetal outcome (Morley et al, 1964), concern has been expressed that the use of chemoprophylaxis would in turn decrease the transfer of antimalarial immunity to the fetus and ultimately the protection which infants enjoyed during their first few months of life.

Approaches adopted in vector control include:

- (1) spraying of houses with residual insecticide;
- (2) treatment of mosquito bed nets with insecticides such as the synthetic pyrethroids, e.g. Dieldrin.

Although some initial success was achieved in Asia with the spraying of houses using residual insecticides, problems encountered include the development of resistance to insecticides and the reluctance of some communities to grant spray men access to their homes.

A new form of vector control was then proposed at community level which could easily be incorporated into the existing primary health care programme. This was based on

the use of insecticide-impregnated mosquito bed nets. These were found to be without side-effects, well accepted and to be easily implemented. They also helped to protect against bed bugs and head lice (Alonso et al, 1991).

In Gambia, Alonso et al (1991) compared overall mortality and the mortality attributable to malaria in children aged 1-4 years, between PHC villages which used insecticide-impregnated bed nets with control villages. They found a significant reduction of 37% and 30% respectively in these villages. In addition, chemoprophylaxis did not seem to have any additional benefit in preventing deaths among children who slept under treated bed nets.

Despite the large number of researches which have been conducted on anaemia in pregnancy in Nigeria, there is a dearth of information on the views of the community with regard to causes, identification and treatment of anaemia, apart from the study by Elegbe et al (1984), which examined pregnant women's views on causes of dizziness using a group of antenatal clinic attenders in Ile-Ife who wore traditional black rings on their middle fingers as a prophylaxis against dizziness.

Chapter 3

PURPOSE OF THE STUDY

3.1 Aim and Objectives

Aim

The overall aim of this study was to review the association between certain maternal characteristics and anaemia in pregnancy and to explore the community's views regarding the causes, identification, prevention and treatment of anaemia.

Objectives

The objectives of this study were:

- (1) To determine the prevalence of anaemia at different stages of pregnancy.
- (2) To describe the association, if any, between maternal age, maternal education, socio-economic factors, past obstetric history, parity, birth interval, previous infant deaths and antenatal clinic use on anaemia.
- (3) To describe the pattern of use of planned antenatal clinic interventions and the informal health sector interventions.
- (4) To explore the views of the community with regard to causes, identification, prevention and treatment of anaemia.

3.2 Hypotheses

Anaemia is:

- (1) commoner among young primiparae and grandmultiparae;
- (2) commoner among women of low socio-economic status;
- (3) commoner among women with no formal education;
- (4) commoner in women on the intrauterine contraceptive device who have heavy periods;
- (5) associated with a history of anaemia in the preceding pregnancy;
- (6) commoner in women with irregular or few antenatal clinic attendances;
- (7) associated with increased morbidity in pregnancy;
- (8) commoner among women with a history of non-compliance with iron, folic acid and anti-malarial tablets;
- (9) non-compliance is due to side-effects;
- (10) commoner among women who do not use bed nets or any other form of vector control;
- (11) commoner among women on poor diets;
- (12) commoner among women who have experienced previous infant deaths;
- (13) commoner among women who had their babies at short intervals.

Chapter 4

BACKGROUND INFORMATION

4.1 The Country

Nigeria is a multi-ethnic country with a population of 120 million, situated on the shores of the Gulf of Guinea along the West African coast. It has an area of 923,766 km² and lies between latitudes 4° and 14° north of the Equator and longitudes 3° and 14° of the Greenwich Meridian. It is the most populous country south of the Sahara.

Its vegetation is of two main types - tropical rain forest along the south-west coast and the savanna type, which comprises the Guinea savanna in the central part of the country, the Sahel savanna in the northern part of the country and the Sudan savanna, which is predominantly grassland.

There are two main seasons - the rainy season lasting from April to October and the dry season lasting from November to March. The rainy season is the time of food scarcity and during this season malaria transmission and parasitaemia are highest. The main food and cash crops in Nigeria include oil palm, maize, potatoes, sweet potatoes, cassava, rice, cocoa, palm kernel, groundnut oil, rubber, timber, bananas and livestock. Vegetables include dark green leaves, onions, tomatoes and okra.

Women and children under the age of five years constitute about fifty percent of Nigeria's population. About thirty percent of Nigeria's population reside in urban settlements, while the remaining seventy percent reside in rural communities.

The maternal mortality rate in Nigeria is estimated to be about 15 per 1000 live births and factors related to this include poverty, illiteracy, unhygienic conditions under which deliveries take place, inadequate pre-natal care, motherhood at an early age, poor nutrition and a rapid succession of pregnancies.

In Nigeria, 55% of adult men are literate, compared to 31% of adult women (UNICEF, 1991, p.108). The position of women in Nigeria is still influenced by traditional, cultural and religious injunctions which limit their contribution in the social, political and economic development of the country.

The Nigerian Fertility Survey (1982) showed that the median age at first birth was 19.5 years. Only 56.7% of women were in monogamous unions; 42.6% were in polygamous unions. There is also a reluctance in the use of modern contraceptives, as shown by the contraceptive prevalence rate of 6% (UNICEF, 1991, p.114). Modern health care coverage is estimated to be 40% and only about 40% of births which occurred between 1980 and 1988 were attended by trained health personnel (UNICEF, 1991, p.114).

Nigeria's GNP per capita has declined to US \$290 by 1988 (UNICEF, 1991).

4.2 The Study Area

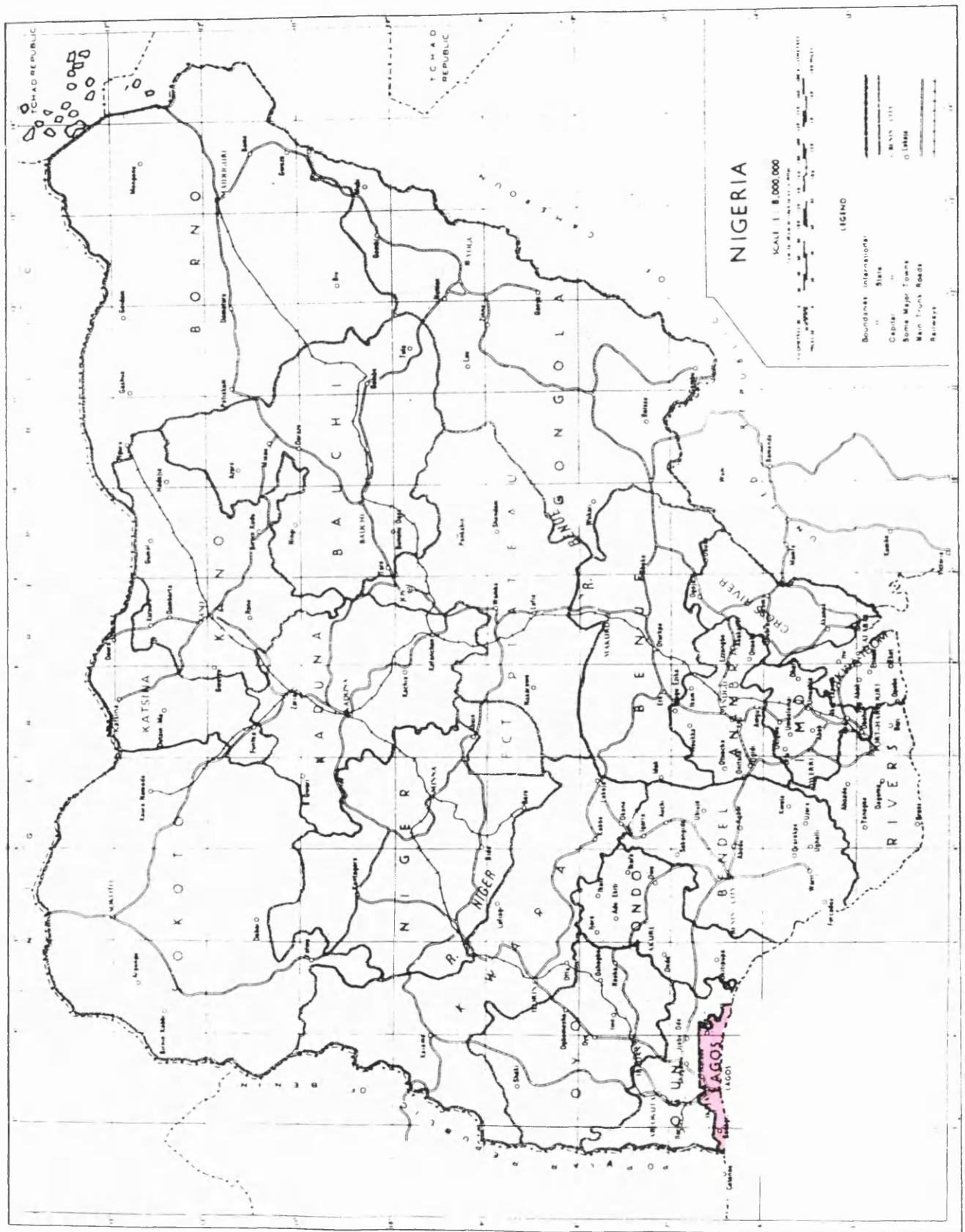
Amukoko is a swampy slum area of Lagos, which used to be the administrative capital of Nigeria. It is situated on the mainland and has a total population of about three million.

Amukoko has all the social and health-related problems of slum areas vis-a-vis housing, water, sanitation, unemployment and malnutrition. It is also a multi-ethnic community, comprising of people representing most of the states of Nigeria. It experiences a constant movement of population as families move in and out of the area as their monetary situation dictates.

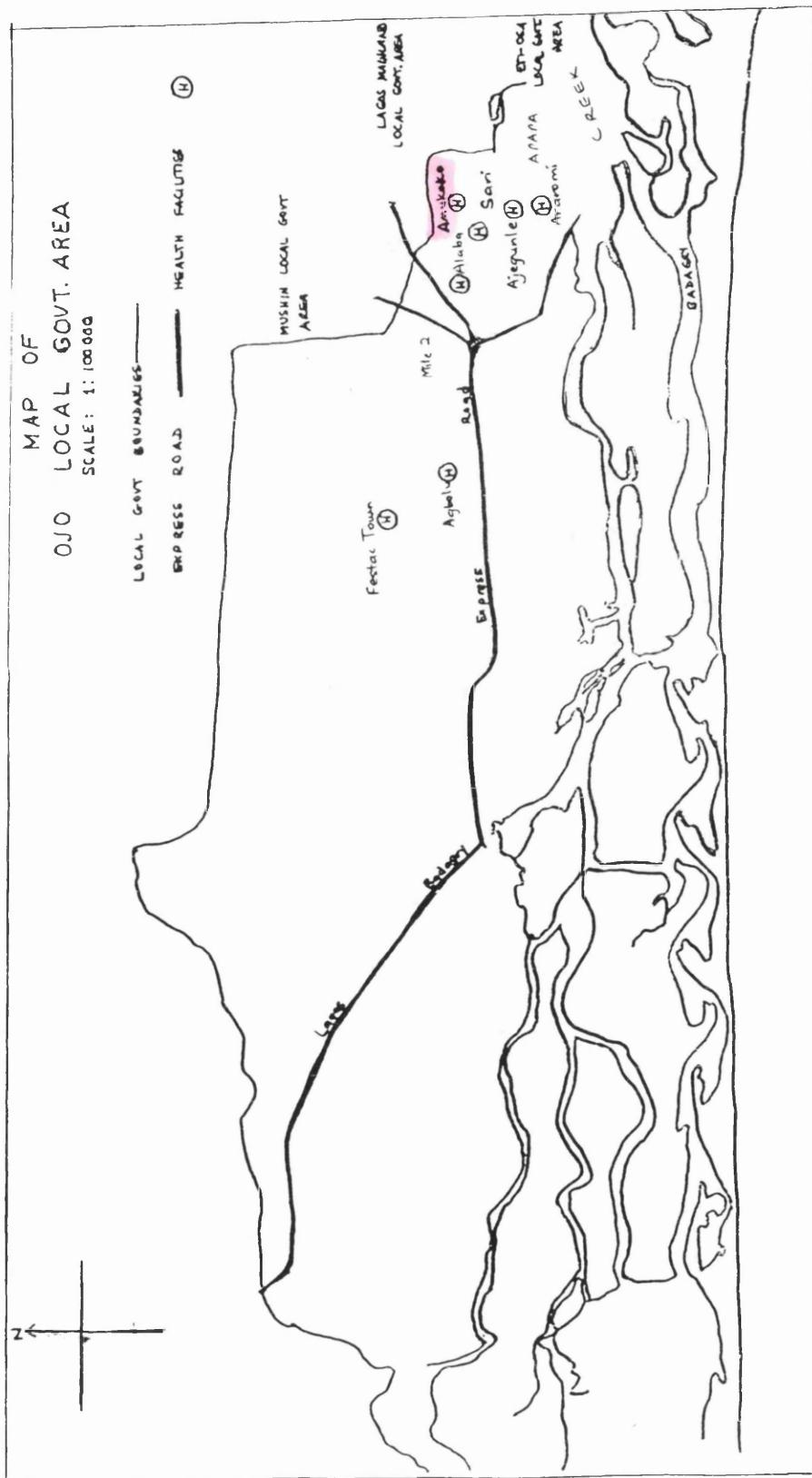
4.2.1 Housing

Housing in Amukoko is grossly inadequate and of very inferior construction in most cases. Usually, a family rents a room, but occasionally two families share a room. Each house has an average of twenty rooms and each room is approximately 9 ft. x 9 ft., housing an average of 8-10 people.

Map of Nigeria showing state in which the study was conducted



Map of Ojo Local Government area



4.2.2 Sanitation

There is no sewage system in the locality, nor is there any facility provided for refuse disposal. Most families use the 'bucket system' of sewage disposal - very few have pit latrines.

4.2.3 Water

Quite a number of residents purchase their drinking water from tankers which truck water from other parts of Lagos. If the roads become impassable for these tankers, people have to carry jerry cans from the main roads. Many compounds have wells of varying standards, but the water in them is not fit for human consumption because of seepage from the swampy land, which is mostly reclaimed land.

4.2.4 Social aspects

Unemployment is a major problem in many families. Income is very low and its effect is malnutrition both among children and parents.

4.3 The Study Site - St. Theresa's Primary Health

Care Centre - Amukoko

This is a community health care project established in 1983 by the Medical Missionaries of Mary with two main objectives:

- (1) Development of a community-based health care system by training of street health workers.
- (2) Promotion of self-reliance among the deprived people in the area, especially in relation to their health.

4.3.1 Reasons for choice

The study site was chosen because of its two main objectives stated above and also because it had a side laboratory for estimation of Hb, PCV, stool and urine examination. It also had a well-defined circular target area with a diameter of 2km. Its target population comprised of all the women, children aged less than 12 years and adult men living within the target area. In 1986, total population in the target area was 64,849, of whom 32,586 were children under the age of 12 years.

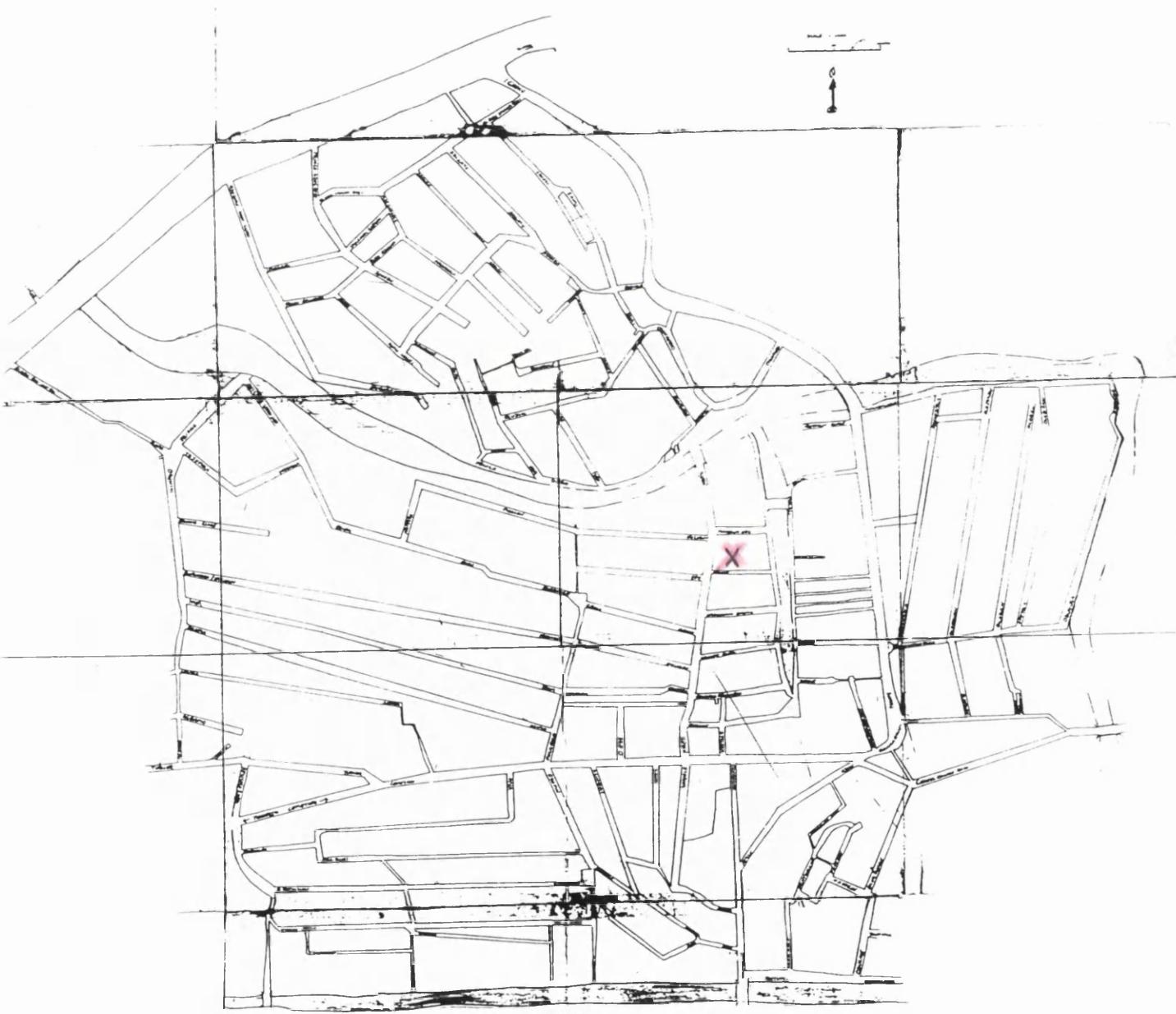
4.3.2 Community outreach programme

Street meetings were initially held with women on topics like child health, vaccinations and water. This was later changed to backyard meetings as a result of irregular attendance. This change afforded a group of women totalling 20-24 mothers the opportunity to learn and discuss in smaller groups.

St. Theresa's Primary Health Care Clinic,

Amukoko, Target Area Street Map

ST. THERESA'S PRIMARY
HEALTH CARE CLINIC
RECORDED
TARGET AREA STREET MAP



A Job Seekers Association was set up in the parish for the unemployed. A 'nutrition canteen' was also opened near the health centre where malnourished children or adults are referred with a meal voucher for a specified period of time, usually two weeks. Nutrition demonstration classes are held three times a week where mothers are taught about food values and also help to prepare and cook food for their children. Daily attendance at this clinic is about 30-50 mothers and children.

The clinic also gives staples (rice and beans) to approximately twenty families each week through the St. Vincent de Paul Society.

4.3.3 Health care available

There is a government antenatal clinic about 5km away from the clinic, Island Maternity, as well as the Lagos University Teaching Hospital, Idiaraba, Mushin, which have agreed to be hospitals of referral for the project clinic.

However, most of the people prefer to attend one of the numerous private hospitals and clinics if they can afford to buy medicines from the unlicensed 'chemist' shops and patent medicine sellers, or consult a native doctor or herbalist.

Chapter 5

METHODOLOGY

5.1 Type of Study

A descriptive cross-sectional study carried out between July and September, 1991.

5.2 Definition of Anaemia

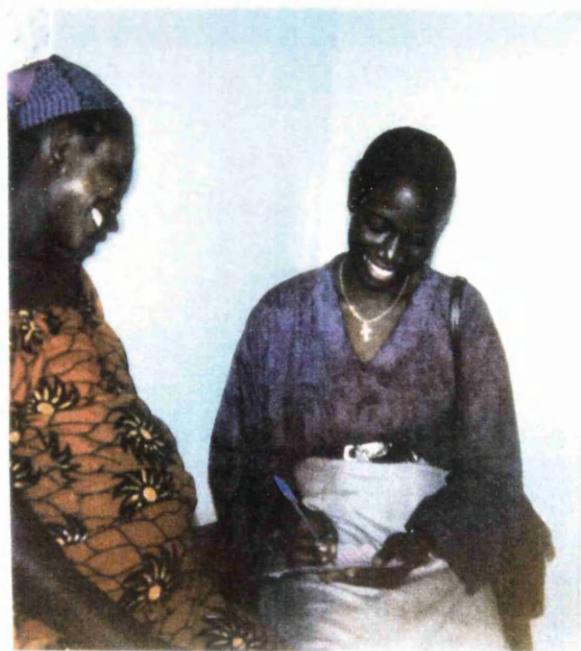
Anaemia in pregnancy is a condition in which the Hb concentration is less than 11g/dl.

5.3 Methods Used

- (1) Structured questionnaire consisting of forty-two both open-ended and fixed-choice questions.

Photograph 1

Administration of questionnaire to a pregnant woman



- (2) Anthropometric measurements - height, weight and mid-upper arm circumference.
- (3) Laboratory investigations - hemoglobin estimation, sickling test, blood film for malaria parasites and blood film report, stool for **ova** and parasites and urinanalysis for urine albumin.
- (4) Focus group discussions with women.

Photograph 2

A group of women involved in a focus group discussion in the community



- (5) Interview of a traditional healer/traditional birth attendant in the community using a pre-designed interview schedule.

5.4 Sources of Data

- (1) Pregnant women attending the antenatal clinic at St. Theresa's Primary Health Care Centre, Amukoko.
- (2) Women in the community.
- (3) Traditional healer/traditional birth attendant in the community.
- (4) Health workers at St. Theresa's Primary Health Care Centre, Amukoko, including the co-ordinator of the project, Sr. Patricia Hoey.

5.5 Review of Methods for Estimation of Hemoglobin

There are two main types of methods of determination of hemoglobin level. These are the visual and the colorimetric methods. Colorimetric methods give more accurate results than visual methods.

The main visual methods available are:

- (1) Talqvist hemoglobin chart. This is not recommended due to its error of 20-50%. It involves a direct visual comparison with lithographed colours.

(2) Sahli's method. This is a dilution visual colour match method which requires ten minutes' conversion time to acid hematin. Although it is quick, it is difficult to obtain accurate hemoglobin values because:

(a) Not all forms of hemoglobin can be changed into acid hematin.

(b) Colour changes when viewed visually are not very great and so some experience is required to obtain accurate results.

(c) Brown colour glass standard is not a true match against the acid hematin solution.

(3) Spencer hemoglobinometer. This involves chemical analysis of the blood sample within a capillary cell and them comparison with neutral grey wedge. Each analysis takes about 2-3 minutes. Although accurate results may be obtained, the capillary cells are expensive.

(4) Lovibond comparator. This is based on a system which involves conversion of hemoglobin into oxyhemoglobin and use of a comparator for matching. Although this is a quick and cheap method, its results may not be too accurate because the eye cannot detect small colour changes. Accurate pipettes are required which are costly to replace. However, it is said to be the most accurate of the visual colour comparison methods.

(5) M.R.C. Grey Wedge. This is a fixed dilution, visual colour matching technique involving the conversion of

hemoglobin into either oxyhemoglobin or cyanmethemoglobin. A comparator is then used for matching. Using oxyhemoglobin method it is both accurate and quick. However, it is not cheap, as fragile pipettes are required which are costly to replace. Cyanmethemoglobin methods require a minimum of five minutes conversion time.

(6) Oxyhemoglobin/Cyanmethemoglobin photometer measurement. This is based on a principle of light absorption by hemoglobin at a wavelength of 540mm by a very sensitive photocell. Its main disadvantage is the susceptibility of the photometers or absorptiometers to climate. This is a more accurate method because all the hemoglobin is converted to either oxyhemoglobin or cyanmethemoglobin.

(7) Automated systems. These are based on the cyanmethemoglobin method and utilise a fixed dilution method, a precision photometer and an automated print-out is obtained. These are considered to be most accurate of all methods and quick. However, they require sophisticated services and back-up and are best suited to centralized laboratories serving urban populations.

5.6 Choice of Method used to Diagnose Anaemia in this Study

The Hb estimation method was used.

5.7 Choice of Method for Hb Estimation

An attempt was made to use the cyanmethemoglobin method for the estimation. This was, however, unsuccessful due to failure to obtain an appropriate calibration curve and deionised water.

Hemoglobin estimation was done using the Lovibond comparator which was available in the side laboratory of the clinic where the study was conducted.

5.8 Other Laboratory Investigations Carried Out

Packed cell volume determination using the capillary method after centrifugation for five minutes at 12,000 rpm.

Sickling test was performed using sodium metabisulphite on all cases with hemoglobin less than 8g/dl.

Blood film for malaria parasites was performed after staining with Field's stain.

Blood film examination for red and white cell morphology was performed after staining with Leishman's

stain and examined together with the hematologist attached to the Federal Staff Hospital, 1004.

Urinalysis was performed using albustix strips.

Stool microscopy for ova and parasites was performed by examination of stool samples under the microscope.

Photograph 3

Examination of blood films for malaria parasite
and blood film picture



5.9 Population and Sample Selection

Inclusion criteria

- (1) Pregnant women attending the antenatal clinic at various stages of pregnancy
- (2) Informed verbal consent

Exclusion criteria

- (1) Hypertension
- (2) Multiple pregnancy

5.10 Sampling

(1) Needed a sample for hemoglobin estimation and gestational age assessment. Three hundred women were selected for this purpose by choosing every third pregnant woman attending the antenatal clinic.

(2) Needed a sample for administration of questionnaires and focus group discussions within the clinic. A total of 150 women were selected for this purpose by choosing every second woman from the sample already selected above.

Of the 150 women expected to be interviewed, only 144 questionnaires were fully completed. Six of the pregnant women did not keep to the appointments given to them.

The sample sizes were based on:

- (1) the number that would enable a distribution of hemoglobin to be shown; and
- (2) the number of women that I could interview within the given time for the study.

5.11 Data Collected

- (1) Personal data - name, ethnic group, present age, age at marriage and age at first conception, marital status, occupation, educational level and monthly income of the mother and her spouse.
- (2) Obstetric and gynaecological data - number of children, menstrual history, most recent contraceptive method used and any side-effects experienced, complications experienced in the last pregnancy, place and type of delivery, last menstrual period, number of antenatal clinic attendances, use of informal health sector, morbidity data in current pregnancy, treatment received and place of receiving such, history of compliance with hematinics and anti-malarials, history of use of mosquito bed nets and alternative methods of vector control.
- (3) Nutritional history - assessment of nutritional intake using a twenty-four hour dietary recall method and enquiring about specific food items known to have a high iron and folate content.

(4) Physical examination - weight, height, mid-upper arm circumference, physical examination for anaemia (e.g. the conjunctiva and tongue) and for oedema.

(5) Laboratory data - hemoglobin, packed cell volume (in some cases), blood film (thick and thin for malaria parasites and red cell morphology), urine for albumin.

(6) Qualitative data in the form of:

- (a) interview held with a traditional healer/traditional birth attendant in the community;
- (b) focus group discussions held with women in the clinic and in the community.

5.12 Sources of Bias

(1) Seasonal. The study was conducted during the rainy season. This led to an eleven percent reduction in the expected number of antenatal clinic attendances.

(2) Interviewee's perception of the interviewer.

(3) Response bias. Incorrect responses may be given to questions relating to income.

5.13 Equipment Used

- (1) Lovibond comparator and discs for hemoglobin estimation
- (2) Plastic TALC insertion tape for the measurement of the mid-upper arm circumference
- (3) Weighing scales
- (4) Hawksley centrifuge

5.14 Assessment of Nutritional Status

Four types of assessment were carried out:

- (1) Anthropometric measurements - height, weight and mid-upper arm circumference.
- (2) Clinical indicators - presence or absence of pallor by inspection of the conjunctivae, palms and tongue.
- (3) Biochemical indicators - hemoglobin and packed cell volume estimations.
- (4) Dietary intake - using a twenty-four hour dietary recall of specific food items known to have a high iron and folic acid content.

5.15 Clinical Examination

After obtaining the verbal consent of the women, a brief history was obtained and an estimation of the height was done by standing against a vertical metric scale. Next, the presence or absence of anaemia was determined by

inspection of the conjunctivae, palms and the tongue. The presence or absence of oedema and hepatosplenomegaly were also noted. The fundal height was then assessed and recorded. The lie and presentation were also determined and the foetal heart auscultated if fundal height was more than twenty-four weeks. The left mid-upper arm circumference was then determined with the left arm semi-flexed at 90° and measurements taken using the plastic TALC mid-upper arm circumference tape.

5.16 Procedure for obtaining Blood Sample

Blood samples for hemoglobin estimation and blood film examination for malaria parasites were obtained from a finger prick using the lancet by the laboratory technologist attached to the project.

Another sample of 2ml of venous blood was obtained from women attending the antenatal clinic by the investigator by minimal stasis from one of the veins in the antecubital fossa for packed cell volume and blood film report. This was put in haematology bottles containing EDTA and taken to another laboratory for analysis. All examinations were done within twenty-four hours of collection of blood sample.

5.17 Procedure for Collection of Stool Samples

Anaemic women who were attending the antenatal clinic for the first time and had not received any anthelminthic were requested to bring fresh stool samples with them to the next antenatal clinic visit, which was within a fortnight.

5.18 Procedure for Collection of Urine Samples

Fresh urine samples for urinalysis were collected from the pregnant women into clean bottles on arrival at the antenatal clinic for determination of albumin content.

5.19 Limitations of the Methods Used

5.19.1 Anthropometric measurements

Determination of the weight by the project staff would depend on the skill and expertise of the individual involved. There was a tendency for weights to be rounded off to the nearest whole number. Measurements were taken by different staff on different clinic days.

All the pregnant women were weighed with light clothes on and no adjustments were made for this.

5.19.2 Testing for anaemia

The hemoglobin concentration in pregnancy is an unsatisfactory index of the total hemoglobin mass because of its dependence upon the magnitude of the increase in plasma volume.

5.19.3 Dietary recall method

The twenty-four hour dietary recall method is often more frequently used to characterize diet because of its greater accuracy than other techniques dependent on longer memory. It may, however, not represent the typical diet. It is also a function of biological variability, as people eat differently on different days. Interviewees may also alter their reported dietary intakes to conform to their perception of complying with the investigator.

Validation of responses obtained is by:

- (1) Comparing the subject's history with that gathered from another person, e.g. spouse.
- (2) Visiting the subject at home during meal times impromptu.

5.19.4 Focus group discussions

In some focus group discussions, it is likely that some vocal participants would dominate the discussion, while others remain passive, resulting in response bias. The

group's perception of the individual leading the discussion may also affect the responses obtained.

5.20 Ethics

Permission to conduct the study was sought from the coordinator of the project and granted (please see appendix). Verbal consent of the women included in the study was also obtained.

5.21 Pilot Study

A pilot study was conducted during the first week of the study and the questionnaire was administered to five women. The question on number of wives was found to be sensitive and dropped.

5.22 Data Analysis

Epi-Info 5 computer package was used in the analysis of the data and significance was calculated using Yates corrected χ^2 test and t tests. The comparison of mean hemoglobin values was also used in analysis.

Chapter 6

RESULTS

6.1 General Characteristics of the Study Sub-Population

6.1.1 Age distribution of women now

Table 1 Age Distribution of Pregnant Women Interviewed

Age in years	No.	%
15 - 19	6	4.2
20 - 24	44	30.6
25 - 29	53	36.8
30 - 34	31	21.5
35 - 40	10	6.9
TOTAL	144	100.0

Mean age = 26.35 ± 4.7 years

6.1.2 Age at marriage

Table 2 Age at Marriage

Age in years	No.	%
12 - 15	17	11.9
16 - 19	68	47.9
20 - 24	52	36.7
25 - 28	5	3.5
TOTAL	142	100.0

Mean age at marriage = 18.89 ± 2.91 years

Two women could not remember their ages at marriage. In the National Fertility Survey (1986), the mean age at marriage was 19.5 years.

6.1.3 Age at first conception

Table 3 Age at First Conception

Age in years	No.	%
12 - 18	44	30.6
19 - 23	86	59.7
24 - 29	14	9.7
TOTAL	144	100.0

Mean age at first conception = 19.99 ± 2.91 years

A total of 30.6% of women interviewed had their first conception before 18 years of age. This is suggestive of the fact that they became pregnant while still growing.

6.1.4 Marital Status

Table 4 Marital Status

Marital Status	Number	%
Married	140	97.2
Single	2	1.4
Yet to marry	2	1.4
TOTAL	144	100.0

A total of 97.2% of the women interviewed were married. The two women who were yet to marry were waiting to deliver their babies before having the marriage ceremony.

6.1.5 Educational Level Attained

Table 5 Educational Levels Attained

Mother's educational level	No.	%	Spouse's educational level	No.	%
No formal education	64	44.4	No formal education	26	18.1
Primary education	51	35.4	Primary education	55	38.1
Secondary education	23	16.0	Secondary education	44	30.5
Post-secondary education	6	4.2	Post-secondary education, incl. technical educ.	9	6.3
TOTAL	144	100.0	University	1	0.7
			Unknown	5	3.5
			Unmarried	4	2.8
			TOTAL	144	100.0

A total of 44.4% of the pregnant women interviewed had no formal education, compared with 18.1% of their spouses. This is suggestive of some gender differences. A total of 38.1% of the spouses of the women interviewed had at least primary education, compared with 35.4% among the women. In Nigeria, the literacy rate among men is 55%, compared with 31% among women (UNICEF, 1991).

6.1.6 Occupation

Table 6 Occupation

Mother's occupation	No.	%	Spouse's occupation	No.	%
Full-time housewife	34	23.6	Unemployed	2	1.4
Trading	82	56.9	Small business	106	73.6
Tailor	18	12.5	Government official	17	11.8
Government official	8	5.6	Company employee	9	6.2
Company employee	1	0.7	Engineer	2	1.4
Herbalist	1	0.7	Islamic priest	4	2.8
TOTAL	144	100.0	Unmarried	4	2.8
			TOTAL	144	100.0

The most common occupation among the women interviewed was trading (56.9%). This included the hawking of food items and clothing. A total of 23.6% of the women were not in any formal employment. A total of 73.6% of the spouses of the women interviewed were engaged in some small business which included skilled jobs like welding, farming, goldsmith, tailor, radio repairer, drum maker and herbalist.

6.1.7 Income

Table 7 Income per Month

Mother's income/month	No.	%	Spouse's income/month	No.	%
No income	51	35.4	No income	4	2.8
< N200	72	50.0	Unmarried	4	2.8
N201 - N499	17	11.9	< N200	4	2.8
N500 - N599	4	2.7	N201 - N499	12	8.3
TOTAL	144	100.0	N501 - N599	3	2.0
			Unknown	117	81.3
			TOTAL	144	100.0

A comparison of the tables on occupation and income shows some disparity. Although 23.6% of women were not in any formal employment, 35.4% of them said that they had no income. This may be related to the fact that many of them may want to conceal their income, thinking that the information would be used for other purposes apart from the research. Quite a number of the women who were traders also found it difficult to estimate their income per month

because they said that they spent part of it for their upkeep during the month, and also on their children.

A total of 81.3% of their spouses' income was unknown. This may be a reflection of the low status of women, in which case women were not expected to ask their husbands how much they earned, or, as one woman put it, "some men will never tell their wives the truth about their income", they either inflate it or underestimate it.

The number of men who had no income is also more than expected, because two of the men had just been relieved of their posts in their offices and consequently had no income.

6.1.8 Type of contraceptive use

Table 8 Type of Contraceptive Use

Contraceptive Use and Type	Number	%
No	131	91.0
Yes:		
Intra-uterine device	2	1.4
Oral contraceptive	3	2.1
Injectable contraceptive	2	1.4
Rhythm method	2	1.4
Unspecified	4	2.8
TOTAL	144	100.0

Only 9% (n=13) of the women interviewed gave a history of contraceptive use prior to the present conception. This low contraceptive prevalence is a reflection of the low contraceptive prevalence rate in the nation, figures for

which are 6% (UNICEF, 1991, p.14). The number of women with a history of contraceptive use is too small to allow any meaningful statistical comparison. The low contraceptive prevalence rate may also be due to the fact that the study was conducted in a health clinic affiliated with the Catholic Church and the only form of contraception encouraged is the rhythm or Billings method. Another reason could be side-effects of contraception.

6.1.9 Side-effects of contraceptive use

One woman who had previously used the I.U.D. observed that her periods were heavier than before and had to remove it for this reason. The other woman who used it too complained of abdominal cramps.

One of the women on the injectable contraceptive experienced scanty periods. Another woman complained of getting pregnant on the pill.

6.1.10 Place of delivery in last pregnancy

Table 9 Place of Delivery in Last Pregnancy

Place of Delivery	No.	%
Hospital	66	55.5
Health centre/maternity home	5	4.2
Own home	18	15.1
Herbalist	26	21.9
Church	4	3.3
TOTAL	119	100.0

A total of 59.7% of the last deliveries occurred within the formal health sector and 21.9% occurred in the informal health sector.

6.1.11 Use of informal health services in current pregnancy

Table 10 Use of Informal Health Services in Current Pregnancy

Antenatal Care in Pregnancy	No.	%
Herbalist	24	85.7
Church	4	14.3
TOTAL	28	100.0

Only 28 (19.4%) of the women interviewed admitted to the use of the informal health sector. Of these, 85.7% consulted the herbalist and were given native herbs. A total of 4 (2.8%) of the women were also examined by trained midwives in the church and given some water in which special prayers have been made.

6.2 Prevalence of Anaemia

6.2.1 Distribution of anaemic women by trimesters

Table 11 Distribution of Anaemic Women by Trimesters

Age of pregnancy	Total no.	No. with Hb<11g/dl	% with Hb<11g/dl
1st trimester	3	3 (2.7%)	100.0
2nd trimester	61	51 (46.4%)	83.6
3rd trimester	80	56 (50.9%)	70.0
TOTAL	144	110 (100%)	

6.2.2 Distribution of severely anaemic women by trimesters

Table 12 Distribution of Severe Anaemia by Trimesters

Age of pregnancy	Total no. of patients	Number with Hb <8g/dl
1st trimester	3	0 (0.0%)
2nd trimester	61	8 (72.7%)
3rd trimester	80	3 (27.3%)
TOTAL	144	11 (100%)

Table (12) above: 50.9% (n=56) of the women with anaemia were in their third trimester of pregnancy. However, of these women only three were severely anaemic (Hb <8g/dl). The high prevalence of anaemia in pregnancy in the third trimester may be related to late registration at antenatal clinics.

All the pregnant women in the 1st trimester were found to be anaemic. This may be taken as an indirect indicator of the hemoglobin status in the non-pregnant state. A total of 83.6% of the women in the 2nd trimester of pregnancy were anaemic and 70% of the women in the 3rd trimester of pregnancy were anaemic.

The mean fundal height at first antenatal clinic attendance was 23.4 ± 5.47 , indicating that most women in this community registered for antenatal care in the 2nd trimester of pregnancy and in this study population a very high proportion of them (83.6%) were found to be anaemic. The mean hemoglobin at the first antenatal clinic was $9.58 \pm 1.32\text{g/dl}$. Registration for antenatal clinic in the

2nd trimester is not an unusual finding in Nigeria. Oluboyede et al (1976) made the same observation among a group of women in Igbo-Ora.

Osuhor et al (1982) also observed that the distribution of first antenatal attendances in the Malumfashi District in northern Nigeria was 15.3% in the 1st trimester, 63.2% in the 2nd trimester and 21.5% in the 3rd trimester. Early pregnancy has been identified as a critical period for malaria control. In a study in Kenya, Brabin et al (1990) found that a missed clinic attendance resulted in a two-fold increase in the incidence of malarial infection.

6.3 Association between Anaemia and Maternal Biosocial Characteristics

6.3.1. Maternal age, parity, education and hemoglobin

a. Primigravidae aged ≤18 years

Table 13 Maternal Parity, Education and Hemoglobin Levels of Primiparae aged ≤18 years

Maternal age (years)	Parity	Hemoglobin (g/dl)	Educational level attained
15	Primip.	8.0	Primary
18	Primip.	10.0	None
18	Primip.	8.5	None
18	Primip.	8.0	None
18	Primip.	11.5	None

Pregnant women aged ≤18 years constituted 3.5% of the study population. A total of 80% (n=4) had hemoglobin levels less than 11g/dl, 40% (n=2) had hemoglobin levels less than 8g/dl. They were all primiparae and 80% (n=4) had no formal education. Educated girls are known to delay marriage and childbearing, thereby avoiding pregnancies under 18 years of age with the known higher risks of infant and maternal death.

b. Multigravidae aged ≥35 years

Table 14 Maternal Parity, Education, Antenatal Clinic Attendance and Hemoglobin Levels of Multigravidae aged ≥35 Years

Maternal Age/yrs.	Parity	Educat. Level	Hemoglobin (g/dl)	Fundal Height	Contraceptive Used	ANC*
40	4	None	11.0	30	Oral	1/6
35	5	Primary	9.0	24	IUCD	5/4
35	4	None	10.0	36	None	7/9
35	3	None	9.0	24	IUCD	4/4
35	6	Primary	9.0	16	None	1/2
35	3	Primary	9.0	28	None	1/5
39	5	None	10.0	36	None	8/9
35	6	Primary	9.0	18	None	2/2
35	3	None	11.0	16	None	2/2
36	4	Primary	11.0	28	None	2/5

* Observed/expected attendance

Pregnant women aged ≥35 years constituted 7% of the study population. A total of 70% (n=7) of these were anaemic. None of them had severe anaemia (Hb<8g/dl). All of them had experienced at least three or more previous births and

in fact 50% (n=5) were grandmultiparae - had four children or more.

A total of 20% (n=2) of the mothers had six previous births and were not on any contraceptive methods prior to present contraception. Depletion of maternal stores from repeated pregnancies at short intervals is a well-recognized phenomenon (Gwatkin, 1982).

The grandmultipara is also more likely to be overconfident, resulting in late registration for antenatal care or infrequent antenatal clinic visits. In this group of women, 30% had less than 50% of the expected number of antenatal clinic visits.

Women with a high parity are also at a risk of post-partum haemorrhage due to interference with the uterine haemostatic mechanism in the third stage of labour.

A total of 50% (n=5) of these women had no formal education. Educated women are more likely to have access to information which would affect many important decisions regarding their health, as well as the health of their children. These decisions will affect the use of preventive and promotive health care facilities, e.g. antenatal care, growth monitoring and the interval between births (UNICEF, 1983, p.57).

The findings of very high illiteracy rates among the youngest and the most parous are consistent with those of Harrison (1985).

6.3.3 Socio-economic status and Hb

Table 15 Maternal Socio-Economic Status and Hemoglobin

Mother's Income	Mean Hb	S.D.	95% Confidence Interval	No. of Observations
No income	9.867	1.529	9.093 - 10.641	15
N200 - N599	9.729	1.063	9.303 - 10.155	24
Difference	0.138			

p = 0.741 (Student's T Test)

The mother's income per month was used as a measure of the socio-economic status of the mother in this study because the spouse's income was unknown to 81.3% of the pregnant women interviewed.

A comparison of the mean hemoglobin of mothers who had no income and those who had some income did not show any statistically significant difference. This may be due to the fact that some of the women interviewed, especially traders found it difficult to estimate accurately their income per month for two main reasons: (1) they spent part of the money as they earned it for their daily up-keep; and (2) some of their income was used in purchasing items for sale. It is also possible that some of the women classified as not having any income received some money regularly from their spouses.

6.3.4 Maternal educational level and Hb

Table 16 Maternal Educational Level and Hemoglobin

Educational level attained	Mean Hb	S.D.	No. of observations
No formal education	9.623	1.092	64
Literate	10.081	1.379	80
Difference	-0.458		

p = 0.02 (T test)

There was some statistically significant difference in the mean Hb levels of pregnant women who had no formal education and those who had some education. Maternal literacy is known to be associated with earlier and more effective use of health services and better hygienic practices (Chen, 1986). The mother's level of education and access to information is also likely to affect many important decisions about her health and the health of other members of her family (UNICEF, 1983, p.57).

6.3.5 Primary vs. post-primary education and Hb

A comparison of the mean Hb values of mothers who had primary with those who had post-primary education did not show any statistically significant difference.

Table 17 Mean Hemoglobin Values of Mothers with Primary and Post-Primary Education

Educational level attained	Mean Hb	S.D.	No. of observations
Primary education	10.362	1.679	29
Post-primary education	9.922	1.163	51
Difference	0.441		

p = 0.167 (T test)

6.3.6 Antenatal clinic attendance and Hb

Table 18 Antenatal Clinic Attendance and Hemoglobin

Antenatal Clinic Attendance	Mean Hb	S.D.	No. of Observations
ANC attendance=1	9.578	1.319	64
ANC attendance>1	10.117	1.195	80
Difference	-0.539		144

p = 0.01 (T test)

There was a statistically significant difference in the mean Hb values of women who had only one antenatal clinic attendance compared with those who had more than one clinic attendance.

On further analysis, the mean Hb values for each antenatal clinic attendance are as stated below:

ANC Attendance	Number	Mean Hb	S.D.	95% C.I.
1	64	9.578	1.319	9.258 - 9.901
2	17	10.176	1.074	9.176 - 11.18
3	14	10.321	1.170	9.710 - 10.93
4	16	9.969	1.118	9.390 - 10.547
5	6	9.167	0.516	8.755 - 9.5786
6	11	10.036	1.430	9.190 - 10.88
7	8	10.625	1.408	9.650 - 11.60
8	6	10.000	0.894	9.285 - 10.715
9	2	11.000	2.828	7.061 - 14.96
TOTAL	144			

There was no great difference in the mean Hb values observed at each antenatal clinic attendance. The mean Hb values for the 4th and 5th antenatal clinic attendance were particularly low. A possible reason for this could be that these women started off pregnancy with low Hb values, fell

ill more frequently in pregnancy and so made more than the expected number of antenatal clinic visits. This may also be a reflection of the dilutional anaemia which occurs in normal pregnancy in the second trimester. Another possible suggestion is impaired iron absorption or poor nutrition. Since stool samples were not analysed for iron content, it is possible that the pregnant women were not taking their tablets as required.

6.3.7 Previous infant deaths and Hb

Table 19 Previous Infant Deaths and Hemoglobin

No. of Infant Deaths	Mean Hb	S.D.	95% Confidence Interval	No. of Observations
1	9.696	1.105	9.246 - 10.146	23
2	9.893	1.559	9.473 - 10.31	14
3	10.000	0.000	10.000	2
TOTAL				39

p = 0.542 (T test)

Although there was no statistically significant difference in the mean Hb values of women who had experienced between one and three previous infant deaths, women who had experienced three infant deaths had higher mean Hb values compared to the other two categories of women. This may be related to the fact that they were more likely to get worried and to utilise health services more, thereby receiving haematinic tablets frequently.

6.3.8 Complications in the last pregnancy and Hb

Table 20 Complications in the Last Pregnancy and Hemoglobin

Complication	Hb < 11g/dl	Hb ≥ 11g/dl
Antepartum haemorrhage	-	1
Jaundice	1	-
Postpartum haemorrhage	3	2
Premature delivery	2	-
Anaemia	5	1
Abortion	6	1
Back pain	2	-
TOTAL	19	5

A total of 24 (20%) of the 119 women who had been pregnant before experienced some complication in their last pregnancy. A total of 79% (n=19) of the women who experienced a complication in their last pregnancy are anaemic in the current pregnancy.

Further statistical analysis could not be done on these figures due to the small numbers involved.

6.3.9 Place of delivery in last pregnancy

Table 21 Place of Delivery in Last Pregnancy and Hemoglobin

Place of delivery	Hb < 11g/dl	Hb ≥ 11g/dl	Total
Herbalist	29	2	31
Hospital	49	19	68
TOTAL	78	21	99

Yate's corrected $\chi^2 = 3.35$ ($p = 0.067$)
 O.R. = 4.65 ($0.92 < \text{O.R.} < 31.52$)

This table shows that pregnant women who had their last delivery at the herbalist were 4.65 times more likely to have a Hb < 11g/dl compared with those who had hospital deliveries. This was not statistically significant. A possible explanation for this is the fact that there were no facilities for checking the hemoglobin at the herbalist.

6.3.10 Birth interval and Hb

Table 22 Birth Interval and Hemoglobin

Birth Interval	Hb < 11g/dl	Hb ≥ 11g/dl	Total
0 - 2 years	39	15	54
> 2 years	43	13	56
TOTAL	82	28	110

Yate's corrected $\chi^2 = 0.11$ ($p = 0.74$)
O.R. = 0.79 ($0.31 < \text{O.R.} < 2.02$)

This table shows that women who had children at an interval less than two years were only 0.79 times more likely to be anaemic compared with those who had a birth interval more than two years. This figure is much lower than expected.

6.4 Laboratory Investigations and Dietary History

6.4.1 Hemoglobin distribution of 300 pregnant women attending the antenatal clinic

Table 23 Hemoglobin Distribution of 300 Pregnant Women attending the Antenatal Clinic

Hemoglobin (g/dl)	No.	%
6 - 6.9	5	1.67
7 - 7.9	19	6.33
8 - 8.9	27	9.00
9 - 9.9	66	22.00
10 -10.9	88	29.33
11 -11.9	52	17.33
12 -12.9	34	11.34
13 -13.9	9	3.00
TOTAL	300	100.00

A total of 8% of these women had severe anaemia (Hb<8g/dl) and 68.33% had Hb values <11g/dl. A comparison with other studies is as shown below:

Comparative Incidence of Anaemia in Pregnancy

% Incidence below 11g/dl

Chukudebelu and Obi Enugu, Nigeria 33.7
(1979)

Jackson and Latham* Liberia, West Africa (1982) 78.0

% Incidence below 8g/dl

Chukudebelu and Obi Enugu, Nigeria 1.1
(1979)

* 3rd trimester women only

The prevalence of anaemia in this study is much higher than those obtained in a study carried out in Enugu in 1979. The difference may be due to the effect of the economic recession. The low incidence in the Enugu study was attributed to the high rate of self-medication prior to initial booking at the antenatal clinic, coupled with widespread drug peddling. Fresh food is also generally cheaper and more readily available in a provincial town like Enugu compared with a capital town like Lagos.

6.4.2 Blood Film Appearance

The results of blood film examinations carried out on 48 blood samples obtained are as shown below:

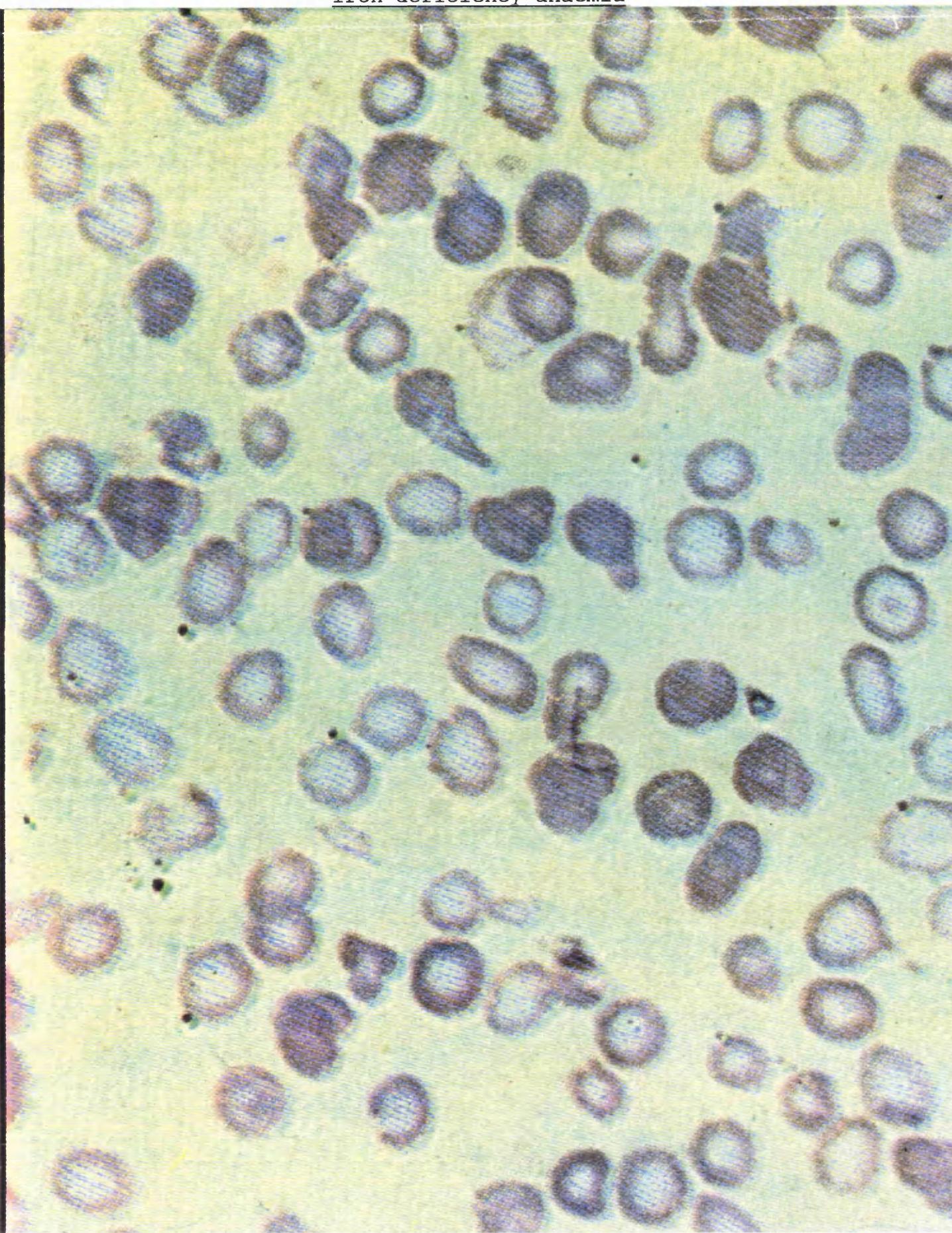
Table 24 Blood Film Appearance

Film Appearance	PCV≤30	PCV>30
1. Hypochromia and microcytes	3	1
2. Hypersegmented neutrophils and macrocytes	3	2
3. Hypochromia, anisocytosis and hypersegmented neutrophils	4	2
4. Normochromic normocytic	13	14
5. Macrocytes, hypersegmented neutrophils and malaria parasites	2	0
6. Basophilic stippling and malaria parasites	1	-
7. Normochromic normocytic and malaria parasites	1	1
8. Hypochromia, anisocytosis and malaria parasites	1	-
TOTAL	28	20

There were no target or sickle cells seen in the blood film examinations done.

Photograph 4

Plate showing the blood film appearance in
iron-deficiency anaemia



hypersegmented neutrophils and anaemia (Chanarin, 1964; Letsky, 1976). It is also known that the presence of iron deficiency can mask the development of megaloblastic changes in the blood film.

Ogunbode and Oluboyede (1976) observed that changes towards a western-style diet including eggs and wheat have led to a rapid increase of nutritional anaemia in pregnancy in some communities where it was previously thought to be rare. Nutritional deficiency is also common in communities whose diets are low in bioavailable iron, especially where the staples are rice, wheat, maize and sorghum (Fleming, 1982).

6.4.3 Stool examination

Ova of Ascaris was detectable in only three of the thirteen stool samples examined.

Blood loss due to hookworm infection is a very unlikely cause of anemia in this community because this is not a farming community, all the women wear shoes to the clinic and hookworm ova were not detected in any of the stool samples examined.

6.4.4 Dietary history

Table showing the proportion of pregnant women who ate food items yesterday.

Table 25 Proportion of Pregnant Women who Ate Food Items Yesterday

Food Item	Frequency of Consumption Yesterday
Dark green vegetables	64.6%
Sweet potatoes	2.8%
Yams	65.3%
Bananas	37.5%
Nuts	38.9%
Liver	18.8%
Meat	80.6%
Egg yolk	56.9%
Fish	70.1%

Over 60% of the women interviewed had eaten yams, meat and fish the previous day. The new yam becomes available in August and is usually very expensive at the time the study was conducted. Meat and fish are also very expensive in the area and most of the women had included these in vegetable soups which they prepared.

Over 50% of the pregnant women had eaten egg yolk and dark green vegetables the previous day. Egg yolk is known to inhibit the absorption of non-haem iron. Although green vegetables were eaten in large quantities, they are usually boiled for long periods of time in soups which are reheated each day until finished (Fleming, 1968).

A seasonal variation in the incidence of anaemia had been observed in Ibadan (Fleming, 1970) which could not be

explained by any change in frequency at which the women became pregnant. This was attributed to food shortages which occurred in the middle of the dry season to the middle of the wet season, especially with regard to the new yam crop (a very good source of folic acid).

Conclusive remarks regarding the aetiology of anaemia in pregnancy in this population can only be made after bone marrow aspirates have been done. However, I would like to suggest a multifactorial aetiology with contributory factors being malarial infection, iron and folic acid deficiency.

6.5 Use of iron, folic acid and antimalarial tablets

Table 26 Use of Iron, Folic Acid and
Anti-Malarial Tablets

Use of tablets	Number	%
Yes	79	98.75
No	1	1.25
TOTAL	80	100.00

A total of 98.75% (n=79) of pregnant women attending the antenatal clinic for the second or more visits said that they were taking their tablets as prescribed. Their compliance was checked by looking at the plastic dispensing packets and the bottle used for this purpose. The only woman who did not take her tablets as prescribed had to

visit her sick mother at home for two weeks and so she missed her clinic appointment. None of the women taking the tablets reported any side-effects.

Brabin (1989) observed that use of small plastic bottles and adequate explanation at the beginning of a malaria prophylaxis regime, together with careful supervision of tablet distribution, were important components for achieving good compliance.

Due to the small number of non-compliance, further statistical analysis could not be done on this piece of information.

6.6 Vector Control

6.6.1 Use of bed nets

Table 27 Use of Mosquito Bed Nets

Use of mosquito bed nets	Number	%
Yes	9	6.3
No	135	93.7
TOTAL	144	100.0

Only 6.3% (n=9) of the pregnant women interviewed made use of mosquito bed nets. None of the nets were treated with Dieldrin.

6.6.2 Alternative methods of vector control

Table 28 Alternative Methods of Vector Control

Alternative method	Number	%
Window netting	45	31.3
Window and door netting	30	20.8
Window and door netting + insecticide	22	15.3
Insecticide only	25	17.4
Window netting + insecticide	14	9.7
Door netting	3	2.1
No need (living upstairs)	2	1.4
Kerosine	1	0.7
White cloth	1	0.7
Window netting and kerosine	1	0.7
TOTAL	144	100.0

A total of 1.4% (n=2) of respondents did not use any form of vector control because they were living upstairs. That 98.6% of respondents used at least one method of vector control is an indication that mosquitoes were a menace in this area, especially during the rainy season.

6.7 Anthropometric measurements

6.7.1 Weight

Table 29 Weight Distribution of Pregnant Women Interviewed

Weight (kg)	No.	%
39 - 45	7	4.8
46 - 50	11	7.8
51 - 55	31	21.5
56 - 60	45	31.2
61 - 65	15	10.4
66 - 70	16	11.1
71 - 75	8	5.5
76 - 80	3	2.1
81 - 85	2	1.4
86 - 89	3	2.1
Unknown	3	2.1
TOTAL	144	100.0

Mean weight = 58.62 ± 11.9kg

It is difficult to interpret these weight measurements, as the pregnant women attended the antenatal clinics at different stages of pregnancy. The pre-pregnancy weights of these women were also not known and so the weight gain in pregnancy cannot be computed.

6.7.2 Height

Table 30 Height Distribution of Pregnant Women Interviewed

Height (cm)	No.	%
≤ 149	47	32.6
150 - 154	43	29.9
155 - 159	30	20.8
≥ 160	24	16.7
TOTAL	144	100.0

Mean height = 152.24 ± 6.75cm

A total of 32.6% of the women interviewed had heights less than 149cm.

6.7.3 Mid-upper arm circumference

Table 31 Mid-Upper Arm Circumference Distribution of Pregnant Women Interviewed

M.U.A.C. (mm)	No.	%
202 - 220	11	7.6
221 - 240	50	34.7
241 - 260	36	25.0
261 - 280	32	22.2
281 - 300	6	4.2
301 - 320	5	3.5
321 - 340	3	2.1
341 - 358	1	0.7
TOTAL	144	100.0

Mean M.U.A.C. = 251.94 ± 26.27mm (range 202 - 358)

Chapter 7

QUALITATIVE DATA

7.1 Focus Group Discussion I

This was held with a group of ten mothers attending the antenatal clinic for the first time on 19th July, 1991. These women were in various stages of pregnancy and of different parities. The discussion was in the vernacular and later translated to English to ensure that all mothers present could benefit from it. The discussions were tape-recorded and later transcribed.

The responses obtained to the questions are as stated below:

(1) Q: How do you recognize someone who doesn't have enough blood?

A: "Their eyes and hands will be white."

A: "They will always feel weak."

A: "They will complain of excessive tiredness."

A: "They will complain of no energy."

A: "They will sleep a lot."

(2) Q: What do you think frequently causes this?

A: "Pregnancy."

(3) Q: Who else is likely to suffer from it?

A: "Non-pregnant women, because they lose blood every month."

A: "Anybody doing strenuous work."

(4) Q: What should be done for an individual who does not have enough blood?

A: "Take them to the hospital."

(5) Q: What are the causes of not having enough blood?

A: "Not eating good food."

A: "Heavy menstrual loss."

(6) Q: How can this be prevented?

A: "Eating good food."

A: "Regular use of tonics."

A: "Regular attendance at the antenatal clinic."

Comments

It would seem that these women had some knowledge of the identification, causes and ways of prevention of anaemia.

Their response to the question "What should be done for an individual who does not have enough blood?" may have been biased by the fact that they were in a clinic setting.

The fairly satisfactory knowledge of the women on the identification and treatment of anaemia may be taken as an

index of the successful community outreach component of the project in which this study was conducted.

7.2 Focus Group Discussion II

This was held with a group of ten mothers in the community on 28th August, 1991.

Responses obtained to the questions asked are as follows:

(1) Q: How do you recognize someone who does not have enough blood?

A: "There will be complaints of dizziness or fainting attacks."

A: "They will be white."

A: "They will have a feeling of pins and needles in their feet."

A: "They will lose weight."

A: "They will always be tired."

A: "They will have swollen feet."

(2) Q: What frequently causes this?

A: "Fever."

A: "Worms."

A: "Poor nutrition."

(3) Q: Who is likely to suffer from this?

A: "Pregnant women."

A: "Unemployed people."

A: "Growing children."

(4) Q: What should be done for people who don't have enough blood?

A: "Take them to the hospital."

A: "Buy tonics from the chemist."

A: "Take them to the herbalist."

A: "You see this baby that I'm holding in my hands today - he suffered from inadequate blood a few weeks ago. I took him to the herbalist and after preparing the herbs as advised and administering them, he has improved a lot, so herbs work too."

A: "Use both tablets from the hospital and herbs."

(5) Q: How can this be prevented?

A: "Good nutrition - eggs, liver, beans, meat, vegetables, fish, crayfish, palm oil, biscuit bone."

A: "Use of tonics."

7.3 Interview Held with a Traditional Birth Attendant

Introduction

Elderly man in his '60's sent on a two-week training course by the Lagos State Health Management Board on modern obstetrics. On completion of the course, he was given a certificate and some equipment - fetal and adult stethoscopes, cord clamps and a pair of scissors.

His clientele comprises of infertile women, pregnant women and children.

Q: When do you advise pregnant women to register?

A: At two-three months. Those who have experienced previous miscarriages before must register by two months.

Q: What do you do when they come to see you?

A: I examine them to assess the stage of their pregnancy, check if they have enough blood using a special paper given to me and then give them the 'drugs' to take, as well as advice.

Q: Which drugs do you normally give them?

A: Some native concoction for prevention of fever, dysentery, 'blood tonics' and protection against the 'elders' (witches are referred to as 'elders'). The tonics are to be taken weekly.

Q: What else do you do for them?

A: I give them advice on rest and tell them to buy worm expeller.

Q: How frequently do you see your patients?

A: It depends on individuals.

Q: How frequently do they take their drugs?

A: This also depends on individuals. If I suspect that they will not take the drugs because some of them are 'bitter', I insist that they come here every morning before 6am and I administer the drug to them.

Q: What do you think are the common causes of insufficient blood?

A: Witchcraft, lack of sleep, excessive work, malaria, worms.

Q: How do you arrive at a diagnosis of the problem your patient has?

A: By a combination of 'incantations' and 'examination'.

Q: How do you treat cases of 'sickle cell disease'?

A: By using a combination of native herbs and soaps.

Q: Have you ever seen any case of AIDS.

A: No.

Q: What are the common obstetric problems you have encountered?

A: Heat in the abdomen, bleeding in pregnancy, cough, constipation.

Q: How would you manage a pregnant woman who had bleeding in pregnancy?

A: By reciting some incantation and dropping something into the blood.

Observation

Each pregnant woman attending the clinic has an antenatal card on which appointment days and monthly fees are recorded. There is also a standard treatment for everybody.

Comment

A survey of 150 traditional birth attendants living in a peri-urban slum area of Ibadan (Sogunro) in 1986 suggested that traditional birth attendants were rendering some useful service and also identified certain areas in their practice in which introduction of simple methods of aseptic techniques, changes in nutritional practices and increased knowledge on the benefits of immunisation could improve the pregnancy outcome for mothers and infants living in traditional societies in Nigeria.

Traditional birth attendants are well respected in their communities and have performed important roles in their societies. Some are very willing to accept and integrate new ideas about health and the treatment of illness, but at the same time retaining old beliefs and practices, which they believe have stood the test of time. Their skills are being acknowledged by the Lagos State Health Management Board, which is organising some short courses for them for the purpose of up-dating their obstetric skills and practice.

Chapter 8

LIMITATIONS OF THE STUDY

(1) Being a clinic-based study, there is the possibility of bias towards pregnant women with either higher or lower hemoglobin values.

A community-based study involving hemoglobin estimations on pregnant women selected at random would give a more accurate picture of the prevalence of anaemia in this community.

(2) The absence of recent census statistics of the area made it difficult to determine total sample size which would be representative of the population.

(3) Mothers attending the clinic were also encouraged to register in at least one other health facility with delivery facilities.

(4) Season. The study was conducted during the rainy season when food is scarce and living conditions are harder.

(5) The gestational ages of the mothers were based on fundal height assessments, since quite a number of women could not remember their last menstrual period.

(6) Time available for the study.

Chapter 9

CONCLUSIONS

- (1) Of a total of 300 pregnant women seen at an antenatal clinic in Lagos, 68.3% were anaemic ($Hb < 11g/dl$).
- (2) A total of 80% of primiparae aged ≤ 18 years were found to be anaemic. Of these, 40% were severely anaemic ($Hb < 8.0g/dl$).
- (3) A total of 70% of women aged ≥ 35 years were anaemic ($Hb < 11g/dl$). None of them was found to be severely anaemic. Fifty percent of these women had four or more previous births.
- (4) There was no significant difference in the mean hemoglobin values of women who had no personal income and those who had.
- (5) Pregnant women who had at least primary education had a higher mean hemoglobin than those who had none.
- (6) Contraceptive prevalence in the study population was low.

- (7) A total of 83.3% of women with a history of anaemia in their last pregnancy were also found to be anaemic in the current pregnancy.
- (8) The number of antenatal clinic attendances did not appear to have a significant effect on the mean hemoglobin values of the pregnant women interviewed.
- (9) A total of 49.3% of the pregnant women interviewed had experienced at least one illness episode in the current pregnancy.
- (10) There was no case of side-effect of iron tablets reported in this study.
- (11) Only 6.3% of the pregnant women interviewed used mosquito bed nets. However, the use of local anti-malarial herbs, window netting and insecticides were striking.
- (12) Women who had experienced three previous infant deaths appeared to have a higher mean hemoglobin compared with those who had experienced only one or two infant deaths.

(13) Traditional birth attendants were frequently consulted by pregnant women both in the antenatal period (19.4%) and for delivery purposes (21.9%).

Chapter 10

RECOMMENDATIONS

These would be considered at three levels.

(A) Family level

- (1) Enabling women to make their own health care decisions, e.g. number of children.
- (2) Increasing the understanding, acceptability and availability of family planning.
- (3) Increasing knowledge in women of locally available sources of hematopoietic factors, e.g. liver.

(b) Community level

Provision of community-based health education particularly targetted at men and adolescents to include:

- (1) Importance of early registration for antenatal care.
- (2) Importance of adequate nutrition for the female children.
- (3) Health benefit of family planning to the family and the community.
- (4) Association between basic education for girls and better health status of educated women and their families.

(5) Recognition of warning signs of complications of pregnancy and need for appropriate and timely care.

(C) National level

- (1) Improving the status of women in the society by valuing their contribution to family, community and national welfare.
- (2) Legislation on the minimum age at marriage stipulated as 18 years.
- (3) Provision of access for girls to all levels of education.
- (4) Use of the media to convey health messages regarding the dangers of childbearing at the extremes of a woman's reproductive life.
- (5) Accessing informal health care providers for the purpose of training, improvement of services and ensuring a better referral system.

Suggestions for Future Research

- (1) Prevalence studies in other parts of the country to determine the causes of anaemia there.

- (2) The active ingredients in the various herbal potions given to pregnant women at the herbalist/traditional birth attendant.
- (3) Reasons for the large number of spontaneous abortions which occurred among the women in this study.

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FACILITATOR'S GUIDE TO FOCUS GROUP DISCUSSION

- (1) How do you recognize someone who does not have enough blood?
- (2) What do you think frequently causes this?
- (3) Who else is likely to suffer from it?
- (4) What should be done for an individual who does not have enough blood?
- (5) What are the causes of not having enough blood?

FACILITATOR'S GUIDE TO INTERVIEW WITH HERBALIST

- (1) When do you advise pregnant women under your care to register?
- (2) What do you do when they come to see you?
- (3) Which drugs do you normally give them?
- (4) What else do you do for them?
- (5) How frequently do you see your patients?
- (6) How frequently should they take their drugs?
- (7) What are the common causes of insufficient blood?
- (8) How do you arrive at a diagnosis of your patient's problem?
- (9) How do you treat cases of sickle cell disease?
- (10) What are the common obstetric problems you have encountered?
- (11) How would you manage a pregnant woman who had bleeding in pregnancy?

ANTENATAL CLINIC ROUTINE

AT

ST. THERESA'S PRIMARY HEALTH CARE CENTRE, AMUKOKO

Antenatal clinics are held on two days of the week - Wednesdays for follow-up clinics and Fridays for booking clinics.

The clinic usually starts by 7am. All the pregnant women are weighed with light clothing on and then given bottles for providing a specimen of urine which is tested for albumin. Thereafter, their haemoglobin values are determined using blood obtained by the finger prick method and the Lovibond comparator. They are then seen by the midwives.

After being examined, all the women are given a health talk and some nutritional advice which lasts about fifteen minutes. Each woman is also given a cup of soya-milk to drink. After this talk, the women collect their drugs - ferrous sulphate, 200mg daily, folic acid, 5mg daily, pyrimethamine, 25mg weekly and mebendazole (iii) stat (only at the first antenatal clinic if gestational age is more than twelve weeks).

A course of chloroquine tablets is given if there is a strong clinic impression of malaria or laboratory evidence to support it. A token fee is charged for these drugs.

The pregnant women are then given appointments following the standard regime of monthly visits until 28 weeks, fortnightly visits until 36 weeks and weekly visits subsequently.

However, they are also encouraged to register at one other health facility where delivery facilities exist, since they only provide pre-natal care.

A STUDY OF FACTORS RELATED TO ANAEMIA AMONG
PREGNANT WOMEN ATTENDING
ST. THERESA'S PRIMARY HEALTH CARE CENTRE, AMUKOKO

Serial number

Date of visit

Name _____

Ethnic group

Home address

Part I: General Information

1. Mother's: Age at marriage

Age at first conception

Age now

2. Mother's marital status: (1) Single

(2) Married

(3) Occupation: Mother Spouse

Unemployed

Small business

Driver

Government official

Company employee

Other, please specify

(4) Income per month Mother Spouse

None

< N200

N201 - N399

N400 - N599

N600 - N699

> N700

(5) Education	Mother	Spouse
None		
Primary		
Secondary		
Post-secondary		
University		

Part II: Obstetric and Gynaecological History

(6) How many children have you had?

Serial No. of Child	Age	Sex	Present Condition of Child
------------------------	-----	-----	-------------------------------

(7) Do you usually have heavy periods?

- (1) Yes
- (2) No

(8) How often do you change your sanitary towels?

- (1) Once a day
- (2) Twice a day
- (3) Three times a day
- (4) > Three times a day

(9) How long do your periods last?

- (1) 0 - 5 days
- (2) > 5 days

(10) Did you use any contraceptive method before becoming pregnant?

- (1) Yes
- (2) No

(11) If yes, which one did you use?

- (1) Condom
- (2) I.U.D.
- (3) Oral contraceptive
- (4) Injectable contraceptive
- (5) Rhythm
- (6) Coitus interruptus
- (7) Other, please specify

(12) If not, why not?

- (1) Husband objects
- (2) Mother-in-law objects
- (3) Not available
- (4) Side-effects
- (5) Not living with husband
- (6) Small family size

(13) Which side-effects did you observe after using the contraceptive?

- (1) Heavy periods
- (2) Scanty periods
- (3) None
- (4) Got pregnant on the pill
- (5) Abdominal cramps
- (6) Other, please specify

(14) Where did you get these side-effects treated?

- (1) Chemist
- (2) Health Centre
- (3) Hospital
- (4) Other, please specify

Last Pregnancy

(15) Which complications did you experience in your last pregnancy?

- (1) None
- (2) Anaemia
- (3) Abortion
- (4) Jaundice
- (5) Pain in legs
- (6) Premature delivery
- (7) Bleeding per vaginam
- (8) Post-partum haemorrhage

(16) Place of delivery for last pregnancy:

- (1) Hospital
- (2) Health Centre/Maternity Home
- (3) Own home
- (4) Herbalist
- (5) Church

(17) Type of delivery for last pregnancy:

- (1) Vaginal delivery
- (2) Caesarian section

Present Pregnancy

(18) When was your last menstrual period?

(19) How many times have you attended the antenatal clinic?

(20) How many antenatal clinics could you have attended?

(21) Where else are you receiving care during this pregnancy?

(22) Have you had any illnesses during this pregnancy?

- (1) Yes
- (2) No

(23) If yes, which illness did you suffer from?

- (1) Fever
- (2) Weakness
- (3) Breathlessness
- (4) Cough
- (5) General body pains
- (6) Other, please specify

(24) At which month of pregnancy did you suffer from this illness?

(25) What was the total duration of the symptoms (in days)?

(26) How were you treated for this illness?

- (1) Tablets
- (2) Tonics
- (3) Injections
- (4) Native herbs
- (5) Other, please specify

(27) Where were you treated for this illness?

- (1) Home
- (2) Clinic
- (3) Health Centre
- (4) Hospital
- (5) Other, please specify

(28) Which type of tablets were you given at the last antenatal clinic?

- (1) Iron tablets Yes/No
- (2) Folic acid tablets Yes/No
- (3) Anti-malarials Yes/No

(29) Do you take the iron tablets given to you?

- (1) Yes
- (2) No

(30) If yes, how many days did you take them for?

- (31) If no, why didn't you take them?
- (1) Nausea
 - (2) Vomiting
 - (3) Constipation
 - (4) Not given
 - (5) Other, please specify
- (32) Do you take the folic acid tablets given to you?
- (1) Yes
 - (2) No
- (33) If yes, how many days did you take them for?
- (34) If no, why not?
- (35) Did you take the anti-malarial tablets given to you?
- (1) Yes
 - (2) No
- (36) If yes, how many days did you take them for?
- (37) If no, why not?
- (38) Do you usually sleep under a mosquito net?
- (1) Yes
 - (2) No
- (39) If yes, was the net treated with Dieldrin?
- (1) Yes
 - (2) No
- (40) If no, why not?
- (1) No need
 - (2) Can't afford it
 - (3) Other, please specify
- (41) Do you have any other methods for getting rid of mosquitoes? Please specify:

(42) Did your diet contain any of the following items yesterday:

Yes No

Dark green vegetables

Sweet potatoes

Yams

Bananas

Nuts

Liver

Meat

Egg yolk

Fish

Physical Examination and Laboratory Investigations

Gestational age

Colour of mucous membrane of conjunctiva and tongue:

Pale

Normal

Height (cm) Weight (kg)

MUAC (mm)

Fundal height

Oedema

Hb (g/100ml)

PCV

Malaria parasite:

+ve

-ve

Urine for albumin:

+ve

-ve

Any other comments:

Iron tablets

Folic acid tablets

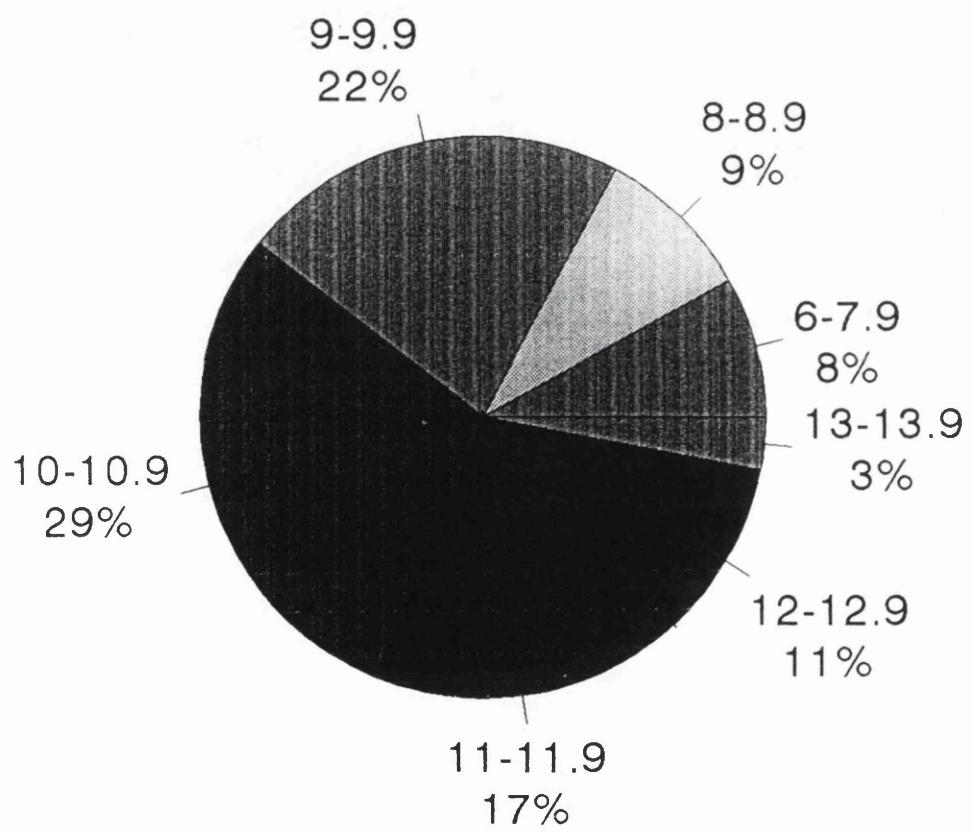
Anti-malarials

Dietary advice

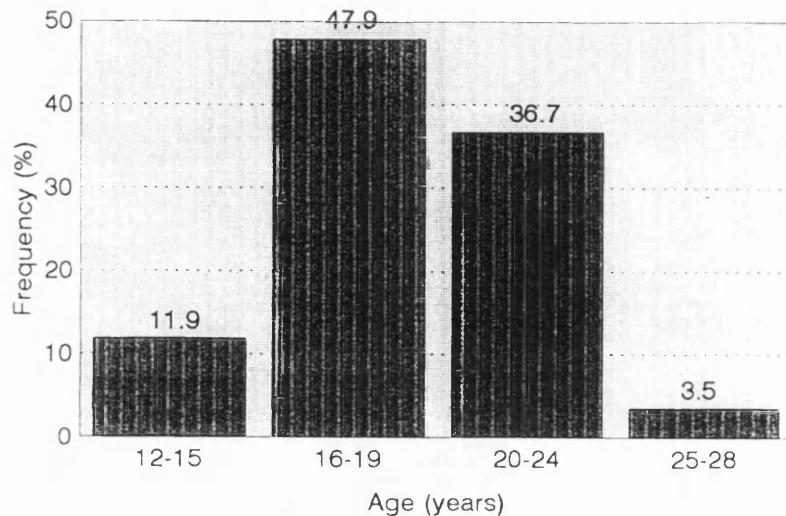
Timetable of the Study

1-30 June, 1991	Design of protocol
17-19 July, 1991	Pre-testing of questionnaire and pilot study
24 July-9 August, 1991	Administration of questionnaires and laboratory investigation
23 August, 1991	Interview of traditional healer/traditional birth attendant
28 August, 1991	Focus group discussion in the clinic
6 September, 1991	Focus group discussion in the community and photographs
20 September, 1991	Return visit to the community with photographs
25 September, 1991	Photographs in the clinic
4 October-1 November, 1991	Data analysis and write-up
4-15 November, 1991	Drafts of thesis
18-29 November, 1991	Typing, binding and submission of thesis
12 December, 1991	Examination

Hemoglobin levels in 300 pregnant women attending St. Theresa's PHC Centre
Amukoko,Lagos

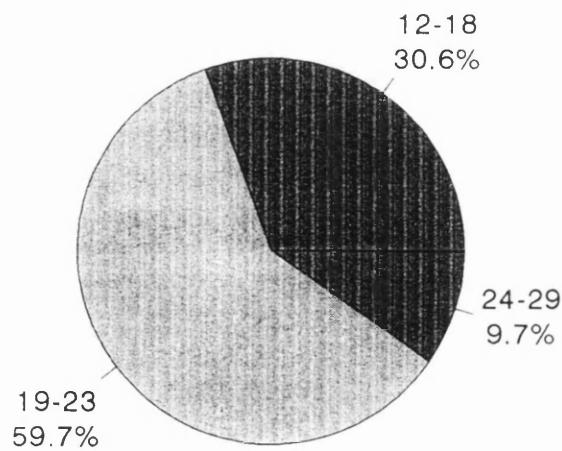


Age at Marriage in study population Amukoko, Lagos



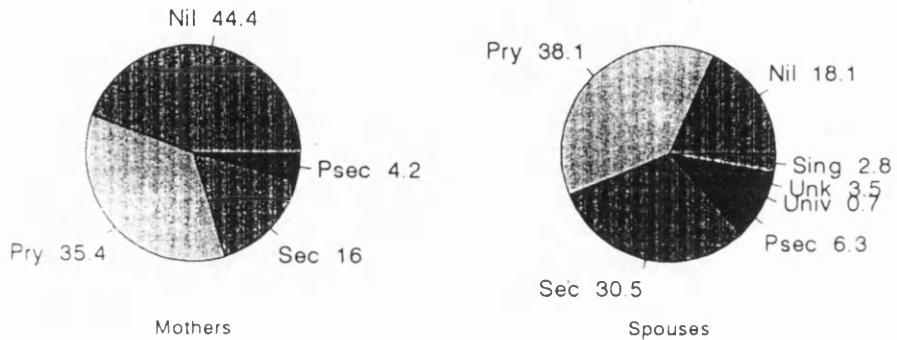
Mean Age at marriage = 18.89, std dev = 2.91

Age at first conception of the study population Amukoko, Lagos



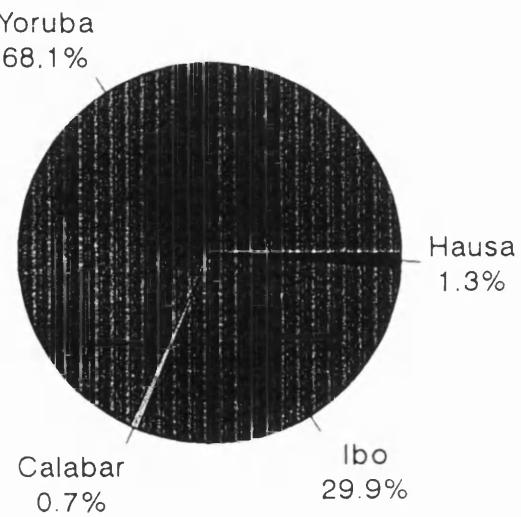
Mean Age at first conception = 19.99, std dev = 2.91

Educational levels (%) Amukoko, Lagos



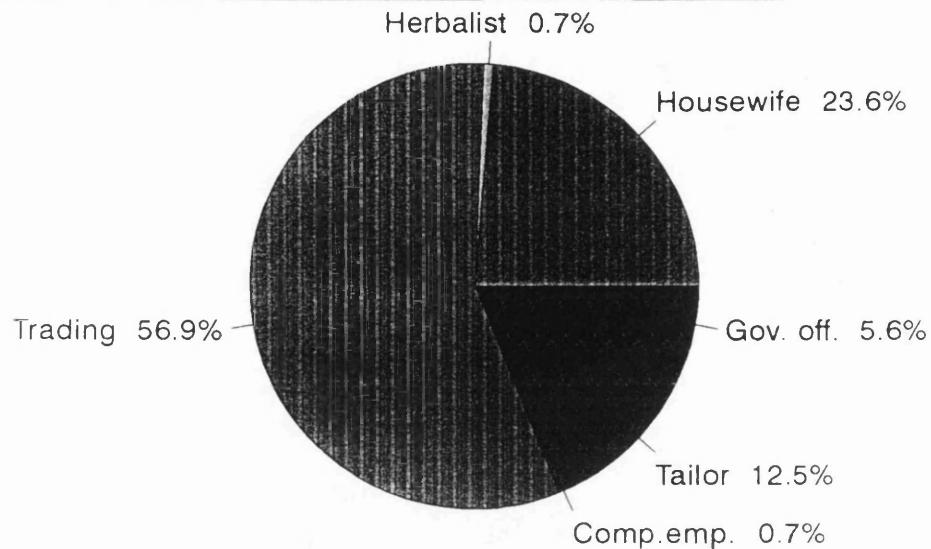
44.1% of the women interviewed had no formal education compared with 18.1% of their spouses

Ethnic Origin of study population Amukoko, Lagos



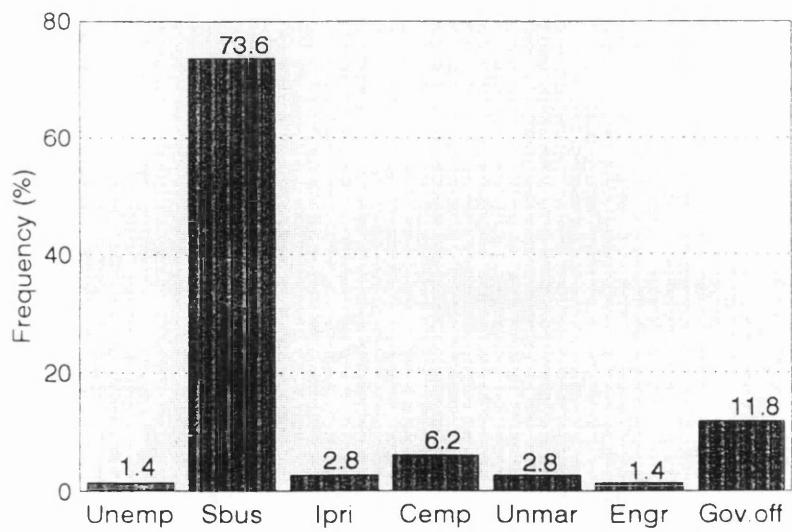
68.1% of the pregnant women interviewed were Yorubas

Occupation of women interviewed Amukoko, Lagos



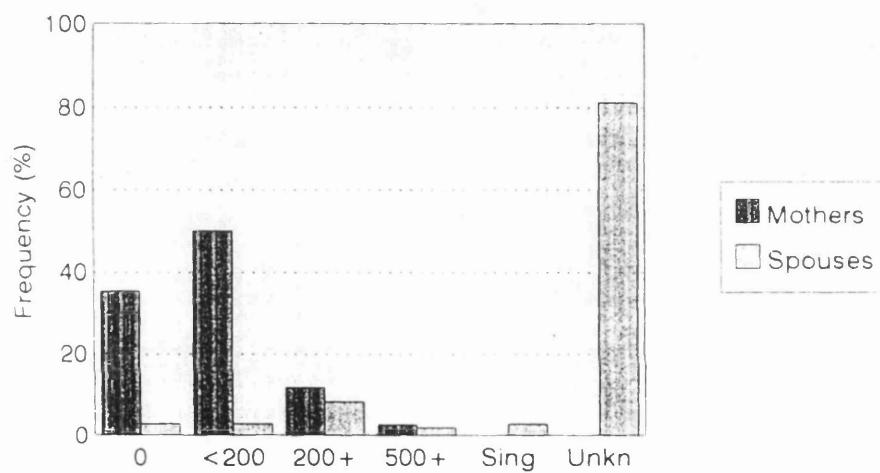
56.9% of the women interviewed were traders

Occupation of the spouses of the women interviewed Amukoko, Lagos



73.6% of the spouses of the women interviewed were engaged in some small business

Income status of women interviewed and their spouses
Amukoko, Lagos

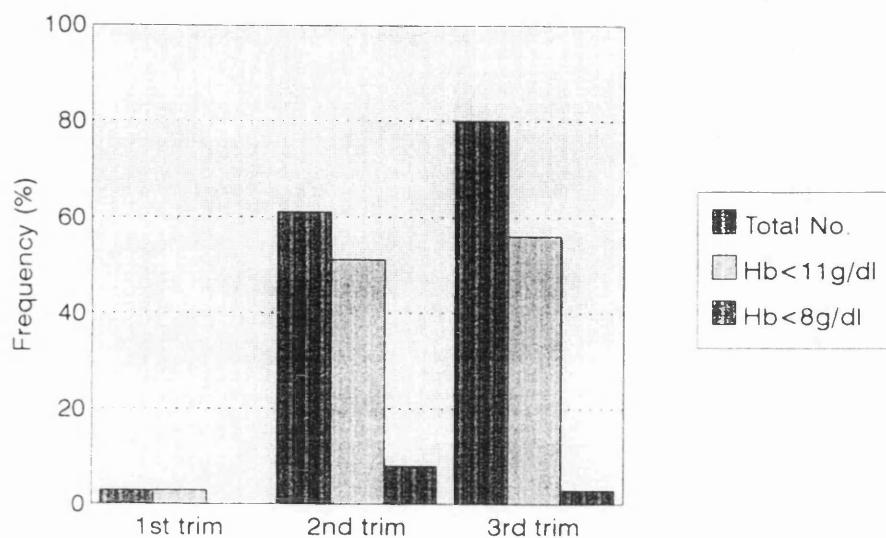


Income of 81.3% of spouses is unknown

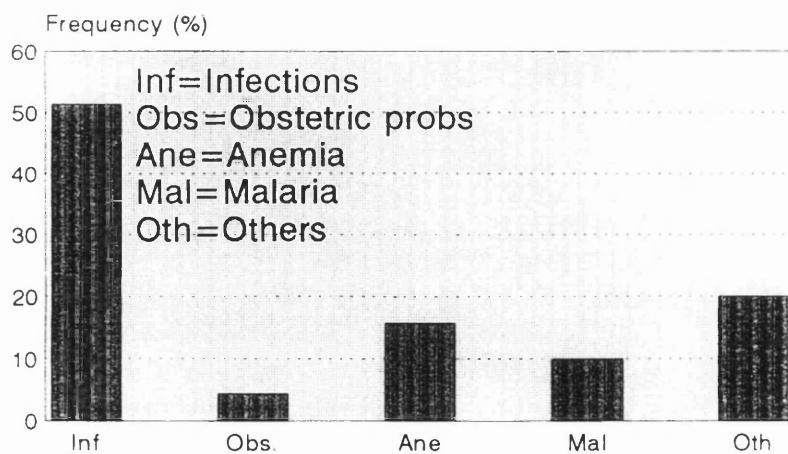
Income is given in the Nigerian Naira

Sing= Single, Unkn=Unknown

Distribution of anaemic women by trimesters Amukoko, Lagos

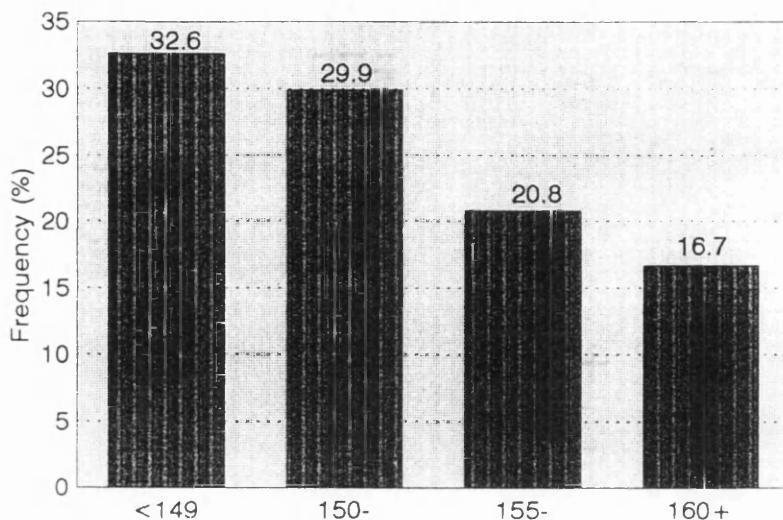


Maternal morbidity in current pregnancy Amukoko, Lagos



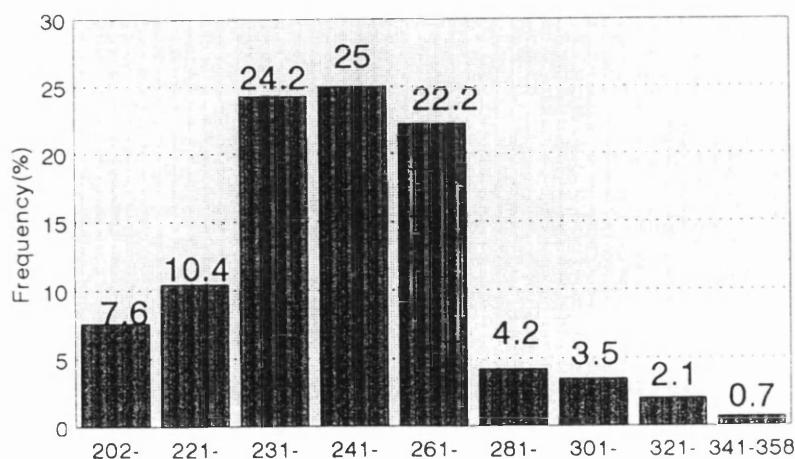
49.3% of women interviewed had experienced at least one episode of illness

Height distribution of women interviewed by trimesters
Amukoko, Lagos



32.6% of women interviewed had heights <150cm

Distribution of Mid-upper arm circumference (mm)
Amukoko,Lagos



18.2% of women had MUAC <230mm

Community & Health Project
Amukoko,
P.O.Box 699, Apapa
Lagos
Nigeria.

24-04-1991

Dear Dr. Ishola,

Regarding your letter of 10 April, 1991. You are very welcome to do part of your field work at this centre.

We have two antenatal clinics per week, one for first visits on Fridays which we have attendance between 30-50 patients. On Weds, we see repeat visits with 80-100 patients. No delivery facilities.

Haemoglobin concentration is checked using Lovibond & pipette and routine Haemaglobin, Scale (paper)

If this is of use to you you are welcome.

Yours sincerely

Sister Patricia Hoey
Sister Patricia Hoey M.M.M.
co-ordinator of project