SOCIOECONOMIC DIFFERENTIATIONS, AGRICULTURE, AND LABOUR: IMPLICATIONS FOR DIET AND NUTRITIONAL STATUS OF PRESCHOOL AGE CHILDREN IN SOUTH MARAMA, BUTERE

By

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DECLARATION

This thesis is my own original work and has not been presented for the award of a degree in any other University.

Donald Oluchina Wandere

This thesis has been submitted for examination with my knowledge as supervisor.

Dr. Anne Fleuret

Mr. Mummo Maundu

TO MY LATE FATHER, MICAH SAULO WANDERE

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ABSTRACT

Anthropologists have continuously carried out investigations, without apparent unanimity, on etiology of nutritional problems particularly in rural economies. What has emerged gives no determinate association between the socioeconomic variables investigated and nutritional outcomes. This underscores the primacy of looking at each case from its experience, hence providing this study with a major cause for departure.

This is a micro-level study undertaken in South Marama location of Butere Division. It is confined to the agrarian, labour and dietary parameters, all analysed against socioeconomic gradations. Statistical evidence reveals profound heterogeneity in the socioeconomic differentiations of the households, resulting in a positive skew. A paradoxical situation here is the outpointing of households participating in commercial sugar cane production by those engaged in food production with regard to socioeconomic scores. This introduces the relevance in conceiving contingencies between the general market sector and improvement in living standards.

The findings also reinforce the conventional contention on adverse nutritional status resulting from sugar cane production. This, it is concluded, is a consequence of the demands put upon cane crop management which in effect makes it more resource-diminishing than resource-generating; and the farmers' lop-sided agricultural strategy which is less favourable to the food sector. It is further observed that, the already insecure food situation not withstanding, a considerable percentage of the households, led by sugar cane producers, delocalize farmfoods in exchange for cash. This nullifies positive nutritional status as in effect, foods imported are comparatively low quality and quantity.

The potential for employment resources in strengthening purchasing capacity is further underlined. It is observed that piecemeal payments lead to a stable linear purchasing power, and subsequently better nutritional status. A major conclusion here is the need to establish institutions within the location which will enhance opportunities for employment.

CHAPTER 1

STATEMENT OF THE PROBLEM

1.1 Introduction

Nutrition is a field of knowledge concerned with effects of food upon individual biochemical and behavioural equilibrium (Freedman 1977). In the life of the individual organism, nutrition is the more primary and recurrent want, while in the wider sphere of human society it determines, more largely than any other physiological function, the nature of social groupings and the form their activities take. Nutritional disorders (or malnutrition) may be of deficiency, imbalance, or excess, may be caused by inborn errors of metabolism or stem from cultural and environmental factors.

From a general perspective, malnutrition, and more specifically undernutrition, has been identified as the world's single most significant health problem and is associated with more morbidity and mortality than natural disasters such as famines (Berg, 1973:2). However, unlike famine which attracts national and international interest, most malnutrition is unobtrusive.

The most sound reason for the neglect of malnutrition may be the isolation of the power structure from its effects. For a long time malnutrition did not raise the concern of the

political and socially vocal classes that an ailment like malaria arouses. Nor does it have the urgency of contagious diseases like the pandemic Acquired Immunity Deficiency Syndrome (AIDS) which too cross-cuts social categories.

However, it is only recently that problems of malnutrition struck a sensitive chord within the policy-making quarters, thanks to disturbing research findings about the effects of malnutrition on childhood death rates, on the frequency and severity of illness, on physical growth, on productivity, and on mental development. As a result of such implications, the degree of a nation's nutritional standards has now become an accepted index of its economic performance.

In developing countries, nutritional problems are considered to be the biggest contributor to child morbidity and subsequent mortality. Selected international comparisons show that Kenyan children compare favourably with those in other countries on prevalence of malnutrition (GOK, 1981a:7). Better nutrition is accepted by Kenyan planners as a national goal (GOK, 1979a: 146-147).

Owing to the emphasis put on nutritional problems in Kenya, much research on food and nutrition has been undertaken by several groups and individuals. Kenya is one of the few countries in the world where a rich data base on food and nutritional information exists (Jansen et al., 1987). The spectrum of the research has embraced all models of studies;

from small intensive research projects which focus on micronutrient deficiencies in nomadic groups to the country's national child nutritional survey. Kenya has conducted four nationally representative surveys on the nutritional status of young children, in 1978-79, 1982 and 1987 (UNICEF/GOK 1989). The results of some of the studies reveal that at least one quarter of the country's rural population is significantly malnourished (Fleuret et al., 1982:217) with Protein Energy Malnutrition being the most widespread form (Meyers 1979).

1.2 The Problem

As of 1979 Kakamega district (within which this study is based) ranked seventh top out of the thirty districts surveyed in terms of incidence of malnutrition (GOK, 1983). According to the survey, 54 out of every 1000 children aged between birth to four years in the district were nutritionally stunted. Malnutrition is considered to be among the five leading causes of morbidity in the district (Olenja, 1988).

The etiology of malnutrition in the district is primarily associated with cash crop production, particularly in sugar cane growing zones such as Butere, Mumias, Kabras, and parts of Lurambi (Barclay, 1977; Fleuret et al. 1982; GOK, 1979b; Kennedy, 1984; Olenja, 1988; Owinyi 1977), demographic factors (Bullock, 1969; Connelly and Chaiken, 1987), consumption of foods of low nutrient density (Shah and Froberg, 1978), and low per capita income in the region (Ibid).

The issue of agricultural and food production strategies and their relationships to nutritional status has been a subject of considerable debate among anthropologists and other scholars. The study by Kennedy (1988) in Awendo, South Nyanza, for instance, concludes that although children of sugar farmers are not worse off than those of food farmers, the increased cash income is not translated into increased food production or other health and nutritional benefits in the sugar growing families. The report by the Government of Kenya (1979b), on the other hand, forthrightly posits a negative relationship between sugar cane production and nutritional status. This contention is also subscribed to by Fleuret et al.(op. cit.), Olenja (op. cit), and Barclay (op. cit). In the Mwea Tebere rice irrigation scheme children are found to be more malnourished than those living in the surrounding areas (Korte, 1969). And in a study in Kisumu District in 1983/84, people who farmed rice but lived elsewhere had better nourished children than those not engaged in rice production (UNICEF/GOK, 1989). Fleuret and Fleuret's study in Taita/Taveta District, Kenya too reveals that while coffee production is disadvantageous to child nutrition in one area, the reverse is the case in a neighbouring area (Fleuret and Fleuret, 1991).

The contingent relationship between commercial and nutritional status is a major impetus in taking up this study. I revisit the subject of sugar cane production and seek to

understand whether this agricultural strategy has effects on nutritional standards of children in South Marama. This approach is taken in cognizance of the importance of looking at each case from its own experience.

South Marama location is characterized by an economy which features a traditionally oriented way of life and whose peoples' ultimate security and subsistence rests in their having certain rights in land, but who simultaneously live within two economies, a food-producing economy and a market economy. The high population in the area has led to fragmentation of land. This land must be utilized to its full potential in order to adequately feed the people. As of 1979, the density in Butere Division was 335 people per square kilometre (District Development Plan 1989-1993). At about the same time (1979), 25% of landowners in the region had less than a half a hectare, while 54% had less than one hectare (GOK, 1982:118).

Despite the constraints imposed by the small size of agricultural holdings, a considerable proportion of households undertake commercial production of sugar cane primarily as clients of the Mumias Sugar Company. Notwithstanding this, in order to meet a variety of other household needs, a number of them trade in the meagre foodstuffs accrued from their landholdings. The relationship between these economic ventures and the nutritional status of children in South Marama forms a major focus of this study. The study also attempts to analyse

household units in relation to their labour resource availability and utilization, and the impact that these factors have had on the food security and, ultimately, the nutritional status of preschool age children here.

Apart from resource availability, diet is largely a product of the environment and tradition of the society into which a person is born (Richards, 1932:8). While the physical structure must remain the ultimate factor, peoples' selection of food is determined by the habits and values which their social heritage has imposed on them. The study seeks to understand food consumption patterns of the household members and how this has been affected by traditional prescriptions and proscriptions on food intake, if at all, together with the purchasing power of the household.

1.3 Objectives of the study

This study generally attempts to determine the agricultural, economic, and social parameters that affect the nutritional status of children of the age between birth and five years in South Marama Location. It also seeks to determine the socioeconomic status of the households in the location, their dietary patterns, and the incidences and prevalence of nutritional problems of the children. Finally it attempts to advance guidelines and proposals on policies and procedures for community action and intervention programmes.

1.4 Rationale of the study

This study should be viewed in a double dimension; as both intellectual and applied work. In the intellectual sense the outcome of the study is significant in the on-going debate on the determinants of nutritional status in a community. Specifically, the results will contribute to the type of agricultural and economic orientation best suited in giving a positive nutritional outcome for children in a small-farmer type of economy. In its applied dimension, the study stems from the assumption that diseases of malnutrition in Kenya are one of the main public health problems as is the case with many tropical and sub-tropical areas with a predominantly rural population. Kakamega district where the research was undertaken is one of the high-risk malnutrition zones in the country. The inferences advanced to explain low nutritional standards in the area have already been mentioned here.

These considerations render this study important in understanding the determinants of nutritional status through an anthropological perspective. On the basis of analysis of the problem, culturally appropriate strategies for ameliorating problems discovered are developed.

CHAPTER 2

REVIEW OF LITERATURE AND THEORETICAL FRAMEWORK

2.1 Literature Review

2.1.1 Culture, Anthropology, and Nutrition

The main focus of anthropological study is human culture. Edward Tylor defined culture as that "complex whole which includes knowledge, beliefs, art, morals, custom, and any other capabilities and habits acquired by man as a member of society" (Tylor, 1958).

Culture may also be defined compositely as the sum total of a group's learned and shared behaviour. Hoebel, for example, defines culture as the "integrated sum total of learned behaviour traits which are manifest and shared by members of a society" (Hoebel, 1971:208). The phenomenon of consistent transmital, sharing experience through time, is apparently unique to the human species.

As a field of study, anthropology describes, interprets, accounts for or explains human behaviour, thus generating valid knowledge (Clifton, 1968). Its dominant mood is that of science. As scientists, anthropologists are intensely involved in the continuing process of creating and testing technical ideas, fashioning methods for objective description of observed facts, deriving firmly demonstrated generalizations, and building schemes of ideas, or theory. In addition, cultural

anthropology has been characterised by a minor theme of humanistic inquiry, which encourages speculation about the nature, meaning and future of man.

In his attempt to define nutritional anthropology, Robert Freedman's departure point is first and foremost conceptualising the study of anthropology as that which seeks to understand the law governing the relationships of individuals with each other and to the cultures they have developed, as well as to explain the process which have evolved to satisfy basic physiological and psychological needs (Freedman, 1977:1).

He then proceeds to define applied nutrition as the application of anthropological data and methods to the solving of the cultural aspects of human nutritional problems, or as the study of the interrelationships between diet and culture and their mutual influence upon one another.

Nutrition has been defined as a field of knowledge concerned with effects of food upon biochemical and behavioural equilibrium of an individual (Ibid.). Nutrition as a science is relatively new and stems from the 18th century research of Lavoisier. This led the 19th and 20th century scientists to discoveries of the role of energy, vitamins, minerals and nutrients in human diet (Grivetti 1978). Although knowledge of nutritional science is recent, both ancient and contemporary man has flourished without or in spite of nutritional knowledge.

Grivetti then goes on to trace the history and development of nutritional diseases investigated by an array of other scholars. He observes some facts that emerge from an examination of their works: (a) nutritional diseases were recognized and treated by physicians of Assyria, Egypt and China; (b) Dental caries were a health problem for fossil and ancient man, not the result of recent dietary change; and (c) pellagra may be the result of the Spanish conquest of the New World (Ibid.)

2.1.2 Malnutrition and Human Nutritional needs

Malnutrition has been defined as a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients, this state being clinically manifested or detected by biochemical, anthropometric or physiological tests (Jelliffe, 1966). Four forms of malnutrition may be identified: (a) undernutrition, which is the pathological state resulting from the consumption of an inadequate quantity of food over an extended period of time; (b) specific deficiency, the pathological state resulting from a relative or absolute lack of an individual nutrient; (c) overnutrition, the pathological state resulting from consumption of an excessive quantity of food; and (d) imbalance, the pathological state resulting from a disproportion among essential nutrients as determined by the requirements of a balanced diet (Ibid.).

A dependable and adequate supply of food is essential for maintainance of good health. Foods can be regarded as carriers of nutrients and non-nutrients. McElroy and Townsend (1985) give a breakdown of nutritional needs for which society must provide. They argue that people need energy for maintainance and growth as well as for internal and external work their bodies do. Carbohydrates, proteins and fats are all sources of energy, measured in kilocalories. Man also need proteins comprised of chains of nitrogen and containing organic compounds called amino acids. They need fats not only for provision of a concentrated source of energy but to supply certain fatty acids, which are necessary for building nerve tissue. People also need water and vitamins. The latter consist of sixteen organic compounds found in very small concentrations in the body. And, finally, human beings need minerals, which are inorganic elements present either in fairly large amounts in the body, such as calcium and phosphorous, or as trace elements, such as fluorine, copper and zinc.

Distinctions can be made within these classes. For example, there are at least 46 different nutrients that have been identified as essential to adequate nutrition. Foods also differ in the quality of the nutrients they contain. For instance, protein containing foods vary in their quality; the quality is further influenced by their digestibility, which varies from one type of food to another and is also influenced

by food preparation techniques. If different nutrients are distributed in great proportions in different types of foods, then the best strategy to ensure adequate nutrition is to eat a variety of foods--a balanced diet.

Berg provides a list of the percentage of protein in some popularly consumed foods; wheat has 12%, millet 11%, maize 10%, milled rice 8%, and cassava, potatoes, and plantains under 2% (Berg, 1973:52). McElroy and Townsend (op.cit.) also provide yet another list on grammes of proteins per 100 kilocalories in certain foods. The full list includes sago and cassava with less than one gramme each, yam, taro, and highly milled rice with 2 grammes each, Irish potato, maize and wheat with 3 grammes each, cows whole milk with 5 grammes, lentils with 7 grammes, eggs with 8 grammes, lean beef and soybeans with 9 grammes, cows skim milk with 10 grammes, poultry with 14 grammes, and fresh water fish with 19 grammes.

2.1.3 Protein Energy Malnutrition

Protein Energy Malnutrition (PEM) is the most important public health problem in the under developed countries in the world today (Davidson et al., 1972:254). Kwashiorkor and marasmus are the two extremes of the PEM continuum. Between the extremes of this continuum, there are some less-defined forms in which clinical features are due to varying combinations of deficiency of protein and energy together with deficiencies in

minerals and vitamins with associated infections. These well defined forms sometimes referred to as marasmic kwashiorkor and nutritional dwarfing provide the majority of PEM cases (Ibid).

PEM occurs characteristically in children under five years, wherever the diet is poor in protein and energy. No age is immune but in the older lot the disease is infrequent because both energy and protein requirements are relatively reduced as age advances.

Typically the marasmic form of the syndrome occurs mostly in infants under one year old and is most frequently found within towns; kwashiorkor is mainly a disease of rural areas occurring in the second year of life (Ibid).

Kwashiorkor is the name given to the disease by the Ga people living in and around Ghana. It was introduced into medicine by Cicely Williams. The meaning of kwashiorkor that was originally given to Williams is the "sickness the older child gets when the next baby is born". This indicates the circumstances under which the disease develops, i.e, an ignorance of the best foods to give children during the weaning period, or an inability to provide them for one reason or another. Among the events that can precipitate kwashiorkor are termination of breastfeeding, which in many cultures is brought about by new pregnancy. However, infections can also precipitate the disease.

Scrimshaw says that in some countries kwashiorkor has

demonstrated a distinct periodicity usually following, by a few weeks, the peak frequency of diarrheal disease which serves as a precipitating factor. Diarrheal disease causes loss of appetite and there is a tendency towards ingestion of more liquid and a more nutritionally deficient diet. For more or less the same reasons, increases in the occurrence of kwashiorkor follow epidemics of measles and other common communicable diseases. We can therefore arrive at the conclusion that kwashiorkor may be thought of as a frequent result of synergism of malnutrition and infection in which symptoms of malnutrition predominate (Scrimshaw, 1964)

Marasmus is derived from a Greek word meaning "to waste" (Davidson et.al.op.cit:388). Although the nutritional factors and physiological processes are different in marasmus, cessation of breastfeeding may also be a factor in marasmus.

Marasmus is likely to occur when the young infant is weaned prematurely from the breast to a nutritionally unsound substitute. The urban influences which predispose to marasmus are a rapid succession of pregnancies and early abrupt weaning, followed by dirty and unsound artificial feeding of infants with very dilute milk products, given in inadequate amounts to avoid expenses.

Both maramus and kwashiorkor are increasing in many of the burgeoning cities of Latin America and Africa because women are weaning their children earlier, either in imitation of the more

well-to-do or in order to work at industrial or domestic jobs. Unfortunately because of ignorance and poverty, they fail to provide their children with proper food substitutes (Scrimshaw, op. cit:114).

Symptoms of kwashiorkor include failure of growth, anorexia, oedema, and a generalised unhappiness or apathy. Those of marasmus are different. They include failure of growth, severe wasting, irritability, fretfulness or, alternatively, apathy.

2.1.4. Milkfeeding and Weaning Periods

Weaning is a critical time for child health. This is because during this period inadequate nutrition, infection, and psychological stress interact synergistically, magnifying the effects of each (McElroy and Townsend, 1985). Infections increase the need for certain nutrients such as protein. At the same time gastrointestinal infections reduce the body's capacity to absorb these nutrients, and appetite may be reduced. When a child is marginally nourished, an episode of infectious diseases may push her or him over the line to outright malnutrition. Caught in this vicious circle, the poorly nourished child is less resistant to infections because antibody production is impaired (Ibid).

In many developing countries, particularly in the villages and rural areas children are weaned on maize gruels or starchy

preparations from roots and tubers. Investigations into the nutrient composition of these traditional weaning foods show that many of them provide some calories, but often not enough; they are grossly inadequate in proteins and other nutrients.

In Nigeria children are weaned on a food prepared from fermented corn known as "ogi", deficient in protein and hence a major cause of PEM among children in the region. Most Kenyan children receive supplementary foods before the age of 6 months, and by the age of 8 months nearly all children would have received such foods (Fleuret et al.,1982:225). Of the weaning foods, cassava and bananas are used primarily in the rural areas of Nyanza and Western provinces. This trend contributes tremendously to the poor nutritional status of children in these regions.

A survey by Olenja (1988) in Kakamega district concurs with that of Fleuret et.al. In this study it is revealed that although a few mothers supplemented the baby's diet as early as three months, a majority of them did this from five months up to eight months. Usually, no special foods are prepared for babies partly because there may be no time for this but, more importantly, because other food resources may not be available. The weaning foods thus consist of starchy foods that are easily produced and prepared such as "uji", "ugali", sweet and Irish potatoes, and bananas. Although women breastfeed for a long time, the low nutrient density of the weaning foods contributes significantly to the problem of malnutrition in the district.

2.1.5 The Mother-Child Relationship

The nutritional health of a newborn baby may be influenced by the mother's diet during pregnancy and also by her own nutrition during her infancy and adolescence. Women have special nutritional needs during pregnancy and lactation which in most cases are inadequately met (McElroy and Townsend, op.cit.).

Frequent pregnancies may be a major host factor in malnutrition in women of childbearing age. When the demands of pregnancy and lactation are not met by diet, the mother's own tissues become depleted. If the postpartum diet is not sufficient to allow repletion, the mother becomes progressively more poorly nourished. This also reflects on the early health of the successive offspring.

McElroy and Townsend (op. cit.) attempt to show the relationship between the mothers' diet and that of the successive child. During the first few months of foetal development, the embryo does not make great demands on its mother's nutritional stores. The nutrition of the mother is not directly a matter of the woman's diet at this time. Rather, it is critically important for the nutrition of the foetus that the placenta is well established. Poor placental development is often found if the mother is poorly nourished or immature.

Foetal malnutrition can result from poor circulation in the mother or from poor placental transport of nutrients as well as

from inadequate nutrients in the mother's circulation. The nutrients that reach the foetus through the placenta and umbilicus are those circulating in the maternal bloodstream. The diet during pregnancy is the source of most of these, but prepregnancy stores are also tapped. The mothers' nutritional state during the first few months of pregnancy seems to be especially critical for the foetal storage.

Relationships of maternal nutrition and weight gain to newborn birthweight were studied by Ademowore et al.(1972). These authors found good correlation between pregnancy weightgain of the mother and that of the baby. Their conclusion was that the quality of nutrition might be an important factor in the production of larger babies and that emphasis should be placed upon the quality of the diet during pregnancy to ensure production of larger babies.

Omololu (1972)states that the average African child starts life at a nutritional disadvantage--he is born with a low birthweight for gestational age which results mainly from maternal malnutrition especially during the last trimester.

Traditionally, among the Abaluyia, men and children were fed first--and this trend still persists (Olenja op.cit). With the scarcity of food witnessed presently, women are much affected by the intra-household food distribution. Many women quietly go hungry, their first need being to attend to the needs of the other family members. Men are much favoured in terms of

intrahousehold food distribution. Thus women end up being malnourished and this in turn affects their offsprings (Ibid).

2.1.6 The Etiology of Nutritional Diseases: Environmental Factors

Environmental factors are significant in the etiology of nutritional disease. The term "environment" not only includes physical and biological factors, but cultural and social factors as well (Scrimshaw, op.cit:118). These factors may act in at least three ways in relation to nutritional disease.

The first way is by affecting the availability of nutrients. Included among these are physical factors such as soil and climate which directly affect agricultural production; biological factors, which influence the types of plants and animals which land can support, and social factors. This category of environmental factors is almost beyond the control of the physician.

The second is by affecting nutritional requirements of the host. Here again physical, biological and social aspects are involved. Instances of physical aspects include high environmental temperatures which result in an increased loss of water and significant quantities of essential nutrients through perspiration. Biological factors include the occurrence of pathogens in the environment, which through the infection of the host increase nutrient requirements. Social factors are, for

example, the occurrence of rickets in children whose parents protect them from the sun to keep their skin from turning darker, which is not uncommon among West Indian Blacks in the Panama Canal Zone. This second category of environmental factors are most likely to be understood by the physician.

The third way is by affecting the intake of nutrients. The most significant group of environmental factors influencing food consumption is the socioeconomic; for example the prices of food commodities. Cultural factors which influence food consumption are also decisive. These include food prejudices and taboos.

Thus when an individual is found to have a nutritional problem, the remedy should not only include the therapeutic aspect of supplying the nutrients needed to alter the disease state but also the preventive aspect of altering the environment that gave rise to the problem.

2.1.7. The Etiology of Nutritional Diseases: Agricultural Factors

Quite clearly agriculture has a strong influence on a people's nutritional status. In spite of this strong influence, seldom do agricultural policies of most nations flow from specifically stated and analysed nutrition objectives. Rather, the goals of agricultural production are to reduce dependence on foreign suppliers for major staples, expand exports, produce raw materials for industrial goods, and provide producers with

adequate food supplies that will maintain stable prices and avoid pressures on industrial wages and prices.

Research findings on the optimum mode of agricultural production best suited for favourable nutritional status have not been conclusive. Conventional thoughts in this field have been challenged as new variables emerge. It has been variously suggested for example that a shift from subsistence crop production to cash crop production generates poor nutrition, partly because of consumption patterns and partly because of changing patterns of household allocation. On the other hand certain quarters hold that a shift towards commercial agriculture normally involves an increase in income and, consequently, a strong economic base enabling sound food purchase.

In her study on the impact of agricultural change on diet and nutrition in Tabasco, Mexico, Kathryn Dewey found that the number of crops grown on a family plot can affect the nutritional status of children. She notes that in many traditional systems of agriculture, a variety of crops are grown in mixed culture and often the combinations of all those crops supply a diverse diet. In addition yields are often higher when crops are grown in polycultures rather than monocultures. With a shift to commercial agriculture, the diversity of crops grown falls drastically and dietary diversity may decline as well. Decreased crop diversity may also force a greater reliance on

purchased foods which are often more expensive and/or of poorer nutritional value. This may therefore have negative nutritional consequences. This study further implies that families that maintain a higher level of subsistence production may be nutritionally better off (Dewey, 1978).

A study by Louis Grivetti among the Ballokwa of Botswana supports Dewey's contention on the positive correlation between dietary diversity and nutritional status. The Ballokwa practise agricultural activities in addition to placing high regard on keeping cattle. Apart from animal husbandry and field agriculture, the Ballokwa have adopted the practice of preparing gardens for raising food. Within these gardens 58 varieties of domesticated and edible wild plants are tended. While only 5% of the foods raised in the Ballokwa agricultural holdings are exotic to Botswana, over 61% of the foods raised within the household gardens are exotic. With this abundant food base and hence relatively large diversity, the study did not find any clinical signs of vitamins A, B complex, C or D deficiency (Grivetti 1975).

The Fleurets' study among the Taita shows that, under certain circumstances, in East Africa commercialization of agriculture and involvement in wage labour are associated with substantial nutritional benefits. For example, they noted that in areas where commercial production of coffee and vegetable was practised, better nutritional status of children was revealed.

It was also noted that landless labourers working on a sisal plantation had children who, on the average, were of better nutritional status than children in any of the agricultural communities except those in areas where commercial agriculture was significant. The reason associated with this positive situation is because workers in the sisal plantation were paid on a daily basis; the bulk of the household's income being spent on food, and very little remaining for investment in consumer durables or children's education. These results suggesting a relationship between cash income from sales of crops and/or from sales of labour, and good nutrition are not in the same tune with the more popular thinking which sees no positive correlation between cash crop production and/or off-farm wage employment, with nutritional status (Fleuret and Fleuret, 1982).

In another context, Fleuret and Fleuret (1991), still on the Taita, caution against generalising on the relationship between agriculture and nutrition, and instead prefer to adopt the theme of contingency. The relationships between agricultural and nutritional variables are not invariant. For example, they found out that while coffee production was disadvantageous to child nutrition in one area, the reverse was true in a neighbouring one. With the adoption of contingency, the concept of resilience becomes worthy of consideration. Resilience, they say, encompasses the ideas of redundancy and diversity, but also means taking advantage of specialized

production opportunities through an adaptive allocation of resources. Resilience may or may not be achieved as households respond to a shifting set of environmental and institutional contingencies.

2.1.8 The Demographic Factor

Demography has been considered an important factor in relation to nutrition.

A comparative study drawn by Connelly and Chaiken in Masumbi and Hamisi Divisions of Siaya and Kakamega districts respectively, emphasises the significance of the population variable in analysing nutritional status. Hamisi Division, with a favourable climatic and socioeconomic condition, mixed farming systems that combine food crops and small scale cash crops production, and access to income from off-farm employment, was expected to have a more positive pattern of food consumption.

However, the survey revealed a consistently better level of consumption in terms of both starch and proteins among households in Masumbi. The authors argue that the intense population pressure in Hamisi (700+ per sq.km.) plays a major role in the lower level of food consumption observed here than in Masumbi (with 200 people per sq.km.). Because of restricted farm production, Hamisi farmers are heavily dependent on market purchases to obtain maize, flour and milk, the two staple foods of the diet. Income available from cash crop production and

off-farm employment is barely sufficient to meet the needs of most families. As a result, purchases of other important sources of protein are considerably lower than in Masumbi (Connelly and Chaiken 1987).

A comparative survey in Central and Western Kenya also suggests a negative correlation between intense population density and nutritional status (Bullock 1969). This study shows that per capita availability of calories decline as population density per cultivated food crop increases.

2.1.9 Income, Food Delocalization and Purchases

Income is a major determinant of diet quality and quantity (Chaiken, 1988; Fleuret and Fleuret, 1982; Connelly and Chaiken, 1987). In developing countries, the poor devote a high proportion of their income on food; this more money generally means a better diet (Berg, 1973). As the poor enjoy some increases in their income, they usually spend a bigger fraction of it on additional food expenditures. However, the increases in income may not be proportional to the income spent on food. The Engels law states that as income rises expenditure on food also rises, but the proportion of the income spent on food decreases (Davey, 1968).

In rural India where the poor have another rupee to spend, 76% of it goes to food. This percentage declines as total income increases; upper income rural Indians spend 34% of each

additional rupee on food. Income levels also establish a pattern of what foods are purchased with that additional rupee. For example the poor spend most of it on food grains, the rich much less (Berg, op.cit.).

But even when expenditures on food are increased, additional income does not always lead to improved diet. People may spend much on food but not necessarily better food. In South Asia, the common shift with increment of income is from sorghum or millet to rice, the shifts being aesthetically pleasing but nutritionally costly (Ibid.).

Often, with increased income, certain items that are identified as food of the poor are discarded from the diet. Quinoa, an excellent cereal of the Bolivians is associated with low status, and Bolivians invariably choose a more costly but less nutritious substitute which they can afford. In much of India green vegetables are regarded with disdain because they are plentiful and inexpensive. In Calcutta seafish is scorned in favour of the more expensive freshwater fish. In El Salvador, there is abundance of yellow maize to satisfy vitamin A needs, but people prefer eating white maize (Ibid.).

A study on a little village, Sandy Bay, in Nicaragua shows that purchasing competes with local subsistence and in effect, negatively relates to nutritional status (Cattle 1978). Major subsistence activities in the village include swidden agriculture, turtling, and purchasing. The incentive for

turtling is not consumption but cash. The turtlemen have chosen to sell rather than to consume, thereby using a traditional subsistence product to obtain cash rather than meat. Higher quality protein (turtle) is flowing out of the Miskito ecosystem into the market place and in turn villagers are purchasing carbohydrates and calories.

2.1.10 Food Habits, Prescriptions and Proscriptions

Food habits, beliefs and taboos can determine or affect the nutritional status of individuals, families and communities. Habits are defined as settled tendencies or practices; beliefs are things which people accept or are satisfied as being true or existing; and taboos as bans or prohibitions which set something apart as dangerous or holy (Bennett, 1975). Food habits, beliefs and taboos then are a set of ideas and practices which regulate the food used by an individual, a family or a community.

A change in food habits must be made if a nutritional problem has to be eliminated. In order to bring about change, it is necessary first to understand the economic, cultural, and social factors which influence dietary patterns, food intake, and hence nutritional patterns.

Food habits are an outcome of many influences--culture, economy, society, religion, agriculture--which interact with personal, physiological, and psychological factors (Ibid.). Some factors which influence food habits among individuals

include familiarity, i.e, having previous experience of the food; income; preparation time; food conventions and taboos; and individual or/and group beliefs (Robson et al., 1972).

Changing food habits, as is the case with any other habit, is not a simple task. The following may determine a change of habits: crop failures, pestilences, epidemics, and the devastation made by wars. People migrate as individual families or large groups and find different climatic conditions that determine the food supplies.

Changes in food patterns may occur as human societies borrow from each other, conquer each other, trade, and migrate. Urban living dictates new ways of producing and supplying foods. To this list may be added the following: the changing patterns of cash crops have introduced new purchasing power, especially for protein foods; marketing, roads and food processing changes have made many foods more available; the changing role of women has led to more working mothers and less lengthy breastfeeding (Bennett, op.cit; Robson et al., op.cit.).

Nearly all human beings have cultural restrictions on eating foods that are considered edible by other groups. Such taboos may be applied to the entire society, or for particular periods of time. In most African societies the best foods may be kept for men, while the mother commonly receives no special foods (Carruthers 1953).

In many societies pregnancy is a time for many food restrictions. The degree of restrictiveness varies considerably within the populations. For example, in India women fear that papaya, meat, and eggs will lead to abortions. In Malawi, pregnant women do not eat animal meat because they believe that the animal traits are transferred to the child (Berg 1973).

A study of pregnant women in South Carolina, U.S.A., discovered that nearly half of the respondents hold some beliefs such as milk drunk during pregnancy causes cancer, pork rots the uterus, eggs harm the child's brain, fish is poisonous, leafy vegetables mark the child, cheese causes the baby's head to stick to the womb during delivery (Ibid.).

Postpartum avoidances are also observed in many societies. In Tamilnad, India, such avoidance include milk products, fish, meat and eggs. In Indonesia many women take less food after childbirth to regain shape. In some Asian countries many mothers believe that a diet containing animal proteins make breastmilk toxic to the baby. In East Africa, the consumption of mutton by the mother allegedly leads to the dimness of the baby's vision and eating groundnuts is believed to cut the supply of milk. In Vietnam custom demands that nursing mothers should not eat fish (Berg op.cit.).

In many areas nutritious foods are withheld from children for fear of adverse consequences. In parts of India, eggs are feared to cause jaundice and swellings; in Lebanon and Syria,

indigestion; and among the Yoruba of Nigeria, a child that grows to become a thief. Eggs are blamed to cause mental retardation in parts of East Africa, and for late development in Korea. In a number of African communities eggs are not fed to girls for fear of infertility; and, at times, increased fertility. In Malawi, fish and chicken are feared to cause sterility. Some West African societies say that oranges make a child " soft", some in East Africa say that they cause heartburn (Ibid.).

In a study done in East Bukusu location of Bungoma, Kenya, it was concluded that malnutrition in the area was a result of poverty and lack of education of the mothers. The survey revealed that the uneducated mothers, who are strongly tied to tradition, had more malnourished children as compared to educated mothers (Wandatti 1984).

2.1.11 The Household and its Decision-Making Process

The household has been defined as those individuals who eat from the same pot (Robson et al.,op.cit.:566). However, such a definition may not make sense in certain cases. For example, individuals who share in the consumption may differ from those who participate in productive activities - an unmarried Tolai youth usually cultivates his own gardens but takes most of his meals with kinsfolk (Epstein, 1967).

Among the Siane, all initiated men stay in one place while each married male builds a separate house for his wife, children

and pigs (Ibid.). Thus, where common residence and membership of a household coincide, i.e., where women, men and children live under one roof and share in the production of goods, it is easy to sort out census material into households.

Epstein (op.cit.), therefore, suggests that in difficult cases where household membership is not clearly definable in terms of common residence, then it is advisable to take adult women as the centre of households. Whoever helps a woman regularly to produce the food she cooks should be counted as belonging to her household

African households typically contain more than one decision-maker (Guyer, 1979). Individual men and women maintain rights in the wider kinship units from which they derive incomes. Men and women generally work in different spheres of the economy and manage their own personal incomes. Among the Yoruba of Nigeria a woman's income is kept separately from that of her husband (Ibid.).

In the 1963 Kenya Population Census, the household was defined as a group of people living together, whether or not they are consanguineous but so long as they stayed in one homestead and shared in the same principal meals (GOK 1966). Members of the same family sleeping in the same quarters within a compound but sharing the same meals were regarded as comprising one household; servants sleeping in the same premises as their employers or in a separate building in the same

compound were included with their employers' households. This definition centred upon the concept of "eating from the same pot".

The 1976 Kenya Statistical Digest, however adopts a new definition of a household. A household, it says, comprises a person or persons, generally bound by ties of kinship, who normally reside together under one single roof or several roofs within a single compound and who share a common source of food (Ibid:6). Under this definition the polygynous wives living within a single compound will be included in the same household whatever the cooking arrangements may be.

2.1.12 Anthropometry

Anthropometry was probably first applied to nutrition when Liharzik produced the first tables of child weight and height in the mid-19th century in Vienna (Kanawati, 1976:62). The method of utilising anthropometry has generally been accepted in the developing nations where technical resources are limited.

Anthropometric indices that are widely used are Weight for Height (WH), Height for Age (HA), and Weight for Age (WA). Others are the Upper Arm Circumference, Skinfold thickness, Head Circumference and Chest Circumference.

The index of WH relates body mass to stature. It has been recommended as a superior indicator of the child's current nutritional status (Graitcer et al., 1981). Data from

nutritional surveys indicate that the nutritional status of a preschoolage child based on WH is associated with the presence of recent symptoms of illness, fever and diarrhoea (Ibid).

Weight reductions can easily occur as a result of impairment of metabolism, decreased intake, or increased requirements from catabolic effects of infections. This usually results in an immediate decrease in a child's weight. On this basis WH is a good indicator of current nutritional status or short term nutrition. Of the anthropometric indices, it has the strongest association with cross-sectional morbidity (and subsequent mortality) prevalence in young children. It is also said to be independent of age, and relatively independent of ethnic group (Waterlow et al.,1977).

In using WH, the influence of shortness of height upon weight is eliminated and only the degree of under--or over--weight is measured. WH discounts totally any importance in attaining a specific height at a certain age, since it has not been proven that health and nutritional status actually improve as a result of height increments (Navab et al., 1982). Acute undernutrition is characterized by low WH and is called wasting.

The index of HA is a measure of linear growth. Significant growth retardation which occurs during short-term episodes of acute food shortage, infection, or sustained periods of inadequate food intake especially during the first two years of

life may result in an individual who is short for his life or age. This condition, resulting from chronic undernutrition, is called stunting. Since HA is not a strong indicator of present nutritional status, it theoretically is not an indicator of a child's risk of morbidity and subsequently, mortality.

WA has been the most and widely recognized indicator of PEM (WHO, 1983). However WA has a disadvantage in that it does not distinguish between acute and chronic malnutrition (Waterlow et al., op.cit.). WA is particularly useful in children under one year old and, if length measurements are not performed accurately, WA may be the most valid index. According to a WHO guide, the following combinations of WH, HA, and WA may assist in the interpretation of nutritional status (WHO, op.cit:27).

1. Normal WH + Low WA + Low HA =Normally fed with past history of malnutrition.
2. Normal WH + Normal WA + Normal HA =Normal.
3. Normal WH + High WA + High HA =tall, Normally nourished.
4. Low WH + Low WA + High HA =Currently underfed.
5. Low WH + Low WA + Normal HA =Currently underfed.
6. Low WH + Normal WA + High HA =Currently underfed.
7. High WH + High WA + Low HA =Obese.
8. High WH + Normal WA + Low HA =Currently underfed with past history of malnutrition.
9. High WH + High WA + Normal HA =Overfed but not necessarily obese.

From these combinations and interpretations we get the following picture:

(a) All children with normal WH are not malnourished, whatever the classifications of the other two indicators (1,2,3).

(b) All children with low WH are underfed, some more than others depending on the values of the other two indicators (4,5,6).

(C) All children with high WH are overfed in varying degrees depending again on the other two indicators.

The other indices mentioned, i.e., the upper arm circumference (MUAC), skinfold measures, head circumference, and chest circumference, are popularly used as supplementaries to WH, HA, and WA. The MUAC has been shown to be relatively age independent and highly correlated with traditional WH indices (Yost and Pust, 1988). Gurney and Omolulu's conclusions, after their survey in South West Nigeria using weight, height, MUAC, and triceps skinfold measures, underscore the difficulties in the evaluation of the arm circumference. They state that while the muscle circumference increases steadily during normal childhood, triceps skinfold actually decrease at some ages and shows marked sex differences that occur before puberty (Gurney and Omolulu, 1971).

Evaluations of anthropometric measurements are usually compared to standards of reference. Ideally, local anthropometric reference should be the best standards. However, these have not been collected.

In the absence of local standards, general standards of reference may be maximized. General standards are ideally cross-cultural, cross-sectional, and cross-racial and hence their applicability is universal.

According to Waterlow's widely referenced article (op.cit.), three bodies of data may be considered for use as international reference: the measurements of Dutch children reported by Van Wieringen (1972); those of the United States National Academy of Sciences (WHO 1983); and those of British children reported by Tanner et al. (1966).

The data by the United States National Academy of Sciences which are published as a monograph of the United States National Center for Health Statistics have been recommended as suitable for use as an international reference by several authorities including Frisancho and Tracer (1987), Graitcer (op.cit.) Waterlow (op.cit.), and WHO (1983). These data were drawn from a defined sample of American children which contains between 300 and 1600 children in each year group.

The actual value of indices which are compared to other reference values are usually expressed in percentiles, percents or medians, or Standard Deviation scores or Z-scores.

percentiles are not a useful parameter for expressing data from developing nations since substantially larger numbers of children have anthropometric values below 5th and 3rd percentile values (Graitcer et al., op.cit.).

Standard Deviation scores or Z-scores are the preferred method for presenting anthropometric values from nutritional surveys. The formula for Z-scores is as follows:

$$\text{Z-score} = \frac{\text{Standard mean value - Value of subject}}{\text{Standard Deviation of Scores}}$$

To determine the levels of nutrition, cut-off points have to be chosen beyond which the child is regarded as malnourished. The choice is an arbitrary one which can vary from one type of investigation to another (WHO, 1983). Jansen and Mannetje's comparative survey between the Akamba of Kenya and the Indians of Fiji concludes that cut-off points may also vary according to sex (Jansen and Mannetje, 1982).

While the cut-off points indicating undernutrition of percentages of the median are supposed to be approximately the same as the standard deviations from the median, it has been recommended that the number of standard deviations from the median be used rather than the percentages (Navab et.al.1982).

Traditionally, anthropometric cut-off points were established on the basis of clinical judgement. Generally, -2.0 to +2.0 Z-scores for both HA and WH are felt to be the limits of anthropometric values (Waterlow et.al.op.cit; Graitcer op.cit;

WHO 1983). Frisancho and Tracer (op.cit.), however, apply a cut-off of -1.6 Z-score to define severe undernutrition. In order to identify a suitable cut-off point, the WHO recommends that the data be tabulated using different cut-off points before identifying the appropriate one (Ibid.). The -2.0 to +2.0 Z-score range was chosen by the WHO after such an exercise.

In undernourished populations, -2.0 Z-score corresponds approximately to 80% of the median WH and 90% of the median HA. If further extension below -2.0 Z-score units is desired, it should be done in units of 0.5 or 1.0 Z-scores. Individuals with WH Z-score values of less than -2.0 are classified as stunted (Graitcer et al., 1981). In populations where overnutrition is a problem, the principle described by Waterlow and colleagues should be applied in extending upwards or downwards from +2.0 units, particularly for WH (+2.0 SD units corresponds approximately to 120% median WH).

Waterlow et al.(1977) also point out the additional usefulness of looking at the deficit in WH (wasting) and HA (stunting) together. Children who are concurrently stunted and wasted are assumed to be at a greater risk of increased morbidity and mortality than adequately nourished children (see also Graitcer et al., op.cit.)

2.2 Theoretical Framework

This study applies two models. Both models applied focus around relationships between nutrition and the complex etiological factors that are associated with it.

2.2.1 The Agriculture-Nutrition Model

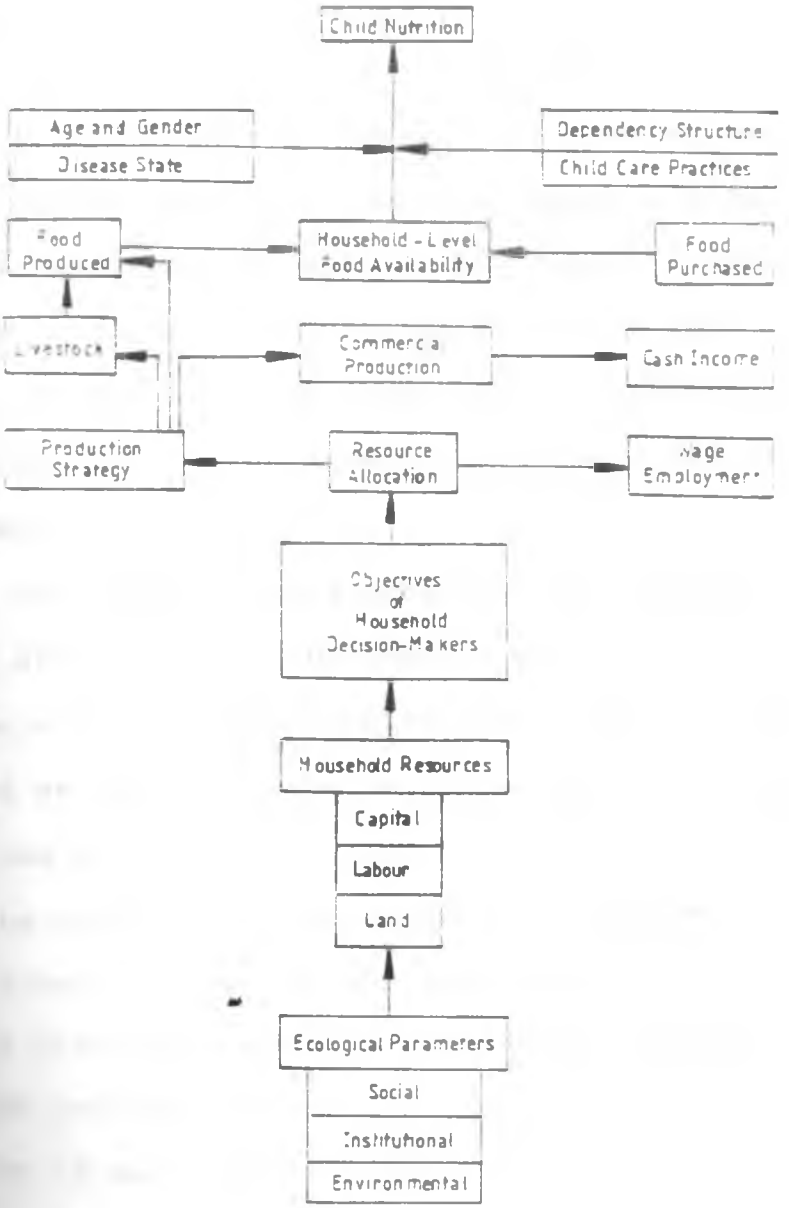
This model, applied by Fleuret and Fleuret (1991), encompasses an elaborate network of interrelationships of variables thought to influence child nutrition, as seen from Figure 1 (p. 40).

In their study the Fleurets focused on four elements of this model: ecological parameters, household resources, production strategies, and nutritional outcome. It is quite apparent that the analysis of all variables in the above model is difficult conceptually and impracticable in research design. This study focuses on the following elements of the model: ecological parameters, household resources, commercial agriculture, food purchases, and child nutrition.

2.2.2 The Adaptive Model

The Adaptive Model has been proposed by Dorothy Cattle (1976) as an alternative to what she calls "particularistic research". Cattle criticizes "particularism" for failing to generate interdisciplinary cooperation, producing discrete and disconnected bodies of data and resulting in low level

The agriculture- Nutrition Relationship model



Adopted from Fleuret and Fleuret (1989:10)

generalizations which lack potential for further development. Thus, a general model is needed, a need that is adequately met by the Adaptive Model.

Adaptation means the process of modification to suit a new condition. Freedman (1970) has called adaptation a "unifying concept". It is a unifying concept as it encompasses human biology and culture, history and environment within a general evolutionary framework (Ibid:40). The Adaptive Model can therefore be conceived of as an assemblage of four processes: biological, cultural, evolutionary, and ecological. It is for this reason that it has been referred to as a "general" or "holistic" model by Cattle.

Health and disease are measures of the effectiveness with which human groups combine biological and cultural resources to adapt to their environment (Lieban, 1973:1031). According to Wellin, what we ought to examine in an adaptive orientation is: how do factors of biology, culture, and environment pressure influence the process or distribution of disease? Thus the disease is always treated as the dependent variable. Sometimes, however, the disease becomes an independent variable; for example, when determining the sociocultural consequences of a given disease in particular groups (Wellin, 1977:54).

Alland, one of the people associated with this orientation, presents a general statement of the interrelatedness of culture, biology, environment, and disease. He says that, generally, the

incidence of disease is related to genetic and non-genetic factors. Any change in the behavioural system is likely to have medical consequences, some of which produce changes in the genetic system. On the other hand, disease induced changes in the genetic structure can affect the behavioural system. He attempts to apply the Darwinian model to cultural evolution. He sees adaptation in human groups as bound to be the result of combined biological and cultural forces and, consequently, proposes that we should not study biological or cultural evolution separately, but evolution as a total process. The Darwinian model of evolution, according to him, can therefore be applied in cultural evolution (Alland, 1970).

Wiesenfeld, another proponent of the ecological or adaptive model, relates the distribution of sickle cell anaemia using the above factors. Analysing data from 60 East and West African societies, he finds that particular types of agricultural systems significantly affect the rate of sickle cell traits and of malaria. Specifically, he reports that reliance on root and tree crops creates a more malarious environment, leading to selective advantage with the sickle cell trait and to changes in population gene pool over time (Wiesenfeld, 1967).

McElroy and Townsend (1985) say that cultural adaptations to health problems involve both conscious and intended efforts to control disease and unconscious, unintended effects of certain customs on health. In the latter type of adaptation, a

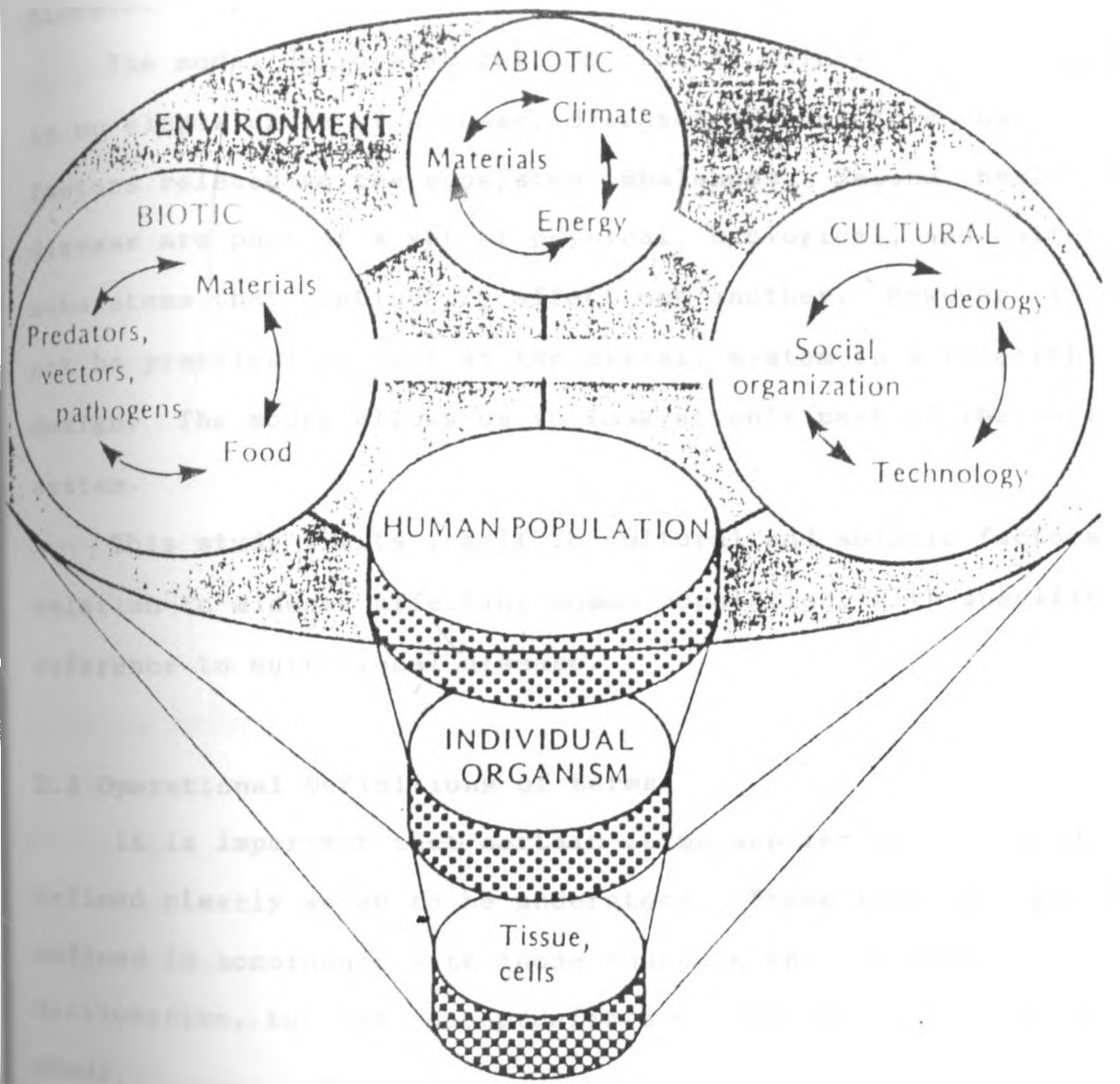
custom may have adaptive functions even though it is not consciously developed to solve a health problem.

For example, most societies have postpartum sex taboos, which prohibit a couple from having sexual intercourse for an extended period of time after the woman gives birth. People who do this do not justify it in medical terms. But one adaptive function of the custom is birthspacing.

In this study a model applied by McElroy and Townsend (Ibid.) is employed, as shown by Fig. 2, p. 44.

The model shows that the environment that impinges on people can be broken into three parts; the physical or abiotic environment, the biotic environment, and the cultural environment. The parts are interdependent and continually in interaction; a change in one variable frequently leads to a change in another. Although we usually focus on different parts and think of them as causes and effects of change processes, it is also possible to imagine all individual spheres and variables functioning as one unit. If looked at as a whole, then we may have an ecosystem--a set of relationships among organisms and the environment.

How do we fit health and disease in this model? A change in any one of these variables can lead to certain ecological and physiological imbalances, too severe an imbalance will be defined as disease or stress. For instance, change in climate may lead to a sharp decrease in human food supplies. Adaptive


ENVIRONMENT
ABIOTIC
Climate
Materials
Energy
BIOTIC
Materials
Predators,
vectors,
pathogens
Food
CULTURAL
Ideology
Social
organization
Technology
HUMAN POPULATION
INDIVIDUAL
ORGANISM
Tissue,
cells

responses within the cultural sphere--say like a shift in food production--can easily change relationships with other organisms in the ecosystem, and this change may involve an increase in disease.

The model delineates certain crucial points. First, there is no single cause of disease; diseases are due to a chain of factors related to the ecosystem imbalances. Second, health and disease are part of a set of physical, biological, and cultural subsystems that continually affect one another. However, it may not be practical to look at the overall system in a research design. The model allows us to look at only part of the entire system.

This study limits itself to cultural and abiotic factors in relation to disease affecting human population, with specific reference to nutritional disease.

2.3 Operational Definitions of terms

It is important that certain terms applied in this study be defined clearly so as to be understood. These terms may not be defined in accordance with those found in the standard dictionaries, but are conceptualised within the context of the study.

Nutritional Status - is that condition of health of people that can be attributed to the foods they habitually consume. This definition implies that problems arising from overnutrition

are included. In our study we are specifically concerned with problems stemming from undernutrition.

Anthropometric Measurements - are classical tools for the measurement of nutritional status. In our case the following anthropometric measurements were taken; height, weight, Mid Upper Arm Circumference (MUAC), and triceps fatfold. The tools utilised in taking the measurements were; a Salter PBW 25 adjustable Spring Scale, a Wooden length Board, a Fibre Glass Tape, and Lange Skinfold Calipers. The data obtained were analyzed against the General Standards of Reference adopted by WHO (1983).

Occupation - is defined as the principal activity a person/persons does/do, and should therefore not to be confused with "employment".

Education - is defined in terms of formal education. It directly refers to the level of schooling one has attained. It is recorded here in categories of "no education", "lower primary education", "upper primary education", "secondary 1-4 education", "secondary 5-6 education", and "higher education" (which includes specialized training).

Nutrition - the process by which the organism utilises food. In nutrition, food or anything normally ingested by the organism is utilized by the processes of digestion, absorption, transport, storage, metabolism, and elimination for the purposes of maintainance of life, growth, normal functioning of organs, and the production of energy.

Contingency Associations - also referred to as "partial associations" in statistics.

Contingency - uncertainty

Meal - is the sum of food ingested in one feeding. Our categories of meals here are essentially three-fold; the morning meal (breakfast), the mid-day meal (lunch), and the evening meal (supper).

Diet - the sum of the daily or weekly meals, considered so in relation to their quality and effects. A dietary is a prescribed or adopted course of diet.

Malnutrition - is a disordered nutrition of any kind; whether being of deficiency or of excess, or of inborn errors of metabolism or from cultural or environmental factors. In this context, we are much more concerned with problems of undernutrition, i.e., those of deficiency; which may also result from cultural and environmental factors.

Delocalization - is the "externalizing" of local foodstuffs, usually for the purposes of generating cash.

Household - a group of persons who normally live and eat together, whether or not they are related by blood or marriage, and who share a common source of food.

Age - the length of time in years or months that a person has lived.

Village - a unit of people living within one administrative sub-location and who are represented by a headman. In my case the headman is referred to locally as "likuru".

Co-wives - individuals of the female sex, in polygynous unions, who "share" one husband with the wife in reference. Such a wife/wives may be residing away from the homestead with or without the husband but still regarded as de facto wife/wives of the husband.

Cash-crops - crops that are produced solely for the purpose of generating cash through sales. In this case, sugar cane is regarded as the major cash crop.

Famine - large-scale experience of lack of food, as contrasted with "hunger" which is at a small-scale level.

Food-crops - crops that are produced solely for the purpose of household consumption.

Salaried Jobs - jobs offered to workers on long albeit temporary terms, or on a permanent basis. Such jobs are normally remunerated on a monthly basis.

Wage-Labour - jobs offered to workers on a short-term basis and paid in wages (usually after short intervals, e.g, daily, weekly, or fortnightly).

Food-sales - trading in household farmfoods in order to meet other needs, subsistence or otherwise.

Farmer - a person who cultivates a piece/pieces of land; though not necessarily the legal owner.

Family - a group of persons who reside or do not reside together but are related by blood.

2.4 Statement of the Hypotheses

In view of the literature reviewed herein, the following research hypotheses were advanced to guide this study:

1. Children from households producing sugar cane for commercial purposes tend to manifest poorer nutritional standards than do those from households which practise subsistence farming.

2. Children from households which delocalize farmfoods have a tendency to manifest poorer nutritional status than those from households which do not sell farmfoods.

3. Access to employment opportunities and resultant resources enhances the nutritional status of children.

CHAPTER 3

THE STUDY AREA AND POPULATION

3.1 Kakamega District

Kakamega District within which this study was undertaken is one of the three districts comprising Western Province.[1] The district is bordered by Siaya and Kisumu districts to the south, Bungoma and Uasin Gishu districts to the north, Busia district to the west, and Nandi district to the east. Kakamega district covers a total of about 3,520 sq km, of which 3,250 is arable land.

Geologically, the district may be categorized into two zones; a hilly zone in the south and a slightly undulating peneplain in the northern, central, and eastern parts. In areas around Vihiga, Tiriki, Sabatia, and Emuhaya divisions huge granite boulders placed in precarious positions may be seen. Isolated bulks of granites are also positioned around Ibokolo area in north Marama and certain areas of Isukha, Idakho, and Wanga locations.

The district is traversed by two major rivers; Nzoia and Yala (locally called Lukose) rivers, which pour their waters into the massive Lake Victoria.

The district is adequately and reliably served in terms of precipitation. The rainfall increases both with altitude and with rainfall belt, varying from 1,250mm to 2,000mm annually.

peak rainfall is received between the months of March and October as is the case with most other parts of Kenya. However, maximum rainfall here is received between the months of April/May and August/September. The period between December to February may be regarded as a dry season although not entirely without any rain. The northern and central areas of the district have the heaviest rainfall.

The temperatures in the district vary between a mean maximum of 26 degrees and 32 degrees, and a mean minimum of 14 degrees and 18 degrees centigrade.

Cultivation seasons respond to the precipitation patterns. The southern and central parts of the district have two food crop growing seasons per year with maize, sorghum, and beans being dominant.

Ecologically, a massive part of the district (62%) lies on high potential land, 18% within the low potential, while the remaining 10% is occupied by the physical infrastructure. The high potential zone is found principally in the southern part of the district, the area with the highest population density.

Three main types of soils may be identified; the well drained dark brown, sandy loam soils found in the northern region and part of the southern and central regions which are mostly suitable for maize cultivation; well drained dark red friable soils to the south and east covered with top soil and suitable for maize, beans, and cultivation of sorghum; and

yellow-red loamy sands derived from both sediments and basement rocks and found in the western and northwestern parts of the district. Generally a large part of the district is of high agricultural potential--but not so much because of the soils than because of favourable climatic conditions.

Of the total land area, 88% is evidently under cultivation and livestock holding. A large number of farmers in the district undertake small scale agriculture and grow food crops for household consumption and sale in the local market. Food crops grown comprise maize, beans, sorghum, cassava, groundnuts, and millet. Other crops grown are bananas, vegetables, and pawpaws. Livestock kept include cattle, poultry, sheep, and goats.

Cash crops cover 30% of the area under cultivation--the main ones being coffee, tea, sugar cane, and sunflower.

Demographically, as of the 1979 population census, the population of Kakamega district stood at 1,030,887 people, over one half of them being people below 15 years of age. The 1.03 million of 1979 had increased from 782,586 that had been recorded a decade earlier--hence representing a growth rate of 2.8%. The estimated population for 1988 is given as 1.43 million people, thereby representing a growth rate of 3.3% (Kakamega District Development Plan 1989-1993). This growth rate is by any standards, one of the highest in the world.

The population in the district is highly imbalanced in terms of the female-male ratio: 74.6:100, in 1979 in the 15-49 age-group. The major reason for the imbalanced sex ratio in this age-group is that more men than women in the group migrate from the district to seek better opportunities elsewhere (Ibid.). Thus the productive labour in the district is largely provided by the female inhabitants together with children and the aged.

The population density varies widely but averaged 302 persons per sq. km. in 1979, hence rating as one of the highest in the country. A true reflection on the gravity of the situation may be underscored by looking at divisions such as Vihiga, Sabatia, and Emuhaya which by 1979 had densities of 696, 772, and 686 persons per sq km respectively. By the time of this study these divisions had population densities of about 1000 persons per sq km. Thus the pressure on land is already overstretched in these divisions.

At the administrative level, the district is divided into 13 administrative divisions: Mumias, Emuhaya, Lugari, Tiriki, Khwisero, Butere, Sabatia, Vihiga, Municipality, Ikolomani, Lurambi, Kabras, and Shinyalu. The divisions are further divided into locations and sub-locations which as of 1988 were 43 and 223 respectively.

Within the local government, 5 local authorities have been created, namely Kakamega County Council, Kakamega Municipal

Council, Vihiga Town Council, and Mumias and Luanda Urban Councils. A total 71 County Council Wards have been established.

3.2 South Marama Location

South Marama location is one among the four locations in Butere Division; the others being North Marama, Central Marama, and East Marama--the latter having been carved out partially from South and North Marama in 1989. The location is situated at the south-west end of Kakamega District. It is bordered by Siaya District to the south and west, South Wanga and Central Marama locations to the north, and East Marama to the east. South Marama location is divided into three sub-locations, namely, Shibembe, Shiatsala, and Manyala sub-locations.

The terrain of the location is relatively flat with slightly undulating plains, but with no notable changes in elevation as is the case with neighbouring Gem location in Siaya district. The land is mainly covered with well-drained, dark-red friable soils suitable for cultivation of maize, beans, cassava, sorghum, ground-nuts, and millet, which are the primary staple foods of the Marama people. There is a gradual but determined move by the Mumias Sugar Company to introduce sugar-cane production in the area, a move that has found a positive response by a considerable number of farmers mainly in Shibembe and Shiatsala sub-locations. Isolated cases may be seen of farmers cultivating coffee and sunflower.

Fruits that are chiefly grown include pawpaws and bananas. Guava and mango trees may be found growing wild, with the former proving a major utility during famine days. While guava trees fruit annually, mango trees fruit in alternate years.

The people of South Marama observe two main food production seasons annually, both of which coincide with the peak rain seasons. The first season starts in the months of February/March, coinciding with the long rains, while the second starts in July/August, coinciding with the short rains.

The 1979 population census gave the population of South Marama (which had five sub-locations then) as standing at 11,174 (GOK 1981b). The total number of households in the three sub-locations in 1979 was 2636. The sub-divisions were as follows: Manyala 1112 households, Shiatsala 489 households, and Shibembe 1035 households. According to the Kakamega District Development Plan, the density of population in Butere division was 335 persons per square kilometre in 1979, and was projected to be 451 persons per square kilometre by 1988 (District Development Plan: Kakamega District 1989-1993).

At the level of welfare, as of the moment the location is poorly favoured in terms of health facilities. Only one private clinic run by a Clinical Officer exists within the location. It charges a flat rate of Kshs.60.00 per patient (at the time of study). Otherwise the nearest government health facility is the Butere Health Centre situated in Central Marama. Serious cases

are referred to Kakamega Provincial Hospital. For those who may afford it, St. Mary's Hospital in Mumias, Mukumu Hospital in Kakamega, Ngi'ya Mission Hospital in Siaya District, Mwihila Mission Hospital in Khwisero Division and Maseno Mission Hospital serve as better alternatives.

In spite of the contemporary gloomy picture, there is apparent hope in the future. For in Manyala sub-location, a multi-million shilling health centre project was by the time of study on the verge of completion. Not only is this project expected to improve the morbidity situation in the location, but it is anticipated that the project will give a new impetus in the socioeconomic life of the residents here.

Educational opportunities open for the population are many at the primary level of schooling, scanty at the secondary level and absent at the technical level. There are 12 primary schools and one secondary institution (Manyala Secondary School) - with one more intended at Shiatsala.

The location is linked to the outside world by one earth road; the Sigalagala-Butere-Yala road. Due to this road's poor condition, (and the even poorer condition of its feeder roads), public transporters with any respect for their vehicles avoid the road. Public service vehicles plying this road can be found early in the morning (when moving out to serve other areas) or late in the evenings (when coming back). Otherwise, commuters are forced to walk 6 kilometres to Butere township to board vehicles.

A sub-post office--which only sells stamps and receives letters - has been set up at Shiatsala market. The area is, however, not served with telephone lines. According to the 1989/93 Plan by the Kenya Posts and Telecommunications, the area should have been adequately served with telephone lines by 1989, yet this had not been done as of 1990 (Ibid.).

Electrical services are notable by their absence, although they have been established in North and Central Marama. This has contributed to the slow pace of social and economic development in the area.

Although traversed by the Malanga-Sidindi water line, there is very little to cheer about here. The water kiosks built to serve residents of the area who live along the pipe line run dry during the better part of the year. Since water is sold per "debe" (ten cents per each), residents of the area prefer fetching water from springs, rivers and streams. Rivers Efiratsi and Isika along the borders of the location and their tributaries are major sources of water in the location.

3.3 The Marama People

The Marama people occupy the entire Butere Division. They are one among the seventeen sub-tribes of the larger Abaluyia tribe who are alike in so far as descent, customs and language are concerned - although dialects vary according to locality.

The Marama are by tradition agriculturalists. Among the traditional food crops of the Marama and which are still cultivated now include sorghum, finger millet, varieties of beans and peas, sweet potatoes, cassavas and pumpkins (Berg-Schlosser, 1984). Apart from cultivation, the Marama also keep livestock, primarily cattle but to a lesser extent sheep and goats. In the past, the men within this community were preoccupied with hunting wild animals such as antelopes for food. However, with most of the bushes cleared this economic activity has become less dependable as wild game is now scarcely found.

The conventional meal times of the Marama people begin in the mid-morning after the early morning farm activities which may commence as early as 4.30 a.m. A calabash of gruel ("obusera") prepared from millet (and now maize) flour would be served. At times, this is taken along with pieces of cassava or sweet potatoes. Later in the evening the major meal comprising a heap of "obusuma" ("stiff porridge" or "ugali") with any relish would close the day for most families. When eating, the family sit in two groups: the mother and her daughters and sometimes small boys eat together in the cooking-partition of the house, while the father and the older sons take their meals in the front partition. Meals would be served to those in the front partition first before the mother retreats to the rear to eat with the daughters and other small ones.

The basic landholding unit of the Marama people is the extended family consisting of grandparents, the married sons and their families, and unmarried children. Traditionally, these extended family members built their homes on the same piece of property, but each elementary family cultivated its own field. Each of the families constituted a consumption unit on its own. Rights of ownership were established either by inheriting a piece of the grandfather's land, being apportioned a piece by one's father, or by cultivating a piece of virgin land. In addition to these plots owned by individual families, there used to be some sections which were under the control of the clan head. A part of this land served as the communal grazing ground for all members of the clan. Another part was traditionally held in reserve and in times of need could be allocated by the clan head to individual clansmen whose property this land became after they had first cultivated.

The traditional tenure system favoured the male children who would, ultimately, receive an equal or nearly equal share of the family land and cattle. If a man died before his sons inherited his property, one of his brothers acted as a trustee until the sons came of age. If a man had no direct descendants his property was inherited by his brothers or their sons.

The social and legal relationship between a Luyia husband and his wife was ill-balanced. Traditional customs and conventions were defined to prejudice against the wife's status:

> ....she has no ownership status whatsoever...she has no right of ownership to any object she handles...she has no right to dispose of any of these objects unless she acts upon her husband's instructions...she has no right over her own children in her quality as the mother...she has no legal independence or individuality.... (Wagner op.cit.13-14).

Though seemingly overstated, Wagner's contention above drives home the asymmetrical power relations between the man and woman among the Abaluyia.

The traditional division of labour among the Marama is in many aspects akin to that of other agricultural communities. Yet again the heavier burden here lies with the wife who has to clean the house and the cattle section, fetch water, collect firewood, cook and look after the children. The greater part of the planting, weeding, and harvesting is also done by her. The husband, on the other hand, has certain duties of construction of the house and looking after cattle and other livestock, and is responsible for all other transactions concerning the transfer of livestock in kinship relations. Children are trained at early ages to share the duties of the family life; boys begin to herd small livestock (e.g. goats, sheep) and later on cattle. Girls assist their mothers in the daily work of fetching water, gathering firewood, foraging vegetables, grinding millet and sorghum, etc.

The shift from economic self-sufficiency within the traditional family to dependence on the market economy has affected both the division of labour and the social cohesion.

where commercial crops are produced, as is the case with South Marama, women have to bear the heavy burden of extra work while men go comparatively idle - particularly so because their former duties of hunting, cattle raiding and protecting the herds have through time been rendered irrelevant. At the level of social cohesion, the effects result from the continous flux in search of employment (more so among the male members) which subsequently lead to a separation in family lives.

3.4 Research Methods

3.4.1 Sampling

In this study, the ideal sample unit is defined as the household. Sampling was done through four main stages.

Sampling stage one:

Before proceeding to the field, I anticipated to take a household census survey of the entire location which would have comprised my sampling frame. I had worked out a recording schedule on household census survey which would have elicited the following information on the members, among other information: age, education, occupation, marital status, household structure, and agricultural practices.

However, realities in the field proved different. Given the limited time and financial resources, it was not feasible to take a census of the entire population of the households in the location. I therefore formulated a method of getting my

sampling frame without necessarily going into the intricacies of counting each and every household within the location.

I set a sampling frame of 1,500 households, a figure that was expected to be about one half of the number of households within the location (Note: the 1979 population census recorded the number of households in the location as 2636).

With the assistance of two young men and the respective headmen ("amakuru") of each village surveyed, I set up to take a census of each sub-location. After a gruelling period of three weeks, I ended up with a sub-census population of 1,500 households. Each sub-location was represented in the sub-census by 500 households, with at least each single village in the location represented.

Sampling stage two:

The required sample of the study was estimated at about 100 households. The sample was expected to represent the following populations: (a) Sugar cane agricultural population.

(b) Dual sugar cane and food agricultural population.

(c) Subsistence agricultural population.

Despite these expectations, my sample frame did not reveal any household which participated exclusively in sugar cane production. Hence with this population (sugar cane growing population) eliminated, I was left with the two other

populations from which to sample.

I chose to apply the stratified sampling procedure to get my sample. All the households in my sampling frame were involved in one agricultural pursuit or the other (i.e.,either food agricultural production or both food and sugar cane agricultural production). The two categories were assumed to form two strata. The subsistence agricultural population stratum had 1060 (71%) households, while the sugar cane and food agricultural population stratum had 440 (29%) households.

Sampling stage three:

This stage entailed sampling from the two strata in order to obtain the targeted sample group. I opted to use the disproportional type of stratified sampling procedure to achieve this.

Each household was given a number. A list was then drawn for all the households in the two strata. Using systematic sampling, I eventually came up with a sample of 102 households, both sugar cane and food agricultural households and subsistence agricultural households. Proper consideration was made to ensure that all the three sub-locations were properly and proportionally represented in the sample. Each sub-location was represented by 34 households (33.3%).

Sampling stage four:

A sub-sample group was required for the purpose of dietary and food purchase survey. Such a survey is prone to many

errors. The most reliable way of taking such data would be to physically present oneself at mealtimes or on purchasing; a method that was yet again inhibited by limited time resource.

I adopted the method of leaving questionnaires with respondent households where members were able to read and write either Oluluyia, English, or Kiswahili. The questionnaires were supplied at the time of the main survey and collected at the time anthropometric data were collected. The number of households in this sub-sample was 28.

3.4.2 Data Collection Techniques: Secondary Data

Documentary sources were exhaustively utilized in the formulation of the research proposal leading to this study. These sources were useful in giving the study a clear orientation and focus.

Although an anthropological study, it was, however, imperative that knowledge on the effects of food upon individual biochemical and behavioural equilibrium should be well understood. Thus medical and nutritional secondary sources were exploited to augment the basic nutritional knowledge that I possessed. Background information on various parameters that have effects on nutritional status were collected. Documented information on statistics relative to the area's nutrition were further exploited at the site.

The secondary data provided me with the framework with which to operationalise the study. A set of hypotheses to be tested in the field was also formulated.

3.4.3 Unstructured Interviews

In order to enrich my data, it was essential to obtain data in a spontaneous, less controlled settings. In this connection, I engaged in random discussions with residents of the location.

Proper rapport with people had been initiated on the first day of the field study. A chiefs' "baraza" (meeting) was convened for the sole purpose of introducing me to the general public. At the meeting, I made it known to the people in attendance on the nature and objectives of the research and the means of acquiring relevant data. I also took the opportunity to introduce my assistants to help with part of the field work.

The "baraza" turned to be the first major test of what to expect in the field. Questions were advanced; how do we gain from the study? And why not look at nutritional problems facing older children, or even adults? Will the respondents be remunerated? Why women respondents and not men?....and so on.

The questions put forward were meticulously answered so that by the end of it all, the audience was fully satisfied and ready to render any assistance needed from them. However, I was to face more or less the same questions from women respondents

when I visited them in their homes (not a single woman was present at the "baraza").

Nevertheless, the "baraza" ensured that my presence was well known in the location. I therefore needed very little introduction when visiting most of the places. I took advantage of public gatherings, which usually hampered the home visits, to engage a group of people or an individual in discussions. I participated in five such gatherings; three funeral ceremonies, one pre-wedding party, and one public "baraza". Such informal discussions were essential for providing qualitative data.

3.4.4 Structured Interviews

Formal interviews were carried out using recording schedules and questionnaires which contained a series of specific questions that were to be read out to the respondents. My main informants here were women.

The interviews were performed through home visits. In an investigation of this kind, home visits are essential for apart from the method being useful in assessing environmental and socioeconomic circumstances within the household, it offers the advantage of seeing the family together in their domestic setting, of not missing sick children and of causing the least disruption of normal life and behaviour. Thus non-verbal interactions among household members can be observed this way within their natural environment.

I had at minimum two visits to each sample household. The first contact was at the preliminary stage when a sub-census collection was being taken. The second was at the stage of the main survey with the sampled group. We may add a third time; on the day anthropometric data were collected (although this was done at one particular centre, but still I had the opportunity of seeing members of the sample group and their children). This was all apart from participant-observation.

3.4.5 Recording Schedules and Questionnaires

A number of recording schedules and questionnaires were used to collect the required information. As already indicated, a household census survey form was used in the preliminary stages. The form recorded among other information, that on the household structure; sex, marital status, residence, and occupation of household members; and the crops grown on the household land.

During the main survey, the socioeconomic status of the household was determined through a recording schedule on material inventory. The scheduled indicated information on the main dwelling house of the household, on household durables, and on livestock belonging to the household.

Data on the participation of the household members in the labour market was acquired through a recording schedule on off-farm and non-farm employees. The schedule sought to get

information on the nature of jobs performed by the members (i.e. whether salaried, wage-employed or self-employed), the occupation of the employee, his/her place of work, his/her residence when at work, the approximate income earned, and the income flow.

A recording schedule on agricultural information sought to obtain information on land size, acquisition and ownership of the land, agricultural inputs, and the sales of land proceedings.

To determine the dietary patterns of the mother and that of her children, a separate recording schedule was used. The schedule recorded information on mortality rate, the mother's diet during pregnancy, lactation and otherwise, the child's weaning and breastfeeding patterns, and the household food consumption patterns.

For dietary survey and food imports within the households, a sub-sample group was selected from among those in the sample who are literate or had members who could read or write. The group was then given three sets of questionnaires; one each on the household diet survey, the child's diet survey, and the foods purchased by the household. The two former questionnaires were meant to record meals taken for a period of seven consecutive days. That on food imports was meant to record foods purchased for the same period of time.

In all, although 60 households in the sub-sample were given questionnaires to fill, only 28 of them filled them satisfactorily - this revealing the unreliable nature of this method.

3.4.6 Anthropometric Measurements

To complete the survey, arrangements were made to collect anthropometric data of the study group. A date was set aside, and information communicated to the mothers at the time of the main survey. The local administrators: the chief, the assistant chiefs, and the village "amakuru" helped in disseminating information through their respective "barazas".

On the material day, 55 women from the three sub-locations brought 78 children at the Shiatsala Chief's Centre for anthropometric measurements. The measurements started at 10 a.m. and ended at 3.30 p.m. and were done with the assistance of two other persons. The following measurements were taken:

Age:

The study group was ideally children aged between birth and five years old. It is desirable that ages of children between this age-group be known to the exact month in anthropometry (Jelliffe 1966:58).

In my case two methods were used to determine the age of the children:

(a) Mothers' recall - mothers were asked to give dates that their children were born. It was gratifying to know that in the majority of cases, the mothers were able to recall the exact day, month and year their children were born. This can be attributed to the fact that virtually all of them did attend antenatal clinics or did take their children for immunization. This necessarily meant that they had to know birthdates of their children.

((b) Documentary evidence - some mothers came along with documents such as baptismal and clinic cards which were full-proof evidence of the dates that their children were born.

The days of birth were recorded on the spot and the ages calculated at a later stage. All the children whose measurements were taken fell within the required age-group of between birth and five years old.

Weight:

The weights of the children were taken using a Salter PBW 25 adjustable spring scale. The scale was hung using a rope tied in a knot, and around a firm building timber.

Children were undressed to remain in a nude state. They were suspended from the scale in a nylon sling. The sling material ensured some degree of cleanliness from prolific water-passing by the rather terrified children. There were however many pairs of such trousers, which had to be changed at regular intervals.

The children were then suspended on the scale and measurements taken after the scale hands steadied. The measurements were recorded to the nearest 0.1 kilogramme.

Height:

The heights of the children were taken using a wooden lengthboard and steel tape. The board was placed on a flat concrete floor against a wall.

Nude as they were, the children were laid on the board with the head firmly fixed against the headboard and eyes looking vertically. The knees were extended flat on the board using firm pressure. The feet were then flexed at the right angles to the lower legs. The upright sliding foot-piece was moved to obtain firm contact with heels. The measurements were then read to the nearest 0.1 centimetre.

Taking these measurements was quite difficult as the struggling children could lead one to make errors. Measures to reduce errors were taken with the assistance of at least one person who would help in holding the child firmly as the other read the measurements.

Middle Upper Arm Circumference:

The MUAC was measured using a fibreglass tape.

The mid-point where the measurements was taken was selected halfway down the upper left arm. The arm circumference was then measured to the nearest 0.1 centimetre by gently but firmly pressing the tape around the limb.

Upper Arm Fatfold:

The fatfold was measured using Lange skinfold calipers. The measurements were done at the mid-point of the left upper arm where the MUAC was measured. The skinfold was then picked up between the thumb and the forefinger of the left hand, with the right hand holding the calipers to measure. The children had to be "pinched" three times - all the "pinches" or measurements being recorded. The average measurement results from the three "pinches".

Both MUAC and fatfold measures were not taken on children who were less than 6 months old, as they would not have generated the required amount of fat.

3.4.7 Data Collection Problems and Limitations

A number of shortcomings on data collection procedures may be cited. While a significant proportion of these problems may have been controlled, others were nevertheless beyond my control.

Field work in South Marama commenced in the month of January and reached its end on the close of March. According to the agricultural timetable of the farmers in the location, this period calls for the preparation of land in readiness for the planting season which starts in late February through to mid-April.

Therefore at this time women respondents, who are the main participants in agricultural activities, went to their plots before sunrise and came from duty at around mid-morning. In this case, home visits had to be conveniently done from noon. The situation was more difficult in the wet days when rains would start as early as 11 a.m. and defiantly pour throughout the day.

The original sample was estimated at 100 households. However, I was faced with two problems when making home visits. To begin with, in some of the homes visited at the time of the main survey, women respondents in the sample households were absent. Either they would have gone to local markets for short trips, or taken sick children to the health units, and so on. In such cases, replacements were done randomly - whereupon other households within the same village were visited and incorporated in the sample.

Secondly, since parts of the location - particularly Mahondo village in Shibembe, and Yiro, Munzeywe, and Ebukuti villages in Manyala - are predominantly occupied by the Luo people, it was necessary to replace some Luo households in the sample with Luyia ones.

So with the assistance of the village "amakuru" and after a satisfactory explanation on the purpose of the bias, households belonging to the Luyia were conveniently visited and interviews carried out.

A number of errors were discovered in the recording schedules. For instance, it became apparent that at the time of sub-census collection details on the sex identification of the children was not as crucial as their dates of birth which had earlier been omitted. The children's age would have determined whether a household would have been a potential sample member or not.

The questions on the weaning of the children were also found to be unnecessarily detailed. For instance, information on the quantity of foods taken daily were found to be not only cumbersome but also unqualified.

I therefore observe that a pretest interview, or field reconnaissance should have been done before proceeding for field-work. However, this was constrained by time and financial resources which would not have enabled me to go to the field before the main survey.

Finally, the technique of leaving questionnaires with respondents was not quite forthcoming. As earlier stated, although 60 households were given questionnaires to fill, only 28 of them were able to return theirs on the day anthropometric measurements were taken.

In this connection, I conclude that a study of this nature would bear rich data when carried out over a long period of time. Only then would dietary intakes be properly assessed through home visits at meal times. In addition, a longitudinal

type of study will ensure that environmental and sociocultural factors are learned with a sharper precision.

3.5 Data Analysis and Interpretation

There are three main sets of quantifiable data that were collected: that on the sample households, that on the sub-sample households, and that on the children's anthropometry. Most of these data were worked out on a computer. Simple ones were, however, computed manually. Data on children's anthropometry whose results are most central in this study were analysed using the following systems; Lotus 1-2-3, Paradox, Systat, and the United States Centers for Disease Control (CDC) module for the analysis of anthropometric data.

In the assessment of nutritional standards, much emphasis has been put on the application of Height for Age (HA) and Weight for Height (WH) indices. The use of these two indices as primary indicators of nutritional status has been recommended by the FAO/UNICEF/WHO Expert Committee on Nutritional Surveillance (WHO 1976). The index of HA is a superior indicator of long term nutritional status, while the WH index is a good indicator of current nutritional status and has strongest association with cross-sectional morbidity prevalence in young children.

The actual anthropometric values used here are expressed as Standard Deviations or Z-scores. The Standard Deviation scores or Z-scores describe the approximate probability distribution

values and are a preferred method of presenting anthropometric values from nutritional surveys (Frisancho and Tracer, 1987; Waterlow et al., 1977; Graitcer et al., 1981). Percentiles are not a useful parameter for expressing data from developing nations since, as noted previously, substantially large numbers of children have anthropometric values below 5th or 3rd percentile values (Graitcer et al., op.cit.). Percent, or median, on the other hand, provides a distribution of low values but does not relate to the overall distribution of these values in the reference population.

The cut-off points chosen for both HA and WH are +2.0 to -2.0 Z-scores as limits of the anthropometric values. These are the general limits subscribed to by among others the WHO (1983), Waterlow et al.(1977), and Graitcer et al.(op.cit.). In undernourished populations -2.0 Z-scores corresponds approximately to 80% of the median WH and 90% of the median HA values. Individuals with Z-score values of less than -2.0 in WH are classified as wasted, while those with HA Z-score values of -2.0 are classified as stunted. Nutritional values have been classified in units of 1.0 Z-scores as recommended by Waterlow. The levels are as follows:

Nutritional levels	Height for Age	Weight for Height
-2.0 or below	Stunted	Wasted
-1.9 to -1.0	Mild PEM	Mild PEM
-0.9 to +1.0	Average	Average
+1.1 to +2.0	Above average	Above average
+2.1 or above	Advanced	Overweight/Obese

In the case of the MUAC index application, the traditional 13.5 cm. cut-off point is applied (Yost and Pust, 1988).

In the absence of local standards of reference, the data from United States Center for Disease Control (CDC) published as a monograph of the National Center for Health Statistics is used as the reference population. These data have been adopted by the WHO for worldwide use (WHO op.cit.). There is a reasonable amount of data to show that Kenyan children do not grow differently from the American children in the WHO reference population (UNICEF/GOK, 1989:75).

Results of the children's ages are given in months. Jelliffe recommends that analysis of children's ages be done in three month age-groups for the first one year of life and in six month age-groups or yearly age-groups for children of 1 to 5 years (Jelliffe, 1966:166). On the other hand, Waterlow et.al.(op.cit.) recommend six month age-groups for the first year, and one year age-groups for the 1 to 5 years. They however, prefer three month age-groups for the first year, although six month age-groups are still accepted.

The choice of different age-groups depends primarily on certain factors including the type of investigation, the standards available for comparisons, and the need to pinpoint the age incidence of a given type of malnutrition. Where applicable, the interpretation of the results of this study have

been done on six month age-groups for all children within the study group. In so doing, we are also able to check against the influences of age on the indices, particularly the HA index which is vulnerable to the effects of age.

Information relative to food purchases and consumption derived from the sub-sample have been expressed primarily as percentages of items, cash, meals, or households as the case may be. This information is, however, at best qualitative and helps in giving an approximate general outline of food purchase and consumption patterns among the households.

The chi-square measure has been applied to test the statistical significance relationships predicted in the hypotheses. The gamma measure has also been introduced to determine the strength of association between certain variables. The distinctive marker in categorising the nourished/undernourished populations in these two measures is -2.0 in both HA and WH.

FOOTNOTE

1 At the time of study plans were at an advanced stage to carve a new district from Kakamega - to be christened Vihiga District. The new district is expected to comprise Vihiga, Emuhaya, Sabatia, and Tiriki divisions.

CHAPTER 4

HOUSEHOLD STRUCTURE, SOCIOECONOMIC STATUS AND THE STUDY GROUP

4.1 Household Structure and Socioeconomic Differentiation

The household is a society's most commonplace and basic socioeconomic unit. It contains a multitude of roles and tasks encompassed within a relatively limited repertoire of shapes and sizes. It is the primary arena for the expression of age and sex roles, kinship, socialization, and economic cooperation.

Not to be confused with a household is the family. For my purposes, a simple distinction between the two lies within the functional and economic role of the former as opposed to the "affective" relation underlying the latter. Thus, while households are task-oriented residence units, families are kinship groupings that need not to be localized. In this case non-relatives who live together, as well as servants and lodgers who cooperate in some common activities are household members, whereas a non-resident kinsperson may be affiliated principally with another household.

Netting et al. (1984) give five categories of activities most often performed by households: production, distribution, transmission, reproduction, and coresidence. In yet another presentation, Netting et al. (1984) pose apparently opposing characteristics between the household and the family with the former featuring productive, consumptive, and reproductive

activities directed towards satisfaction of needs, against the latter's emphasis on symbols, values and meanings.

Among the Marama people, the unit which is identified as the household is both the home ("hango") as well as the social unit or group associated with that home ("abe hango"). The term "hango" becomes more meaningful when it is represented by the physical structure ("inzu") which houses the "abe hango". Members of one household would reside in more than one house ("tsinzu"-plural) which may include the main house ("inzu ikhongo"), the sons' hut ("isimba"), or the daughters' hut ("eshikono"). A homestead ("litala") comprises an amalgamation of households each overseen by a specified head ("omwene hango"). A typical "litala" consists of a man, his wife/wives, sons and their spouses and children, and married daughters (and their children).

Linguistically, there is no kinship terminology which refers to the nuclear family as a distinct group. The closest to this is "omwikho" which is a reference term for any member of the kin group. The mother-children unit in a polygynous family is referred to by the term "inzu" (literally - "house"). So we may find a number of "houses" in a polygynous family with the "inzu-ikhongo" (literally - "big house") being that of the wife married first ("omukhasi omukhulundu" or "omukhasi omukhongo") and the "inzu inditi" (literally - "small house") being the house of the wife married last ("omukhasi omutiti"). As a rule,

these "houses" form the basic socioeconomic units in such type of families and subsequently are households in their own right as per our definition.

In a nutshell, the major household types among the people of South Marama are:

(a) The man-wife-children unit characterizing a simple monogamous household.

(b) The man-wife-children-other unit characterizing a "complex" monogamous household.

(c) The wife-children-(man) unit characterizing a simple polygynous household; and

(d) The wife-children-other-(man) unit characterizing a "complex" polygynous household.

Other types of households albeit peculiar for one reason or the other but found within the area are;

(a) The widow/widower-children unit.

(b) The widow/widower-children-other unit.

(c) The single mother/father-children-parents unit.

A total of 102 women representing their respective households were interviewed during the main survey. Of these 96 were mothers of children aged five years or below while the rest stayed and looked after children within this age-group. Of the latter, three are grandmothers of the children, two are fathers' sisters, and one is a step-mother.

The marital status of the respondents is tabulated in Table 4.1. Table 4.2 shows the frequency of the married and widowed respondents whose husbands are/were polygynously married.[1]

Table 4.1 Marital Status of the Respondents.

	Frequency	Cum.Freq.	Percent	Cum.percent.
Married	95	95	93.1	93.1
Widowed	5	100	4.9	98.0
Divorced	1	101	1.0	99.0
Single	1	102	1.0	100
TOTAL	102		100	

Table 4.2 Respondents in Polygynous Unions.

	Frequency	Percent	Valid %	Cum.%
Polygynous unions	17	16.7	17.0	17.0
Monogamous unions	83	81.4	83.0	100
Missing	2	1.9	-	-
TOTAL	102	100	100	

It is evident from Table 4.2 that polygyny, which is considered a mainstay in the Abaluyia marital instituition is under threat. According to Wagner's (1939) ethnography of the Abaluyia, through polygyny a man could accumulate and hold wealth acquired by the numerous helpers characterizing such a household. Modern life economics, however, calls for a small family to achieve better living standards without draining much of the household resources.

The difficulties in determining the precise age of persons in the developing nations is an acknowledged fact (Bennett, 1979; Jelliffe, 1966). This is associated with lack of formal

education and the nonregistration of such events with the relevant government departments.

A number of respondents lacked precision when they were asked their date of birth or their age. Much more so a considerable number of them confessed ignorance of their husband's age. Table 4.3 represents age variations of the respondents and their husbands as recalled by them.

Table 4.3 Age of the Respondents and that of Husbands.

	RESPONDENTS				HUSBANDS			
Age(years)	Freq.	Cum.	Perc.	Cum	Freq.	Cum.	Perc.	Cum.
10.0-19.11	2	2	2.0	2.0	1	1	1.2	1.2
20.0-29.11	51	53	50.0	52.0	19	20	22.6	23.8
30.0-39.11	27	80	26.5	78.5	29	49	34.5	58.3
40.0-49.11	17	97	16.7	95.2	19	68	22.6	80.9
50.0-59.11	3	100	2.9	98.1	11	79	13.1	94.0
60.0-69.11	2	102	0.0	100	4	83	4.8	98.8
70.0>	0	102	0.0	100	1	84	1.2	100
Missing	-	-	-	-	18	102		

Mean Years: Respondents=31.5 years.
Husbands =41.5 years.

The ten year mean age difference between the husband and the wife may, for instance, imply that if other factors remain constant and age and its associative factors are taken to be the causative variables of death, then it is expected that the number of widows will be more than that of widowers among the older members of this society. This is especially so since women have longer life expectancy at birth than men--even in developed areas.

The number of persons in a household and the corresponding availability of food resources are critical issues when determining the household's food security. A major thrust in the conception of a household as defined here is the idea of "eating from the one pot". A household is therefore not only a productive unit, but it is also a consumption unit. The average number of persons per household in the sample is 5.96. This number requires ample food resources to satisfy. Whether theseresources are available is a major issue in this research. Table 4.4 shows the number of persons in the households surveyed, and the mean household size.

Table 4.4 Number of Persons in the Households.

Number	Frequency	Cum.Freq.	Percent.	Cum.Perc.
1 or 2	5	5	4.9	4.9
3 or 4	25	30	24.5	29.4
5 or 6	30	60	29.4	58.8
7 or 8	29	89	28.4	87.2
9 or 10	12	101	11.8	99.0
11or more	1	102	1.0	100
TOTAL	102		100	

In many developing countries rural poverty and unequal distribution of available productive resources are causing heavy rural-urban migration by men, which in turn is creating a large number of female heads of households. In most of these communities female headship amounts to reversing the traditional roles ascribed to the men. Thus, when traditionally the man is

the de jure head of the household, his absence may lead to the wife becoming the de facto head but with limited decision-making powers.

Table 4.5 shows that over one quarter of the women in the sample are de facto heads of household, with their husbands out in search of economic gains.

Table 4.5 Household Heads, Sample, by Gender.

Household heads	Frequency	Cum.freq.	Percent	Cum.perc.
females*	27	27	26.5	26.5
females**	7	34	6.9	33.4
males	68	102	66.7	100
TOTAL	102		100	

*with husbands.**widows,singles,divorcees.

Migration is a sex-age selective process. In the sample, the average age of the female heads of the household is 28.9 years while that of male heads is 35.4 years. The average age of husbands of the female heads of households is 37.3 years - a difference of 8.4 years with that of their wives (28.9 years). However, in households where men are the heads, their wives have an average age of 31.6 years - a 3.8 difference with that of their husbands (35.4 years). Thus, young and active women are left behind to oversee the households while their husbands are away. But as heads of the households, the women are more active participants in chores rather than in making crucial decisions pertaining to the household.

4.1.1 Socio-Economic Differentiation among Households

Gradations of wealth and poverty are characteristics of every community, however homogeneous it may superficially seem. Both local and international indices may be applied when ranking the socioeconomic categories of a community.

In a study of a Zambian rural community, Long (1968) makes a differentiation of the society along socioeconomic lines. A "bawina" (to win) is a wealthy man who has obtained notable success - "has money, cattle, guns, or owns a store or tearoom". A "basambashi" enjoys a reasonably high standard of living - "dresses well, eats well, and possesses plenty of furniture and other items of property" (pp.164-5). Thus, whereas "bawina" singles out wealth as a distinguishing characteristic, "basambashi" tends to place emphasis on patterns of consumption and the types of consumer goods purchased. A "basambalila" (from "to learn") is an educated man. "Nshimishi" are the rest of the population who command little respect for their wealth, style of life, or educational achievements.

Berg-Schlosser (op.cit.) says that the Abaluyia discourage desire for material wealth and look upon the wealthy suspiciously. A sort of levelling mechanism is thus found among them as may be inferred by such sayings as "olia eshititi olafimba inda" (i.e, it is no use eating too much if it is going to cause you stomachache). The social differentiation among the Abaluyia may be less pronounced than in other parts of Kenya.

But as Berg-Schlosser concludes, it is more an "equality in misery" than a positive indicator of a more "balanced" development (p.104).

Castro et al. 1981) list 10 indices that may be applied in the assessment of rural inequality, viz, land, capital equipment, income, livestock, non-productive property, fuel, ceremonial expenditure, diet, nutrition, and health, and household size and composition.

Fleuret's study in Lushoto District of rural Tanzania shows how differential access to land, labour, and capital may result in inequalities among households (Fleuret 1980). Awiti (1973) makes a differentiation of economic groups among the Ismani of Iringa region (Tanzania) using land, capital equipment, agricultural methods, and labour. Casterline's categorisation of the Egyptian society was by use of paternal schooling and occupation, maternal schooling and the type and region of residence (Casterline et al., 1989).

The indices used to assess economic differentiations of the sample households in this study are material inventory, occupation, and education.

(a) Material Inventory:

Material possessions that are easily seen are an important indicator of past and present purchasing power (Hunt, 1975:20). Ideally, a household's income should be the best indicator of its economic performance as it represents the net income of the

household's productive capabilities and resources. It also determines the household's ability to pay for goods and services.

Indices of material possessions are used because, in practice, it is very difficult to get an accurate assessment of income. Material possessions are in this case applied as a proxy for income.

Housing is one of the most visible and important indicators of inter and intra-community wealth differences (Chambers, 1981:10). When a house is taken as an indicator, several factors may be put into account. The type and quality of the house, including the type of construction materials used, is a good proxy for income levels (Castro et.al.op.cit:411). Thus by looking at materials used for flooring, walls, and roofing, one is able to identify relative wealth differences.

It is not quite easy to distinguish between the wealthy and the poor on account of the traditional housing structures of the Abaluyia. The materials used are all of the same type which are locally available or at a low cost or no cost at all (Wagner op.cit.). The only distinguishing mark is that of wealthy man having a cattle enclosure ("Olukaka") to the side of the living hut, while the poor share their round huts with livestock (ibid:6). If a large family is taken to be a manifestation of wealth, as Wagner contends, we may then conclude that the more the number of huts ("tsinzu") in a homestead ("litala") the

wealthier the person ("omuinda").

Information collected on the sample group's dwelling place was that on the main house possessed and occupied by the head of the household and his/her spouse. The information gathered is relative to the quality of the house, evidently judged by the materials used for construction and to a lesser degree, the approximate size of the house judged by the number of rooms ("efikoro").

In general, three types of houses may be seen to belong to the households:

TYPE	ROOF	WALL	FLOOR
A	tile	block	cement
	iron	brick	
B	iron	mud	mud
		mud&cement	cement
C	grass	mud	mud

Table 4.6 below presents the type of dwelling houses occupied by the heads of the households and/or their members.

Table 4.6 Type of Dwelling Houses belonging to the Households.

TYPE	Frequency	Cum.Freq.	Percent	Cum.Freq.
A	5	5	4.9	4.9
B	25	30	24.5	29.4
C	72	102	70.6	100
TOTAL	102		100	

To rate differentiations in wealth relative to the houses, values consonant to the quality and size of houses are given. The table below shows the values.

Table 4.7 Socioeconomic Index Scale (House).

QUALITY	VALUE	SIZE	VALUE
Tile/iron roof	80 points	1to3 rooms	no value
Brick/blockwall	80 points	Each room after	
Cement floor	60 points	3rd in type A	20 points
Grass/tinroof	no value	Each room after	
Mud wall	no value	3rd in type B	10 points
Mud wall	no value		

The second lot of material inventory measured are the household durables. The use of such assets as an index of wealth is justified by several studies.

In Tepoztlan, Mexico, wealthier families generally own enough plates, pots, glasses, spoons, chairs and so on to be able to serve fiesta meals to a large number of people without having to borrow (Lewis, 1951:183). Wrist-watches, bicycles, sewing machines, radios, refrigerators, gas stoves, television sets, motor vehicles and other industrially manufactured goods are concentrated among those households with the greatest purchasing power (Colson and Scudder, 1975; De Walt, 1979;; Firth, 1959; Hunt op.cit.; Knight and Gregory, 1974). Long (op.cit.) and Fleuret (op.cit.) used these indices in their respective studies.

Body-covers also do indicate the differentials in wealth possessions. A narrative by Wagner on the Abaluyia comparing the "rich" husband and the poor "wife" suffices here:

> .....the chestful of suits, shirts, and neckties of the average teacher, clerk or trader stands in a distinct contrast to the few cheap "amerikani" dresses which make up his wife's wardrobe... (Wagner op.cit:43).

Twenty household durables were used to measure the wealth differentiations of the sample households. The items are classified into three sub-groups depending on the value put on them:

Table 4.8 Socioeconomic Index Scale (Household Durables).

Sub-group 1.Small Possessions:

ITEM	VALUE	ITEM	VALUE
Bed	2 points	Charcoal burner	5 points
Torch	2 points	Hurricanelamp	5 points
		Cupboard	5 points

Sub-group 2.Average Possessions:

ITEM	VALUE	ITEM	VALUE
Radio	20 points	Cassette Player	25 points
Pressurelamp	20 points	Record Player	25 points
Pressure stove	20 points	Bicycle	30 points
		Sofa sets	40 points

Sub-group 3.Large possessions:

ITEM	VALUE	ITEM	VALUE
Sewing Machine	50 points	Television	60 points
Gas cooker	50 points	Motor cycle	70 points
Water tank	60 points	Posho mill	70 points
Water tap	60 points	Motor car	80 points

None of the households in the sample possessed any of the following items from the list above: gas cooker, motor cycle, motor car, and posho mill. Items possessed by a majority of the households are bed (83 households) and torch (73 households). Most households (70) made more use of tin lamps ("nyangile" or

"koroboi") than hurricane lamps (47). Other items possessed considerably include radios (59), charcoal burners (57) and cupboards (36).

(b) Occupation:

The second index used is occupation. Occupation is not only the rank system that is most representative of social status (Blalock and Blalock 1968) but it may assist an investigator in determining a person's income. For instance, if one is a primary school teacher in a particular grade, one's income may be readily determined through relevant offices or the media.

Each society has a rank system of the various occupations found within it. This is true at both the horizontal (i.e., through human history) and vertical (i.e.,among the contemporary societies) levels. A hunter, on the one hand, and a gatherer on the other hand, may be of different social standings in a particular society. Similarly, the contemporary complex societies with their multiplicity of roles has each (of the roles) assigned a status.

Rank systems may however differ from one community to another. A teacher may be held with high esteem in one society, but the reverse may be the case in another society. Additionally, an occupation assigned a high social status may not be in congruence with income matching the level.

Here, occupation is recorded for the women respondents and that of their husbands. It is classified into six categories: professionals (including teachers, medical practitioners, accountants, etc.); skilled workers (carpenters, drivers, tailors, mechanics, etc.); unskilled workers (casual labourers, guards, etc.); petty traders (market women, etc.); big traders (store owners, hotel business, transporters, etc.); and farmers. Table 4.9 indicates the number of men and women in each category.

Table 4.9 Occupation of Respondents and their Husbands.

	Respondents				Husbands			
Occupation	Freq.	Cum.	Perc.	Cum%	Freq.	Cum.	Perc.	Valid%
Professionals	1	1	1.0	1.0	7	7	6.9	7.4
Skilledworkers	0	1	0.0	1.0	18	25	17.6	18.9
Big traders	0	1	0.0	1.0	4	29	3.9	4.2
Petty traders	2	3	1.9	2.9	2	31	2.0	2.1
Unskilled	0	3	0.0	2.9	12	43	11.8	12.6
Farmers	99	102	97.1	100	52	95	51.0	54.7
Missing	-	-	-	-	7	102	6.9	-
TOTAL	102		100		102		100	100

On the whole, a majority of the respondents and their husbands (for those with them) are not engaged in occupations generating regular and dependable incomes. A considerable proportion of them are solely dependent on land as their major resource thus underscoring their insecure position in relying on this "economy of risks". A comparison of men and women in Table 4.9 reveals a more wanting situation for the latter in terms of profitable resource accessibility. All but less than 3% of them are tied to farming where conventionally, men remain the

principal decision-makers in crop production and distribution, while women are active participants in the production, preparation and distribution of crops.

For the purposes of determining the socioeconomic status of the households, the different occupations listed are each assigned a value. For every household, a value is given to the occupation of the respondent and her spouse. A totality of these values contributes to ascertaining the eventual socioeconomic status of the households.

Below are the distribution of the values:

Table 4.10 Socioeconomic Index Scale (Occupation)

OCCUPATION	VALUE
Professionals	80 points
Skilled Workers	60 points
Big Traders	70 points
Petty Traders	40 points
Unskilled Workers	40 points
Farmers	20 points

(c)Education:

Of the variables applied in the assessment of socioeconomic status, education is the most relatively easy to obtain, and with a high degree of precision too. Bennett identifies education as the most useful indicator of socioeconomic status (Bennett, 1979:41). Education not only promotes inequalities but it also creates egalitarianism (Prewitt, 1974). Educational attainment constitutes the most formidable advantage in the hierarchies of class, status, and power, and lack of education puts one at a crippling disadvantage.

Wealth and education are associated because the better educated have the skills and obtain the positions which are disproportionately rewarded in society. Deference and education are associated because the better educated have the disproportionate access to the cultural system which stands at the centre of society and is held in high esteem. It therefore requires little effort in stating that education produces many changes as reflected in knowledge, attitudes and practices.

Castro et al. (op.cit.) emphasize the need to record the educational levels of each member of the household when examining inequalities among a group. A study by Hunt among the Mbeere of Kenya shows that households that have none or only a small proportion of their children in school were substantially poorer in terms of their possession of items on the selective inventory (Hunt, op.cit.). The results of this study imply that the educational level of the head of the household and that of his/her spouse are not sufficient correlates of wealth, but whether or not (and why not) the children participate in schooling is pertinent. Casterline et al. (op.cit) were able to draw significant results by measuring maternal and paternal schooling without regard to the educational status of children.

Educational measurements for my sample are applied in the same way as Casterline et.al, i.e., paternal and maternal schooling only. It is my contention that the need to assess the educational levels of all household members becomes paramount if

education is used as the only wealth index, or with other weak indicators.

There are six categories of educational levels used here; those with no access to formal schooling, those who have received up to lower primary education (i.e., up to standard four), those who have received upper primary education (i.e, between standard five and eight), those who have received secondary school education (i.e., forms one to four), those who have received high school education (i.e, forms five and six), and those who have received higher education (i.e., colleges offering degree and diploma certificates). Table 4.11 shows the educational levels of the respondents and those of their husbands.

Table 4.11 Level of Education of Respondents and Husbands.

	RESPONDENTS				HUSBANDS			
Level of Educ.	Freq.	Cum.	Perc.	Cum%	Freq.	Cum.	Perc.	Valid%
No education	29	29	28.4	28.4	8	8	7.8	8.4
Lower Primary	23	52	22.5	50.9	15	23	14.7	15.8
Upper Primary	42	94	41.2	92.1	59	82	57.8	62.1
Secondary 1to4	8	102	7.8	100	11	93	10.8	11.6
Secondary 5to6	0	102	0.0	100	1	94	1.0	1.1
Higher educat.	0	102	0.0	100	1	95	1.0	1.1
Missing	-	-	-	-	7	102	6.7	-

The socioeconomic index scale used for education is tabulated below.

4.12 Socioeconomic Index Scale (Education)

EDUCATIONAL LEVEL	VALUE
No Education	No value
Lower Primary	20 points
Upper Primary	40 points
Secondary 1to4	60 points
Secondary 5to6	80 points
Higher Education	100points

To determine the socioeconomic status of the households surveyed, a combination of indices used here (i.e, material inventory, occupation, and education) is applied. Each household is taken individually and scores according to the values of the variables given (see Appendix 1).

Figure 4.1 shows that the distribution of points scored by the households are positively skewed. The standard deviation of the scores is 110.6, showing a considerable degree of heterogeneity in the socioeconomic differentiations of the households. The degree of skewing is as follows:

$$SK = \frac{\text{mean - mode}}{SD} = \frac{193 - 102}{110.6} = \frac{91}{110.6} = 0.82$$

To get the cut-off points for the socioeconomic categories, the following formula is used:

$$\text{Cut-off} = \frac{\text{maximum points scored - minimum points scored}}{\text{number of socioeconomic categories.}}$$

$$= \frac{644 - 44}{3} = \frac{600}{3} = 200$$

Table 4.13 Scoring Chart on the Socioeconomic Categories.

Scores	Frequency	Mean	Range	Median	SD
44 - 244	80	146.8	193	148	50.7
245- 445	18	316.5	160	305.5	31.9
446- 645	4	559.8	135	543	31.3
44 - 644	102	193.0	600	170.5	110.6

Table 4.14 Socioeconomic Status of the Households.

Status	Frequency	Cum.Freq.	Percent.	Cum.Percent
Low	80	80	78.4	78.4
Medium	18	98	17.6	96.0
High	4	102	3.9	100

When the household scores are seen relative to agricultural strategies, households undertaking subsistence agriculture have a higher mean and median than those practising sugar cane production. The mean for the subsistence households is 210.5 points while that of sugar cane producers is 174.0 points. The median, which is a much more accurate representation of central tendency in a skewed distribution, is 187.0 for subsistence households and 155.5 for sugar cane producing households. When material inventory (a direct consequence of purchasing power) is assessed exclusively, sugar cane growers still trail subsistence farmers. The mean and median scores for sugar cane growers is 79.7 and 50.5 respectively while that scored by subsistence farmers is 93.9 and 67.0 points respectively. Thus cane farming does not necessarily enhance a household's economic performance.

Households in polygynous marital institutions score relatively impressive points. The mean, median and standard

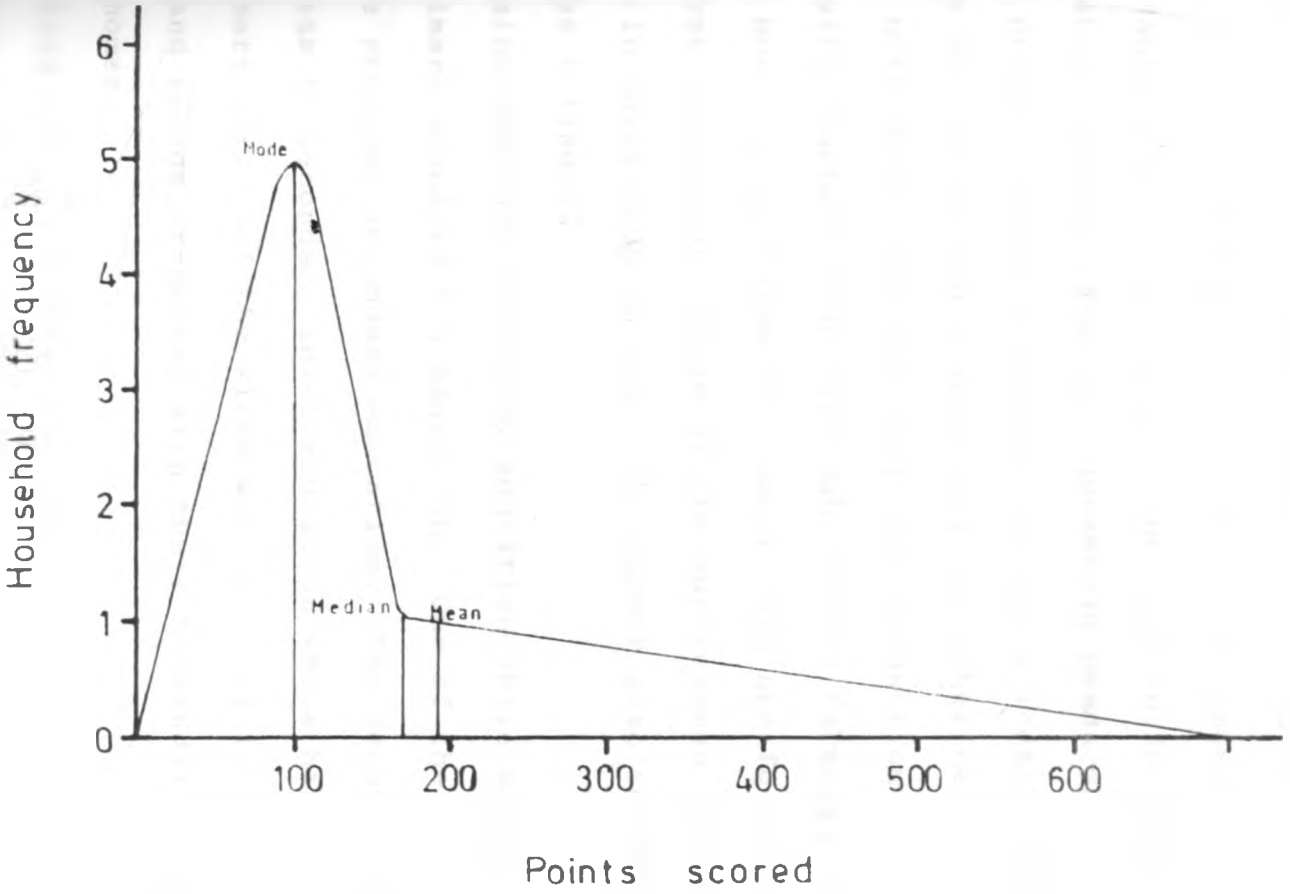


Fig 4.1

Mode, Median and Mean points on the socioeconomic index scores.

deviation scores for these households are 275.3, 230.0 and 35.5 in that order. This practice is rooted in the traditional milieu, in which case a Luhyia man would acquire an additional wife with an increase in status, including economic status.

Of the four households in the high socioeconomic category, two are in Manyala sub-location with one each in Shibembe and Shiatsala sub-locations. Two have household heads who are employed as primary school teachers, one has a local businessman (running two butcheries and a shop) and the other has a farmer undertaking both sugar cane and food crop production. The two households with teachers undertake subsistence farming, while that with a businessman farms both sugar cane and food crops. Three of these households; those of the businessman, farmer and teacher are in polygynous unions. The farmer also serves as a village elder ("likuru").

The businessman has secondary education while his wife received primary standard two education. One of the teachers and his wife received secondary education. The second teacher too had access to secondary level education while his wife reached primary six. All the wives are occupied in farming activities and reside, together with their husbands, in their respective homes.

Apart from the businessman who lives in a house with an iron-roof, mud walls and floor, the rest live in houses of iron-roof, brick or block walls, and cemented floor. The two

teachers' houses have seven and three rooms respectively, while that of the farmer has two rooms. The businessman's house has four rooms.

All the four households have the following durables; torch, bed, radio, charcoal burner, and bicycle. In addition the businessman has the following; pressure lamp, record player, cassette player, television set, and a water tap. The farmer has the following additional items; hurricane lamp, pressure lamp, cassette player, pressure stove, water tap, cupboard and sofa seats. One of the teachers (the polygynously married with a seven roomed house) has the following to add; one set of sofa seats and a cupboard. The second teacher has these additions; pressure lamp, hurricane lamp, record player, water tank, cupboard and a set of sofa seats.

The farmer oversees five members in his household. Two members of his family work in Nairobi as accounts clerks. The polygynously married teacher is in charge of seven members of his household. None of the members, save the head, is in any form of employment. The second teacher too has none of the household members apart from himself employed. He has eight members within his household. The businessman with ten household members, like the others, has none of the household members employed. The farmer, teacher in polygynous union, monogamous teacher, and businessman are aged 68, 46, 37, and 38 in that order.

On the other hand, the households which score nearest to the median in the medium socioeconomic category (307points) and the low socioeconomic category (149points) are headed by a businessman and a farmer respectively. Both are in Shiatsala sub-location.

The businessman owns a small store, is forty years old, has two wives, and is in charge of five members. He has access to primary standard seven education while his wife never attended school. Apart from the business, the household also cultivates sugar cane, maize, beans and sweet potatoes in their 0.8 ha farm. The main house in the home has an iron-roof with mud walls and floor. It is divided into four rooms. Among the household durables are a hurricane lamp, pressure lamp, bed, radio, record player, charcoal burner, pressure stove and cupboard.

The farmer too is forty years of age; both he and his thirty year old wife attained upper primary level of education. His late father, one of the first chiefs of the then Marama location, allocated him a 0.8 ha piece of land on which he cultivates maize, beans, cassava, sweet potatoes, and sugar cane for chewing. His grass-thatched, mud wall and floor house is divided into three rooms. All the household members (eight in total) stay in the house. The only valuable durables in the house are a bed, radio, and a charcoal burner.

The household with the lowest score (4 points) is in Wanyala sub-location and headed by a farmer who, together with his wife, never attended formal schooling. He has a 2.4 ha piece of land on which he plants sugar cane for commercial purposes (1.4 ha), maize (0.4 ha) and cassava. His grass-thatched, mud-walled and floored house is divided into two rooms. His household is composed of eight members. The valuables in the household are a torch and a bed. The man and his wife are aged fifty one and forty two years respectively.

4.2 The Study Group: Age, Gender and Birth Information

This study is focused on children aged between birth and five years, normally referred to as preschool age children. Seventy-eight children underwent the anthropometric assessment. Of these, sixty are from the sample households while the remaining eighteen are from nonsample households. At this stage, I attempt to analyse certain general observations related to all the seventy-eight children.

There are 39 males and 39 females among the seventy-eight. The mean age for the male children is 24.1 months, while that of the female children is 30.7 months. For the sample, the mean age is 27.2 months. Table 4.15 shows the distribution of the children along gender and six month age groups.

Table 4.15 Distribution of all Male and Female Children.

Age(month)	FEMALES Freq.	Perc.	MALES Freq.	Perc.	BOTH Freq.	Prec.
Birth-6.0	3	7.7	5	12.8	8	10.3
6.1-12.0	3	7.7	8	20.5	11	14.1
12.1-18.0	4	10.3	5	12.8	9	11.5
18.1-24.0	5	12.8	2	5.1	7	9.0
24.1-30.0	4	10.3	5	12.8	9	11.5
30.1-36 0	8	20.5	4	10.3	12	15.4
36.1-42.0	2	5.1	5	12.8	7	9.0
42.1-48.0	5	12.8	3	7.7	8	10.3
48.1-54.0	2	5.1	1	2.6	3	3.8
54.1-60.0	3	7.7	1	2.6	4	5.1

A considerable number of children (56%) were delivered at home as opposed to those who were delivered at medical centres (28.2%). This may be attributed to the existence of local birth attendants in the area whose services were widely utilised (Table 4.17). The local birth attendants constitute an institutionalised and recognised unit of modern health services.

Although the percentage of home deliveries is by far higher than that done in medical centres, antenatal and paediatric attention in clinics is very much sought by the mothers. For example, 98.7% of the children's mothers attended antenatal clinics while 96.2% of the children are immunized.

Table 4.16 Birth Assistants on the Children's Delivery.

	Frequency.	Percentage
Aunt	1	1.3
Co-wife	2	2.6
Husband	2	2.6
Mother-in-law	3	3.8
Nurse/Midwife	21	26.9
Mother	1	1.3
TBA	42	53.8
None	6	7.7

4.2.1 The Study Group: Health and Nutritional Status

Short term nutritional indicators are vulnerable to the effects of the subjects' morbidity condition. The children's health in the past two weeks prior to the day anthropometric data were collected was therefore determined. 68 children were ill within this stipulated period, while 10 were in good health condition. Table 4.17 shows the frequency of children suffering from various ailments in the two weeks.

Table 4.17 Frequency of Children Illness as Reported By the Mothers.

Type of Illness	Frequency	Percentage
Asthma	2	2.9
Cough	4	5.9
Diarrhoea	7	10.3
Diarrhoea/vomiting	1	1.5
Epilepsy	1	1.5
Eye Problems	1	1.5
Fever	16	23.5
Fever/Vomiting	2	2.9
Fever/Cough	1	1.5
Flu	1	1.5
Headache	1	1.5
Malaria	23	33.8
Malaria/vomiting	1	1.5
Skin Rashes	4	5.9
Stomach Problems	2	2.9
Tuberculosis	1	1.5
TOTAL	68	100

A considerable number of the sick children were treated on tablets bought from the local stores. Other treatment options utilised include injections by local "quack" doctors, traditional therapy, private clinic, government health units, and no treatment. Table 4.18 shows the different options followed in the treatment of the ailments. The mean cost of therapy is Shs.8.62 per episode with a Standard Deviation of Shs.11.88.

Table 4.18 Treatment Options followed in Children's Illness

Treatment Option	Frequency	Percentage
Shop Medicines	46	67.6
"Quack" Injections	5	7.4
Traditional Therapy	2	2.9
Private Clinic	10	14.7
Government H/Centres	2	2.9
None	3	4.4

The nutritional condition of the 78 children taken together shows that their long-term nutritional standards determined by the HA index is mild to moderate malnutrition (mean Z-score of-1.5), while their short-term nutritional standards determined by the WH index is average (mean Z-score of -0.2). Gender has apparently no varying effects on both HA and WH indices. The mean HA score for the male children is -1.5 while that of the female children is -1.4. The mean WH Z-score for the male children is -0.1 and for the female children is -0.2.

When all children who were ill are taken together, their nutritional standard is not significantly distinct from those who were not ill. The mean HA Z-score for the ill is -1.5 while that of the non-ill is -1.3. The WH and MUAC which respond to illness also show no significant varying conditions. The WH mean Z-score for the ill is -0.2, while that of the non-ill is -0.1. The mean MUAC of the ill is 14.9 while that of the non-ill is 15.0.

4.2.2 Socioeconomic Status vis-a-vis Nutritional Status

Of the 60 children in the sample households, 16 come from households in the medium socioeconomic category while 44 come from households in the low socioeconomic category. None of the children are from households in the high socioeconomic category.

On the average, children from both the medium and the low socioeconomic categories are mildly malnourished on the HA index

(mean Z-score=-1.6 in each case), and averagely nourished on the WH index (mean Z-scores=-0.3 for the former and -0.2 for the latter). Hence there is no significant variation in the nutritional standards of the two groups. Using the HA nutritional classifications for instance, it may be verified that there are no distinctive relationship between the two socioeconomic categories and the children's HA:

Table 4.19 HA Nutritional Levels of Children Relative to Medium and Low Socioeconomic Categories.

	MEDIUM		LOW	
Nutritional level	Freq.	Perc.	Freq.	Perc.
-2.0 or below	7	43.8	20	45.5
-1.9 to -1.0	5	31.3	12	27.3
-0.9 to +1.0	4	25.0	11	25.0
+1.1 to +2.0	0	0.0	0	0.0
+2.1 or above	0	0.0	1	2.3
TOTAL	16	100	44	100

The Gamma measure of association shows no distinctive relationship between the two categories with the HA index:

$$Y=\frac{\text{(No.of concordant pairs)-(No.of disconcordant pairs)}}{\text{(No.of concordant pairs)+(No.of disconcordant pairs)}}$$

$$Y=\frac{7(24)-20(9)}{7(24)+20(9)}=\frac{168-180}{168+180}=\frac{-12}{348}=0.0$$

Summary:

Among the emerging issues in this chapter is the relatively large household size (average of 5.96 members per household). For such a number to be well fed there should be a correspondingly large foodbase. Does such a formidable base exist within the households?

It is also notable that men have a wider access to occupational fields than do the women. As a whole however, a substantial percentage of both men and women are not occupied in areas with reliable and considerable cash rewards. In such circumstances the household may depend on land as a primary resource in providing basic means of livelihood.

An apparent profound socioeconomic differentiation characterises the households. A majority of them are for instance classified to be of below average socioeconomic status, while only a few rank high on the socioeconomic index scale. However, contrary to conventional thinking, households undertaking subsistence agricultural production outdo those participating in commercial agriculture along the socioeconomic rank system. Polygynous households too rank well along the scale, thus making polygyny a variable worthy of consideration in socioeconomic gradations among the Marama people. And finally, the relationship between socioeconomic categories (at least for the medium and low categories) and nutritional status is seen to be invariable.

FOOTNOTE

1 In the case of polygynous households, the wives referred to are those within the sample group.

CHAPTER 5

AGRICULTURAL STRATEGIES, FOOD DELOCALIZATION, LABOUR AND DIET

5.1 Agricultural Strategies

Land is quite evidently a dependable resource among the residents of South Marama. Not only is it a place on which household shelter is erected but its role as a source of food is vital. It is no wonder then that the local administrative office has to deal more with land arbitration cases than any other complaints brought before it.[1]

The household landholding consists of those plots to which the head of the household can claim right of ownership or usufructory rights, through legal sanctions or traditional conventions. A person claiming right of ownership enjoys proprietary rights over land duly registered in his/her name. Usufructory rights may be enjoyed for instance, through allocation of family land or in case of leasing or hiring of land. A person claiming such use rights is considered here as an owner of the said land.

Table 5.1 shows the method of acquisition of family land.

Table 5.1 Method of Acquisition of Family Land.

	Frequency.	Percentage.
Allocated to husband by father	95	93.1
Bought by the husband	2	1.9
Leased by the husband	1	1.0
Allocated to wife by her lineage	2	1.9
Allocated to husband by lineage	1	1.0
Given to husband by someone	1	1.0

The results above emphasize the strong traditional land tenure system still practised by the Abaluyia of Marama location. The Abaluyia are a patrilineal group. Traditionally, land could only be inherited by male descendants, the eldest son getting the ancestral land ("omukunda kwa kuka") and the other sons inheriting equal parts from their father (Berg-Schlosser, 1984; Wagner, 1939). If a man died before his sons were grown, one of his brothers acted as a trustee until the sons came of age. If a man had no direct male descendants, his property was inherited by his brothers or their sons.

In spite of the seemingly strict observance of the traditional land tenure system, there is now a growing tendency to relax this custom. In Berg-Schlosser's sample of 100 people, one quarter of them stated that their property would be inherited by all "children" regardless of gender (p.104). In my sample, two women claimed to have usufructory rights on plots allocated to them; one of them is a single mother while the other is a divorcee.

The laws of inheritance are responsible, together with the overall size in population, for the extremely small size of individual plots. Table 5.2 shows the distribution of hectareage of land in relation to the households based on information given by respondents. Three quarters of the households in the sample had less than four acres of land. The average acreage possessed by each household is 1.1 ha.

Table 5.2 Size of Land belonging to the Households.

Size of Land(ha)	Freq.	Cum.Freq.	%	Cum.%
Less than 0.4	13	13	12.7	12.7
0.4 & less 0.8	20	33	19.6	32.3
0.8 & less 1.2	27	60	26.5	58.8
1.2 & less 1.6	14	74	13.7	72.5
1.6 & less 2.0	9	83	8.8	81.3
2.0 & less 2.4	7	90	6.9	88.2
2.4 & less 2.8	10	100	9.8	98.0
2.8 or more	2	102	2.0	100
TOTAL	102		100	

Each of the households surveyed possessed at least one agricultural plot. At the time of the survey (January to March), most of the plots were being prepared in readiness for the first food planting season, which coincides with the long rains.

5.1.1 Commercial versus Subsistence Agriculture

A number of households, particularly in Shibembe and Shiatsala sub-locations, are involved in production of both sugar cane and food crops. In the more peripheral Manyala

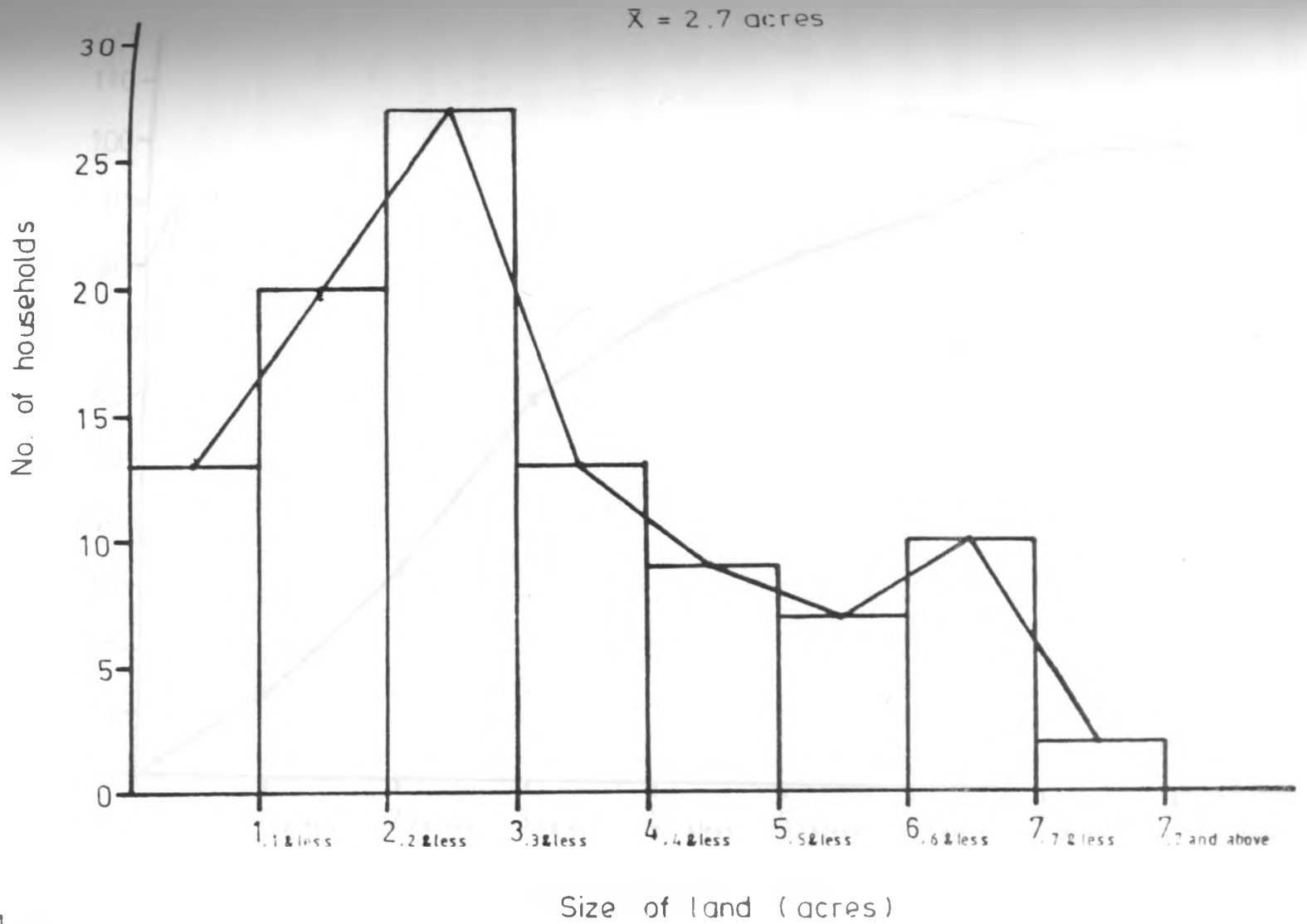


Fig. 5.1 Size of land belonging to the household.

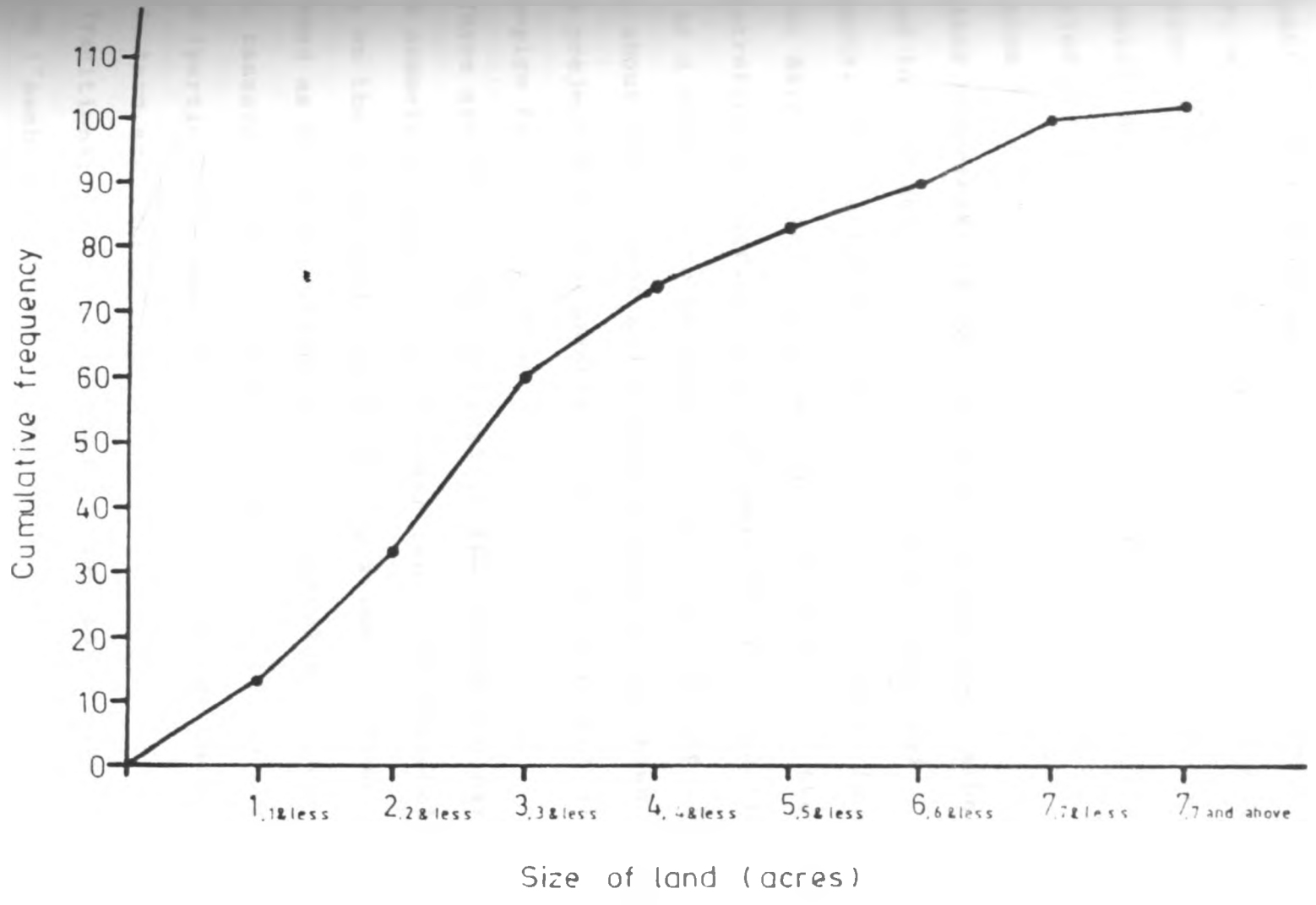


Fig. 5.2 Cumulative frequency of size of land belonging to households.

sub-location subsistence agriculture is the main pursuit. However, a number of farmers in the location have taken up the production of coffee on an experimental basis. According to the local chief, about 100 farmers within the sub-location have been identified for the purpose of experimenting on coffee production.[2]

Other commercial crops cultivated in the area, albeit produced in very small quantities, are sun-flower and groundnuts. The latter are habitually cultivated as food rather than for sale. There is also a joint arrangement by the local administration and agricultural officers to introduce french beans as a cash crop to be grown in the area. At the time of study, about 200 farmers and 3 women's groups had shown interest in the project and subsequently, registered as potential guinea-pigs for the project.[3]

There are 49 households (48%) in the sample who participate in the commercial production of sugar cane. 53 households (52%), on the other hand, are food crop growers. Food crops mentioned as being cultivated by the households include maize, beans, cassava, sorghum, bananas, vegetables (of all sorts), fruits (particularly pawpaws), sweet potatoes, groundnuts, peas, millet, taro and tannias.

Traditionally, the main crops of the people have been sorghum ("amabele"), beans ("amakanda"), sweet potatoes ("amapuoni"), and bananas ("amaramwa"). Today, maize

("amatuma") has become the staple foodcrop. From maize flour, people prepare some type of "ugali" ("obusuma") that is widely consumed by the Abaluyia, and just about everyone else in the country. Subsequently, maize is not only cultivated by virtually all households, but it is also allocated a bigger hectareage than the rest of the food crops. Beans are commonly interplanted with maize. Table 5.3 shows the number of households from commercial and subsistence agricultural households that cultivate food crops.

Table 5.3 Frequency of Households Cultivating Food Crops.

	SUBSISTENCE		COMMERCIAL	
Food Crop	Frequency	Percent	Frequency	Percent
Maize	51	96.2	47	95.9
Beans	43	81.1	44	89.8
Sweet potatoes	34	64.2	34	69.4
Cassava	34	64.2	32	65.3
Bananas	20	37.7	12	24.5
Vegetables	8	15.1	15	30.6
Sorghum	4	7.5	2	4.1
Millet	3	6.0	2	4.1
Arrow roots	1	1.9	1	2.0
Fruits	0	0.0	1	2.0

As a policy, the Mumias Sugar Company (the principal recipient of the farmers' cane) emphasizes to its clientele on the need to allocate a "reasonable" area of land for food production.[4] Locally, commercial farmers are regarded as people with large tracts of land which can sustain both sugar cane and food crops production. Table 5.4 verifies that commercial farmers have actually more land in their possession than do

subsistence farmers. But this represents the total land controlled.

Table 5.4 Size of Land Belonging to Commercial and Food Farmers.

Area(ha)	FOOD Freq.	FOOD Perc.	COMMERCIAL Freq.	COMMERCIAL Perc.
Less 0.4	11	20.8	2	4.1
0.4 & less 0.8	13	24.5	7	14.3
0.8 & less 1.2	15	28.3	12	24.5
1.2 & less 1.6	4	7.5	10	20.4
1.6 & less 2.0	5	9.4	4	8.2
2.0 & less 2.4	2	3.8	5	10.2
2.4 & less 2.8	3	5.7	7	14.3
2.8 or above	0	0.0	2	4.1

When visiting households undertaking commercial agriculture, it was evident that the area of land apportioned to sugar cane production was larger than that allocated to food crops. The cash incentive in sugar cane production explains its favoured position. The average of land set aside for the staple food, maize, by the commercial farmers is one half that allocated to sugar cane. The average hectareage of maize land among the subsistence farmers on the other hand is slightly higher than that among commercial farmers. Tables 5.5 and 5.6 show the area of land covered by sugar cane and maize among commercial and subsistence farmers.

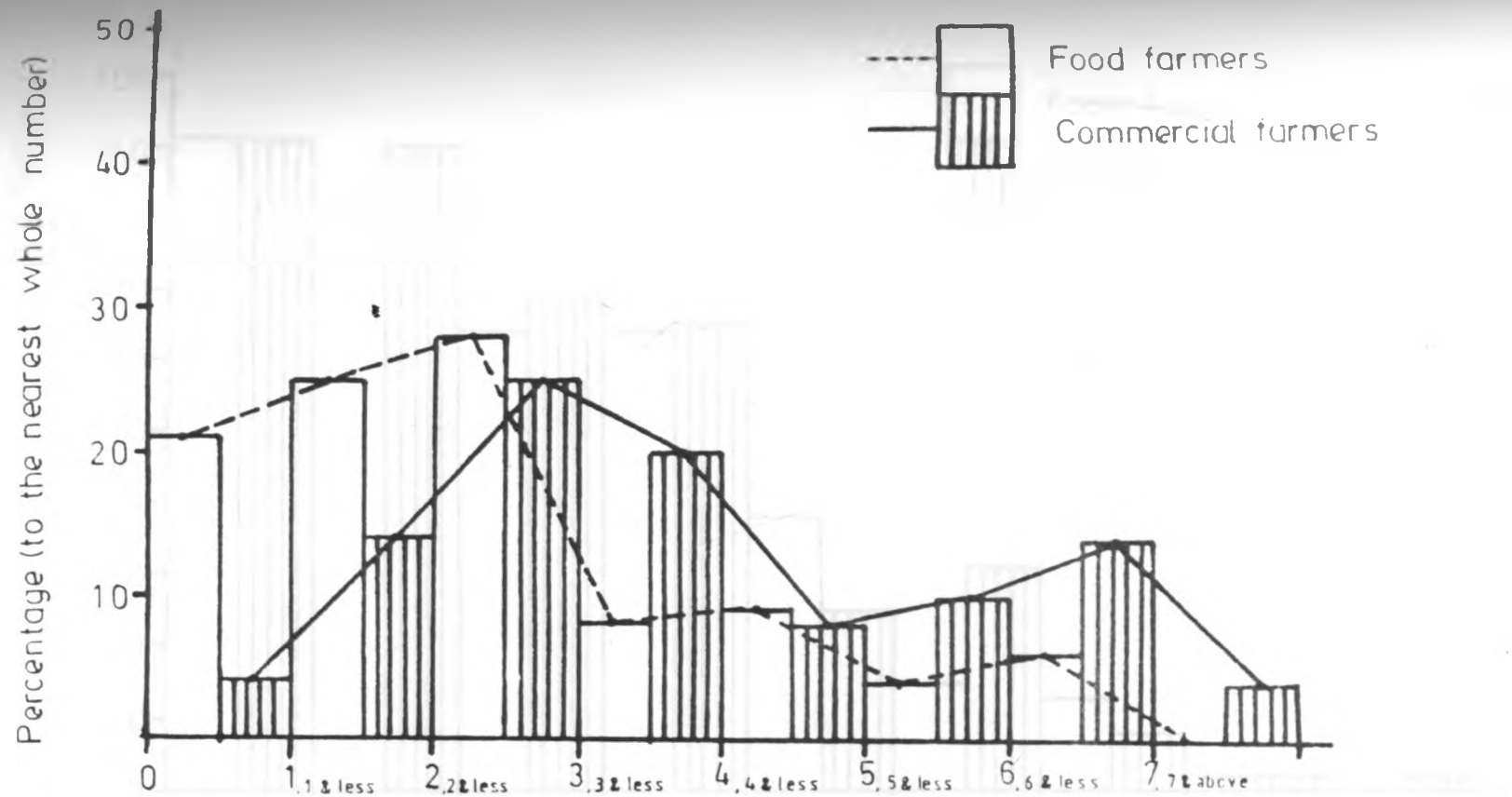


Fig. 5.3 Size of land belonging to commercial and food farmers (by percentage)

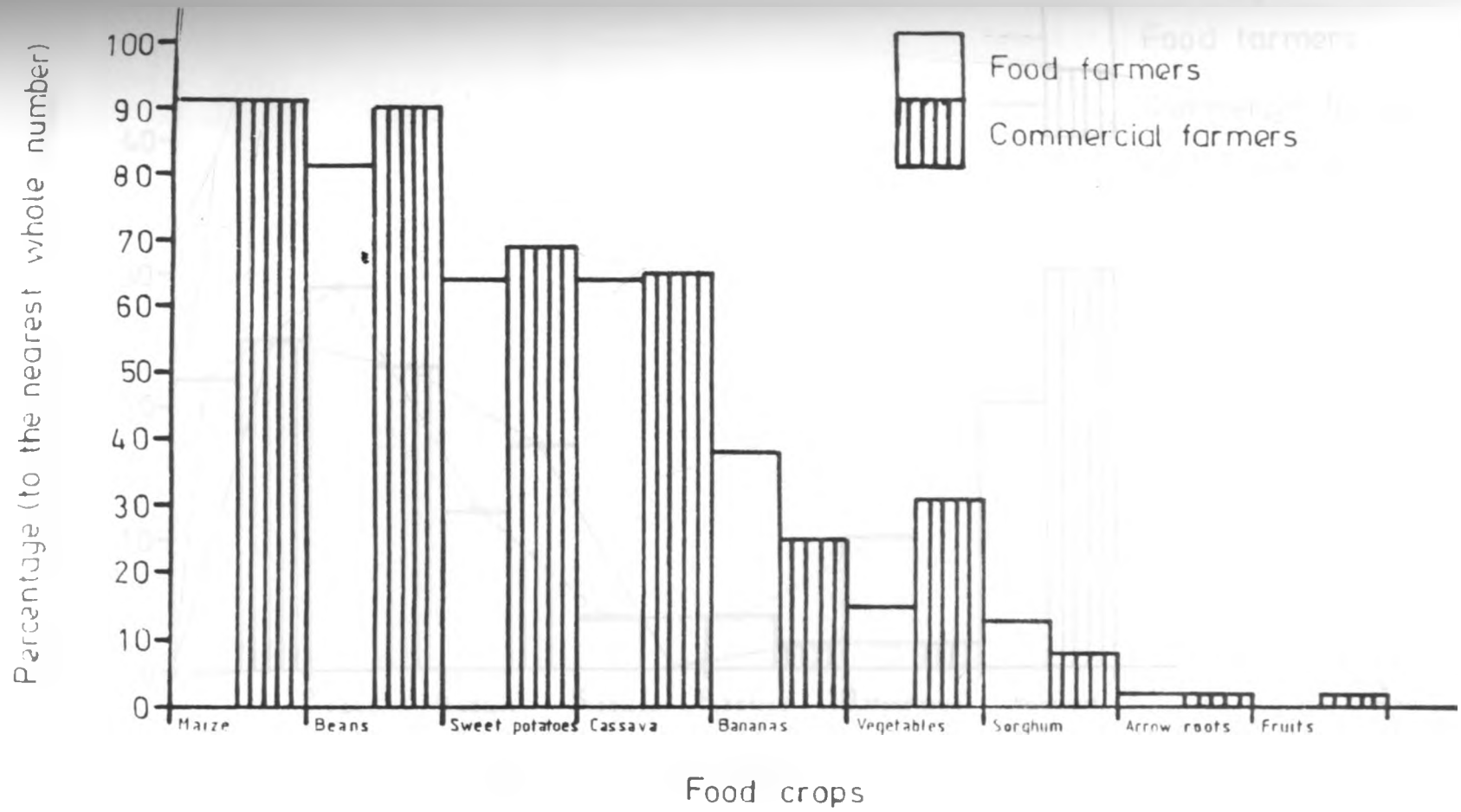


Fig. 5.4 Percentage of commercial and food farmers producing food crops.

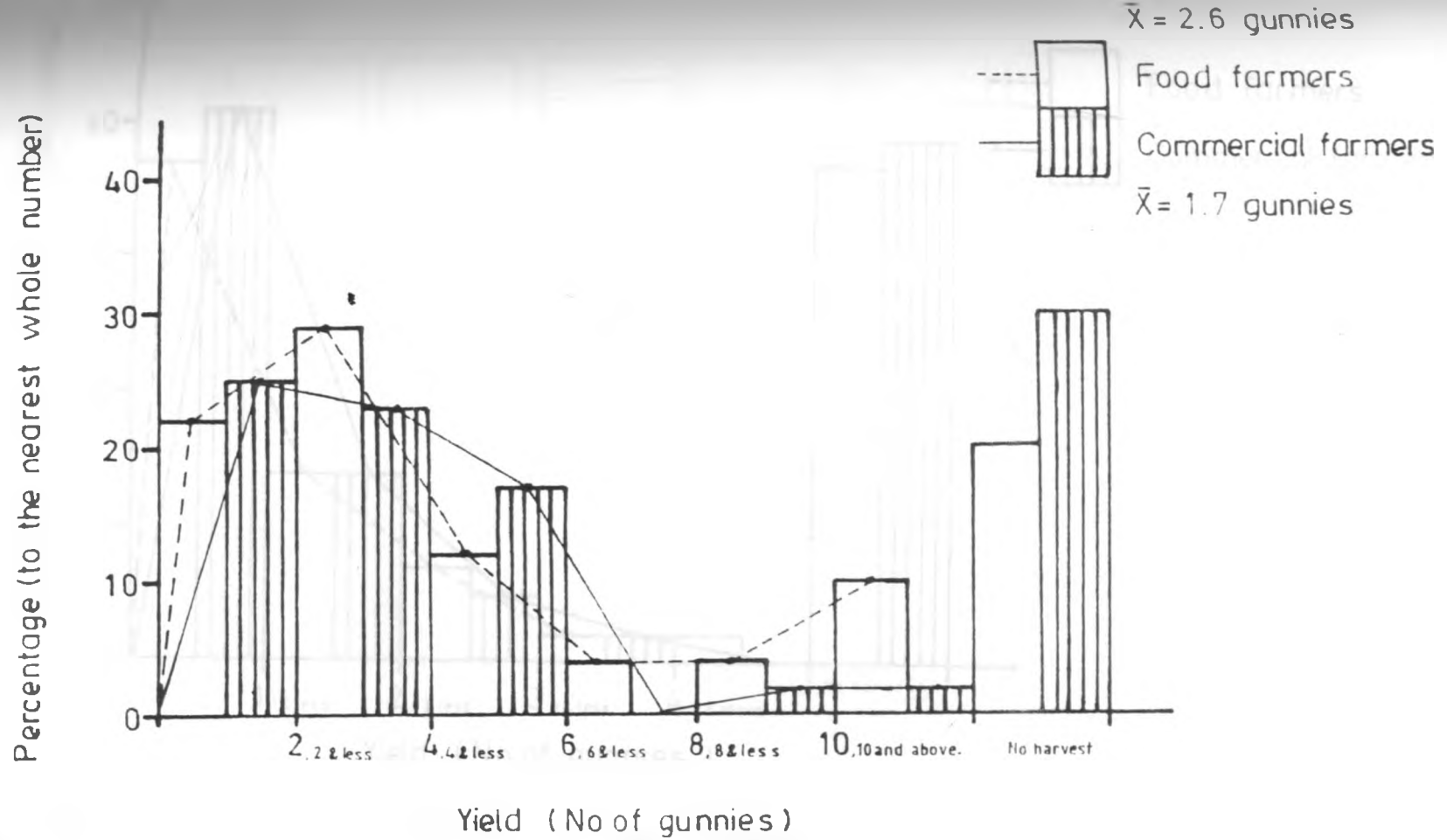


Fig. 5.5. Maize yield among commercial and food farmers.

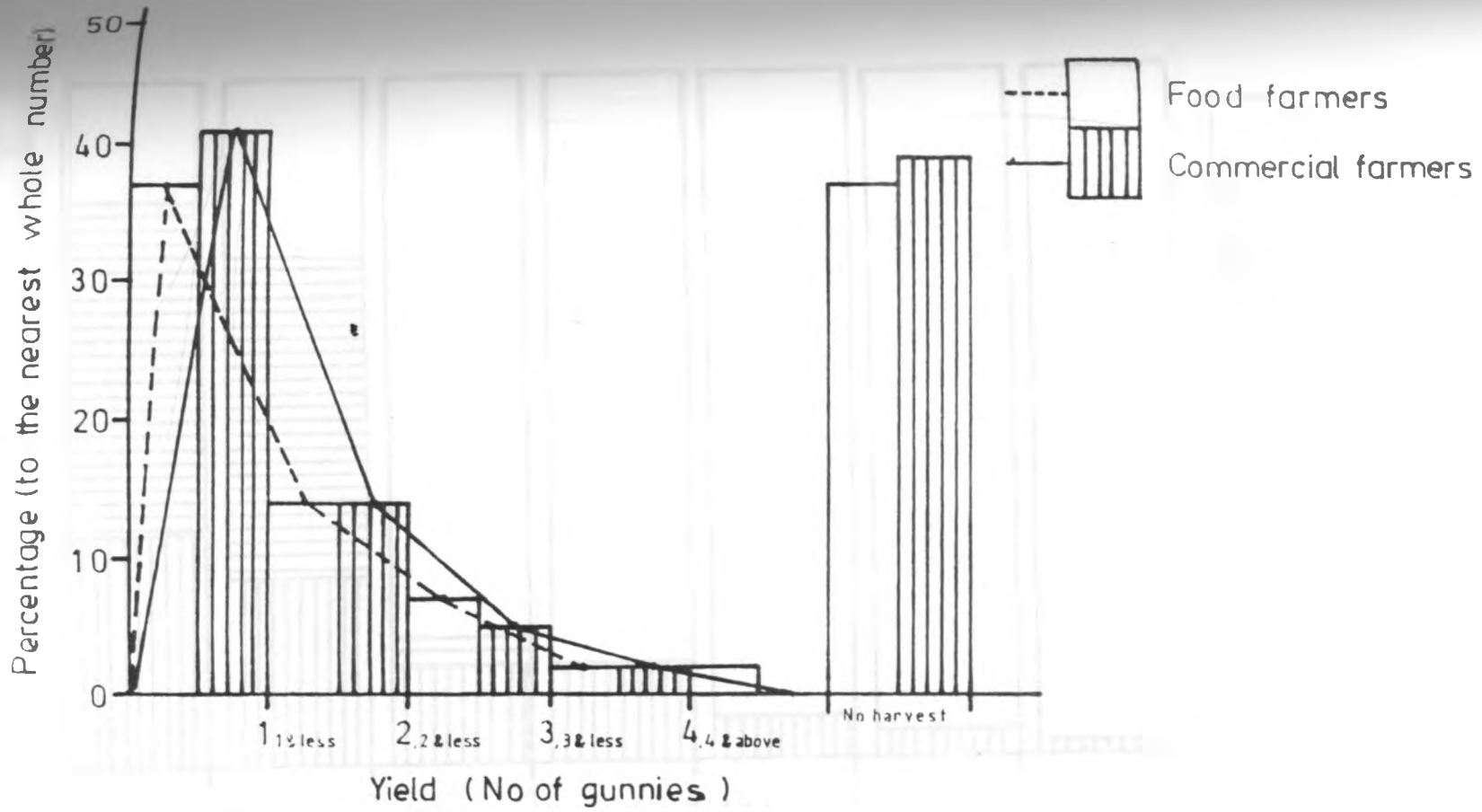
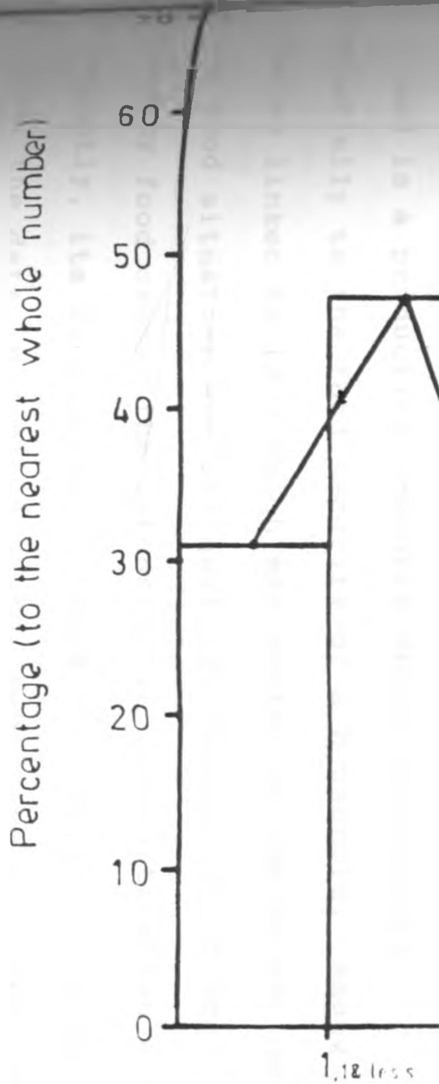


Fig. 5.6 Bean yield among commercial and food farmers.

Fig. 5.7. Percentage diagram showing size of land covered by commercial farmers who grew maize.



5.8
Percentage showing si
among food farmers

$\bar{x}$ = 1.2 acres

Size of land (acres)

ze of land covered by maize

Table 5.5 Area Covered By Sugar Cane Among Commercial Farmers

Area(ha)	Frequency	Cum.Freq.	Percent	Cum.Perc.
Less than 0.4	16	16	32.7	32.7
0.4 & less 0.8	13	29	26.5	59.2
0.8 & less 1.2	7	36	14.3	73.5
1.2 & less 1.6	7	43	14.3	87.8
1.6 & less 2.0	3	46	6.1	93.9
2.0 & less 2.4	2	48	4.1	98.0
2.4 & less 2.8	1	49	2.0	100
TOTAL	49		100	

Mean hectares=0.72

Table 5.6 Area Covered By Maize Among Commercial And Subsistence Farmers.

	COMMERCIAL				SUBSISTENCE			
Area(ha)	Freq.	Perc	Valid%	Cum.%	Freq.	Perc.	Valid%	Cum.%
Less 0.4	23	46.9	48.9	48.9	16	30.2	31.4	31.4
0.4& less 0.8	22	44.9	46.8	95.7	24	45.3	47.1	78.5
0.8& less 1.2	2	4.1	4.3	100	9	17.0	17.6	96.1
1.2& less 1.6	0	0.0	0.0	100	1	1.9	2.0	98.1
1.6& less 2.0	0	0.0	0.0	100	1	1.9	2.0	100
Missing	2	4.1	-	100	2	3.8	-	100
TOTAL	49	100	100		53	100	100	

Mean hectares(commercial)= 0.36
Mean hectares(subsistence)= 0.44

Land is a productive resource which contributes substantially to the food security of a household. Among the variables linked to land which may assist in the determination of the food situation are its quality, the amount of area covered by food crops, the intensity of its cultivation and, subsequently, its food output. Using the "amount of area" variable, the data in Table 5.6 show subsistence farmers having a better potential for food security than commercial farmers.

5.1.2 Agricultural Technology and Food Output

Apart from factors external to a farmer e.g. climate and soil quality, agricultural technology comes uppermost in determining crop output. Technology is a wide concept embracing knowledge, skills, implements, and practical methods in the application of such implements.

Table 5.7 shows the frequency with which certain farm inputs, implements and labour are utilised by commercial and subsistence farmers on their maize land.

Table 5.7 Utilisation of Labour and Farm Technology on Maize land.

	COMMERCIAL		SUBSISTENCE		TOTAL	
	Freq.	Perc.	Freq.	Perc.	Freq.	Perc.
Manure	19	40.4	32	62.7	51	52
Fertilizer	10	21.3	7	13.7	17	17.3
Ox-plough	21	44.7	29	56.9	50	51.0
Hand-hoe	26	55.0	22	43.1	48	47.1
Hired-labour	13	27.7	9	17.6	22	22.4
Insecticide	7	14.9	3	5.9	10	10.2

The use of the hand-hoe ("imbako"), the traditional instrument for cultivating, seems to be widely maintained. Alternatively, farmers may hire ox-drawn ploughs which are faster than the hand-hoes. Table 5.7 shows that a considerable percentage of subsistence farmers utilise ox-ploughs on their maizeland more than do the commercial farmers. This is acceptable considering that the commercial farmers generally have smaller maize plots and hence hand-labour alone suffices.

Hired labour is relatively cheaper than the hire of ox-ploughs and is thus preferred by farmers with bigger plots.

The planting season is not devoid of some exciting spectacle. When walking up and down the village footpaths, I noticed groundnut shells scattered along certain pathways. At first, this had very little meaning to me. But I later made a casual remark about it to one of my resourceful guide and informant. "Ooh!", he exclaimed, "people believe that when this is done then their shambas yield plenty of harvest".[5] This magico-religious observance rooted in the traditional preplanting rituals is meant to invoke supernatural powers to bring forth a bounteous harvest.

According to the area Chief, one reason for frequent food shortages in the location is the lack of/improper utilisation of agricultural information.[6] As to whether such information reaches the farmer is yet to be established. However, the Chief's contention was confirmed to me when during the planting season, I witnessed a number of farmers broadcasting maize and beans on their "shambas" instead of planting them in the technically accepted manner. The best that some of the farmers would come to was to drop the seeds randomly in the furrows made by the ox-ploughs. The popular belief among the farmers was that the more the seeds sowed, the higher the harvest. For the farmers who have been caught unawares by the rains, broadcasting serves as the quickest method of sowing before rains recede.

Lack of preparation in readiness for the planting season was observed to be a major weakness on the part of the farmers. In Munzeywe village of Manyala sub-location for instance, a few days after the onset of the long rains in February, several farmers were seen frantically pleading with the only ox-plough owner in the locality to assist them. According to one informant, poor timing of the rains is the single most significant threat to farm production in the area.[7]

The well-drained dark friable soils covering the location are naturally fertile and suitable for cultivation of a variety of crops. However, the plots have generally been overused and hence depleted of their natural minerals and elements. This is a consequence of the minuteness of household land which cannot be left to lie fallow, coupled with the two annual food growing seasons observed. Artificial fertilizers would therefore ensure better crop yields.

Table 5.7 shows that 52% and 17.3% of the farmers use manure and chemical fertilizers, respectively, to stimulate growth of maize. The use of manure and chemical fertilizers gives positive results when applied in the recommended way. Otherwise the results may be disastrous. A farmer from Shiatsala sub-location told me that he opts to use dung manure because an earlier attempt to use chemical fertilizers proved futile. He lamented, "imbolea yasamba imwo yanje" (literally: the fertilizer burnt my seeds). Even with the dung manure which

is more widely used than composite manure, I observed some farmers applying it before the dung was properly decomposed as is technically recommended.

Indigenous maize seeds ("imwo") are more commonly grown than the improved or hybrid maize seeds (indigenous seeds are carefully selected grains from the previous season). I gathered two primary reasons for the preference of the indigenous seeds. First, though readily available in the local stores, the hybrid seed is quite costly in comparison to the indigenous type. A random check at the local stores revealed that a 10 kg. bag of hybrid maize seeds costs KShs. 129.70. When planted in the recommended way, this is sufficient to cover a 0.4 ha piece of land. A two kilogramme packet of hybrid maize, enough to cover 0.08 ha was sold at KShs. 27.00. On the other hand a two kilogramme tin-full of indigenous maize seeds was at the same period (March 1990) sold at KShs. 17.00.

Secondly, the popular "obusuma" that is prepared from indigenous maize flour is considered to have "eshuya" i.e, is tasty, whereas that from improved maize seeds is bland. The yellow and dark blue maize varieties ("amatuma ke shipindi") are major catalysts in giving "obusuma" from indigenous seeds that appreciated taste.

According to agricultural recommendations, if hybrid maize seed of the type suitable for the altitude in South Marama is planted in the technically accepted way, it is expected to yield

between 44 to 69 bags per hectare. Hybrid maize seeds type 511 can yield 44 bags per hectare, type 622 can yield 67 bags per hectare, and type 632 can yield 69 bags per hectare.

Table 5.8 indicates the yield of maize among the farmers for the previous season i.e that ending December 1989. On the other hand, Table 5.9 indicates the yield of beans for the same season.

Table 5.8 Maize Yield of Commercial and Subsistence Farmers.

	COMMERCIAL				SUBSISTENCE			
Yield(90kg.bags)	Freq.	Cum.	Perc.	Cum.%	Freq.	Cum.	Perc.	Cum.%
Less than 2	12	12	25.5	25.5	11	11	21.6	21.6
2 and less 4	11	23	23.4	48.9	15	26	29.4	51.0
4 and less 6	8	31	17.0	65.9	6	32	11.8	62.8
6 and less 8	0	31	0.0	65.9	2	34	3.9	66.7
8 and less 10	1	32	2.1	68.0	2	36	3.9	70.6
10 or over	1	33	2.1	70.1	5	41	9.8	80.6
No harvest	14	47	29.8	100	10	51	19.6	100
TOTAL	47		100		51		100	

Mean yield(commercial)=1.7 bags.
Mean yield(subsistence)=2.6 bags.

Table 5.9 Bean Yield of Commercial and Subsistence Farmers.

	COMMERCIAL				SUBSISTENCE			
Yield(90kg.bags)	Freq.	Cum.	Perc.	Cum.%	Freq.	Cum.	Perc.	Cum.%
Less than 1	18	18	40.9	40.9	16	16	37.2	37.2
1 and less 2	6	24	13.6	54.5	6	22	14.0	51.2
2 and less 3	2	26	4.5	59.0	3	25	7.0	58.2
3 and less 4	1	27	2.3	61.3	1	26	2.3	60.5
4 or over	0	27	0.0	61.3	1	27	2.3	62.8
No harvest	17	44	38.6	100	16	43	37.2	100
TOTAL	44		100		43		100	

Mean yield(commercial)=0.5 bags.
Mean yield(subsistence)=0.5 bags.

It is noted that quite a significant percentage of farmers did not harvest maize or beans although they planted them. This may largely be due to improper application of agricultural information as there was no adverse climatic condition during the season to warrant this situation. In certain instances, green maize is boiled or roasted and then eaten while still in the field--with none left for the season harvest.

Subsistence farmers, advantaged with relatively bigger average hectareage of maize land (Table 5.6) and with a slightly larger percentage of them using either manure or artificial fertilizers (Table 5.7), obtain on average a better yield than do commercial farmers (Table 5.8). However, this is still a far cry from the expected output if optimum use of the land is applied - considering that the average hectareage of maize land is 0.44 ha (Table 5.6), which is expected to yield an average of 19.4 bags for the least productive type 511 hybrid maize seeds.

5.1.3 Agriculture and Nutritional Status

60 children from the sample households undertaking one or the other agricultural strategies underwent anthropometric assessment. Of these, 31 came from subsistence agricultural households while 29 were from commercial agricultural households.

Taken together, the results of the assessment of these 60 children reveal an average Z-score of -1.6 HA and -0.2 WH,

showing mild long term undernourishment and adequate short term nourishment respectively. The distribution of children along nutritional levels applied is seen in the table below.

Table 5.10 Children's Nutritional Levels (HA, WA, And WH indices).

Nut.Level	HA Freq	HA Perc.	HA Age	WA Freq	WA Per.	WA Age	WH Freq	WH Perc.	WH Age
-2.0 or below	25	41.7	33.5	10	16.7	30.8	1	1.7	9.3
-1.9 to -1.0	19	31.7	29.7	23	38.3	31.4	10	16.7	25.3
-0.9 to +1.0	15	25.0	17.0	26	43.3	24.6	45	75.0	29.6
+1.1 to +2.0	0	0.0	0	1	1.7	3.9	4	6.7	13.7
+2.1 or over	1	1.7	9.3	0	0.0	0.0	0	0.0	0.0
TOTAL	60	100		60	100		60	100	

Note:"Age" refers to mean age.

From the above table, it is quite apparent that age has some effects on the nutritional status of the children, particularly on the HA indicator. As age advances, nutritional status deteriorates. Seemingly, as weaning commences and dependency on the mother's milk relaxes, children's nutritional status starts to decline. By around 24 months when most children from Kakamega District are off the mother's breast (Olenja 1988), extra-maternal variables such as household economics and food security would be having their full effects on children's diet. For most children, this transition implies leaving the more nutritious mother's milk for the solid foods that lack essential nutrients.

When age is controlled on six month age groups, the tendency for increasing age and decreasing nutritional status is still evident on HA. Table 5.11 shows the relationship between the different age groups with HA and WH of the 60 children.

Table 5.11 Relationship between Age Groups with HA and WH.

Age Group(months)	Mean Age	HA Z-scores	WH Z-scores.
Less than 6.0	4.3	-1.4	0.9
6.1 to 12.0	9.2	-0.2	0.7
12.1 to 18.0	14.6	-1.6	-0.8
18.1 to 24.0	21.7	-1.7	-0.5
24.1 to 30.0	27.2	-1.1	-0.1
30.1 to 36.0	32.6	-2.2	0.1
36.1 to 42.0	38.8	-2.2	0.0
42.1 to 48.0	46.7	-2.2	-0.1
48.1 to 54.0	49.4	-2.3	-0.5
54.1 to 60.0	58.0	-2.1	-0.1

When the children are classified according to the agricultural systems practised by their respective households, those from commercial households have a poorer performance on HA than the ones from subsistence agricultural households. The percentage of stunted children from commercial households is almost twice that from subsistence households. However, no major variations can be seen on the short term nutritional status of the children from the two agricultural systems as measured by WH. Tables 5.12 and 5.13 give a full classification of the children's nutritional levels on HA and WH respectively.

Table 5.12 Nutritional Levels of Children from Commercial and Subsistence Agric.Households (HA index).

	COMMERCIAL			SUBSISTENCE		
NutritionalLevel	Freq.	Perc.	MeanAge	Freq.	Perc.	MeanAge
-2.0 or below	16	55.2	32.9	9	29.0	34.2
-1.9 to -1.0	11	37.9	28.2	8	25.8	31.2
-0.9 to +1.0	2	6.9	19.9	13	41.9	14.0
+1.1 to +2.0	0	0.0	0.0	0	0.0	0.0
+2.1 or over	0	0.0	0.0	1	3.2	9.3
TOTAL	29	100		31	100	

Table 5.13 Nutritional Levels of Children from Commercial and Subsistence Agric.Households (WH index).

	COMMERCIAL			SUBSISTENCE		
NutritionalLevel	Freq.	Perc.	MeanAge	Freq.	Perc.	MeanAge
-2.0 or below	0	0.0	0.0	1	3.2	9.3
-1.9 to -1.0	4	13.8	30.5	6	19.4	20.1
-0.9 to +1.0	23	79.3	31.7	22	70.9	27.5
+1.1 to +2.0	2	6.9	20.1	2	6.5	7.3
+2.1 or over	0	0.0	0.0	0	0.0	0.0
TOTAL	29	100		31	100	

The WH index as previously stated is a superior indicator of children's current nutritional status, which is strongly affected by their morbidity condition. Infections which may lead to weight loss through dehydration (as is the case with diarrhoea and vomiting) or loss of appetite which subsequently leads to weight loss (such as malaria and fever), have a strong effect on WH. Table 5.14 shows children's morbidity condition one or two weeks prior to the day anthropometric data were collected.

Table 5.14 Infections of Children from Commercial and Subsistence Households.

Type of Infection	SUBSISTENCE Freq.	Perc.	COMMERCIAL Freq.	Perc.
Fever/Stomachache	1	3.2	0	0.0
Fever/Diarrhoea	1	3.2	0	0.0
Fever/Skin Rashes	1	3.2	0	0.0
Fever Only	5	16.1	5	17.2
Diarrhoea/Vomiting	1	3.2	0	0.0
Diarrhoea Only	3	9.7	4	13.8
Malaria/Vomiting	0	0.0	1	3.4
Malaria Only	9	29.0	8	27.6
Cough/Vomiting	0	0.0	1	3.4
Cough/Skin Rashes	0	0.0	2	6.9
Skin Rashes Only	1	3.2	1	3.4
Stomachache Only	1	3.2	0	0.0
Asthma	0	0.0	1	3.4
Eye Problems	1	3.2	0	0.0
No Infections	7	22.6	6	20.6
TOTAL	31	100	29	100

The percentage of children who had had infections is not significantly distinct between those from commercial and subsistence agricultural households (79.4% for the former and 77.4% for the latter). The percentage of children who were suffering from infections likely to lead to weight loss (such as malaria, vomiting, diarrhoea, fever, or stomach problems) is slightly higher for those children from subsistence farming households (70.8%) than those from commercial farming households (65.8%). The children's WH however shows insignificant variations for the two groups (Z-scores -0.1 for those from commercial and -0.3 for those from subsistence households). The MUAC index which has a close association with WH also shows insignificant difference (mean 14.9 and 14.6 for children from

commercial and subsistence farmers respectively). In a nutshell, all the children irrespective of their households' agricultural background are of adequate short term nutritional status as measured by WH and MUAC.[8]

Treatment of the various infections range from using traditional therapy to buying tablets from local stores, utilising health unit care, and using services of local "quacks". The mean cost for therapy for children from commercial agricultural households is KShs. 9.10 with a standard deviation of KShs. 13.70. For those from subsistence agricultural households, the mean cost is KShs. 7.56 with the standard deviation being KShs. 10.73 - hence not much different with children from commercial agricultural households.

Profile: Morris Anekeya.

Incidentally, the child with the highest HA Z-score (2.1) and the lowest WH Z-score (-3.3) among those from the sample households is one, Morris Anekeya, from Ebukara village in Shibembe Sub-location. On the day anthropometric data were collected, Morris was 9 months and 3 days old.

Morris' mother, Abigail, is a single mother aged 18 years. Abigail stays with her parents, Mr.and Mrs. Bulali aged 68 and 59 years respectively. The Bulalis' main occupation is farming. They also depend on assistance from their son, Shitandi, a school teacher at the nearby Manyala Primary School.

The Bulalis live in a small homestead ("litala") on which are erected three mud-walled and floored, grass-thatched houses. The home is on a 0.8 ha piece of land that was allocated to Mr. Bulali by his late father and in accordance with the Luyia land inheritance system. On the land, the Bulalis cultivate maize and beans which are interplanted and cover about 0.4 ha, some sugar cane for chewing (which they consume and sell any surplus), sweet potatoes, bananas and cassava. They also keep three indigenous cows to supply milk for home consumption, and some poultry for home consumption too. Basically, the family carries out a subsistence life. During the previous food season, the Bulalis harvested one bag of maize and about one quarter bag of beans from their 0.4 ha mixed maize/beans culture.

When Abigail was pregnant, she would eat ripe bananas, irish potatoes, and chew sugar cane from their "shamba" - these apart from the normal household diet. Otherwise, she has a general allergy for fish and cabbage and so she does not eat them.

After Morris was delivered, Abigail would take tea with sufficient milk and groundnuts to stimulate milk production. When Morris was 4 months old, Abigail fed him with some light porridge. At 6 months, she supplemented the porridge with fresh milk from the household animals. All through, Morris did not show any flaws in his health. He had in fact completed the

immunization process as prescribed by the clinic staff.

A few days before anthropometric data were collected, Morris had a strong attack of malaria. He lost appetite, was unable to feed well and subsequently became very weak. Abigail bought some tablets from the local stores for KShs. 2.10 and administered them orally to Morris. Gradually, his condition started improving and on the day anthropometric data were collected, he was able to take some porridge in the morning.

It was earlier on suggested that subsistence farmers have better maize yield mainly because their maize hectareage is, on the average, bigger than that of commercial farmers, and also because a bigger percentage of them utilise manure and/or chemical fertilizers. Here, an attempt is made to link these variables with nutritional status.

Of the 60 children from the sample households, 48 (or 80%) come from households which had cultivated less than 0.4 ha of maize in the previous season. Twelve of the children (or 20%) are from households which had cultivated between 0.4 and 0.8 ha of maize. Table 5.15 shows the children's HA nutritional levels relative to the hectareage of maize cultivated by their respective households.

Table 5.15 Nutritional Levels (HA) of Children from Households that cultivated Maize.

Nutritional Level	LESS THAN 0.4 HA Freq.	Perc.	MeanAge	BETWEEN 0.4-0.8 HA Freq.	Perc.	MeanAge.
-2.0 or below	21	43.7	33.9	4	33.3	28.6
-1.9 to -1.0	14	29.2	26.6	5	41.7	40.8
-0.9 to +1.0	12	25.0	18.1	3	25.0	6.7
+1.1 to +2.0	0	0.0	0.0	0	0.0	0.0
+2.1 or above	1	2.1	9.3	0	0.0	0.0
TOTAL	48	100		12	100	

To determine the strength of relationship between the area of maize land and nutritional status, the Gamma (Y) measure of association is applied:

$$Y=\frac{\text{(No.of concordant pairs)-(No.of disconcordant pairs)}}{\text{(No.of concordant pairs)+(No.of disconcordant pairs)}}$$

$$=\frac{21(8)-4(27)}{21(8)+4(27)}=\frac{168-108}{168+108}=\frac{60}{276}=0.21.$$

The Gamma measure (0.21) thus shows a positive though moderate relationship.

Table 5.16 shows the children's HA nutritional levels in relation to the household utilisation of manure and chemical fertilizers for maize production.

Table 5.16 Nutritional Levels (HA) of Children from Households applying/not applying Manure/Fertilizers.

Nutritional Level	APPLYING Freq.	Perc.	MeanAge	NOT APPLYING Freq.	Perc.	MeanAge.
-2.0 or below	11	32.4	35.1	14	53.8	32.3
-1.9 to -1.0	10	29.4	28.6	9	34.6	31.6
-0.9 to +1.0	12	35.3	17.5	3	11.5	10.6
+1.1 to +2.0	0	0.0	0.0	0	0.0	0.0
+2.1 or above	1	2.9	9.3	0	0.0	0.0
TOTAL	34	100		26	100	

$$Y=\frac{(\text{No.of concordant pairs})-(\text{No.of disconcordant pairs})}{(\text{No.of concordant pairs})+(\text{No.of disconcordant pairs})}$$

$$=\frac{14(23)-11(12)}{14(23)+11(12)}=\frac{322-132}{322+132}=\frac{190}{454}=0.41.$$

The Gamma measure between the use of manure/chemical fertilizers with HA (0.41) shows a positive relationship.

Table 5.17 shows the children's HA nutritional levels relative to the farmers' use of the ox-plough and hand-hoe.

Table 5.17 Nutritional Levels (HA) of Children from Households using Ox-plough and Hand-hoe.

Nutritional Level	OX-PLOUGH Freq.	Perc.	MeanAge	HAND-HOE Freq.	Perc.	MeanAge
-2.0 or below	12	41.4	32.8	13	41.9	28.5
-1.9 to -1.0	8	27.5	36.1	11	35.5	34.2
-0.9 to +1.0	8	27.5	20.0	7	22.6	8.8
+1.1 to +2.0	0	0.0	0.0	0	0.0	0.0
+2.1 or above	1	3.4	9.3	0	0.0	0.0
TOTAL	29	100		31	100	

$$Y=\frac{(\text{No.of concordant pairs})-(\text{No.of disconcordant pairs})}{(\text{No.of concordant pairs})+(\text{No.of disconcordant pairs})}$$

$$=\frac{12(18)-13(17)}{12(18)+13(17)}=\frac{216-221}{216+221}=\frac{-5}{437}=-0.01$$

The Gamma measure of relationship between the use of the ox-plough and hand-hoe and HA (-0.01) indicates that there is no relationship.

Hence, the utilisation of manure and/or chemical fertilizers has a more positive relationship than the hectareage of maize land with children's HA. There is, however, no relationship between implements for ploughing and HA.

The implications of these findings would be to put more emphasis on intensive cultivation as a more resourceful use of land than is the case with extensive farming.

An ideal procedure for controlling for age is to subgroup the children along lines and relative to the subgroup nutritional status. This can be seen in Table 5.18, comparing children from commercial agricultural households and those from subsistence agricultural households.

Table 5.18 Relationships between Age-Groups with HA and WH among Children from Subsistence and Commercial Agric.Households.

	COMMERCIAL			SUBSISTENCE		
Age-Groups(months)	HAZ	WHZ	MeanAge	HAZ	WHZ	MeanAge
Birth to 6.0	-2.1	0.6	4.8	-0.5	1.4	3.5
6.1 to 12.0	-0.9	-0.1	8.7	-0.2	-0.8	9.3
12.1 to 18.0	-2.0	-0.5	14.2	-1.1	-1.1	14.9
18.1 to 24.0	-2.5	-1.1	18.3	-1.4	-0.2	22.8
24.1 to 30.0	-1.3	-0.3	27.6	-0.9	0.2	26.7
30.1 to 36.0	-2.5	0.2	32.6	-1.6	0.0	32.9
36.1 to 42.0	-2.9	0.1	38.7	-1.8	-0.1	38.8
42.1 to 48.0	-1.7	-0.1	47.5	-2.5	0.1	46.2
48.1 to 54.0	-2.8	-0.1	49.5	-2.1	-0.7	49.3
54.0 to 60.0	-2.1	0.1	58.0	-	-	-

HAZ=Height for Age Z-Scores
WHZ=Weight for Height Z-Scores.

Table 5.18 does not exhibit an inverse relationship between increase in age and decrease in nutritional status among children from commercial agricultural households as is the case for all the children in Table 5.11 . A tendency towards such a relationship may be noticed in the HA index of children from subsistence agricultural households.

It may, therefore, be safe to suggest that while children from subsistence agricultural households seem to respond to the age increase-nutrition decrease curve, those from commercial agricultural households seem to be affected by another factor, namely, the sugar cane productive strategy which nullifies the WH status. Tables 5.19 and 5.20 classify the frequency of the age-groups along (HA) and (WH) nutritional levels, respectively. The results of Table 5.19 strengthen the contention that

children from commercial agricultural households are of poorer long term nutritional status than those from subsistence households. I therefore hypothesize that in a small-farmer economy, production of sugar cane as a cash crop has adverse effects on the nutritional status of preschool age children.

Table 5.19 Nutritional Classifications (HA) of Childrens' Age-Groups in Commercial and Subsistence Agric. Households.

Nut.Classification	COMMERCIAL Freq.	Perc.	SUBSISTENCE Freq.	Perc*.
Stunted	7	70.0	2	22.2
Mild	2	20.0	4	44.4
Average	1	10.0	3	33.3
Above Average	0	0.0	0	0.0
Advanced	0	0.0	0	0.0
Missing	-	-	1	
TOTAL	10	100	10	100

* Valid percent.

Table 5.20 Nutritional Classifications (WH) of Childrens' Age-Groups in Commercial and Subsistence Agric.Households.

Nut.Classification	COMMERCIAL Freq.	Perc.	SUBSISTENCE Freq.	Perc*.
Wasted	0	0.0	0	0.0
Mild	1	10.0	2	22.2
Average	9	90.0	7	77.8
Above Average	0	0.0	0	0.0
Advanced	0	0.0	0	0.0
Missing	-	-	1	
TOTAL	10	100	10	100

* Valid percent.

Testing of the Hypothesis using a Chi-Square:

Hypothesis: Children from households producing sugar cane for commercial purposes tend to manifest poorer nutritional standards than do those from households which practise subsistence agriculture

Nut.level	COMMERC. Freq(HA)	SUBSIST. Freq(HA)	TOTAL	COMMERC. Freq(WH)	SUBSIST. Freq(WH)	TOTAL
-2.0 or below	16	9	25	0	1	1
-1.9 or above	13	22	35	29	30	59
TOTAL	29	31	60	29	30	60

Degrees of freedom, df =(r-1) (c-1)
Level of significance =5% (or 95% degree of confidence)
Chi-square (HA) =4.2
Chi-square (WH) =1.0

Height for Age (HA): Calculated value chi-square =4.2. Table value chi-square 0.05(1) =3.84. The calculated value chi-square (4.2) is greater than the table value Chi-square (3.84). Hence on the HA grounds, we accept the hypothesis. Commercial agriculture is concluded to have adverse effects on long term nutritional status.

Weight for Height (WH): Calculated value chi-square =1.0. Table value chi-square 0.05(1) =3.84. The calculated value chi-square (1.0) is less than the Table value chi-square (3.84). Hence on the WH grounds there is insufficient evidence to accept the hypothesis. Thus, commercial agriculture and subsistence agriculture do not vary in their effects on short term nutritional status.

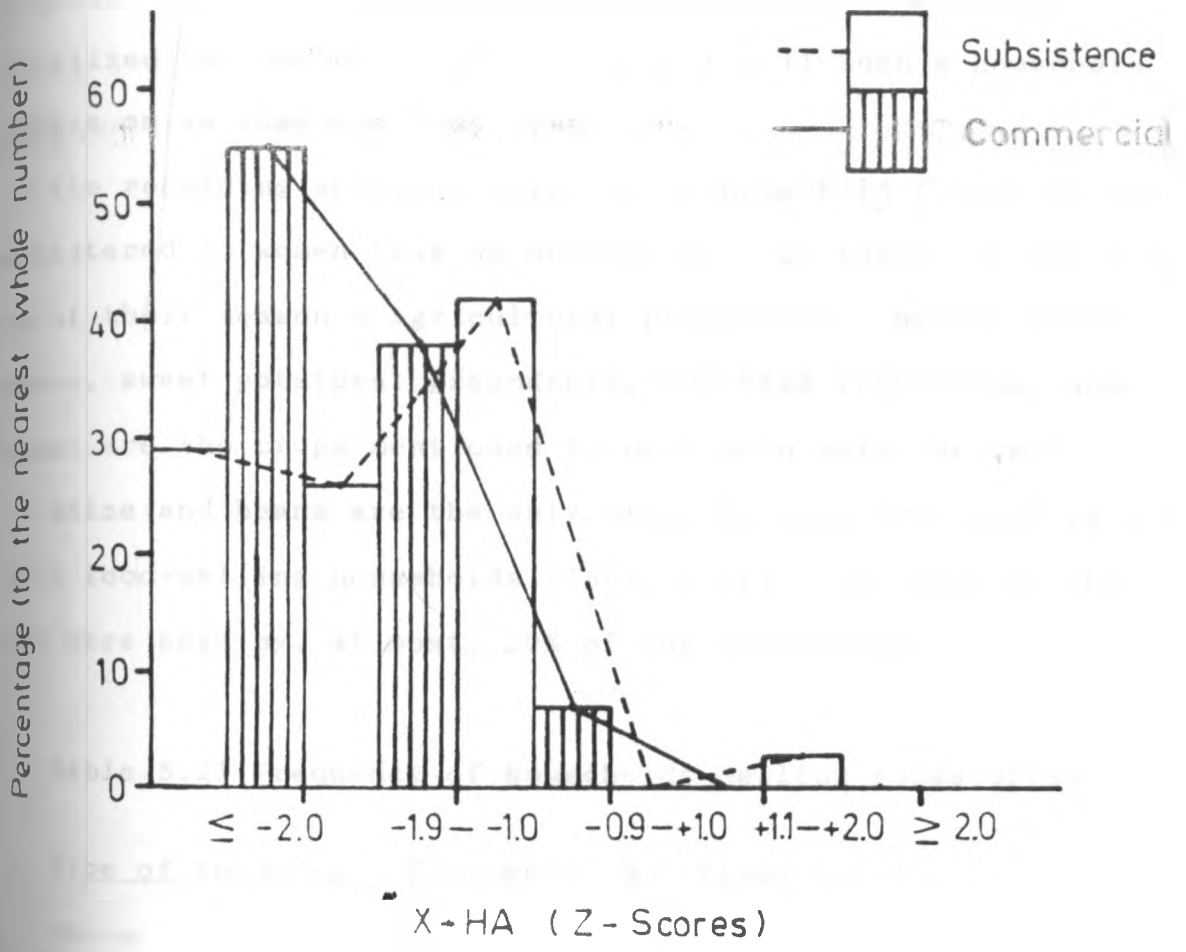


Fig 5.9 HA levels of children from commercial and subsistence Agric. Households.

5.2 Commercialization of Household Food Resources

The concept of household food security can be defined in terms of food supply and availability or accessibility. It is hypothesized here that accessibility to the food produced within the household may encounter disturbing influences when food is delocalized for market value, particularly if such a household operates on an insecure food base.

The recording schedule relative to household foodsales was administered to women from 68 households. Of these, 30 had sold part of their season's agricultural production. Maize, beans, cassava, sweet potatoes, groundnuts, assorted vegetables, and bananas are the crops mentioned to have been sold for cash.

Maize and beans are the only crops to have been sold by all the 30 food-selling households (Table 5.21). The rest of the crops were sold by, at most, 20% of the households.

Table 5.21 Frequency of Households Selling Foodstuffs.

Type of Foodcrop	Frequency	%of foodsellers.
Maize	30	100
Beans	30	100
Cassava	6	20.0
Sweet Potatoes	6	20.0
Groundnuts	2	6.7
Bananas	2	6.7
Assorted Vegetables	3	10.0

An observation of the local market-places where most of these crops find the way out shows that most traders deal in maize and beans. Apart from the supply-demand determinant which

applies to the value of all commodities, the price of food sold within the area was observed to respond to the proximity of the market-place and the particular day of marketing.

The main market-place in South Marama is located at Shiatsala shopping centre which also serves as the locational Chief's centre. Other subsidiary market-places are in Manyala (commonly referred to as Adhiegera by the Luo community) and Shibembe shopping centres. A number of other "satellite" markets may be seen conveniently placed under tree shades along roads and paths. It is characteristic of these "satellite" markets to sell foodstuffs at a slightly higher price than at the subsidiary and main market-places. The rationale would be that such foodstuffs (and other nonfood items) are, in fact, purchased at the main market-places but brought closer to the consumers. It is common, however, to find that the foods are those obtained from the seller's own "shamba", the seller needing cash for other subsistence requirements.

In the context of the people of South Marama and indeed the entire Butere Division, a "market-day" is an exceptional time in the economy of exchange. This is a day set aside in each market-place for the purposes of buying and selling goods at a relatively fair price, a factor which gives the day much more meaning. This is the main nerve which makes "satellite" markets thrive. Shiatsala's market-day falls every Tuesday, Shibembe on Wednesdays, and Manyala on Thursdays. However, these

market-days are overshadowed by the ones at Butere in Central Marama (Mondays) and Manyulia in East Marama (Saturdays) which attract a clientele from as far as Kakamega and Kisumu.

Quite expectedly, maize is the crop most vulnerable to fluctuations in price in response to supply and demand. Being the staple food crop, the demand for maize is greater than the supply. For instance, at the onset of fieldwork in the first week of January 1990, a two kilogramme tin of maize ("gorogoro") was sold at KShs. 5.00 at the main and subsidiary markets, and KShs. 6.00 at the "satellite" markets. This was the period after the farmers had brought in their second season harvest. By the end of the field study (in the last week of March), a two kilogramme tin of maize had hiked to KShs. 8.00 at the main and subsidiary market-places and KShs. 9.00 at the "satellite" market-places. This period coincides with the first planting season when food shortage effects are felt. In early May when I revisited the site, a "gorogoro" of maize was being sold at KShs. 10.00.

The value of maize would have risen even more drastically, but for the illegal maize transfer to the area undertaken by certain individuals (said to be "outsiders", i.e., coming from outside of the district). The illegal middlemen transport maize from as far as Trans Nzoia and Bungoma districts, and Lugari Division of Kakamega District and bring it to Marama and other areas hit by maize shortages. As the local Chief remarked,

"...these are the people who feed the inhabitants of the location".[9]

Through informal discussions with respondents, I gathered that sales of food resources are expected to generate cash for the purchases of a variety of basic household requirements. These needs were mainly symbolised by two items: soap and sugar. For example the conversation would go as follows:

Question: "Neshichira shina sho okusirinjia amatuma kako?" (what reasons lead you to sell your maize?)

Answer: "kho enyole khwo limondo elio okhukula isabuni" (so I may get a coin to buy soap).

Subsequent probing may reveal the additional needs: school levies, bus-fare, clothing, medicine, processed foodstuffs and additives.

Most intriguing is the relatively big percentage of commercial farmers who sold their foodstuffs when compared to the subsistence farmers. 24 commercial farming households (58.5%) were involved in selling farmfoods as compared to 6 subsistence farming households (22.2%).

An analysis of the average yield of maize in relation to the average size of the households commercializing farmfoods, shows a threatened food security resulting from the asymmetrical maize yield-household size relationship. This is more evident among the commercial farmers as Table 5.22 reveals. Food commercialization, therefore, aggravates the food situation within these households.

Table 5.22 Maize Yield-Household Size among Foodselling Commercial and Subsistence Households.

	Freq.	Perc.	MAIZE-YIELD Mean	SD	HOUSEHOLD SIZE. Mean	SD
Commercial	24	80.0	2.4	1.8	5.9	1.6
Subsistence	6	20.0	4.9	5.6	5.8	2.0
TOTAL	30	100				

Note:SD=Standard Deviation.

Some associations can be advanced in relation to the high rate of food commercialization by sugar cane growers. To begin with, the first crop plant takes two years to be ready for harvest. This crop is quite demanding in terms of labour and agro inputs necessary for optimum performance. This, in turn, calls for a broad financial base on the part of the farmer. Since most of these farmers are of generally weak economic status, they resort to translating part of their food sector into cash in order to manage the cane farm and to meet other subsistence requirements within the household.

The precarious position of the cane farmer makes him vulnerable to exploitation by shysters who take advantage of the farmer's misfortune to loan him cash at 100% interest rate. The recipient's security in this transaction is his sugar cane (still in the field) whose payment after delivery is used to repay the loan. According to one informant, victims of shysters find themselves in a vicious circle from which it is difficult to extract oneself. In effect, after payment of the first

harvest - a large part of which is used to pay back the loan--a farmer is compelled to borrow yet again in order to manage the second crop.[10] This chain of events eventually affects the food sector which is required to generate cash for the farmer's basic needs.

5.2.1 Importation of External Foodstuff and Additives

A sub-sample of 25 households recorded foodstuffs purchased for a maximum of 7 days per household. The method of collecting these data was by way of leaving questionnaires with the respondents who would fill foods and additives (what is added on food mainly to make it palatable) bought in seven consecutive days. The sub-sample includes both the foodselling and nonfoodselling households.

30 varieties of foodstuff and additives were bought by the 25 households in a total of 163 days. The amount of money used to purchase these items totalled KShs. 3,316.85 of which KShs. 635.75 was used to buy addititives and KShs. 2,681.10 was used to buy foodstuffs. Sugar was the most frequently purchased additive while milk was the most frequently purchased foodstuff. Table 5.23 shows the frequency and amount of money used to in purchases of foods and additives.

Table 5.23 Frequency and Cash used in the Purchases of Foods and Additives.

	Freq.	AMOUNT OF CASH(KShs.Cts.) Total	Mean	SD
Food Additives	78	635.75	91.25	130.24
Foodstuff alone	145	2681.10	116.56	197.45
Foostuff&Additives	223	3316.85	110.56	184.20

Note:SD=Standard Deviation.

The largest amount spent on a single item is on maize, hence underlining its central role on the peoples diet (Appendix 2). The frequency of the purchase of maize and its associated maize flour is only second to that of milk although the total cash used in the purchases of the former is over seven times that of the latter. This frequency (of maize and maize flour purchases) signifies the instability of the households' staple food situation considering that the data on the sub-sample were collected only three months after the last maize harvest.

A variety of vegetables were the most frequently purchased relish, which customarily goes with "obusuma". These vegetables include the local type such as "tsimboka", "likhubi", "lisebebe", "litoto", "omurere", "emiroo", "lisucha" and "lisaka" (see Appendix 4 for botanical names). Kale ("sukuma wiki") is another relish that is purchased frequently.

Fish ("inyeni") is a frequently purchased alternative to the vegetables. The main type of fish found in the local markets are tilapia ("ingeke"), nile perch ("imbuta"), and assorted smoked fish ("eshibambala"). "Omena" (anchovies or

fingerlets) are other much utilised varieties of fish. While the "imbuta" is disfavoured due to its strong smell, it is, however more affordable than the rare "ingeke". "Omena" is the lowest in price - then about KShs. 5.00 to 6.00 for a one kilogramme tin.

Meat is less frequently purchased than the other relishes probably due to its high cost. Three butcheries: two at Chiatsala shopping centre and a seasonal one at Manyala, are all that cater for the inhabitants of South Marama. All the butcheries, understandably, deal in beef. Traditionally, the Marama people hold on to certain taboos against mutton and goat-meat. The price of beef was KShs. 30.00 per kilo for mixed bones and flesh, and KShs. 10.00 per kilo for the more popular and low priced tripes.

The socioeconomic rank system used here (Table 4.14) classifies 7 out of the 25 households in the sub-sample in the medium status; the rest being of low socioeconomic status. Although making up 28% of the sub-sample, the frequency with which households in the medium status purchase foodstuffs and additives is between 30.8% to 35.2% of the total frequency purchase of the sub-sample. The amount of money spent on additives by these households is over 35% of the total as opposed to about 64% by those in the low socioeconomic category (who comprise 72% of the sub-sample). Table 5.24 gives a composite picture of the frequencies, money spent, and their

percentages in relation to purchases of foodstuff and additives by the medium and low socioeconomic households in the sub-sample.

Table 5.24 Patterns of Food Purchases by Socioeconomic Status.

	MEDIUM				LOW			
	Freq	Perc.	Sh.Ct.	Perc.	Freq	Perc.	Sh.Ct.	Perc
Additives	24	30.8	224.85	35.4	54	69.2	410.90	64.6
Food	51	35.2	641.70	23.9	94	64.8	2039.40	76.1
Food/Additives	75	33.6	866.55	26.1	148	66.4	2450.30	73.9

Additives such as sugar, cooking fat, curry powder, onions, margarine, tea leaves, and tomatoes are optional requirements which can be avoided in economic hardships. Milk, meat, fish, bread, and fruits are part of the foodstuffs which are purchased by those possessing formidable purchasing power. That, proportionally, households in low socioeconomic ranks are outdone by those within the medium socioeconomic category in frequencies and cash purchases of most of these "luxuries" is a testimony to the greater economic power of the latter.

5.2.2 Commercialization of Food Resources, Food Imports, and Nutritional Status

Anthropometric data were taken on 15 children from households commercializing farmfoods and 25 children from households not involved in farmfood sales. 33 children from households in the sub-sample recording food imports were assessed.

The 33 children from the sub-sample are on the average mildly undernourished in HA (Z-score -1.4) and of average WH nutritional status (Z-score -0.3). Similar nutritional levels are reflected on those children among 33 who are in the households in the medium socioeconomic category (mean Z-scores in HA=-1.5 and WH=-0.3) and low socioeconomic category (mean Z-scores in HA=-1.2 and WH=-0.4).

Purchase of maize and/or maize flour indicates an insecure staple food situation within the households. This is however not manifested in the children's nutritional status. Children from households which purchased maize or maize flour during the week register mild malnutrition in HA (mean Z-score =-1.3) and average nutritional in WH (mean Z-score=-0.2), similar to the average scores registered by those from households which did not purchase maize (mean HA and WH Z-scores =-1.5 and -0.4 respectively). This, however, should not be taken to reflect the true state of affairs as, for instance, it is not known whether households which did not buy maize during the week had in fact done so during the the previous week, or whether those which bought maize/maize flour stored them as reserves for future utility.

The mean HA Z-scores of children from households which sold local foodstuffs and those which did not is -1.8 and -1.5 respectively. The mean WH Z-scores for both groups of children show average nutritional status (-0.2 and -0.4 for those from

foodselling and nonfoodselling households respectively).

Children from households which sold maize from the household farm, but later on imported maize or maize flour are on the average stunted (mean HA Z-score -2.0); contrasting with those from households which sold maize but did not import maize/maize flour later (mean HA Z-score -1.7). The contradictions involved in food delocalization and importation are therefore observed to result in negative effects on HA.

When children from foodselling and nonfoodselling households are controlled by age (Table 5.25), a majority of age-groups in the foodselling households are stunted. No age-group is wasted in either households which sold food resources or those which did not. Tables 5.26 and 5.27 summarises the age-groups' HA and WH nutritional levels respectively.

Table 5.25 Relationship Between Age-Groups with HA and WH Among Children from Foodselling and Nonfoodselling Households.

	FOODSELLING			NONFOODSELLING		
Age-Groups(months)	MeanAge	HAZ	WHZ	MeanAge	HAZ	WHZ
Birth to 6.0	3.1	1.0	0.7	5.1	-1.1	0.5
6.1 to 12.0	9.4	0.3	-0.6	9.1	0.0	-0.8
12.1 to 18.0	14.4	-2.1	-0.8	14.7	-0.6	-0.9
18.1 to 24.0	-	-	-	21.0	-1.8	-0.8
24.1 to 30.0	27.2	-2.6	0.1	25.5	-1.0	-0.6
30.1 to 36.0	32.1	-1.7	0.2	33.3	-2.1	0.2
36.1 to 42.0	36.7	-3.4	-0.2	38.6	-1.8	-0.3
42.1 to 48.0	47.3	-2.3	-1.0	47.2	-3.1	-1.6
48.1 to 54.0	50.5	-2.2	-0.8	48.9	-2.4	-0.3
54.1 to 60.0	60.0	-2.6	0.0	58.0	-1.7	0.6

HAZ=Height for Age Z-score.
WHZ=Weight for Height Z-score.

Table 5.26 HA Nutritional Classifications of Age-Groups in Foodselling and Nonfoodselling Households.

Nut.Classification	FOODSELLING Freq.	Valid Perc.	NONFOODSELLING Freq.	Valid Perc.
Stunted	6	66.7	3	30.0
Mild	1	11.1	5	50.0
Average	2	22.2	2	20.0
Above Average	0	0.0	0	0.0
Advanced	0	0.0	0	0.0
Missing	1	-	0	0.0
TOTAL	10	100	10	100

Table 5.27 WH Nutritional Classifications of Age-Groups in Foodselling and Nonfoodselling Households.

Nut.Classification	FOODSELLING Freq.	Valid Perc.	NONFOODSELLING Freq.	Valid Perc.
Wasted	0	0.0	0	0.0
Mild	1	11.1	1	10.0
Average	8	88.9	9	90.0
Above Average	0	0.0	0	0.0
Overweight	0	0.0	0	0.0
Missing	1	-	0	0.0
TOTAL	10	100	10	100

When individual children are classified relative to nutritional levels, there is still a continuity of poor HA performance on those from foodselling households (Table 5.28).

Table 5.28 Nutritional Levels (HA) of Children from Foodselling and Nonfoodselling Households.

Nutritional Level	FOODSELLING Freq.	Perc.	MeanAge	NONFOODSELLING Freq.	Perc.	MeanAge
-2.0 or below	9	60.0	40.0	9	36.0	28.4
-1.9 to -1.0	2	13.3	24.5	8	32.0	34.8
-0.9 to +1.0	4	26.7	13.0	7	28.0	18.8
+1.1 to +2.0	0	0.0	0.0	0	0.0	0.0
+2.1 or above	0	0.0	0.0	1	4.0	9.3
TOTAL	15	100		25	100	

Table 5.29 Nutritional Levels (WH) of Children from Foodselling and Nonfoodselling Households.

	FOODSELLING			NONFOODSELLING		
Nutritional Level	Freq.	Perc.	MeanAge	Freq.	Perc.	MeanAge
-2.0 or below	0	0.0	0.0	1	4.0	9.3
-1.9 to -1.0	2	13.3	29.4	5	20.0	25.8
-0.9 to +1.0	13	86.7	31.1	18	72.0	29.2
+1.1 to +2.0	0	0.0	0.0	1	4.0	10.6
+2.1 or above	0	0.0	0.0	0	0.0	0.0
TOTAL	15	100		25	100	

Using the Gamma measure in determining the relationship between foodselling and HA, we find the following results:

$$Y=\frac{\text{(No.of concordant pairs)-(No.of disconcordant pairs)}}{\text{(NO.of concordant pairs)+(No.of disconcordant pairs)}}$$

$$Y=\frac{9(6)-9(16)}{9(6)+9(16)}=\frac{54-144}{54+144}=\frac{-90}{198}=-0.45$$

The Gamma measure (-0.45) thus shows a negative relationship between HA and food sales.

Testing of Hypothesis using a chi-square:

Hypothesis: Children from households which delocalize farm-foods have a tendency to manifest poorer nutritional status than those from households which do not sell such foods.

Nut.Level	FOODSALES Freq(HA)	NONSALES Freq(HA)	TOTAL	FOODSALES Freq(WH)	NONSALES Freq(WH)	TOTAL
-2.0 or below	9	9	18	0	0	0
-1.9 or above	6	16	22	15	25	40
TOTAL	15	25	40	15	25	40

Degrees of freedom, df =(r-1) (c-1)
Level of significance =5% (or 95% degree of confidence)
Chi-square (HA) =2.1
Chi-square (WH) =0.0

Height for Age: Calculated value chi-square =2.1. Table value chi-square 0.05(1) =3.84. The calculated value chi-square is less than the table value chi-square. Thus, although the Gamma measure shows that food commercialization has negative relationship with HA, the chi-square shows the relationship as not being statistically significant.

Weight for Height: Calculated value chi-square =0. The table value chi-square 0.05(1) =3.84. The calculated value chi-square is less than the table value. Therefore, no evidence is present to permit us to accept the hypothesis.

4.3 Households' Involvement in Employment Resources

Basically, employment resources pay off in real economic terms and are subsequently a pointer to a household's food security. In the modern sector the criterion of rewarding workers in cash has the potential to improve and diversify the recipients' diets through external food procurement.

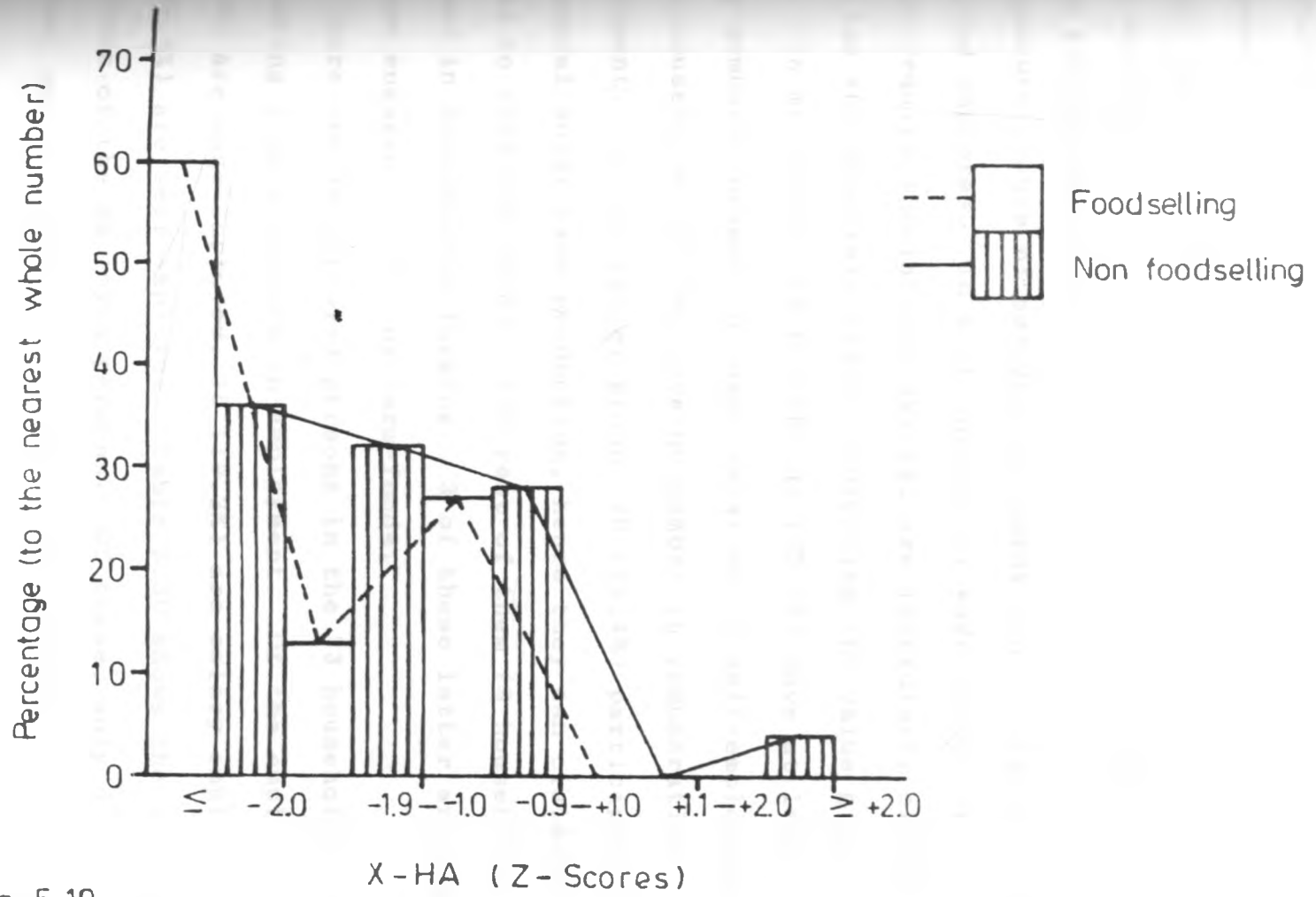


Fig 5.10

HA levels of children from Foodselling and Non foodselling Households.

For our purposes, wage labour can be distinguished from a salaried job in the perspective of terms and nature of service rendered. A salaried worker is contracted to serve on long, albeit temporary terms, or on a permanent basis. Typically, such an employee is paid a monthly salary, although in certain cases facilities for early advances exist. A wage labourer has an insecure tenure of service in comparison to that enjoyed by a salaried employee. In most instances, wage labour opportunities do not require specialized skills, are irregularly offered, and have low and uncertain wages, indicating the value given to the jobs. In my sample, 73 households (72.3%) have at least one of their members engaged in wage, salaried or self-employment. 28 other households (27.7%) have no member in remunerative employment. Of the latter group, 20 (71.4%) participate in commercial sugar cane production, hence they can claim to have access to cash resources. The rest of them (8 households) are engaged in subsistence farming. 3 of these latter are observed to have engaged in selling farm-foods.

There are 78 employed persons in the 73 households - with a few having 2 or 3 members in employment. Of the employed, 42 (53.8%) are wage employed, 15 (19.2%) are salary employed, and 21 (26.9%) are self-employed. Table 5.30 shows the various positions of the employed persons. Of these, only 6 are females; one housegirl, two farm hands, and three petty traders.

Table 5.30 Wage, Salaried and Self-employed Household Members.

WAGE EMPLOYED			SALARY EMPLOYED			SELF-EMPLOYED.		
Position	Freq.	Perc.	Position	Freq.	Perc.	Position	Freq.	Perc
Farmhand	19	45.2	Warder	1	6.7	Trader*	3	14.3
Mineworker	1	2.4	Teacher	7	46.7	Trader**	5	23.8
Ind.worker	6	14.3	Clerk	3	20.0	Ox-Plower	4	19.0
Mechanic	3	7.1	Acc.Clerk	3	20.0	Tailor	5	23.8
Driver	1	2.4	Priest	1	6.7	Carpenter	3	14.3
Waiter	1	2.4				Mason	1	4.8
Porter	1	2.4						
Cane cutter	5	11.9						
Night guard	1	2.4						
Tea-picker	3	7.1						
House-girl	1	2.4						
TOTAL	42	100		15	100		21	100

* - Big traders.
** - Petty traders.
Ind.worker - Industrial worker.
Acc.clerk - -Accounts clerk.

A considerable percentage of the employed are migrants; 80% among the wage labourers, 40% among the salaried, and 61% among the self-employed. This may be attributed to the rural-urban imbalances that characterize the developing nations. This aside, in the case of South Marama and specifically in relation to wage earners, the stringent economy here is unable to create a capitalistic culture to harness and subsequently retain local unskilled labour.

As has already been indicated, salaried workers are favoured in terms of tenure and reliable income flow. Hence, they are in a position to plan and subsequently invest in consumer and non-consumer goods much more than the wage earners. The same can be said about the self-employed who, depending on

their economic pursuits, may, in fact, be more securely placed than the salaried. When gauged against the socioeconomic index scale (Appendix 1), the average score of households with wage workers is 338.2 points (i.e.,"above average" medium socioeconomic status). Among the self-employed, households with big traders score a mean of 362.3 points followed by that of a mason (189.0 points), carpenters (178.3 points), ox-ploughers (168.0 points), tailors (164.8 points), and petty traders (150.5 points) in that descending order.

The potential for employment resources to strengthen purchasing power has already been underscored here. Purchases for the betterment of food security and consequent nutrition is more a matter of cognizant strategy than mere numbers. A high income resource, for instance, may not necessarily be consonant with better nutrition. The rate at which income flows may also have effects on food security. For example, it is evident from the intervals in the purchases of groceries by cane cutters that piecemeal payments provide them with a stable linear purchasing power.

There are two cane cutters in the sub-sample that collected data relative to food purchases. Both are heads of their respective households with each paid KShs. 400.00 on or about the 15th and 30th of the months that their labour is commoditized.

One of the two, Nandwa, is from Shiatsala Sub-location and

oversees a household of 9 members. Data on purchases by Nandwa's household were collected from 14th February to 20th February 1990. Within this period, Nandwa bought foods and additives worth KShs.356.90. On 14th and 15th of February (presumably after payment), his household bought cooking fat and cabbage worth 3% of the total costs. This was apparently done after receiving his bi-monthly pay. Thereafter, from 17th to 20th February, the household purchased some more cooking fat plus sugar (both worth 6% of the costs) and wheat flour and maize worth 13% of the costs. Therefore, there is a tendency within the household to use much more cash on foods after payment is done. This tendency, of a stable linear purchasing position runs for some period of time before being boosted by the second bi-monthly payment.

Although unrelated, the purchases of the second canecutter, Maloba, serves as a sequence to Nandwa's. Maloba's data were collected from 21st February to 27th February 1990. Maloba too comes from Shiatsala Sub-location and has six members within his household. Within the one week duration (i.e. 21st to 27th February), his household purchased grocery worth KShs. 182.80. Between 21st and 24th February, the household purchased cabbage, kale, cowpeas leaves and beans worth 18% of the total costs, fish and meat worth 24.6% of the costs, maize worth 26.8% of the costs, and sugar and curry powder at 6.6% of the costs. Between the 25th and 27th February, the Malobas yet again purchased

maize worth 15.3% of the total costs, cowpeas leaves and a local vegetable variety ("omurere") worth 2.7% of the costs, and sugar and tea leaves worth 5.5% of the total costs.

The purchasing power of the non-employed group is quite expectedly weaker than that of the wage earners. For instance, while KShs. 539.70 was spend between Nandwa's and Maloba's households in 14 days (an average of KShs. 38.55 per day), 8 households of the non-employed in the sub-sample with an average of 7.5 members per household spent KShs. 554.65 in 45 days (average of KShs. 12.33 per day). Households among the non-employed which possessed commercial cane farms spent KShs. 214.30 in 10 days (an average of KShs. 21.43 per day); while those practising subsistence farming spent KShs. 340.35 in 35 days (an average of KShs. 9.72 per day). Households with farmhands, gardeners and other workers performing such like duties (incidentally all are migrants) spent KShs. 1077.60 in 44 days (an average of KShs. 24.50 per day). Their average per day expenditure is minutely higher than that of 2 primary school teachers who spent KShs. 331.70 in 14 days (an average of KShs. 23.70 per day). The former have an average of 6.3 members per household, while the latter have an average of 7.5 members per household.

5.3.1 Employment Resources and Nutritional Status

Anthropometric data were assessed on 25 children from households with the wage employed members, 20 children from those with non-employed members, 9 children from those with self-employed members and 6 children from those with members employed for a salary.

When the nutritional status of these respective groups is compared, those from the salaried and self-employed groups perform best on HA index followed closely by those from the wage employed and, lastly, the ones from the non-employed households who, on the average, are stunted. All the groups have average WH conditions. There is, however, no definite association between these scores and the socioeconomic scores as can be seen in Table 5.31.

Table 5.31 Nutritional Status and Household Socioeconomic Scores of Children from Wage, Salaried, Self and Non-employed.

Category	Freq.	MeanAge	MeanHA	MeanWH	MeanSocioec.
Wage Employed	25	28.1	-1.6	-0.3	185.6
Salary Employed	6	30.4	-1.0	-0.8	258.5
Self-Employed	9	15.0	-1.0	0.1	175.2
Non-Employed	20	28.1	-2.1	-0.1	154.9

Note: MeanHA - Mean Height for Age Z-Score
MeanWH - Mean Weight for Height Z-Score
MeanSocioec. - Mean Socioeconomic Score

It may be simple to argue that given the vulnerability of the HA indicator to the effects of age, the performance of the group from households with self-employed members may be

exaggerated. This argument does not, however, hold in the case of the wage employed and the non-employed groups which tie on mean age. Hence it may be safe to conclude that, at least when taken compositely, children from households with wage employed persons have a headstart over those from the non-employed with regard to long-term nutritional status.

81.8% of the measured children from households with wage employees come from those (households) with migrant labourers. Their mean HA Z-score is -1.6, not significantly different from those households with non-migrant workers whose mean Z-score is -1.3. Households with salaried and self-employed persons whose children were assessed are all non-migrants.

Table 5.32 shows the classification of children from the different categories referred to along nutritional levels in WH, while Table 5.33 shows the same on HA.

Table 5.32 WH Nutritional levels of Children from Wage, Salaried, Self and Non-employed Households

	WAGE			SALARY			SELF			NON		
Nut. Level	F.	%*	Ag*	F.	%*	Ag*	F.	%*	Ag*	F.	%*	Ag*
-2.0 or below	-	-	-	1	16.	9	-	-	-	-	-	-
-1.9 to -1.0	6	24.	31	2	33	24	2	22	8	4	20	15
-0.9 to +1.0	19	76	27	3	50	40	5	56	19	14	70	32
+1.1 to +2.0	-	-	-	-	-	-	2	22	4	4	10	11
+2.1 or above	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	25	100		6	100		9	100		20	100	

Note: F - Frequency
%* - Percent to the nearest whole number
Ag* - Mean age (to the nearest whole number)

Table 5.33 HA Nutritional Levels of Children from Wage, Salaried, Self and Non-employed Households

	WAGE			SALARY			SELF			NON			
Nut. Level	F.	%*	Ag*	F.	%*	Ag*	F.	%*	Ag*	F.	%*	Ag*
-2.0 or below	10	40	41	3	50	35	3	33	29	11	55	30
-1.9 to -1.0	9	36	24	1	17	48	2	22	14	6	30	36
-0.9 to +1.0	6	24	12	1	17	25	4	44	8	3	15	11
+1.1 to +2.0	-	-	-	-	-	-	-	-	-	-	-	-
+2.1 or above	-	-	-	1	17	9	-	-	-	-	-	-

Note: F - Frequency
%* - Percent to the nearest whole number
Ag* - Mean age (to the nearest whole number)

The Gamma measures below show the relationships between the modes of employment with HA:

$$Y = \frac{\text{(No.of concordant pairs) - (No.of disconcordant pairs)}}{\text{(No.of concordant pairs) + (No.of disconcordant pairs)}}$$

(a) Wage labour with HA

$$Y = \frac{11(15) - 10(9)}{11(15) + 10(9)} = \frac{165 - 90}{165 + 90} = \frac{75}{255} = 0.3$$

(b) Salary employment with HA

$$Y = \frac{11(3) - 3(9)}{11(3) + 3(9)} = \frac{33 - 27}{33 + 27} = \frac{6}{60} = 0.1$$

(c) Self-employment with HA

$$Y = \frac{11(6) - 3(9)}{11(6) + 3(9)} = \frac{66 - 27}{66 + 27} = \frac{39}{93} = 0.4$$

(d) Wage + Salary employment with HA

$$Y = \frac{11(18) - 13(9)}{11(18) + 13(9)} = \frac{198 - 117}{198 + 117} = \frac{81}{315} = 0.3$$

(e) Wage + Salary + Self-employment with HA

$$Y = \frac{11(24) - 16(9)}{11(24) + 16(9)} = \frac{264 - 144}{264 + 144} = \frac{120}{408} = 0.3$$

The Gamma measures thus show that in spite of the varying degrees, there is nevertheless a positive relationship between the modes of employment and HA.

Testing of the hypothesis using a chi-square:[11]

Hypothesis: Access to employment opportunities and resultant resources enhances nutritional status of preschool age children.

(a) Wage labour with HA

	Wage Labour (Freq.)	Non-Employment (Freq.)	Total
-2.0 or below	10	11	21
-1.9 or above	15	9	24
TOTAL	25	20	45

Degrees of freedom, df =(r-1) (c-1)
Level of significance =5% (or 95% degree of confidence)
Chi-square = 1.0

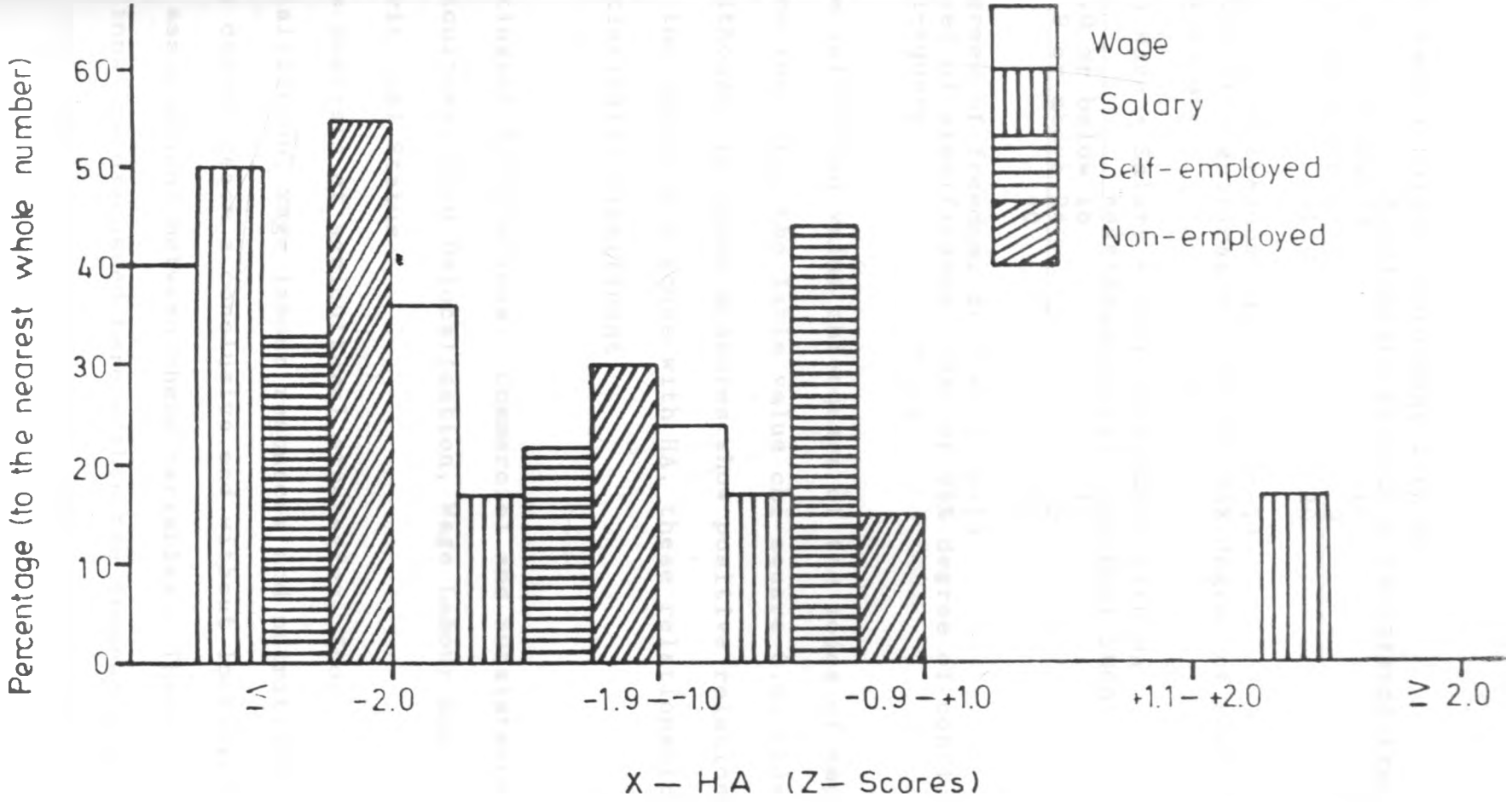


Fig. 5.11. HA levels of children from Households with wage, salary, self and non-employed persons.

(b) Wage + Salary employment with HA

	Wage+Salary(Freq.)	Non-Employment(Freq.)	Total
-2.0 or below	13	11	24
-1.9 or above	18	9	27
	31	20	51

Degrees of freedom, df =(r-1) (c-1)
Level of significance =5% (or 95% degree of confidence)
Chi-square = 0.9

(c) Wage + Salary + Self-employment with HA

	Wage+Salary+Self	Non-Employment	Total
-2.0 or below	16	11	27
-1.9 or above	24	9	33
	40	20	60

Degrees of freedom, df =(r-1) (c-1)
Level of significance =5% (or 95% degree of confidence)
Chi-square = 1.2

The calculated value chi-square of the modes of employment above are less than the Table value chi-square 0.05 (1)= 3.84. Thus, although the Gamma measures show positive relationships between the employment modes with HA, these relationships are not statistically significant.

5.4 Contingent Associations: Commercial and Subsistence Agriculture, Food Delocalization, Wage Labour and Nutritional Status

The analysis of agricultural strategies, food commercialization, wage labour resources and nutritional outcomes cannot reach a conclusive end without looking at partial associations between these variables. These associations are discussed here within the framework of agricultural alternatives pursued by the households.

Each of the independent variables when associated with HA, shows a negative, albeit varying, relationship with this indicator. The mean HA Z-scores for children from commercial and subsistence agricultural households is -2.1 and -1.1 respectively. That of children from households undertaking sales of farmfoods and wage labour is in both cases -1.6. Thus, while the relationship between HA and subsistence agriculture, wage labour and food sales show mild undernourishment, that between HA and commercial agriculture exhibit a stunting level. On the other hand, the relationship between WH and all the independent variables reveals average nutritional status. The mean WH Z-scores for commercial agriculture, subsistence agriculture, foodsales and wage labour are -0.1, -0.3, 0.0, and -0.4 in that order.

The HA indicator succumbs to any partial associations with commercial agriculture. For instance, when commercial agriculture influences the following test-factors, nutritional stunting results: foodsales (mean HA Z-score=-2.0), nonfoodsales (-2.2), wage labour (-2.3), and nonemployment (-2.2). This suggests an asymmetrical relationship between commercial agriculture and poor HA performance. In comparison, the association between subsistence agriculture and food sales shows average HA performance (mean Z-score=-0.9), while that with nonfoodsales, wage labour and nonemployment shows mild undernutrition (mean Z-scores of -1.2, -1.3, and -1.1 respectively).

In contrast to the HA indicator, children's nutritional status measured by the WH index does not accord with the agricultural strategies. Partial associations between subsistence and commercial agriculture and either foodsales, nonfoodsales, wage labour and nonemployment does not indicate any wasting in the children. Overall, the children's short term nutritional status is comparatively better than their long term nutritional status. For instance, only one child among those from the sample households is wasted as against 25 who are stunted.

5.5 Dietary Patterns of the Child, Mother, and Household Members

The quality and quantity of a household's diet is the final determinant of its members' nutritional performance. The diet, on the other hand, is restricted by other considerations such as socio-cultural, environmental, and economic factors whose interplay leads to predictable patterns of food intake. The nutritional condition of the newborn is also influenced by the mother's diet during pregnancy and the postpartum regime.

5.5.1 Mothers' Diet: Pregnancy and Lactation

Although a considerable number of women admitted having foregone or taken special foods during pregnancy and lactation, such decisions are established to be more of economic and personal nature than traditionally sanctioned.

Of the 102 women, 46 (45.1%) avoid eating certain foods during pregnancy. Seven varieties were mentioned by these women, viz, mixed maize and beans ("amenjera"), tea with milk, fish, ""ugali"", eggs and fried vegetables (particularly "sukuma wiki"). Of these foods, fried vegetables are the most frequently avoided. Certain stereotypes are associated with the consumption of fried vegetables during a woman's pregnancy. Women claimed that when eaten, fried vegetables lead to foetal overgrowth which subsequently results in difficulties during delivery.

Table 5.34 shows the frequency of abstinence of the foods mentioned.

Table 5.34 Food Abstinence of Mothers During Pregnancy.

Type of Food	Freq.	%out of 46.	%out of 102.
"ugali"	9	19.6	8.8
Mixed maize and beans	2	4.3	2.0
Beef	6	13.0	5.9
Fried vegetables	14	30.4	13.7
Tea with milk	9	19.6	8.8
Nile Perch("imbuta")	4	8.7	3.9
Anchovies("omena")	7	15.2	6.9
All types of fish	3	6.5	2.9
Eggs	1	2.2	1.0

37 women (35.3%) supplement their normal diet with special foods during pregnancy. Several of these women linked the supplementation to their own nourishment - not with that of their foetus. About 75% of those who took tea with milk maintained that it checks against anaemia (those who abstained

as per Table 5.34 mainly complained of nausea). Table 5.35 gives the frequency in the supplementation of foods mentioned by the 37 women.

Table 5.35 Frequency In the Supplementation of Foods During Pregnancy.

	Freq.	%out of 37	%out of 102.
Ripe bananas	6	16.2	5.9
Cooked bananas	4	10.8	3.9
Beans	1	2.7	1.0
Beef	1	2.7	1.0
Liver	1	2.7	1.0
Assorted vegetables	6	16.2	5.9
Tea with milk	8	21.6	7.8
Eggs	2	5.4	2.0
Fruits	2	5.4	2.0
Tilapia("ingeke")	3	8.1	2.9
Sweet potatoes	2	5.4	2.0
Rice	4	10.8	3.9
Cassava	1	2.7	1.0
Soft drinks	4	10.8	3.9
Bread	1	2.7	1.0
Bread with margarine	2	5.4	2.0
Irish potatoes	4	10.8	3.9
Porridge	3	8.1	2.9
Sugar cane	1	2.7	1.0

Pregnancy imposes considerable strain on the maternal blood forming system. In most instances, the greatest need is for iron and to a less extent, folic acid. Although diets which provide the recommended amount of protein and calories may provide iron and folic acid, other specific sources of these nutrients may be required. Among the richest sources of iron are beef, liver, and egg-yolk, while plant sources include whole wheat and its products. The main source of folic acid are green vegetables, liver and kidneys.

As may be observed in Tables 5.34 and 5.35, beef, a rich source of iron, is more avoided than eaten. Liver and eggs are used as supplements by 1% and 2% of the total respondents respectively. The issue of tea with milk to "generate more milk", as was literally put, is ill-conceived and would be cheaply and valuably replaced by green vegetables.

Another costly blunder resulting from lack of information or misinformation is, for instance, the purchase of sodas with the objective of improving one's health condition. Of the four women who drank soda during pregnancy, two have not had access to formal education while the remaining two terminated schooling at the lower primary level. The former two score 47 and 137 points respectively along the socioeconomic index scale while the latter two score 259 and 287 points respectively. This suggests a linkage between education, socioeconomic status and improper feeding in pregnancy.

Throughout the lactation period, the nursing mother requires her normal diet supplemented with proteins, calcium, kilocalories, fluids and vitamins to enable repletion of lost energy and tissues. The survival of the breastfed baby too largely depends on the health and nutritional state of the mother.

Eight women abstain from eating the following foods for the subsequent reasons: one in each case does not consume chicken, porridge and groundnuts for lack of appetite, while one in each

case does not eat meat and anchovies nor take tea for feeling nauseated. One other does not eat some type of local vegetable ("omurere") as it results in the disappearance of breastmilk; while the last one does not eat tripes; she believes that if she does so, her child's hair stops growing.

Thirty four mothers supplement other foods to their normal diet during lactation. A considerable number of them take tea with milk specifically to generate more breastmilk. Although milk is a rich source of nutrients required by the lactating mother, it works better when undiluted. Understandably, the women have to take it in the diluted tea form as most households do not have adequate milk supplies. Indigenous zebu cows are the most commonly kept animals. The more milk-productive improved grade cattle have been unable to survive here because of their demanding nature in terms of health care and ample food resources - demands which in retrospect have not been met. Table 5.36 represents the distribution of the improved cattle and the indigenous zebu cattle among the sample households. Table 5.37 shows the frequency in the supplementation of foods during lactation.

Table 5.36 Frequency of Households with Grade and Zebu Cattle.

Number	GRADE Frequency	Percent.	ZEBU Frequency	Percent.
1 to 3	1	100.0	33	71.7
4 to 6	0	0.0	8	17.4
7 to 9	0	0.0	4	8.7
10 to 12	0	0.0	1	2.2
TOTAL	1	100.0	46	100.0

Table 5.37 Frequency in the Supplementation of Foods during Mothers' Lactation.

Type of Food	Freq.	%out of 34.	%out of 102.
Tea with milk	28	82.4	27.5
Irish potatoes	2	5.9	2.0
Beef	3	8.8	2.9
Eggs	4	11.8	3.9
Beans	3	8.8	2.9
Fish	2	5.9	2.0
Cooked bananas	5	14.7	4.9
Fruits	3	8.8	2.9
Rice	5	14.7	4.9
Soft drinks	2	5.9	2.0
Vegetables	4	11.8	3.9
Groundnuts	4	11.8	3.9

Although cultural prejudices in the normal diet discriminate against women, they are not that profound as to have any significant effects on their nutritional outcome and, subsequently, that of their children. Food taboos affecting and upheld by a considerable number of the women are restricted to the gizzard ("imondo") and the rear ("eshiasundi") of a chicken, mutton and goat meat. Chicken, though a popular delicacy among the Marama (and in fact the Abaluyia) is however, infrequently eaten by the households (Appendix 5). Mutton and goat meat on

the other hand are traditionally unpopular with the Marama people as a whole.

Proscriptions on the consumption of mutton and goat meat seem to be dying away with time. Women are traditionally prohibited from eating these meats - otherwise their skin develops rashes. However, it was observed that some women, particularly those of the younger generation, would not mind eating the meat. On the other hand taboos relative to the consumption of "imondo" and "eshiasundi" are so entrenched that it goes without saying. 92.2% of the 102 women clearly said that they do not eat these chicken parts, "because women are not allowed to eat them". As for goat meat and mutton, 13.6% and 16.5% of respondents respectively do not eat them.

5.5.2 Children's Dietary Patterns

All the women interviewed were currently breast feeding or had breastfed their children who, at the time of study, were aged five years or below. 33 women (34.3%) supplemented their own breastmilk with cow's milk. No considerable distinction exists in the nutritional status of children who have/had cow's milk supplements and those who do/did not. Both groups suffer mild stunting (HA mean Z-score=-1.3 for the supplemented and -1.5 for the unsupplemented) and have average short term nutritional status (WH mean Z-scores of -0.2 for the supplemented and -0.1 for the unsupplemented).

Most mothers claimed to put their children on weaning foods when they are between 3 and 6 months old. The weanlings are generally given the normal household diet although some mothers complement this with special foods. "Ugali" and porridge prepared from maize flour are the primary weaning foods. To feed the infant with ""ugali"", a small lump is dipped into gravy or soup from some relish, to soften and make it palatable, and then given to the child. The most frequently applied method of feeding the infant with porridge is by cupping one's palm on the child's mouth, then pour the porridge into the cupped palm and level directly into the mouth. Not only is this method unhygienic but it is also strenuous for the child, leaving it with short moments to gasp for breath. Tables 5.38 and 5.39 show the normal weaning foods and the complementary foods that mothers use to feed their children respectively.

Table 5.38 Normal Weaning Foods Given by the Mothers

Type of Food	Freq.	%out of 102 women.
"Ugali"	101	99.0
Porridge	98	96.1
Cooked bananas	12	11.8
Sweet potatoes	11	10.8
Irish potatoes	8	7.8
Tea	6	5.9
Cassava	5	4.9
Beef	1	1.0
Beans	6	5.9
Mixed maize and beans	3	2.9
Eggs	10	9.8
Fish	3	2.9
Rice	2	2.0

Table 5.39 Complementary Weaning Foods used by the Mothers.

	Freq.	%out of 102 women
Irish potatoes	12	11.8
Cooked bananas	8	7.8
Eggs	4	3.9
Ripe bananas	5	4.9
Tea with milk	1	1.0
Fruits	1	1.0
Fish	2	2.0
Groundnuts	1	1.0
Porridge from millet flour	1	1.0
Glucose	1	1.0

A number of the weaning foods including sweet potatoes, cooked bananas, cassava and "ugali", have large cellulose and fibre content, which increases their bulk. A child has therefore to consume large quantities of the foods to obtain its daily requirements. During periods of anorexia which are not uncommon in children aged 6 to 24 months, a child's capacity for eating may be limited and the bulky foods become insufficient. Children who are/were weaned on some of these foods register negative nutritional consequences. The mean Z-score for children weaned on cassava and sweet potatoes is -2.5 in each case. This contrasts with the condition of those weaned on fish (-1.1), eggs (-1.4) and Irish potatoes (-1.0).

Taboos on diet relative to children are apparently not observed. According to the area's nutritionist, this change has been possible through deliberate efforts to educate mothers on the vices of such taboos.[12] Though worthy of applause, this measure of cognition is merely aimed at the absolute and more

institutionalised traditional dos and don'ts in eating mannerisms. Other conventionally upheld food distributive norms but with no traditional backup have yet to be eliminated. For example, it is normal to give children less fleshy and nutritious parts of a chicken such as the limbs, neck, and head, or the nonfleshy caudal fins of a fish; while the older members enjoy the thickly fleshed and nutritious parts.

5.5.3 The Households' Dietary Patterns

The diet of the present Marama people is a product of a number of considerations including tradition and change, environment, economics, access to cash resources, and the availability of the foods. This is the general impression arrived at after a sub-sample of 26 households collected data on their diet for a total of 167 days - a mean of 6.4 days per household (Appendix 5).

The conventional frequency of eating meals is three times a day. This however depends on convenience and the capacity of each of the households to provide the meals. For the farmer who rises up as early as 4.30 a.m. to go to the field, he may forego breakfast and come back for an early lunch (about 11.00 a.m. or 12 noon) or alternatively, he may have a mid-morning or mid-day breakfast but then forego lunch.

The principal breakfast meal is either tea ("ichai") or porridge ("obusera"), which may be taken with a relish from the

household farm such as bananas ("amaramwa"), sweet potatoes ("amapuoni"),a mixture of cooked maize and beans ("amenjera"), or cassava ("emioko"). Other relishes consumed but externally procured are bread ("omukate"), buns ("amandasi") and "chapati" prepared from wheat flour.

Porridge, the most important breakfast meal is in most cases prepared from maize flour. At other times it may be made from the more nutritious millet flour. The virtual absence of the improved dairy cattle (Table 5.34) restricts most households to taking strong tea ("ituringi") which has limited nutritional value. "Ituringi" is usually spiced with some herbal grass which makes it tastier. On the whole, of the 167 days, breakfast was not taken by 6 households for 17 days (10.2% of the total).

Of the 315 meals for lunch and supper served to the household members, 214 (67.9%) comprised "ugali". "Ugali" which is largely water and maize, sorghum, and cassava flour, contains calories, protein, vitamins and minerals but is very bulky (Appendix 6). Vegetable relish is popularly served to go with "ugali". Vegetables contribute 65% of the relishes served. The other popularly consumed relish is fish, which makes up 11.7% of the total. While kale is rich in a variety of vitamins (including C, K, and B2), fish is rich in proteins and vitamins A, D, K, and B3.

Apart from "ugali" and the associated relishes, other meals consumed include cassava, sweet potatoes , cooked bananas, "amenjera", and cooked beans, among others. These meals are at times served with tea or porridge. The contribution of these meals to the total 315 is as follows: cassava 7.9%, "amenjera" 4.8%, bananas 4.1%, sweet potatoes 3.8% and beans 2.2%. Since they are bulky, the foods have to be consumed in generous quantities to meet the required values (except beans which have a high kilocalorie content compared to maize and cassava, for instance).

The majority of the households (51.0%) dine together as a unit. 26.5% of the households dine in groups along gender lines. This is mostly the case when the household has adolescent children. In 23.5% of the cases, the mother eats with children while the father eats alone. This is characteristic in polygynous households and those with young pre-adolescents. This arrangement favours the father whose frequency in 'visiting' the vessel with food is unchallenged while on the contrary, a competitive situation rages in the mother-children feeding unit.

5.6 Summary

In Chapter 4, we took note of the sizeable average number of persons per household and subsequently underscored the necessity to have a strong food base to satiate the numbers. In

this chapter we find an incongruent association between the average output from the agricultural plots and that of persons per household. Therefore, on the whole, a general pattern of "involutionary growth" seems to prevail - where production is eaten up by the number of mouths to be fed. Comparatively, commercial farmers are observed to possess a weaker food base than the subsistence farmers. An apparent sequence to this is a poor show of nutritional standards among children from commercial agriculture households.

Against expectations, commercial farmers are observed to be active participants in commercialization of household food resources. From this we inferred that sugar cane production is more resource-diminishing than resource-generating as is expected. The demands put upon sugar cane crop management prior to payments is suggested to put the farmer in a vulnerable position to cycle debts from vulturous shysters. Though not statistically significant, we, however, note a negative association between HA and sales of farm foods. It is also noted that the contradictions involved in delocalizing and inversely importing maize results in a poor HA performance.

On employment, it is noted that access to resources from any of the employment modes (wage, salary or self) is a major contributory factor in enhancing nutritional standards. The rate at which income from employment flows is also observed to have a relationship with household food security.

Finally, the chapter concludes by examining the dietary patterns of the household units. It is observed here that traditional food taboos upheld by the units are not significant enough to create adverse effects on their nutritional outcome.

FOOTNOTES

1 Interview with Chief Geoffrey Okoti Namayi of South Marama location, 14/2/1990.

2 Ibid

3 Ibid

4 Interview with Babu Masaba, Agricultural Extension Officer, South Marama Location.

5 Conversation with Mr.Andrew Obanda, headmaster Manyala Secondary School, 20/2/1990.

6 Interview with Chief Okoti Namayi.

7 Interview with Akello Adwera, a Building Economics undergraduate student who comes from South Marama.

8 The cut-off point for MUAC is 13.5 cm. Over 13.5 implies normal to good nutritional status.

9 Interview with Chief Okoti Namayi.

10 Conversation with Mr.Andrew Obanda.

11 The chi-square is inapplicable in testing units in the salaried and self-employment categories per se due to their insufficient numbers.

12 Interview with Mrs. Mary Shiundu, nutritionist, Butere Health Centre, 15/3/1990.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The thesis of this study is to investigate certain parameters within the wider socioeconomic realm which determine the nutritional outcome of pre-school age children in Butere. To achieve this, baseline data were collected in South Marama location over a period of three months. Methodologically, an anthropological approach was employed and considerable emphasis put on observed events. An attempt has been made to integrate narratives of some of these observed data in the analysis. However, as the gist of the problem is essentially technical, much quantification has been made to validate certain contentions made here.

The conclusions of this study are made along the themes investigated:

(A) Socioeconomic Differentiations: The differences in the socioeconomic status of the households investigated is a theme that runs throughout this study. Gradations of the socioeconomic status of the households were done using material inventory, educational, and occupational indices. The distributions of the points scored by the households along these indicators results in a positive skew of SK= 0.82. This

testifies on the extent of economic inequalities among the sample households; 3.9% of them are located within the high socioeconomic category of the scale, 17.6% of them within the medium category, and 78.4% of them in the low category.

One of the objectives of setting up the Mumias Sugar Company was to improve the living standards of the surrounding population through employment and their participation in the production of sugar cane for cash (Barclay 1977). In the case of South Marama location, the situation remains paradoxical as households involved in commercial sugar cane production are outdone by those in subsistence farming in terms of socioeconomic status. If sugar cane production rewards in terms of cash benefits, then evidently these (benefits) are not translated into material resources such as are employed to measure wealth here. These findings underline the risks involved in full dependency on the market economy, and necessitate the relevance in conceiving uncertainities in associating the general market sector with improvement in living standards.

The invariable link between the socioeconomic status found in this study is contrary to the contentions in other works (Berg 1975, Gatundu 1977, Hoorweg 1981, Kithinji 1985, Latham 1969, Mukolwe 1977, Wandatti 1984). An asymmetrical relationship between a high socioeconomic class and positive nutritional outcome as subscribed by these studies depends on

whether or not the households' favoured position is used to improve the food security situation within them. In the case of South Marama, although the households in the medium socioeconomic category use more cash on purchases of food items than those in the low category, most of it is directed towards nonessential addititives than towards quality foods (5.2.1). The amount of cash used by the households in the medium category is further neutralised by their larger membership (average 7.2 persons per household) than those of the low category (average 6.6 persons per household).

(B) Agriculture: Quite plainly, agriculture has a strong influence on nutritional outcomes in a rural community. This influence flows pyramidically from a nation's agricultural policy down to the household agricultural strategy; the latter being more often than not determined by the former.

In this study, commercial production of sugar cane is an agricultural strategy found to be adopted by a substantial number of households in South Marama. This mode of agriculture is adopted with the objective of generating income to improve the living standards of the participants. These findings however reveal that not only is sugar cane production unable to significantly elevate the socioeconomic status of households involved in its cultivation, but also adversely affects the food security of these households, subsequently resulting in poor nutritional standards of the units in them.

That commercial production of sugar cane results in poor nutritional performance is much more conventional than a strange phenomenon. Owinyi (1977) and Barclay (1977) say the same in relation to sugar cane growers in Mumias, while Wandatti (1984) concurs in his study among the Nzoia sugar cane farmers. Olenja (1988) and Fleuret et al.(1982) make similar generalizations in reference to sugar cane production. However, Kennedy (1988) sees no distinction in the nutritional standards of the children from sugar cane growing households in Awendo, South Nyanza. Sugar cane production may nullify positive nutritional outcome; but that may not be so with all commercial crops as Fleuret and Fleuret (1982) found out in relation to coffee and vegetable production in Taita, Kenya.

In the case of South Marama, two causative factors may be said to be instrumental in the nullification of a positive relationship between commercial sugar cane production and nutritional status:

(1) The farmer-originated cause: Although this applies to both subsistence and commercial farmers, the latter are much more victims of this factor.

Both commercial and subsistence farmers are, understandably, constrained by having small landholdings - primarily as a consequence of population pressure. However, the commercial farmer with a relatively bigger proportion of the cultivated and uncultivated land than the subsistence farmer,

puts less of his land under food production but more under sugar cane production (5.1.1). Moreover, his small food plot is not under intensive cultivation and, consequently produces a low yield. The subsistence farmer, with a relatively bigger average size of land under food crops, additionally makes more use of manure and/or artificial fertilizers than does the commercial farmer. Consequently, he has the potential to improve his household food situation with an expected higher yield.

(2) The crop-originated cause: The first cane crop takes two years to be ready for harvest with subsequent ones taking eighteen months. Sugar production is both capital and labour intensive. To adequately meet these demands, the sugar cane farmer incurs substantial debts, often from ready shysters at a 100% interest rate. To sufficiently service the debts incurred, the farmer may have to use the entire payment of the delivered sugar cane. This way, debts are cycled and recycled.

This trickles down to the food sector where, as observed in (5.2), the cash crop farmer is an active participant in the sale of farm foods in order to subsist. Thus, the food security in the farmer's household is further aggravated (his farm's low yield not withstanding) resulting in poor nutritional standards among the vulnerable group within it.

(C) Food Delocalization: Primarily resulting from factors such as poor agrarian management and the constraints imposed by the small landholdings, food output from households is far below

the expected level. This in itself does not augur well for the food security within the households. Inspite of this, 44.1% of the households engaged in the sales of farm foods in exchange for cash, hence further undermining the food situation. Poor economic performance among a big cross-section of the households is definitely instrumental in their participation in this injurious business with the intent of meeting other subsistence demands. The result of this nullifies positive nutritional outcome as, in effect, the households resort to purchasing low quantity and quality foods in place of the ones delocalized.

(D) Employment Resources: It has variously been argued that income is a major determinant of diet quality and quantity (Chaiken, 1988; Connelly and Chaiken, 1987; Fleuret and Fleuret ,1991; Wandatti, 1984). These findings concur with the contentions in the above cited studies. Children who come from households whose member(s) has/have access to wage, salaried, and self-employment perform better nutritionally than those with none of the members employed.

Children from households accessible to income from sugar cane production nevertheless manifest poorer nutritional standards than those who do not come from such households (i.e.,from subsistence households). Relative to farming systems therefore, access to income from cash crops grown plays a secondary role to the strategies employed in exploiting the

agricultural modes open; if positive nutritional outcome has to result.

(E) Dietary Patterns: Shah and Froberg (1978) associate poor nutritional outcome in the region covering South Marama with low preference for high density foods. Cassava, bananas (Fleuret et al. 1982), "ugali", sweet and Irish potatoes (Olenja 1988) are primarily used as weaning foods. The findings in South Marama are in consonance with these conclusions. They reveal that children weaned on cassava and sweet potatoes experience a greater degree of stunting. There is an apparent linkage found between non or poor educational standards, low socioeconomic status, and improper feeding patterns. And finally, there are no food taboos upheld that may significantly affect child nutritional status.

6.2 Recommendations

In view of the findings in this study, the following recommendations are given:

(A) The rate and pattern of agricultural development are critical factors influencing the success of efforts to eliminate nutritional problems. This depends on simultaneous expansion in food production and increases in productive capacity to enable households to raise food consumption.

At the national level, it is therefore paramount for the government designers to pursue "unimodal" strategies for

agricultural development aimed at progressive modernisation of the entire agricultural sector rather than a "bimodal" strategy which concentrates on more rapid increases in productivity and output within a sub-sector of large-scale and inappropriately capital-intensive farm enterprises.

In the case of South Marama, such a policy would ensure a progressive phasing out of low mechanisation and technology presently in existence; to give way to more superior and appropriate types that would ensure higher productivity and consequently, better nutritional standards. For instance:

(1) Much more emphasis should be put on the use of the ox-plough which is less laborious and covers a wider area within a shorter time than the hand-hoe.

(2) There is need to utilise cheap and locally available manure (dung or compost) in preference to the more costly artificial fertilizers. The use of manure should nevertheless be applied in the technically recommended way so as to get optimum results.

(3) The use of hybrid seeds which have a higher productive capacity ought to be more emphasized. However, as has been pointed out in reference to maize seeds (5.1.1), such a move is bound to meet a barrier since the local people tend to prefer the "obusuma" prepared from the flour of indigenous maize. Therefore, this is a challenge to not only the change agents who need to educate the people on the need to adapt to the new

technology, but also to the researchers who ought to respond to tastes that go with the people's rythmn of life.

(4) Virtually all livestock owners (97.8% in the sample) keep the indigenous zebu cattle (5.5.1) which although adapted to local conditions, are, however, of little value in so far as milk production is concerned. Indeed pure breed cattle are more demanding in terms of management; they require optimal feeding and veterinary services. Cross-breeds, a more or less intermediate technology, may be able to withstand lesser extreme conditions and hence would be more appropriate for the South Yarama farmers.

The proposals above may be facilitated if the local leaders and innovators take advantage of the nearby Bukura Institute of Agriculture in the education and demonstration of agricultural methods to the farmers.

(B) As most of the prevalently grown crops are low density and essentially bulky, there is need to strenghthen and reorient agricultural research and extension programmes so as to influence the outcome of new high density and productive foods to be grown.

In the same vein, there is need to educate the people to modify their dietary and culinary patterns so as to integrate and emphasize on quality foods presently in existence but apparently less consumed (as is the case with anchovies and groundnuts).

(C) The practice of broadcasting seeds with the hope that the more sowed the more bounteous the harvest is, to say the least, anachronistic and ought to be discarded. Secondly, although of no apparent consequence is the belief that scattering nutshells with expectations of good harvest (5.1.3) breeds fatalism. Local leaders and innovators are therefore called upon to make deliberate and concerted efforts to educate the people against depending on these practices.

(D) It is also of prime importance that farmers should be educated on the need to prepare their agricultural plots for sowing long before the rains are expected. For those who can afford it, this minimizes competition for the scarce ox-ploughs and labour in existence, and is, in fact a major step in proper agricultural management.

(E) Cash crop production is adopted by farmers primarily because it is expected to generate income which raises their standards of living. The results of this study reveal that sugar cane production has not only failed in significantly improving the living standards of the households undertaking it, but it also has adverse effects on the nutritional status of children in such households.[13] In view of these findings, the following recommendations are made:

(1) That for those households undertaking cash production of sugar cane, there should be a specified minimum hectareage of land under foodcrops which ought to run parallel to the

household size. Land under foodcrops should be sizeable enough to produce at least reasonable harvests during times of adverse weather conditions. For instance, considering the size of landholdings in the area, the following hypothetical format could be applied:

Household Size	Minimum Size of Land
1 to 3 members	1.2 hectares
4 to 6 members	2.0 hectares
7 to 9 members	2.8 hectares
10 to 12 members	3.6 hectares

In this case, households with less than 3 hectares of land should not be encouraged to grow sugar cane. Such arrangements can be done with the assistance of local leaders, extension officers, and the cooperation of the agro-industries.

(2) Low or interest-free loan facilities, particularly in the form of services should be open to the sugar cane growers through their customers. This will ensure that farmers are not exploited by the locally based unscrupulous money-lenders.

(3) There is need to introduce less capital-intensive cash crops that reward more handsomely. In this regard, the feasibility studies being carried out on coffee and french beans production are very welcome. However, coffee production is only profitable, in terms of offsetting costs, labour, and inputs if and when a farmer grows over 1000 trees or so.[14] A farmer has also to wait for three to four years to see the first returns.

A noble suggestion was given by a local leader:[15] that a groundnut oil factory should be established within or at the precincts of the location. Such a factory would result to mass production of groundnuts by farmers which as a valuable foodcrop (in terms of nutrient density), will find much use in home consumption. Such a factory will in addition create ample employment opportunities which are an important necessity for income and better nutrition.

(F) The central government should reconsider the restrictions on inter-district maize transfers so as to allow competition between maize dealers. A high supply of maize would inevitably result in low retail prices.

(G) In South Marama location, as is the case with other agricultural communities, women are the active participants in farming and other economic activities. Women should therefore be the main target group for any intervention programme or change policies. In my observations, virtually no women attended "barazas" organised by the Chief, his assistants, or the village "amakuru". "Barazas" constitute the main fora for facilitating institutional change, yet women are left out of them!

It may be that the non-participation of women in such meetings is constrained by cultural and attitudinal factors, or by time. In that case, women should be reached through non-formal groupings or meetings where their rate of attendance

is known to be high, such as churches, women group meetings, funerals or wedding groups, and so on.

(H) South Marama is much wanting in terms of extension services - in both nutritional and agricultural fields. Only one nutritionist stationed at the Butere Health Centre presently serves the entire Butere Division. In the agricultural sector, there is one extension officer who caters for both East and South Marama locations.

In the nutritional field, the locational leaders may make their contribution by identifying a number of women within it who can be trained as Community Health Workers (CHW) at the Butere or the nearly complete Manyala Health Centre, or any other institution for that matter. This will play a pivotal role in providing basic nutritional information and health therapy to the community. Further assistance may be sought through relevant non-governmental bodies in the training and kitting of workers.

(I) South Marama has no single Youth Polytechnic. The establishment of such an institution should come high on the agenda of local developers. A Youth Polytechnic will not only occupy young men and women[16], it will also shape them into artisans and craftsmen and, consequently, give them access to employment resources.

(J) Finally, as a result of the compounded problems in the area (which include unsafe water and poor sanitation, poverty,

high population density and, of course, malnutrition), there is need for an approach which is designed to further multiple goals of achieving self-sustaining growth, reducing poverty, improving nutrition and health, and slowing the rate of population growth. However, as these goals are essentially designed at the national level, a three-pronged programme can be narrowed as feasible in South Marama. This integrated programme should be able to promote health, nutrition, and Family Planning services.

In arguing that high priority should be given to nutrition, health and Family Planning services, we note significant complementaries among these three activities. Indeed they are mutually reinforcing in the sense that each activity increases the attractiveness and effectiveness of the others. Thus an integrated approach to the delivery of nutrition, health and Family Planning services can be expected to have especially significant effects in directly reducing nutrition and health deprivations and at the same time facilitate the achievement of those and other development goals by slowing the population growth.

FOOTNOTES

1 These results, that commercial sugar cane production has no positive significance on the living standards of the households concurs with Chief Okoti Namayi's (of South Marama location) contention. He associates this to the small landholdings whose sugar cane carrying capacity is in effect uneconomic for cash production.

Headmaster Andrew Obanda of Manyala Secondary School is of the view that heavy debts incurred by most sugar cane growers has adverse effects on their living standards.

2 Presently, the coffee industry in Kenya has been considerably affected by management wrangles to the detriment of its development. A number of farmers particularly in Central Kenya, are known to have uprooted their coffee trees claiming to be disadvantaged by this economy.

3 Chief Okoti Namayi.

4 Chief Namayi lamented on the high numbers of idle young men in his location. The young men, he went on, were the potential recruits to the notorious "Angola-Msumbiji" terror gang operating in the area.

Appendix 1. Distribution of Points Scored by Households on Socioeconomic Scale.

Scores	Freq.	Scores	Freq.	Scores	Freq.
644	1	217	1	129	1
549	1	212	2	127	2
537	1	207	2	124	3
509	1	199	2	122	1
412	1	197	1	117	1
409	1	194	1	114	1
389	2	192	1	112	1
354	1	189	4	109	1
329	1	187	1	107	2
319	1	182	1	104	2
309	1	174	4	102	5
307	1	172	1	89	1
304	1	169	1	84	2
294	1	167	2	82	1
287	2	157	1	72	1
274	1	155	1	67	1
264	1	154	2	64	1
259	2	152	1	62	1
252	1	149	3	54	1
237	1	147	1	49	1
234	1	144	2	47	1
230	1	140	1	44	1
229	2	137	1		
224	1	134	1		
222	2	132	2		

Mean=193.0
Mode=102.0
Median=170.5

Appendix 2. Frequency and Cash used in Purchases of Foods and Additives.

Foodstuffs	Freq.	AMOUNT OF CASH(KSHs.Cts.) Total	Mean	SD
Milk	22	167.10	7.59	3.98
Fish	17	327.00	19.23	7.63
Meat	14	392.00	29.42	9.99
Kale("sukuma wiki")	12	72.90	6.07	2.77
Maize	11	918.20	83.47	132.47
Maize Flour	10	295.75	29.75	12.77
Assorted Vegetables	20	78.00	3.90	1.92
Bread	9	64.40	7.15	3.30
Eggs	4	19.10	4.77	0.60
Buns("mandazi")	1	2.40	2.40	0.00
Chicken	1	55.00	55.00	0.00
Biscuits	1	4.00	4.00	0.00
Rice	2	34.00	17.00	7.00
Bananas	2	55.00	27.50	2.50
Oranges	2	12.00	6.00	4.00
Irish Potatoes	3	38.00	12.66	8.80
Mangoes	1	5.00	5.00	0.00
Glucose	1	4.50	4.50	0.00
Wheat Flour	3	73.70	24.56	6.32
Anchovies("omena")	4	17.00	4.25	2.20
Ripe Bananas	3	8.50	2.83	1.50
Beans	2	33.00	16.50	1.50

Additives	Freq.	Total	Mean	SD.
Sugar	36	380.50	10.56	4.61
Cooking Fat	20	174.75	8.73	5.60
Salt	7	14.90	2.12	0.20
Tea Leaves	7	30.10	4.30	1.09
Curry Powder	1	6.90	6.90	0.00
Onions	4	11.00	2.75	1.90
Blue Band(margarine)	1	20.60	20.60	0.00
Tomatoes	2	6.00	3.00	1.00

Appendix 3. Purchases of Foods and Additives by Households in the Medium and Low Socioeconomic Status.

	MEDIUM SOCIOECON.				LOW SOCIOECON.			
Foodstuff	Freq.	%	KSh.Ct.	%	Freq.	%	KSh.Ct.	%
Milk	12	54.5	101.45	60.7	10	45.5	65.65	39.3
Fish	8	47.0	124.00	37.9	9	53.0	203.00	62.1
Meat	4	28.6	80.00	20.4	10	71.4	312.00	79.6
"Sukuma wiki"	4	33.3	15.00	20.6	8	66.6	57.90	79.4
Maize	0	0.0	0.00	0.0	11	100	918.20	100
Maize Flour	3	30.0	71.35	24.1	7	70.0	224.40	75.9
Vegetables	4	20.0	18.00	23.1	16	80.0	60.00	76.9
Bread	5	55.6	30.10	46.7	4	44.4	34.30	53.3
Eggs	0	0.0	0.00	0.0	4	100	19.10	100
Buns	0	0.0	0.00	0.0	1	100	2.40	100
Chicken	1	100	55.00	100	0	0.0	0.00	0.0
Biscuits	0	0.0	0.00	0.0	1	100	4.00	100
Rice	0	0.0	0.00	0.0	2	100	34.00	100
Bananas	2	100	55.00	100	0	0.0	0.00	0.0
Oranges	1	50.0	10.00	83.3	1	50.0	2.00	16.7
Irish Potatoes	1	33.3	25.00	65.8	2	66.6	13.00	34.2
Mangoes	1	100	5.00	100	0	0.0	0.00	0.0
Glucose	1	100	4.50	100	0	0.0	0.00	0.0
Wheat Flour	1	33.3	15.70	21.3	2	66.6	58.00	78.7
Anchovies	1	25.0	6.00	35.3	3	75.0	11.00	64.7
Ripe Bananas	1	33.3	5.00	58.8	2	66.6	3.50	41.2
Beans	0	0.0	0.00	0.0	2	100	33.00	100
Additives	Freq.	%	KSh.Ct.	%	Freq.	%	KSh.Ct.	%
Sugar	8	22.2	87.00	23.0	28	77.8	292.90	77.0
Cooking Fat	7	35.0	105.35	60.3	13	65.0	69.40	39.7
Salt	3	42.9	5.00	33.6	4	57.1	9.90	66.4
Tea Leaves	2	28.6	10.00	33.2	5	71.4	23.20	66.8
Curry Powder	1	100	6.90	100	0	0.0	0.00	0.0
Onions	2	50.0	8.00	72.7	2	50.0	3.00	27.3
Blue Band	1	100	20.60	100	0	0.0	0.00	0.0
Tomatoes	1	50.0	2.00	33.3	1	50.0	4.00	66.7

Appendix 4. Botanical Names of Local Vegetables.

Local Name	Botanical Name
Tsimboka	Amaranthus dubius
Likhubi	Vigna unguiculata (L)
Lisebebe	Cucurbita siceraria
Litoto	Amranthus hybridus
Omurere	Amaranthus sp.
Emiroo	Crotalaria recta
Lisutsa	Solanum nigrum
Lisaka	Gynandropis gynandra

Appendix 5. Meals Consumed by Households in the Sub-sample.

(a) Breakfast

Meal	Frequency
Tea only	20
Tea/bread	7
Tea/sweet potatoes	10
Porridge only	53
Porridge/sweet potatoes	3
Tea/"amenjera"	8
Porridge/"amenjera"	3
Tea/cassava	6
Porridge/cassava	5
Tea/cooked bananas	16
Porridge/cooked bananas	3
Tea/groundnuts	2
Tea/chapati	2
Tea/eggs	2
Tea/buns	6
Tea/yams	2
Porridge/yams	1
Porridge/groundnuts	2
Tea/rice	1
TOTAL	152
No breakfast	16

(b) Lunch and Supper

Meal	Lunch(freq)	Supper(freq)	Total(freq)
"ugali"/"lisebebe"	0	1	1
"ugali"/fish	14	11	25
"ugali"/"likhubi"	12	7	19
"ugali"/kale	23	27	50
"ugali"/"omurere"	5	10	15
"ugali"/beef	9	10	19
"ugali"/chicken	1	2	3
"ugali"/assorted vegetables	18	25	43
"ugali"/cabbages	6	6	12
"ugali"/beans	2	3	5
"ugali"/greengrams	2	2	4
"ugali"/eggs	5	3	8
"ugali"/tripes	1	0	1
"ugali"/"omena"	4	5	9
Tea/sweet potatoes	2	4	6
Tea/cassava	6	6	12
Tea/yams	2	0	2
Tea/"amenjera"	4	4	8
Tea/beans	2	4	6
Tea/cooked bananas	3	4	7
Porridge/sweet potatoes	1	0	1

Lunch and Supper	Lunch(freq)	Supper(freq)	Total(freq)
Porridge/cassava	1	2	3
Porridge/beans	1	0	1
Porridge/cooked bananas	1	1	2
Sweet potatoes	3	2	5
Cassava	6	4	10
Yams	1	0	1
"Amenjera"	2	5	7
Cooked bananas	4	0	4
Porridge	8	4	12
Porridge/irish potatoes	1	0	1
Rice/chicken	1	1	2
Rice/beef stew	2	1	3
Rice/irish potatoes	1	1	2
Rice/fish	1	0	1
Rice	0	1	1
Rice/beans	0	1	1
Beans/chapati	0	1	1
Chapati/beef stew	1	0	1
Chapati/tea	0	1	1
TOTAL	156	159	315

No lunch - 11
No supper - 8

Note:"amenjera" - a mixture of cooked maize and beans

Appendix 6. Nutritional Values of some Foods consumed in South Marama (composition in terms of 100 grams edible portion)

Food	1*	2*	3*	4*	5*	6*	7*	8*	9*
1.BEVERAGES									
Porridge(from fresh maize)	76	1.8	0.8	15.6	4	-	0.6	-	-
Porridge(from sour maize)	-	-	-	-	-	-	-	-	-
Tea	-	-	-	-	-	-	-	-	-
Cow whole milk	79	3.8	4.8	5.4	143	95	-	80	0
Cow skim milk	39	3.5	0.8	4.4	-	-	-	-	0
Cow sour milk	-	-	-	-	-	-	-	-	-
Human milk	268	1.1	3.1	9.1	32	18	-	-	-
2.CEREALS/PRODUCTS									
White bread	261	7.7	2.0	51.7	37	95	1.7	0	0.3
White maize	357	9.4	4.2	73.6	16	220	3.6	5	1.9
Yellow maize	364	10	4.8	73.6	13	219	4.9	100	2.0
Maizemeal (a)	368	9.4	3.3	74.1	18	178	3.3	-	1.0
Maizemeal (b)	353	9.3	3.8	73.4	17	218	4.2	25	1.9
3.STARCHY ROOTS & TUBERS									
Ripe bananas	88	1.5	0.1	20.6	9	21	1.4	120	0.9
Cassava (c)	124	0.9	0.1	29.9	-	-	-	-	0.4
Yams(raw)	119	1.9	0.2	27.8	52	61	0.8	-	0.8
Potatoes (c)	84	2.0	0.1	19.4	11	56	0.7	-	0.4
4.GRAINS,LEGUMES & PRODUCTS									
Cooked cowpeas	143	6.2	5.7	18.1	23	124	1.8	-	1.2
Groundnuts	595	23.2	50.9	21.7	42	354	-	-	3.2
Cooked beans	50	1.7	3.2	5.5	42	36	0.8		0.9
5.VEGETABLES									
Cowpea leaves	-	-	-	-	-	-	-	-	-
Kale	43	3.5	0.8	7.7	132	77	1.3	900	1.6
Pumpkin leaves	27	4.0	0.2	4.4	477	136	0.8	3600	2.4
6.FRUITS									
Guavas	64	1.1	0.4	15.7	24	31	1.3	290	5.3
Mangoes	60	0.6	0.2	15.8	24	22	1.2	-	0.9
7.MEAT & POULTRY									
Cooked beef	172	22.6	8.0	0	16	-	2.8	-	0
Chicken	146	20.5	6.5	0	10	206	1.1	-	0
11.FISH									
Smoked "omena"	309	55.8	7.8	-	2680	-	-	-	-
Raw "omena"	99	21.0	1.0	0	-	-	-	-	0
Raw nile perch	107	21.9	1.5	0	89	137	4.1	-	0
Dried.....	420	70.0	13.4	0	170	662	-	-	-

1* Energy value (calories) 2* Protein (grams) 3* Fat (grams) 4* Carbohydrates (grams) 5*Calcium (milligrams) 6* Phosphorous (milligrams) 7* Iron (milligrams) 8* Carotene (micrograms) 9* Fiber
(a) sifted (b) unsifted (c) cooked

Appendix 7.Recording Schedule/Questionnaire Sample

Recording Schedule on Household Census

1.Sub-location..... 2.Village..... 3.Household No..... 4.Name of Husband..... 5.Name of wife.....

6.Are there co-wives in the household? - Yes(tick) Number.....
No (tick)

7.If so, where do they stay? At home.....
Out of the home....

8.What is the total number of people within this household?.....

9.Information on the Husband and Wife

	Husband	Wife
Age.	.....	.....
Education		.....
Occupation.....		.....

10.Information on Children of the First Wife

Name	Age	Married?	Residence	Occupation
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

11.Information on Children of the Second Wife

Name	Age	Married?	Residence	Occupation
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

12.Information on the Children of the Third Wife

Name	Age	Married?	Residence	Occupation
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

13.Crops Grown on the Household Land

Cash crops	Acreage	Why Grown?
.....	.....	.....
.....	.....	.....
.....	.....	.....

Food Crops	Acreage	Why Grown?
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

Recording Schedule on Material Inventory

1.Information on the Dwelling Houses of the Household

	House	Kitchen	Other.
Type of roof	.....	.....	.....
Type of wall(mud,brick,block)	.....	.....	.....
Type of floor(cement,mud)	.....	.....	.....
Number of wooden windows	.....	.....	.....
Number of glass windows	.....	.....	.....
Number of rooms in the house	.....	.....	.....

2.Information on Household Durables.

	No	Yes (tick as appropriate)
Torch	.....	.....
Hurricane lamp	.....	.....
Pressure lamp	.....	.....
Iron bed	.....	.....
Radio	.....	.....
Record player	.....	.....
Cassette player	.....	.....
Television	.....	.....
Charcoal burner	.....	.....
Pressure stove	.....	.....
Bicycle	.....	.....
Car	.....	.....
Water tank	.....	.....
Water tap	.....	.....
Sideboard	.....	.....
Sewing machine	.....	.....
Gas cooker	.....	.....
Posho mill	.....	.....
Sofa set	.....	.....
Motor bike	.....	.....

3.Information on Livestock belonging to the Household

Type of Livestock	Number	Owner	Reason for keeping livestock
Grade cows	.....	.....	.....
Indigenous cows	.....	.....	.....
Goats	.....	.....	.....
Sheep	.....	.....	.....
Poultry	.....	.....	.....
Donkeys	.....	.....	.....

Recording Schedule on Off and Non-farm Employees

1.Information on Household Members performing Casual Jobs

Name	Occupation	Place of Work	Residence	Income
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

2.Information on Household Members performing Salaried Jobs

Name	Occupation	Place of Work	Residence	Income
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

3.Information on Household Members on Self-employed Jobs

Name	Occupation	Place of Work	Residence	Income
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

Recording Schedule on Agricultural Information

1.Household number..... 2.Name of farmer.....

3.Name of landowner.....

4.Size of land..... 5.Has the land been registered with the land board?..... 6.Does the owner have a title deed?.....

7.How did the farmer obtain the land?

	Yes	No
The land was allocated to him by the father	.....	.....
The land was allocated to him by the mother	.....	.....
The land was allocated to her by the husband	.....	.....
The land was allocated to him by the wife	.....	.....
The farmer bought the land	.....	.....
The land was given to him by the government	.....	.....
It was allocated by members of his lineage	.....	.....
It was allocate to him by the wife's lineage	.....	.....
The land was given to him by another person	.....	.....

8.How much was harvested by the farmer during the last season?

Cash crops	Yield	Food crops	Yield
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

9.Which among these crops were sold?

Cash crops	Food crops
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

10.Were the following applied by the farmer during the season?

(a) Manure Yes... No...
(b) Fertilizers Yes... No...
(c) Insecticides Yes... No...
(d) Tractor-plough Yes... No...
(e) Hired labour Yes... NO...
(f) Oxen-plough Yes... No...
(g) communal labour Yes... No...

Recording Schedule on Mother and Child Diet

1.Name of mother..... 2.Age.....
3.Number of past pregnancies.....liveborn
.....stillborn
.....miscarriage
4.Of the liveborn ..... now living ..... now dead
..... died <1 year
..... died at 1 - 4 years
..... died at >5 years

5.Mothers diet during childs pregnancy

Foods avoided	Why	Special foods	Why	Supplements	Why
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

6.Mothers diet during childs pregnancy

Foods avoided	Why	Special foods	Why	Supplements	Why
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

7.Mothers diet during periods other than pregnancy and lactation

Foods avoided	Why	Special foods	Why	Supplements	Why
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

8.This childs name ..... 9.Age .....
10.Date of birth ..... 11.If the child breastfed/is breastfeeding Yes... No... 15.If so, for how long? .....

16.Child-milk Feeding (not breast):
(a) Fresh milk ..... started .....age, to ..... age
(b) Processed milk:
Dry skim ..... started .....age, to ..... age
Dry whole ..... started ..... age, to ..... age

17.Weaning period:

Foods given	Period started	Period stopped	Why given
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Foods avoided	Why	Special foods	Why
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

18.Who prepares food in this house? .....

19.What is the eating arrangement in this house?
(a) Father eats alone, mother with children
(b) Father and boys eat aside
(c) Parents and children eat separately
(d) All eat together

20.Why is this arrangement so?.....

Questionnaire on Household Diet Survey (sub-sample group)

Sub-location ..... Village ..... Household No. ....

DAY.....Food	Relish	Fruits	Fats	Beverage	No.of people
Morning	.....	.....	.....	.....	.....
Mid-day	.....	.....	.....	.....	.....
Evening	.....	.....	.....	.....	.....

DAY.....Food	Relish	Fruits	Fats	Beverage	No.of people
Morning	.....	.....	.....	.....	.....
Mid-day	.....	.....	.....	.....	.....
Evening	.....	.....	.....	.....	.....

DAY.....Food	Relish	Fruits	Fats	Beverage	No.of people
Morning	.....	.....	.....	.....	.....
Mid-day	.....	.....	.....	.....	.....
Evening	.....	.....	.....	.....	.....

DAY.....Food	Relish	Fruits	Fats	Beverage	No.of people
Morning	.....	.....	.....	.....	.....
Mid-day	.....	.....	.....	.....	.....
Evening	.....	.....	.....	.....	.....

Questionnaire on Food Imports

Sub-location ..... Village ..... Household No. ....

	ITEM BOUGHT	QUANTITY	AMOUNT(Shs.Cts)	WHO BOUGHT	FOR WHOM?
DAY 1	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
DAY 2	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
DAY 3	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
DAY 4	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
DAY 5	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
DAY 6	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
DAY 7	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....

Recording schedule on Nutritional Anthropometry

Village ..... Household identifier .....
Mothers name ..... Married ....Fathers name.....

	1	2	3	4
Name of child	.....	.....	.....	.....
Sex	.....	.....	.....	.....
Birthdate	.....	.....	.....	.....
Document?	.....	.....	.....	.....
Birth order	.....	.....	.....	.....
Birthplace	.....	.....	.....	.....
Birthassistant	.....	.....	.....	.....
Antenatalcare	.....	.....	.....	.....
Immunized?	.....	.....	.....	.....
Ill past 2 WKS	.....	.....	.....	.....
Illness name	.....	.....	.....	.....
Treatment	.....	.....	.....	.....
Cost	.....	.....	.....	.....
Morning intake	.....	.....	.....	.....
Other observations	.....	.....	.....	.....
Age	.....	.....	.....	.....
Height	.....	.....	.....	.....
Weight	.....	.....	.....	.....
MUAC	.....	.....	.....	.....
Fatfold	.....	.....	.....	.....

Notes on Abbreviations

FAO - Food and Agriculture Organization
GOK - Government of Kenya
HA - Height for Age
MUAC - Middle Upper Arm Circumference
OAU - Organization of African Unity
PEM - Protein Energy Malnutrition
UNICEF - United Nations International Childrens' Emergency Fund
WA - Weight for Age
WH - Weight for Height
WHO - World Health Organization
Ha - Hectares

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