EFFECTS OF SCHOOL LUNCH FEEDING PROGRAMMES ON NUTRITIONAL STATUS AND ATTENDANCE OF PRIMARY SCHOOL CHILDREN IN EMUHAYA DIVISION, VIHIGA DISTRICT, KENYA.

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ABSTRACT

The school-feeding programme was launched in Kenya in 1966. The aim was to improve nutritional status, school enrolment, attendance, and academic achievement. Little monitoring and evaluation of this programme has been done to assess it's effectiveness. Some studies carried out in other parts of the world show that school-feeding programmes have an effect on the nutritional status, school enrolment and academic achievement of school children. However, there has been no evaluation in Emuhaya Division. The purpose of this study was to determine the role of school-feeding programme in improving the nutritional status and school attendance levels of primary school children in Emuhaya Division of Vihiga District, Kenya. It was conducted between January and April 2003 with the following objectives: to investigate and study the effects of School Lunch Feeding Programmes on nutritional status and school attendance levels of participants and non-participants respectively, and to assess their food and nutrient intake. The diet quality of the school lunch was also assessed. Using a cross sectional research design, the study involved 320 pupils. Interview schedules, 24-hour diet recall and anthropometry were the instruments used in data collection. Using the Statistical Package for Social Sciences computer software version 10, frequencies, means, correlations and multiple regression were all employed in the data analysis. Epi Info version 6 was used to analyze anthropometric data. Food composition tables were used to compute the nutrient intake of index children. From the results, the demographic characteristics of households were not very different between the two groups. However, the non-participants tended to come from households of low socio-economic index compared to participants. The prevalence of malnutrition as determined

by weight-for-age, height-for-age and weight-for-height as well as absenteeism rate were significantly higher ($p \leq 0.05$) among the non-participants than the participants. The nutritional status of girls was generally better than that of the boys. The school lunch provided more calories and proteins to participating children than that provided by the home lunch to non-participants. There was a positive association between the school lunch, attendance and nutritional status. Thus, the nutritional status and attendance levels of participants were better than that of the non-participants.School Lunch Feeding Programmes in Emuhaya Division have a positive effect on both nutritional status and attendance levels of participating children. The programmes should therefore continue but with modifications to improve the nutritional quality since there is an acute food shortage in the study area, which is likely to affect the nutritional status of school children negatively. More schools and parents should be encouraged to venture into the School Lunch Feeding Programme because of it's positive outcome.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of school feeding programme in Kenya.

School feeding programme was launched in Kenya in 1966 by the National School Feeding Council to avert malnutrition among school children. However, this programme was wound up in 1980. Thereafter, the Government of Kenya / World Food Programme (WFP) introduced school feeding programme in 1981 with the realization that malnutrition among school children was escalating. The programme, which is still in operation, covers arid and low potential areas in which food production is low. These areas are poor, have food deficits and school enrolment levels are below the national average of 87%. The objectives of the programme were to improve nutritional status, school enrolment, attendance levels and academic performance of participating children by providing a nutritious midday meal to pupils (CBS, 1991).

During the first school term of 1995, the programme covered 19 districts in the Rift Valley, Coast, North Eastern and Eastern provinces, with a total enrolment of 360,000 children (CBS, 1991).These were Turkana, Samburu, West pokot, Laikipia, KeiyoMarakwet, Baringo, Narok, Kajiado, Mandera, Garissa, Wajir, Marsabit, Isiolo, Meru, Embu, Kitui, Tanariver, Kilifi and Kwale. Some of the areas that were not covered by this programme have adopted a system whereby a midday meal is provided throughout the school year at low cost. Parents contribute money to cater for this. Their objectives are to improve nutritional status, school attendance, enrolment and academic performance. It is also meant to save time for class and recreation during

lunch hour, and to cater for some mothers who may not be available to prepare lunch for their children. The meal is based on locally produced food and it is intended to make up for possible food and nutrient imbalances in the childrens' daily diet. It is referred to as School Lunch Feeding Programme.

Emuhaya Division of Vihiga District experiences food shortages almost throughout the year due to small farm sizes and high population density. A preliminary survey by Compassion International (a Non Governmental Organization) in 1994 revealed that 48% of school children were malnourished (DEO, 2002). There was also poor enrolment and attendance. Compassion International initially supported the school-feeding programme in Emuhaya Division, but has now withdrawn due to financial constraints. From the DEO's report, schools that were supported showed improved academic performance as well as enrolment and attendance (DEO, 2002). Since then, a number of schools begun running their own school lunch. So far, there has been no evaluation of these efforts.

School feeding has been shown to improve school enrolment, attendance and nutritional status in India (Abu and Hallan, 1989). School feeding programmes have been initiated in a number of countries (Lasswell and Roe, 1986). The main objectives of most of these programmes are to improve school enrolment and attendance, academic performance and nutritional status of the children. Though some programmes have reported an improvement in enrolment, attendance and nutritional status of school children, others have not achieved these objectives (Lasswell and Roe, 1986). Past

experience has shown that many nutrition interventions, including school-feeding programmes, are usually not based on baseline data. Furthermore, in many cases the implementation process has met with a number of problems. Consequently, the results, in terms of cost effectiveness and magnitude of impact, have been disappointing (Payne, 1986).

In an evaluation of a school-feeding programme in India, irregularity of meals was found responsible for poor nutritional status, school enrolment and attendance (CARE, 1997). Tansil (1985) found that in some cases the programmes do improve school performance, nutritional status, or both. Observations in Kenya have shown that school-feeding programmes do not necessarily improve enrolment levels nor do they improve the educational performance or nutritional status (Demoel *et al*, 1997). This may have been due to failure to point out the current estimated levels along with the targeted decrease or increase expected. This may have made it difficult for them to notice any change. However, evaluation by National School Feeding Council of the Kenya School-feeding Programme revealed an improvement in nutritional status of participating children (Sigman *et al*, 1989). Therefore, the purpose of this study was to shed more light into the nutritional status and attendance of primary school children as influenced by the school-feeding programme in Emuhaya Division.

1.2 Statement of the problem

Poor nutrition in early childhood has been shown to have long-term consequences affecting a child's later progress during school (Moore, 1988). Nutritional deficiencies among school children are responsible, in part, for poor school enrolment, absenteeism due to hunger and frequent illnesses, early dropout and poor academic performance (Moore, 1988). School-feeding programmes were introduced with the aim of reducing malnutrition and hunger especially in areas experiencing food shortages. Some studies have shown that well nourished children perform significantly better than poorly nourished ones. The purpose of this was to improve school enrolment, attendance and in the long run academic achievement.

Primary schools in Emuhaya Division have been and are still adopting the School Lunch Feeding Programme. Their aim is to provide a midday meal to pupils throughout the school year at a low cost. Their objectives are to improve nutritional status, school enrolment, attendance, and academic achievement. So far, there has been little monitoring and evaluation of the School Lunch Feeding Programme. Therefore, it is not possible to establish whether the time, money and other resources invested in the programme are worth the benefits realized. It was therefore necessary to analyze the effect of these programmes and thereby facilitate the making of necessary adjustments so that maximum benefits are realized.

1.3 Purpose of the study.

The purpose of this study was to investigate the effect of school-feeding programme on nutritional status and school attendance levels of primary school children in Emuhaya Division.

1.4 Research objectives.

The objectives of this study were:

1. To determine the socio-economic status of households of participating and non-participating children in the School Lunch Feeding Programme.
2. To study the effect of the School Lunch Feeding Programme on school attendance levels of participating and non-participating children in Emuhaya Division.
3. To investigate the effect of the School Lunch Feeding Programme on nutritional status of participating and non-participating children in Emuhaya Division.
4. To assess the food and nutrient intake of a sub- sample of participating and non-Participating children in the School Lunch Feeding Programme.
5. To assess the diet quality of the School Lunch.

1.5 Hypotheses

1. The nutritional status of participants in the School Lunch Programme is better than that of the non- participants.
2. The school attendance of participants in the School Lunch Programme is better than that of the non-participants.

1.6 Significance of the study.

The findings of the study are useful in evaluation of the effects of school-feeding programmes on nutritional status and school attendance levels of primary school children in Emuhaya Division, which has never been done before. The study has identified the role played by the feeding programme in the educational system and improvement of nutritional status of school children in Emuhaya Division. Through this study, data has been generated that will enrich the current scarce database on the feeding programmes in Kenya. Findings of this study have brought out the benefits of the programme that may encourage more pupils and parents to participate in the school-feeding programme. They may serve as an encouragement to the government and organizations concerned with children's welfare like UNICEF, UNESCO and World Vision, to support feeding programmes. Findings reported are useful in the identification of problems faced by the school-feeding programme in Emuhaya Division. These problems can be addressed for future maximum benefits. Documented proof of benefits may enhance community participation in the programme.

1.7 Limitations of the study.

1. This study was limited to schools in Emuhaya Division of Vihiga district. Thus, generalizations of study findings to other areas should be done with caution.
2. Due to time and financial limitations, only selected schools in Emuhaya Division were involved in the study.
3. The effect of the study was limited to nutritional status and attendance.

4. Boarding schools provide meals to all pupils and therefore were excluded from the study.

1.8 Assumptions of the study.

This study was based on the following assumptions;

- The eight schools chosen for the study would be willing to participate.
- Parents would give the required information.
- The schools would have up to date records.

1.9 Operational definition of key terms.

For the purpose of this study, the following definitions were adopted;

- **School feeding programme**

  This refers to a scheme for providing meals to children in non-boarding primary schools.

- **School lunch**

  This refers to a scheme for providing a midday meal to children in non-boarding primary schools.

- **School attendance**

  Availing oneself for school and classes as stipulated in the school regulations without missing.

- **Nutritional status**

  A measurement of the extent to which an individual's physiological need for nutrients is being met as measured by weight-for-age, height-for-age and weight-for-

height. The WHO National Centre for Health Statistics (NCHS) standards of 1986 were used.

- **Anthropometric measurements**

Physical measurements of the body such as height and weight, which provide an indirect assessment of body composition and development to evaluate the growth, progress and detect undernutrition.

- **Underweight**

It is a deficit in total body mass than expected for a certain age. It is determined by weight-for-age. Children whose Z-scores fall below-3.00 and -2.00 standard deviations of the standard weight -for-age are severely and moderately underweight respectively.

- **Wasting**

This is loss of muscle and fat occurring after a short period of acute nutritional deficiency and /or infection. It is determined by weight-for-height. Children whose Z-scores fall below-3.00 and -2.00 standard deviations of the standard weight -for-height are severely and moderately wasted respectively.

- **Stunting**

This is slowing of skeletal growth and of stature that results from extended periods of inadequate food. It is determined by height-for-age. Children whose Z-scores fall below-3.00 and -2.00 standard deviations of the standard height -for-age are severely and moderately stunted respectively.

- **Adequate diet**

Is one that provides essential nutrients in amounts at or above the RDA for the sex, age and activity involved in at a particular time.

- **A malnourished child**

A child whose weight-for-age, height-for-age and weight-for-height scores fall below the cut-off point of minus two (-2SD) and three (-3SD) standard deviations from the median of the reference population using the NCHS standards.

- **Participating children (participants)**

Pupils who eat the school lunch.

- **Non participating children (non-participants)**

Pupils who do not eat the school lunch.

- **Household**

People living together in a compound that comprises members of a nuclear family, or other relatives who had lived in the compound for a period of at least three months prior to the survey, all eating from the same pot/kitchen and are answerable to the same household head.

- **Household head**

The person (male or female) who is the major decision maker on household income and expenditure patterns of a particular family.

- **Respondent**

The parent who was interviewed at the time of the study.

- **Index child**

Children in classes five and six who formed the study sample in the selected schools

- **Occupation**

Major activity involved in by a person to earn income for a living. It was categorized according to major activities that most people engage in to earn a living in the area of study such as business and farming.

CHAPTER TWO

2.0 REVIEW OF LITERATURE

2.1 School feeding programmes

2.1.1 School feeding programmers in other countries.

The school feeding programmes can be traced as far back as the mid nineteenth century, when the Paris Guards in France established a fund for providing needy children with school lunches (Tansil, 1985). Most of the early feeding activities were privately financed. In Japan in 1889, a Buddhist priest initiated school feeding, with food furnished as alms. Later, a nationally funded programme was started (Allan, 1983). The early school or institutional feeding programmes were generally on small scale, sponsored by private charitable groups and directed to poorer children. These programmes were often concerned with distribution of milk. With time, however, they evolved to nation-wide programmes, with governments taking over sponsorship, at the same time providing a broader range of foods and embracing children of all economic levels ((Allan, 1983).

International organizations like United Nations Children's Education Fund (UNICEF), World Food Programme of the Food and Agriculture Organization (FAO) and others have been involved in the school feeding programmes, showing that school feeding is a major concern worldwide. The feeding programmes were started with different aims. In the United Kingdom, school feeding was started in 1960 with an educational motive (Marjorie, 1983). It was realized that malnourished school children could benefit from the programme offered. Besides, the programme offered a means of teaching children

better dietary habits, and through the children, their parents and the community at large. Thus, FAO advocated feeding programmes as a means of improving nutrition of vulnerable groups of preschool and even school age to improve their school enrolment and academic achievement (Marjorie, 1983).

2.1.2. School feeding programmes in Kenya.

There are a number of school feeding programmes (SFP) in Kenya and their nature depends mainly on the type of school and to a lesser extent the geographical location of the school in the country.

2.1.2.1 The World Food Programme – sponsored school-feeding programme.

The Government of Kenya/World Food Programme (GoK/WFP) school-feeding programme was introduced in 1981. It covers the districts in arid and semi-arid areas (ASAL) as well as divisions of the less arid and low potential areas in which food production is low. These areas have food deficits, are economically poor and have school enrolment levels that are below the national average of 87%. During the first school term of 1995, the programme covered 19 districts in Rift Valley, Coast, North Eastern and Eastern provinces with a total enrolment of 360,000 children (CBS, 1991).

The feeding programme diet consists of maize, beans and vegetable oil. These are used for preparing mid-day meals in pre-primary and primary schools. The parents and the school community are encouraged to provide vegetables or any other foods available in the community to supplement nutrients lacking from the meal, for example

fruits and vegetables to supply vitamins and minerals. The programme is viewed as a positive means of achieving realistic and measurable education objectives. As a support service it is used as a means of promoting education in the disadvantaged districts by providing food to school children to improve enrolment, attendance and in the long run academic achievement.

As this programme relies heavily on transportation of food to schools in the disadvantaged areas of the country, transport problems due to the extremely rough terrains, difficult roads and long delays in vehicle repairs continue to be bottlenecks to the smooth operation of the programme. According to the WFP Country Director, 70% of WFP's development assistance to Kenya goes to the school feeding scheme, but only 60% reaches the beneficiary institutions due to poor transportation (Daily Nation, 22nd September 1995).

Budgetary constraints have also affected the project. Monitoring and evaluation of programme performance has not been carried out smoothly due-to inadequacy of funds to run vehicles both at the Ministry of Education and District headquarters. According to the WFP Country Director the Ministry of Education has found it impossible to meet 50% of the internal transport, handling and storage costs as should be the case (Daily Nation, 22nd September 1995). Since 1990, the National Cereals and Produce Board (NCPB) which supplies maize and beans has found it difficult to supply enough grains to the project due to incapacitation by drought conditions and recent liberalization of the grain market (FAO/WHO, 1992).

A monitoring and evaluation mission for the project in 1986 after visiting 15 schools in three beneficiary districts (Turkana, Isiolo and Meru) observed that the nutritional objective of the WFP – sponsored School Feeding Programme was not quantified and therefore it was difficult to evaluate. It pointed out that the estimated levels of under nutrition should have been stated along with the targeted reduction. This mission also found out that the project document did not explain the link between the government's goals in the education sector and the objectives of WFP's assistance through the project. Thus there was a need for this to be done in order to assess the intended effects of the project.

2.1.2.2 The Ministry of Education school feeding programmes

The Ministry of Education runs two school feeding programmes. One programme targets the children in arid and semi-arid areas of Kenya and is supported by the WFP. The second targets children in middle and high potential areas. This one is participatory where parents of the children pay a subsidized fee to the programme while the Ministry provides finances to cover the remaining cost of the programme. Both programmes aim at provision of nutritionally balanced lunch meals (FAO/WHO, 1992). Some schools in other areas that are not covered by the Ministry of Education school feeding programme provide a midday meal to pupils at a low cost.

In Kenya, the school-feeding programmes are aimed at reducing hunger so that children can learn more effectively, especially in the afternoon classes (CBS, 1991). The meal provided by the feeding programme should also help the children to meet 1/3

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In Kenya, the school-feeding programmes are aimed at reducing hunger so that children can learn more effectively, especially in the afternoon classes (CBS, 1991). The meal provided by the feeding programme should also help the children to meet 1/3

to 1/4 of their daily dietary requirements. Hunger in the classroom is generally believed to lead to lethargy, apathy and inability to pay attention (Coursin, 1982). Unfortunately, there is no hard data on which to base judgments on the usefulness of the feeding programmes in combating these problems and meeting the varied aims.

It was realized that officials had devoted time and resources to assess and upgrade the nutritional and administrative sophistication of feeding programmes, but less systematic assessment had been made on their basic value (Demoel *et al*, 1997). Demoel further explained that measures of success of feeding programmes have been based on numbers of children reached, effectiveness of distribution systems, cost and nutritive value of the food given. According to Demoel, the assessments should instead have been based on the children reached, the effects of the programmes on nutritional status, growth of the children and the resulting changes in the education system or the return to the investment. Thus, the latter aspects should be addressed.

2.2 School Feeding Programmes and Educational Attainment.

School lunch programmes have been said to have favorable effects on educational attainment. It is expected that a well-nourished child will learn more readily than a poorly nourished one. In a study done in USA, twenty schools that had received hot lunches for one year revealed a higher increase in attendance rate compared to the ten that had not received lunch at any time (Marjorie, 1983). Three studies done in France on school children pointed out that school achievement and progress of children is

affected by nutritional and dietary variables (Pollit, 1983). They showed that iron deficiency anemia might be associated with poor school achievement.

A similar study done on short term fasting and its effects on problem solving in 9 - 11 year old children in France, revealed that children who did not fast (miss breakfast) had fewer errors in problem solving compared to those who fasted (Pollit, 1983). Those who missed breakfast were also more easily distracted by stimuli irrelevant to the task at hand. This study showed that variations in the timetable of dietary intake could affect specific processes such as attention and concentration.

In a Kenyan study, children in the School-Feeding Programme had better nutritional status and a faster growth than those not participating in the school lunch in Kirinyaga District (Demoel *et al*, 1997). Good feeding had contributed significantly to their rapid growth and mental development. The variables considered in this study were nutritional status, food intake and level of living and growth of pre-puberal primary school children. The government of Kenya noted that school-feeding programmes are recognized as efficient networks to distribute food to the pre-school and school age children (Kenya Development Plan, 1974-78).

Recent studies on nutritional status of school children in Kenya have indicated that a child's mental and physical development is improved significantly by proper nutrition during the first years of primary school (Demoel *et al*, 1997). The launching of the National School Milk Programme in Kenya by the presidential directive in 1978 was a

move to ensure better health and nutritional status of the school children and therefore an improvement in school enrolment, attendance and academic achievement (Kenya Development Plan, 1974-78). There was no evaluation of this programme to determine whether its objectives were achieved.

In Tamil Nadu State in India, a school-feeding programme aimed at fighting illiteracy was started in 1982 (Abu and Hallan, 1989). The programme was based on the premise that poverty induced malnutrition was by far the most important cause of child illiteracy and school dropout in India as in most parts of the third world. Through the programme, a midday meal consisting of rice, pulses and vegetables was provided to 8 million school children. The operating expenses were met by funds from voluntary, charitable and religious organizations. The Programme led to improved enrolment in primary schools, decreased dropout rate, added growth in height and weight of children, reduced complaints of deficient subcutaneous fat, poor musculature and mild anemia in children within three years. The Programme had proved a success and was recommended by UNESCO as a model to be followed by poor countries on the road to the goal of education for all. School-feeding programmes could thus enhance educational attainment of pupils.

2.3 Effects of school feeding programmes on school enrolment, attendance and nutritional status.

School feeding programmes have favorable effects on the nutritional status and attendance of school children. A study conducted in New York to determine the effects

of milk as a supplementary food given to children 7 - 11 years showed that there was greater increment in height and weight of the children on the milk supplement (Corryman, 1982). The same children had a better skin complexion, were more cheerful, attended school more regularly and were better at athletics than the controls. Another study done in Japan in the 1980's revealed that in Tokyo, school children fed on 200 milliliters milk supplement each day for six months gained 86% more in weight and 16% more in height than the control group not getting the supplement (Coursin, 1982).

A study done in Tamil Nadu, India suggests that increased nutrition, as a result of school feeding programmes helps retain the children in the schools (Abu and Hallan, 1989). Evaluation of the school lunch programme by Roy and Rath (1970) in Orisa, India as well as by Cotten (1982) in Haiti suggest a positive relationship between SFP, attendance and enrolment. Both studies found that school attendance and enrolment were higher in schools with a feeding programme than those without. The WFP school-feeding programme has been reported to have led to increased and stabilized school enrolment and maintained attendance in some beneficiary districts in Kenya (UN/WFP, 1992).

A research conducted in Mafraq area, Jordan to asses the impact of school feeding programmes on the nutritional status of primary school children aged 7-15 years showed that weight and mid-upper-arm circumference values were significantly and generally higher for children participating in the programme compared to those not

participating in the programme. This was so especially among females and younger age groups, who are more sensitive to nutritional changes. Stunting was common in the programme area, which was an indication of the presence of past chronic malnutrition. Nevertheless, because the programme was less than one year, it was difficult to draw precise and definite conclusions from the data collected (Hijazi and Abdulatif, 1986).

Studies carried out in Baroda-India, have shown that a good school lunch designed to remove deficiencies in the home diet and based on locally available foods can result in a significant improvement in the nutritional status of school children and as judged by weight gain and biochemical status (Rajalakshmi, 1977). Several other researches conducted in south India on outcome of school lunch have reported that a well balanced diet supplement provided at school resulted in statistically significant increases in weight and height, in school attendance, and in classroom performance (Rajalakshmi, 1977).

Rewel and CARE (1983) reported that, supplementary food eaten on a regular basis had a positive impact on the nutritional status of school children in Madhya Pradesh, India. A study carried out in Kirinyaga district of Kenya to evaluate the effect of a school feeding programme under the National School Feeding Council of Kenya (ten years after its inception) on the growth of school children aged 7-11 years showed that children in the school lunch group were heavier and taller than in the control group (Demoel *et al*, 1997).

In New York, a report on the effect of the school lunch revealed an increase in growth for children receiving school lunch (Tansil, 1985). In the study, 1,600 black children whose families were on relief (receiving aid to meet domestic needs) were given free lunch containing 1/3 to 1/2 of the recommended allowance of proteins, carbohydrates and vitamins. The weights, heights and ages were analyzed for boys and girls in five age groups. Seven of the groups showed greater gain in stature and weight than those who ate either at home or at the nearby shops. The boys made significantly greater gains in height while the girls gained significantly more in weight.

A similar study was conducted in Jamaica with stunted and non-stunted children. Nutritional supplementation to the stunted children produced benefits to the childrens' mental and motor development. The stunted children caught up with the non-stunted control group in development levels too. This implies that at least part of the deficit in the development of stunted children was due to poor nutrition (McGregor et al, 1991). Therefore, school-feeding programmes when well organized can play a vital role in improving the nutritional status of school children.

From the foregoing, educational policy-making must protect children's nutritional status by among other things, making provisions for nutritious foods at school, especially in arid and semi-arid areas with food deficits. Mobilization of parents and the school community to support such an intervention would be very necessary together with the

setting up of school gardens to grow crops and rear animals for use in the feeding programmes to ensure sustainability. (Van Der Vynckt, 1986).

2.4 Nutrition Status of School Children Worldwide

Nutrition status of a person is a measurement of the extent to which his/her physiologic needs for nutrients are being met. It refers to the state of health of a person, which is the product of the balance between nutrient intake and its utilization by the body (Moore, 1988). The nutrition and health of school age children have only recently began to receive attention (ACC/SCN, 2002). A long-standing assumption has been that by school age, a child has survived the most critical period and is no longer vulnerable.

However many of the infectious diseases affecting preschool children persist into the school years. Until recently data on school children were not routinely collected, despite growing evidence first, that malnutrition is widespread in this age group, and second, that these nutrition problems adversely affect school attendance, performance and learning(ACC/SCN, 2002).

There is increasing evidence, with resulting international concern, that the high level of nutritional deprivation combined with the heavy burden of disease in this age group has negative consequences for a child's long-term overall development (ACC/SCN, 2002). This has prompted an increased focus on the diverse needs of school age children. The main nutritional problems facing school age children include stunting, underweight, anemia and iodine deficiency and Vitamin A deficiency on the basis of information from

recent surveys (ACC/SCN, 2002) . Malnutrition is therefore a worldwide problem that needs serious attention as demonstrated by various reports. In the United States of America (USA) researchers estimate that over 13 million children under twelve years of age find it difficult to get all the food they need (Bread for the World Institute, 1997).

In Russia the prevalence of stunting among children less than two years increased from 9% in 1992 to 15% in 1994 (UNICEF, 1997). According to ACC/SCN (2000), the Africa region has the highest estimated prevalence of stunting (20.2-48.1%) and has the lowest rate of improvement. This report further says that in East Africa sub-region rates of stunting are increasing. An analysis of the nutrition situation was done on various studies carried out among children and their nutrition status worldwide including countries like Guatemala, India, Philippines, Thailand and Kenya. The analysis concluded that growth retardation observed among school age children is striking and suggests that nutrition status of school children in these countries is at risk (Pollit, 1990). Nutrition status is therefore an area of concern among school children and a threat to their academic performance.

2.5 Nutritional status of school children in Kenya

In Kenya as in most developing countries, conditions resulting from food deprivation predominate in nutrition and diet related problems. Available medical evidence and food production data identifies children under five years of age, school-age children, pregnant women, lactating and the elderly as persons most commonly affected (FAO/WHO, 1992). Results from nutrition surveys indicate that the nutritional status of

under fives has deteriorated. This affects the children into the school years with significant implications for their health as well as learning. Significant deteriorations in nutrition status were notable in Western and Nyanza provinces (FAO/WHO, 1992). In western province, 37% of the children were stunted, which was above the national rate of 33.6%. Vihiga District had the highest percentage of wasted children (12.5%), compared to other Districts in the province (CBS, 1994). Stunting and underweight levels were however higher in other Districts.

Protein energy malnutrition is the commonest and most devastating form of malnutrition among school age children in Kenya (FAO/WHO, 1992). The general nutrition problem in Kenya is one of insufficient calories and proteins. The main cause for this may be the high population increase (World Bank, 1990). The negative impact of malnutrition on learning in Kenya as well as other countries is well documented (Pollit, 1990). A survey carried out by the CBS (1991) showed that malnutrition is widespread among school children in Kenya and is consistently higher among boys than among girls in Kwale and Kitui districts. Nutritional status of school children has been reported to deteriorate with age (SDDP, 1993). Similar observations have been reported in Tanzania (Kimati, 1986).

A number of studies carried out in Kenya indicate that a significant number of school children are malnourished. A study carried out by Odoyo (1996) in Homabay District (Kenya) to ascertain the occurrence of intestinal helminthiasis and malnutrition among school children indicated that the prevalence of stunting was higher in boys than girls,

although the study population was basically malnourished. A study carried out by Sigman et al (1989) in Embu district, Kenya, on school children aged seven to nine years showed that 25% of the sample was stunted.

Similarly, a study carried out by Kielmann (1998) in Samburu, showed a high prevalence of wasting among school children aged five to fifteen years. Though most studies carried out on nutrition status of Kenyan children concentrate on those below five years of age, there is evidence that malnutrition exists among all ages of children in Kenya. It affects school children directly through absenteeism and frequent illnesses, poor school enrolment, early dropout and poor classroom performance (FAO/WHO, 1992).

There is however little information on nutritional status of school children within school feeding programmes in Kenya. A few studies done in Kenya show that nutritional status of school children within the same age group of children in this study is poor (FAO/WHO, 1992). Trends show that the nutritional status of school children has deteriorated with time particularly in areas experiencing food shortages (Pollit, 1990). Vihiga District was cited as one of the areas experiencing acute food shortage and therefore a high prevalence of malnutrition, due to high population density according to the Fifth Nutritional Survey 1994 (CBS, 1994).

Highly prevalent good nutrition and health conditions among school age children are important determinants of educational outcomes. Educational policy makers and

planners can no longer afford to overlook such determinants. There are ways to intervene to improve the nutrition and health of today's school-age populations, which offer the ministries of education promising avenues for improving the quality of primary education. School-feeding programmes are one such intervention and thus there is a need to investigate how effective the programmes are.

2.6 Gaps in the knowledge.

Some studies carried out in Kenya reveal that the nutritional status of school children is poor. School feeding programmes were thus introduced with the overall aim of improving nutritional status, academic performance, school enrolment and attendance. An evaluation of some feeding programmes implemented in Kenya showed an improvement in nutritional status, school attendance and enrolment of participating school children. Others did not show any improvement. Investigation should be done to find out why some School Feeding Programmes did not have any effect on participating children. No evaluation has however been conducted in Emuhaya Division. This study was therefore undertaken to establish whether the objectives of the School Feeding Programmes in Emuhaya Division were being met.

CHAPTER THREE

3.0 RESEARCH METHODS

INTRODUCTION

3.1 Area of study.

This study was carried out in Emuhaya Division, Vihiga District between January and April 2003. This is one of the smallest of the seven districts in Western Province. The District is 32 km wide from East to West and 19 km from North to the South and occupies a total area of 541 sq. km. Vihiga District is divided into six administrative divisions, namely: Emuhaya, Luanda, Sabatia, Tiriki East, Tiriki West and Vihiga. Located within the lake basin, the district has an altitude ranging between 1,300 m and 1500 m above sea level and slopes gently from West to East.

The District annual rainfall ranges from 1800 mm to 2000 mm. Emuhaya Division is on the leeward side of the Maragoli hills. It therefore receives the lowest amounts of rainfall in all the six divisions, a factor likely to affect food production in the area leading to shortages. Temperatures in the district range from 14°c to 32°c. Population estimate for the district is 590,000 persons constituting 73,751 households. The population density is approximately 1091 persons per square km. The average family size is 8 persons while the mean farm size is slightly less than 0.6 ha or 1.5 acres (Vihiga District Department of Agriculture, Annual Report, 1997-2000).

The main reasons for the high population density in the District is high birth rate coupled with attachment to ancestral land and unwillingness to migrate or resettle

elsewhere even when available land space is dwindling for some divisions (Vihiga District Development Plan, 1997-2000). According to GoK/UNICEF (1998), the national Fertility Rate (FR) in Kenya declined from 6.7 in 1989 to 5.4 in 1993. Some parts of the country have however not achieved this decline and should be given special attention so that they attain the national FR of 4.0 by year 2000 and 3.5 by year 2005. This is true for the study population where the average household size was six people.The difference in district and divisional average family size may be due to high morbidity and mortality in young children in the division.

Major economic activities in the area of study include small-scale farming, commerce, trade, dairy farming and to some extend forestry related activities. There are fertile soils, which support the growing of cash crops mainly tea and coffee, and food crops particularly maize, beans, vegetables and fruits. Small stocks of cows, pigs and poultry are kept, due to small sizes of land holdings. They provide households with milk, eggs and beef. Agroforestry activities are important in supplying firewood, timber and soil conservation. Commercial activities include maize milling, sale of general merchandize, vehicle repairs, welding furniture making and sale of second hand clothes. Hawking of vegetables and other goods is a notable phenomenon in the trading centers. The distribution of incomes in the division varies with sectors. The highest income is in the wage employment sector and the lowest in the agricultural sector (Vihiga District Development Plan, 1997-2000).

Emuhaya Division has 4 locations namely Wekhomo, North Bunyore, East Bunyore and North East Bunyore. It has a population of 101, 196 people in an area of 169.5 Sq. Km. The most prevalent diseases in the area are anemia, malaria, respiratory tract infections, skin diseases, pneumonia and ear/eye infections. Malnutrition (34%) among the children has been identified due to poor feeding habits that cause marasmus, kwashiorkor and anemia (Vihiga District Development Plan, 1997-2000). Emuhaya Division was chosen because it is one of the Districts that experience food shortages due to limited land, a factor likely to jeopardize food intake and hence nutritional status of school children. Poor nutrition and hunger affects the school attendance of school children.

3.2 Study population.

The study sample comprised of primary school children in Emuhaya Division. The sample was drawn from mixed day public primary schools in the area of study. Class five and six pupils were the study subjects. These classes were chosen because the pupils were likely to be on the lunch programme for at least two years, since most children start participating in the programme at class three. Since the effects of diet on nutritional status occur after some period (Moore, 1988), this made it possible to see the two years' effect of school feeding programme on nutritional status. These pupils were approximately aged 10 to 12 years.

3.3 Sample size

The sample size was determined according to the following formula, which is suitable for comparative studies according to Fisher et al (1991):

$$n = \frac{Z^2 (pq)}{d^2}$$

Where n = the desired sample size

Z = The standard normal deviation, set at 1.96 which corresponds to 95% confidence

d = Acceptable range of error (0.05)

p = participating rate in the school feeding programme in Vihiga District (D.E.O., 2001) which is 30%

q = Non-participating rate in the school feeding programme in Vihiga District which is 70%

Therefore: $n = \frac{1.96^2 (0.3 \times 0.7)}{0.05^2}$

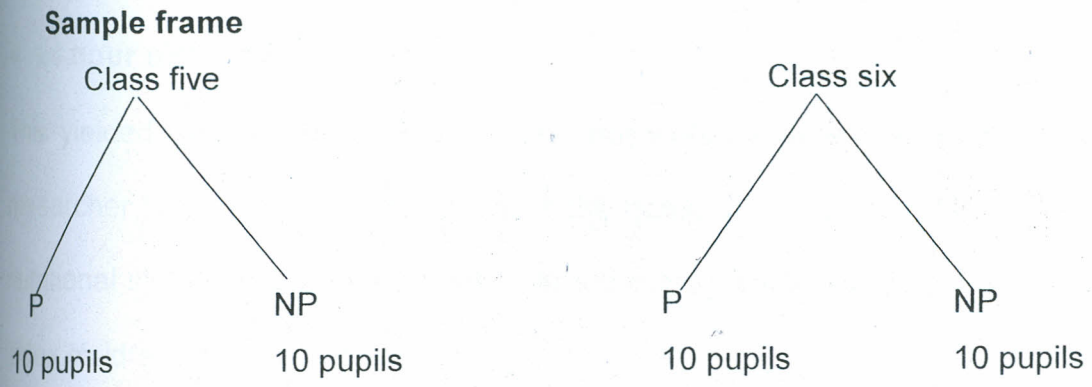
n = 320 pupils

3.4 Research design and sampling procedures.

This study adopted a cross-sectional survey design. This incorporated both qualitative and quantitative research approaches. In the division, twenty schools had the school lunch feeding programme while thirty-seven schools did not (DEO, 2002). Schools with the school lunch feeding programme were identified using records at the Emuhaya Division education offices. To obtain the study sample, eight schools were randomly picked from schools with School Lunch Feeding Programme. Since Emuhaya Division has four locations, two schools were randomly selected from each location. To do this, schools with the lunch programme in each location were listed and two schools

randomly selected from each location. North Bunyore location had six schools,North East Bunyore had four schools, East Bunyore had five schools while Wekhomo had five schools.

To obtain the pupils' sample in each school, teachers availed standard 5 and 6 lists of pupils to constitute the sampling frame. Using stratified random sampling; ten pupils were then randomly selected in each group to give twenty pupils per class. This gave forty pupils per school and a total sample of three hundred and twenty pupils for the eight schools (Figure 1). The stratum for this population was obtained by grouping the population into two: participants and non-participants in the lunch programme. Socio-economic and demographic data were collected from one parent of each index child as well as the parents' opinions regarding the feeding programme.



P - Participants

NP - Non-Participants

Figure 1 Sample of pupils in each school

3.5 Research Instruments.

- **Interview Schedule**

This yielded information on demographic and socio-economic status, attendance records of pupils in school and classes as well as parents' opinions about the feeding programme.

- **School Registers**

They showed records of index children on absenteeism from school and classes as well as their ages.

- **Anthropometry**

This yielded data on nutritional status using weight for age, height for age and weight for height measures of index children. Measurements were taken three times and an average obtained. An electronic seca weighing scale and shorr adult height boards were used for measuring weight and height respectively.

- **24 hour diet recall**

This yielded data on kinds of foods and nutrients pupils eat at home. It enabled the researcher to establish the adequacy of the home diet and control it's influence on the nutritional status of the pupils. It was carried out on a sub-sample of 30% of parents of index children, which are approximately 100 parents.

- **Observed weighed technique**

This was used to assess the caloric and protein intake of participants in the school lunch (Cameron and Staveren, 1988). It was important in establishing the adequacy of the school lunch.

3.6 Pretesting Research Instruments.

Research instruments were developed and pretested on a pilot sample of 10% children and parents not included in the main study. Pretesting helped in checking the validation of research and assisted in improving the instruments accordingly. The research assistant was trained to familiarize herself with the tools.

3.7 Data Collection Procedures.

Data was collected as follows;

- **Interview procedure**

The researcher visited the households of index children and interviewed the parent who was available (respondent). Interviews were arranged with each respondent selected for the study. They yielded data on attendance, parents' opinions regarding the school lunch as well as demographic and socio-economic characteristics of households. The 24-hour recall was also completed at this time by interviewing a sub-sample of 30% parents of index children.

- **24 hour recall**

This was used to ascertain the nutrient intake at individual level of index children. The respondent mentioned the foods consumed during the past twenty-four hours. Food quantities and ingredients used were estimated using household measures.

- **School registers**

The school attendance information was extracted from the school records.

- **Anthropometric measurements**

The ages, weights and heights of pupils were determined. The height and weight were measured using a height board and an electronic "Seca " weighing scale respectively. The weighing scale was calibrated every morning at Maseno market with a one-kilogramme stone. Before weighing each child, the scale was set at zero on a flat surface. Then the lightly dressed child was made to stand on the scale and the weight recorded to the nearest 0.1kilogramme. Three readings were taken and an average weight calculated. For the heights, the child stood barefoot and upright on the flat board with hands hanging loosely. The headpiece of the board was then lowered gently, making contact with the top of the head. The child's height was recorded three times using same procedure to obtain the average height. The ages of the index children were obtained from the school records and parents and verified using birth certificates, clinical attendance cards or baptism cards.

- **Observed weighed technique procedure**

This was used to assess the diet quality of the school lunch. The volumes of the food portions served and consumed by the children were measured as well as the leftovers. The proportions of the ingredients used in cooking and the total volume of the food cooked were also measured. The nutrients consumed were then computed using the WHO (1987) food composition tables.

3.8 Data Analysis.

Data was entered and cleaned in Dbase111+software. It was analyzed both quantitatively and qualitatively. By use of Statistical Package for Social Sciences (SPSS) computer software, frequencies, t-tests and chi-square tests were used. These generated percentages, means and standard deviations in the descriptive analysis and presentation of general household and child characteristics. The T-test for independent samples was used to test the significant difference between the means. Anthropometric data was analyzed using the Epi Info version 6. This generated z scores and anthropometric indicators (W/A, H/A and W/H) which were used to classify the school children into categories of nutritional status.

Children's' caloric and protein intakes were computed and used to calculate the dietary adequacy of children based on the RDA from the WHO (1987) food composition tables (Appendix 1). Comparisons of the contribution of different meals to caloric and protein adequacy for the children in the two groups were carried out using the t-test for independent samples. Pearson correlation of independent variables with nutrition indicators (W/A, H/A and W/H) as the dependent variables was done to identify demographic and socio-economic factors (independent variables), which potentially influence the nutritional status of school children in the area of study. Multiple regression analysis, with nutritional indicators (W/A, H/A and W/H) and attendance as the dependent variables and school lunch as the independent variable, was employed to give the effect of school lunch on nutritional status and attendance of index children.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

In this chapter, results of the study are discussed under the following sub-headings;

- Demographic characteristics of respondents of index children.
- Socio-economic characteristics of respondents of index children.
- School attendance and parents' opinions regarding the school lunch.
- Food and nutrient intake of index children.
- Diet quality of the school lunch.
- Nutritional status of index children.

4. 2 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS OF INDEX CHILDREN

4.2.1 Sex and age of respondents of index children.

Table 4.1 shows sex and age of respondents. The study population comprised of 320 parents (respondents); 160 for participating and 160 for non-participating children in the school lunch feeding programme. A larger percentage of respondents in both groups were females (64.4% and 75% for participants' and non-participants parents respectively). These results are typical of rural households where men go out to work as women stay at home to look after children and carry out household chores (FAO/WHO,1992). In most households only women were found at home at the time of the study. Most of them however work within the area of study and are back home in the evening.

More respondents in both groups were between 30-39 years (55% participants and 46.3% non-participants' parents). At least 8.8% of non-participants' parents were above 60 years as compared to the participants' households where there was none in this group. This implies that participants have young parents as compared to the non-participants. This may also influence participation in the school lunch. The younger parents of participants may be more aware of the role of the school lunch than the older parents of the non-participants. None of the respondents in the two groups was less than 20 years old. This can be attributed to the fact that most Kenyan women and men get married and take charge of their own households during their twenties. This agrees with (FAO/WHO,1992) report that most kenyans get married in their twenties. Before then, they are still under their parents' care. Consequently, more are still in schools and colleges with the growing emphasis on the education.

Table 4.1 Age and sex of respondents of index children.

Age	Participants		Non-participants		P value
	Male(n)	Female(n)	Male(n)	Female(n)	
20-29 years	10	26	08	06	0.025*
30-39 years	32	56	20	54	0.026*
40-49 years	10	16	02	28	0.035*
50-59 years	05	05	06	02	0.025*
Above 60 years	0	0	04	10	0.038*
Total	57	103	40	120	

$\chi^2 = 33.7$ df=4 $*\chi^2$ significance at $p \leq 0.05$ n=number

Dependency ratio for this study population was 1:2, and the average household size was six people. Both are in line with results seen in other developing countries according to the FAO/WHO(1992) report. Large household sizes may have a negative effect on childrens' nutritional status due to a scarcity of resources especially food.

4.2.2 Marital status of respondents of index children.

Table 4.2 shows marital status of respondents. In both groups, majority of the respondents were married (69.4% participants' parents and 45% non-participants' parents). Almost 10% of respondents were single or widowed in the two groups. The number of divorced and separated parents in this study was rather high (21%) which does not seem to be consistent with Mburugu's (1994) finding, which showed that marriages in the rural areas are relatively stable unlike in the towns. There was no association however between marital status and participation in the school lunch. A possible explanation to this may be that women are not able to make decisions as to whether their children should participate in the school lunch since most of them were the respondents. They may also be lacking money to pay for the school lunch especially the single parents.

Table 4.2 Marital status of respondents of index children.

Marital status	Participants		Non-participants		P value
	n	%	n	%	
Single	10	6.3	21	13.1	0.035*
Married	111	69.4	72	45	0.027*
Widowed	19	11.9	20	12.5	0.028*
Divorced	12	7.5	18	11.3	0.038*
Separated	8	5.0	29	18.1	0.027*
Total	160	100	160	100	

$\chi^2 = 25.39$ df=4 $^*\chi^2$ significance at $p \leq 0.05$ n=number

4.2.3 Relationship of respondent to Head of household.

In this study sample, all heads of households were men. More than half (64.4%) respondents in the participants' households were wives to the household heads. More than a third (35.6%) respondents were the actual household heads (men and husbands of those households). For non-participants' households, 75% respondents were wives to household heads while 25% were the actual household heads. Although men are regarded as household heads, they are physically not available to take decisions during the day as they are away working. This may indicate that women are in a dilemma as to whether to let their children participate in the school lunch programme.

4.2.4 Level of Education of respondents of index children.

The level of education of parents is likely to determine their occupation and income through it's influence on the employment potential and may have an effect on nutritional status. Table 4.3 shows the level of formal education of respondents of index children. In participants' households, respondents (parents) had higher levels of education than the respondents in non-participants' households. A majority of these participants' parents were young (between 20-39 years old). These findings are in line with that of other parts of Kenya, which show that younger persons are normally on the average more educated than older ones (CBS, 1987). Thus, the average level of education of younger parents of participants was higher than the non-participants parents.

Table 4.3 Level of education of respondents of index children.

Educational level	Participants		Non-participants		P value
	n	%	n	%	
Primary	32	20.0	50	31.3	0.024*
Secondary	63	39.4	48	30.0	0.038*
College	38	23.8	24	15.0	0.028*
University	12	7.5	9	5.6	0.035*
No formal education	15	9.4	29	18.1	0.028*
Total	160	100	160	100	

$\chi^2 = 14.02$ df=4 $^*\chi^2$ significance at $p \leq 0.05$ n=number

Findings reveal that, though majority of the respondents were women, the males were highly educated than the women. The number of males (65.7%) with formal schooling

was significantly higher ($p \leq 0.05$) than that of the females (49.8%). This finding indicates that rural women are less educated than their husbands. This could be because, until recently, education for girls was taken lightly and sometimes ignored altogether. This is also consistent with CBS (1988) findings, which reflect higher national literacy levels for males (63.2%) than women (46.5%). Consequently, according to ACC/SCN (1993), illiteracy levels among African women are still high, especially in the rural areas.

The low literacy levels among the non-participants' parents could be attributed to the high dropout rates in primary schools in the area and high levels of poverty; therefore not many pupils were able to pursue education beyond primary school. In a report by Abagi (1997) western province had an average drop out rate of 8%, which is above the national rate of 5.4%. Low literacy levels among non-participants' parents is most likely to influence participation in the School Lunch Feeding Programme as is evident in the findings. These parents may not be aware of the role the school lunch is likely to play in improvement of enrolment, attendance and nutritional status of their children.

4.2.5 Occupation of respondents of index children.

Occupation to some extend determines the income of a household. Table 4.4 shows occupation of respondents of index children. More than a third of the respondents in both groups (32.5% participants' parents and 35.6% non-participants' parents) engaged in business. More than 20% engaged in both farming and teaching while a few (13.8%) did other jobs like clerical and secretarial duties.

Almost a third (29.4%) of the non-participants'parents were teachers. However most of them did not understand the role of the school lunch. Teachers may be assuming that they feed their children well at home which may not be the case. Their children go home for lunch and some very far away. Some of these children reported that they get fatigued from walking long distances to go home for lunch. This interferes with their concentration in the afternoon classes. Some still go home and miss lunch or find when it's not ready. The school lunch could thus be useful to these children if their parents are made to understand it's role. Some of the respondents had more than one occupation but the study considered the occupation where one spent most of their time.

Table 4.4 Occupation of respondents of index children.

Occupation	Participants		Non-participants		P value
	n	%	n	%	
Teacher	30	18.8	47	29.4	0.026*
Business	52	32.5	57	35.6	0.028*
Farmer	47	29.4	43	26.9	0.038*
Other	31	19.4	13	8.1	0.025*
Total	160	100	160	100	

$\chi^2 = 15.24$ df=3 $^*\chi^2$ significance at $p \leq 0.05$ n=number

The large percentage of households whose members engaged in business could be attributed to the high population density and land fragmentation in the area, which force people to rely on business as a source of livelihood as compared to farming. This finding corroborates with the Vihiga District Development Plan, 1997-2000 report, which

indicates that Vihiga District is densely populated. The same report states that the highest income earners are in wage employment while the lowest earners are in business and agricultural sector. Thus, this implies low income for a bigger population in the study sample as most of them engage in business and agriculture. This is likely to influence participation in the school lunch, as parents are required to contribute some money.

More parents of participants (38.2%) were in wage employment as compared to those of non-participants (37.5%), though the difference was not significant ($p>0.05$). This seems to imply that the participants' parents who engage in business and farming get higher income than the non-participants' parents who engage in the same occupation. Participants' parents in the "other" category were involved in wage employment as well. They were civil servants, policemen and secretaries. They were thus earning much more than the non-participants parents in the same category who were mainly clerks and watchmen. Therefore as a whole, participants' parents had higher income compared to the non-participants' parents. Findings revealed that respondents of non-participating children earn low income. They may be unable to raise money for the school lunch.

The nature of occupation in the area of study determines the income, which may affect food availability in the household and therefore nutritional status of the members. This also influences participation in the school lunch, as parents are not able to afford the payment towards the school lunch.

4.3 SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS OF INDEX CHILDREN

4.3.1 Sources of income of respondents of index children.

There were no other sources of income revealed among the respondents, apart from the sources of income summarized in table 4.4. Sources of income did not differ significantly between respondents of participating and non-participating children. Income affects the family's purchasing power and provides the major means of having access to food. Thus households with less income may not be able to purchase food that will satisfy the needs of all family members. Lack of enough food affects nutritional status negatively.

4.3 .2 Total household Income

This referred to the amount of money in Kenya shillings that was available to the respondent for household use every month. It was difficult to establish the households' income since most people were not ready to disclose their real income. However, an estimate was made using both knowledge of the occupation of the individual respondent, household head (in cases where the respondent was not the household head), family expenditure as well as salary estimate.

Table 4.5 shows cash income of respondents of index children. Mean income was Kshs. 6900 ±50.50 for participants and Kshs. 6200±75.60 for non-participants. Total income was significantly higher ($p \leq 0.05$) among the participants' parents than the non-participants. Participants' parents earned significantly higher ($p \leq 0.05$) income than

parents of the non-participants did (a difference of Kshs.700). This implies that parents of participants can afford to pay for the school lunch as compared to those of the non-participants.

Low-income earners in the study area may be vulnerable to malnutrition and health problems because either they have no access to or experience limited access to food resources in the community. Low income also, coupled with little or no subsistence level food production were some of the factors contributing to poor nutritional status in a Kenyan study on nutrition of it's population (FAO/WHO, 1992). Thus children in households with insufficient income do not have continued access to safe and good quality food and thus are vulnerable to malnutrition.

Table 4.5 Cash income of respondents of index children.

Total income	Participants		Non-participants		P value
(per month)	n	%	n	%	
Below 2500	10	6.3	20	12.5	0.032*
2501 to 5000	28	17.5	51	31.9	0.025*
5001 to 7500	52	32.5	46	28.8	0.037*
7501 to 10,000	38	23.7	23	14.4	0.024*
Above 10,000	32	20.0	20	12.5	0.034*
Total	160	100	160	100	

$\chi^2 = 16.85$ df = 4 $^*\chi^2$ significance at $p \leq 0.05$ n=number

Central Bureau of Statistics (1996) findings also indicate that household income is an important determinant of household food security; it either increases or reduces the household's access to food. Food security is ultimately associated with access to nutritionally adequate food at the household (the ability of households to acquire a nutritionally adequate diet at all times). Household food security depends on an adequate income and assets, including land and other productive resources owned as well as food for purchase.

4.3.3 Land ownership.

Table 4.6 shows the amount of land owned by respondents of index children. More than 90% households in both groups owned less than two hectares of land. Only few households (nearly 10%) owned above 3 hectares of land. The mean land size was 1.5 ±0.35 hectares for respondents of participants and 1.6±0.55 hectares for respondents of non-participants. The difference in land size was not significant ($p>0.05$) between the two groups. As mentioned earlier this can be attributed to high population density and land fragmentation in the area of study. This compares well with the Vihiga District average acreage of 0.6 hectares per household (Vihiga District Development Plan, 1997-2000).

Table 4.6 The amount of land owned by respondents of index children.

Amount of land owned	Participants		Non-participants		P value
	n	%	n	%	
Less than 1 ha	54	33.8	48	30	0.950(NS)
1 ha	50	31.8	52	32.5	1.000(NS)
2 ha	38	23.2	48	30	0.890(NS)
3 ha	14	8.2	10	6.3	0.980(NS)
Over 3 ha	4	3.0	2	1.3	1.000(NS)
Total	160	100	160	100	

χ^2 =10.32 df=4 NS=Not significant (p>0.05) n=number

According to the respondents, limited land in the area of study is mainly due to rapid population increase affecting food production adversely. This is consistent with the FAO/WHO (1992) findings that rapid population increase in the country has overstretched provision for basic resources particularly food. Over 80% of Kenya's populations live in the 17.5%of agriculturally high potential land. Population density in this area has grown from 87 persons per one sq.km. in 1948 to 110 and 154 persons in 1969 and1979 respectively. The situation is even worse in Vihiga District where the population density is 1091 per sq. km. (Vihiga District Development Plan, 1997-2000). These figures indicate excessive and increasing pressure on land, a situation that has caused excessive fragmentation on farms and land degradation. Inadequate food production on these farms makes the rural small holder farming communities most

vulnerable to nutritional deprivation. More than a half of the respondents admitted that 50% of their food is from the produce of the farm.

The amount of land owned is likely to affect participation in the school lunch. Households, which solely rely on farms to produce food for both sale and consumption, are likely not to have some surplus food and money to contribute towards the school lunch. The small farms may not produce enough food for sale to earn income for the family as well as consumption.

4.3.4 Agricultural activities of respondents of index children.

Table 4.7 shows the agricultural activities of respondents of index children. Food crop cultivation (maize, bananas, cassava and vegetables) was the main agricultural activity in both groups. This agrees with the FAO/WHO (1992) findings that for an average rural household, about 50% of the food consumed is derived from own farm production. This pattern suggests that many households have no confidence in the market as being a source of adequate and timely food supplies. KDHS (1993) findings also indicate that the agricultural sector is characterized by smallholder farmers, 80% of whom own less than 2 hectares of land and produce food both for sale and consumption.

Table 4.7 **Agricultural activities of respondents of index children.**

Agricultural Activities	Participants n	%	Non-participants n	%	P value
Food crop cultivation	94	58.8	72	45.0	0.027*
Cash crop cultivation	16	10.0	17	10.6	0.029*
Livestock rearing	21	13.1	25	15.6	0.035*
Mixed farming	29	18.1	36	22.5	0.026*
No activity	0	0	10	6.3	0.035*
Total	160	100	160	100	

χ^2 =14.04 df =4 *χ^2 significance at p≤0.05 n=number

More than half of the participants (58.8%) in the School Lunch Programme were from households whose parents engaged in food crop cultivation as the major agricultural activity. Harvested food (not much due to small farms) was mostly sold in the market and cash income generated used to purchase food at the time of need, though there was no guarantee of timely food supplies. Some households (30%) harvest less food than what they would need for the full satisfaction of their families between the planting seasons. Such families get some small income from causal labor, which they may use to buy food and other necessities on monthly basis.

The cash generated for households that engaged in cash crop farming (mainly tea), was used to purchase foodstuffs and other necessities. Similarly, those who reared livestock (cattle, sheep and goats) sold their milk to purchase other foods. A small percentage (6.3%) of households of non-participants did not engage in any agricultural activity and thus relied on business to generate money to buy food. Mixed farmers on the other hand got food from both the crops and animals. The larger number of households of participants who engaged in food crop production could however be an indication that at least they have some food to contribute for the school lunch unlike the non-participants.

4.3.5 Expenditure patterns of households of index children.

The amount of money spend on various categories of family needs per month was sought. This to a large extend assisted with estimation of monthly income in various households since it was difficult for respondents to disclose their real income. Table 4.8 shows the mean expenditure on various needs among households of participants and non-participants.

Food expenditure was significantly ($p \leq 0.05$) higher among households of participants (Ksh.255 $\pm$ 27.6) than households of non-participants (Ksh.178 $\pm$ 27.6). Similarly the t-test revealed a significantly ($p \leq 0.05$) higher family health and school fees expenditure among households of participants (Ksh.220.5 $\pm$ 38.7) and (Ksh.1200.5 $\pm$ 129.8) respectively than among households of non-participants (Ksh.175.3 $\pm$ 57.8 and (ksh.937 $\pm$ 105.4); $P \leq 0.05$ respectively. This could be attributed to the higher socio-

economic index of participants' households. A higher proportion of the participants' households money was spent on fees, though food purchase was given priority over the other household needs like clothing, health and miscellaneous.The increased fees may also be due to participation in the school lunch.

Table 4.8 Mean expenditure on various needs of households of index children (kshs).

	Participants (n=160)	non-participants (n=160)	T-value
Family food	255.0 ± 52.4	178.2± 27.6	3.7*
Family health	220.5 ± 38.7	175.3± 57.8	4.6*
School fees	1200.5± 129.8	937 ± 105.4	2.8*
Family clothing	187.8± 32.9	186.3± 44.2	-3.1
Miscellaneous	156.2± 28.6	158.8± 52.3	-1.8

P<0.05 *t-test significant at p≤0.05 n=number

Expenditure on family clothing and miscellaneous was low in households of both groups although it did not differ significantly (p>0.05) between the two groups. This may be because these two are secondary and other needs have to be met first.

More than a third (34.1%) of the children in both groups came from the households where parents earn less that Ksh. 5,000 per month (table 4.5). This may imply that only a small fraction of this money is spent on food every month because of other family needs like health and school fees as revealed in the findings. This agrees with the

FAO/WHO (1992) findings where 20% of Kenyan rural families do not have enough income to afford a basic adequate diet to meet their nutritional needs and therefore suffer from "Food Poverty". According to World Bank (1990), Food Poverty has grown worse since the 1970's. It varies regionally with Nyanza and Western provinces containing about 60% of the food poor (World Bank ,1990). This makes food availability critical, compromising the nutritional status of families. GoK/UNICEF (1998) findings also highlight poverty as a major constraint affecting the nutritional status of children and women in Kenya. According to these findings, mild to moderate malnutrition continue to place a high burden of disease on children.

Family expenditure on food, health and fees is likely to influence participation in the school lunch. Parents may not afford to contribute money towards the school lunch because the three needs are given priority to fit in with the limited income.

4.4 SCHOOL ATTENDANCE AND PARENTS' OPINIONS ON THE SCHOOL LUNCH PROGRAMME

Attendance information was collected by a questionnaire and school registers.

4.4.1 Reasons for non-participation in the school lunch

Nearly half (47%) of the parents in both groups felt that the payment for the school lunch was too high. Parents were usually expected to contribute some amount of money, maize and beans in all the studied schools for their children to participate in the school lunch. Low levels of income and insufficient food production due to small acreage of land in the study area are likely to hinder some parents from paying money and food for their children.

More than a third (32%) of the parents indicated that their children could go home for lunch, though most get tired from long distances and hence not able to concentrate in the afternoon classes. Some children (12%) even go home and miss lunch. Consequently, the home lunch in most cases is not nutritionally adequate and is unavailable at times. The least ranked reason was that the children could carry food to school reported by 22% parents. Most of it was not nutritionally adequate. Nearly 10% of the packed lunch was low in proteins. This is likely to jeopardize the nutritional status of these children, as they need enough proteins for rapid growth and development at this stage. Proteins play a vital role in brain development of children and are thus instrumental in a child's mental as well as physical development during the school years (Moore,1988). Low proteins could thus lead to nutritional deficiencies, which may affect

school attendance and mental retardation that would result in poor academic performance.

4.4.2 Opinions about the school lunch.

Parents (44%) in both groups agreed that the school lunch plays an important role in improving class concentration, while 15% and 17% supported the improvement of nutritional status and encouragement of regular school attendance respectively. A few (13%) said it saves them from walking long distances when going home for lunch which makes the children fatigued and unable to concentrate in the afternoon classes. The rest (11%) agreed that the school lunch is convenient.

Similar findings were demonstrated by Marjorie (1983) who in support of FAO agrees that, FAO advocated feeding programmes as a means of improving nutrition of vulnerable groups of preschool and even school age children. This would then improve their school enrolment, attendance and academic achievement. Walking long distances for lunch also makes the children fatigued. This could also affect their concentration in the afternoon classes. In this case, the school lunch becomes convenient for them.

4.4.3. Absenteeism from school.

School absenteeism was used to measure attendance levels of index children. Table 4.9 shows school absenteeism of participants and non-participants in the School Lunch Feeding Programme. School absenteeism rate was significantly higher ($P \leq 0.05$) among the non-participants than participants. This supports the hypothesis that attendance

levels of participants are better than the non-participants.There was a statistically significant ($p \leq 0.05$)relationship between absenteeism from school and the school lunch. Adequate kilocalorie and protein intake at school was strongly associated ($p \leq 0.05$) with reduced absenteeism. This association was positive (Table 4.12). Evaluation of a school lunch programme by Cotten (1982) in Haiti also revealed a positive relationship between the school lunch and attendance. Similarly the WFP school-feeding programme has been reported to have led to increased and stabilized school enrolment and maintained attendance in some beneficiary districts in Kenya (UN/WFP, 1992).

Table 4.9 School absenteeism of participants and non-participants in the School Lunch Feeding Programme.

School absenteeism	Participants		Non-participants		P value
	n	%	n	%	
Present	126	78.8	79	49.4	0.027*
Absent	34	21.3	81	50.6*	0.035*
Total	160	100	160	100	

$\chi^2 = 29.98$ df = 1 $^*\chi^2$ significance at $p \leq 0.05$ n=number

4.4.4 Number of days absent from school

Table 4.10 shows the numbers of days index children were absent from school. The number of days index children missed school were significantly higher ($p \leq 0.05$) among non-participants (3.62 ± 0.66), than among the participants (3.31 ± 0.83). This supports

the hypothesis that attendance levels of participants are better than those of the non-participants. Regression coefficients with school lunch variables; kilocalorie and protein intake were significant ($p \leq 0.05$) for the number of days index children were absent from school (Table 4.12). This implies that participants in the School Lunch Feeding Programme tended to attend school more regularly than the non-participants did. This may suggest that the school lunch when well organized plays an important role in improving the school attendance levels of school children.

Table 4.10 The number of days index children were absent from school.

Days absent from school	Participants		Non-participants		P value
	n	%	n	%	
2 times and below	8	22.9	8	9.9	0.065
3 times	8	22.9	15	18.5	0.055
More than 3 times	19	54.3	58	71.6	0.035*
Total	35	100	81	100	

$\chi^2 = 22.07$ df = 2 *χ^2 significance at $p \leq 0.05$ n=number

Coursin (1982) reported similar results where the children who received school lunch were more cheerful attended school more regularly and were better at athletics than the controls in his study in Tokyo. Consequently, the launching of the National School Milk Programme in Kenya by the presidential directive in 1978 was a move to ensure better

health and nutritional status of the school children and therefore the school enrolment, attendance and academic achievement (Kenya Development Plan, 1978). An evaluation of a School Nutrition Programme in Jamaica found that the provision of breakfast resulted in higher school attendance and greater achievement in arithmetic (ACC/SCN, 2002). Another evaluation of the impact of a Mid Day Meal (MDM) Programme in 60 primary schools in India reported significantly higher enrolment, attendance, and retention rates with reduced dropout rates among MDM programme children(ACC/SCN, 2002).

4.4.5. Reasons for missing school

Table 4.11 shows reasons why index children missed school. More than a quarter (25.7%) of the index children missed school because of sickness while 9.4% missed school because of other reasons like helping with household chores and taking care of younger siblings, when their mothers are away. The number of index children absent from school because of hunger was significantly higher ($p \leq 0.05$) among non-participants (26.9%) than the participants (0.6%). It can be deduced that the school-lunch plays an important role as far as regular school attendance is concerned. Participants who miss breakfast and may be supper at home are at least assured of school lunch and therefore encouraged to go to school unlike the non-participants.

Table 4.11 Reasons why index children missed school.

Reasons for missing School	Participants n	%	Non – participants n	%	P value
Lack of school funds	0	0	16	10	0.027*
Sickness	26	16.3	15	9.4	0.035*
Hunger	1	0.6	43	26.9	0.025*
Other reasons	9	5.6	6	3.8	0.05(NS)
No reasons	124	77.5	80	50.0	0.025*
Total	160	100	160	100	

$\chi^2 = 69.13$ df = 4 $*\chi^2$ significance at $p \leq 0.05$ NS= Not significant. n=number

There was also a positive significant relationship ($p \leq 0.05$) between hunger as a reason for missing school and the school lunch (Table 4.12). Participants in the school lunch hardly missed school because of hunger like the non-participants. This finding compares well with CBS (1991) objective where the school-feeding programme was aimed at reducing hunger so that children can attend school more regularly. It is also consistent with Pollit (1983) results where variations in the timetable of school dietary intake affected specific processes such as attention and concentration. In a similar study, twenty schools that had received hot lunches for one year revealed a higher increase in attendance rate compared to the ten that had not received lunch at any time in USA (Majorie, 1983). Coursin (1982) also agrees that hunger in the classroom is generally believed to lead to lethargy, apathy and inability to pay attention. Thus, the

school-feeding programme may act as an incentive for school children to go to school everyday especially those who miss some meals at home.

Table 4.12 Regression coefficients of dependent variables with the school lunch (independent variable).

Dependent variables	Kilocalorie intake	Protein intake	P values
School absenteeism	0.2872*	0.2880*	0.035
Number of days absent from school	0.2965*	0.2975*	0.032
Reasons for missing school (hunger)	0.2785*	0.2775*	0.036

*Significance at $p \leq 0.05$

4.5 FOOD AND NUTRIENT INTAKE OF INDEX CHILDREN

The kinds of foods and nutrients that index children consumed at home were ascertained by use of the twenty four-hour recall diet survey. This was to facilitate establishment of the adequacy of the home diet and control it's influence on nutritional status of index children. It was conducted on a sub-sample of 30% households of index children; 50 households of participants and 50 households of non-participants. The household dietary caloric and protein intake and adequacy were computed using food composition tables by WHO (1987) for East, Central and Southern Africa (Appendix1).

4.5.1 Daily meals

On average there were three meals served in a day. These included breakfast, lunch and supper. Among the index children none was given snacks.

Foods commonly served for breakfast included porridge and both milk and strong tea. A few (21%) pupils took milk tea or porridge with bread or either bananas, cassava or potatoes. There were however, few (17%) children who went to school without breakfast. Majority (62%) of the pupils took strong tea with either bananas, cassava or potatoes.

For lunch, most pupils (72%) who did not eat at school ate *githeri* (a mixture of maize and beans) sweet potatoes, bananas, cassava and arrow roots some with strong tea at home. A few (24%) consumed rice with beans or *ndengu* (green grams). There were very few (14%) cases where pupils ate 'ugali' with vegetables or meat at lunchtime.

Nevertheless some pupils (12%) still missed lunch at home and went back to school hungry.

'Ugali' was the most common food in most households (76%) at suppertime. 'Ugali' was mostly taken with kales or traditional vegetables. This concurs with the findings of Asule et al (1999) in Sabatia Division (a similar ecological zone), where a majority of the respondents in this study consumed ugali daily. Few households (28%) recorded to have taken beef, fish and eggs.

Important foods consumed by the community for all the meals were sweet potatoes, greengrams, cassava, green bananas, beans and arrowroots. Generally, foods rich in carbohydrates were the most consumed in comparison to other nutrients. It is most likely that the studied community greatly valued these foods because of their high satiety value. These foods are also affordable to them. Foods rich in proteins like meat could also be expensive to buy and not easily available. A few households (23%) took *Githeri (a mixture of maize and beans)* and Irish potatoes at suppertime. The time of the study could also have influenced the availability and affordability of various foods. At least there were no households that missed supper due to lack of food.

Among the foods rich in proteins, some households (34%) took mainly tea with milk for breakfast. Very few households (28%) consumed eggs, fish and beef. This could be attributed to the low family income that makes beef unaffordable for most families.

Beans were taken in most households (87%). Some households (27%) took 'ugali' with greengrams.

Among the vegetables, kales and traditional vegetables were the most commonly consumed. Cooking fat, salt and sometimes milk were used in the preparation of the vegetables. Cabbage was rare mainly because it was out of season at the time of study. It is also rarely grown in the area of study. Carrots and pumpkins consumption was not reported by any of the respondents. This indicates that they may be unpopular or difficult to access on the local market since they are not grown in the area of study. Nevertheless, most people tend to have a negative attitude towards pumpkins even in the area of study.

Fruits were consumed by only a small number (28%) of participants. Guavas were the common fruits because they grow wildly in the area of study. However not all children in the study sample were able to access the guavas. Nearly half (47%) of the sample studied did not understand the importance of fruits in the daily diet. Thus, nutrition education could be useful in this community. Others found fruits quite expensive to purchase because of low-income levels. This implies their diet is lacking minerals and vitamins. The study community should note that diets lacking a variety of fruits and green vegetables may be deficient in certain vitamins and minerals. It is essential for a balanced diet to contain a selection of vegetables and cultivated or wild fruits. Animal and fish products that can also help contribute towards a fully balanced diet can supplement this.

Most foods in the study area were purchased from the market. This is due to limited land as is reported in the Vihiga District Department of Agriculture, Annual Report (1997-2000). Thus households growing foodstuffs do not produce enough to feed their families in between planting seasons. Some households prefer to plant cash crops (mainly tea) on their small farms, while others rear animals (cattle, sheep and poultry). In all cases therefore food has to be purchased on the market. This also concurs with CBS (1994) findings that households, which cannot produce enough food, have to purchase it from the markets. On average, households in Kenya, spend 54% of their budget on food (FAO/WHO, 1992). Households that produce their own food are less at risk of food insecurity than those that rely heavily on purchased food. Thus households in the area of study may be vulnerable to malnutrition because of this.

The proportion of household expenditure on food is usually linked directly to the preferences of those controlling the income. Thus if food is not given priority, then this affects the nutritional status of household members negatively. This is common in households where men are controlling the income like in majority of the households that were studied. Purchase also depends on household earnings and market prices. If the prevailing market prices are not favorable, then the households suffer from food poverty. Nearly 30% of the households studied did not have enough food to sustain them through the day. CBS (1994) reported similar findings where one in two households in western province are absolutely food poor.

4.5.2 Household Food Consumption Frequency

The weekly food frequency for households is presented in Table 4.13. Cereals were the most frequently consumed foods while meats were most infrequent. The frequency of consumption of cereals, legumes, tea with milk; fats and oils, meats and roots and tubers was almost the same for households in both groups. The consumption of vegetables among the participants (5.2 times/week) was significantly higher ($p \leq 0.05$) than that of households of non-participants (2.8 times/week).

Table 4.13 Mean Weekly Household Food Consumption Frequency

Foods	Participants (mean number of times foods are eaten per week)	Non-Participants (mean number of times foods are eaten per week)	T Value
Cereals	17.4	18.4	0.4
Legumes	16.0	15.2	0.2
Tea with milk	7.8	6.8	0.6
Fats and Oils	4.1	4.0	0.2
Vegetables	5.2*	2.8	3.8*
Meats	1.8	1.5	1.0
Fruits	0.7	0	0.2
Roots and tubers	7.2	7.9	0.5

*t-test significant at $p \leq 0.05$

4.5.3 Twenty four hour caloric and protein intake of index children.

Nutrient intake at individual level for index children was ascertained using the twenty four-recall. Respondents recalled the foods eaten during the preceding 24 hours. They were asked to show the amounts of each ingredient used to prepare the meal, as well as food quantities consumed by the child using household measures. These were weighed and converted into grams. Then the household nutrient intake of the children was calculated using the WHO (1987) food composition tables. The amount of calories and proteins derived from all the ingredients used to prepare the meal consumed by the child were calculated. For both groups, calories and protein intake for breakfast, lunch and supper were computed. For participants, calories and proteins derived from the school lunch were used to calculate their lunch nutrient intake. No leftover foods were reported.

Table 4.14 shows the mean caloric and protein intake of index children. The t-test for independent samples demonstrated a significantly higher ($p \leq 0.05$) intake of kilocalories (2089± 12.41 Kcal) among participants than the non-participants (1841± 15.68Kcal) per day. Similarly, the total protein intake per day was significantly higher ($p \leq 0.05$) among participants (58± 7.5 g) than the non-participants (40± 2.4g).

Table 4.14 Mean caloric and protein intake of index children.

Meal		Participants	Non participants	T value
Breakfast	Kcal	600 (24)	510 (20.4)	59.76*
	Proteins (g)	8 (17.7)	8(17.7)	3.44
Lunch	Kcal	841(33.6)	720 (28.8)	63.24*
	Proteins (g)	40 (88.8)	24 (53.3)	15.84*
Supper	Kcal	648 (25.9)	611(24.4)	22.48*
	Proteins (g)	10 (22.2)	8(17.7)	2.10
Total	Kcal	2089 (83.5)	1841 (73.6)	87.67*
	Proteins (g)	58 (129)	40 (88.8)	15.68*

Figures in parenthesis: % contribution of RDA

- T- test significant at P≤0.05

There was no significant (p>0.05) difference in protein intake at breakfast and suppertime between the two groups. At lunchtime however, protein intake was significantly higher (p≤0.05) among participants (40± 7.2) than the non-participants (24±1.4g).

The amount of calories derived from breakfast (less than 30% of RDA) were not sufficient to enable the children perform adequately until lunch. A mid morning snack would be appropriate for these children if the School Feeding Programme could be able to provide. Furthermore, some children went to school without breakfast. Thus these

children were hungry for most part of the morning before lunchtime. This is likely to affect concentration in class as well as attendance. Lunch and supper contributed higher amounts of nutrients to daily nutrient intake in both groups. This suggests that more emphasis was laid on these two meals than breakfast. The respondents explained that, once they have had supper, they could perform adequately until lunchtime the following day. This is also a coping mechanism that people adopt (adjusting to two or one meal per day) during food shortages and lack of money until to some it has become routine.

For both groups, lunch seems to be the most important meal and source of nutrients for children for its contribution of kilocalories and proteins. There was a higher intake of kilocalories and proteins at lunchtime than at both breakfast and supper. The lunch nutrient intake of participants was higher than the non-participants and contributed more than 30% of the RDA. This concurs with U. S. Department of Health and Human Services (Obert, 1994) recommendation that school lunches should provide at least 1\3 to 1\4 of RDA. This means that the school lunch contributes significantly to total daily nutrient intake of participants.

Despite the contribution of school lunch to total daily nutrient intake, the caloric intake of participants was still low 83.6% of RDA just like the non-participants (74.2% of RDA). Demoel et al (1997) reported similar findings in his study where he observed that school-feeding programmes in Kenya do not necessarily improve the diet adequacy of children.

4.5.4 Dietary intake adequacy of index children

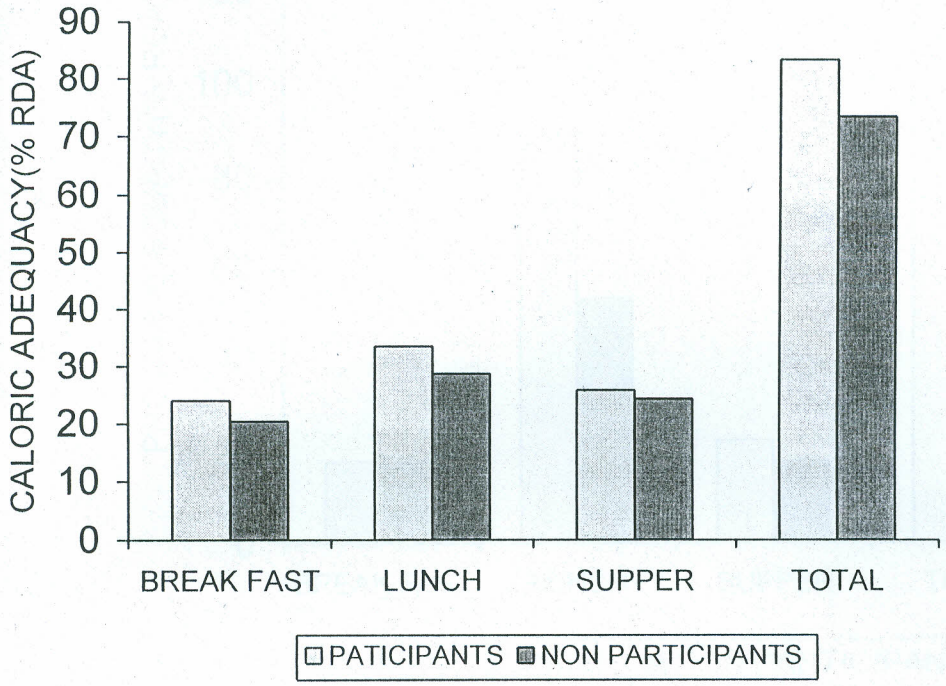
Figure 2 and 3 illustrates the caloric and protein adequacy of index children respectively. Children in both groups took fewer calories and more proteins than the RDA. For both groups, breakfast and supper contributed less than 30% of the RDA for calories as well as proteins. For breakfast and lunch the caloric adequacy of participants was significantly higher ($p \leq 0.05$) (24± 3.2%of RDA and 33.6±4.3%) than that of the non-participants (20.4±2.6% of RDA 28.8± 5.6%). The caloric adequacy at supper was not significantly different between the two groups. However, the participants had a higher intake than the non-participants.

There was no significant ($p > 0.05$) difference in protein adequacy at breakfast and supper between the two groups. However, at lunch the t-test demonstrated a significantly higher ($p \leq 0.05$) protein adequacy among the participants (88.8±125% of RDA) than the non-participants (53.3± 98% of RDA).

The overall caloric adequacy per day was significantly ($p \leq 0.05$) higher among participants (83.5± 0.4% of RDA) than among the non-participants (73.3±98% of RDA). Similarly the protein adequacy among the participants (129± 16% of RDA) was significantly higher ($p \leq 0.05$) than the non-participants (88.8± 5.4% of RDA).

This difference could be due to the fact that the school lunch provides a higher amount of calories and proteins for participants than that provided by the home lunch for non-

participants. Thus the school lunch plays a significant role in it's contribution to the overall diet adequacy of the participants (contributes more than 1/3 0f RDA of nutrients).

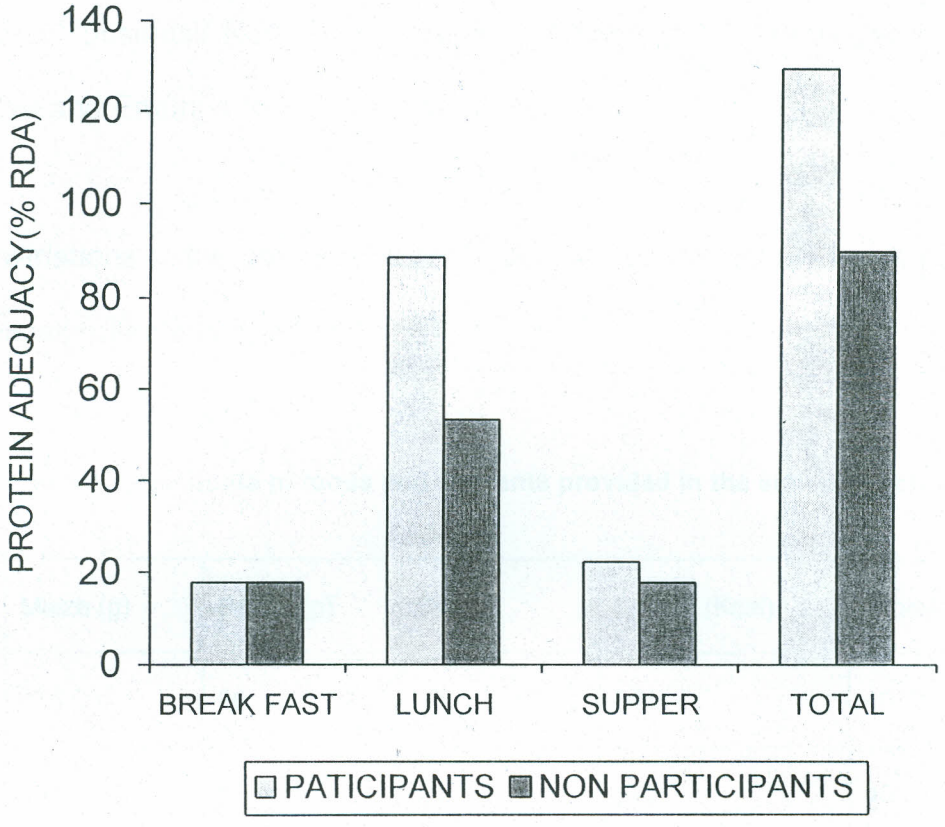


T-test significant at P≤0.05

Figure 2 Dietary caloric adequacy of participants and non-participants.

T values

Breakfast :2.89*
Lunch :3.85*
Supper :1.8 (Not significant)
Overall :7.55*



T-test significant at P≤0.05

Figure 3 Dietary protein adequacy of participants and non-participants.

T values

Breakfast :3.42(Not significant).
Lunch :26.7*
Supper :4.18*
Overall :32.75*

4.6 DIET QUALITY OF THE SCHOOL LUNCH

Two schools were randomly selected from each of the 4 locations in Emuhaya Division. The eight schools selected were Musitinya and Esiembero(Bunyore East location), Mukhombe and Ebusiratsi(North East location), Kilingil and Ematsuli (North location) and Emukhuya and Emunua from Wekhomo location.

There were variations in the amounts of food provided by the school lunch per pupil in all the schools as reflected in table 4.15.

Table 4.15 Variations in amounts of foods and nutrients provided in the school lunch per pupil.

Food	Maize (g)	Beans (g)	Oil (g)	Energy (Kcal)	Protein (g)
1. Esiembero	155	66	20	841	40
2. Kilingili	155	66	20	841	40
3. Mukhombe	155	66	20	841	40
4. Emukhuya	163	89	25	905	53
5. Ebusiratsi	145	55	25	817	24
6. Ematsuli	140	89	18	761	53
7. Musitinya	163	89	25	905	53
8. Emunua	145	55	25	817	24

Variations in amount of foods and nutrients in the school lunch provided in the schools were due to convenience. Each school provided what was affordable to them as well as the parents of participating children. On average, the school lunch in the selected schools provided each child with 841 kilocalories, which is 88.8% of RDA and 40g of protein, which is 88.8% of RDA. This concurs with findings of Pollit (1990) who agrees that foods provided for school age children should satisfy the high demands of rapid growth, intense physical activity and mental development. Consequently, school-feeding programmes are required to correct moderate wasting and prevent moderately undernourished children from becoming severely undernourished. Thus, they should be nutritionally adequate to achieve this objective (ACC /SCN, 1998). The kilocalorie and protein intake of participants was significantly ($P \leq O.05$) higher (841 kcal; 40g) than that of the non-participants (720 kcal; 24g).

There was an organized system in these schools whereby children were required to bring a certain amount of maize, beans and money. In Musitinya, Mukhombe and Kilingili primary schools, the children were expected to avail 6 kgs (3 tins) of maize, 6 kgs (3 tins) of beans and two hundred shillings each per term. In Ematsuli and Esiembero primary schools, the children were expected to avail 6kgs of maize (3 tins), 6 kgs of beans (3 tins) and two hundred and fifty shillings each per term. In Ebusiratsi, Emunua and Emukhuya primary schools, the participants brought 4 kgs (2 tins) of maize, 6 kgs (3 tins) of beans and two hundred shillings each per term. Non-participants are disadvantaged because most of their parents cannot afford to contribute food and money towards the School Lunch.

In all the schools there was an employed person to cook for the pupils. Part of the money paid was used to pay the cook and the rest to purchase fuel, cooking oil and salt as well as maize and beans to add to what was brought by the pupils. Every lunchtime, food was ready for the pupils and they would queue and be served with an equal share of food. The cooks in all the selected schools served the food in an orderly manner. The contribution of maize, beans and money however, seemed to be a hindrance to some parents. Their children could not participate in the school lunch due to this. This is reflected in the parents' reasons why their children do not participate in the school lunch. Almost 23.4% of parents admitted that the payment for the school lunch was unaffordable to them.

There was a significant reletionship ($p \leq 0.05$) between school lunch and nutritional status (weight for age and weight for height). The regression coefficients with school lunch variables; kilocalorie and protein intake were significant ($p \leq 0.05$) for weight for age and weight for height. Thus, adequate kilocalorie and protein intake at school was strongly associated ($p \leq 0.05$) with reduced prevalence of underweight and wasting (Table 4.16). This implies that the school-feeding programme has an effect on nutritional status of school children in Emuhaya Division. It leads to the acceptance of the alternate hypothesis that nutritional status of participants is better than that of the non-participants.

Table 4.16 Regression coefficients of dependent variables (W/A, H/A and W/H) with the school lunch (independent variable).

Dependent variables	Kilocalorie intake	Protein intake	P values
Weight-for-age	0.2785*	0.2802*	0.035
Height-for-age	0.0855	0.0865	0.057
Weight-for- height	0.2975*	0.2977*	0.025

*Significance at p≤0.05

4.7 NUTRITIONAL STATUS OF INDEX CHILDREN.

Nutritional status of the selected children was measured using weight -for-age, weight-for-height and height-for-age as anthropmetric indicators. The mean age of the school children studied was 11 years. The mean weight of participants was 28.5kilograms and 27.2 kgs for non-participants. The mean height was 130cm for participants and 120cm for non-participants. The age range was 10- 12 years in both groups.

4.7.1 Weight-for-age of index children

Table 4.17 shows levels of weight-for-age (underweight) of participants and non-participants in the School Lunch Feeding Programme. There was a significant difference in prevalence of underweight between the two groups. Only 8.1% participants were malnourished as compared to 16.3% non-participants. This is consistent with the findings of Hijazi and Abdulatif (1986) in Jordan, where the weights of children participating in the lunch programme were significantly and generally higher the non-participants.

There was a significant association ($p \leq 0.05$) between school lunch and weight-for-age. The prevalence of underweight was much lower among the participants in the school lunch than the non-participants. Thus, the school lunch contributes towards better nutritional status of the participants. This supports the hypothesis that nutritional status (weight-for-age) of participants is better than that of the non-participants. The prevalence of underweight was lower than that of stunting. This compares well with

ACC/SCN (2002) report where underweight, due to chronic undernutrition or wasting were found to affect fewer children globally than stunting.

Table 4.17 Levels of weight-for-age (underweight) of participants and non-participants in the school lunch feeding programme.

Weight for age "z" score	participants		Non-participants	P value	
	n	%	n	%	
Severe underweight (<-3SD)	0	0	4	2.5*	0.035*
Moderate underweight (<-2SD)	13	8.1	22	13.8	0.025*
Normal (-2 to + 2SD)	147	91.9	134	83.7	0.025*
Total	160	100	160	100	

χ^2= 5.91 df = 2 *χ^2 significance at p≤0.05 n=number

4.7.2 Height-for-age of index children.

Table 4.18 shows levels of height-for-age (stunting) of participants and non-participants in the school lunch feeding programme. Using height-for-age measurement 30% participants and 53.1%, non-participants were stunted. The prevalence of stunting was significantly higher (p≤0.05) among the non-participants than the participants. This prevalence is higher than the national rate. Findings of KDHS (1993) reveal that stunting, a feature of chronic undernutrition, is the most prevalent presentation of malnutrition with a current national rate of 34%. ACC/SCN (1997) recorded a prevalence of 39.4% for sub-Saharan Africa. The number of children affected by

stunting had increased by an alarming 62% between 1980 and 1995. Similarly, ACC/SCN (2002) reported that an estimated 32.5% of children in developing countries are stunted. Thus, the prevalence in the area of study is higher than all this regions. It indicates a public health problem and there is need for intervention.

The significantly higher ($P \leq 0.05$) levels of stunting among the non-participants in the area of study as compared to the participants indicates that the school lunch may have played a big role in reducing levels of stunting among participants. Since stunting is a long-term deficit, this implies that non-participants could have suffered food deprivation for a long time. Participation in the school lunch could thus reduce levels of stunting among them. Findings however revealed that due to the low socio economic index of households of non-participants, they are unable to participate in the school lunch. Most participants come from households of a higher socio economic index as measured by income, amount of land owned, family expenditure as well as sources of income and therefore are able to contribute money towards the school lunch.

Kielmann (1988) in Samburu obtained similar results where high levels of stunting were recorded among school children aged five to fifteen years. A study carried out by Sigman et al (1989) in Embu District, Kenya, on school children aged seven to nine years also showed that 25% of the sample was stunted. Consequently a large study of anthropometric status of rural school children conducted in low-income countries of Africa found an overall prevalence of 34 to 62% for stunting (ACC/SCN, 2002). A study

in Brazil of the gender differences in growth of school children suffering from helminth infections found that 21% of the children were stunted (ACC/SCN, 2002).

Seemingly, levels of stunting are generally high among school children. This may be due to consumption of inadequate diets. In the World Bank report of 1990, the general nutrition problem in Kenya was one of insufficient calories, which may be due to the high population increase in the country. Thus, Protein Energy Malnutrition is still the commonest and most devastating form of malnutrition among children under five years of age and school children. It is not surprising therefore, that chronic mild to moderate food deprivation (stunting) is rampant among school children. This may suggest that interventions in school-age children can supplement efforts in the pre-school years to reduce levels of stunting and related effects on children's health and education if there is catch up growth.

School feeding programmes, well planned around the nutritional needs of school children can play a crucial role in improving their nutritional status. The high levels of stunting among the non-participants in this study may be due to food deprivation at home. This could be true considering that the area of study experiences acute food shortages almost throughout the year due to population explosion and high land fragmentation.

There was an association between height-for-age and the school lunch. Adequate kilocalorie and protein intake at school was associated ($p \leq 0.05$) with reduced levels of stunting. Non-participants in the school lunch were more stunted than the participants.

The association did not however, reach statistical significance. Therefore, the school lunch cannot be directly linked to better nutritional status (height- for-age).

Table 4.18 Levels of height-for-age (stunting) of participants and non-participants in the School Lunch Feeding Programme.

Height for age "z" score	Participants		Non-participants		P value
	n	%	n	%	
Severe stunting (<-3SD)	15	9.4	40	25.0*	0.025*
Moderate stunting (<-2SD)	33	20.6	45	28.1*	0.035*
Normal (-2 to + 2SD)	112	70.0	75	46.9	0.027*
Total	160	100	160	100	

$\chi^2 = 20.53$ df = 2 $*\chi^2$ significance at $p \leq 0.05$ n=number

The high prevalence of stunting could be due to the fact that these children were already stunted before they began participating in the school lunch. They could also be lacking key nutrients in their home diet. Thus for the school lunch to make a positive impact, there is need to investigate the specific nutrients these children are deficient in, and then plan the school lunch around these needs. Nevertheless, balanced home diets should be emphasized to parents.

The prevalence of stunting was higher than that of underweight. This is in line with the ACC/SCN (1997) report where the prevalence of stunting (39.4%) in Sub-Saharan

GoK/UNICEF (1998) findings revealed that Western province is one of the most vulnerable to acute undernutrtion.

Table 4.19 Levels of weight-for-height (wasting) of participants and non-participants in the School Lunch School Feeding Programme

Weight for Height 'Z' Score	Participants		Non-Participants		P value
	n	%	n	%	
Severe Wasting (<- 3 SD)	0	0	2	1.2	0.025*
Moderate Wasting (<-2 SD)	8	5	27	17	0.015*
Normal (-2 to + 2 SD)	152	95	131	81.8	0.017*
TOTAL	160	100	160	100	

$\chi^2 = 12.82$ df=2 *χ^2 significance at P≤0.05 n=number

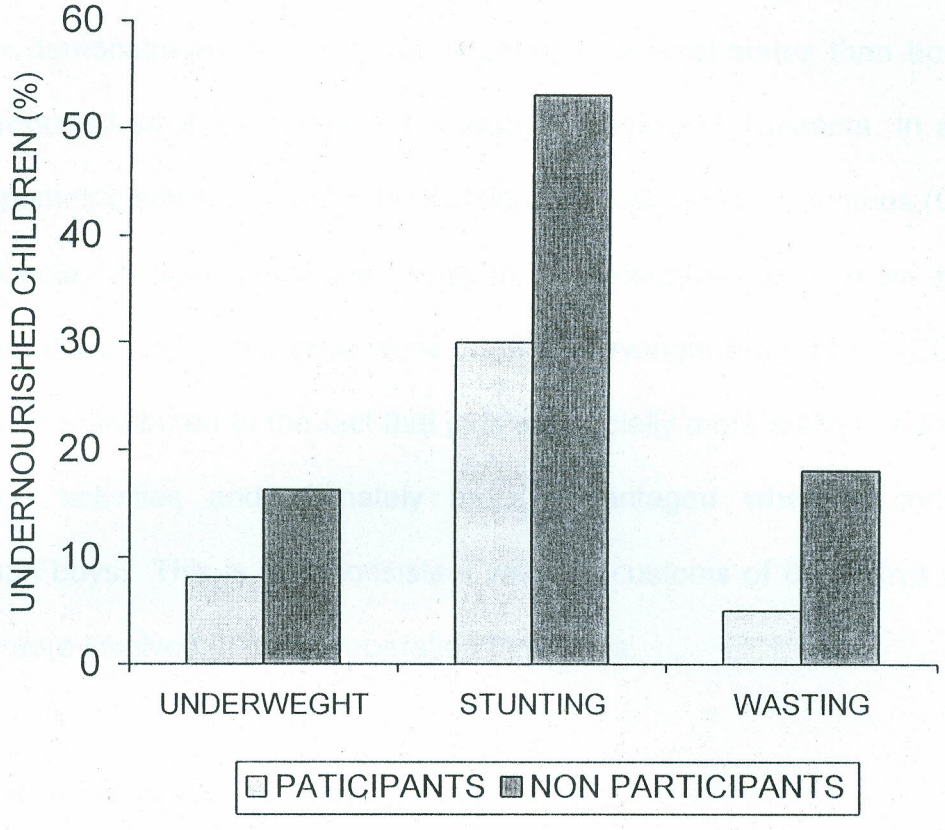
The prevalence of wasting however is not as alarming as that of stunting. This is consistent with the FAO/WHO (1992) findings where, inferences drawn from the national nutrition surveys seem to suggest that, nutritional wasting or acute malnutrition affects only a small proportion of the child population, although nutritional stunting or chronic malnutrition is fairly prevalent in the country.

The high levels of wasting among the non-participants could be linked to acute food shortages in the area of study. ACC/SCN (2002) reported similar observations that wasting is not as common as stunting and underweight among school-age children in

developing countries. Nevertheless, wasting rates can change rapidly in situations of acute food crisis, with school-age children becoming severely malnourished in such situations.

The prevalence of wasting was significantly higher ($p \leq 0.05$) among the non-participants (18.2%) than the participants (5%). The effect of the feeding programme is evident from the observation that the prevalence of wasting was significantly higher among non-participants than participants. In fact, more than three times non-participants were wasted than participants. Regression coefficients with school lunch variables; energy and protein intake were significant ($p \leq 0.05$) for weight-for-height. The prevalence of wasting was lower among participants and much higher among the non-participants. This supports the hypothesis that the nutritional status (weight-for-height) of the participants is better than that of the non-participants.

This could be due to the significantly higher ($p \leq 0.05$) amounts of nutrients taken at lunchtime by participants as compared to the non-participants. This is true because children in both groups took an almost similar amount of nutrients at home during breakfast and suppertime. It is thus prudent to say that the feeding programme conferred better protection nutritionally for the participants as measured by wasting. The higher lunch calorie and protein intake placed the participants at a greater advantage nutritionally than the non-participants.



(P≤0.05)

Figure 4 Prevalence of malnutrition among index children

Table 4.20 shows the levels of malnutrition of participants and non-participants in the School Lunch Feeding Programme by sex. The nutritional status of girls was generally better than the boys. This is in line with studies of school children in other parts of Kenya. In the Samburu study by Kielmann (1988) and Homabay study by Odoyo (1996), findings demonstrated that girls had a better nutritional status than boys did. Kimati (1986) reported similar findings in his study in mainland Tanzania. In a large study of anthropometric status of rural school children in low-income countries (Ghana, Tanzania, Indonesia, Vietnam and India), boys in most countries were more stunted than girls and in all the countries; boys were more underweight than girls (ACC/SCN, 2002). This could be attributed to the fact that girls are socially more actively involved in food preparation activities and ultimately more advantaged when it comes to consumption than boys. This is also consistent with the customs of the Luhya people where girls are more involved in food preparation than boys.

Table 4.20 Prevalence of malnutrition by sex.

Sex and Group	Underweight (W/A)	Stunting (H/A)	Wasting (W/H)
Participants			
Boys	8 (5.0)	28 (17.5)	5 (3.1)
Girls	5 (3.1)	20 (12.5)*	3 (1.9)
Chi-square	1.6	6.2*	0.9
Non-participants			
Boys	15 (9.4)	55 (34.3)	15 (9.4)
Girls	11 (6.9)	30 (18.6)*	14 (8.6)
Chi-square	2.1	12.8*	0.75

Figures in parenthesis - percentage

Figures not in parenthesis – the actual number of boys and girls who are malnourished and chi-square values

*Chi-square significance at $p \leq 0.05$

4.7.4 Factors which had associations with nutritional status.

Table 4.21 and 4.22 indicates some demographic and socio-economic factors that had correlations with nutritional status. It was observed that children from households where parents (42.6%) were in wage employment tended to be of a significantly ($p \leq 0.05$) better nutritional status. This is in line with the findings of Stateson (1983), that found an correlation between parental occupation and nutrition status in a USA study. Occupation may be associated with the total amount of income; the better the type of occupation in terms of remuneration, the higher the income.

There was a significant correlation ($p \leq 0.05$) between parents' income (kshs 6900 for participants and kshs 6200 for non-participants) and nutritional status. Children from households that had a higher income tended to be of good nutritional status. This may imply that income could be an important determinant of food procurement. There was no association however between the size of land owned (1.5 ha for participants and 1.6 ha for non-participants) and nutritional status. This may imply that the size of land owned may not contribute towards improved nutritional status. A posible explanation to this may be poor utilization of land or selling off of all foods produced so that they are not consumed by the household members. Other sources of income, which enhance the household purchasing power like business and wage employment, may however contribute towards improved nutritional status. Similarly, there was no significant ($p > 0.05$) correlation, between food crop production and nutritional status of index children. This may imply that the amount of food produced in a household may not necessarily improve the nutritional status of its members. Most households may be selling off their food for income.

Children whose parents had higher levels of education (51.9%) had better nutritional status. This seems to imply that highly educated parents are also likely to be more knowledgeable about nutrition. Improved knowledge often leads to changes in attitudes and practices and ultimately, better feeding practices. Children whose parents were less educated(48.1%) tended to have a low nutritional status (weight-for-age). This is consistent with findings of a Bangladesh study in which the parents' exposure to formal education was significantly associated with the child's nutritional status (Food and Nutrition Bulletin, 1994).

Table 4.21 Pearson correlation coefficients of independent variables with nutrition indicators (dependent variables) for participants.

Independent variables	Weight for age	Height for age	Weight for height
Level of education	0.2852*	0.2855*	0.0955
Occupation	0.2955*	0.2945*	0.2950*
Total income	0.2785*	0.0875	0.2795*
Agricultural activities	0.0895	0.0885	0.0870
Child's age	-0.2785*	-0.2760*	0.2770*

*Significance of p≤0.05.

Table 4.22 Pearson correlation coefficients of independent variables with nutrition indicators (dependent variables) for non- participants.

Independent variables	Weight for age	Height for age	Weight for height
Level of education	-0.2574*	0.2572*	0.2575*
Occupation	0.0772	0.0797	0.0791
Total income	-0.1056*	0.1057	0.1050
Agricultural activities	0.0868	0.0882	0.0854
Child's age	-0.2423*	-0.2452*	0.2454*

*Significance of p≤0.05.

It was observed that children (47%) whose parents could not afford to pay for the school lunch were of low nutritional status. This could be attributed to the fact that these parents are of low socio-economic index and therefore could not afford a better home diet for their children. There may be need to design measures where all parents are given an equal chance to participate in the school lunch.

Table 4.21 and 4.22 also indicates a negative significant ($p \leq 0.05$) relationship between the children's age and stunting and underweight. This implies that younger children are more likely to be underweight and stunted than older ones. This is true considering the higher proportion of nutrient demand of younger children (below 10 years) compared to those of older ones (above 12 years) for growth and development as confirmed by Passmore and Davidson (1987). Similar findings were reported in a large study of rural school children in low-income countries (Ghana, Tanzania, Indonesia, Vietnam and India). There was a trend for z-scores for height-for-age and weight-for-age of these children to decrease with age (ACC/SCN, 2002).

The positive and significant ($p \leq 0.05$) relationship between child age and wasting indicates that wasting increased with age among the children studied at that time of the study. This may indicate that there might have been food deprivation at the time of the study. This was the planting season in the area of study and most people are likely to have used up the food for the previous harvest by then.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The demographic characteristics of households were not very different between the participants and non-participants. However, the non-participants tended to come from households of low socio-economic index compared to participants. The prevalence of malnutrition as determined by weight-for-age, height-for-age and weight-for-height was significantly higher ($p \leq 0.05$) among the non-participants than the participants. The nutritional status of the girls was generally better than the boys. The attendance levels of participants were significantly higher ($p \leq 0.05$) than the non-participants.

The household children's intake of calories for participants was significantly higher ($p \leq 0.05$) than that of the non-participants. The household children's intake of proteins at home was not different between the participants and non-participants. However, the school lunch provided more calories and proteins to participating children. It provided more than 1/3 of the RDA of nutrients to pupils. There was a significant association ($p \leq 0.05$) between the school lunch and both attendance levels and nutritional status. Thus, the nutritional status and attendance levels of participants were better than that of the non-participants. Some parents did not seem to understand the role of the school feeding programmes.

On the basis of results obtained from this study, the school feeding programmes in Emuhaya Division play a role in improving both nutritional status and attendance levels

of participating children. The programmes should therefore continue but with modifications to improve the nutritional quality since there are acute food shortages in the area of study, which compromises the nutritional status of school children. The school feeding programmes help to cater for possible imbalances in the home diet. All parents should therefore be encouraged to participate.

5.2 Recommendations

The following recommendations have been made based on the findings of this study.

Nutrition education for the school cooks and headmasters is recommended. They should be taught by nutritionists to balance the school lunch and the importance of this. Beans to maize ratio of 1:2 (Obert,1994) should be ensured for optimal nutritional value and addition of fruits and vegetables to balance the lunch diet. Parents may however be required to pay more money to cater for this. Protein and energy balance should be ensured. Nutrition education for both parents and pupils is also important. They should be taught to provide balanced meals for their children as well as appropriate methods of preparation to preserve nutrients.

School gardens can be an important source of food especially vegetables and fruits for the school lunch. Rearing of small animals through the 4-k clubs or young farmers associations in schools can go a long way in providing animal protein as well an income to support the feeding programme. The community can also take up the same in their home gardens, to improve food security in households as well as income levels.

The government should extend the sponsored school-feeding programme to Emuhaya Division since this is an area that experiences acute food shortages almost throughout the year compromising the nutritional status of school children. Similar areas within the country should also be considered. Support is vital especially during emergencies like drought, floods and civil strife to ensure increased enrolment, better learning and improved nutritional status and school performance that contribute to development.

Organizations concerned with children's welfare like UNESCO, UNICEF, World Food Programme and World Vision should be encouraged to support the school feeding programmes in Emuhaya Division since they have demonstrated a positive effect on nutritional status and attendance levels of school children.

The school feeding programmes should be evaluated regularly to identify areas of weakness for future improvement. Targeting of programme beneficiaries should involve nutritional surveys so as to make monitoring and evaluation easy and accurate. This should be done to all school feeding programmes in the country.

Food mechanisms that increase food production and distribution through food preservation, processing and storage and ensure continued and easy access by women and children should be fostered in this community. Opportunities that increase womens' access to income should be promoted. This could also improve the socio-economic status of non-participating households so that they are also able to participate in the school lunch. Fortification of commonly consumed foods and

ingredients such as salt, cooking fat and suitable food carriers with the essential micronutrients like vitamin A, iron and iodine as well as high-energy foods needs to be considered. These measures can help improve the nutritional status of children as well as reduce the levels of malnutrition, which are high.

Finally on the basis of the results of this study, all parents and schools in Emuhaya Division should be encouraged to venture into this programme of school lunch because of its positive outcome on nutritional status and attendance levels of school children.

5.3 Suggestions for further Research

More research is needed on:

- Effects of school lunch feeding progrmme on enrollment.
- Effects of school lunch feeding progrmme on academic attainment.
- Socio-economic factors that may affect participation in the school lunch.
- Attitudes of parents and their influence on participation in the school lunch.
- Economic activities that may enhance self sustainability of the school lunch by individual schools.

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