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ASSESSMENT NUTRITIONNAL STATUS OF PRIMARY SCHOOL CHILDREN OF EPE LOCAL GOVERNMENT AREA OF LAGOS STATE

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BY

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DEDICATION

This dissertation is dedicated to God who gave me the opportunity and made it possible, to my husband Engineer S.T. Lawal, my late parents Mr. and Mrs. Eboh, my guardian Chief S.A. Ogunbiyi and my children Foluke, Femi and Funmi for their support and encouragement.

ABSTRACT

NAME: **LAWAL, Mary Omolola**
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Malnutrition in children has become a major public health problem in Nigeria due to harsh economic situation. While research work has been carried out to assess the nutritional status of the pre-school children, not enough has been done on school age children. In this comparative study, the nutritional status of 480 primary school children, 180 of whom come from Coastal and 300 from the Mainland parts of Epe Local Government Area (LGA) of Lagos State were assessed using a combination of anthropometric measurements, physical examination, 24 hours dietary recall, and haemoglobin estimation. Socio-demographic data was also obtained by a standardized questionnaire. Students were randomly selected for the study using a multistage, 2 phase epidemiological design. The number of students from Coastal and Mainland areas were determined by quota sampling.

Using the National Centre for Health Statistics (NCHS) standard, the results that 82(45.6%) of Coastal and 147(49%) of Mainland students were moderately to severely malnourished (<-2STD), while 10(5.6%) of Coastal and 27(9%) of Mainland students were stunted in growth. Seven (3.8%) of students from Coastal and 16(5.3%) from Mainland areas were wasted. Assessment of their 24 hour dietary recall showed that significantly more students (50%) from Coastal area had protein in their diet in the last 24 hours, prior to the interview when compared with only 37% of students from the Mainland region ($X^2 = 18.27$, $p<0.05$). Goitre rate was higher in Mainland (1.3%) when compared with Coastal area (0.6%) though the difference was not significant (Yates Corrected $X^2 = 0.13$ $P\leq0.72$).

Iron deficient anaemia was found to be very high in both areas and haemoglobin estimation revealed that 39(43.4%) and 111(46/3%) from the Coastal and Mainland areas respectively were anaemic with haemoglobin levels <12g/dl. The difference was significant for trend among the male students in Mainland school ($X^2 = 14.98$; $P<0.020$). Factors found to significantly affect the students nutritional status include age, children 8 years and younger were better nourished than those 9 years and above in both Coastal and Mainland regions ($X^2 = 4.92$; $P\leq 0.03$; $X^2 = 14.6$; $P\leq 0.0001$) respectively. Other factors include availability of school meals ($X^2 = 36.41$; $P<0.0001$; $X^2 = 51.16$; $P<0.00001$) respectively and the strict adherence to food taboos ($X^2 = 22.61$; $P<0.0001$). Children whose fathers are teachers, civil servants and fishermen were better nourished than children of artisans, farmers and traders in both Coastal and Mainland areas ($X^2 = 3.90$; $P<0.05$; $X^2 = 3$; $P<0.05$) respectively. Children of working mother were better nourished than children of housewives in both Coastal and Mainland area ($X^2 = 4.5$; $P<0.03$; $X^2 = 13.59$; $P\leq0.0002$) respectively. Morbidity pattern has significant effect on the students nutritional status. In addition, the better nourished performed significantly better academically than their malnourished counterparts in both Coastal and Mainland schools ($X^2 = 28.3$; $P\leq0.001$; $X^2 = 28.5$; $P\leq 0.001$) respectively. Students from the Coastal part of the LGA were significantly better nourished than those from the Mainland region ($X^2 = 38.8$; $p\leq0.04$)

The research limitation was encountered with the parents of the students. It was difficult for blood letting. The Parent Teachers Association (PTA) had to be persuaded before the haemoglobin test was carried out and the PTA not allow stool test.

Based on the findings, it is recommended that more attention be paid to the diet of the older children; housewives should be encouraged where possible to have income generating activity to augment family income and school meals should be introduced into all schools in the LGA particularly the Mainland schools. Parents should be counselled on how to provide nourishing meals for their children within their resources.

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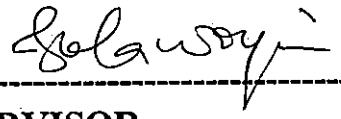
CERTIFICATION

I certify that this work was carried out by Mary Omolola Lawal in the Department of Preventive and Social Medicine College of Medicine, University of Ibadan, Nigeria.



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CHAPTER ONE

INTRODUCTION

1.1 DEFINITION

The level of nutrition and health status are direct indicators of the quality of life and indirect indicators of overall socio-economic development in a society.

Malnutrition could be said to be a pathological state in which an individual is taking in nutrients that are more or less than the required normal physiological range as needed by the body (Jelliffe, 1966). Malnutrition impairs immunocompetence so that children involved tend to be more prone to severe infection than healthy children, (Delgado, 1980). It could also result in adverse effects like kwashiorkor, marasmus, increased morbidity, increased mortality, and retarded growth which consequently impairs intellectual performance (Petelletier, 1994, Van de Broeck et al, 1993).

Nutritional status could be defined in terms of input and output indicators . Input indicators measure the food and nutrient intake like home

diet consumption, while output indicators include the clinical signs of malnutrition, biochemical indicators, physical activities and anthropometric measurements, thus making it more related to health and functional capacity,(Morterel et al 1990).

1.2 MAGNITUDE AND JUSTIFICATION

Malnutrition is a major determinant of mortality rate in children (Martorell et al 1990) and it has been documented that childhood malnutrition is widespread in Nigeria (UNICEF/Federal Government of Nigeria, 1990). Malnutrition has also been found to be the major cause of mortality and morbidity among the young children in the developing country (Idusogie, 1980, UNICEF/Federal Government of Nigeria, 1990, Jelliffe, 1963).

Bailey et al (1980) reported that malnutrition was responsible as an underlying cause for a high proportion of under-five deaths in the developing countries. It has been documented that more than one-quarter of a million children die every week in the developing countries as a result of chronic malnutrition and infection. (UNICEF/Federal Government of Nigeria 1988).

It has also been reported by UNICEF/Federal Government of Nigeria,

(1994) that more than 50% of the under-five children in the country are stunted i.e. chronically malnuourished; Malnutrition has a negative effect on intellectual performances,and it is a major cause of morbidity and mortality in a high proportion of children in Nigeria today. It therefore becomes an important public health problem and calls for urgent attention, in order to arrest this dangerous trend.

Ransome-Kuti et al (1972) reported in his study some socio-economic factors that contribute to malnutrition,and showed that malnutrition was more rampant among the lower socio-economic group in Nigeria. Epe Local Government area of Lagos State, which is the study area, is one of the rural local governments in Lagos State, and is partly surrounded by the lagoon. Due to the general economic hardship in the country and the deprived environment, with its coastal and mainland setting of communities, the inhabitants are mainly from the lower socio-economic class. A lot of studies have been done on the nutritional status of under-fives in Nigeria, but there is little or no information documented on the nutritional status of the primary school children of ages 6-13 years of Lagos state. In addition, not much

work has been carried out assessing the nutritional status of children from the same socio-economic background but different environments, viz, coastal and mainland environments. Also since Primary School education has been made compulsory in Lagos State, this age group 6-13 years will be available at school for effective intervention which can be implemented to improve the health of the school children.

Moreover, development and economic planners are looking for social indicators such as nutritional status to guide their decisions on economic development strategies. Nutritional status of the children is a health indicator, thus the information from this study will be useful for health planners as baseline data for developing intervention programmes to break the vicious circle of malnutrition in this age group. It is therefore pertinent for the nutritional status of this age group to be assessed.

This study was therefore carried out to fill in the gap on nutritional status of school age children in Epe Local Government Area of Lagos State.

1.3 OBJECTIVES OF THE STUDY:-

This study is primarily to assess the nutritional status of the primary

school children in coastal and mainland areas of Epe Local Government area of Lagos State.

1.4 SPECIFIC OBJECTIVE OF THE STUDY:-

1. The study is to assess the level of malnutrition among the primary school children in Epe Local Government area of Lagos State.
2. To compare the nutritional status of children in Coastal and Mainland schools of Epe Local Government Area of Lagos State.
3. To identify the factors that contribute to their nutritional status and make appropriate recommendations.

1.5 NULL HYPOTHESIS

There is no difference in the nutritional status of the coastal and mainland school students of Epe Local Government area of Lagos State.

CHAPTER TWO

2.1 LITERATURE REVIEW

A child responds to protein-energy malnutrition in two related aspects, viz, deceleration or cessation of growth and body wasting, which can be measured with standard anthropometric techniques, and the cumulative effect of malnutrition can be estimated by means of certain indicators. These includes weight for height index which shows wasting, weight for age, which shows under or over nutrition, height for age which shows stunting, or chronic malnutrition, mid-upper arm circumference and Body Mass Index (BMI). In addition, for children under 2 years, head and chest circumference are usually included. Each of these indices provides specific information on the nutrition status of a child (Mortorell et al 1980).

In 1994, Gorstein et al, worked on malnutrition and the use and interpretation of anthropometric measurements. The indices of weight for height versus height for age, versus weight for age, and, based upon many factors, with all these indices used together,gives better meaning to

anthropometric measurements. Using Z-score (or standard deviation) are also found to be more superior to percentiles, (National Center for Health Statistics 1976), especially in malnourished population.

It has been documented by Vella et al (1994), that height and weight and mid upper arm circumference measurement could be predictors of a child's survival, while mid-upper arm circumference was found to be the most sensitive of these measurements in predicting survival.

However, Morley (1968) compared the anthropometric measurement of School children in Imesi in Western Nigeria with British children and found that Nigerian 97th percentile was closer to British 50th percentile. When he now compared the Imesi group with the elites in Nigeria, the weight of the elite children were higher than that of Imesi children.

Ogunranti (1986) also supported this finding, concludung that the weight of the children from elite groups in Nigeria have comparable values with Tanner's figures for English children.

Mid-upper arm circumference has also been used to assess the nutritional status of pre-school children in the Northern part of Nigeria (Addo

1984), and it is a measure that has been shown to be highly correlated with weight, and weight for heights, (Morterell et al, 1982).

Also, Rankinen (1995) made use of the mid-upper arm circumference method to show that those children that have higher nutritional intake and take part in athletics had larger-upper arm muscle than those who take in less nutritional energy and were less active.

Omololu et al (1971) using skinfold thickness, and mid-upper arm muscle circumference of the pre-school children in Owu and Oba in the Western part of Nigeria, found out that the majority of the children were shorter and weighed less than the English 3rd percentile thus deducing nutritional dwarfing syndrome, while some of the children between ages 10 and 20 years were found to be wasted with low calorie reserves. Also in Osegere village in Western Nigeria, he found out, using weight for age and height for age, in infants, that sex plays a role in children. Male children were found to be heavier and taller in weight and height respectively than the female children.

2.2 STUNTING - EFFECT ON NUTRITION:

Stunting is a deficit in linear growth of children when compared with International Standards, Waterloo, (1987), observed that linear growth in children begins to fall in the sixth month of life. Growth in length in the early years of life is very sensitive to nutritional and environmental influences and in developing countries, the growth rate often falls off within a few months of birth but returns to normal by the fourth year, leaving the children with a deficit attained height and body size, compared with their privileged peers (Waterloo, 1987).

However, Hendricks (1995) using anthropometric method, found out that the acute and chronic protein - energy malnutrition (low weight for height) and (low height for age) respectively, based on Waterloo criteria remains common in sick children in the United States. He identified some risk factors such as underlying chronic disease during the period of normal rapid growth as a cause of malnutrition and recognised the need for nutritional intervention. Measuring of height and weight of Nepal children ages 0 - 6 years by Costello (1989) showed that the thinness of the child on subsequent height and weight velocity was reciprocal, while thin children seemed to increase in weight at the expense of height, thus suggesting that

stunting is caused largely by a reduced growth. He also found out that nutritional, intervention, after the second year of life are unlikely to alter the prevalence of linear growth retardation in poor communities. Onadeko (1980) in her study among the pre-school children in a rural community in Oyo state, in Nigeria documented their nutritional status to be markedly below that of the elite in society and significantly below that of other pre-school children residing in urban area but with similarly low socio-economics background.

2.3 BODY MASS INDEX AND NUTRITIONAL STATUS:

Body Mass Index is a new concept. Shetty et al (1994) studied the anthropometric measurement using Body Mass Index (BMI) (i.e. weight/height^2) and found it to be more useful in assessing nutritional status as it reflects the physiological, the social, and economic consequences of under-nutrition in a community and helps to assess the impact of intervention strategies in a population.

Cornu et al (1980) also supported this view when he carried out a cross sectional survey on Brazzaville children under 6 years old, using the BMI of

these children, he concluded that Body Mass Index is sensitive to economic changes. It also enables the negative effects of the economic crisis to be quantified. It could also be recommended as a possible indicator for monitoring the nutritional status at population level.

Also, Naidu et al (1994) studied the Body Mass Index (BMI) of some pre-school children and adults, he showed that the BMI values were lower in rural population in India with marked malnutrition.

2.4 SOCIO-ECONOMIC STATUS AND ITS EFFECT ON NUTRITIONAL STATUS:

The basic causes of malnutrition in developing countries are due to low socio-economic status. A lot of work has been done to show the effect of this by Akinlosotu et al (1985).

A distinct socio-economic gradation of malnutrition in relation to income has been shown by Akinlosotu et al (1985) and the percentage of normal children were significantly higher in the high-income group.

Oduntan (1971) showed that the elite children which were better nourished, came mostly from monogamous - homes and did better in school

when compared with the malnourished children. It was noted that there could be an improvement in the intelligent quotient of the malnourished children following an improvement in their diet.

This was supported by Musaiger et al, (1989) in his assessment of physical growth of school children in Bahrain, his result showed low growth rate by the none elite children compared to the elite children in Western State of Nigeria.

Also, in a survey of nutritional status among the international adopted children to United States of America, it was found that the anthropometric measurements of these children were below the means for weight and height based on WHO standards, which shows that there is growth and developmental delay due to environmental deprivation and low socio-economic condition (Miller et al 1995).

A comparison of heights and weights between children living in rural coastal area and non-coastal area of Kerela in India has shown a prevalence of various forms of growth retardation. This is more marked with children in rural coastal area due to environmental deprivation, despite a better food intake.

Also, Ransome Kuti (1972) found out in a study in Mushin, Lagos, Nigeria, that ignorance, about most nutritional foods such as beans, meat, and fish have been a cause of malnutrition among the low income group. He also suggested health education especially of the mothers to play a vital role in wiping out ignorance among the poor communities.

To this effect, Scrimshaw et al (1960) highlighted the effect of poor environment leading to easy assess of infection among the low socio-economic group which he argued could shift an undernourished child's nutrition from positive nitrogen balance to a negative one and might precipitate kwashiorkor.

Kapil et al (1989) also contributed to this view in his study of pre-school children residing in an urban slum in Delhi, where he found out that there is overall prevalence of protein energy malnutrition among these children.

It has also been documented by Izquierdo et al (1988) that somatic growth depends on genetic and nutritional factors and the latter are related to socio-economic status of the population concerned.

In another study that Cornu et al (1995) carried out in Congo, due to the introduction of structural adjustment programme (SAP) he showed the negative effect of the economic crisis on the nutritional status of children under 6 years. The nutrition of these children were seen to be affected depending on the head of household occupation and economic level of the family.

Vella et al (1995) also showed that socio-economic status and environmental factors were related to poor nutritional status in his cross sectional survey carried out among under-five children in South-West Uganda. He also documented the negative association of some infections like diarrhea, with all the anthropometric parameter he used, suggesting a directional influence of diarrhea on malnutrition.

However, Ahmed et al (1993) showed in his nutritional study of children 5 - 12 years in Dana City, Bangladesh, that there is a complex interaction between the concentration of biochemical index on nutritional status and socio-demographic anthropometric and biochemical variables.

This was also supported by Osman et al (1993) using anthropometric

measurement to determine the nutritional status of children aged 3 - 12 years, from wealthy families in Malaysia, he showed that these children from wealthy families have growth rates comparable to children in the developed countries. Also, Shar et al (1993) studied the nutritional status of children of the displaced families in Greater Beirut in (1986 and 1991), of ages 1 - 3 years, the lower nutrient intake in 1991 compared to 1986 was negatively related to social class, while their anthropometric measurements showed an increased past and recent under nutrition of these children in 1991 as compared to 1986. This was attributed to severe inflation and marked increase in food prices, thus reflecting in their dietary intake and growth.

Lin in a survey, in 1992 showed the nutritional situation in Kuala Lumpur among the underprivileged pre-school children squatter. He pointed out the wide disparity in the socio-economic status between the advantaged and the poor groups in the city as reflected in the dietary practices and nutritional status of these children. He observed that the percentage of pre-school children from urban poor household with inadequate intakes of calories and nutrients is two to three times higher than those from the advantaged group.

In Philippines, South East Asia, Florentino et al (1992) observed in their nutritional studies of the children that the economic factors exerted a big impact on the nutritional situation, particularly on the dietary status of the households and the nutritional status of the children. Due to the economic dislocation that always occur in developing countries, it appears therefore that the nutritional situation in these countries is highly dependent on the economic situation, globally, and nationally.

However, Mora et al (1992) compared the nutritional status of Colombian infant and young children between 1965 to 1986, he found a marked improvement in their nutritional status with marked reduction of malnutrition paralleling socio-economic gains. Also, social class has been shown to have effect on nutrient intake on height of children, (Lopez: et al 1992). He found out this in his study of Adean equadorian children, using three sub-groups of nitrogen supplementation. He suggested this could provide a reliable means of assessing the effect of nutritional programme intended to improve the growth of children in under-developed countries.

2.5 BIRTH ORDER AND NUTRITIONAL STATUS

Birth order in a family has been documented to have some impact on the child's chance of survival, (Vella et al, 1992) thus a birth order higher than five with low socio-economic background has been shown to have a significant association with child mortality, in effect, nutritional status and specific socio-economic factors are both, independently important predictors of child mortality.

2.6 ADOPTION OF CHILDREN AND NUTRITIONAL STATUS:

Adoption of children in relation to their nutritional status has been found to produce developmental delays and reversibility of growth, findings are applicable to any environmentally deprived child, (Miller et al 1995).

2.7 NUTRIENT INTAKE AND NUTRITIONAL STATUS.

A lot of work has been done on nutrient intake in relation to nutritional status. The quality and quantity of nutrients taken by a child has been shown to have a significant impact on their nutritional status, (Odumodu et al, 1994). He observed in his study of preschool children in Jos, Nigeria children who

are fed with adequate food nutrients have a significant increase in their anthropometric measurement of weight for age than those fed on local food stuff with no further food supplement.

However, Nnanyelugo et al (1985) documented in his cross sectional study of the nutritional status of some Nigeria children 1-15 years in Anambra State of Nigeria, that rate of growth for age in children has significant association with the quantity of food eaten, instead of the parents education.

Brown et al (1993) found that some type of diet e.g polysacchride significantly and markedly reduced the duration of liquid stool excretion thus helping the nutritional status of a child with diarrhea positively.

2.8 OBESITY AND NUTRITIONAL STATUS.

It has been documented by Hauke et al (1992) in a cross sectional survey using anthropometric measurements among Mescalero Apache Indian preschool children that improvement in nutritional intake has led to decrease in underweight and short stature among these children within a period of 20 years, however given the current high prevalence surveillance of obesity among them, the surveillance of nutritional status should be continued and

appropriate interventions be developed to treat and prevent obesity in this population.

2.9 NUTRITIONAL VALUES OF SOME NIGERIA SCHOOL MEALS

A typical Nigerian diet has been analysed to contain a high carbohydrate, low protein and high fats (Egwin 1972). Due to the high level of physical activity an average Nigerian passes through at work, the diet could be said to meet their energy requirement.

It has also been of help since it lower the incidence of atherosclerosis and coronary disease among them (Falase, 1973).

However it has its hazard especially the excess of the staple tuber, like cassava (Gari) which causes suppression of thyroid function due to production of thiocyanate, cyanide poisoning and neurological diseases e.g. "Rase Rase" (Egwin, 1972).

The thiocyanate and cyanogenic glycosides in-vivo has been seen to be an anti-sickling agents, and this may be useful in the management of sickle cell patients, also it has been documented to be an effective therapeutic

antineoplastic agents.

Moreover, the chemical composition and the nutritive value of some Nigeria School snacks has been analysed (Ketiku, 1985). Snacks like Lollipop, cakes, Ice cream, buns, cooked beans, puff-puff, cooked rice have been analysed for their protein, sugar, (energy), mineral and water content.

Ice cream has the highest moisture content (85%) with the lowest energy gain of 57 kcal/100g, cooked beans has the highest protein content of 15g/100g and buns has the highest energy content of 325Kcals/100g). Beans has been found to support growth while some of these snacks has been found to cause weight loss in experimental animals.

2.10 SCHOOL MEALS AND NUTRITIONAL STATUS

The effect of School Meal Programme (SMP) on learning and nutritional status of primary school has been documented by many researchers. Kanno (1973) using an intelligence test, anthropometric measurements, teacher's report and close observations in class rooms, found no significant difference between the intellectual measurements, teacher's report and close observations in class rooms, and found not much significant

difference among school meal programme participants and non-participant school children.

Roy et al (1970) also supported this view when in his evaluation of school lunch programme in Orissa, India, among the primary school children, he found no significant difference in the academic performance of the boys that participated in school meal programme and those that did not.

However, contrary to the above view, Agarwal et al (1989) documented that there is some gain among the primary school children who participated in school mid-day meal programme than those children who do not, giving them a better physical growth and mental function.

2.11 BREAK - FAST OMISSION AND NUTRITIONAL STATUS

Meyers (1989) found a positive improvement in the absence rate and academic performance of the primary school children in Boston-USA who participated in the school break fast programme than those of the children that do not participate, thus participating in the school meal programme is said to be associated with significant improvements in academic functioning among low income elementary school children.

2.12 COGNITIVE FUNCTIONS AND NUTRITIONAL STATUS

A lot of work has been carried out on the relationship between diet and cognitive development as it relates to the level of the students cognitive perfromances and is in part, a function of the adequacy of his or her diet.

Cognitive function include memory, hearing, problem solving, language acquisition and use, and abstract thinking, (Rugutti et al,1972).

It has been suggested that cognitive function of a child could be further developed if an undernourished child is provided with an adequate diet, (Meyers 1989). This is said to also improve test scores, decreased repetition of grades, decreased drop-out and absenteesims rates. Thus school feeding programme(SFP) has been advocated.

This beneficial effect of SFP has made University of California, Berkeley, in 1978, to establish a collaborative research programme on the relationship between diet and cognitive development as it relates to student's cognitive performance.

It has been documented in University of California by Berkeley (1980) that mild to moderate malnutrition acts synergistically with social

environmental factors to affect cognitive function, and that increased calorie intake affects work output positively. It has also been suggested that the effect of supplement are greater in "unfavourable" environment than in favourable one.

Richardson (1980) in University of California Berkeley, suggested the need to have a broader concern for the total ecology of a child's development than nutrition as the sole primary cause of cognitive impairement of a child. From the hypothesis that "malnutrition results in a lag in the development of sensory integrative capacities, Cravioto et al (1966) supported this hypothesis from his study of Guatemala children in a rural village in California when he found that children in lower quartile for height showed poorer intersensory integration for the visual, tactile and kinesthetic modalities than children in the highest quartile, further study reveals a functional relationship between chronic undernutrition and intellectual deficit.

Sigman et al (1989) in his cognitive findings among Kenya chidlren, using nutritional factors, family characteristic and duration of schooling, found that better nourished children had higher composite scores of test of

verbal comprehension, and they are more attentive during classroom observation than those children who were malnurished.

However, Weinbergeral (1974) and Balderston (1981) documented that bigger children remain longer and do better in school, have higher test scores, and that nutritional intervention alone may account for bigger and cognitively more advanced children respectively.

Also Weinbergeral (1974) documented that the longer the treatment for malnutrition in a younger child the greater the impact of intervention.

Furthermore it has been demonstrated that a moderate degree of malnutrition could influence the 1 Q scores of a child having a higher magnitude on his immediate memory, visual perception and visual motor integrreation as compared to verbal reasoning and comprehension, Upadhay et al (1989).

2.13 MOBIDITY AND NUTRITIONAL STATUS

Childhood infections, infestations and diet deficiences have been a major cause of mobidity in children in developing countries, Ahmed et al (1989), Akpede (1994).

2.14 MICRO NUTRIENT DEFICIENCES AND NUTRITIONAL STATUS

Deficiencies in some vital nutritional components could cause ill health. In iron deficiency and Nutritional Anaemia, Abidoye et al (1988) has observed hypochromic Iron deficiency anaemia in secondary school children of both Federal and State Secondary schools in Lagos State Nigeria. Among ages 14 and above he observed that there is no significant correlation between eating or not eating of school meals. He also documented the higher prevalence of anaemia among female students than male students of both Federal and State Secondary Schools.

Nutritional anaemia has been found more common among children with poor personal hygiene than their counter part, (Ojo Fehintimi 1983).

Also in Makurdi, Benue State Nigeria, Abidoye et al (1988), studying the aetiology of nutritional anaemia, found out that mild to moderate protein calorie malnutrition is associated with iron deficiency anaemia.

Nutritional anaemia in pre-school age children has also been found common in the Carribean and Suriname where their haemoglobin level has

been found to be less than 10g/dl as compared with WHO standard of 11g/d1 for such age group (Simmon et al 1982), while for school age group WHO standard of 12g/d1 has been recommended but most children in this age group from developing countries do not meet the standard. He also documented that most of these nutritional anaemia were attributed to iron deficiency while folate defiency came second. However Vitamin B12 deficiency was not found to have much effect.

Tellez et al (1994) in his evaluation of the children's nutritional status of 10-12 years Bolivian boys, he deduced that higher-altitude hypoxia has had an overall effect on haemoglobin, given it higher value.

However, Stefanidis et al (1992) has docuemnted in their correction of ten ambulatary peritoneal dialysis at Athens, Greece, that correction of nutritional anaemia with human erythopoietin would possibly have a positive effect on nutritional status of a child by improving appettite and protein metabolism if the child is malnurished but no effect on well nourished children.

2.15 VITAMIN A DEFICIENCY AND NUTRITIONAL STATUS

Another common nutrient deficiency in Nigeria is vitamin A. This has made it necessary for the State and Federal Ministry of Health in Nigeria to introduce the vitamin A supplementary programme for all post natal mothers that attend the post natal clinic through out the federation.

However, Ramakrishnan et al (1995) found out in his study of vitamin A supplementation and mobidity among pre school children in south India that vitamin A supplementation does not reduce common morbidity in children with mild to moderate vitamin A deficiency in areas where access to health care and immunization are good.

2.16 PARASITIC INFESTATIONS AND NUTRITIONAL STATUS

It has been documented that parasitic infestations are less prevalent among children who are well nourished and who live in a better environmental condition (Ahmed et al (1989).

Thus, Cerf (1981) concluded in his parasitological study of children in rural Belinesse Village that lower nutritional intakes and lack of health care facilities or its low utilization gives a significant negative correlation between

De Andrade et al (1995) also had the same view with Lindt jorn et al (1993) when he documented that there is an association of interaction between study on nutritional status and trypanosome cruzi infection, when he did a nutritional survey among the Brazillian school children of ages 7 - 12 years. He found that seropositive children had a higher risk of being stunted than unaffected children.

2.18 MORTALITY AND NUTRITIONAL STATUS

The prevention of child mortality is a commonly stated health goal in developing countries and the target of much international assistance in the health sector. Over the past decade the primary strategy for accelerating the reduction in child mortality has been the dissemination of simple, low-cost technologies, such as immunization, oral rehydration therapy and antibiotics, that target specific diseases, (Huffmann and Steel, 1994).

Pelletier (1994) in his review noted that malnutrition and disease have a synergistic relationship and that the optimal strategy may involve a combination of health and nutrition interventions. It has been estimated that malnutrition especially protein energy malnutrition was the underlying or

contributing cause of death for roughly half of all deats to children age 1 - 4 years in several Latin American countries (Puffer et al, 1993). He further points out that there are accumulated results which are consistent in showing that the risk of mortality is inversely related to anthropometric indicators of nutritional status and that there is elevated risk even in the mid-to-moderate range of malnutrition. He finally deduced that all nutritional related deaths are associated with mild-to- moderate malnutrition rather than severe malnutrition, thus most studies showed that 46 - 80% of all nutrition related deaths are in the mild-to-moderate category.

Vella et al (1994) using anthropometric measurements, also suggested that nutrition has an influence on mortality which he said is independent of socio-economic status, in his under 5 children study in Uganda.

However, Van Den Broeck et al (1993) in his own nutritional status study of under 5 in rural Zaire documented malaria and anaemia to be the commonest causes of death, while extreme kwashiorkor is another major cause of death.

In Nigeria, malnutrition is found not only to be a major cause of death in childhood but also a contributory factor to other causes of death. (UNICEF, 1998)

CHAPTER THREE

MATERIALS AND METHODS

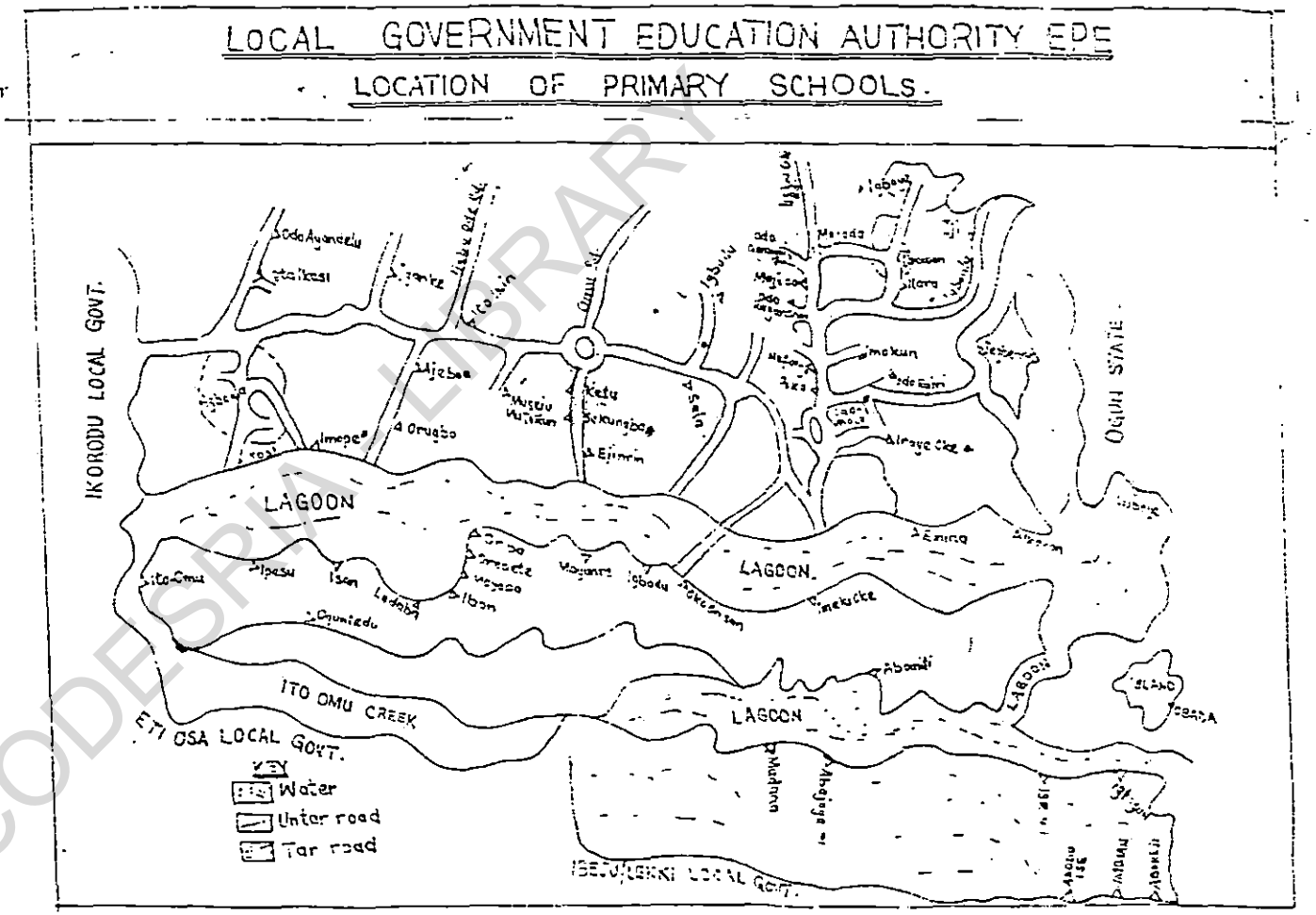
3.0 Primary School children of Epe L.G.A. were the focus of this study.

3.1 BACKGROUND INFORMATION ON STUDY AREA

Epe Local Government is one of the fifteen Local Government Areas of Lagos State. It is divided by the Lagoon to coastal and mainland regions. The major towns in the mainland part are Epe, Agbowa, Ajebo, Sekungba, Igboye Ejinrin, Igbonla, Iraye Oke and Ketu, while coastal part has Oriba, Ise, Abomiti,and Yegunda towns.

The Local Government Area is more of a low land with occasional highlands but with relatively flat features. It is situated at latitude 6° N and longitude 3^0 77^1 E of Green Meridian. The area is swampy and almost encroached in the South by the Lagos Lagoon, in the West by Ogun State and Lagos Lagoon, and Northward by Ogun State (*Figure I*). It has rainfall throughout the year following equatorial type of climate. The vegetation is

Figure 1



rain forest with mangrove forest in the creek.

Historically, the Local Government was believed to be founded by Huraka who is an hunter who settled there. As of now the Local Government Area is inhabited by the Yorubas, mainly the Ijebu and Eko origin.

Population:

The Local Government Area has a population of ninety-nine thousand (99,000) by the last census figure released in 1993.

Socio-economic Activities:

The people's main occupation are fishing, farming and petty trading while there are some artisans. and some civil servants. Fishing is so widely spread that they have a special fish market known as 'Oluwo'. Some crops like cassava, maize and yam are also grown by the people. Fishing is commoner in the coastal area than farming and vise visa.

Religion:

The people's religion are predominantly Chrisitan and Islam. There are does of traditional religion also. They have some traditional festivals which they join their neighbour to perform.

Physical Infrastructure:

The road network that connects to major towns in the Local Government are not well developed, although they have some fairly good network road to other neighbouring Local Government. However, they have a well-developed jetty system for all boats coming from the East and West.

Their major water supply comes from bore holes, and the Lagoon, though there is a mini water work through which water is distributed to some major towns. Other accessories like telephone are in their major towns. There is electrical supply by the National Electrical Power Authority (NEPA), while some people supplement this with generators.

They have a plywood industry in Epe town, owned by the Odua Investment Company.

Medical Facilities:

There is a General Hospital in Epe town. There are some health centres in other towns like Ketu, Igbonla and Agbowa.

There are many dispensaries in other villages. Primary Health Care Centres are established in Ketu and Agbowa town to serve the school

children around there. There are private hospitals scattered mainly in the major Local Government towns which supplements the Government effort on health care delivery.

Educational Facilities

Epe Local Government has 74 Primary Schools with a total of 23,874 students enrolled in them. There are 12,099 males (50.7%) and 11,775 females (49.3%) (Local Government School Authority, Epe 1996).

The Primary Schools are under the control of the Local Government Education Authority.

Description of the Schools in Study Area

The buildings of the schools are block classrooms, well-roofed, and colourfully painted. The surroundings are neatly kept with decorative flowers all over. The bush around are low cut. The landscape is relatively flat and sandy. There are adequate recreation facility spaces for games like football and physical education. There are trees planted round the schools to give shade. There is good plastic container outside at a corner of the schools for refuse disposal. There are toilet facilties, some of the schools have water

system toilet facilities while some make use of pit laterines. Most of the schools get their water supply from well water, few have water being supplied by water tankers.

The classrooms are well aerated with adequate wooden windows. The floors are smoothly cemented. The classrooms have good sitting desks and long benches with back rest for the pupils. The classes are not crowded about an average of 33 pupils in a classroom and each classroom is about 20 feet by 25 feet.

School Meal Facilities

There were only few organised school meals in all the schools inspected. Food hawkers sat around under shades of trees to sell the food and snacks to the students. In the mainland schools, the food hawkers were up to four or five in number, in some of the schools while they were very few, about one or two in the coastal schools. This may be due to the fact that most of the students from the coastal schools live very close to their schools, so not many of them take school meal, they usually run home to eat their meal during school breaks.

3.2 STUDY DESIGN AND SCOPE

This was a descriptive, cross-sectional comparative study, aimed at assessing the nutritional status of primary school children in Epe Local Government Area of Lagos State, using multistage epidemiological design.

3.2.1 Target Population

The target population were the children in 74 primary schools in the Epe Local Government Area of Lagos State, from two distinct geographical areas - viz-Coastal area and Mainland area.

3.2.2 Sample size Estimation for the study

$$\text{Using } n = Z^2 \frac{[p(1-p)]}{d^2}$$

Where n = minimum sample size

p = Best estimate of population prevalence = 50%

d = The difference between the true population rate and the sample rate that is tolerable (precicions) =5%

Z = A constant at 95% confidence level

(Ref. Kish & Leslie Survey sampling, (1965)

Applying the formula above at 95% confidence level, it gives a minimum sample size of 3 8 4. However, sample size of 480 was used in order to have enough numbers to work with.

3.2.3 **Sampling Procedure:**

The Local Government primary schools were first stratified to coastal and mainland schools. There are 52 schools in the mainland and 22 schools in the coastal area. Two out of the 22 schools and 5 out of the 52 schools were chosen respectively from coastal and mainland schools, representing about ten per centof schools from both areas. Using simple random method, a total of 7 schools from the Local Government area were chosen. The chosen schools from Mainland area were Ajebo Anglican Primary School with student population of 189, having 94 boys and 95 girls.and Igboye Local Government Primary School with student population of 180, having 100 boys and 80 girls; Local Government Primary School, Sekungba with student population of 185, having 103 boys and 82 girls; REM Primary School, Igbonla, having student population of 190, with 107 boys and 83 girls, and UPE Primary School, Iraye Oke having student population of 192 with 104 boys and 88 girls. The coastal schools are Ise Local Government School with student population of 195 having 95 boys and 100 girls, and Ikosi Beach Local Government School having student population of 385 having 205 boys

and 180 girls.

The 480 sample size was proportionally divided among the 7 schools according to the student population of each shcool, six out of the seven schools had almost an equal student population, thus, 60 students were chosen from each school by simple random system stratifying for sex. One of the coastal schools had twice the population of each of the other six schools, thus, 120 students were chosen from the school by simple random system, stratifying for sex as in each of the above six schools. The student population in each of the primary 1 to 6 classes are almost equal on the average, thus, 10 students from each class were chosen by simple random system by balloting, after stratifying for sex.

In the seventh school, twice the number of students were chosen using simple random sampling technique by balloting from each class after stratifying for sex, thus, 20 students from each class were chosen.

3.3. CONSENT FROM THE AUTHORITY

A letter of introduction tothe Local Government Education Authority (LGEA) of Epe was obtained from the Department of Preventive and Social

Medicine UCH, Ibadan. *see Appendix III* An introductory letter to the Head Teacher of the concerned primary schools was obtained from the Education Secretary of the Epe Local Government. *See Appendix I.*

3.4. INSTRUMENT FOR DATA COLLECTION

The instrument used for data collection were a set of questionnaires. This was in five parts:

Section A - dealt with the demographic data

Section B - dealt with the nutritional data

Section C - dealt with the health data

Section D - dealt with the Teachers' report on the children's school performance.

Section E - dealt with the general physical examination, anthropometric measurement, and the laboratory investigation.

The questionnaires contained both closed-ended (Precoded) and open ended questions to allow for free responses to the questions, *Appendix I.*

The questionnaires were administered to the school children and their

teachers during the school hours between 8 am to 1.30 pm using about 15 minutes to complete each questionnaire. The pilot study was done in a Local Government primary school in Epe town in Mainland region, of Epe Local Government Area of Lagos state. The questionnaire were pre-tested in the schools and the students were randomly selected. This school was not among the schools chosen for the study.

The questionnares were standardised from a review of relevant records and literature before it became an instrument for use. All interviewers were adequately trained in terms of methodology and anthropometric evaluation.

3.4.1 Anthropometric and Physical Examination

Measurements made were that of weights, heights and mid-upper arm circumference.

Weight

A good quality spring scale was used to measure weight, in kilograms. The scale was checked before each weighing to make sure it read zero. It was also tested for accuracy daily using objects of known weight. The

weight was read at correct eye level.

Height

A calibrated rule in centimmetres was used with the children standing straight - eyes looking forward and knees press straight.

Mid-Upper-Arm Circumference:

With a measuring fibre tape,in centimetres the mid-point of the left upper arm; was identified and the tape was held snugly around the arm at this point with the hand hanging straight.

3.4.2 **Laboratory Investigation:**

Heamoglobin estimation was done by puncturing the left thumb and using Lerdele haemoglobin scale (Lerdele haemoglobin Co. UK) to estimate the level. This was standardised with the chart from the Federal Ministry of Health and National Primary Health Care Development Agency (1995). (*Appendix II*).

Clinical Screening:

This was done on all the children by the author in the headmasters' office, of each school using two benches as an examination table. This

eliminated errors by different examiners.

3.4.3 Data Analysis:

The pre-coded questionnaire was entered and analysed by means of Epi-Info 6 statistical computer software programme. The results were subjected to appropriate statistical analysis, using frequency tables and tests of significance using X^2 (Chi square). Yates corrected Chi square to verify or reject the study hypotheses using the 5 per cent probability level.

3.5 LIMITATIONS:

It was difficult for blood letting. The Parent Teachers Association (PTA) had to be persuaded before the haemoglobin test was carried out and the PTA did not allow stool test.

CHAPTER FOUR

4.0 RESULTS

4.1 DESCRIPTION OF STUDY POPULATION

There were a total of 480 students examined in both Coastal and Mainland schools of Epe Local Government Area of Lagos State. Out of these, 150 students came from Coastal Schools i.e from Ise Local Government Primary School and Ikosi Beach Local Government School, while 300 students came from the Mainland School i.e from Ajebo Anglican Primary School, Igboye Local Government Primary School, Sekungba Local Government Primary School, REM Primary School Igbonla and UPE Primary School Iraye Oke.

Demographics Information

Tables 1 to 6 show the distribution of the student of both Coastal and Mainland Schools by age, sex, occupation of the parents, the marital status of the parents, their religion, the students home sanitary environment and their source of drinking water at home .

4.2 TABLES

Table 1

Age distribution of students in Coastal and Mainland Schools

Age	Coastal Schools		Mainland Schools	
	No examined	(%)	No examined	(%)
6	23	(10.6)	39	(13)
7	25	(13.3)	44	(14.7)
8	26	(12.6)	43	(14.3)
9	29	(15.3)	27	(9)
10	28	(16.6)	46	(15.3)
11	16	(10.6)	28	(9.3)
12	20	(11.3)	46	(15.3)
13	13	(10)	27	(9)
Total	180	(100)	300	(100)

The age distribution ranges from 6-13 years in the study from both the Coastal and Mainland schools.

Table 2

Sex distribution of the students in Coastal and Mainland schools

Sex	Coastal Schools		Mainland Schools			
	No. examined	(%)	No. examined	(%)	Total no examined	Total (%) examined
Male	103	(57.2)	153	(51)	256	(53.3)
Female	77	(42.8)	147	(49)	224	(46.7)
Total	180	(100)	300	(100)	480	(100)

This table shows the sex distribution among the examined students from Coastal and Mainland schools.

There were more males especially in the coastal region than females. See Table 2.

Table 3

Distribution of students of Coastal and Mainland schools by sex and age

Age	Coastal school students		Mainland school students	
	Female (%)	Male (%)	Female (%)	Male (%)
6	10 (13)	13 (12.6)	24 (16.3)	15 (9.8)
7	14 (18.2)	11 (10.7)	18 (12.2)	26 (17)
8	7 (9.1)	19 (18.4)	26 (17.7)	17 (11.1)
9	11 (14.3)	18 (17.5)	13 (8.8)	14 (9.2)
10	15 (19.5)	13 (12.6)	21 (14.3)	25 (16.3)
11	8 (10.4)	8 (7.8)	23 (15.6)	5 (3.3)
12	7 (9.1)	13 (12.6)	11 (7.5)	35 (22.9)
13	5 (6.5)	8 (7.8)	11 (7.5)	16 (10.5)
Total	77 (42.8)	103 (57.2)	147 (49)	153 (51.0)

Table 3 shows the distribution of students in both study areas by sex and age. The ratio of boys to girls in the coastal schools was about 1.3 to 1 while in the mainland schools it was about 1 to 1.

Table 4

Distribution of Students from Coastal and Mainland Schools by Fathers' Occupation

Fathers' Occupation	Students from Coastal Schools		Students from Mainland Schools	
	No examined	(%)	No examined	(%)
Fisherman	101	(56.1)	79	(26.3)
Trader	20	(11.1)	33	(11)
Artisan	14	(7.8)	18	(6)
Civil servant	12	(6.7)	29	(9. 7)
Teacher	16	(8.9)	27	(8.7)
Farmer	15	(8.3)	100	(33.7)
Others	2	(1.1)	14	(4.7)
Total	180	(100)	300	(100)

Predominant occupation found among fathers of students from the Coastal areas was fishing, while that of fathers of students in the Mainland area was farming. Other occupations include trading, teaching, artisan and civil servant.

Table 5

Distribution of Students from Coastal and Mainland School by mother occupation.

Mother Occupation	Coastal school students		Mainland school student	
	No examined	(%)	No examined	(%)
Trader	105	(57.8)	165	(55)
Artisan	28	(15.6)	47	(15.7)
Teachers	17	(9.4)	22	(7.3)
Housewives	17	(9.4)	29	(9.7)
Civil servants	7	(3.9)	9	(3)
Fisher women	4	(1.9)	18	(6)
Others	2	(1.1)	10	(3.3)
Total	180	(100)	300	(100)

In both regions trading was the commonest occupation among the mothers followed by artisans.

Table 6

Environmental Sanitation

Distribution of where students of Coastal and Mainland schools pass their faeces at home.

Location of passing faeces	Coastal school pupils		Mainland school pupils	
	No examined	(%)	No examined	(%)
Lagoon	95	(52.7)	-	-
Pit Latrine	48	(33.1)	197	(65.7)
Bush	31	(21.4)	71	(23.7)
Water closet	3	(2.1)	14	(4.7)
Bucket latrine	2	(1.4)	16	(5.3)
Others	1	(1)	2	(0.7)
Total	180	(100)	300	(100)

None of the students from mainland schools pass their feaces in the lagoon while 95 (52.7%) of students from coastal schools do. More students from mainland schools pass feaces in pit laterine 197(65.7%) compared with students from coastal schools 48(33.1%).

Table 7

Distribution of sources of drinking water for the students of Coastal and Mainland schools in their homes.

Sources of drinking water	Coastal school students	Mainland school students
	No examined (%)	No examined (%)
Well water	13 (7.2)	175 (58.3)
Ponds/Lakes	70 (48.2)	117 (47.7)
Lagoon water	95 (52.8)	0 (00)
Tap water	2 (1.4)	8 (2.7)
Total	180 (100)	300 (100)

Lagoon and pond water was the main source of drinking water for the students from coastal schools 95(52.8%), 70(48.2%) respectively, while well water and pond water was the main source of drinking water for the students of mainland schools 175(58.3%) and 117(47.7%) respectively. None of the mainland students obtained their drinking water from the lagoon.

ANTHROPOMETRIC MEASUREMENTS

Table 8

Distribution of students in Coastal school by age, mean weight, height, mid-upper arm circumference and BMI

Age	Weight (kg)	Height (cm)	Mid-upper arm circumference (Cms)	BMI (kg/m^2)
	Mean ± SD	Mean ± SD	Mean ±SD	Mean ±SD
6	19.3 ±4.15	115 ±15.47	15.74 ±1.23	14.88 ±3.45
7	20.3 ±3.46	118 ±5.47	16.05 ±1.45	14.91 ±1.93
8	21.00 ±3.48	120 ±6.64	16.16 ±1.25	15.49 ±2.93
9	25.03 ±3.5	124.7 ±11.63	17.41 ±1.56	16.08 ±2.31
10	26.5 ±4.07	129.5 ±10.48	17.78 ±1.29	16.38 ±2.99
11	27.9 ±6.63	131.9 ±16.07	17.98 ±1.85	16.68 ±3.79
12	29.1 ±5.93	133.2 ±12.53	18.39 ±1.75	16.85 ±2.34
13	32.5 ±6.59	138.5 ±7.67	20.33 ±2.21	17.24 ±3.15

NB SD = Standard deviation
BMI = Body Mass Index ($^{kg}/_{M^2}$)

Table 9

Distribution of students in Mainland schools by age and mean weight, height, mid- upper arm circumference and BMI

Age	Weight (kg)	Height (cm)	Mid-upper arm circumference (Cms)	BMI (kg/m^2)
	Mean ±SD	Mean ± SD	Mean ± SD	Mean± SD
6	19.5+4.92	109.5 +9.9	15.69 +1.09	14.34+3.56
7	21.4±4.75	117 ±10.23	15.88 ±1.92	14.45±2.47
8	21.80±3.45	118.5 ±10.1	16.0 ±1.45	15.10±2.88
9	25.63±4.866	120.7 ±11.64	16.88 ±1.84	16.05±3.02
10	26.9+3.78	125.5 +10.35	17.55 +1.64	16.22+2.08
11	28.1±4.63	130.8 ±8.31	17.65 ±1.65	16.58±2.22
12	30.1±5.13	132.5 ±11.56	18.11 ±1.8	16.73±2.6
13	32.9±5.43	138.3 ±11.49	19.49 ±2.32	17.03±2.65

Tables 8 and 9 show the anthropometric measurements an indication of availability of food in the community of students from both Coastal and Mainland regions. The mean weight of the Mainland students were slightly higher than the Coastal while the mean height and upper arm circumference and the BMI of Coastal students were slightly higher than the Mainland students.

Table 10

Distribution of Male Students in Coastal school by age and Mean Ht, Wt, BMI Mid-upper arm circumference

AGE	HEIGHT (cm)	WEIGHT (kg)	BMI (wt/h^2)	Mid upper arm cir.(Cm)
	Mean ±SD	Mean ±SD	Mean±SD	Mean±SD
6	108.7±7.56	19.2 ±5.8	14.15±3.73	15.73±1.46
7	118.1±4.42	20.21±3.19	14.57±1.99	16.33± 1.29
8	119.14±3.34	22.00±2.94	15.85± 2.33	16.96±1.95
9	125.3±10.59	24.91± 5.36	16.22±2.43	17.15±1.44
10	129.90 ±11.62	26.07± 4.32	16.02±3.14	18.20±1.10
11	130.5±14.78	27.25± 7.25	16.96± 3.55	18.61±1.92
12	134.00±14.57	29.00± 6.95	17.21± 2.80	18.71±2.04
13	141.0 ±6.46	32.60±4.51	17.55±2.69	20.1±1.95

NB
Ht = Height (cm)
Wt = Weight (kg)

Table 11

Distribution of male students in Mainland school by age and Mean Ht, Wt, BMI, Mid- upper circumference

AGE	HEIGHT (cm)	WEIGHT (kg)	BMI (w/h^2)	Mid upper arm cir (cm)
	Mean ±SD	Mean ±SD	Mean±SD	Mean ± SD
6	107.1 ±10.07	20.25 ±4.92	14.02± 3.31	15.21±1.09
7	117.06 ±10.642	21.94 ± 5.61	14.52±2.51	16.28 ±1.67
8	118.34 ±10.69	22.85 ± 3.13	15.83 ± 2.86	16.82 ± 1.57
9	121.1 ±11.81	23.62 ± 5.24	16.16 ± 3.10	17.07±2.47
10	127.3 ±11.33	25.38 ± 4.12	16.71± 2.07	17.50 ± 1.91
11	130.04 ± 8.56	27.95± 4.76	16.94± 2.27	18.00 ±1.66
12	133.64 ±14.73	29.00± 6.47	17.1± 3.94	18.67± 1.60
13	140.39 ±9.79	33.5±3.56	17.3 ± 1.92	19.0±1.53

Tables 10 and 11 above show the mean weight, height, BMI mid upper arm circumference for boys age 6 years to 13 years from Coastal and Mainland schools. Mainland school children weighed a little more than the Coastal students, while Coastal students were a little taller than the Mainland students. However, there were no difference in the mean BMI and mid-upper arm circumference of the students although those of the Coastal students were slightly higher than the Mainland students. The difference was not significant ($p>0.05$).

Table 12

Distribution of Female Students in Coastal schools by age,mean Ht, Wt, BMI and Mid-arm upper circumference

AGE	HEIGHT (cms)	WEIGHT (kg)	BMI(w/h^2)	Mid upper arm circumference (cm)
	Mean ±SD	Mean ± SD	Mean ±SD	Mean ± SD
6	114 ±18.25	19.39 ±2.50	14.33±3.00	15.15±0.87
7	117.91 ±6.82	20.73±3.93	14.42±1.93	16.25 ±1.68
8	119.11 ± 6.28	22.58 ±3.02	14.64±2.69	16.45 ±1.68
9	124.50 ± 6.28	23.58 ±3.02	14.67±2.69	16.87 ±0.93
10	129.92 ±14.71	24.23 ±4.09	15.87±3.82	17.62 ±1.56
11	130.50 ± 10.84	26.00±6.12	16.0 ±2.42	18.78 ±1.88
12	133.85 ± 1.80	29.08 ± 5.60	16.19 ±2.15	18.92 ±1.64
13	138.81 ± 8.72	33.13 ± 7.86	17.17±3.58	20.60 ±2.45

Table 13

Distribution of Female students in Mainland schools by age, Mean Ht, Wt, BMI. and Mid-arm Upper circumference

AGE	HEIGHT (cm)	WEIGHT (kg)	BMI (w/h^2)	Mid upper arm circumference (cm)
	Mean± SD	Mean±SD	Mean±SD	Mean ±SD
6	110.80 ±9.93	19.13± 5.85	14.72±4.20	15.03 ± 1.01
7	115.73±11.00	20.19± 3.38	14.14±2.03	15.50 ± 1.16
8	116.01± 9.32	21.77± 3.99	14.84±2.90	16.27 ± 1.30
9	118.43±11.79	23.50± 4.09	15.73±3.03	16.51 ± 1.33
10	124.84 ±8.89	26.32± 3.51	15.95±1.95	17.60 ± 1.41
11	126.20±6.94	27.60± 3.21	16.10±2.09	18.46 ± 1.77
12	131.79 ±10.50	27.74± 4.79	16.20±2.08	18.76 ± 1.57
13	136.94 ±12.64	32.56± 6.52	17.03±3.34	19.02 ± 2.11

Tables 12 and 13 show the distribution of the female students in Coastal and Mainland school by age and their mean height, weight, BMI and mid- upper arm circumference.

The mean height for age and mean upper arm circumference and BMI of the Coastal female students tended to be higher than that for Mainland students. The difference was not significant.

Table 14

Distribution of male students of Coastal and Mainland Schools by age and by Nutritional status

Age group	Coastal school students		Mainland school students	
	No and % Malnourished	No and % Nourished	No and % Malnourished	No and % Nourished
6	1(7.7)	12(92.3)	3(20)	12(80)
7	3(27.3)	8(72.7)	7(22.9)	19(73.1)
8	6(35.6)	13(68.4)	7(41.2)	10(58.8)
9	6(38.8)	12(66.7)	7(50)	7(50)
10	6(45.9)	7(56.1)	14(56)	11(44)
11	4(50)	4(50)	3(60)	2(40)
12	8(61.5)	5(38.5)	23(65.8)	12(14.2)
13	5(62.5)	3(28.6)	11(68.75)	5(31.2)
Total	39(37.9)	64(62.1)	75(49)	78(51)

The above table showed the distribution of male students from Coastal and Mainland schools by nutritional status. Malnutrition is -2SD of National Centre for Health Statistics median value (NCHS).

The younger male children tended to be significantly better nourished than the older male children. ($X^2 = 14.92$, $P<0.05$, $X^2 = 14.6$, $p<0.05$). Nobody was overweight i.e +2SD of NCHS media value. There was significance difference between the nutritional status of the male Coastal and Mainland school students X^2 38.8, $p<0.05$. The male student from Coastal school were better nourished that those of Mainland schools.

Table 15

Distribution of female students of Coastal and Mainland schools by age and by nutritional status

Age group	Coastal school students		Mainland school student	
	No and % Malnourished	No and % Nourished	No and % Malnourished	No and % Nourished
6	3(30)	7(70)	8(33.3)	16(66.6)
7	5(35.7)	9(64.3)	7(38.8)	11(61.2)
8	3(42.9)	4(57.1)	12(46.2)	14(53.8)
9	6(54.6)	5(45.4)	8(61.5)	5(38.5)
10	9(60)	6(40)	13(61.9)	8(38.1)
11	5(62.5)	3(37.5)	15(65.2)	8(34.8)
12	5(71.4)	2(28.6)	8(72.7)	3(27.3)
13	4(80)	1(20)	9(81.8)	2(18.2)
Total	40(51.9)	37(48.1)	80(54.4)	67(45.6)

The above table shows the distribution of female students of Coastal and Mainland schools by nutritional status and using -2SD National Centre for Health Statistics median value.

With the females the trend is the same as was found in the male students i.e the younger students were better nourished than the older ones $X^2 = 14.75$ ($p<0.05$), $X^2 = 14.3$, $p<0.05$.

Table 16

Distribution of students by sex from Coastal and Mainland schools by nutritional status

Sex	Coastal school student		Mainland school student		Total	
	No and % Malnou-rished	No and % Nou-rished	No and % Malnou-rished	No and % Nou-rished	No and % Malnou-rished	No and % Nourished
Male	47 (45.6)	56 (54.4)	82 (56.4)	71 (43.6)	129 (30.9)	124 (49)
Female	35 (45.5)	42 (54.5)	65 (42.2)	82 (57.8)	100 (44)	127 (56)
Total	82 (45.6)	98(54.4)	147 (49)	153 (51)	229 (47.7)	251 (52.3)

This table show the distribution of students by sex from Coastal and Mainland schools by nutritional status. A higher percentage of malnourished children were found in Mainland school children when compared with those from the Coastal region.

The percentage malnourished among the student of the male Mainland school is greater 82(56.4%) than the male student in the Coastal school 47(45.6%), though it is not significant $p>0.05$. However the prevalence of malnutrition among the students of Coastal 82(4.6%) and Mainland students 147(49%) are sigificant $X^2 = 38.8$, $p<0.04$.

Table 17

Distribution of Coastal and Mainland male school students by weight for height.(wasting)

Age group	Coastal school students		Mainland school student	
	No and % Wasted	No and % Normal	No and % wasted	No and % Normal
6	0(0.0)	13(100)	0(0.0)	15(100)
7	0(0.0)	11(100)	0(0.0)	26(100)
8	1(5.2)	18(94.7)	2(11.8)	15(88.2)
9	1(5.5)	17(77.8)	2(14.3)	12(85.7)
10	1(7.7)	12(92.3)	3(12)	22(88)
11	1(12.5)	7(87.5)	1(20)	4(80)
12	0(0.0)	13(100)	1(2.9)	34(97.1)
13	0(100)	8(100)	0(0.0)	16(100)
Total	3(2.9)	100(96.1)	9(5.8)	144(94.2)

The above table shows number and percentage wasted using weight for height for males by age for students from the Coastal and Mainland schools (wasting was weight for height less than 2SD NCHS standard). None of the 6 - 7 year old were wasted in both Coastal and Mainland schools and also none of age 12 and 13 were wasted among Coastal school students. Only one child aged 10 years was seen to be wasted among Mainland school students. This difference is not significant statistically, $X^2 = 0.41$, $p>0.05$. Wasting was found to be commoner in children between the ages of 8 and 11 years in both Coastal and Mainland schools.

Table 18

Distribution of Coastal and Mainland Female School Students by weight for height (wasting)

Age group	Coastal school students		Mainland school student	
	No and wasted (%)	No and Normal (%)	No and wasted (%)	No and Normal (%)
6	0(0.0)	10(100)	0(0.0)	24(100)
7	0(0.0)	14(100)	0(0.0)	18(100)
8	0(0.0)	7(100)	2(3.8)	24(96.1)
9	1(9.1)	11(88.9)	2(10)	11(90)
10	2(20)	13(80)	3(4.8)	18(95.2)
11	0(0)	8(75)	0(0.0)	23(100)
12	0(0.0)	7(100)	0(0.0)	11(100)
13	0(0.0)	5(100)	0(0.0)	11(100)
Total	3(3.9)	74(96.1)	7(4.8)	140(95.2)

The above table shows the distribution of female students in both Coastal and Mainland regions who are wasted (weight for height less than 2SD median value NCHS standard). More students were seen to be wasted in Mainland than in Coastal schools the same is applicable as for their male counterpart. The difference is not significant $X^2 = 0.39$, $p>0.05$.

Table 19

Distribution of Students by sex from Coastal and Mainland schools showing wasting using weight for age .

Sex	Coastal school students		Mainland school student		Total Wasted and (%)
	No and (%) wasted	No and (%) Normal	No and (%)wasted	No and (%) Normal	
Male	4(3.6)	99(96.4)	9(5.8)	144(94.1)	13(5.1)
Female	3(3.9)	74(96.1)	7(4.8)	140(95.2)	10(4.5)
Total	7(3.8)	173(96.2)	16(5.3)	284(94.7)	23(4.8)

From the above Table, wasting was commoner in children from Mainland schools. The overall state of wasting among the male and female of both Coastal and Mainland school is not significant $X^2 = 0.44$, $p>0.05$.

Table 20

Distribution of Coastal and Mainland male school student by height for age (stunting)

Age group	Coastal school students		Mainland school student	
	No. and % Stunting	No. and % Normal	No and % wasted	No. and % Normal
6	0(0)	13(100)	0(0)	15(100)
7	0(0)	11(100)	0(0)	26(100)
8	0(0)	19(100)	0(0)	17(100)
9	2(11.1)	18(88.9)	2(14.3)	12(85.7)
10	1(7.7)	12(92.3)	3(12)	22(88)
11	1(12.5)	7(100)	2(40)	3(60)
12	1(7.7)	12(76.9)	6(11.4)	29(88.6)
13	1(12.5)	7(89.5)	5(31.2)	11(68.8)
Total	6(5.8)	97(49.2)	18(11.8)	135(88.2)

Table 20 shows proportion of students stunted (Height for Age -2SD NCHS standard) among the Coastal and Mainland school male students. Stunting was uncommon below age 8 years. It was a feature of the older age group particularly in Mainland schools. More male students were found to be stunted in the Mainland school when compared with males students of Coastal school. The difference was significant.

Table 21

Distribution of Coastal and Mainland female school students by height for age (stunting)

Age group	Coastal school students		Mainland school student	
	No and % stunted	No and % Normal	No and % stunted	No and % Normal
6	0(0)	10(100)	0(0)	24(100)
7	0(0)	14(100)	0(0)	18(100)
8	0(0)	7(100)	1(3.8)	25(96.1)
9	0(0)	11(100)	2(15.4)	11(84.6)
10	0(0)	15(100)	1(4.8)	20(95.3)
11	2(25.0)	6(75.0)	1(4.3)	22(95.7)
12	2(28.6)	5(71.4)	2(18.2)	9(81.8)
13	0(0.0)	5(100)	1(9.1)	10(90.9)
Total	4(5.2)	73(94.8)	9(6.1)	138(93.9)

This table shows the distribution of female in Coastal and Mainland schools by height for age and the proportion, that are stunted i.e have chronic malnutrition. In the Coastal schools, no females under the age of 10 years was found to be stunted; there were more females from different age groups who were stunted in the Mainland schools when compared with Coastal school, though the difference was not significant $X^2 = 0.39$, $p>0.05$.

Table 22

Distribution by sex of Students of Coastal and Mainland schools by height for age (stunting)

Sex	Coastal school students		Mainland school students		Total
	No. and % stunted	No. and % Normal	No. and % stunted	No. and % Normal	Stunted
Male	6(5.8)	97(94.2)	18(11.8)	135(89.5)	24(15.7)
Female	4(5.2)	73(94.8)	96(1.2)	138(94.6)	13(8.8)
Total	10(5.6)	170(94.4)	27(9)	273(91)	37(7.7)

The above table shows stunting by gender among the Coastal and Mainland school students.

There was no significant difference in the proportions of male and female students who were stunted in the Coastal region $X^2 = 1.78$ ($p>0.05$). There were however more stunted males than females from students in Mainland school. A higher proportion of Mainland students were stunted but the difference was not significant $X^2 = 1.88$, $p = 0.17$, $df = 1$.

Table 23

Table 23

Distribution of the students of Coastal and Mainland Schools by their Father's Occupation and its association with nutritional status

Fathers' Occupation	Students from Coastal school		Students from Mainland school	
	No. Malnourished and (%)	No. Nourished and (%)	No. Malnourished and (%)	No. Nourished and (%)
Teacher	6(42.9)	9(57.19)	53(42.5)	48(47.5)
Fisherman	41(43.6)	57(56.4)	15(43.5)	38(56.5)
Civil servant	8(46.9)	8(53.3)	11(37.9)	18(62.1)
Artisan	9(53.3)	7(43.7)	14(53.8)	12(46.2)
Farmer	7(58.3)	5(41.7)	53(52.5)	48(47.5)
Trader	12(60)	8(40)	18(54.5)	15(45.5)
Others	1(100)	0.00(0.00)	8(57.1)	6(42.9)
Total	84(45.6)	94(54.4)	147(49)	153(51)

$X^2 = 3.7$, $P = 0.05$ $df = 1$

In Table 23, a higher proportion of malnourished children had parents who are traders, farmers, and artisan in Costal region when compared with the children of fishermen, teachers and civil servant. In the Mainland schools, the trend is the same. The better nourished students were children of civil servant, fishermen, teachers and farmers, and they are better nourished in both regions than children of traders. There is a significant difference between the nutritional status of the children whose fathers are teachers, fishermen and civil servants compared with those whose fathers are of other occupation.

Table 24

Distribution of Students from Coastal and Mainland schools by Mothers' occupations and its Association with Nutritional Status.

Mothers' Occupation	Coastal school students			Mainland school students		
	No.Examined and (%)	No. Malnourished and (%)	No. Nourished and (%)	No. Examined and (%)	No. Malnourished and (%)	No. Nourished and (%)
Fisher women	4(7.4)	1(25)	3(75)	78(6)	6(33.3)	12(66.7)
Teacher	17(9.7)	6(35.3)	12(64.7)	22(7.3)	8(36.4)	14(63.6)
Civil servant	7(3.9)	3(42.9)	4(57.2)	9(3)	2(22.2)	7(77.8)
Traders	105(57.8)	44(43)	60(57)	165(55)	82(96.7)	83(54.3)
Artisan	28(15.6)	16(57.1)	12(42.9)	47(15.7)	30(58.9)	17(41.1)
Housewives	17(9.4)	12(70.6)	5(29.4)	29(9.7)	22(75.4)	7(24.6)
Others	2(1.1)	1(50.0)	1(50.0)	10(3.3)	6(60.0)	4(40)

$X^2 = 4.51$, $p<0.03$ $df = 1$

Table 24 shows the distribution of students from Coastal and Mainland schools by their mothers' occupation and by their nutritionals/status. Students whose mothers were traders, artisan and housewives in Coastal and Mainland school respectively were worse off nutritionally. Children of mothers who were in occupations that required a certain level of education were found to be significantly better nourished in both Coastal and Mainland areas than those whose mothers are housewives, artisan and traders.

MARITAL STATUS OF PARENTS AND ITS ASSOCIATION WITH NUTRITIONAL STATUS.

Table 25

Distribution of students by type of family and its association with nutritional status

Family type	Coastal school			Mainland school		
	No. Examined and (%)	No. Malnourished and (%)	No. Nourished and (%)	No. examined and (%)	No. Malnourished and (%)	No. Nourished and (%)
Monogamy	105(58.3)	45(42.9)	60(57.1)	204(68.0)	80(39.2)	104(60.7)
Polygamy	75(41.7)	37(49)	38(51)	96(32.0)	47(48.5)	49(51.5)

Table 25 shows the distribution of the pupils by their type of family and nutritional status. Among the parents of students from Coastal and Mainland schools, monogamy seemed to dominate. More parents from the Coastal than the Mainland schools, were in polygamous union. Monogamy appears to protect slightly both Mainland and Coastal school children from malnutrition. The difference was not significant $X^2 = 0.5$, $p>0.05$.

Table 26

Distribution of students by Type of Religion and its Association with their Nutritional status.

Type of Religion	Coastal School			Mainland School		
	No Examined and (%)	No Malnourished and (%)	No Nourished and (%)	No Examined and (%)	No malnourished and (%)	No Nourished and (%)
Christianity	88(48.7)	39(44.3)	49(55.7)	163(54.3)	81(49.7)	82(50.3)
Islam	84(46.6)	38(45.2)	46(54.7)	106(35.3)	59(55.7)	44(47.0)
Traditional	8(4.5)	5(62.5)	3(37.5)	31(10.3)	18(58.1)	13(41.9)

This table shows the distribution of the Coastal and Mainland school students by type of religion and nutritional status. Children of Christian or Islamic religions were better nourished than those of traditional religion in Mainland schools ($X^2 = 0.98$, $p = 0.9$) and Coastal schools. The different was not significant $X^2 = 0.18$, $p>0.05$.

Table 27

Distribution of where students pass faeces and its association with nutritional status

Places of passing faeces at home	Coastal school students				Mainland school students	
	No of student	No Malnourished and (%)	No Nourished and (%)	No of student	No Malnourished and (%)	No Nourished and (%)
Water closet	3	0(0.0)	3(100)	14	5(35.7)	9(64.3)
Pit latrine	33	25(39.7)	8(60.3)	197	98(49.7)	99(50.3)
Lagoon	91	44(47.5)	47(52.4)	0.00	0(0)	0(0)
Bush	49	24(49)	25(51)	71	36(50.7)	35(49.3)
Bucket latrine	3	1(66.7)	2(33.3)	18	10(62.5)	6(37.5)
Others	1	1(100)	0(0)	-	-	-
Total	180	82(45.6)	98(54.4)	300	147(49.0)	153(51.0)

The above table shows the association between nutritional status and where the students of Coastal and Mainland schools pass their faeces at home. Students who pass faeces into lagoon, bush and bucket in the Coastal and Mainland schools were worse off nutritionally than those who pass faeces in more hygienic environment. Though the association is not significant $X^2 = 0.17$, $p>0.05$.

Table 28

Distribution by age of the anaemic and non-anaemic female students in Coastal and Mainland schools with Haemoglobin level less than and above 12gm/dl

Age	Coastal school students		Mainland school students	
	No of % of Student with Hb<12g	No and % of student with >12gm	No and % of student with Hb12gm	No and % of student with Hb≥12gm
6	1(16.6)	15(83.4)	2(25)	8(75)
7	2(40)	43(60)	2(28.6)	5(71.4)
8	2(40)	43(60)	6(46.1)	7(53.9)
9	3(42.9)	54(57.1)	4(50)	4(50)
10	4(44.4)	45(55.6)	5(62.5)	3(37.5)
11	2(66.7)	21(33.3)	7(63.6)	4(36.4)
12	1(33.3)	32(66.7)	2(33.3)	4(66.7)
13	0(0)	1(100)	0(0)	6(100)
Total	15(38.5)	24(61.5)	28(40.0)	41(60.0)

This table shows the age distribution and percentage of female students by Hb level gm/dl. The proportion of the anaemic student increased with increasing age till the age of 11 years in both Coastal and Mainland region after which the trend reversed, this is not significant $X^2 = 1.76$, $p>0.05$, $X^2 = 10.88$, $p>0.05$ (*figure II*). At the age of 12 years equal percentage (33.3%) of the female students were found to be anaemic i.e. Hb below 12gm/dl.

FIGURE II

AGE DISTRIBUTION BY HAEMOGLOBIN OF ANAEMIC FEMALE STUDENTS IN COASTAL AND MAINLAND SCHOOL (HAEMOGLOBIN LESS THAN 12gm/dl

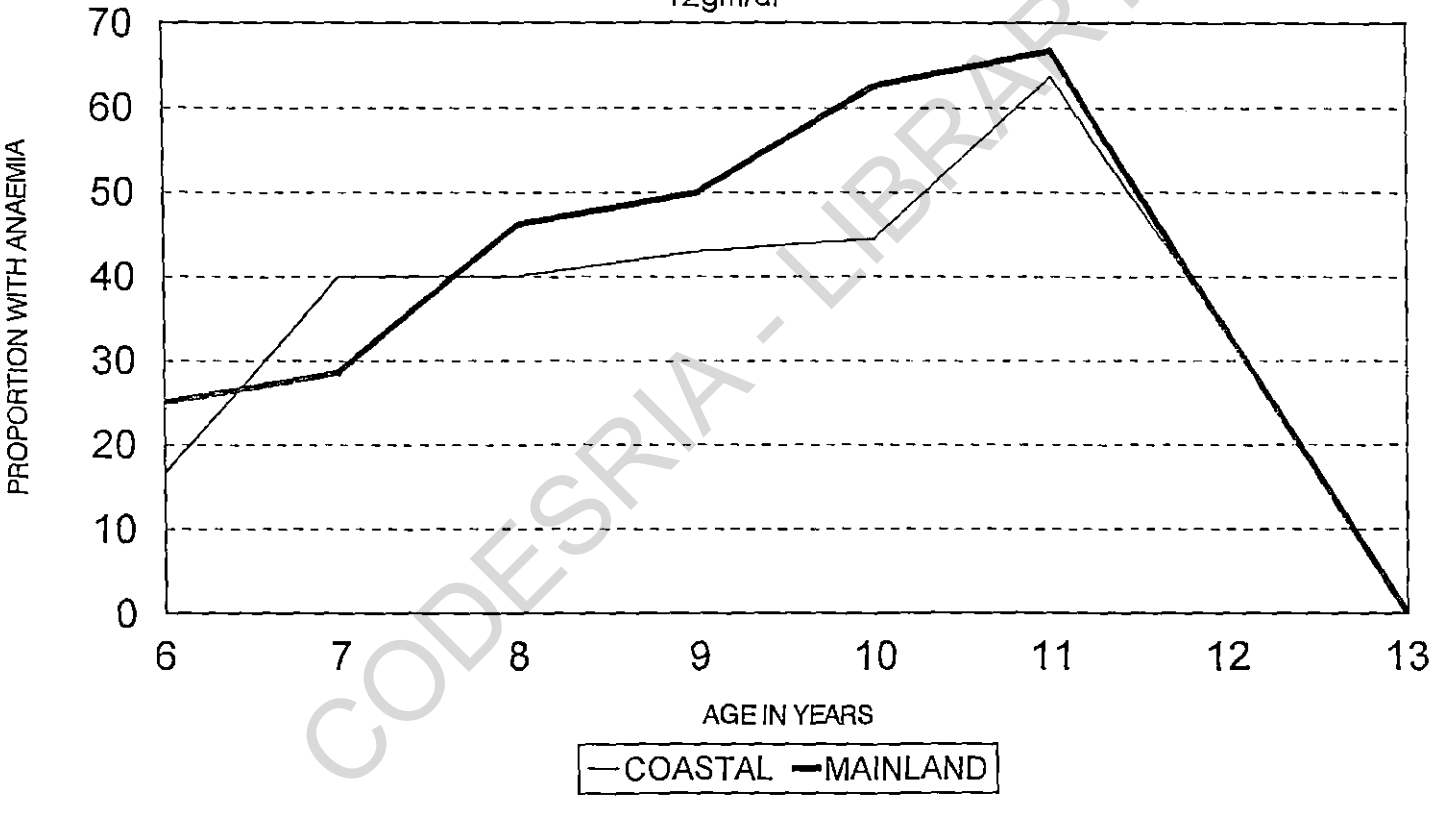


Table 29

Distribution by age of anaemic and non-anaemic of Male students in Coastal and Mainland schools with Haemoglobin level less than and above 12gm/dl.

Age in years	Coastal school student		Mainland school student	
	No and % of student with Hb <12gm	No and % of student with Hb ≥12gm	No and % of student with Hb <12gm	No and % of student with Hb ≥12gm
6	1(20)	3(60)	1(14.3)	6(85.7)
7	2(40)	9(40)	5(21)	16(79)
8	3(50)	3(50)	6(55.5)	2(66.7)
9	6(54.5)	5(45.5)	3(60)	5(45.5)
10	4(66.7)	2(33.3)	10(71.4)	4(64.3)
11	2(66.7)	1(33.3)	3(75)	1(75)
12	2(28.6)	5(71.4)	8(44.4)	10(38.9)
13	0(0.0)	0(0)	0(0.0)	0(0)
Total	20(39.2)	31(60.8)	37(46.3)	44(53.6)

Table 29 shows the distribution of anaemic and non anaemic male students in Coastal and Mainland school with haemoglobin less than and above 12gm/dl respectively.

The same trend as found in females holds for the male students in both regions $X^2 = 6.68$, $p>0.05$ (*figure III*). However there is significant trend among the male students of Coastal and Mainland schools. Higher proportion of students in the Mainland are significantly anaemic $X^2 = 14.98$, $P<0.05$.

Table 29

Distribution by age of anaemic and non-anaemic of Male students in Coastal and Mainland schools with Haemoglobin level less than and above 12gm/dl.

Age in years	Coastal school student		Mainland school student	
	No and % of student with Hb <12gm	No and % of student with Hb ≥12gm	No and % of student with Hb <12gm	No and % of student with Hb ≥12gm
6	1(20)	3(60)	1(14.3)	6(85.7)
7	2(40)	9(40)	5(21)	16(79)
8	3(50)	3(50)	6(55.5)	2(66.7)
9	6(54.5)	5(45.5)	3(60)	5(45.5)
10	4(66.7)	2(33.3)	10(71.4)	4(64.3)
11	2(66.7)	1(33.3)	3(75)	1(75)
12	2(28.6)	5(71.4)	8(44.4)	10(38.9)
13	0(0.0)	0(0)	0(0.0)	0(0)
Total	20(39.2)	31(60.8)	37(46.3)	44(53.6)

Table 29 shows the distribution of anaemic and non anaemic male students in Coastal and Mainland school with haemoglobin less than and above 12gm/dl respectively.

The same trend as found in females holds for the male students in both regions $X^2 = 6.68$, $p>0.05$ (*figure III*). However there is significant trend among the male students of Coastal and Mainland schools. Higher proportion of students in the Mainland are significantly anaemic.

$X^2 = 14.98$, $p=0.020$

FIGURE III

AGE DISTRIBUTION BY HAEMOGLOBIN OF ANAEMIC MALE STUDENTS IN COASTAL AND MAINLAND SCHOOLS (HAEMOGLOBIN LESS THAN 12gm/dl)

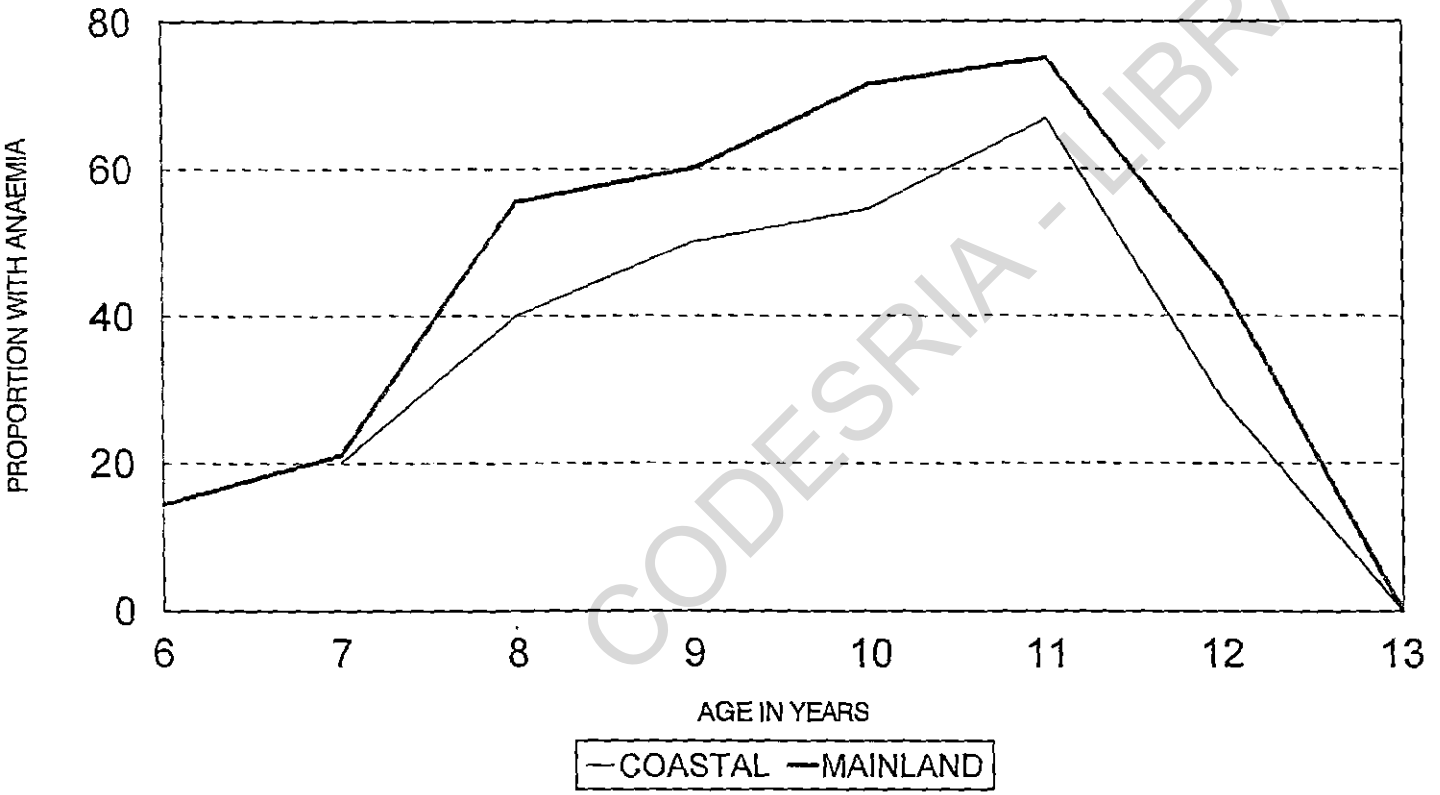


Table 30

Distribution of students by level of anaemia in both Coastal and Mainland Schools

		Coastal students	Mainland students
Classification	Hbg/dl	No and (%)of student	No and (%) of student
Severe	<8	5(5.6)	7(4.6)
Moderate	8-9.9	18(20)	46(30.5)
Mild	10-11.9	16(17.8)	19(12.6)
Normal	12-12.9	49(54.5)	69(45.7)
High	13 above	2(2.2)	9(6)

Total number and (%) of Coastal school students anaemic 39(43.3)
Total number and (%) of Mainland school students anaemic 72(48)
Total number and (%) of Students anaemic in Coastal and Mainland schools = 111 (46.3)

Table 30 show the distribution of students by classifications of the level of anaemia among Coastal and Mainland schools. A small proportion of students in both region were severely anaemic. (*figure IV*). A higher proportion of students were found to be severely or mildly aneamic among the Mainland school students 72(48%) compared with the Coastal schools 39(43.3%), though there is no significant difference $X^2 = 0.49$, $p>0.05$.

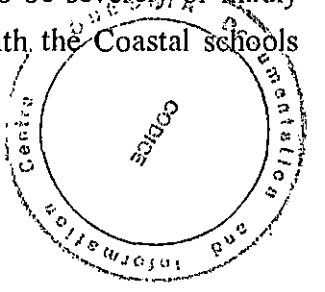
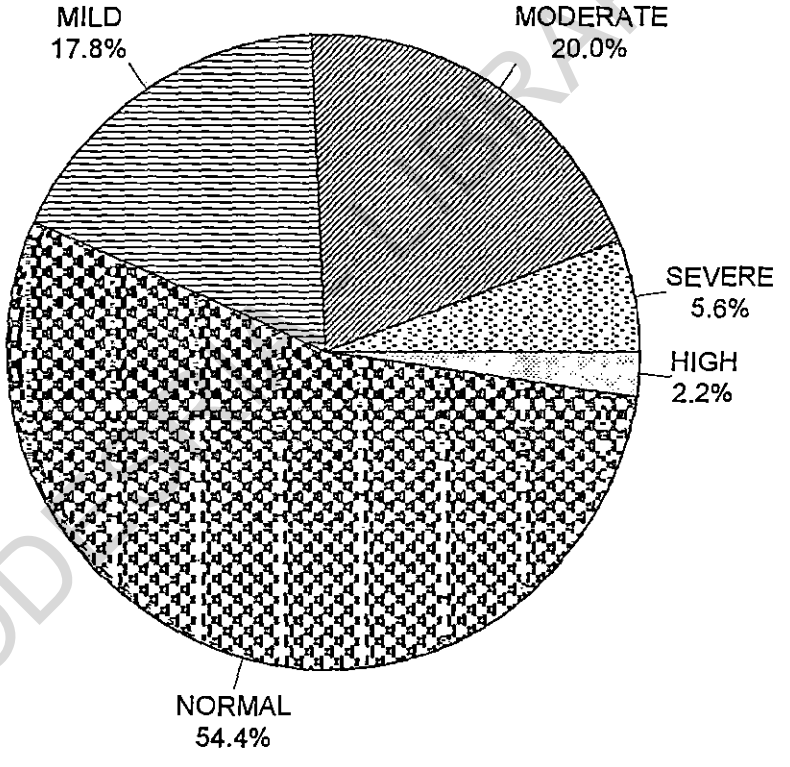


FIGURE IV N = 90

DISTRIBUTION OF STUDENTS BY LEVEL OF ANAEMIA IN COASTAL SCHOOLS

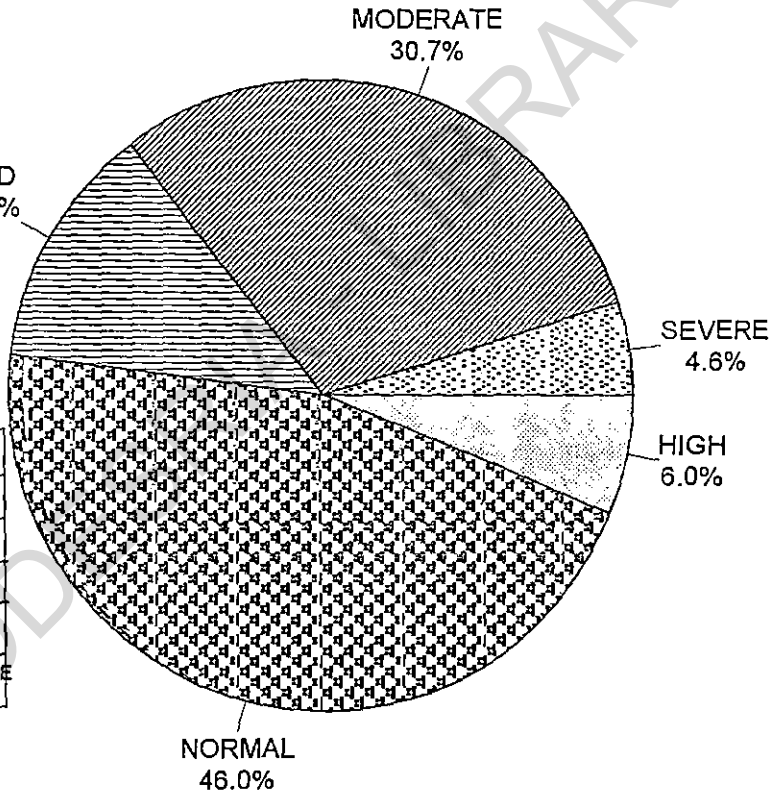


KEY

CLASSIFICATION	gm/dl
SEVERE	<8
MODERATE	8 - 9.9
MILD	10 - 11.9
NORMAL	12 - 12.9
HIGH	13 ABOVE

FIGURE V N = 150

DISTRIBUTION OF STUDENTS BY LEVEL OF ANAEMIA IN MAINLAND SCHOOLS



KEY

CLASSIFICATION	gm/dl
SEVERE	<8
MODERATE	8 - 9.9
MILD	10 - 11.9
NORMAL	12 - 12.9
HIGH	13 ABOVE

Table 31

Distribution of physical signs among the students of Coastal and Mainland schools

Physical signs	Coastal schools students		Mainland schools students		
	No and (%) Present	No and (%) Absent	No and (%) Present	No and (%) Absent	Total (%) of Student Positive
Pallor	7(3.9)	173(96.1)	54(18)	246(82)	12.7
Conjuctivities	24(13.3)	156(86)	50(16.7)	250(83.3)	15.4
Angular stomatitis	36(20)	144(80)	109(36.3)	191(63.7)	32.2
Parotid enlargement	11.0(6.1)	169(93.9)	18(6)	282(94)	6
Dental Cavies	90(50)	90(50)	171(57)	129(43)	58.0%
Goitre	1(0.6)	179(99.4)	4(1.3)	293(97.7)	1
Splenomegaly	52(28.9)	128(71.1)	66(22)	234(78)	24.6
Hepatomegaly	1(0.6)	179(99.4)	0(0)	300(100)	0.2
Pedal Oedema	1(0.6)	179(99.4)	1(0.3)	299(99.7)	0.4
Scabies Skin Infection	98(54.4)	82(45.6)	195(65)	105(35)	61

The above table shows the distribution of physical signs among the students of coastal and mainland school students. Pallour, angular stomatitis goitre, dental caries and scabies (skin infection) as a physical sign were commoner in students of Mainland schools while splenomegaly and conjunctivities are commoner in students of Coastal schools. (*Figure V and VII*).

FIGURE VI

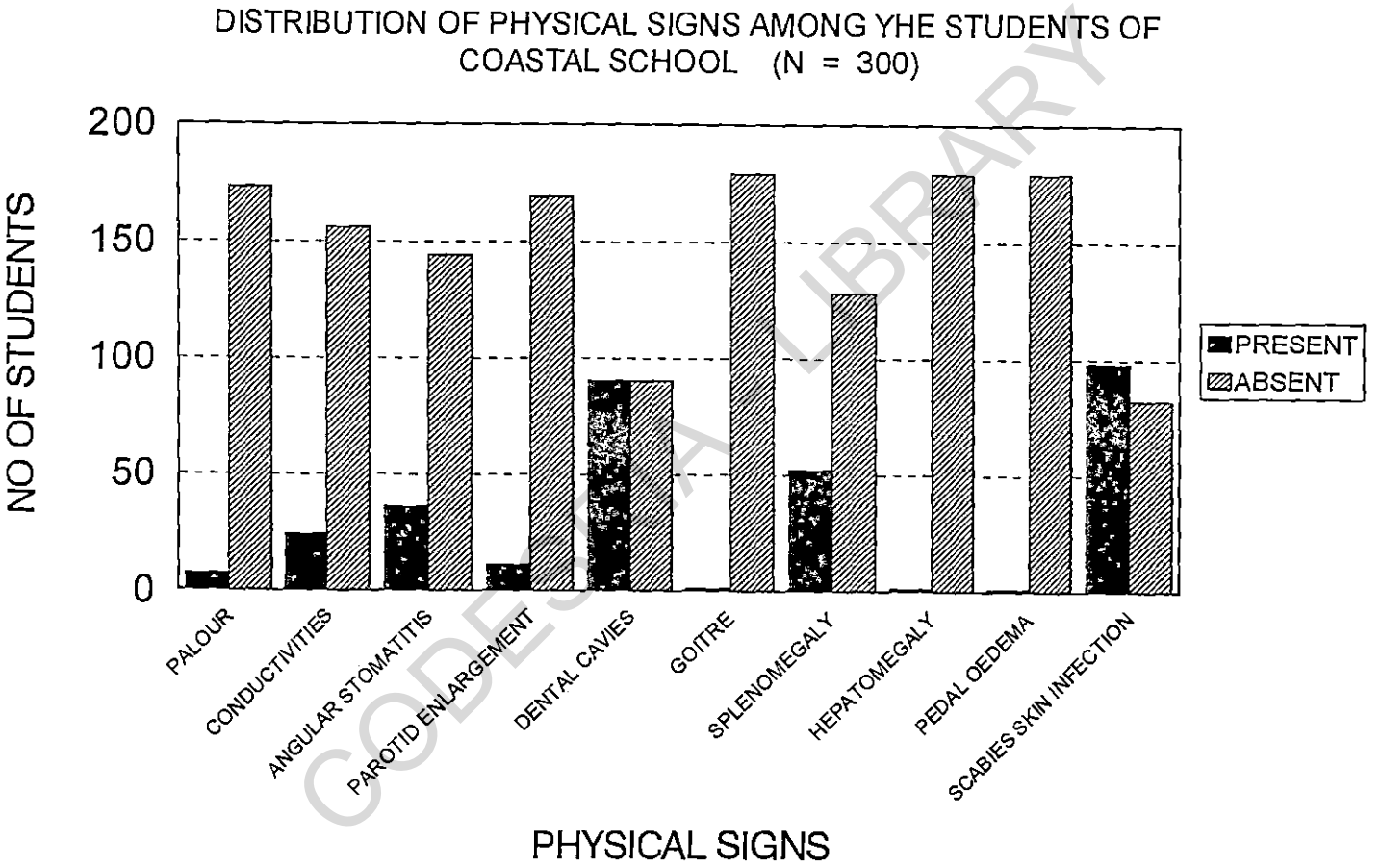
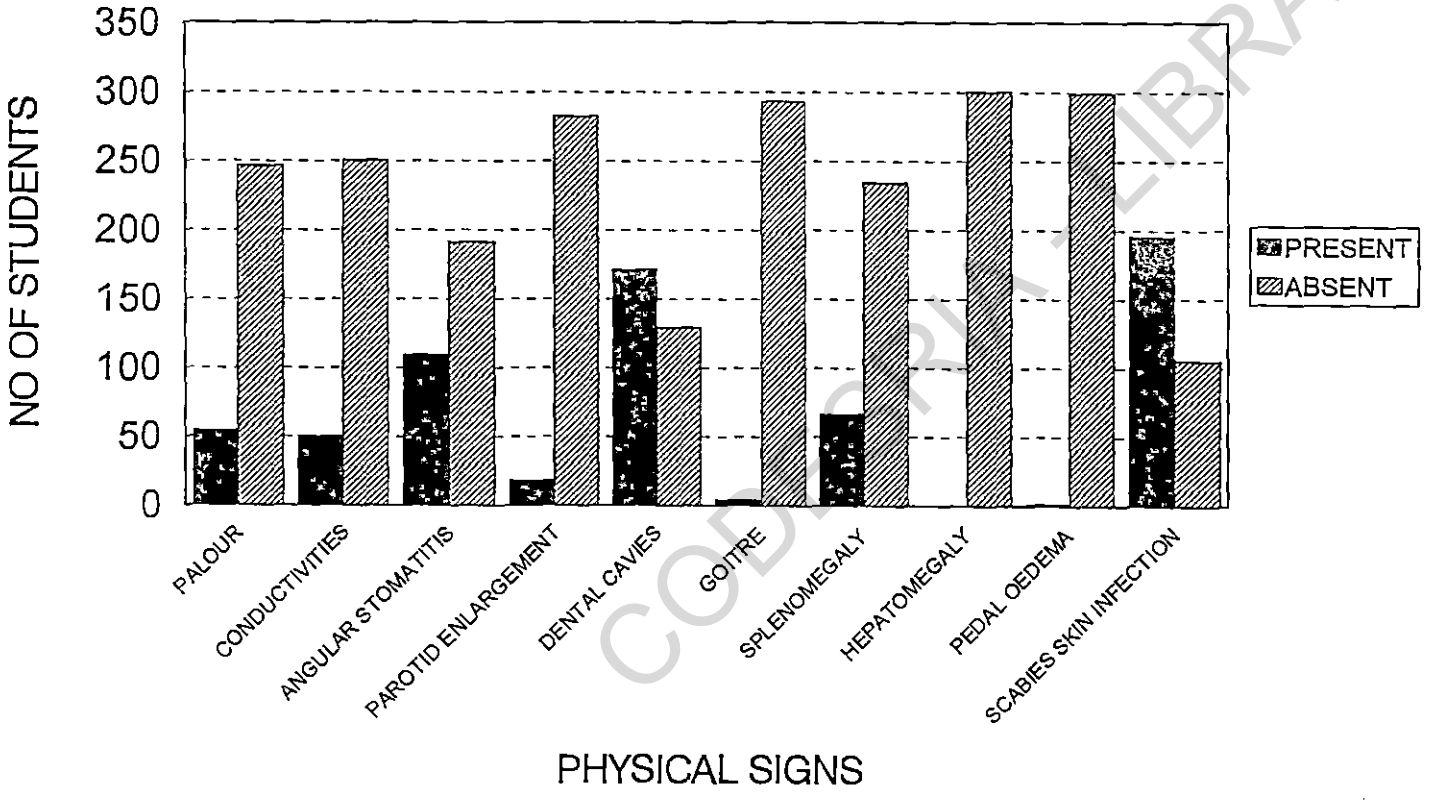


FIGURE VII

DISTRIBUTION OF PHYSICAL SIGNS AMONG YHE STUDENTS OF MAINLAND SCHOOL (N = 300)



DIETARY PATTERN

Table 32

Distribution of students by type of breakfast in Coastal and Mainland school and their association with Nutritional status

Type of Breakfast	Coastal school students			Mainland school students		
	No and (%) Examined	No and (%) Malnourished	No and (%) Nourished	No and (%) Examined	No and (%) Malnourished	No and (%) Nourished
Ogi & Akara	2(1.3)	0(0.00)	2(100)	5(1.7)	0(0.00)	5(100)
Bread	2(1.3)	1(50)	1(50)	13(4.5)	4(30.8)	9(69.2)
Rice	39(21.7)	24(61.5)	15(38)	45(15.4)	17(37.8)	28(62.2)
Yam	8(0.6)	7(87.5)	1(12)	13(4.3)	10(76.9)	3(23.1)
Beans	13(7.4)	2(15.3)	11(84)	17(5.8)	2(11.7)	15(76.5)
Eba Only	28(16)	21(75)	7(25)	79(26.2)	55(69.6)	24(30.4)
Eba + Fish/Meat	30(16.3)	11(36.2)	19(63)	30(10)	10(33.3)	20(66.6)
No breakfast	56(32)	30(53.6)	26(46)	96(32.9)	72(75)	24(25)
Others	2(1.1)	1(50)	1(50)	2(0.7)	1(50)	1(50)
Total	180(100)	97(53.9)	83(46.1)	300(100)	171(57)	129(43)

The above table shows the type of breakfast the pupils of Coastal and Mainland school take their nutritional status. Students who had protein in their breakfast in form of Akara , beans, fish or meat in both Coastal and Mainland schools were better nourished than those who had only carbohydrate and those who do not have breakfast. This was found to be significant in students from both the Coastal and Mainland schools respectively. There is a significant association between the students of both regions who had a form of protein in their breakfast compared with those who do not have $X^2 = 19.13$, $p \leq 0.01$, $df = 1$.

Table 33

Distribution of students of Coastal and Mainland schools by the Type of Lunch eating at home

Type of Food	Coastal school	Mainland school
	No and % of student	No and % of student
Pap + Sugar	3(2.1)	11(3.8)
Gari + Sugar	56(38.6)	60(55.4)
Eba Only	65(36.1)	153(51.0)
Maize	1(0.7)	1(0.3)
Rice only	10(6.9)	27(9.3)
Bean	13(9.0)	15(5.0)
Amala only	1(0.7)	2(0.7)
Eba + Fish/Meat	24(13.3)	31(10.5)
Others	7(4.8)	0(0)
Total	180	300

Table 33 shows the distribution of students of Coastal and Mainland schools and the type of lunch they eat at home. Eba and Gari with sugar was the commonest lunch among the stukdents of coastal and mainland schools though a higher proprotion of students from Coastal school have protein in their lunch when compared the students from Mainland schools.

Table 34

Distribution of students showing the source of their lunch in Coastal and Mainland schools

Lunch source	Coastal school students	Mainland school student
	No and (%) of student	No and (%) of student
Buy from vendor	78(43.3)	172(57.43)
Cook at home	102(56.7)	128(42.7)
Total	180 (100)	300(100)

Table 34 show the distribution of students showing the source of their lunch in Coastal and Mainland schools. More students 172(57.4%) in the Mainland buy their lunch compared with 78(43.3%) of the students of Coastal schools.

Table 35

Distribution of students of Coastal and Mainland schools by the type of dinner they eat

Type of Dinner	Coastal school	Mainland school
	No and (%) of student	No and (%) of student
Eba Only	77(42.8)	192(64)
Rice	53(29.4)	44(14.6)
Eko	12(6.7)	16(5.3)
Bean	3(2.1)	8(2.8)
Amala	30(16.7)	36(12)
Eba + Fish	5(3.5)	4(1.3)
Total	180(100)	300(100)

The table above shows the distribution of type of food eaten for dinner by students of Coastal and Mainland schools. The commonest food for dinner among the students of both regions was Eba. Only few had bean and eba with fish/meat. Most student had carbohydrate only for dinner.

Table 36

Distribution of students in Coastal and Mainland schools showing the source of their dinner

Source of Dinner	Coastal school	Mainland school
	No and % of student	No and % of student
Buy from vendor	11(2.4)	29(16.1)
Cook at home	169(97.6)	271(83.9)
Total	180(100)	300(100)

Table 36 shows the distribution of students in Coastal and Mainland schools showing the source of their dinner. Most students in both regions had their dinner cooked in their homes unlike their lunch when more of the student buy their food outside (Table 34). However, a higher proportion of students from the Mainland bought their dinner 29(16.1%) compared with the students of Coastal school 11(2.4%).

Table 37

24 Hours Dietary Recall Protein for the students in the Coastal and Mainland schools.

Region	No and (%) with protein in diet			
	No and % of student with protein in their breakfast	No and % of student with protein in their lunch	No and % of students with protein in their dinner	Total no and (%) of student
Coastal	45(25.0)	37(20.5)	8(4.5)	90(50)
Mainland	52(17.5)	46(15.3)	12(4.0)	110(37)
Total	97(42.3)	83(35.8)	20(8.5)	200(41.7)

The above table shows the 24 hours dietary recall for protein, for students in the Coastal and Mainland schools. Less than half of the examined students in both school had protein in their diet in 24 hours. However more students from Coastal school had protein in their diet in 24 hours 90(50%) compared with 110(37%) of the students from Mainland school. $X^2 = 18.27$; $p<0.050$, df = 1).

Table 38

Distribution of the students of Coastal and Mainland schools by Food Taboo

Type of Food	Students of Coastal schools		Students of Mainland schools	
	No and (%) with food taboo	No and (%) without food taboo	No and (%) with food taboo	No and (%) without food taboo
Okoro	44(38.3)	136(61.7)	67(34.6)	113(65.4)
Crab	18(21.4)	162(78.6)	31(21.4)	149(78.6)
pork	72(40)	108(60)	257(92.3)	43(7.7)
Fish	2(2.1)	178(97.9)	4(4.1)	176(95.9)
Snake	100(97.8)	80(2.2)	151(92.4)	29(7.6)
Snail	18(22.2)	162(77.8)	56(44.5)	124(54.5)
Bush meat	10(28.4)	170(71.6)	60(10.7)	120(89.3)

The table shows the distribution of students of Coastal and Mainland schools by food taboos. Most of the food listed in the table are proteinous food, and quite a number of the students in both Coastal and Mainland schools believe in food taboo, and thus deprive themselves of these sources of proteinous foods.

Table 39

Association of food taboo with nutritional status among students of Coastal and Mainland schools

Student with Food taboo	Students from Coastal school		Students from Mainland school	
	No and (%) Malnourished	No and (%) Nourished	No and (%) Malnourished	No and (%) Nourished
Yes	50(68.5)	23(31.5)	121(51.9)	112(48.1)
No	32(30)	75(70)	26(38.8)	41(61.2)

$X^2 = 22.61$ $P<0.001$ $df = 1$

The table above show the association between food taboo and nutritional status of the students from Coastal and Mainland schools. In both regions students who do not have food taboos were better nourished. This difference is significant $P<0.05$.

School Health

Table 40

Type of school meal bought by students of Coastal and Mainland schools.

Type of Food	Coastal school	Mainland school
	No of Student and (%)	No of Student and (%)
Rice	65(60.4)	126(55.8)
Beans	7(6.0)	11(4.8)
Fruits	19(18.0)	4(1.7)
Maize	6(5.7)	9(3.9)
Eba	7(6.6)	75(33.1)
Others	1(1)	1(0.45)

The table above showes the distribution of types of food bought at school by the Coastal and Mainland schools students.

Rice seemed to be popular among both groups. However a higher proportion of students from Mainland 25(33.1%) eat eba at school compared with 7(6.6%) of the students of Coastal school.

Table 41

Distribution of students in Coastal and Mainland schools showing whether they eat school meals and their Nutritional Status

School meal consumption	Coastal school student			Mainland school student		
	No and (%)	No and (%) malnourished	No and (%)Nourished	No and (%)	No and (%) malnourished	No and (%) nourished
Yes	105(58.30	34(32.4)	71(67.6)	226(75.3)	41(20.8)	185(79.2)
No	65(36.1)	45(69.2)	20(30.8)	29(9.7)	23(78.3)	6(20.7)
Sometime	10(5.6)	6(60)	4(40)	45(15)	37(82.2)	8(17.8)

$X^2 = 37.41$, $P = 0.0001$ $df = 1$

The above table shows that students who ate school meal in both Coastal and Mainland school were better nourished when compared with those who do not. School meals were found to significantly protect the children from malnutrition.

Table 42

Distribution of students of Coastal and Mainland schools by academic performance and Nutritional status

Academic performance	Coastal school students		Mainland school students	
	No and % Malnourished	No and % Nourished	No and % Malnourished	No and % Nourished
Poor	25(71.4)	10(28.6)	32(80)	8(8)
Fair	34(38.1)	21(61.8)	80 (71.4)	32(28)
Good	17(23.1)	37(68.5)	29(47.5)	61(52.5)
V. good	3(11.5)	23(88.5)	15(28.3)	28(71)
Excellent	0(0)	1(100)	1(16.7)	5(83)

$X^2 = 28.3$ $p<0.001$ $df = 1$

The above table shows academic performance of students from Coastal and Mainland region.The better nourished performed significantly better in school than their malnourished counterpart than those who did not. This difference is significant.

Table 43

Type of common sickness among students of Coastal and Mainland schools and nutritional status

Type of sickness	Coastal school students			Mainland school students		
	No and (%) Exammined	No and (%) Malnourished	No and (%) Nourished	No and (%) Examined	No and (%) Malnourished	No of Student and (%) Nourished
Fever	76(86.3)	68(89.5)	8(10.5)	194(83.1)	179(40.2)	19(9.8)
Skin infection	98(54.4)	15(76.5)	23(12.5)	195(65.0)	155(79.5)	40(20.5)
Cough/ARTI	29(25.2)	22(75.7)	7(24.1)	44(33.5)	25(56.8)	19 (43.1)
Diarrhoea	44(64.4)	40(90.9)	4(9.1)	97(86.1)	72(14.2)	20(25.8)
Stomach pain	53(83.9)	31(58.4)	22(41.5)	89(75.3)	51(14.2)	25(25.8)
Nil	1(0.7)	0(0)	1(100)	0(0)	0(57.3)	38(42.7)

$X^2 = 43.41$, $P = 0.00001$

The above table shows the common types of common sickness which affect the student of Coastal and Mainland schools. Fever was the commonest sickness among the students of Coastal schools, 76(86.3%) while diarrhoea was the commonest among the students of Mainland schools 96(86.1). A significantly higher proportion of children with history of diarrhoea and fever were malnuourished.

* ARTI = Acute Respiratory Tract Infection

CHAPTER FIVE

5.1 DISCUSSION

In this study the nutritional status of the primary school children in Epe Local Government Area (LGA) of Lagos State was assessed. This was based on their weight for age, which indicates the level of malnutrition, weight for height, which shows acute malnutrition or wasting, and height for age which shows stunting or chronic malnutrition. Assessment of their diet was also made through a 24 hour dietary recall and haemoglobin level estimation. From the data present the prevalence of malnutrition using weight for age among school age children in the LGA was 47.7%. The level was found to be 45.6% among the Coastal students and 49% among the students from Mainland region. The percentage malnourished was significantly higher among the Mainland students, compared with Coastal students. The disparity in rates for Coastal and Mainland school students, in effect, could be due to the availability of sea food in the Coastal region which provides adequate protein source for the students. The effect of parents occupation is also seen

here to be significant as more parents of student from Coastal regions are fishermen which makes it more likely that sea food/protein was readily available to the students of Coastal region in their homes.

The younger age groups in Coastal and Mainland Schools were found to be better nourished than those in the older age groups and this has a significant effect. This findings compares well with the studies from the Nigeria Demographic and Health Survey (1992) among the under fives where 36%, 9%, and 43% were found to be underweight, wasted and stunted respectively. The level of malnutrition among the under-fives is much lower (36%) when compared with 47.8% found in this study among age-group 6-13 years.

Furthermore in USA Hendricks et al (1996) in his study, found out that the prevalence of energy protein malnutrition among the hospitalised children were more pronounced among the older age grou, above 8 years when compared with the younger children.

The relative improvement in nutritional status among the younger age group in this environment compared with the older age group may be related

to the increase in attention normally given to the pre school children in this community. Wasting is not as common as malnutrition and stunting. From the data presented, the prevalence of malnutrition among the Epe students is low when compared with findings of Kapil et al. (1989), who found the prevalence of malnutrition among the children in Delhi, India to be 82%.

Haemoglobin level estimation was another criteria used to assess nutritional status of these students. World Health Organisation (WHO) has recommended the haemoglobin level of 12g/dl as normal limit for pupils below 12 years (Simeon et al,1982). The proportion of students who were anaemic between ages 10 to 11 years in both regions in this study were high. This is probably related to the fact that peak growth velocity is usually seen at this age and suggests that there is an increasing nutritional demand at this age. This may explain why a lot of children were anaemic in the study at this age.

Clinical examination was done to assess the students nutritional status and 12.7% of all the examined students were clinically pale. This is very low compared with the 46.3% which had their haemoglobin below 12g/dl and

confirms that clinical assessment is not as reliable as biochemical assessment. Most of the female students were found to apply local eye cosmetics (TIRO) which caused conjunctival irritation and interfered with conjunctival assessment. The high number of students examined with angular stomatitis (32.2%) shows a deficiency in some vitamins in the children's diet. Dental caries is an indication of poor oral hygiene and this was found to be fairly common among the students (58%). There is a need to screen for dental caries in schools in order to prevent more severe dental problems at an older age.

The relatively lower incidence of goitre among the students in Coastal region compared with Mainland is probably due to the higher content of iodine in sea food which they are more likely to eat, although right now iodine salt is distributed in the country and about 83% of salt in the Southwest region of this country is already iodised (UNICEF, 98). The proportion of children with goitre is very low when compared with 10% sited for Nigeria (UNICEF, 98). Spleen rate is high and probably related to malaria which is holoendemic in Nigeria. The higher spleen rate seen among

the Coastal students is probably related to free breeding of mosquito in surrounding waters. Sickle cell anaemia was not investigated and could not be ruled out in this study. Lagos State Government in the 1998 budget announced free treatment for all malaria infected patients in the state. This will go a long way towards improving the health of all children in the state.

Prevalence of skin infection was also found to be lower in the Coastal region. This may be due to the readily available source of water both for domestic and other uses. Water supply is very important and an adequate supply improves the level of hygiene in any community.

Certain factors were found to be contributory to the state of the nutritional status of the examined students. Parents occupation which is closely related to the parents education and income was found to be a contributory factor. Students whose parents were civil servants, teachers, and fishermen were better nourished. This study is in agreements with studies done by Shear et al. (1993), Osman et al. (1993), Ransome Kuti et al. (1975) which show that the socio-economic level of the parents is closely associated with the children nutritional status. Children whose mothers were house

wives and traders were worse off nutritionally (most of the traders were petty traders). It appears that mothers who are not able to contribute much financially to the house keeping are more likely to have malnourished children. Children of better educated mothers were better nourished. This is not surprising as children's health is shown to be closely linked in the developing countries to their mothers' level of education. Even within the same socio-economic group, children with more educated mothers have significantly better nutritional status and better prospects for health and survival (ref. UNICEF, 1984). The fishermen and fisher women's children were better nourished than children of farmers. This again may be due to availability of protein resources to the family from fishing.

Religion was also associated with the level of nutrition though not significantly. This effect was more pronounced among students from the Coastal schools. Christian and Moslem religions give teachings which are related to diet. Islam for example advocates breast-feeding and both religions defines house keeping roles for woman. Environmental factors were found to be associated though not significant, with nutritional status. A higher

proportion of the students who passes faeces in water closet were better nourished than those who passed faeces in bucket latrine. Even though the better off families are able to provide water closets and also more likely to feed better, faeco-oral transmission of intestinal parasites may compromise a child's nutritional status and a child that pass faeces in the bucket latrines or bush is more likely than those who pass faeces in water closet to be infected with helminthes. This agrees with the study of Cornu et al (1995) which he carried out on under-fives of South-east Uganda, where they found a direct effect of the environment on nutritional status.

Food taboos could be related to the type of religion which usually enforces its norms on the students. Those students who observed no food taboos were found to be significantly better nourished than those that did not. Traditional religion proscribe more often, hence it was not surprising to find more children adhering to food taboos from traditional religious group. This findings is also supported by a study by Ransome Kuti et al. (1972), which showed that food taboos affect the nutritional status of the child

Types of family formation was found to have some effect on the

nutritional status of the students. A higher proportion of students from monogamous families were better nourished than those from polygamy families though this is not statistically significant. It is suggested that the parents have less mouths to feed in the monogamous homes than polygamous homes.

Morbidity pattern has a significant effect on the development of malnutrition and in this study it had an effect on malnutrition. Acute infections like diarrhoea and fever could have a negative vicious circle on the nutritional status of the student. A febrile child is more likely to loose the appetite and a child with diarrhoea does not retain nutrients, and if recurrent, can lead to the development of malnutrition.

From the 24 hours dietary (protein) recall of the students, those who had more protein in their diet were better nourished. Most of the students whose food consisted mainly of carbohydrate were malnourished. Gari is the staple food in the area, and this food has negligible protein value, however Coastal students had significantly more protein in their diet. Children from Coastal and Mainland schools who had school meals were significantly better

nourished than those who did not have school meals. The difference was more marked in children from Mainland i.e. Mainland children in particular benefited more from school meals. Provision of school meal in the school will go along way in approving the nutritional study of these children.

The brilliant students were found to be better nourished and there was a significant association between the school performance and the childs' nutritional status. This is in agreement with studies by Becklay et al. (1980). They found that children who had protein malnutrition are less intelligent compared with those who do not have.

Comparing the nutritional status of the students of Coastal and Mainland schools in this study, the mean height for age, the mean upper arm circumference for age and the mean BMI for age of the Coastal school students were slightly higher than that of the Mainland school students. Also more age groups are found to be stunted among the Mainland school students when compared with the Coastal school students . There was a significant difference between the level of malnutrition of the male Coastal school students compared with the male Mainland school students. In addition and

from the physical examinations a higher proportion of the Mainland school students were pale, had goitre, angular stomatitis, and skin infections compared with the Coastal school students.

From the 24 hours dietary recall, a higher proportion of students from Coastal school had protein in their diet compared with the Mainland school students and it was found out in the study that all those who had protein in their diet within the 24 hours were significantly better nourished, than those who did not, therefore, mmore students were better nourished among the Coastal school students than the Mainland school students.

In the Coastal region more parents are fishermen and women compared with Mainland region, and the result show more students of fishermen and fisher women to be significantly better nourished than children of farmers who are predominant in the Mainland region. From the above findings, Null hypothesis which says that there is no difference between the nutritional status of the Coastal and Mainland school children is rejected. It could be said that the Coastal school children are better nourished than the Mainland school children.

This result is not in agreement with Rajasness and Somans (1993) which was carried out among the children of Coastal and non-Coastal communities in Kerala, India. Their study showed that the rural Coastal children had poorer nutritional status despite their better food intake, than the urban Mainland children and this was attributed to environmental deprivation by the authors. In this study the difference in the state of the environment among the two communities were negligible.

5.2

CONCLUSION

In conclusion this study was carried out in order to assess the nutritional status of the primary school children of Epe Local Government Area of Lagos State. The study population was randomly selected from 2 distinct regions of the local government namely the Coastal and Mainland regions of Epe LGA and a total of 480 students were examined. One hundred and eighty (180) of the students and 300 students were from the Coastal and Mainland schools respectively.

Using the National Centre for Health Statistics (NCHS) standard, the results showed that 82(45.6%) of Coastal and 147(49%) of Mainland students were moderately to severely malnourished (less than -2SD), while 10(5.6%) of Coastal and 27(9%) of Mainland students were stunted in growth, Seven (3.8%) of students from Coastal and 16(5.3%) from mainland areas were wasted. Assessment of their 24 hour dietary recall showed significantly more students (50%) from Coastal area to have protein in their diet in the last 24 hours prior to the interview when compared with only 37%

of students from the Mainland region. Goitre rate was higher in Mainland (1.3%) when compared with Coastal area (0.6%).

Anaemia was found to be very high in both areas and haemoglobin estimation revealed that (43.4%) and (48%) from the Coastal and Mainland areas respectively were anaemic with haemoglobin level <12g/dl. While the 46.3% of the total students were found to be anaemic. Factors found to significantly affect the students nutritional status include age; children 8 years and younger were better nourished than those 9 year and above in both Coastal and Mainland regions $P<0.05$. Other factors include availability of school meals $P<0.001$ morbidity pattern $p<0.0001$, type of breakfast $p<0.01$ and the strict adherence to food taboos ($P<0.0001$). Children whose fathers are teachers, civil servants and fishermen were better nourished than children of artisans, farmers and traders in both Coastal and Mainland areas ($P<0.05$). Children of working mothers were better nourished than children of housewives in both Coastal and Mainland areas $p<0.03$, $p<0.0002$

respectively.In addition, the better nourished performed significantly better academically than their malnourishedcounterparts in both Coastal and Mainland schools $P<0.001$. Male students from the Coastal part of the LGA were significantly better nourished than those from the Mainland region.

RECOMMENDATION

5.3 The problem of malnutrition and its effects on the children are of great magnitude especially in Nigeria. This is due to our poor socio-economical climate and environment, unstable political atmosphere, negative cultural practices and attitude and underdeveloped technology. This effect has been appreciated in the under-fives where extensive research has been carried out, but not enough work has been done on the primary school age group children. From this study the following recommendations are made:

Starting from the family as a unit, families should be enlightened through health education and encouraged to get involve in homestead farming particularly to cultivate local proteins and food stuff like beans and vegetable in their backyard, with poultry rearing to boost the quality of protein intake in the home. Parents should be counselled on how to provide nourishing meals for their children within their resources and more attention should be paid to the diet of the older children. Housewives should be encouraged where possible to have income generating activities to augment family income. School meals should be re-organised and introduced into all schools in the local government area particularly the Mainland schools with effective supervision.

The school curriculum should be re-orientated to include simple hygienic teaching and enforced by the teachers. Health education of the

students should include simple home-economic programme to help them have an idea of how to use the local available proteinous food stuffs to their maximum benefits in their homes. A continuous assessment of the children's growth is necessary in order to assess nutritional status of school age children

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APPENDIX I

ASSESSMMENT OF NUTRITIOONAL STATUS OF PRIMARY SCHOOL CHILDREN OF EPE LOCAL GOVERNMENT AREA OF LAGOS STATE

INTRODUCTION

This questionnaire is designed to obtain information about the nutritional status of primary school children in Epe Local Government Area of Lagos State. It is highly desired that the information be honest and this will be treated with confidence.

Section A

Demographic Data

Answer the questions below:

1. Respondent

   1. The child 2. School teacher 3. Others specify ..... /____/

2. What school do you attend? 1. Coastal 2. Mainland ...../____/

3. What is the name of your school?..... /____/

4. How old are you?..... /____/

5. Sex

1. Male 2. Female /___/

6. What class are you ..... /___/

7. What is your religion?

1. Christian 2. Islam 3. Traditional /____/

8. Whom do you live with

1. Father alone 2. Mother alone 3. Both father & mother

4. Others specify..... /___/

9. Does your mother live with your father

1. Yes 2. No

10. What work does your father do?.....

11. What wok does your mother do?.....

12. What work does your guardian do? .....

13. How many wives does your father have?.....

14. What is your mother's position as a wife in the family?.....

15. How many children does your mother has? .....

16. If your father has more than one wife how many children does your father have .....

17. What birth order do you take among your father's children?.....

Section B

Nutritional Data

1. Respondent

   1. Child

   2. School teacher

   3. Others specify ..... /___/

2. Do you usually take breakfast before leaving home in the morning?

   1. Yes 2. No 3. Sometimes. /__/

3. If yes what do you usually take for breakfast? .....

4. Where do you usually get the food you eat in the morning?

   1. Buy 2. Cook 3. Others specify ..... /___/

5. What do you usually take for lunch .....

6. Where do you usually get the food you eat for lunch?

1. Buy 2 Cook 3. Others specify..... /____/

7. What do you usually take for your dinner at night? ..... /____/

8. Where do you usually get the food you eat for dinner?

1. Buy 2. Cook 3. Others specify ..... /____/

9. Do you usually buy meals for lunch at school?

1. Yes 2. No 3. Sometimes

10. If yes what food did you buy for lunch at school today?

.....

11. Is there any particular food you do not eat in your house?

1. Yes 2. No /____/

12. If yes mention it .....

13. What did you eat in the last 24 hours

1. Breakfast 2. Lunch 3. Dinner .....

Section C

Health Data

1. Respondent

    1. Child

    2. School teacher

    3. Others specify ..... /___/

2. Is there any school health clinic attached to your school

    1. Yes 2. No /___/

3. If yes, how frequent do you visit the clinic?.....

4. Which of the sicknesses do you usually have?.....

5. From where do you fetch your drinking water at home?.....

6. Where do you go when you want to pass feaces at home.....

SECTION D

1. Respondent

   1. Child 2. School teacher /___/

   3. Others specify .....2.

   What is the academic performmance of the student?

   1. Poor 2. Fair 3. Good 4. Very Good

   5. Excellent /___/

   6. Others specify .....

3. How often does the student absent himmself from school in a term?

   .....

SECTION E

General Physical Examination

1. Palour/Anaemia 1. Present 2. Absent /___/

2. Conjunctivities 1. Present 2. Absent /___/

3. Angular stomatities 1. Present 2. Absent /___/ 4 .

   Parotic enlargement 1. Present 2. Absent /___/

5. Dental caries 1. Present 2. Absent /__/

6. Goitre 1. Present 2. Absent /__/

7. Splenomegally 1. Present 2. Absent /__/

8. Hepatomegally 1. Present 2. Absent /__/

9. Skin Infection/Scabies 1. Present 2. Absent /__/

10. Others specify .....

Anthropometric Measurement Results

1. Weight (kg) /__/__/__/

2. Height (cm) /__/__/__/

3. Mid upper aarmm circumference (cm) /__/__/__/

4. Basal Metabolic Index (BMI) /__/__/__/

Haemoglobin (Hb) Result (Gm/dl)

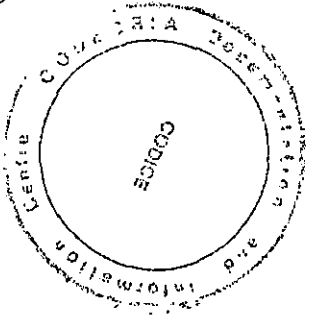
Haemoglobin level (Hb) gm/dl .....

APPENDIX II

Haemoglobin Estimation in Percentage and its Equivalent in Gram Per Decilitre. Haemogobin %/100 ml

Hb Present age	Hb Gm/dl	Hb Present age	Hb Gm/dl	Hb Present age	Hb Gm/dl	Hb Present age	Hb Gmm/dl	Hb Present age	Hb Gm/dl
2 =		40 =	5.8	68 =	9.9	96 =	14.0	124 = 125 = 126 = 127 = 128 =	18.1 18.2 18.3 18.5 18.7
4 =		41 =	6.0	69 =	10.1	97 =	14.2		
6 =		42 =	6.2	70 =	10.2	98 =	14.3		
8 =		43 =	6.3	71 =	10.3	99 =	14.5		
11 =	1.6	44 =	6.4	72 =	10.5	100 =	14.6		
13 =	1.9	45 =	6.6	73 =	10.7				
15 =	2.2	46 =	6.7	74 =	10.8				
17 =	2.5	47 =	6.8	75 =	11.0				
19 =	2.8	48 =	7.0	76 =	11.1				
21 =	3.1	49 =	7.2	77 =	11.3				
22 =	3.2	50 =	7.3	78 =	11.4				
23 =	3.3	51 =	7.4	79 =	11.5				
24 =	3.5	52 =	7.6	80 =	11.7				
25 =	3.7	53 =	7.8	81 =	11.8				
26 =	3.8	54 =	7.9	82 =	12.0				
27 =	4.0	55 =	8.1	83 =	12.1				
28 =	4.1	56 =	8.2	84 =	12.3				
29 =	4.3	57 =	8.3	85 =	12.4				
30 =	4.4	58 =	8.5	86 =	12.6				
31 =	4.5	59 =	8.6	87 =	12.7				
32 =	4.7	60 =	8.7	88 =	12.8				
33 =	4.8	61 =	8.9	89 =	13.0				
34 =	4.9	62 =	9.0	90 =	13.1				
35 =	5.2	63 =	9.2	91 =	13.2				
36 =	5.3	64 =	9.3	92 =	13.4				
37 =	5.4	65 =	9.5	93 =	13.6				
38 =	5.5	66 =	9.7	94 =	13.7				
39 =	5.7	67 =	9.8	95 =	13.8				

Ref: Federal Ministry of Health and National Primary Health Care Development Agency (1995)



APPENDIX III

LETTER OF RECOMMENDATION TO EPE LOCAL GOVERNMENT SCHOOL AUTHORITY

24th May, 1996

TO WHOM IT MAY CONCERN

Dr.(Mrs.) M.O. Lawal is a postgraduate student of this Department and I would be grateful if she is given the necessary assistance to enable her carry out her research work.

Thank you for your co-operation at all times.

Signed

Dr.(Mrs.) T.O. Lawoyin

Supervisor.