

	DISTRICT HOSPITAL
	HEALTH CENTRE TYPE II
	HEALTH CENTRE TYPE I (RURAL CLINIC)

BEREKUM DISTRICT HEALTH INSTITUTIONS NETWORK

TABLE OF CONTENTS

	Page
<u>Title Page</u>	iv
Declaration	v
Acknowledgement	vi
List of Tables	vii
Abstract	ix
<u>CHAPTER ONE</u>	
1.1 Introduction	1
1.2 Statement of the Problem	4
1.3 Objectives	6
1.3.1. General Objective	6
1.3.2. Specific Objectives	7
1.3.3. Definition of concept	7
1.4 Literature Review	8
1.5 Methods	16
1.5.1. Study Design	16
1.5.2. Primary Source of Data	16
1.5.3. Secondary Source of Data	17
1.5.4. Data Collection Techniques and Tools	18
1.5.5. Selection of Study Groups	19
1.5.6. Plan for Data Collection	20
1.5.7. Ethical Consideration	22
1.5.8. Limitation of Study	22

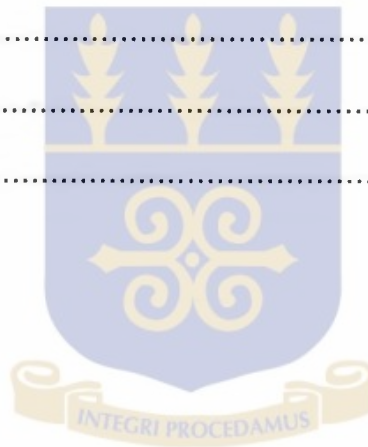
CHAPTER TWO

2.1 Introduction.....	24
2.2 Population Distribution.....	25
2.3 Ethnicity.....	26
2.4 Rainfall And Vegetation.....	27
2.5 Road Network and Transportation.....	27
2.6 District Health Administration.....	27
2.7 Health Facilities.....	28
2.8 Public Health Programmes.....	30

CHAPTER THREE : DATA ANALYSIS32

3.1 Institution Based Study	
3.1.1 Introduction.....	32
3.1.2 Haemoglobin Level.....	34
3.1.3 Mortality of Anaemia.....	35
3.1.4 Causes of Anaemia.....	37
3.2 Knowledge, Attitude and Practice Study of Anaemia.....	41
3.2.1 Introduction.....	41
3.2.2 What are the most common diseases of importance in children in the community.....	42
3.2.3 Why do you think anaemia is common or problem in this community?.....	44
3.2.4 How can you recognise an anaemic child?.....	45
3.2.5 What are the courses of anaemia in your community?.....	46
3.2.6 How do you treat anaemia in your locality?.....	48
3.2.7 Food practices on anaemia.....	50
3.2.8 Breast feeding.....	51
3.2.9 How do you prevent anaemia in your locality?.....	52

<u>CHAPTER FOUR Conclusion and recommendations</u>	55
4.1 Conclusion	55
4.2 Recommendations.....	57
List of references.....	60
Appendix A.....	63
Appendix B.....	64
Appendix C.....	65
Appendix D.....	66



CHILDHOOD ANAEMIA: THE CASE OF DORMAA DISTRICT

BY

DR. JOSEPH ODURO

**A DISSERTATION SUBMITTED TO THE SCHOOL
OF PUBLIC HEALTH, LEGON, OF THE UNIVERSITY
OF GHANA**

**IN PARTIAL FULFILMENT OF THE REQUIREMENT OF
MASTER OF PUBLIC HEALTH DEGREE**

JUNE, 1997

ABSTRACT

The study was conducted out of concern of the District Health Management Team of Dormaa District to find a solution to the rising anaemia problem in children in the District. The study was conducted from the 28th January, 1997 to 16th May, 1997.

The main objective of the research was to find the distribution, outcome and the determinants of anaemia in children in the Dormaa District. The specific objectives were to find the age and sex distribution of anaemia cases and mortality, the causes of anaemia and its age distribution and the knowledge, attitude and practices on anaemia among community members.

The study design was a descriptive cross-sectional one.

Data were collected and analysed from the records of 1141 anaemic children 0 - 5 years admitted or treated at the Dormaa Presbyterian Hospital (District Hospital), and the three main Health Centres in the District from 1993 to 1996. Data on the knowledge, attitude and practices on anaemia were also collected from 70 Traditional Birth Attendants and Herbalists through interviews using questionnaire. Seventeen focus group discussions were also organised to collect data from grandmothers, nursing mothers and health staff.

351804


RJ 416. A5 Oa8

Theses Room

DECLARATION

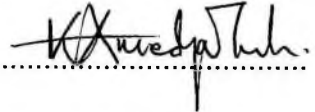
I declare that this dissertation has been the result of my own field research, except where specific references have been made; and that it has not been submitted towards any other degree, nor is it being submitted concurrently in candidature for any other degree.

CANDIDATE:

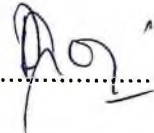


DR. JOSEPH ODURO

ACADEMIC SUPERVISORS.



DR. K. A. SENAH



DR. FENELLA AVOKEY

ACKNOWLEDGEMENT

I am most grateful to the Almighty God for giving me the strength, knowledge and guidance in carrying out this research.

I am very grateful to the School of Public Health and the Ministry of Health for providing funds for the research which was carried out in the Dormaa District from 28th January, 1997 to 16th May, 1997.

I am also grateful to my Academic Supervisors for their supervision and guidance during the preparation and implementation of the research proposal as well as the report writing.

I wish to express my sincere thanks and appreciation to the Regional Director of Health Services and staff (Brong Ahafo Region), the District Director of Health Services of Dormaa District, the Dormaa District Health Management Team, all the seven Sub-district Health Teams of Dormaa and the staff of the Dormaa Presby Primary Health Care for their assistance in making my work possible.

Finally, I thank all the respondents including Traditional Birth Attendants, Traditional Healers, grandmothers, nursing mothers and health staff who I came into contact with during my research work.

LIST OF TABLES

Table 1:	Major causes of infant mortality 1979-1983	3
Table 2:	Major causes of under-five mortality 1979-1983	3
Table 3:	Population distribution at subdistrict level	26
Table 4:	HIV Positives among blood donors	31
Table 5:	Yearly admission of anaemia cases (Dormaa Presbyterian Hospital)	33
Table 6:	Age and sex distribution of anaemia cases (Dormaa Presbyterian Hospital)	33
Table 7:	Distribution of haemoglobin among study group (Hospital data)	35
Table 8:	Age and sex distribution of anaemia deaths Dormaa Hospital	35
Table 9:	Severity of anaemia and mortality	36
Table 10:	Outcome of anaemia (alive or dead) and haemoglobin category	37
Table 11:	Table of main causes of anaemia in Dormaa Presbyterian Hospital	38
Table 12:	Age distribution of the causes of anaemia	38
Table 13:	Mortality from anaemia and causes	39

Table 14:	Reasons why anaemia is a problem in the (Dormaa District)	44
Table 15:	Causes of anaemia as given by key informants	47
Table 16:	List of herbs and route of administration (Dormaa Presbyterian Hospital)	49

ABSTRACT

The study was conducted out of concern of the District Health Management Team of Dormaa District to find a solution to the rising anaemia problem in children in the District. The study was conducted from the 28th January, 1997 to 16th May, 1997.

The main objective of the research was to find the distribution, outcome and the determinants of anaemia in children in the Dormaa District. The specific objectives were to find the age and sex distribution of anaemia cases and mortality, the causes of anaemia and its age distribution and the knowledge, attitude and practices on anaemia among community members.

The study design was a descriptive cross-sectional one.

Data were collected and analysed from the records of 1141 anaemic children 0 - 5 years admitted or treated at the Dormaa Presbyterian Hospital (District Hospital), and the three main Health Centres in the District from 1993 to 1996. Data on the knowledge, attitude and practices on anaemia were also collected from 70 Traditional Birth Attendants and Herbalists through interviews using questionnaire. Seventeen focus group discussions were also organised to collect data from grandmothers, nursing mothers and health staff.

MAIN FINDINGS

Anaemia was found to be an important cause of morbidity and mortality especially in children under 3 years in the Dormaa District. Anaemia accounted for 27.3 percent of the total admissions for 1993, 1994, 1995 and 1996. Most of the anaemia cases had haemoglobin less than 6g/100ml. There were 105 anaemia deaths out of 1141 cases (9.2 percent) with most of the deaths occurring in the age group less than one year (48.6 percent). The traditional birth attendants, herbalists, grandmothers and nursing mothers, had poor perception of the causes, signs and symptoms, prevention and treatment of anaemia.

Their main practices on anaemia were the use of herbal preparations resulting in undue delay at home of anaemic children.

It is recommended that health education on anaemia should be intensified with the target group being nursing mothers, grandmothers, traditional birth attendants and herbalists.

CHAPTER ONE

1.1 INTRODUCTION

Anaemia is one of the major causes of morbidity and mortality in developing countries including Ghana [1]. Severe anaemia is usually life-threatening in the pre-school child. In West Africa, anaemia caused by malaria constitutes the commonest single cause of severe anaemia during the first three years of life [1]. However, anaemia is one of the diseases which can easily be prevented without relying heavily on drugs because anaemia like many other diseases is not only a medical but also a social problem [2].

Anaemias are caused primarily by problems related to nutrition, infection and to genetic factors. Knowledge of the relative importance of the various causal factors, their interactions and the patterns of anaemia would be of an inestimable value in designing efficient medical programmes to improve the health of children [3].

The social basis of anaemia has been stressed by Ogbeide [4] who identified socio-economic factors in anaemia mortality as environmental deficiencies such as insanitary conditions, poor housing, overcrowding, unwholesome water supply and lack of public health services. He also identified protein energy malnutrition, lack of adequate medical care, poverty, ignorance and superstition as other factors in anaemia mortality.

Dietary iron deficiency is one of the commonest nutritional disorders which, if uncorrected leads to iron deficiency anaemia. Iron deficiency anaemia leads to reduced work capacity, diminished learning ability, increased susceptibility to infection and a greater risk of death in children. The deleterious effect of anaemia may persist even after correction of the deficiency, especially if the deficiency occurred during infancy, a period of rapid brain growth and organisation [5]. It is generally held that at least half of the anaemia cases world wide is directly due to iron deficiency [6].

In a study of the influence of nutritional status on child mortality in rural Zaire (now Democratic Republic of Congo), it was concluded that the commonest cause of death was malaria followed by anaemia. Following from this study anaemia is now recognized as an important cause of morbidity and mortality in African children admitted to hospital. To improve child survival therefore it is suggested that malaria and anaemia should be made priorities for intervention in Africa [7].

In Ghana, anaemia is not listed among the top ten causes of outpatient attendance, even though it is among the top ten causes of admissions and deaths in children [8]. Table 1 and 2 show the major causes of infant mortality and major causes of under five mortality, respectively, for 1979 - 1983 in Ghana. In both situations anaemia ranks 5th among the 10 top causes of deaths [9].

Table 1: Major Causes of Infant Mortality (1979-1983)

<u>Causes</u>				<u>Percentage of Deaths</u>
Prematurity	.....	.....	.....	18.8
Pneumonia	.....	.....	.....	7.7
Measles	.....	.....	.....	6.5
Diarrhoea	.....	.....	.....	6.4
Anaemia	.....	.....	.....	3.4
Malaria	.....	.....	.....	3.3
Marasmus	.....	.....	.....	1.3
Kwashiorkor	.....	.....	.....	0.6
Tuberculosis	.....	.....	.....	0.3
All other causes	.....	.....	.....	51.7
Total No. of Deaths	.....	.....	.....	100.0

Source: Ghana Statistical Service (1989)

Table 2: Major Causes of Under-Five Mortality (1979-1983)

<u>Causes</u>				<u>Percentage of Deaths</u>
Measles	.....	.....	.....	12.6
Pneumonia	.....	.....	.....	9.1
Low Birthweight	.....	.....	.....	8.2
Malaria	.....	.....	.....	7.2
Anaemia	.....	.....	.....	6.8
Diarrhoea	.....	.....	.....	6.6
Kwashiorkor	.....	.....	.....	3.4
Marasmus	.....	.....	.....	2.7
Tuberculosis	.....	.....	.....	0.6
All other causes	.....	.....	.....	42.7
Total No. of Deaths 11,190.....	.....	.....	.....	100.0

Source: Ghana Demographic and Health Survey, 1988. Accra. P.65.

1.2 STATEMENT OF THE PROBLEM

In the Dormaa District of the Brong Ahafo Region, the continuing rise in the incidence/prevalence of anaemia has become a source of concern to the District Health Management Team (DHMT). The most important source of concern is the high mortality associated with anaemia especially in children. In 1994, a total of 40 cases of anaemia were admitted to the Dormaa Hospital Children's ward. Out of this number, 14 died, representing a case fatality rate of 35 percent. In 1995, 172 cases of anaemia were admitted, of which 28 died representing a case fatality of 16.3 percent. In 1994, anaemia was the second leading cause of death and accounted for 10 percent of all deaths in the district [12].

A number of factors have been identified as influencing the incidence/prevalence of anaemia in children in the Dormaa District. Repeated malaria infection, malnutrition, intestinal helminthic infestation, sickle cell disease and recurrent diarrhoea are some of the major factors that increase the incidence of anaemia [12]. The extent to which any of the above factors influence the incidence of anaemia is not known. It is however suspected that more anaemia cases are due to malaria infection than the other factors mentioned above [12].

Socio-economic and cultural factors like poverty, illiteracy, ignorance, superstition

and cultural beliefs and practices also influence the incidence of anaemia, most of them indirectly through poor nutrition [2]. Research is needed to investigate the above factors to enable us focus and strengthen existing preventive measures and develop new ones to reduce the incidence of anaemia.

The high incidence of anaemia is the reason for a high blood transfusion rate. With a high Human Immunodeficiency virus positives among blood donors in the Dormaa District [167 out of 1375 (ie 12.5%) blood donors in 1995] [12], it is imperative that something should be done to reduce the incidence of anaemia in order to minimise blood transfusions. The high incidence of severe anaemia places a strain on the limited resources at the health facilities. There is pressure on health staff especially nurses and laboratory technicians to provide emergency services to severely anaemic children who are referred from health centres to the Dormaa Presbyterian Hospital (District Hospital) which is the only health facility in the district where laboratory and blood transfusion services are available. Screening kits for human immunodeficiency deficiency virus and hepatitis B are sometimes not readily available. Some of the severely anaemic children die on the way to the hospital when they are referred from far places. Transport is not always immediately available to convey severely anaemic children to the hospital.

Despite this continuous rise in the incidence of anaemia and its associated problems in the district, no study has been conducted to find out the determinants, distribution of anaemia cases and outcome of anaemia in the district. Because of the

importance the District Health Management Team attaches to the anaemia problem, the last refresher course for health workers in 1995 was on anaemia. Staff from all the health institutions were taken through the causes, signs and symptoms, treatment and prevention of anaemia. This was done to stimulate health workers to take concrete steps to prevent anaemia. It is for the above reasons that the epidemiology of anaemia in the Dormaa District is being studied.

The research is expected to provide epidemiological information on anaemia focusing on age and sex distribution of cases of anaemia and mortality due to anaemia, causes of anaemia, blood transfusion rate of cases and haemoglobin level of cases. The study will also provide information on the local perception of anaemia. This information will be used to draw an intervention programme for anaemia in the Dormaa District. Existing programmes relating to the prevention of anaemia will also be strengthened using the results of the research.

1.3 OBJECTIVES

1.3.1 General Objective

The main objective of the study is to identify the distribution, outcome and determinants of anaemia in the Dormaa District and to make recommendations for the prevention of anaemia.

1.3.2 Specific Objectives

In furtherance of this objective, the study focuses on the following:

1. Identifying the age and sex distribution of anaemia cases as reported in the Dormaa health institutions from 1993 to 1994.
2. Finding out the age and sex distribution of deaths due to anaemia.
3. Identifying the main causes of anaemia as diagnosed at the health centres and hospital.
4. Studying the knowledge, attitude and practices of grandmothers, nursing mothers, traditional birth attendants, herbalists and health staff with respect to childhood anaemia.
5. Making recommendations to the District Health Management Teams and the District Assembly based on the findings.

1.3.3 Definition of Concepts

1. Childhood anaemia may be mild, moderate or severe. It is mild if haemoglobin level is between 9g/100ml and 11/g/100ml; moderate if haemoglobin level is between 6g/100ml and 9g/100ml and severe if haemoglobin level is less than 6g/100ml.
2. In this study a child is any person between 0 and 5 years.
3. Haemoglobinopathy: This is a hereditary disease in which one inherits, an abnormal haemoglobin from either or both parents.

1.4 LITERATURE REVIEW

Several studies on anaemia have been conducted in Ghana as well as in other developing and developed countries. Most of these studies were on the epidemiology, aetiology, prevention and treatment of anaemia especially in African countries.

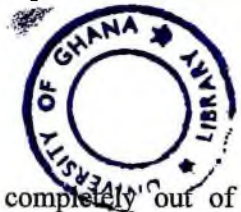
Literature on the knowledge, attitude and practices on anaemia among community members are however not readily available even though this is quite important especially in the Dormaa District where anaemia is not only treated at the hospital and health centres but also by traditional healers and other unorthodox practitioners.

On the aetiology of anaemia a lot of work has been done in Ghana. In 1964, Jilly and Nkrumah [1] conducted a survey on anaemia patients (infants and children) at the Korle Bu Teaching Hospital with special reference to the aetiology in order to ascertain the relation of anaemia to the common haemoglobinopathies and various infections including malaria. Malaria, haemoglobinopathies, malnutrition, hookworm infestation and others were identified as causes of anaemia. It was also observed that there was absence of sickle cell trait in cases of anaemia in which malaria parasites were identified.

Another important observation was that the cases of anaemia associated with malaria usually occurred under the age of three years. Asirifi [13] also found similar causes of anaemia in his survey at the Korle Bu Teaching Hospital among children 0 - 5 years.

Norris [3] in her study at the Korle Bu Teaching Hospital on anaemia also noted that nutritional deficiencies such as marasmus and kwashiorkor, parasitic and bacterial infections, hereditary and erythrocyte abnormalities were the main factors most frequently and widely associated with these anaemias. Similarly Marial and Bruce-Tagoe [14] in their research at the Korle-Bu Hospital anaemia clinic have shown that hookworm infestation is the cause of the very severe cases of iron deficiency.

Nkrumah [15] undertook a study to collate the level of parasitaemia to the degree of anaemia in a group of children from an area hyperendemic for malaria in Ghana. The diagnosis of severe malaria anaemia, haemoglobin (Hb) less than 6g/100ml, was established in each case on the basis of positive blood film for malaria parasites and the exclusion of other possible causes of anaemia in each group.



The result was that the degree of anaemia observed was completely out of proportion to the parasitaemia level. In a related study carried out by Abdalla et al [16] in the Gambia, haematological analysis was made of a group of young children with either acute or long-standing plasmodium falciparum infections. It was found out that in children with acute malaria, anaemia was most marked during the period after treatment with chloroquine. A second group of children with more chronic malaria were anaemic at presentation. There was a rise in haemoglobin after treatment. A third group with acute malaria who were anaemic at presentation gave results intermediate between the two. The results indicate that the pathophysiological mechanism responsible for anaemia are

different at different stages of the illness. The above is important in the management of anaemia caused by plasmodium falciparum.

In a prospective study carried out in Enugu, Nigeria, involving 50 anaemic patients between 4 months and 10 years old, Azubuike et al [17] found that severe anaemia was common in West Africa and that malaria is significant in the cases found in Ghana and Nigeria in infancy. However, poor nutrition was considered more significant than malaria in causing anaemia in children under 2 years old.

Asafo-Agyei et al [13] working at the Komfo Anokye Teaching Hospital in Kumasi found that anaemia caused by malaria was the most significant cause of morbidity and mortality in children. Anaemia accounted for 15.3 percent of all admissions at the paediatric unit, and 12.4 percent of all deaths in children. A similar survey carried out at the Korle Bu Hospital by Commey [19] showed that anaemia caused by malaria in children accounted for 9.96 percent of deaths. In a related study he also found that anaemia accounted for 6.5 percent of all deaths in pre-school age at Korle Bu Hospital, malaria being the commonest cause.

Also in Nigeria, Akinsete and Boyo [20] investigated 55 females and 30 males aged between 3 to 35 months old with malnutrition were for megaloblastic anaemia. Their Haemoglobin was below 11g/100ml in 96 percent. This shows that malnutrition is an important cause of anaemia. The importance of iron deficiency as a cause of anaemia has

been confirmed by Sjolín [21] who showed that iron deficiency is extremely low in Sweden because of high socio-economic standards and good health care and the addition of iron to mothers' breast milk substitutes, body fluids and flour.

Stetler and Huong [22] working in El Salvador among 736 children aged between 6 to 59 months, found the incidence of mild anaemia to be 12.6 percent and of severe anaemia 0.7 percent. Risk of anaemia was 5 times as great in children with chronic malnutrition assessed from height/age index as in the healthy but risk was not high in acute malnutrition.

In June 1994, Koomson et al [23] carried out a survey in the Berekum District of the Brong Ahafo Region on the nutritional status of under fives. A total of 250 children had their haemoglobin estimated. The prevalence of haemoglobin less than 8g/100ml was 15% and for haemoglobin level less than 10g/100ml it was 72.8%. The prevalence rate of haemoglobin less than 10g/100ml was lowest (40.6%) amongst children less than 6 months and highest (86.7%) among those in the range 6 to 12 months. Very severe anaemia, haemoglobin level less than 8.0g/100ml was more prevalent from 6 to 35.9 months of age. Children less than 6 months also had the highest percentage of haemoglobin level greater than 11.0g/100ml. The prevalence of haemoglobin less than 11g/100ml among infants was 82.2%. The study also found that there was a significant association between haemoglobin less than 10g/100ml and moderate/severe chronic malnutrition. (Chi-square = 5.72 and P-value = 0.02). The rate of haemoglobin level less

than 10g/100ml among males and females was 74.3 and 71.3 respectively. Sickling test was also performed on 220 children aged more than 6 months, 15 (6.8%) were positive.

Hossian and Bakir [24] working in the Al Ain City, United Arab Emirate, estimated the haemoglobin levels of 309 children aged 1 - 22 months with the objective of finding the haemoglobin levels, estimate prevalence of anaemia and examine the role of iron deficiency in causing anaemia. Anaemia was detected in 3% of those aged 1 - 2 months (Hb < 9g/100ml), in 8% of those aged 3 - 5 months (Hb < 10g/100ml) and in 25 - 39% of those aged 26 months (Hb < 11g/100ml). Of 19 children tested 10 (53%) were iron deficient. The recommendation after the study was that the widespread prevalence of anaemia and probably iron depletion in young children in Al Ain City underscores a need for the reinforcement of existing programmes and the introduction of new programmes aimed at the prevention, early detection and correction of anaemia.

Another epidemiological study was conducted in the Gilbert Islands by Roberts et al [25] involving 830 children who had their haemoglobin estimated and diet histories obtained by interview of parents using simple questionnaires. Stools of 267 children were examined for hookworm ova. Prevalence rate of anaemia was 18.6 percent for haemoglobin less than 10g/100ml. High rates of anaemia seemed to be related to the unfavourable and overcrowding conditions in the central parts of the Island. Prevalence rate of hookworm infestation was 42.3 percent.

Rao et al [26] , also estimated the prevalence of anaemia by age, sex, growth retardation and clinical nutritional status in 1000 children. Prevalence rate of anaemia was about 50% higher in the younger children 1 to 3 years than those 3 to 5 years old. Children with poor growth had a higher prevalence of severe anaemia than those with better growth. His conclusion was that the association of severe forms of anaemia with poor growth could be due to general dietary inadequacy, poor utilisation of dietary iron or unavailability of iron stores because of infection or infestation. Similarly Hershko et al [27], found haemoglobin less than 11g/100ml to be 19% in his study of 383 Drazé children 1 to 5 years. Iron deficiency was the cause of anaemia in all but two

Damodaran et al [28], carried out a randomised control trial involving 383 Indian children 1 to 5 years with mean initial haemoglobin 10.5 to 11.1g/100ml. Some of the children were given daily supplement of 20mg iron and 100mg of folic acid.

In the treated group mean haemoglobin became 12.1 to 12.5g/100ml with less infections and in the untreated group 10.5 to 11.6g/100ml with more infections after 6 months.

In Nigeria an epidemiological study involving 701 children (1 to 10 years) was carried out by Akinkugbe [29]. It was found that the prevalence of anaemia was high but fall gradually with age (from 63% at 1 to 2 years old to 4.3% at 9 to 10 years). Of all the children examined, 33 percent were anaemic; 36 percent were boys and 40.5 percent

girls; 44.5 percent of those children were between 1 and 5 years and 24.4 percent between 6 and 10 years old. In the anaemic group 10 percent showed the presence of malaria parasites, 10% showed evidence of iron deficiency anaemia and 4 percent evidence of sickling. The remaining 76 percent showed a mixture of the above causes. A similar study was also Carried out in Sao Paolo, involving 278 children aged 6 to 60 months. Singulem et al [30] found that 63 had haemoglobin less than 11g/100ml and were classified as anaemic. Incidence of anaemia was greatest among children aged 6 to 24 months old and about 65% of those with malaria belonged to the lowest income groups. In the same study, when 15 anaemic infants were given iron daily for 1 month, the haemoglobin rose to normal. This shows iron as an important cause of anaemia. Untario et al [31], also carried out a survey on the prevalence of iron deficiency anaemia among 1160 Paediatric patients at a general hospital in Surabaya (Indonesia). It was found that iron deficiency was more common in the age group 6 months to 2 years, than 2 to 5 years and than 5 to 12 years. Overall prevalence of anaemia was 14.2% and of iron deficiency anaemia 9.8%.

Margo [32] et al also found the incidence of anaemia to be 6.7%. Thirteen to twenty-four months highest (12.4%) and 25 to 36 months lowest (5.9%) in their study involving 392 Kwazulu children aged 13 to 60 months old. Despite poverty and overcrowding nutrition was good except iron which was low. Absence of hookworm and malaria and high incidence of breast feeding were considered to be possible factors in good nutrition of the children.

Other studies also touched on the mortality of anaemia. Analysis of the records at the Korle Bu Teaching Hospital by Ofori-Amaah et al [33], showed that anaemia was the commonest cause of mortality in children 1 to 5 years being 7.7%. Ashitey [34] in his epidemiological study of deaths in a rural hospital showed that anaemia was one of the five chief causes of deaths among children 0 - 14 years. In Nigeria, Ogbuide [35] has also stated that protein energy malnutrition, malaria and anaemia were the primary causes of deaths in about 15 - 20% of the cases.

Literature on the knowledge, attitude and practices on anaemia were not easy to find. Only one study touched on this aspect of anaemia. Iron deficiency anaemia associated with diet involving abnormal predominance of milk was found in 82 children aged 6 months to 6 years old. Ten of the children were premature. Wulf [35] blamed deficient knowledge of health education and diet requirements.



The above studies have done a lot on the aetiology as well as the epidemiology of anaemia. In Ghana most of the studies were done in the cities and in the Teaching Hospitals. Only a few studies have been done in the rural areas on anaemia. In the Dormaa District no study has as yet been conducted on anaemia. It was therefore agreed with the District Health Management Team that as a beginning, an epidemiological study on anaemia should be conducted to find the causes of anaemia, age and sex distribution and mortality using existing data in order to project the anaemia problem to health workers

and the District Assembly. The study in the Dormaa District will also involve the knowledge, attitude and practices of anaemia in children among mothers, grandmothers, herbalists and Traditional Birth Attendants.

1.5 METHODS

1.5.1 Study Design

The study design is a descriptive cross-sectional. The study was in two parts. It focused on knowledge, attitude and practice with data collected from a cross section of the people. This formed the primary source of data of the qualitative study. The second aspect of the study was an institutional based and formed the secondary source of data.

1.5.2 Primary source of data

For the qualitative study, data were collected from the following category of people:

- (i) Mothers who were currently nursing babies or who had children aged between 0 and 5 years.
- (ii) Grandmothers (above 60 years) who were caretakers of children aged between 0 and 5 years.
- (iii) Traditional healers/Herbalists.
- (iv) Traditional Birth Attendants.
- (v) Health staff.

The nursing mothers and grandmothers were chosen for the study because most of them practice home management for their children and grandchildren for many types of diseases including anaemia. Their local perception on anaemia is therefore important if we are to prevent anaemia.

The herbalists and traditional birth attendants have a strong linkage with the formal health system in the Dormaa District. Most of them have undergone some training programme organised by the Dormaa Presbyterian Primary Health Care under the Healers' Project. They are the group mostly engaged in home management practices for anaemia and other diseases in children. In fact for those living far away from health institutions, the traditional birth attendants and herbalists are the first point of call when they are sick. Seeking their knowledge, attitude and practices on anaemia is therefore important.

Data were collected from health staff in order to ascertain how much they knew about anaemia. The information will guide health education development programme for anaemia in the district.

1.5.3 Secondary source of data

The secondary source of data were the records on anaemia patients 0 - 5 years and early school going age from 1993 to 1996. Data were collected from outpatient and in-patient records at the Dormaa Presbyterian Hospital and the three main health centres in

the seven sub-districts. This formed the quantitative study.

1.5.4 Data Collection Techniques and Tools

The data for the institution-based study were collected using available information on anaemia patients, that is out-patient and in-patient records in the Dormaa Presby Hospital and the three main health centres from 1993 to 1996.

The tool for the data collection was a checklist drawn using all the relevant variables for the study. The independent variables were age, sex, haemoglobin levels, outcome and the causes of anaemia.

The full checklist is in Appendix A. See Appendix D for dependent and independent variables. For the qualitative study, data were collected using focus group discussion and key informant interviews. The tools for the data collection were a focus group discussion guide and key informant interview guide.

Focus group discussion was used because in-depth information on the causes, signs and symptoms and local practices on anaemia were needed. Key informant interviews or in-depth interview were conducted to collect information from herbalists and traditional birth attendants using interviewing guideline. (See Appendix C).

Traditional birth attendants and herbalists were practitioners who actually treat patients, so each person's knowledge on anaemia was important.

1.5.5 Selection of Study Group

The study involved several groups of people.

(i) For the institution based study, no sampling technique was applied because existing data on anaemia were used. The study population was made up of children 0-5 years in the Dormaa District. This is estimated to be 20 percent of the total population which is 31,000 children. The population comprised the records of all the children treated or admitted for anaemia in the Dormaa Hospital and the three health centres from 1993 to 1996.

(ii) For the qualitative study, the following were selected:

Women of child bearing age (mothers, 15-49 years) who were currently nursing babies or have children between 0 and 5 years. The participants were selected by purposive sampling. A total of seven focus group discussions were held for them, one for each subdistrict. Each focus group contained ten nursing mothers.

The following towns or villages were selected by simple random sampling through balloting from each subdistrict; Wamfie, Dormaa Akwamu, Asikasu No.1, Asunsu No.1, Nsesreso and Danyame.

For the grandmothers above 60 years seven focus group discussions were held, one for each subdistrict. Each focus group contained 8 - 10 grandmothers who were selected by purposive sampling. Seven towns and villages were selected excluding those for the

nursing mothers.

Three focus group discussions were held for staff of three main health centres which were selected by purposive sampling. The health centres were Dormaa Akwamu, Wamfie and Nkrankwata. All the health staff in each health centre took part in the discussion because they were not many, between 10 to 12 people.

(iii) Traditional Birth Attendants

A total of 35 traditional birth attendants were interviewed individually. Five traditional birth attendants were selected by random sampling from each subdistrict. Each subdistrict has about 10 trained traditional birth attendants. The names of the traditional birth attendants were known so five of them were selected through balloting.

(iv) Traditional Healers or Herbalists

Thirty five herbalists were interviewed individually. Five each were selected by simple random sampling from each subdistrict like was done with the traditional birth attendants. Each sub-district has about 8 trained herbalists.

1.5.6 Plan for Data Collection

Data collection for the research started on the 3rd April 1997 with a one-day training of three research assistants from the Dormaa Presbyterian Primary Health Care. They were identified with the assistance of the District Director of Health Services. Other assistants who were mostly health staff were identified in each sub-district to contact the herbalists and traditional birth attendants who were selected for the key informant

interview. They were also to assist in the organisation of mothers and grandmothers for the focus group discussions. They also informed the chiefs and opinion leaders about the research.

Stationery, tape recorder, tape recorder cassettes and batteries were purchased for the data collection. Data collection started with the Dormaa Presbyterian Hospital after obtaining permission from the District Director of Health Services, the General Manager of the Hospital and the Medical Superintendent. At the records department, all out-patient cards on children 0 - 5 years were removed for the year 1993 to 1996 and those with haemoglobin value of less than 11g/100ml were selected as anaemia patients for the study. We also went through the in-patient records and those at the emergency department to collect complete records on most of the patients. The variables explained earlier were entered onto the EPI INFO Software of the computer.

Before the community survey we did a pre-test of the Focus Group Discussion guide and the key informant interview guideline at Wamanafo and Kyeremasu both in the Dormaa sub-district. This was done to detect faults in the interviewing guideline. Amendments were made accordingly. We then went to each sub-district to do the key informant interviews for herbalists and traditional birth attendants and conducted Focus Group Discussions for nursing mothers, grandmothers and health staff. The focus group discussions were conducted either under a shady tree or in a quiet room at the health centre. The participants were always seated in a circle and we put them at ease by

introducing ourselves to them and greeting them. They in turn introduced themselves to us. A moderator and recorders were chosen among the interviewers.

Quantitative analysis was done with the hospital data using the EPI INFO analysis package and qualitative analysis was done with the key informant interviews and the focus group discussions.

1.5.7 Ethical Consideration

In a study such as this, ethical problems are bound to arise when medical records are used. Confidentiality of the out-patient and in-patient records were maintained. No names were mentioned on the checklist. The cards were returned to the records department soon after all the necessary information had been taken.

1.5.8 Limitation of the Study

1. Using hospital data do not represent the anaemia cases in the whole district and therefore the actual prevalence rate cannot be calculated with such data. However when the data was analysed, it was found that the anaemia cases were treated or admitted from all parts of the district to the Dormaa Presbyterian Hospital which is the only health facility with in-patient and laboratory facilities. To find the prevalence rate of anaemia in the district, the haemoglobin levels of a cross-section of children should be measured and analysed in future studies.
2. There were some difficulties in tracing the out-patient and in-patient records. Some of

the cards were missing due to poor record keeping. The out-patient register from which we traced the anaemia cases were poorly entered so we had to go through the cards picking all the anaemia cases. The cards that were missing further reduced the representativeness of the hospital data.

3. Some of the confirmed causes of anaemia were not written on the out-patient and in-patient records. The finding of the causes of anaemia which is one of the objectives of this study will therefore not reflect the true picture.

CHAPTER TWO

THE STUDY AREA

2.1 INTRODUCTION

The Dormaa District is one of the thirteen administrative districts of the Brong Ahafo Region of Ghana. The district is the fifth largest in the Brong Ahafo Region and it is located in the forest belt. The district capital is Dormaa Ahenkro, which is 82km from Sunyani, the Regional Capital and 11km from Gonokrom and Badukrom the entry and exit border towns with Ivory Coast. Dormaa Ahenkro is the administrative centre of the district where we have the Omanhene or the Traditional Head and the Political authority of the district.

The district has an area of 2376km square and a population of 156,000 people. Population density is therefore 65.5 people per square kilometre. The district has a growth rate of 3.1% per annum. There are 205 towns and villages in the district. The district shares boundaries with Cote D'voire on the Western aspect, on the eastern aspect with Berekum District, on the northern part with Jaman district and on the southern aspect with Sefwi Wiaso (Western Region), Goaso and Asunafo districts. The boundary with Cote D'voire is quite significant with regard to the transmission and control of communicable diseases like HIV/AIDS and Yaws. There is movement in and out of Dormaa District and Ivory Coast every day for trading purposes.

2.2 POPULATION DISTRIBUTION

The total population of the district is approximately 156,000. Like the national level the male to female ratio is 49:51.

The age distribution of the population are as follows:

0 -11 Months	-	4%	6,225
Under Five Years	-	20%	31,126
5 - 14 Years	-	27%	42,020
15 - 9 Years	-	20%	31,126
Women In fertile Age		20%	31,126

(WIFA)

Table 3: Population Distribution at Sub-District Level

NAME OF SUB-DISTRICT	POPULATION	NO. OF HOUSES
Nkrankwanta	19,968	2,893
Wamfie	24,894	3,874
Aboabo/Amasu	26,866	1,982
Dormaa Akwamu	18,702	1,875
Danyame	13,948	1,689
Dormaa Ahenkro	32,926	4,883
Kwadwo Kumikrom	13,234	1,069

2.3 ETHNICITY

The ethnic people are the Brong who belong to the Akan tribe and speak Twi (Brong). However it is a mixed district with people from all parts of Ghana, especially Ashanti and the Northern Ghana who have come to the district for farming.

OCCUPATION

The majority of the people are farmers cultivating maize, cassava, yam, cocoyam and plantain. The main cash crops are cocoa, coffee and oil palm. Some timber concessions are also located in the district.

The literacy rate of the people is about 53% and the illiteracy rate about 47%.

2.4 RAINFALL AND VEGETATION

The district is located in the forest belt of the Brong Ahafo Region. The vegetation is mainly the tropical rain forest with some areas turned into savannah due to recurrent bush fires. There are two main raining seasons which regulate their farming activities. The first raining season is in April, May, June and July; and the second in September and October. Food is in short supply when it does not rain enough and this has effect on the nutrition of children.

2.5 ROAD NETWORK AND TRANSPORTATION

The road from the capital of the Brong Ahafo Region, Sunyani to Dormaa Ahenkro, the district capital is asphalted. All the other roads in the district are untarred and are spoilt during the rainy season. General transportation through the district is by taxis and big passenger cars. In the remote areas, passenger cars are not available all the time and referred cases to hospital are delayed leading to high mortality due to anaemia.

2.6 DISTRICT HEALTH ADMINISTRATION

The Dormaa District Health Services is a joint effort of the Ministry of Health and the Presbyterian Church of Ghana (Dormaa Presby Hospital and Dormaa Presby Primary Health Care). The administration of Health Services in the district is based on the 3-tier system.

(a) Level A: The Community Level

Community health workers and Traditional Birth Attendants manage health activities at this level. Presently there are 17 Community Health Workers (CHW) and 155 Traditional Birth Attendants in the various communities. Their function includes health education and treatment of minor ailments and deliveries. They are supervised by the Sub-District Health Teams (SDHT).

(b) Level B

This is the Health Centre Level where we have Sub-District Health Teams (SDHT). The district is divided into 7 sub-districts to ease administrative responsibilities at the district level. They are managed by the Sub-district Health Teams. They are: Dormaa Ahenkro, Wamfie, Dormaa Akwamu, Danyame, Nkrankwanta, Kwadwo Kumikrom and Aboabo Sub-districts. Each sub-district has a Sub-district Health Team with members including the Medical Assistant, the Midwife, Public Health Nurse/Community Health Nurse, the Disease Control Officer, the Environmental Health Officer and the Enrolled Nurse.

(c) Level C:

The District Hospital and the District Health Management Team (DHMT) form the level C. The District Health Management Team has the overall responsibility for health programmes in the districts. The DHMT has membership drawn from the Ministry of Health and the Dormaa Presbyterian Hospital.

2.8 HEALTH FACILITIES

(a) District Hospital

The Dormaa Ahenkro Presbyterian Hospital is the district hospital for the Dormaa District. It is a 128-bed hospital established in 1955 through the initiative of the Dormaa Traditional State and the Presbyterian Church of Ghana. It is the only health facility in the district where laboratory services including blood transfusion are offered. It is the referral hospital for the district where all the health centres refer their cases. It provides out-patient, in-patient, surgical, laboratory and maternal and child health services. The hospital has a staff

strength of 201 including 3 senior medical officers. Average yearly out-patient attendance stands at 40,000 patients.

(b) Health Centre Type II and Health Centre Type I

The district has three main health centre type II namely: Wamfie , Dormaa Akwamu and Nkrankwanta Health Centres.

The health centre type I include Kwameasua Clinic, Akontanim Clinic, Asikasu Clinic, Danyame Clinic, Kwabena Dwomokrom, Aboabo Presby Clinic, Kwadwo Kumikrom Presby Clinic, Kyeremasu Presby Clinic, Wamanafo Presby Clinic, Amasu Rural Clinic, St. Augustine Clinic, and four Private Clinics and five Private Maternity Homes.

The two types of health centres provide similar functions which include diagnosis and treatment of common health problems, management of normal pregnancy, promotion of breast feeding and monitoring of child growth. They do not offer any laboratory services and therefore cannot treat severe anaemia cases.

Other health services providers are community clinics, traditional birth attendants and healers. The 155 traditional birth attendants and 52 traditional healers have been trained under the Dormaa Presby Primary Health Care. They treat all kinds of diseases including anaemia.

Common diseases seen at the out-patient department are malaria and anaemia, upper respiratory tract infection, diseases of skin, accidents and burns, pregnancy with complications, intestinal worms, diarrhoea, rheumatic joint pains, measles and hypertension .The main causes of

mortality are anaemia, meningitis, acute respiratory infections, malaria, typhoid fever and malnutrition.

2.9 PUBLIC HEALTH PROGRAMMES

a. Maternal and Child Health/ Family Planning (MCH/FP)

There are a total of five static MCH/FP centres and seventy outreach points which provide services for children. Activities include growth monitoring, promotion of breast feeding, immunisation, education on family planning, use of oral rehydration salt and school health services.

b. Nutrition Services

These are services targeted to children and pregnant women to prevent malnutrition and anaemia. Activities include education on nutrition through talks and food demonstration.

c. Communicable Disease Control

Important communicable diseases in the district are yaws, tuberculosis, sexually transmitted diseases including HIV/ AIDS, meningitis and guinea worm. The number of HIV/ AIDS cases continue to rise and this is a challenge to the District Health Management Team. This is important for blood donation purposes because anaemia is quite common in the district. The table below shows the number of HIV positive cases among blood donors.

Table 4 **HIV Positives among Blood donors**

Year	No. of Donors	HIV Positives	%
1992	755	25	4 %
1993	895	60	7%
1994	1046	39	4%
1995	1375	162	12%
Total	4071	291	7%

d. Environmental Sanitation

Most of the diseases treated in the Dormaa Presby Hospital and the health centres were those related to the environment. Environmental sanitation is poor in the district. There are weedy surroundings, poor drainage and refuse are scattered about in many places. There is also indiscriminate defaecation. The result is that mosquitoes are abundant and malaria leading to anaemia is a common disease.

CHAPTER THREE

DATA ANALYSIS

3.1 INSTITUTION-BASED STUDY

3.1.1 Introduction

The records on a total of one thousand one hundred and forty one (1141) children diagnosed with anaemia between 1993 to 1996 were studied at the Dormaa Presbyterian Hospital and the three main health centres in the Dormaa District (Wamfie, Dormaa Akwamu and Nkrankwanta health centres). The sex distribution of the study population showed that there were 606 (53.1 percent) females and 531 (46.9 percent) males. Their ages ranged from 1 to 60 months with a mean of 24 months. The standard deviation and standard error were 1.8 and 0.1 respectively.

The anaemia cases in adults were not many and were therefore discarded. They were mainly in females and the causes were incomplete abortions and pregnancy related. Analysis of the records have actually shown that anaemia is an important cause of morbidity and mortality in children in the Dormaa District. For the years 1993 to 1996, anaemia formed 27.6 percent of the total admissions to the children's ward of the Dormaa Presbyterian Hospital.

Most of the anaemia cases occurred in the age group 0-3 years, approximately 81 percent. The number of anaemia cases decreased with increasing age. Males seems to have a higher

incidence than females. Tables 4 and 5 below show the yearly admission and the age and sex distribution of anaemia cases respectively.

Table 5: Yearly Admission of Anaemia Cases (Dormaa Presbyterian Hospital)

YEAR	TOTAL ADMISSIONS IN CHILDREN'S WARD	ANAEMIA CASES	PERCENTAGE OF YEARLY ADMISSION
1993	850	133	11.7
1994	924	333	29.2
1995	1250	337	29.6
1996	1106	336	29.5
Total	4130	1141	100

Table 6 Age and Sex Distribution of Anaemia Cases (Dormaa Presbyterian Hospital)

Age groups (years)	Sex		Total	%
	Male	Female		
Under 1 year	194 (32.0%)	183 (34.2%)	377	33.0
1-2 years	293 (48.3%)	256 (47.9%)	549	48.1
3-4 years	70 (11.6%)	52 (9.7%)	122	10.7
Above 4-5 years	40 (8.1%)	33 (8.2%)	73	6.4
Total	606 (100%)	535 (100%)	1141	100

Though the number of preventable anaemia cases above occurred at the hospital and health centres, it gives a fair idea about the importance of anaemia in the Dormaa District. Despite the fact that most of the causes of anaemia are preventable, the number of anaemia cases continue to rise each year in the Dormaa District.

Table 5 shows that most of the anaemia cases seen at the Dormaa Presbyterian Hospital occurred in the age group 0-3 years. The group contributed approximately eighty-one percent with a male preponderance. The period 0 - 3 years is therefore important and must be taken into consideration in the planning of health services. Children should complete their immunisation before their first birth day so that they are protected against common infections which can lead to anaemia.

3.1.2 Haemoglobin Levels (0-5years)

Haemoglobin levels of the anaemia cases ranged between 0.5g/100ml and 10.5g/100ml.

Mean	Median	Mode	Standard Deviation	Variance	standard Errors
5.623g/100ml	5.5g/100ml	7.0g/100ml	2.031g/100ml	4.124g/100ml	0.060g/100ml

Six hundred and eleven (53.5 percent) of the haemoglobin were below 6g/100ml. Four hundred and fifty-two (39.6 percent) of the haemoglobin were between 6g/100ml and less than 9g/100ml and 78(6.8 %) between 9g to 11g/100ml. See table 6 below.

This shows that most of the anaemia cases were of the severe type and this has implications for mortality. When the haemoglobin is low any delay without blood transfusion will lead to death of the child.

The number of blood transfusion given for the four year period in children were 728 (63.8 percent). This also has implications for human immunodeficiency virus. There is high blood donor positives for human immunodeficiency virus in the Dormaa District [12]. Relatives of children bought blood from donors when they could not donate themselves.

Table 7: **Distribution of Haemoglobin (Hb) among Study Group**

	CASES	PERCENTAGE
Severe Anaemia (Hb less than 6g/100ml).	611	53.5
Moderate Anaemia (Hb between 6g/100ml to less than 9g/100ml).	452	39.6
Mild Anaemia (Hb 9g/100ml to 11g/100ml)	<u>78</u> 1141	<u>6.8</u> 100.0

3.1.3 Mortality of Anaemia

The total deaths due to anaemia as recorded in Dormaa Presbyterian Hospital for the four year period were 105 out of 1141 cases (9.2 %). Most of the deaths occurred in the age group less than one year (48.6 %). There were only a few deaths in the older age group. The number of deaths in children with haemoglobin less than 6g/100ml was more, 83 (79.0 %). See tables 7 and 8 below.

Table 8: **Age and Sex Distribution of Anaemia Deaths**

Age Group (years)	Female	Male	Total	Percentage
Under 1 year	25	26	51	48.6
1-2	16	27	43	41.0
3-4	5	5	10	9.5
above 4-5 years	1	0	1	1.0
Total	47	58	105	100.1

Table 9: **Severity of Anaemia and Mortality**

Haemoglobin Level (Hb)	Mortality		Total	Percentage
	Male	Female		
Hb less than 6g/100ml	42	41	83	79.0
Hb between 6g/ml to less than 9g/100ml	12	6	18	17.0
Hb 9 to 11g/100ml	4	0	4	3.8
Total	58	47	105	99.8

The mortality from anaemia was high contributing 19.3 percent of all deaths in the paediatric unit of the Dormaa Presby Hospital which is the main admission hospital for the Dormaa District. More deaths occurred in the younger age group and fell with age. The main cause of the anaemia being malaria. The reasons for such high mortality were blamed on delay at home because parents tried all sorts of treatment including herbs and also bought drugs from chemical stores. Apparently when those treatment failed that they rushed the child to the clinic or hospital often over long distances. The result is frequent deaths which can be avoided by early blood transfusion. Asafo Agyei et al [18] found 12.4 percent of all deaths in children (0-5 years) to be due to anaemia at the Komfo Anokye Teaching Hospital in Kumasi. Similarly Commey [19] also showed that anaemia caused by malaria accounted for 9.9 percent of deaths. He also found that anaemia accounted for 6.5 percent of all deaths in pre-school age at the Korle-Bu Teaching Hospital.

From Table 8, more of the deaths occurred in children with haemoglobin less than 6g/100ml. When the number of anaemia cases who survived in each haemoglobin category (mild, moderate and severe) were compared with the anaemia cases who died in each of the haemoglobin category, the association between them was found to be significant. See table 9 below.

Table 10: **Outcome of Anaemia (alive or dead) and Haemoglobin category.**

Outcome	Mild	Moderate	Severe	Total
Alive	73	434	528	1035
Dead	4	18	83	105
Total	77	452	611	1140

Chi square = 30.24

P - value = 0.00000027

Given this, the difference between those who died and those who survived in each haemoglobin category is not due to chance.

3.1.4 Causes of Anaemia

Analysis of records has shown that out of 1141 cases, the major causes of anaemia as diagnosed on the out-patient and in-patient records were malaria (90.6 percent), intestinal helminthic infestation (12.0 percent), malnutrition (11.7 percent), sickle cell 2.9 percent, dysentery (1.7 percent) and other causes 1.1 percent (Enteric fever, bronchopneumonia and urinary tract infections). It must be pointed out that most of the anaemia cases had more than one cause. Most of the causes of anaemia were more common in the younger age group than

older children. Intestinal helminthic infestation was more common in older children. More deaths were associated with malaria 95 (90.4 percent) out of 105 deaths than malnutrition, 20 (19.1 percent), sickle cell disease 5 (4.8 percent) and intestinal helminthic infestation 4 (3.8 percent). See tables 10, 11 and 12.

Table 11: Table of Main Causes of Anaemia in Dormaa Presby Hospital

Cause	Cases n=1141	Percentage n=1141
Malaria	1034	90.6
Intestinal Helminthic infestation	137	12.0
Malnutrition	133	11.7
Sickle Cell disease	33	2.9
Other causes	36	3.2

Table 12: Age Distribution of the Causes of Anaemia

Age group years	Malaria	%	Intestinal Helminths	%	Malnutrition	%	Sickle Cell disease	%
Under 1 year	356	34.4	4	2.9	48	36.1	1	3.0
1-2	513	49.6	52	38.0	65	48.9	15	45.5
3-4	93	9.1	36	26.3	15	11.3	6	18.3
Above 4 - 5	72	7.0	45	32.8	5	3.8	11	33.3
Total	1034	100	137	100	133	100	33	100

Table 13: **Mortality of Anaemia and Cause**

Cause	Mortality n=105	Percentage n=105
Malaria	95	90.4
Malnutrition	20	19.0
Sickle cell disease	5	4.8
Intestinal helminthic infestation	4	3.8

This differentiation of anaemia by its causes is quite important. This enables health education messages to be targeted at specific issues. For example in the control of malaria in the Dormaa district, the management of environmental issues are quite important. Malaria causes anaemia more in the young child (84.0 percent in children under 3 years in this study). In the Dormaa District malaria is therefore the main cause of anaemia, followed by intestinal helminthic infestation, malnutrition and sickle cell disease. The finding of malaria as the leading cause of anaemia in the Dormaa District has not come as a surprise. Mosquitoes are abundant in every part of the district. This is because of poor environmental sanitation, weedy surroundings, poor drainage, poor disposal of both solid and liquid waste. The same reasons may apply to intestinal helminthic infestation. Poor nutrition and poverty were the main reasons for a high malnutrition related to anaemia. Other studies also found similar causes at other places. Jilly and Nkrumah [1] found at Korle Bu Hospital that malaria, haemoglobinopathies, malnutrition, hookworm infestation and others were the main aetiological factors in anaemia.

Norris [3] and Comney [19] have also established that malaria constitutes the commonest single cause of severe anaemia during the first three years of life. It has also been

observed by Marianal Janofi and Bruce-Tagoe [14] that the cause of the very severe cases of iron deficiency was hookworm infestation. Similarly Azubuikwe et al [17] have also shown that hookworm infestation may be a more common cause of anaemia in children over 2 years old. Akinsete and Boyo [20] have also observed that malnutrition is an important cause of anaemia in children.

The period 0-3 years is particularly significant because at this age resistance is low and children are overwhelmed by infections like malaria, diarrhoea, urinary tract infections and acute respiratory infections leading to anaemia. Early supplementation of breast milk with calorie-poor local foods like maize porridge without milk are some of the factors leading to anaemia in the early part of life. Koomson et al [23] in their study of under fives in the Berekum district also found more more anaemia cases in children under 3 years. They found that haemoglobin level less than 8g/100ml was more prevalent from 6 to 35.9 months of age. They also found the range of haemoglobin level less than 10g/100ml among males and females to be 74.3 percent and 71.3 percent respectively. In this study in the Dormaa District this was found to be 46.9 percent and 53.1 percent for males and females respectively. In Nigeria Akinkugbe [29] also found that anaemia was high in children but falls gradually with age (from 63% at 1 to 2 years old to 4.3% at 9 to 10 years old).



3.2 KNOWLEDGE, ATTITUDE AND PRACTICE STUDY ON ANAEMIA

3.2.1 Introduction

The results of the herbalists and traditional birth attendants in-depth interview have been analysed and discussed together because most of them practice as both herbalists and traditional birth attendants. The focus group discussions have also been analysed and discussed.

Fifty six (80 %) of the key informants were fifty years and above whilst 14 (20 %) were below 50 years. The mean age of the respondents was 61 years. Males were 25 (35.7 %) and females 45 (64.3 %). Most of them were illiterates. Only eight (11.5 %) completed middle form four and three (4.4 %) reached form two and stopped because of financial reasons. The illiteracy rate in the Dormaa district is about 47 %. Almost all the respondents interviewed have however undergone some training organised by the Presbyterian Primary Health Care (PHC) at Dormaa Ahenkro. The training was on primary health care, personal hygiene, how to prepare their medicine under hygienic conditions, nutrition and good delivery practices among others. They are supervised by the PHC team every quarter and also refresher courses are organised for them. Apart from being herbalist and traditional birth attendants, all the respondents were also farmers. Forty six (65.7 %) of the respondents were Christians, nineteen (27.1 %) were Moslems and 5 (7.2 %) were fetish priests. The period of practice of the respondents range from 3 years to 40 years.

The respondents for the focus group discussions were grandmothers, nursing mothers and health staff. They were interviewed in separate groups. The ages of the grandmothers ranged between 60 and 70 years. None of them had any formal education and they were all farmers.

Forty six (65.7 %) of the respondents were Christians, nineteen (27.1 %) were Moslems and 5 (7.2 %) were fetish priests. The period of practice of the respondents range from 3 years to 40 years.

The respondents for the focus group discussions were grandmothers, nursing mothers and health staff. They were interviewed in separate groups. The ages of the grandmothers ranged between 60 and 70 years. None of them had any formal education and they were all farmers. The ages of the nursing mothers were between 25 and 40 years. About 70 % of had formal education up to middle school. Fifty percent of them were farmers whilst the rest were seamstresses and hairdressers. The health staff interviewed were made up of medical assistants, midwives, ward assistants and dispensary attendants.

The local perceptions of anaemia were elicited through a number of questions.

3.2.2 What are the most Common Diseases of Importance in Children in the Community?

The importance of this question was to ascertain whether the respondents thought anaemia was among the common diseases in the district, especially among children. Among the 70 key informants (traditional birth attendants and herbalist) the majority mentioned anaemia as common in the district, 61 (87.1 %). Most of them agreed that anaemia was an important cause of morbidity and mortality among children in the district. Other diseases mentioned include malaria, diarrhoea, convulsions, measles and malnutrition.

“One male herbalist commented that as for anaemia I fear it. When the children have convulsion from anaemia and they are brought to me they die. My herbal drugs are not strong enough to treat anaemia.”

For the focus group discussion among grandmothers, in addition to anaemia, they also mentioned measles, “ananasono”, “Asram” and “asabra” as important in children.

“One grandmother exclaimed that as for ‘mogyawie’ (anaemia) it kills our children very much and something must be done about it.”

The grandmothers explained some of the signs of the diseases they mentioned.

- (a) “Ananasono” was defined as childhood disease characterised by diarrhoea with whitish offensive stool, egg-like stools and fever.
- (b) “Asram” was defined as childhood disease characterised by diarrhoea, loss of weight, wide fontanelle and small-for-date.
- (c) “Asabra” also defined as childhood disease characterised by greenish frequent stool and fever.

Among the nursing mothers only a few mentioned anaemia as important in the district.

Among the health staff the majority were of the opinion that anaemia was quite common.

The local names used to describe anaemia include “mogyawie” and “mogya asa” for severe anaemia and “mogya so ate” for mild anaemia. These names were common among all the study groups.

3.2.3 Why do you think anaemia is common or a problem in this community.

The key informants gave six main reasons why anaemia was a problem. Twenty six (42.6%) said anaemia was a problem because it kills many children. Some remarked that some of their grand children died of anaemia. Sixteen (26.2 per cent) said anaemia was a problem because they see many cases and treat and refer them to hospital when no improvement occurs.

The other reasons were that anaemia causes convulsions, joint pains, loss of appetite and jaundice. See table 13 for details.

Table 14: **Reasons why Anaemia is a problem in the Dormaa District**

Reasons why anaemia	Respondents n=61	Percentage
Anaemia kills children	26	42.6
We treat many cases and refer when there is no improvement	16	6.2
Anaemia causes convulsions	7	11.5
Anaemia causes joint pains	5	8.2
Anaemia causes loss of appetite	4	6.6
Anaemia causes jaundice	4	6.6

*n=61 because 9 respondents had earlier said anaemia was not a problem.

Among the grandmothers, the majority agreed that anaemia was a problem in the community. Some gave personal testimonies of their grandchildren who suffered from anaemia and died.

The majority of the nursing mothers on the other hand said though anaemia is a problem, it is not as a problem as malaria and convulsions which kills so many children in their areas.

One nursing mother said *“as for convulsion “esoro” we fear it more than any other disease.”*

The majority of the health staff in the focus group discussion said anaemia was a problem because they see many cases of severe anaemia and refer to hospital for blood transfusion.

The conclusion is that the majority of the respondents (in-depth and focus group discussions) were aware that anaemia is a problem in their various localities. This is necessary for the success of control measures in the district.

3.2.4 How can you recognise an anaemic child?

Among the key informants (traditional birth attendants and herbalists) the main signs and symptoms of anaemia were white conjunctiva, palms, finger nails and feet (98.6 percent), convulsions (4.3 percent), fever (8.6 percent), swelling of body 2.9 percent and vomiting (1.4 percent).

Among grandmothers and nursing mothers similar signs and symptoms were mentioned. *“One grandmother emphasised the white body of an anaemic child by using the expression “fruhyyee” which means as white as the cloud.”*



Another grandmother gave a case history “*she said her grand child had convulsion whilst being bathed. When she looked at the eyes they were very white so she took the child to Berekum Hospital. Unfortunately the child died on arrival at the hospital*”

The signs and symptoms mentioned by health staff were similar to above.

The conclusion was that respondents from all the study areas knew the major signs and symptoms of anaemia. This is quite important if the mortality of anaemia is to be reduced. Severe and mild anaemia can easily be identified and referred when necessary.

3.2.5 What are the causes of anaemia in your community

The main causes of anaemia as perceived by the key informants were poor diet (52.9 percent) and malaria (50 percent). The other causes are presented in Table 15. Health staff were of the view that malaria, malnutrition and intestinal helminthic infestation were the main causes.

Table 15: Causes of Anaemia as given by Respondents

Causes of Anaemia	Respondents n=70	Percentage
Poor diet	17	52.9
Malaria	35	50.0
Spiritual illness	12	17.1
Excessive sunshine	11	15.7
“Asram”	5	7.1
Sleeplessness	5	7.1
From breast feeding when mother eats mangoes, oranges	2	2.8
Convulsions	2	2.8
Poor Personal Hygiene	2	2.8
Worms	1	1.4
Poor water supply	1	1.4
Poverty	1	1.4
Diarrhoea	4	5.7

For the focus group discussions among grandmothers and nursing mothers, the majority were of the opinion that anaemia is caused by poor diet because of poverty, mosquito bite causing malaria, unripe mangoes, children playing under severe sunshine, sickle cell disease, sleeplessness, intestinal worms and witchcraft.

“One grandmother said when the children go to school they pluck unripe mangoes and eat resulting in anaemia.” She was emphatic on this assertion.

From the above one can conclude that, though the majority of the respondents knew the causes of anaemia, some of the causes they mentioned were misconceptions. Examples are : spiritual illness, excessive sunshine and sleeplessness. These must be dispelled during health education. Knowing the correct causes of anaemia will enable community members devise their own preventive measures.

3.2.6 How do you treat anaemia in your locality?

According to respondents there were several ways of treating anaemia patients at home. Among the key informants (traditional birth attendants and herbalists), thirty four (48.6 %) said they refer the child to hospital immediately because they cannot measure the severity of the anaemia. Thirty six (51.5 %) said they start with herbal treatment and if there was no improvement then they referred to hospital. Other respondents advised on diet when the anemia was not severe, others resorted to prayers (14.3 %), bought drugs from chemical sellers (12.9 %) and sponged the child when febrile.(5.7 %).

Almost all the key informants also mentioned fresh eggs added to milo, milk or coconut juice as treatment of anaemia. Among grandmothers and nursing mothers majority said they give the children fresh eggs added to milo, milk or coconut juice to drink, the use of herbal preparations, “nseawa” (dried small fish) and the use of “kwawu nsosoo” (green peas). There were common practices among respondents. See table 16.

Table 16 **List of herbs and route of administration**

Type of Herb	Route of Administration
“Dry gyamma leaves” + dry cocoa leaves + dry pawpaw leaves boil add sugar	Oral for 7 to 14 days
Boil green pawpaw and “nseaaawa” (small dry fish)	Oral for 7 days
Boil teak leaves and let it cool	For washing the child treats malaria
The bark of “amire tree” and Nufumini” and dry pawpaw leaves (boil)	Oral
The bark of “Nyamedua” tree and “Kyikuoisuo” tree. Boil and let it cool	Bathing and drinking
“Ntumm (Asonso dua) leaves” add pepper and ginger	Used as enema or cream
Grind ginger and “nunum leaves”	Enema
Grind “afama leaves” and “wisa” (ground)	For treating malaria
Fresh egg add to cotton leaves (pound) you can add milk	Oral
“Gyamma” leaves and bark, boil and add fresh egg.	Oral
“Keatema leaves” and “awaha” for preparing soup (abeduro for mother)	Oral, stimulation of breast milk
Add “kukumademkum” bark (bontodie), “fena bark” “anomadie leaves” and “akondodie” bark and boil	Oral
The bark of the “otie tree” add ginger, “sorowisa” and “famwisa”, pound and boil	Oral
“Gyamma leaves” and papaya leaves boil and add sugar and milk	Oral
Add mahogany bark and “Hwentiaa” and boil.	Oral
Add dry “kontomire” leaves dry pawpaw leaves, dry “gyamma leaves, “dry mongo leaves, dry “adoma leaves” Wawa” bark and “Kwawu nsosaa” leaves boil.	Oral

Type of Herb	Route of Administration
Add “afama” leaves, plantain peels, “gyamma” leave (dry). “Wedie aba” (roasted), “Sorowisa” roasted and roasted “ntonkom”, pepper, grind them and heat. Let it cool.	Enema
Add dry papaya leaves, cocoa leaves, dry cassava leaves, dry cocoyam leaves and boil, add sugar.	Oral
Add “nsesaawa (small dry fish), egg yolk (fresh). Grind together and add honey	Oral
Add “kwawu nsosooa” leaves, cocoa leaves and teak leaves	Oral
Add “Otie” bark and leaves, papaya leaves, dry “kontomire” leaves, “gyamma” leaves and “kwawu nosooa” leaves and boil.	Oral
Add coffee leaves, pawpaw leaves, cocoa leaves and boil	Oral
Nwama bark, boil and add sugar	Oral
“Akonkodie bark boil and drink.	Oral

3.2.7 Food practices on anaemia

According to the key informants, the commonest food they advised for children were fresh eggs added to milo, milk or coconut juice 51 (72.9 %). The next preferred food were groundnuts and beans (55.7 %) followed by dried fish “nsesaawa” (48.6 %) and then fruits like pawpaw, oranges, banana and palm fruits.

The food practices among grandmothers and nursing mothers were not different from the above. “Kwawu nsosooa” was also mentioned. *“Some grandmothers asserted that “kwawu nsosooa” and nsesaawa (small dried fish) are good for anaemia.”*

3.2.8 Breast Feeding

The traditional birth attendants and herbalists said they advised their clients to breastfeed for an average of 2½ years. The females among them said they themselves have practiced breast feeding for all their children. They said bottle feeding is not practised unless the mother dies or has not got enough breast milk. They said they encourage breast feeding by giving the women some herbs to clean all the dirt around the nipple during pregnancy and after delivery to prepare soup to stimulate milk production. *‘They went on further to say that breast milk was heavier than bottle feeding and that it will make the child grow healthier’.*

Among grandmothers and nursing mothers breast feeding was unanimous. Most of the grandmothers said they breast fed their children until they could eat all types of food. The nursing mothers said they breast feed for a period of 1½ to 2 years.

Supplementary food was however introduced early as replied by the nursing mothers. The food includes maize porridge or “koko” with or without milk, weanimix and soft food like “nuhu”, mashed yam, cocoyam with palm oil. *“Some of the grandmothers and nursing mothers commented that because of poverty they cannot buy milk or other ingredients to prepare nutritious food to supplement the breast milk as the child grows and therefore they rely on mostly :koko” which is quite cheap.”* This is one factor why anaemia starts early in the Dormaa District.

The weaning food given to children are not different from the food practices on anaemia patients. In addition to the above, solid foods like ampesi, banku, fufu, mashed yam, cocoyam or plantain with palm oil, “nuhu” and weanimix are also added. Most of them are poor calorie carbohydrates.

3.2.9 How do you prevent anaemia in your locality?

According to traditional birth attendants and herbalists, preventive measures as perceived by majority of them include good diet. Some of the good diet they mentioned were fresh eggs added to milk, milo or coconut juice, eggs fried with stew, meat, “nsesaawa” (dried fish), beans, groundnuts, and “kwawu nsosooa”. Other preventive measures include maintaining good personal hygiene, giving children herbal blood tonic regularly, prevention of malaria, sending children to child welfare clinic, maintaining a good environmental sanitation, prevention of worm infestation and avoiding too much sunshine.

Apart from the above, the majority of grandmothers and nursing mothers added avoiding eating of unripe mangoes, avoiding exposure to cold and cleaning of teeth every day. When asked why they resorted to traditional medicine, most of the grandmothers and nursing mothers responded that poverty was the main reason. They could not afford the high fees charged at the health institutions. Some also said they believed in the potency of the traditional medicine in treating anaemia.

“One herbalist asserted that traditional medicine has been with us for a long time and it is good so we shall continue to use it.”

One nursing mother however said she fears to use herbal preparations because they do not measure dosage and it may cause toxicity in children as well as in adults. The knowledge, attitude and practices study on anaemia was undertaken to find some of the reasons why anaemia in children was high in the district and to use the result for health education on anaemia. Some

dry fish) and “kwawu nsosooa” were also found to be very common among all the study groups. Other local practices were resorting to prayers, as one female spiritualist testified, and buying drugs from chemical stores.

Respondents knew most of the preventive measures but as to whether they practice them or not is another issue. Preventive measures like avoiding too much sunshine, buying drugs from chemical stores and avoiding eating unripe mangoes are misconceptions and must be dispelled.

People can assist in preventive measures only if they understand the causes of the illness. Their knowledge on anaemia must therefore be reinforced. Misconceptions must however be dispelled. The local practices on anaemia must be looked at critically. Since we are not sure of the efficacy of these herbal preparations, hospital treatment must be stressed during health education. Probably the high mortality of anaemia in the Dormaa district is because of the use of herbal preparations and late referral of cases. The practice of using fresh eggs added to milk, milo or coconut juice for the treatment of anaemia must be discouraged. The use of ‘nsesaawa’ and “kwawu nsosooa” if found to be good must be encouraged.

There were no cultural practices found among the study groups that affect child feeding negatively. Poverty was the underlying factor for the use of herbs and other local practices for the treatment of anaemia resulting in avoidable deaths. Supplementary feeding prepared from mainly carbohydrates were introduced early resulting in malnutrition and anaemia in the first or second year of life.

The study has thrown more light on what people know and do about anaemia. The herbal preparations may be studied in future to confirm if there are any haematinics in them. The health staff interviewed had adequate knowledge on anaemia which is an asset for health education in the district.

CHAPTER FOUR

CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSION

Anaemia is a common disease of infants and children especially in developing countries, including Ghana. The Dormaa District of the Brong Ahafo Region has its share of this burden of anaemia. The main aim of the present study was to find the distribution of anaemia, outcome and determinants of anaemia in the Dormaa District and to use the information to draw an intervention programme for anaemia.

In the first quarter of 1997, the epidemiological records of 1141 anaemic children (0 - 5 years) treated at the Dormaa Presbyterian Hospital and the three main health centres in the Dormaa District from 1993 to 1996 were analysed. At the same time the knowledge, attitude and practices regarding anaemia were sought from Traditional Birth Attendants, Traditional Healers, Nursing Mothers, Grandmothers and Health Staff through interviews and Focus Group Discussions.

For the years 1993 to 1996, anaemia contributed an average of 27.3% to the total admissions to the children's ward of the Dormaa Presby Hospital with most of the anaemia cases in the age group 0 - 3 years (81%). Anaemia in children (0 - 5 years) accounted for about 19.2% of all deaths in the paediatric unit of the Dormaa Presbyterian Hospital. More deaths occurred in the younger age group (under 1 year) than the older group.

The main causes of anaemia at the Dormaa Presby Hospital were malaria (90.6%), intestinal helminthic infestation (12.0%), malnutrition (11.7%), sickle cell disease (2.9%) and other causes 3.2% (dysentery, enteric fever, bronchopneumonia and nephrotic syndrome).

The mortality from anaemia was high during the four year period because most of the anaemia cases treated were severe. This is largely due to parental use of herbal preparations in treating anaemia before consulting the health centre, often when the condition was getting worse. Approximately, 63% of the anaemia cases had blood transfusion. Relatives bought blood from blood donors when they could not donate themselves.

Traditional birth attendants, herbalists, grandmothers and nursing mothers interviewed had poor perception of the causes, treatment and the prevention of anaemia in children. Whilst some of them thought anaemia was caused by malaria, poor diet, intestinal worms, poor environmental sanitation and poor personal hygiene, others thought anaemia was caused by excessive sunshine, sleeplessness and witchcraft. Also it is believed that a pregnant mother who eats pawpaw, mangoes and oranges will have an anaemic baby.

The majority of the respondents knew the major signs and symptoms of anaemia such as white eyes and body, convulsions and loss of appetite. For the treatment of anaemia most referred to hospital whilst others bought drugs from chemical stores and others also went to the spiritualist.

The practices on anaemia were mostly the use of herbal preparations in the treatment and prevention of anaemia. Whether those herbal preparations are effective or not needs another study to investigate their haematinic components or effectiveness.

One other common practice was the use of fresh eggs added to milo, milk or coconut juice for the treatment of anaemia. Almost all the respondents were confident that this is the best way to treat anaemia in both children and adults. Raw eggs are poorly absorbed and therefore eating raw eggs will not benefit the child.

The majority of the respondents also thought “nseasaawa” (small dried fish) and “kwawu nsosooa” (green peas) were the best fish and vegetable respectively for treating anaemia in children.

The health staff interviewed had adequate knowledge on anaemia and it is suggested that they use that knowledge to educate the community on anaemia.

4.2 RECOMMENDATIONS

Based on the findings and conclusions of the research, the following recommendations have been made for implementation by the District Health Management Team for the Dormaa District:

1. The District Health Management Team must draw a programme to create awareness about anaemia as an important cause of morbidity and mortality in children in all parts of the district. The target group of the education should be nursing mothers, grandmothers, males especially those with young children and the District Assembly which controls resources for health programmes.
2. Intensive health education on the causes, signs and symptoms, treatment and prevention of anaemia must be done.

The target group being Traditional Birth Attendants and Herbalists who also treat anaemia cases. Nursing mothers, grandmothers and teachers must also be targeted.

Nursing mothers and grandmothers do home management of anaemia cases.

3. Positive perceptions about anaemia must be encouraged whilst aetiological misconceptions like excessive sunshine, sleeplessness, witchcraft and eating mangoes, pawpaw and oranges while pregnant must be dispelled.
4. The practice of adding fresh eggs to milo, milk or coconut juice as a treatment or prevention of anaemia must be discouraged. The people must be told to boil or fry eggs before eating.
5. Child welfare services must be strengthened to cover most children in the district. The five static and 70 outreach points are few compared to the size of the district.
6. Early reporting to hospital of all anaemia cases must be stressed during health education in order to reduce anaemia mortality.
7. The use of herbal preparations in the treatment of anaemia must be looked into critically and preparation which may pose danger to the life or health of children are discouraged. The high mortality of anaemia in the district is probably because of the dependence on herbs during the onset of the illness.

8. The community members must be discouraged from buying drugs from chemical stores to treatment anaemia. They may end up buying drugs which have nothing to do with anaemia.

9. The nutrition division of the Ministry of Health should draw a programme to educate mothers, grandmothers, traditional birth attendants and herbalists on types of food and their functions. Examples, carbohydrates, proteins, fats, vitamins and minerals and how to prepare nutritious food for children. Food demonstrations must be organised for antenatal diets and mothers whose children have been admitted to the Dormaa Presbyterian Hospital. The Dormaa Presbyterian Primary Health Care must be contacted for such an exercise.

10. Community members must be educated on how to maintain good personal hygiene and also keep a clean environment.

11. The District Assembly should be contacted to assist in the provision of good drinking water and good waste management facilities to control malaria and intestinal helminthic infestation. Liquid and solid waste disposal, improving drainage and weeding of surroundings are important if we are to control malaria, intestinal helminthic infestation and diarrhoea diseases.

LIST OF REFERENCES

1. **Jilly P, Nkrumah F K**
A Survey of Anaemia Children in the Korle-Bu Teaching Hospital with Special Reference to Malaria. Ghana Medical Journal, September 1994; Volume 3 No. 3: pp118-125.
2. **Baker S J**
Nutritional Anaemia, A Major Controllable Public Health Problem. Bulletin of WHO, 1978; 56: pp 659-674.
3. **Norris R M.**
A Survey of Anaemia in the Medical Unit of the Korle-Bu Teaching Hospital. Ghana Medical Journal, December 1996; Volume 8 No. 4: pp 222-228.
4. **Ogbeide M J**
Socio-Economic Factors in Disease of Infancy and Childhood. Ghana Medical Journal, 1968; Volume 7. No. 3: pp 128-138.
5. **Webb T E, Oski F A**
Iron Deficiency and Scholastic Achievements in Young Adolescents. Journal of Tropical Paediatrics, 1973; 82: pp 827-830.
6. **McGuire J.**
Best Practices in Addressing Micronutrients Malnutrition. SCN New, 1992; No.9 : pp 1 - 14.
7. **Vanden Broeck J, Beckels R**
Influence of Nutritional Status on Child Mortality in Rural Zaire. The Lancet, 12th June, 1993; Vol. 341: pp 1491-1495.
8. Facts and Figures, MOH 1994.
9. **Ghana Statistical Services (1989)**
Ghana Demographic and Health Survey, 1988, Accra. P.65.
10. **Komfo Anokye Teaching Hospital Records Department, 1994, 1995 and 1996.**
11. **Brong Ahafo Regional Health Administration.**
Annual Report, MOH, 1995.
12. **District Health Management Team, Dormaa District.**
Annual Report, MOH, 1995.

13. **Asirifi Y**
Patterns of Disease as seen in Hospital. Ghana Medical Journal, December 1966; Volume 5. No. 4: pp 137 - 143.
14. **Marianal J, Bruce-Tagoe A A.**
Review of the First Six Months of the Korle-Bu Hospital Anaemia Clinic. Ghana Medical Journal, September 1972; Volume 11 No. 3: pp 294 - 297.
15. **Nkrumah I A**
Severe Anaemia Associated with Malaria in Children. Ghana Medical Journal, March 1973; Volume 12. No.1: pp 17-21.
16. **Abdalla S et al**
The Anaemia of Plasmodium Falciparum Malaria. British Medical Journal, 1980; Vol.46 No.2: pp 171-183.
17. **Azubuikwe J C, Izuora G, Obi G O**
Anaemia in Non-sickling Nigerian Children Around Enugu. Tropical and Geographical Medicine, 1977; Volume 29. No. 4: pp 365-368.
18. **Asafo Agyei et al**
A Survey of Admissions and Deaths in the Paediatric Department, Komfo Anokye Teaching Hospital. Ghana Medical Journal, June 1978; pp 84-94.
19. **Comney J O O**
Childhood Mortality at the Korle-Bu Teaching Hospital. Ghana Medical Journal, September-December 1991; Vol. 25 No. 3 and 4: pp 334-341.
20. **Akinsete F I, Boyo A E**
Megaloblastic Anaemia in Nigeria Infants and Pre-School Children. Ghana Medical Journal, 1976; Vol. 15 No. 2: pp 114-119.
21. **Sjolin S**
Incidence of Iron Deficiency Anaemia Among Swedish Children. Var-foda, 1979; Volume 31. No. 1: Pp 11 - 14.
22. **Stefler H C, Huong A Y**
Anaemia Incidence Among Children and Their Mothers in El Salvador. Archivos Latinoamericanos-de-Nutricion, 1981; 31: pp 679-607.
23. **Koomsom M et al**
A Survey on Nutritional and Immunisation Status of Under Fives in the Berekum District of the Brong Ahafo Region. Unpublished Research Report, June, 1994; pp 14-15.
24. **Hossain M K, Bakir M**
Prevalence and correlates of Anaemia Among Children in Al Ain City, UAE. Annals of Tropical Paediatrics, 1995; Vol.15: pp 227-235.

25. **Roberts A B, Roberts F, Tira T, Tailimanu K.**
Malnutrition and Anaemia in Gilbertese Pre-School Children. A Case Finding and Epidemiological Survey. *Journal of Tropical Paediatrics*, 1981; Volume 27. No. 2: pp 78-82.
26. **Rao K V, Radhaiah G, Raju S V S**
Association of Growth Status and the Prevalence of Anaemia in Pre-School Children. *India Journal of Medical Research*, February, 1980; Vol. 71: pp 237-246.
27. **Hershko C et al**
Anaemia Among Druze Children in the Golan Heights. *Israel Journal of Medical Sciences*, 1980; Volume 16, No. 5: pp 384-388.
28. **Damodaran M, Naidu A N, Sarma K V R.**
Anaemia and Morbidity in Rural Pre-School Children in India. *India Journal of Medical Research*, 1979; Volume 69. No. 3: Pp 384-388.
29. **Akinkugbe F M**
Prevalence of Anaemia in a Rural Population in Nigeria. *Nigerian - Medical-Journal*, 1978; Volume 46. No. 4: Pp 312-318.
30. **Sigulem D M, Tudisco E S, Goldenberg P.**
Iron Deficiency Anaemia Among Children in Sao Paolo. *Revista-de-Saude-Publica*, 1978; Volume 12. No.2: Pp 168-178.
31. **Untario S, Juwana M T, Netty R H T.**
Prevalence of Iron Deficiency Anaemia Among Indonesian Children. *Tropical and Geographical Medicine*, 1978; Vol. 30. No. 3: Pp 337-342.
32. **Margo G, Baroni Y, Wells G, Green R.**
Nutritional Anaemia in Pre-School Children in Rural Kwazulu. *South Africa Medical Journal*, 1978; Volume 53. No. 1: Pp 21- 26.
33. **Ofori-Amaah S, Brookman-Amisah E.**
Analysis of Deaths in the Department of Child Health, Korle-Bu Hospital. *Ghana Medical Journal*, 1970; Volume 9. No.1: pp 12-23.
34. **Ashitey G A**
An Epidemiological Study of Deaths in a Rural Hospital. *Ghana Medical Journal*, December 1974; Volume 14; No. 4: pp 272-278.
35. **Wulff C H.**
Dietary Iron Deficiency Anaemia in Children. *Ugeskrift-for-Laeger*, 1977; Volume 139. No. 38: pp 2249-2253.

APPENDIX A**Checklist list for data collection for Hospitals and Health centers**

Age group	frequency		Mean Hb		outcome		Blood transfusion	Confirmed Cause of Anaemia					
	M	F	M	F	Alive	Dead		Malaria	sickle cell	Malnutrition	Hookworm	Others	

APPENDIX B

Guidelines for focus group discussion

Town :

Village :

Characteristics of respondents

Name :

Age :

Sex :

Educational level:

Occupation :

1. What are the most common disease in this community in order of importance ?
2. What are the most common disease among children in this community in order of importance ?
3. What is anaemia ?
4. Do you consider anaemia a problem in this community?
5. What are the local names used to describe anaemia?
6. How will you recognise that a child has anaemia?
7. What are the causes of anaemia ?
8. What do you do when one has anaemia?
9. What food should be given to a child with anaemia or ti prevent anaemia?
10. Do you breastfeed your children and for how long? What about bottle feeding?
11. What food do you give after weaning?
12. Are there any sociocultural beliefs and practices related to anaemia / child feedings ?
13. How can anaemia be prevented?

APPENDIX C**GUIDELINES FOR KEY INFORMANT INTERVIEW**

- a] Traditional Healer/ herbalist Age Sex
- b] Traditional birth attendant Educational level Occupation
- Religion

14. 1. What are the most common disease in this community in order of importance ?
15. 2. What are the most common disease among children in this community in order of mportance ?
16. 3. What is anaemia ?
17. 4. Do you consider anaemia a problem in this community?
18. 5. What are the local names used to describe anaemia?
19. 6. How will you recognise that a child has anaemia?
20. 7. What are the causes of anaemia ?
21. 8. What do you do when one has anaemia?
22. 9. What food should be given to a child with anaemia or to prevent anaemia?
23. 10. Do you breastfeed your children and for how long? What about bottle feeding?
24. 11. What food do you give after weaning?
25. 12. Are there any sociocultural beliefs and practices related to anaemia / child feedings?
26. 11. How can anaemia be prevented

APPENDIX D**VARIABLES, INDICATORS AND DATA COLLECTION TECHNIQUE**

DEPENDENT VARIABLE	Independent variable	Indicator	Data collection Technics	Source of data	Specific Objective Address
1. Anaemia	Age distribution of anaemia	No. Of anaemia cases in each age group	Availabe records from hospitals to health centers	Out patient and in patient records	1
“	sex distribution	males / female cases	“	“	1
“	causes of anaemia eg malaria, mulnutrition, helminthic, infestation	No. Of anaemia cases diagnosed as being a result of malaria, mulnutrition, Helminths	“	“	2
“	Distribution of anaemia mortality	Males/females cases in each group	“	“	3
“	Level of knowledge	Cause of anaemia, signs and symptoms, treatments at home and hospital/ health centre.	Focus group discussion (FGDS)	Primary source a) months b) TBAs c) Herbalist d) Health workers	4
	Level of knowledge of breast feeding and weaning food.	.Type of weaning .Food given to children	(FGDS)	Mothers, TBAs, herbalist and health workers	4
	Literacy level of parents.	highest level attained	(FGDS) Available records	Mothers, TBAs,Herbalist, OPD records.	4
	Levels of knowledge of preventive measures.	Type of preventive measures at home.	(FGDS)	“	4
	Cultural belief and practices	Types	(FGDS)	“	4