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COMMERCIALIZATION OF AGRICULTURE: ECONOMIC AND HEALTH  
IMPLICATIONS FOR THE HOUSEHOLD IN MUMIAS DIVISION,  
KAKAMEGA DISTRICT. 4

BY

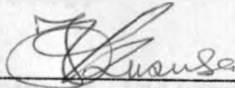
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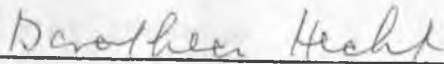
DECLARATION

This Thesis is my original work and has not been presented for a degree in any other University.



JUDITH KUSIMBA

This Thesis has been submitted to the University of Nairobi with my approval as University Supervisor.



DR. DOROTHEA HECHT



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## ABSTRACT

This study was done in the outgrowers' sugar scheme in Mumias Division. The study was prompted by the general outcry about food shortage in the Division. It was argued by administrators and scholars that the agro-industry is accountable for food deficits. Barclay (1977), Mwandhihi (1985) and Owinyi (1977) have indicated in their scholarly work that since the establishment of the agro-industry, in the early 1970s, there has been a shift of attention and resources to sugar cane production to the disadvantage of food crop production. The population of Mumias has ever since relied on purchased food that is imported from other parts of the country. Furthermore, malnutrition is a problem that has been noted in Mumias and its prevalence is evidenced by the presence of the Rehabilitation Centre in Mumias township. This study, therefore, set out to investigate the extent to which sugar cane farming has affected food crop production and diversity, nutrition and health status of the household in Mumias. Taking an anthropological approach, the study examines the cultural aspects of nutrition and health.

The nutritional status of children aged five years and below is used as the health indicator for the nutritional status of the household.

Apparently, land shortage coupled with ecological and natural phenomena as well as cultural constraints, emerges as a key issue in the causality of food deficits.

## CHAPTER 1

### INTRODUCTION

Developing countries are characterised by poverty, which is often attributed to underdevelopment. The adverse food and nutrition situation in Africa today is one aspect of Africa's underdevelopment (PAG 1977; Biswas 1979:213). The situation has been aggravated by rapid population which has caused pressure on available arable land in rural areas, persistent drought and extensive ecological degradation (Juma 1989). Consequently, many African countries have to import foodstuffs to meet the food requirements of their rapidly growing population.

In order for successful economic development to be achieved the citizens of the country must be healthy. Malnutrition, which is defined as 'a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients' (Jelliffe 1966:8), is one of the factors that affect the health of a people adversely. Malnutrition has been identified as the principal cause of mortality and morbidity in young children in the developing countries and in the world at large. Globally, malnutrition is responsible for more than one quarter of the deaths, and may contribute to at least 50 percent of the deaths among children aged five years and under. In Kenya, malnutrition poses a major health problem both in the rural areas and among impoverished urban dwellers. It is estimated that up to 30 percent of the pre-school children in Kenya suffer from mild to

moderate protein-calorie malnutrition. Of these, five percent are in the severe category, suffering from clinical marasmus and Kwashiorkor (GOK 1979:146).

The identification of protein-calorie malnutrition as a primary etiological factor in high infant morbidity and mortality is evident in Kenya's concern about the nutritional status of pre-school aged children, that is, those under the age of five years. This concern is in turn evidenced by a series of nutritional surveys and numerous nutritional intervention programmes all over the country.

Malnutrition has been associated with poverty, lack of food, and/or lack of awareness embedded in cultural beliefs and practices relating to diet (Taylor and Taylor 1976; Latham 1976; Reutlinger and Selowsky 1976:1; Olenja 1989; IFPRI 1984:2). Hence, every post-independence government in Africa including Kenya has addressed these causes by attempting improvement in and expansion of educational, agricultural, health and welfare facilities, the creation of employment and the development of rural areas.

Rural development programmes and projects such as agro-industries in the Kenyan areas such as Mumias, Nzoia, Awendo and Muhoroni which focus on sugar cultivation by individual outgrowers on their own land is a new concept moving away from the estate system used earlier at Miwani, Ramisi and Chemelil. The new concept ensures that first, sugar cane supply comes from small scale farmers, providing them with cash income; second, it

is part of a rural industrialization strategy intended to provide employment in the rural areas, thus curtailing rural to urban migration. This employment is not only provided on farms but also in the factory. These two factors would have been expected to provide income by which rural standards of living would improve. This is partly what my research was intended to investigate: why does malnutrition persist despite locally-available wage income? This study used one of the best indicators available for measuring the progress of development and the quality of life, namely, nutritional status of children (Jansen 1987; Latham 1976). This is because children are the most vulnerable group in the population and are highly susceptible to undernutrition. Although commercial agriculture is regarded as the engine for economic development, commercialization has also been identified as a cause of nutritional problems in Kenya (CBS/UNICEF 1984:77). Food shortages in places such as Mumias have been associated with diversion of labour and resources to cash cropping and neglect of early maturing but labour intensive traditional crops like millet.

Moreover, the rural poor do not capture so a significant share of the economic gains from cash cropping as to be able to purchase food that can meet their requirements. This is because they have limited factors of production; that is, their access to land, labour and capital is limited, thereby affecting their ability to earn substantial rewards from commercial production.

Although poverty is prevalent in rural areas of Africa and Kenya in particular, the rural population is not homogeneous. Patterns of rural inequality are generated by such factors as differential access to the resources of land, labour and capital which are the principal factors of production. Some individuals are better able to take advantage of existing opportunities to improve their economic and nutritional status (cf. P. Fleuret 1980: Castro, Hakkansson and Brokensha 1981). According to A. Fleuret (1980:16):

There has been particularly extensive research into nutrition from the biological and medical as opposed to the socio-cultural or anthropological standpoint. African literature particularly lacks studies that seek to demonstrate specific relationship that may exist between nutritional status, diet and health and such potentially significant variables as household size, wealth differences, population density, household landholdings, migratory wage labour, sexual division of labour, commercial agriculture, crop diversity, educational differences and environmental change.

The present study sheds light on the relationship between commercial agriculture and food diversification and production, and health. The variables considered in this case are household landholdings, a variety of food crops, sugar cane growing, food crop production, labour utilization and allocation, consumption patterns, child feeding, food habits and child nutritional status.

## 1.2 Statement of the Research Problem

Mumias is situated in Kakamega District of Western Province.

The province is inhabited mainly by the Luyia ethnic group. The province also faces a number of problems relating to nutrition and health. It records a relatively high infant mortality rate of 115 deaths per 1,000 live births per annum compared to a nationwide average of 74. In Kakamega District, the infant mortality rate ranges between 129-159 per 1,000 live births (CBS/UNICEF 1984). This is more than the national average infant mortality rate of 74 deaths per 1,000 live births (GOK/UNICEF 1989:10). Since Kakamega District is designated as one of the 'high malnutrition' districts of Kenya, it is possible that the high infant mortality rate is linked to these high levels of malnutrition. These high levels of malnutrition may in turn coincide with cash cropping areas such as Mumias, Hamisi (CBS/UNICEF 1984), Kisii and Kirinyaga (GOK/UNICEF 1989).

Rural development projects, especially rural industrialization activities, are meant to improve the quality of life in the rural areas with regard to health, education, agriculture and income. Such projects are also intended to make rural areas more economically viable, in order to reduce rural to urban migration. A reduction in the flow of migrants from the countryside to city in turn reduces pressure on basic services such as housing, safe drinking water, transport, health, sewerage facilities, schools and security. The agro-industry in Mumias is a rural industrialization project that is intended to make Kenya self-sufficient in sugar production (Odhiambo 1978:13; Mwandishi 1985) and secondarily to improve the living standards of the poor

population (Barclay 1977). It is expected to provide a source of income through direct employment and payments for sugar cane as a cash crop. This is a departure from the earlier sugar industries around the country which are based on large sugar cane estates or plantations. An estate is an individually or corporately owned area of land generally planted in a single crop which is maintained by wage labourers who reside on the estate. In the early stages, the development of Kenya's sugar industry was carried out by settlers from England and India. These settlers acquired large farms and actually formed the outgrowers in the early stages of the industry. With the advent of political independence in 1963, some of the farms changed hands through the government policy of Kenyanization of the large farms accounting for a significant proportion of cane area in their respective zones. Large farms are arbitrarily categorised as those with a size of 20 ha or more. In Mumias sugar zone, virtually all outgrowers are small-scale farmers with between 1.2 and 6 ha as demonstrated in Table 1 (Odhiambo 1978:22-23). The Mumias sugar factory was based on a core estate designed to supply sugar cane seedlings to outgrowers with the aim of making small-scale farmers the main suppliers of sugar cane to the factory. By so doing the government intended that smallholders' incomes be raised and at the same time employment be available on the farms, and factory in a rural setting.

It has, however, been observed that sugar cane in Mumias has increasingly replaced traditional crops such as simsim, millet,

finger millet, sorghum and bambarra nuts. Other food crops such as maize, beans, sweet potatoes, cassava, groundnuts and cowpeas are produced in limited quantities and the population therefore depends largely on purchased food from other parts of the country, for example, Bungoma and neighbouring locations (Mwandishi 1985). Wild fruits such as exotic guavas, mangoes and indigenous passion fruits and wild green vegetables, such as omurere (Corchorus olitorius) and tsimboka (Amaranthus dubius) and mushrooms that usually supplement diet, particularly during scarcity, are meagre, since most of the land has been cleared and placed under sugar cane production.

Earlier, when land was corporately owned, all members of the community had usufructory rights to it. Married women obtained rights to use land through their husbands. Never-married women and divorcees obtained land rights through male consanguines such as fathers and brothers. Although the rights of ownership were vested in the male members, the question of disposal or rental did not arise. Changes have, however, occurred with the process of individualization of land tenure which was inaugurated by the Swynnerton Plan beginning in 1954. This Plan initiated consolidation of land and its registration under individual freehold titles in Kenya. The creation of individual title deeds has increased competition for the major factor of production through the land market and land rent and lease (Barclay 1977). Hiring out of land for food or cash crop production becomes a necessity in the absence of any other source of income and as a



result of the need for cash to meet household requirements such as payment of school fees and purchase of food and clothing. Population growth, strong attachment to ancestral land, and poverty are some of the factors accounting for the small size of holdings in the area.

Agricultural extension services in Mumias Division are almost totally confined to sugar cane production because of the keen interest shown in sugar production by the local farmers. The influence of technical assistants, employees of the Ministry of Agriculture in charge of every sub-location, is hardly felt by the population in Mumias. Agricultural demonstrations in food crop production are unheard of and smallholders who are not exposed to modern agricultural techniques are disadvantaged. The ineffectiveness of agricultural extension agents may be explained in terms of low working morale caused by lack of incentives.

The land can also be said to be unproductive due to a number of factors; overuse, ecological shortcoming and inefficient methods of farming. Smallholders often lack capital to purchase fertilizers and seeds or to pay for ploughing. Manure is available in small quantities since few livestock are kept, a situation dictated by land shortage. Although the agro-industry in Mumias produces a fertilizer called 'mud' (Minns 1978:73), that is available free of charge, smallholders face constraints of high transport costs and lack of awareness of its existence.

TABLE 1: ESTIMATES OF CANE LAND AREA DISTRIBUTION BY TYPE OF PRODUCER IN KENYA  
1975/76 (HECTARES AND PERCENTAGES)

TYPE OF FARM	NUCLEUS ESTATE			LARGE SCALE GROWERS			SMALL SCALE GROWERS			TOTAL CANE AREA			ADDITIONAL CANE LAND			TOTAL CANABLE AREA
	HA	%	%	HA	%	%	HA	%	%	HA	%	%	HA	%	%	HA
	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a
MUMIAS	3238	28.6	28.6	0	0	0	8094	71.4	71.4	11332	100	100	0	0	0	11332
EMELIL	2833	21.9	18.9	6475	50	43.2	3642	28.1	24.3	12950	100	88.9	2024	15.6	13.5	14974
MORONI	2024	20.6	13.9	1214	12.5	8.3	6475	66.7	44.4	9713	100	66.7	4856	50	33.3	14569
MWANI	3228	30.8	25.0	5666	53.8	43.8	1619	15.4	12.5	10522	100	81.3	2428	23.1	18.7	12950
MUMIAS	4856	82.8	36.9	202	3.4	1.5	809	13.8	6.6	5868	100	44.6	7285	124	53.4	13153
TOTAL	16189	33.1	24.2	13557	26.9	20.2	20639	41.0	30.8	50385	100	75.2	16593	32.9	24.8	66978

Source: Adapted from economic review of Agriculture Vol. 1 No. 1 1975 p.12 Quoted from Odhiambo, M.O. (1978:21) "The structure and performance of Kenya's sugar Industry (with special emphasis on the Nyanza Sugar Belt)".

Note: a = hectares                      b = % of total cane hectareage  
c = % of total canable land area

\* Mumias Zone has no large scale farms.

Furthermore, the agro-industry has extended credit facilities to smallholders for improving food crop production but to the dismay of the company management, these facilities are underutilized by the people they are meant for. From the inception of the food production scheme in 1985 until February 1990, only Ksh. 7 million had been distributed to applicants; these came mostly from outside Mumias Division (Daily Nation 4th February, 1990).

The traditional division of labour in the area is based on sex and age and is culturally defined. Men, women and older children perform complementary productive tasks while the younger children look after infants and toddlers. The earlier age and gender based division of labour in Mumias has been to some extent re-defined by commercial agriculture, the labour market and free education for school-age children. Women not only perform their culturally defined roles but also carry out tasks that were formerly ascribed to men and school-age children. Women are primarily responsible for food production (planting, weeding and harvesting) although men usually help clear and break the land in preparation for planting. Women have exclusive responsibility for childcare, food preparation and the provision of water and firewood.

Men's labour is focused on wage employment, commercial agriculture and livestock. Generally, women are more concerned with food production than men. However, in many households men play an indirect role, because the cash earned through wage

labour is used to purchase food for immediate consumption as well as to pay for agricultural labour for food crop production.

Communal labour in the traditional set up was an asset rather than a liability. Family members joined hands with relatives to form a large force. Today, labour has become commoditised. Women, in particular, hire out their labour to earn cash but at the expense of food crop production for domestic use and domestic chores such as cooking and childcare. Women's wage employment in turn has both positive and negative implications for the nutritional status and the health of children.

The cane harvest depends largely on the size of the sugar farms and how they are tended by the smallholders. The farmers pay for such services as land preparation, which includes surveying, ploughing, first and second harrowing; transport; seed cane; harvesting; and fertilizer. The charges are deducted from the payments producers receive for their cane and are enormous. A more complicating factor arises where lumpy incomes arrive at long intervals, in this case at intervals of 18 to 24 months depending on whether it is a plant or ratoon crop. A plant crop is that which grows from the seed cane. This initial harvest occurs approximately 24 months after planting. After the first harvest, the second growth referred to as the ratoon crop, may be harvested after 18 months. Lumpy payments are often difficult to manage, particularly by farmers who are accustomed to a strategy based on food crop production. If this happens, it may lead to drastic changes in spending towards the purchase of

consumer durables and non-foods at the expense of essential food purchases. For example, in a study on the Mwea Irrigation Scheme in Kenya, it was found that a higher percentage of the income was spent by participating households on items like bicycles and children's school fees than was spent by farmers not participating in the scheme (Mwandhihi 1985). Barclay (1977) also observed that many times when smallholders in Mumias received their income from the cash crop, they spent it on leisure and luxuries. The household is therefore deprived of a resource that could meet its requirements for personal consumption (balanced diet, clothing and improved shelter). Changes in expenditure patterns are reinforced by the inflow and promotion of non-food and more expensive foods as more cash income becomes available in the region (IFPRI 1984:22).

Commercialization of agriculture is the backbone of economic development in many developing countries. Commodity production is viewed as a means of increasing the incomes of the rural smallholders, providing employment for the landless and stimulating growth linkages with other segments of the economy. It is often assumed that economic gains will result in improvement in the welfare of the smallholders including an improvement in the health and well-being of household members (Kennedy 1989:95). Experience has shown, however, that such an outcome cannot be taken for granted and concerns are often expressed about the nutritional situation of households involved in such projects (Fleuret and Fleuret 1980; Dewey 1979;

enberger 1989).

Although it is argued that economic benefits of commercialization of agriculture have not materialized and that nutritional status has been negatively influenced (Kennedy ), this view should not also be taken for granted. It is that cash cropping can influence production for domestic consumption and allocation of resources within the household and consequently nutrition and health status. However, the direction in which the influence takes is by no means regular or predictable (Buret and Fleuret 1980, 1991). Projects promoting a shift from production for domestic consumption need careful assessment of any possible negative effects on food availability, nutrition and health.

Since studies that have been carried out in Mumias focus primarily on the social and economic impact of the sugar scheme and hardly any reference to nutrition and health, this study focuses on the latter aspects.

#### Objectives of the study

The Kenya government established the agro-industry in Mumias primarily to attain self-sufficiency in meeting the country's demand for sugar and therefore, reduce the need to import the product. This aim was temporarily achieved in the early 1980s, a time when Kenya was even able to export some sugar. Secondary aims of the Mumias sugar scheme are to earn foreign

exchange through sugar export, and to improve the living standards of the rural population (Barclay 1977; Mwandhihi 1985:9). This study seeks to evaluate the extent to which the living standards of the rural population in Mumias have improved. Since health is one of the indicators of improved quality of life, the study uses nutritional status of children aged five years and under as a reflection of the health status of households in Mumias.

In this study, the researcher investigates the impact of the sugar cane scheme on the nutrition and the health of the household by focusing on food and cash crop production, time allocation, consumption patterns and childcare practices. The researcher also examines the cultural definition and concept of malnutrition and treatment options of such cases.

Finally, the researcher develops recommendations aimed at improving the nutritional status of children in the communities that engage in cash cropping, including practical suggestions for individual households and the community at large.

#### 1.4 Justification of the study

Agro-industrial projects have a vital role to play in the growth and expansion of developing economies. This alone points to the need for strengthening the projects through research and evaluation studies.

There is a growing concern about the nutritional situation of

the farming households involved in agro-industrial projects particularly in the development of young children who are often vulnerable to adverse changes in economic and social conditions (Kennedy 1986). There is therefore need for more detailed knowledge on the nutritional effects of agricultural change (McGuire 1981; Pinstrup Anderson 1981; Martin 1984 quoted in Niemeijer et al. 1985:18). The understanding of the interaction between variables such as land, labour, cash cropping, food crop diversification and production, childcare practices and beliefs concerning food may be useful in designing strategies for curbing nutritional deficiencies that may be anticipated as a result of agricultural projects. This study should therefore provide reference material for rural development project designers, especially for cash crop production since there is danger of overemphasizing cash crop production at the expense of food crops and hence creating health problems. This could eliminate food shortage and error in nutrition and thus raise the standard of health (Kraut 1969:15).

The findings reported in this study also contribute to what has been written on cultural values which affect the nutritional status.



## CHAPTER 2

### LITERATURE REVIEW AND THEORETICAL FRAMEWORK

#### 2.1 Literature Review

The developing world is characterised by what Chambers (1983:1) terms 'absolute poverty: a condition of life so characterised by malnutrition, illiteracy, disease, squalid surroundings, high infant mortality and low life expectancy as to be beneath any reasonable definition of human decency'. Although malnutrition is prevalent in the developing world due to poverty (Wasonga 1982:1; Berg 1973:2; Kariuki 1982; Latham 1976; William 1967), it is generally a global problem (Kithinji 1985:8; Frohberg 1980; Schofield 1979:12,124; Biswas 1979; Olenja 1984:89). Poverty is reflected in lack of land, livestock and other property ownership, absence of cash crop farming (Mwangi 1988:39) and in some instances subsistence farming and inability to have regular employment even when no other source of income is available (Nzioka 1984:67). Rural development is therefore a strategy designed to improve the living standards of the poor rural population (Lele 1975:20) with regard to health, education, agriculture and income.

Commercialization of agriculture is the engine of development for many African economies and developing countries at large (GOK/UNICEF 1989:73; Uchendu n.d.; Kennedy 1989:95). Although cash crop production contributes substantially to rural income generation and employment (Pinstrup-Anderson 1983:10), the

question as to whether nutrition is improved or not is still debatable. There is a prevailing assumption that an increase in household cash income will result in an increase in the quantity and quality of food consumed. In this case cash cropping is assumed to have a positive nutritional effect. On the other hand, there is a contrasting view that priority is often given to cash cropping, hence more land, often the best land, is allocated to the cash crop. Subsequently, food crop production declines and smallholders have to rely on purchased food. Diets dependent on purchased foods do not necessarily meet nutritional needs more adequately than diets that rely on agricultural produce and wild edible products (A. Fleuret 1979; Frankenberger 1989) which flourish on fallow land. Consequently, the level of nutrition also declines (Biswas 1979).

Certain studies have shown that cash crop production does not necessarily affect food crop diversity and production. For example, Tuma (1968) in the narrative account of cotton growing in Kigulu is contrasted with Ghana where cocoa growing almost replaced food crops. The author points out that in order to meet food and cash crop demands in Uganda, many people bought land in the neighbourhood, and those who could not afford buying and remained on ancestral land, borrowed from those who had large parcels; payment was in the form of reciprocity after harvest. It is possible that since cotton is a first maturing crop, it was grown interchangeably with food on the same piece of land. It is possible that intercropping of cotton and food was practised.

Most important was the positive response of the population to the need to expand their holdings through the land market and borrowing in order to accommodate cotton farming conveniently. This study, however, fails to touch upon nutrition although neutral effects of cotton farming on food consumption and nutritional status of the household can be safely assumed.

Guyer (1978:17) observed that among neither the Yoruba of Western Nigeria nor the Beti of South-central Cameroon was food farming abandoned in favour of exclusive commercial specialization. During the period of cocoa expansion, the food and young cocoa farms were complementary. Plantation and cocoyam (taro and/or tannias) were used as shade crops so that the two sides of the farming system expanded together. The result was often more food than could be eaten or sold on the market. As cocoa plantations reached their limit, the traditional food fields could no longer be supplemented by the extra crops interplanted with cocoa. A separate food system had been preserved for both subsistence and sale. This view is corroborated by Almy (1989) in a recent study in Cameroon.

Other studies show that cash crop production adversely affects food crop production and diversity. Barclay (1977) points out that during the initial years of the agro-industry in Mumias, there was stagnation of subsistence production. He goes on to state:

The nutritional implications of this pattern deserve a detailed examination although this was beyond my competence and would have involved a major investment of time. The reduced intake of foods and where cassava replaces maize in the diet, an

increase in starch relative to protein occurs at the time when the requirements of manual labour on the farm are greatest. In the absence of systematic data regarding calorie consumption and energy output, one can only speculate about the effects of famine on agricultural performance (Barclay 1977:299-300).

Owinyi (1977) and Mwandhihi (1985) agree that sugar cane in Mumias has rapidly replaced maize and cassava, contributing to food deficits.

Other studies go beyond food diversification and production to show the association or lack of association between cash cropping and nutrition. Dewy (1979) describes the impact of the 'Plan Chontalpa', an agricultural development project in the state of Tabasco, Mexico, on agricultural practices and nutritional status and the effects of the increased dependence on external food sources and reduced diversity of crops grown by a family on dietary diversity and nutritional status. The nutritional study, which evaluated children aged between two and four years because of their susceptibility to malnutrition and the fact that indices of growth can be easily measured as a reflection of nutritional condition, involved anthropometric assessment, biochemical measures in the form of blood tests for serum proteins and vitamin A, and clinical evaluation. In addition, stool samples for each child were analysed to determine gastrointestinal parasite levels. All children were measured and examined in the mouth with the help of local medical personnel. The study concludes that agricultural development presented by the 'Plan Chontalpa' had not improved nutritional status of pre-school children. The study, however, omits cultural practices

ected with diet.

A study by Kennedy (1988) was carried out in Awendo in South Kenya, a sugar-growing area, with several goals in mind; to evaluate the effect of cash crop production on income and food consumption, and to assess the health and nutritional status of pre-school children and women. The first stage of data collection took place from June 1984 to March 1985. A follow up study was initiated in December, 1985 to build upon the data collected in the 1984/5 portion of the research. The sample included cane growers and non-cane growers. The results indicated that increased economic gains associated with participation in the outgrowers' programme did not translate into improvement in health status.

Niemeijer et al. (1985) focused on the nutritional conditions among farming households engaged in irrigation rice cultivation in the Kano Plain, Kisumu District. The groups studied are tenants working and living at Ahero and West Kano Irrigation Schemes (resident tenants); tenants growing crops at the same time residing outside the scheme boundaries (non-resident tenants); and rice growers participating in small-scale irrigation projects (individual rice growers). Families not cultivating rice (non-rice growers) were included for the purpose of comparison. The observed differences in nutrition between the four groups appeared to be primarily related to variations in resource availability. Generally, the youngest children proved to have high prevalence of diarrhoea and vomiting and showed a

slowdown of height gain in the second half of the first year. The incidence of stunting among the pre-school children was similar to that among Kenyan children in general. Gains in weight relative to height were low and indicated a considerable incidence of wasting at the time of the survey, in early 1984. The average quality and quantity of food consumed by three and four year old children was also examined. Protein consumption was generally sufficient, but calorie consumption was not. The same study reveals the findings of earlier work on the nutritional status of the population at the Mwea Rice Scheme in Kirinyaga District conducted by Korte (1969) and Wanjohi et al. (1978). Both studies indicated a high prevalence of malnutrition with at least double the rate of malnutrition in young children compared to the national average. This rate of malnutrition is attributed to an unbalanced diet as a result of mono-cropping and irregular expenditures of cash by households that are not accustomed to purchasing food. Generally, mono-cropping is thought to influence nutritional conditions negatively. In centrally-managed large irrigation schemes, cash crops are often cultivated exclusively. Other uses of the land are not usually permitted. Moreover, the size of the homestead plots usually does not allow for the cultivation of sufficient quantities of subsistence crops. These circumstances may easily lead to unbalanced or inadequate diets. Additionally, tenants are not allowed to keep cattle at the scheme and yet milk is an important supplementary food for young children. Participation in large-scale

rice production does not necessarily have negative nutritional consequences and may contribute positively under certain conditions. However, this is not the case where the sole existence of the farming households depends on this type of agriculture.

A link has been shown between socio-economic class and nutritional status (Frohberg 1980:8; Hoorweg 1981; Latham 1969; Gatundu 1977:75; Kithinji 1985:13, 19, 39; William 1977). This link may be negative or positive depending on whether the household is accustomed to purchasing essential household non-farm food crops that are not being grown (Gatundu 1977:2); experience variations in income (Wasonga 1982); or mismanages or receives lumpy income (Rodrigues 1972; Mwangi 1988; Kithinji 1985; Nzioka 1984:70).

Hoorweg (1981) describes a nutritional survey in Kigumo division, Murang'a district. This survey aimed at establishing the extent to which three variables, namely, area, social class and domestic stage, were related to the nutritional status of young children in the household. A distinction was made between cash farmers (35 percent) and subsistence (65 percent) in the coffee growing area. Three classes of households were identified on the basis of income and wealth indicators and designated affluent, intermediate and poor. Poor households depended on subsistence farming and wage labour. Intermediate households derived an income from either regular employment or cash farming. Affluent households enjoyed incomes derived from both

subsistence and commercial activities. The survey revealed significant differences in the nutritional status of children from different social classes. This was reflected in the average height-for-age (H/A) which increased from 91.8 percent of the reference median among children from intermediate households to 95.7 among children from affluent households. As regards food consumption, the same pattern emerged. The highest food intake was among the children in affluent households. Data on incidence of diseases among children which is useful in the analysis of the nutritional status of children, were omitted as the prime objective was not to study the causes of malnutrition but to collect background information for the evaluation of the programme.

Nzioka (1984) reveals that of the households which had low incomes in Machakos, 86.2 percent had children with protein-calorie malnutrition, while of those with middle incomes, 30 percent had children who were malnourished. Evidently, households with low incomes had the highest percentage of children with protein-calorie malnutrition. It was observed that some mothers and their children who had severe protein-calorie malnutrition dressed expensively. In Nzioka's analysis, some parents place priorities on some luxuries at the expense of their children's nutritional status. It was further noted that of the households that spent between Ksh. 100.00 and 500.00 per month on foodstuffs, 77 percent had children with protein calorie malnutrition, while only 44.4 percent of those who spent Ksh.



500.00 or more had children with protein-calorie malnutrition. This suggests that increased expenditure on foodstuffs reduces malnutrition rates and improves child welfare in any given household.

Kithinji (1985), in a study in Meru District, argues that families where peasant farming is the only way to earn a living, mothers are producers. Unfortunately they have very little say as to how the earnings from what they produce should be utilized. Fathers who happen to be the household heads have money at their disposal. They spent most of it or the whole of it on beer-drinking and other recreational pursuits, neglecting their families. In such families, if there are no other channels open to acquire food, malnutrition is inevitable. Kithinji adds that taking a second wife when there is extra money from either cash crop or subsistence farming has the effect of adding new problems to the existing ones. The study revealed that in the households where no cash crop farming was practised, 53 percent of the children suffered from malnutrition. This contrasted with 47 percent of households experiencing malnutrition and practising cash crop farming. Although the difference in nutritional status is not significant, the results suggests higher prevalence of malnutrition in cash cropping households than in households that do not practice cash cropping. Moreover, in households where cash crop farming was practised, 64 percent of the mothers earned less than Ksh. 500.00 per year. This money was inadequate to buy food, leave alone other household requirements and meeting other

needs. There is something about certain vitamins that make

Kraut (1969:21) on the other, found an ambiguous relationship between income and nutrition. In Soni in Tanzania where income observed to be greater, people ate a little more (better calorie intake) but the composition of the diet (with sufficient protein, vitamin and mineral content) remained for the most part unchanged. The author concludes that it is not possible to say that differences in the state of nutrition were dependent on social standing. The supposition that an increased income automatically brings about an improvement in nutrition is not necessarily a universal truth.

Rodrigues (1972), in her study of food production and diet in Githunguri, supports the idea that the growing of cash crops always affects diet adversely. She argues that agricultural work is shared among the family members, women being responsible for food crops and men for cash crops. The man keeps the money from crop sales and it may not be spent on food. This is a common but erroneous assumption. Findings among children suggest that protein-calorie malnutrition existed among all age groups in both cash cropping and noncash cropping households. This was so because families that lived on small holdings did not acquire self sufficiency in food or adequate income to purchase basic food supplies.

The spending and consumption patterns depend on who within the households controls the income and decides on expenditure, purchase, and consumption pattern ( Pinstруп-Anderson 1981:1,

1983:10). There is consensus among certain scholars that women-controlled income is more important for child nutrition and welfare. Kumar (1978), Stavrakis and Marshall (1978) and Guyer (1980) provide empirical support for this observation. In a study of Kerala in South India, Kumar (1978) found that mothers with gardens or income had better nourished children. The results of the study show that the presence of a home garden cared for by mother and her earnings contributed positively to the child's nutrition. The data revealed that increasing material income benefited their children's nutrition. Guyer (1980, 1988:51), in a study of two Beti farming villages in Cameroon, shows that women grew most of their families' staple crops, and earned some income primarily from petty trade. The husbands, on the other hand, grew cocoa as a cash crop. Men and women had different sources of income and separate expenditure responsibilities. Although women farmers earned less cash than their spouses, their contribution towards food and household essentials expenditure was higher. Stavrakis and Marshall (1978) in their study of the effect of introduction of commercial sugar cane on women's economic roles and family in a Belize village, found that the sugar income was male-controlled and men therefore benefited more than women who tended children and animals. Meanwhile, production of corn and other food declined. Consequently, women's income fell because they depended on corn for food for their pigs which were their main source of income. Despite men's increased income, there was no impact on the level

of nutrition. Consumption of healthy food such as fruits, meats and fish was on the decline.

Other culturally conditioned behaviour such as food taboos and feeding habits have been associated with malnutrition (Kariuki 1983:9; Muhuhu 1978; Mwangi 1988; Latham 1965).

Muhuhu (1978), in a study among the Meru, points out that malnutrition is attributed to poor habits, particularly in families where only one meal is served in a day and in cases where mothers feed their babies on demand. Although the author intimates that one meal is served in homes where there is food, it is most likely to happen in homes where food is scarce and in situations where women are too overburdened to have adequate time to prepare meals and feed children adequately.

Latham (1965) points out that different cultures have their own different beliefs, including categories of food, for example, many Englishmen like oysters and eels, which are repellant to many African societies. Most people, especially the rural African women, are profoundly conservative in their food habits. A number of food habits and practices, assuming they are observed faithfully, are unfortunate from a nutritional point of view. Many taboos restrict protein consumption and these tend to affect women and children rather than men. In certain communities, women and children are forbidden to eat eggs. Females are said to become sterile and children, thieves of eggs if they eat them. A section of the Bahaya living near Lake Victoria forbade the consumption by pregnant women of meat, fish, milk, and eggs. The

Kalenjin women were not allowed to eat some inner parts of a cow. This is harmful because animal protein, like other nutrients, is critical to the pregnant women and in child development.

Three National Nutrition Surveys were done in 1977, 1978-79 and 1982 in Kenya. The 1977 survey was confined to rural areas covering sample children between the ages of 12 and 48 months. The data consisted of demographic and anthropometric observations together with information on frequency of food consumption. The 1978-79 second survey covered children aged between 6 and 60 months in both urban and all rural areas except North Eastern Province, the Northern part of Rift Valley Province and parts of some other areas. Urban children included Nairobi Nursery children. The data collected included age, food consumption and health. The third national nutritional survey was concerned with both rural and urban children aged 3 to 60 months.

The results of the second survey showed that more than half of the children in rural areas and nearly three-quarters of urban children were given porridge, the main ingredient being maize. Maize mixed with millet was the next most popular main ingredient followed by millet on its own. Cassava, either alone or mixed with cereals was the main ingredient only in Rural Nyanza (eaten by 12.2% of the children) and in Rural Western Province (2.2%). Bananas were the main ingredient for 58 percent of children in Eastern Province but were named as the main ingredient by very few mothers anywhere else. Few mothers anywhere gave sweet potatoes or 'English' potatoes as the main porridge ingredient.

The children who were given porridge with bananas as the main ingredient had the poorest nutritional status. The results of the second survey also revealed that the proportion of children with low weight compared to that expected for their age (nutritionally stunted children) is greater in the rural parts of the Coast and Nyanza Provinces and lowest in the urban areas of the larger towns. The proportion of children with low weight compared to that expected for their height (nutritionally wasted children) is highest in the rural parts of Central and Western Provinces.

The average weight of children between 48 and 60 months old in the rural sample was 15.4 kg, in the urban sample 16.2 kg, and in the elite Nairobi Nursery children 17.4 kg. The average length of children of the sample age in the rural sample was 99.6 cm, in the urban sample 102.4 cm and in the Nairobi Nursery school children 105.3 cm.

The three surveys concurred that the most prevalent form of malnutrition in young children in Kenya is the protein-energy (PEM) or protein-calorie (PCM) for which the cause is basically inadequate food.

The literature review above basically shows lack of consensus on the impact of commercialized agriculture on food crop diversification, production and nutritional status among the researchers on the subject. Whereas neutral effects of projects promoting cash cropping on food crop diversification and production (Tuma 1968; Guyer 1978) and nutritional status (Dewey

1979; Kennedy 1989), adverse effects of cash cropping on food crop production (Barclay 1977; Mwandhihi 1985; Owinyi 1977) have also been shown. In mono-cropping areas such as rice scheme in Kano and Mwea, a high prevalence of malnutrition was noted (Niemeijer et al. 1985; Korte 1969; Wanjohi et al. 1978). In such areas the population concerned has to depend largely on purchased food. Diets dependent on purchased food do not necessarily meet nutritional needs more adequately than diets which rely on production for consumption.

Other studies comparing nutritional status of cash cropping households receiving high and low incomes highlight a difference in the percentages of malnutrition cases. Percentages of malnutrition cases in low income households are shown to be higher than they are in high income households (Hoorweg 1981; Nzioka 1984). Increased income does not, however, guarantee improved nutritional status (Kraut 1969). Nutritional status depends on who controls household income and decides on spending and consumption (Pinstrup-Anderson 1981; IFPRI 1984:26). There is a general consensus among a number of authors that income is likely to be spent on non-food items (Stavrakis and Marshall 1978; Kumar 1978; Guyer 1978; Kithinji 1985; Rodrigues 1972). The National Nutritional Surveys in Kenya clearly indicate prevalence of malnutrition in Kenya; Hitchings' analysis of data from the third survey confirms that children residing in households where assets are managed and controlled by women are better nourished than those living in households where men manage

the household economy.

Cultural values pertaining to food consumption must not be overlooked as contributing factors in the aetiology of malnutrition (Kariuki 1983; Latham 1965).

## 2.2 Theoretical Framework

Two models are used in the present study to explain conceptual relationship between cash cropping and nutritional status and to show the complex aetiology of malnutrition.

### 2.2.1 Agriculture-Nutrition Model

This model has been used by Kennedy (1989) to show linkages between cash crop production and nutritional status at household and individual levels (see Figure 1).

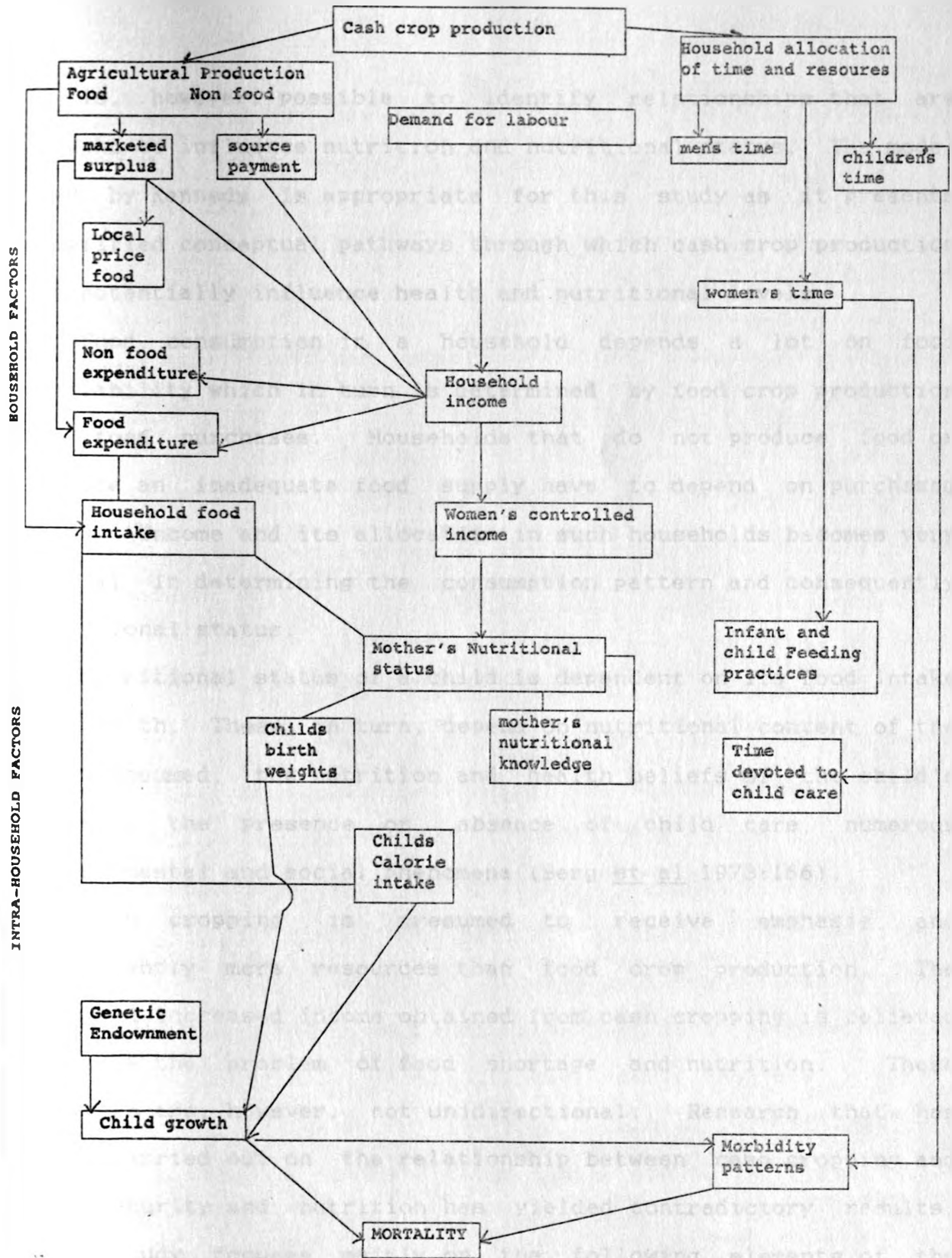
Linkages between agricultural practices and child nutrition are complex. It is noteworthy that much of the prior research on commercialization of agriculture and its impact on food crop production and food security has focused on only a limited number of these potential linkages. It has therefore been difficult to assess the net impact of cash crop production (Kennedy 1989).

Evidently, nutritional status is strongly influenced by agriculture but the exact nature of the influence is irregular and unclear (Fleuret and Fleuret 1991; Berger et al. 1973:50).



FIGURE 1

AGRICULTURE-NUTRITION



SOURCE: Kennedy, E. (1989:90)  
 The Effects of Sugercane Prduction on Food Security  
 Health and Nutritional Status in Kenya: A Longitudinal  
 Analysis. A Washington D.C. IFPRI

It is, however, possible to identify relationships that are thought to influence nutrition and nutritional status. The model used by Kennedy is appropriate for this study as it presents simplified conceptual pathways through which cash crop production can potentially influence health and nutritional levels.

Food consumption in a household depends a lot on food availability which in turn is determined by food crop production and food purchases. Households that do not produce food or produce an inadequate food supply have to depend on purchased food. Income and its allocation in such households becomes very crucial in determining the consumption pattern and consequently nutritional status.

Nutritional status of a child is dependent on its food intake and health. These, in turn, depend on nutritional content of the food consumed, the nutrition and health beliefs of the child's parents, the presence or absence of child care, numerous environmental and social phenomena (Berg et al 1973:166).

Cash cropping is presumed to receive emphasis and consequently more resources than food crop production. The presumed increased income obtained from cash cropping is believed to ease the problem of food shortage and nutrition. These linkages are, however, not unidirectional. Research that has been carried out on the relationship between cash cropping and food security and nutrition has yielded contradictory results. This study focuses mainly on the following elements of the Agriculture-Nutrition Model; cash crop production, resource

allocation (particularly land and labour), food crop production, infant and child feeding practices, household food intake and child nutrition.

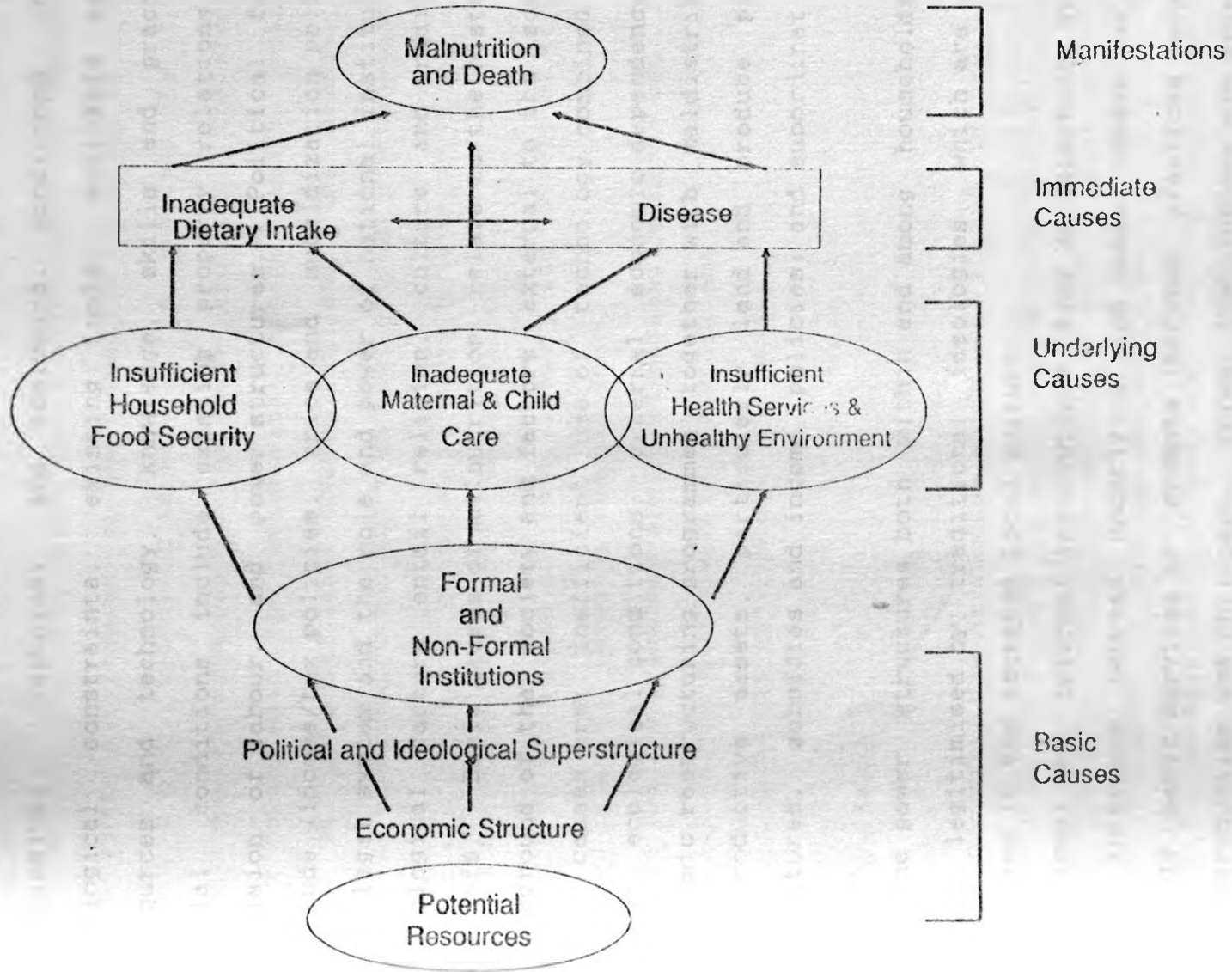
### 2.2.2 Causes of Malnutrition and Death

This model shows the complex aetiology of malnutrition. The model shows the basic, underlying and immediate causes of malnutrition (see Figure 2). Immediate causes that are identified in the model are inadequate dietary intake and disease. Infectious disease in particular affects dietary intake and nutrient utilization. Underlying factors are inadequate supply of food, inadequate health services and unhealthy environment. Household food security, health services, a healthy environment, material and childcare education, water, environmental sanitation and housing are factors that can affect health. Lack of ready access to water, for example, can affect food production and preparation, general hygiene and consequently, nutrition and health. Inadequate access to water affects nutrition directly by increasing the work-load of women, thus reducing the time available for food preparation and childcare. Similarly, mortality may result from any one or a combination of causes, for instance, lack of low utilization of health services, inadequate water supply and sanitary facilities, poor food hygiene or inadequate childcare.

Inadequate or improper education, particularly for women, exacerbates their inability to generate resources for improved

Figure 11

# Causes of Malnutrition and Death



nutrition for their families.

Structural determinants of production, distribution and consumption are technical, economic, social, political and ideological. Technical and ecological conditions include ecological constraints, existing tools, available natural resources and technology, knowledge, skills and practices. Social conditions include existing property relations, the division of labour, and power structures. Political factors include income/tax policies, price and subsidization policies, the legal system and the role and power of national institutions. Ideological factors entail religion, culture and traditional beliefs. Basic causes of malnutrition relate to the historical background of the society and factors external to the society. Such causes are: inefficient use of technology combined with harsh ecological conditions; external economic dependency and economic restructuring programmes together with maldistribution of productive assets, particularly land and produce pricing structures, subsidies and income policies; and subordination of women.

The power structures both within and among households, are often legitimised by traditional ideologies which are often embedded in the accepted local culture.

Formal and informal institutions play an important role as they interface between underlying and basic causes as they provide basic services or promote improved practices regarding food production and childcare. Formal institutions are primarily

schools and adult education classes. Informal institutions include households, extended families, organised religious groups and knowledgeable persons.

The present study basically deals with underlying factors of malnutrition. It focuses on the household capacity to produce and acquire food. Attention is paid to the availability of land resource, women's workload and childcare practices. The study is also concerned with the ideological aspect, namely, cultural beliefs as regards food consumption and the concept and definition of malnutrition and treatment options of such cases.

They variables considered in connection with:

1. cash crop production are land and labour;
2. food crop production are land, labour, and variety of food crops grown for domestic consumption;
3. child feeding practices are child feeding patterns and quality of the food given to children; and
4. child growth are age, weight, and height

### 2.3 Hypotheses

The following are hypotheses which were tested in the field:

1. the allocation of land favours the cash crop to the disadvantage of food crops leading to serious food deficits, lack of dietary variety and malnutrition;
2. women's time allocation to cash and food crop production and to other activities is likely to prejudice food crop



production and to distance women from their childcare activities;

3. children in food crop growing households are likely to display better nutritional status than those in households where both sugar cane and food crops are produced.

## 2.4 Definition of Variables

The independent variables in the present study are cash and food crop production. The dependent variable is nutrition. Intervening variables are land, labour, household time allocation, and childcare practices.

### 2.4.1 Operational Definitions

The operational definitions below apply to this study. They are not necessarily the same as those in standard dictionaries or those used in other contexts.

**cash crop** - the crop planted purely for sale. In Mumias, sugar cane is a major cash crop. Other cash crops like coffee and sunflower are of minor importance.

**Land** - the landholdings in ha that are owned and controlled or other strategies by a given household.

Food variety = number and kind of food crops grown for domestic use.

Malnutrition = protein-calorie deficiency reflected by underweight, height deficiency, or both.

Childcare practices = child feeding patterns, quality of food given to the child, hygiene and consumption of health care services.

Nutrition status = a biological state measured by anthropometric indices including weight-for-height, height-for-age, weight-for-age, mid-upper-circumference and triceps fatfold.

Time allocation = the amount of time devoted to culturally-significant activities by different age and gender groups in the population.

#### 2.4.2 Definition of Terms

##### Health

Health is defined by Kea (1977) as "soundness of body, state of bodily, mental and social well-being". It is a variable condition of body as in good, bad, poor, or ill health. At its best it is "that state of being in which all parts and organs are sound and in proper condition, and that condition of the body and



its various parts and functions which conduces to efficient and prolonged life". In other words "it is the state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (WHO quoted by Kwofie 1987:7-25).

### Malnutrition

Malnutrition is defined as a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients and four types are distinguished: undernutrition; specific deficiency; overnutrition; and imbalance (Jelliffe 1966:8; A Fleuret 1981).

The most severe and widespread nutritional deficiencies among children are a consequence of protein and calorie malnutrition (Jelliffe *ibid.*; Berg *et al.* 1981; Wandati 1984). The three forms of protein-calorie malnutrition also referred to as protein-energy deficiency are marasmus, Kwashiorkor and marasmic-kwashiorkor (Frohberg 1978:3).

### Nutritional Status

Nutritional status is the condition of the body resulting from their utilization of the essential nutrients available to the body (Turner 1965; Nzioka 1984: 21). Nutritional status may be good, fair or poor, depending on the intake of dietary essentials or the relative need for them, and on the body's ability to utilize them. Good nutritional status is noted when

people benefit from the intake of a well balanced diet. Good nutrition is essential for normal organ development and function, for normal reproduction, growth and maintenance for optimum activity and working efficiency, for resistance to infection and for ability, to repair bodily change, or injury. Poor nutritional status results when people are deprived of an adequate amount of the essential nutrients. This is relative. Demands may go up at times as during illness or pregnancy and intake, if constant may become inadequate (Kea 1977).

### Nutrients

Nutrients in food are those chemical components that perform one of the three roles in the body: to supply energy; to regulate body process; or to promote the growth and repair of body tissue.

### Anthropometry

These are measurements of variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition (Jelliffe 1966:50).

### Household

A household is a socio-economic or task oriented residence unit. A household consists of members who may be relatives and nonrelatives such as servants and lodgers living together and cooperative in common consumptive, productive, and reproductive activities. A household is distinct from a family which is a kinship grouping that need not be localised (Netting et al 1984).

## CHAPTER 3

### METHODOLOGY

#### 3.1 Research Site

##### 3.1.1 General Background Information

Mumias Division is situated in Kakamega District (see Figure 3 and 4), which has one of the most dense concentrations of population in Kenya, averaging 429 persons per square kilometre (sq. km) (GOK/UNICEF 1989: 13). The Division is populated predominantly by the Abawanga. The Abawanga are one of the 18 subnations of the Abaluyia, Kenya's third largest ethnic grouping which forms 13 percent of the total Kenyan population. The local dialect, Luwanga, belongs to the Bantu language family. The south and south-west of Mumias Division is inhabited by a minority Luo community, who speak a Nilotic rather than a Bantu language.

Administratively, the division is organised into several locations, each under the administration of a government appointed chief. The locations are further subdivided into sublocations (four in North Wanga/Matungu, seven in East Wanga, four in Mumias Central/Central Wanga, five in South Wanga and five in West Wanga/Koyonzo). Each sublocation is administered by an assistant chief. At grass roots level, there are village elders or headmen, known as amakuru, in charge of several

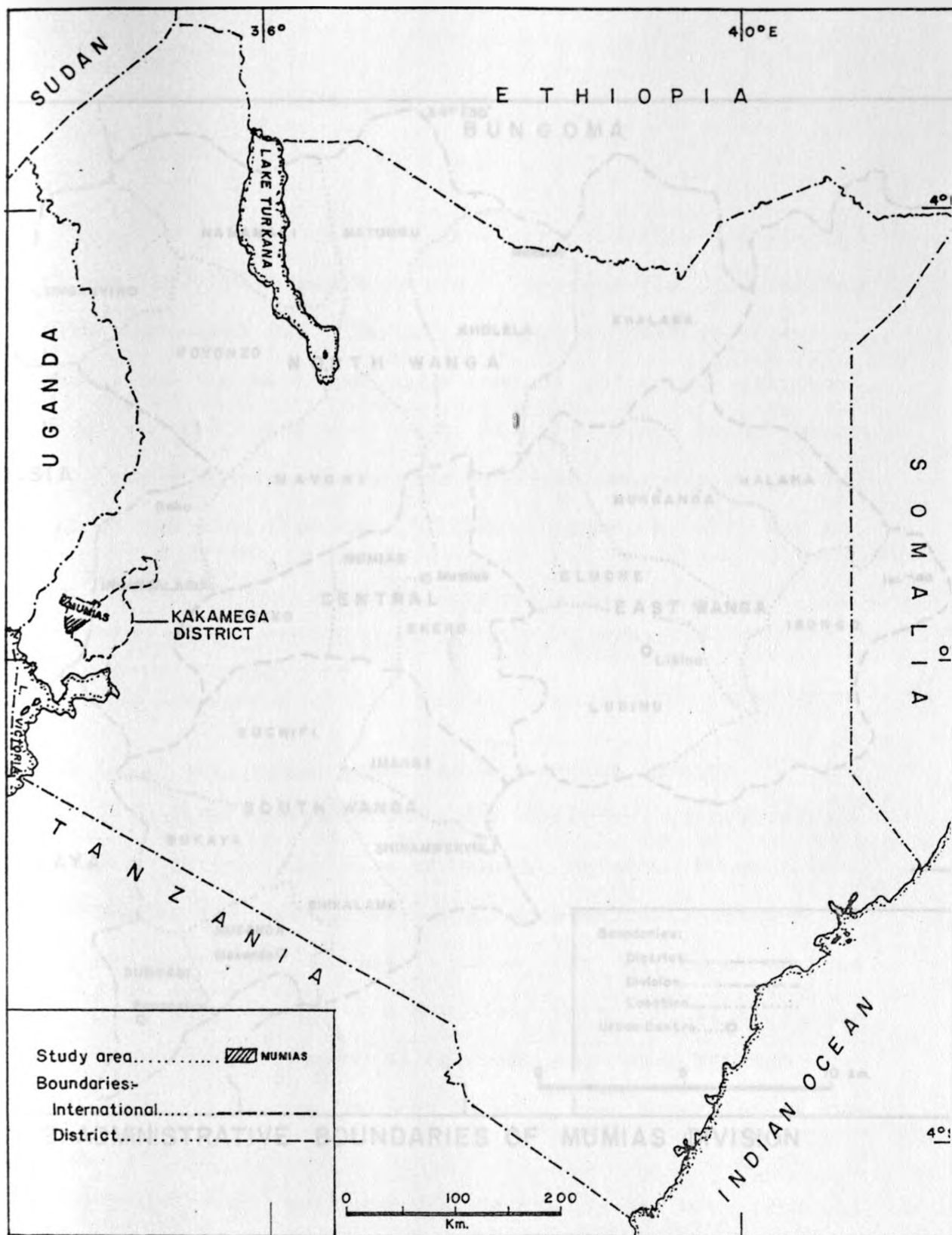


FIG. 1: LOCATION OF STUDY AREA IN KENYA



FIG. 2: ADMINISTRATIVE BOUNDARIES OF MUMIAS DIVISION

villages.

The township of Mumias where the agro-industry is planted serves as the Divisional headquarters. The township is situated about 116 km north of Nairobi, Kenya's capital city at approximately 34' 30" east longitude and 0' 20" north latitude. Geographically, the area is part of the Lake Basin which surrounds Lake Victoria and extends from the drop-off of the Mau Escarpment to the lake (see map of Kenya) (Barclay 1977; May and McLellan 1970:289).

### 3.1.2 Historical Background

Mumias town was established as a trading centre by the Swahili-Arab traders who penetrated the interior of East Africa from the coast, during the rule of Nabongo Shiundu between 1841 and 1883. Mumias lay on the principal caravan route between the East African coast and Uganda. Later, at the turn of the century, the British agents and administrators used it as a base for conquest and establishment of colonial rule when Nabongo Mumia, son and successor of Nabongo Shiundu, was the ruler of the Wanga (Were 1968:62, 196).

The railway line, then known as the Uganda Railway, from the coast to Kisumu on Lake Victoria was completed in 1901 and the overland route to Uganda through Mumias dwindled in importance, as did government and administrative activities. The government officers shifted from Mumias to Kakamega in 1921 and the area was

subsequently neglected and impoverished (Barclay 1977).

The situation of neglect and poverty was aggravated by male labour out-migration which deprived Mumias of able bodied productive labour. The women who were left behind were too overburdened by productive and reproductive tasks to produce and provide adequate food for domestic consumption. Many families therefore tended to depend on cash remittances from the absent male members in the labour market. The problem of insufficient production was compounded by individualization of land tenure, a process that was accelerated by the Swynnerton Plan of 1954. Women's usufructory rights to land became precarious and this presumably curtailed their productive capacity. Due to commoditization of land, some of the household heads disposed of land, thereby reducing the critical factor of production available for domestic consumption.

Ecological limitations including poor soils and insufficient rains during the second planting season, coupled with lack of agricultural technology accounted for food shortage in the area before the establishment of the agro-industry. Earlier were unsuccessful attempts to establish coffee and sisal cash crops (Barclay 1977). Educational and health facilities were limited.

### 3.1.3 Natural Potential

Mumias is endowed with climatic conditions and a rainfall pattern that are well suited to cultivation. The area is

ecologically classified as Lower Midland Sugar Cane Zone with an altitude ranging between 1300 m and 1500 m above sea level, an annual mean temperature of 22.0 - 20.8 °C and an annual average rainfall of 1650 - 2000 mm (Jaetzold and Schmidt 1982:360). Rainfall is distributed fairly evenly over the twelve months with the only prolonged dry season occurring from December to February. The soils are generally deficient in nutrients such as phosphates and nitrates and relatively light textured and well drained in the upland areas.

#### 3.1.4 Agriculture

Arable agriculture is mainly focused on sugar cane as a commercial crop and secondarily on food crop production for domestic use.

Sugar cane is grown at an altitude of 1500 m above sea level. Due to the high altitude, the typical maturity period ranges from 22 to 24 months for a plant crop which grows from the seed cane and 18 to 22 months for the ratoon (offshoot after the first harvest). Three harvests are obtained in a five year crop cycle. Ratoon crop yields tend to be somewhat lower than those attained from a plant crop. They range between 40 and 80 percent of the latter depending on the quality of the soil and the attention given to the crop during the ratoon cycle (Odada 1979; Barclay 1977). The area is also suited for robusta coffee, sunflower and sisal. However, these crops are grown in small quantities by



only a few producers. The area is suited for the growth of a range of food crops including maize, cassava, simsim, taro (cocoyam), finger millet, sorghum, pumpkins and bananas. Fruits include papaya, pineapples, avocados, loquats, oranges and lemons. Before most of the land was cleared, the area was rich in wild plants such as exotic mangoes and guavas and indigenous passion fruit and mushrooms. Cultivation is possible throughout the year although the period from December to February is dry. Nevertheless, three harvests of vegetables and other quickly maturing crops are possible in a year. The area, however, has two planting seasons for the main staples, such as maize and beans. Food crop production is subject to fluctuations from year to year as a consequence of the uncertainties of climatic conditions. The short rains in October and November in particular are not always adequate to support the second plant growth. This partly explains the long history of food shortage and famine in the area. The smallholders must therefore supplement their food crop production and cash income from off and non-farm economic activities, such as wage labour on neighbours' sugar cane farms and the sugar factory, artisanal activity and petty trade, to mention but a few.

### 3.1.5 Livestock

Traditionally, the livestock kept included cattle (zebu), sheep, goats and poultry. A few grade cattle are now kept.

Apparently Mumias division lacks a tradition of keeping many cattle compared to other divisions in the district as suggested by Table 2.

Table 2. Zebu and Grade Cattle Population by Division, Kakamega

<u>District</u>				
<u>Zebu Cattle</u>				
<u>Division</u>	<u>1980</u>	<u>1982</u>	<u>% Change</u>	
Lugari	5,343	91,573	+1,614	
Kabras	40,043	80,366	+ 101	
Vihiga	84,033	32,138	- 62	
Ikolomani	38,666	21,998	- 43	
Hamisi	63,595	31,347	- 51	
Lurambi	27,508	17,949	- 35	
Butere	31,724	15,650	- 43	
Mumias	27,717	15,650	- 43	
<b>Total</b>	<b>318,629</b>	<b>306,449</b>	<b>- 3.8</b>	
<u>Grade Cattle</u>				
<u>Division</u>	<u>1980</u>	<u>1982</u>	<u>% Change</u>	<u>Total % Change</u>
Lugari	18,525	22,515	+ 21	+ 378
Kabras	6,892	9,569	+ 39	+ 91
Vihiga	1,545	2,135	+ 38	+ 60
Ikolomani	1,734	1,948	+ 12	- 41
Hamisi	1,599	1,249	- 22	- 50
Lurambi	195	230	+ 18	- 34
Butere	152	448	+195	- 50
Mumias	77	120	+ 56	- 43
<b>Total</b>	<b>30,719</b>	<b>38,214</b>	<b>+ 24.4</b>	<b>- 1.3</b>

Source: GOK (1984:29) Kakamega District Development Plan.  
Ministry of Finance and Planning.  
Rural Planning Division.

### 3.1.6 Mumias Sugar Company Ltd.

Mumias Sugar Company Ltd. (MSC), a joint venture of the Kenya Commercial Finance Corporation, the Commonwealth Development

Corporation (CDC), Booker Agricultural International (BA) and the East African Development Bank, was formed in June 1971. Financing was arranged through a loan to Kenya from the British government in 1971 and the factory began processing cane in July 1973 (Barclay 1977). The shareholders as of 1983 are: Government of Kenya 70.76 percent; Commonwealth Development Corporation (UK) 17.18 percent; Kenya Finance Corporation 5.00 percent; Booker Agricultural International (BA) 4.42 percent; and East African Development Bank 2.64 percent.

In addition to its investment, Booker McConnel, a London based multinational corporation, manages the enterprise under contract. Mumias Sugar Company is a model of what is called a nucleus estate, a system that integrates a core processing plant, a corporate plantation that ensures a supply of high quality raw material, and an outgrower or satellite farming procurement programme into which large numbers of small-scale farmers are drawn.

Cane is supplied by a corporate nucleus estate of 3,400 ha, part of 4,000 ha leased from the Kenya government, and by 32,000 sugar cane outgrowers under contract to Mumias Sugar Company. The nucleus supplies roughly 12 percent of cane requirements, an amount that could decrease proportionately should the mill further be enlarged. Each of the 32,000 outgrowers within and without Mumias division voluntarily enters into a contract that covers at minimum one five year period (the time necessary to complete one seed cane crop and two ratoon (offshoot) crops, with

specific provision for the termination by either party. The outgrowers supply 88 percent of the cane requirement. Mumias Sugar Company is Kenya's largest producer, supplying 52 percent of Kenya's sugar requirements. It is in this respect that Mumias Division offers a suitable case for examining the relationship between sugar cane cash cropping and economic and health status of the population.

### 3.2 Research Design

The researcher set out to find out the impact of the sugar scheme on food crop diversification and production, land and labour allocation, consumption patterns and nutritional status of children aged five years and below. The researcher had an interest in the cultural aspect of food and the definition and concept of malnutrition in the community. Research design therefore involved data collection from the two categories of households; cane growers and non-cane growers. Anthropological field techniques that were used included the use of randomly selected informants, interview and interview schedules, participant observation, anthropometry and diet recall methods. Key informants and focus group interviews were also used. Documentary resources such as land registers and personal farmers' files were useful.

### 3.2.1 Sampling

This study involved three months of fieldwork in two sublocations, Shikalame and Musanda in South Wanga Location, Mumias Division. The choice of location and sublocations was based on personal judgement. Two sublocations were preferable due to the density of the population and the vastness of the outgrowers' scheme. However, the household sample was based on random sampling technique, that is, every household in the two sublocations had an equal chance of being included in the sample. With the headmen's knowledge of the residents of their administrative areas, household lists were constructed for the two sample sublocations.

The households were grouped into sugar cane growers and non-sugar cane growers. It is, however, noteworthy that sugar cane growers also planted food while non-sugar cane growers did not plant sugar cane at all. In total, 1,600 households practised both sugarcane and food crop production whereas 1,430 households depended purely on food crop production in the two sample sublocations.

A systematic sample was then selected from each of those two groups. Every 25th household was marked on the list of cash cropping households giving a subtotal sample of 64. Every 23rd household was marked on the list of non-sugar cane growers in order to get an equal sample size of these two categories of households. Total sample size was 127. Such a sample is self

weighting and the findings from analysis of the sample are taken as representative of the general population (Ackroyd 1981). Random sampling is a well planned process for selecting an unbiased cross section of the community which is representative of the whole population.

A household as applied here refers to a group of people who live in a house or houses built on the same compound and share meals obtained from a common source.

### 3.2.2 Data collection

The following interview schedules consisting of closed and open ended questions were employed:

#### 1. Household Background Information

This schedule elicited background information about household members with regard to sex, age, education level, marital status, residence, occupation and religious affiliation.

#### 2. Household Landholdings and Land Allocation

This schedule elicited information about the size of the land owned and controlled by the households, the portion which is under sugar cane and food crop production.

#### 3. Family Crop Production and Food Availability

This schedule elicited information about the kinds of food crops that are grown for domestic consumption, planting and harvesting seasons, the amount of food harvested and the period the food lasts.

#### 4. Consumption Pattern

This schedule elicited information about the food, vegetables, fruit, fat and drinks that are consumed by household members.

#### 5. Child Feeding and Food Habits

This schedule elicited information on the kinds of food prepared for the child, feeding patterns, food taboos associated with children and eating arrangements.

#### 6. Time Allocation

This schedule elicited information on the various tasks that are performed by the various households members and the time allocated to various tasks in the household by gender and age.

#### 7. Illness and Treatment Options

This schedule elicited information on the illness in young children, their cultural definitions and the concept of malnutrition and treatment options.

#### 8. Anthropometric Assessment

This schedule elicited information about children's background; age, birth order, birth place, illness, treatment options and the following measurements; height, weight, mid-upper-arm circumference and triceps fatfold.

#### 9. Household Income, Source and Expenditure

This schedule elicited information about the income each household member received and how the cash was spent.

The above different schedules were designed to avoid a long questionnaire that was likely to alienate respondents. The schedules were administered several times to the households and

this facilitated visits to the households and subsequently participant observation.

### 3.2.3 Interviews

Interviews were conducted in the sample households using the interview schedules. Interviewing was appropriate because it can elicit information on the respondents' feelings, attitudes and beliefs. It is an appropriate method for collecting data from people who may be illiterate and have no written records for their activities.

The same questions and the order in which they appear on the schedules were administered to the sample in the same way. The justification for this form of interviewing is that of standardization of stimuli. This ensured that variations in the responses given to the questions were genuine variations. Probing was done when necessary.

Semi-structured interview schedules were designed to collect data from health personnel in clinics and health centres and from Mumias sugar factory management. Although this was time consuming, the method enabled the investigator to fill out the 'bare bones' of responses given to the structured schedules.

### 3.2.4 Time Allocation

Random time allocation based 'on spot' observation method



(cf. Johnson 1981; Gross 1984) was used to collect data on division of labour. This involved household visits at randomly selected hours to see exactly what household members were doing. The data collected in this way are unbiased and amenable to quantitative analysis.

### 3.2.5 Participant Observation

Participant observation, a strategy that facilitates data collection of all kinds, quantitative and qualitative in fieldwork (Bernard 1988: 148,149) was employed. Familiarity with the language spoken in the area was an advantage. On arrival in the area, initiative was taken to inform the chief about the planned research. A letter of introduction from the Kakamega District Commissioner was handed to the chief and the objective of the research was explained to him. The same applied to the assistant chiefs of Musanda and Shikalame. Chief's and assistant chiefs' barazas were attended and the objective of the research was explained to those who were present. Funerals were attended and visits were made to various homes as a way of establishing rapport. When the actual data collection began with interviews being conducted, conditions around the homes were observed. The children aged five years and below who were unwell were observed carefully to see whether the symptoms coincided with those of malnutrition. 'On spot' observation technique and 12 and 24 hour recall methods used to collect data on food consumption patterns

for the entire household and the children in particular facilitated participant observation as frequent visits were made to sample households.

### 3.2.6 Focus Group Interviews

Focus group interviews were conducted at Bungasi Health Centre and two market places, namely, Musanda and Ingusi, located in Musanda and Shikalame sublocations respectively. Although this method raises the issue of whether the respondents are representative of the larger population, this issue was addressed to some extent by careful selection of the sites and the respondents for each focus group. Middle aged and elderly mothers were selected to provide information on beliefs, attitudes and reported practices connected with child feeding and illness. This approach broke the monotony of moving from one household to another and enabled the researcher to get information that could not emerge from face to face interviews.

### 3.2.7 Key Informants

Three key informants provided valuable contextual and specialized knowledge. These included: an elderly mother of several children presumed to be well versed with traditions by virtue of her position as a traditional medicine woman who deals with ailments; a nutritionist who is trained in the field of

nutrition and provides extension services in the area; and an agricultural extension worker who is acquainted with the kind of crops grown in the whole division. The selection of key informants was based on judgement sampling which involved the careful selection of informants on the basis of their distinctive qualification on the related issues.

### 3.2.8 Anthropometric Assessment

The overall development of a child depends very much on its nutrition. To determine nutritional status of children, anthropometric measurements were conducted on children aged five years and under from the sample households. A central location was chosen and respondents were invited to bring their children for assessment. Anthropometric data are essential for evaluation of the physical growth of children and their nutritional status. They are useful measures of nutritional status on their own or with other types of data (Schofield 1979:50).

Weight, height, mid-upper-arm circumference and triceps skinfold (fatfold) measurements were recorded. The weighing was done using a Salter PBW 25 hanging balance calibrated to 100 gm. The scale was suspended from the roof. The accuracy of the scale was checked with known weights of 5 and 10 kg. Weight was difficult to take as most of the children were frightened and therefore struggled, kicked and cried much more than they did during the linear measurements. Each child, dressed only in

panties, was suspended in a pair of plastic trousers from the hook of the hanging balance. The reading was taken and recorded to the nearest 0.1 kg as soon as the child and the scale stopped oscillating. More than one reading was taken and the average of the readings recorded for the most cooperative children.

Weight is the key anthropometric measure (Jelliffe 1966). Weight-for-age (WA) is considered as one of the best indicators of nutritional status in children (McGuire 1980 quoted in Nzioka 1984). Weight-for-age is considered as the basic criterion of assessing the nutritional status of children as weight responds to any slight variation in nutritional and other types of stresses.

Length was measured using a tape with cm and mm calibration. The tape was fixed on an ordinary portable wooden length. The wooden board was placed on a flat table and the child laid straight on its back with the head firmly fixed against the fixed head piece and the eyes looking vertically. While the mother of the child was firmly holding the child's head in position, a second person extended and firmly held the knees down with the toes pointing directly upward. The main observer then took the reading from the tape measure to the nearest 0.1 cm by moving the sliding foot piece and holding it firmly against the child's heel. Length rather than standing height was measured for all the children because it is not possible to measure the height of children less than about 18 months old who cannot stand properly and it would not have been practicable to carry two pieces of

equipment, one to measure young children lying down and another to measure older children standing up.

Height-for-age is important because it reflects long term nutritional adequacies (Wasonga 1986; Fleuret and Fleuret 1991; CBS/UNICEF 1990:54). Low height-for-age (stunting) reflects long term malnutrition in a child. In other words, a child who has received an inadequate diet for much of his life, fails to attain the expected height for a particular age. Malnutrition in infancy and childhood reduces height before adolescence and may in addition delay the onset of puberty (cf. Kulin 1984). The age at which sexual maturity is achieved is delayed and adult height achievement may be as much as 10.16 to 15.24 cm below the reference median.

Mid-upper-arm circumference was measured with a flexible tape calibrated to mm and placed gently but firmly around the upper left arm, half way between the acromial process of the scapula and the olecranon process of the ulna. The midpoint was established with elbow flexed and the circumference read when the child was standing upright with his or her left hand hanging freely. In the case of children who could not walk, they sat on the lap of the parent or the care taker and the measurements were read to the nearest 0.1 cm.

A healthy child is expected to have normal fat deposits and muscular development. Underweight children have diminished reserves of bodily fat while marasmic children are depleted of fat and muscle.

Lange skinfold calipers were used to measure fatfold. The measurement was taken over triceps muscle and at the same marked point located halfway between the shoulder and the elbow and the skinfold pinched up parallel to the longitudinal axis of the upper arm.

The use of skinfold thickness as a measure of nutritional status is related to the assumption that increased subcutaneous adipose is the result of either high calorie intake or low energy expenditure (Ryan and Martinez 1986). Skinfold thickness (fatfold) which indicates the amount of subcutaneous fat and therefore the reserve of calorie in the body is decreased in the case of malnutrition.

Reported birth dates were confirmed against birth certificates, clinic cards and other personal records. In other words, ages for children under five years were established by documentation.

The choice of Anthropometry in assessing the nutritional status of children under five years was based on its simplicity and practability. The aim was to obtain the maximum of useful information using minimum staff, inexpensive equipment and uncomplicated techniques providing data that could be analysed easily. Complex biochemical laboratory procedure and time consuming clinical examinations were avoided and were unaffordable anyway.

### 3.2.9 Written Sources

Files containing information about the agreements made between the agro-industry management and the outgrowers, and payments of sugar cane made to the outgrowers were very useful documents in the factory. The health records indicating the kind of diseases that people and especially children suffer from were also useful. Information on holdings was obtained from the records in the Lands Office at the district headquarters in Kakamega.

### 3.3 Problems in Fieldwork

Problems that were encountered in the field are noteworthy. Many times, members of the households that were scheduled for interview on certain days were found absent from their homesteads. In such cases, two or more visits were made to the homesteads in order to get respondents. Although the visits provided an advantage of familiarization with the prevailing conditions in the homesteads, they were time consuming. Often, targeted subjects were too occupied to attend an interview and therefore appointments which were not honoured at times were made. This also caused delay in research work.

At times subjects scheduled for interview declined to attend the interview. Two out of 127 sample households turned the interview down. They argued that they were not likely to benefit

from the interview materially and therefore there was no need to give the required information. This was regardless of the explanation given to them about the objectives of the research. The two households were replaced by another two which were randomly selected.

Other respondents reluctantly answered the questions posed to them and complained that they were not likely to gain from the research. Others claimed that they were being spied upon and therefore they would not release accurate information regarding ownership and land allocation. Others demanded to know the immediate material gains. The latter group answered the questions posed to them in anticipation of immediate future material gains. The assistant chiefs and the village elders were requested to clarify the objectives of the research in the barazas once again. Village elders visited the targeted subjects and asked them to cooperate during interviewing.

Often female household members did not know the total household holdings, the portions allocated to food and cash crop production. The information they provided had, therefore, to be verified with records in the District Lands Office and the agro-industry. Getting precise birth dates was a problem especially in the absence of documentary evidence. Birth dates given by the respondents had therefore to be used in the analysis. Minimal number of households disclosed that any of their members had suffered from malnutrition. Anthropometric assessment was very revealing in this case. Others did not admit awareness about



### 3.4 Data Analysis and Presentation

Fieldwork involved the collection of both quantitative and qualitative data. Qualitative data include food habits, cultural definition and concept of malnutrition and treatment options of such cases. These data were mainly obtained from participant observation, focus group interviews as well as interviews that were conducted in the households using interview schedules. Quantitative data include holdings, household demography, crop diversity and production, cash income, types of meals eaten in households, time allocation and anthropometry. These data were obtained mainly through interviews conducted in households and by taking physical measurements of the children in terms of height, weight, upper-arm-circumference and triceps fatfold.

The findings of this study are considered in the light of what other scholars have written about nutrition in relation to cash cropping. The data are mainly analysed by the use of descriptive statistics and the test of significance called Chi-square. In the process of analysis the hypotheses too are analysed to sustain the validity in terms of the existence of relationship between the independent and dependent variables. In this context, simple cross tabulation tables are adopted as a tool for analysis because of the small sample coupled with its advantage for easy understanding by many readers. Quantitative data are expressed mainly as percentages and are very useful for illustration particularly.

Raw anthropometric data were entered using an IBM Personal Computer. The analysis was done using the Centers for Disease Control (CDC) developed software which compares measures of particular children against standard values and computes Z-scores or number of standard deviations above or below the reference median. Height-for-age and weight-for-height received attention. Height-for-age is an important nutritional indicator because it indicates long term nutritional status. Weight-for-height is equally important as it reflects the contemporary health status of a child. The ages of children are shown in months. The cut-off points for both HA and WH are given in appendix 2. As nutritional status measured by anthropometric indicators is the dependent or outcome variable, statistical tests of significance of association with the independent variables show to what extent they can be related to incidence, prevalence and severity of malnutrition in the two groups of households.

## CHAPTER 4.

### THE WANGA SOCIETY

#### 4.1 The Origin of the Abawanga

The Abawanga belong to the Abaluyia, an ethnolinguistic group consisting of about eighteen dialects. The dialect speakers are the Ababukusu, Abeisukha, Abeidakho, Abawanga, Abanyala (of Nabakholo), Abanyala (of Lake Victoria shore), Abatachoni, Abakhayo, Abakabras, Abamarama, Abanyole, Abalogoli, Abasania, Abashisa, Abatirichi, Abatura, Abamarachi and Abatsotso. Although these groups have diverse ancestries as evidenced by their migration stories, they form one nation sharing a common culture.

The Abawanga consist of seventeen clans which migrated to the present area between the sixteenth and the seventeenth centuries. Oral tradition reveals association between the Bachwezi state, also known as Bunyoro-Kitara in the lake region of Uganda with the Hima state of Imanga, the nucleus of the future kingdom of Wanga. The Bachwezi, also known as the Bahima, moved to Wanga after the collapse of Bunyoro-Kitara kingdom in Uganda between 1598 and 1625, where they established and controlled Imanga state. They form the Abawamuima clan. Other groups such as Abaleka, an offshoot of the Balega of Toro and neighbouring Congo, Abashieni and Abatobe, both of Kalenjin descent, arrived at the same time. Between 1544 and 1672, a man called Wanga

arrived with a group of people that he led from Tiriki. This group which gave rise to Abashitsetse, Abakolwe, Abakalibo, Ababuka and Abarunga clans is believed to have originated from the north, the area between Lake Turkana and Karamoja. This group settled for a while in the region of modern Kampala in Buganda in the fifteenth century and split up. The group that moved to Kenya settled in the location known as Tiriki and later Wanga's followers moved to Imanga in present day Wanga location. Wanga established a new dynasty of the Abashitsetse clan and a centralised government. Abamuswa, Abamani, Buholo, Bukhayo (Abatura) and Alego (Ababongo) arrived from Gem in present day Siaya District. The influx of the different groups of people resulted in increased population and territorial expansion stretching from Musanda to the south and Matungu in North Wanga.

The Abawanga were the only one of the Abaluyia peoples who possessed a system of centralised chiefly government during the pre-colonial period. The Wanga hierarchy had a king by the title Nabongo, a Prime Minister (Omwikhasia), an army of Spearmen (Olukuyaba), an Army Commander (Omusesia), Provincial and District Chiefs (Abami) and Village Elders (Abenengo). There were councils that ensured the smooth running of the government. The position of Nabongo was central and highly honoured in the political system.

The Nabongo of the Wanga were hereditary kings from the Abashitsetse ruling clan. Normally, the king selected his heir from among his sons. For example, Shiundu chose his eldest son

Mulama to succeed him but Mulama died young and Shiundu had to pick the second eldest, Luta as the future Nabongo. Although the office of Nabongo was highly honoured, his influence was very remote. Real power rested with the Council of Elders. Nabongo could issue orders that were acceptable to the local people and their councils. Nabongo was judge and court of appeal as he listened to complaints of his subjects and solved the problems.

#### 4.1.2 Social Organization

Among the Abawanga, the household which was the basic social unit consisted of husband, wife/wives, unmarried children. Additional kin, such as a man's/wife's sister(s) and children or a man's/ wife's brother(s) and children. Non-kin could also be part of that unit.

A homestead (hango), comprised huts occupied by a man's wife/wive's, married sons and their spouses or/and unmarried sons. The unmarried sons' huts were known as tsisimba. Granaries (efiachi), belonging to each wife were also built on the same compound. Homesteads were usually built within the fields that the occupants cultivated. A homestead comprised one, two or several households each with its head. This was so because when a man married a second wife, she stayed in the same house as the first wife before the husband built a house for the new wife. The two wives had to cooperate in production. They cooked and shared meals with other members who were affiliated to

the same household. Upon building a house for her, usually on the same compound as the first wife, the second wife could cultivate land and prepare meals which she could share with members who were affiliated to her household. A man's sons did not establish their own homesteads immediately upon marriage. They remained members of their parent's households until such a time that they began cultivating their fields and cooking their own meals, thus forming their own households. They continued living in the same homestead until they decided to establish their own homesteads.

The oldest male member of the homestead was the homestead head and was consulted in all matters affecting the welfare of the members of the homestead described above. Household heads were either female or male. For example, in cases where a husband died and the widow remarried and then separated from the subsequent husband, she became the head of her household.

The huts within the homestead had circular walls and thatched roofs with doors facing the centre of the compound. The door of the major house belonging to the eldest wife faced the main entrance, eshilibwa to the homestead.

The Abawanga are organised in clans and lineages. A lineage is called inzu or eshilibwa. Inzu literally means house and eshilibwa means gate of enclosure surrounding a village or a homestead. A lineage comprises the direct descendants of a common grandfather or great-grandfather and as distinct from the larger clan units, its members can trace their mutual

relationship.

"The clan is a patrilineal, exogamous, territorial unit" (Wagner 1949). In other words, a clan comprises all persons who trace their descent from a common male ancestor and who for that reason form a community of interests, refrain from intermarrying and inhabit a common stretch of land.

Whereas the household lived in its own homestead, a number of homesteads formed a village (litala), the focus of daily life. A larger community was olukongo, an association of several villages of the same clan.

#### 4.1.3 Land Tenure System

Land in Mumias was plentiful before 1940 (Barclay 1977:110). It was collectively owned and there were no precise boundaries. The fact of the matter is that there was an emphasis on usufructory rights rather than ownership. The rights in usufruct were held by unmarried or divorced mothers as well as by married women. Vacant land could be used by anyone capable of cultivating, with the sanction of the neighbouring lineages. The grazing lands were common fields. Livestock belonging to the entire community could graze in such lands. Fields cultivated by family members and a man's wives were nominally controlled by the male homestead head. The more hardworking a woman was, the more land she cultivated and held in trust for her sons. The more wives and children a man had, the more land was cultivated and

therefore controlled by him. However, an individual could not dispose of land.

During the colonial era, corporate land ownership ceased. Privatisation of land was initiated by consolidation and registration, which were effected by the Swynnerton Plan, implemented beginning in 1954. On the basis of customary land law, which dictates that men inherit land, and women acquire rights of access through marriage, most of the land was registered in the names of men, the husbands and sons of women who cultivated the land. Furthermore, as a result of capital penetration into the household economy, with increasing emphasis on individual title, and individual ownership, coupled with high population density and constraints on employment, it has become a saleable commodity. Consequently, women's usufructory rights to land have become precarious.

#### 4.1.4 Division of Labour

The division of labour based on gender and age was culturally defined in many African societies. Men, women and children performed complementary tasks. The tasks performed exclusively by men were usually regarded as distinctly complicated, fairly heavy and generally physically demanding, for example, felling trees, clearing land in preparation for cultivation, herding, watering animals, building houses, carrying out transactions with cattle, and exchanging fowls for goats and



sheep, and these again for cattle. Menial, time-consuming domestic chores ranging from firewood collection, water fetching, sweeping, grinding, food preparation, to house mudding and childcare were tasks ascribed to females. In addition to the domestic chores, it was the duty of the wife to hoe before planting. To express this point in Wagner's words:

It is a rule of custom that a person cannot do the work that is on the side of the other person. However, there were tasks such as planting, weeding, and harvesting that both sexes jointly performed. Very young children looked after their younger siblings. At about the age of six years, girls assisted their mothers in the daily domestic tasks of fetching water, gathering firewood, sweeping and grinding. The boys on the other hand herded and watered livestock. Both boys and girls joined together in activities such as sowing, weeding and harvesting as part of their training in agriculture (1939:8).

This pattern of task allocation has persisted to the present, as will be seen later in chapter 5.

Reciprocity in the supply of labour for basic agricultural tasks was practised. Assistance from the pool of kin and affines residing in nearby areas was available. This speeded the completion of seasonal work as men worked together on the clearing and breaking of the land while women were largely responsible for hoeing and weeding.

#### 4.1.5 Religion

The religious views held by Abawanga are generally the same as those held by the other Luyia groups. They believe in a high God who is called Nyasaye, the creator both of the world and

people. Like the rest of the Abaluyia, Abawanga prayed to God every morning facing the rising sun, and spat in the same direction.

These people also believed in ancestral and other spirits. The spirits of the community and clan ancestors particularly are thought to act as guardians of community law and customs, punishing people who deviate from these customs in the same way that God punishes those who infringe on the rules He has given them.

#### 4.1.6 Magico-religious Practices Associated with Morbidity and Mortality

Witchcraft and sorcery were and still are, magico-religious practices associated with poor health and death among African people generally and the Abawanga in particular. Wanga beliefs are consistent with those described by Evans-Pritchard (1937), Gluckman (1956) and other scholars. Witchcraft (obulosi) and sorcery (obufira) involved the wielding of active power by the experts in order to affect the lives and the welfare of other people. A person practising witchcraft is believed to possess an inner latent inherent mystical force that drives him to practice the act.

Obulosi is purely aimed at causing harm, illness and death. The witch (omulosi), acts for himself; he is socially condemned and his activities are always classified as morally bad. A

sorcerer (omufira), on the other hand, learns the art from his father or any other person who is omufira and is willing to teach the art. Obufira can be destructive or constructive. It is destructive so far as illness and death are intended and constructive when it is employed for protective, curative, and preventive purposes. The Omufira may act for himself, or on behalf of a client for a given fee.

Abalosi are believed to keep pets such as leopards and snakes, and they make people ill by performing magical rites over certain poisonous medicine (amaloko) and uttering evil spells against them. They are believed to dance and jump up and down in their victims' homesteads, banging doors to their victims and singing in a low tone. The dancing, amaloko and utterances of spells act together to bring about illness and death.

Obulosi involves the procurement of objects associated with the intended victim, such as remains of food they have eaten, parts of their clothes or ornaments, hair, nails, excreta, or soil taken from the footprints. These paraphernalia are secretly collected and tied together with certain poisonous or magically destructive roots. As these are kept in a hidden place, a destructive spell is uttered over them. As the objects decay, the victim falls ill. The illness manifests itself in a slow wasting away of the victim's health.

Obulosi also involves the wielding of magic by an expert to cause people to fall victim to sudden accidents or misfortunes such as snakebite, attacks by wild animals, drowning, suicide.

and today, road accidents and failing exams.

The omulosi may hide poisonous objects (emisala) at a spot over which the victims passes; this causes his death within a few hours.

The evil eye (ebikhokho), is another form of obulosi. The practitioners are exclusively female and transmit objects into the body of their victim by casting a glance at the victim. The result is acute sickness; stomachache, headache and feverish condition, for example. The experts are active in the early stages of pregnancy. As they become older and leave their childbearing years, the power of transmitting ebikhokho diminishes. This is contrary to Europe and India, where the practitioners are old hags, widows and maids are supposedly envious of young, reproductively capable women.

According to Wagner, the sorcerer or omufira may take the following actions:

1. Pass a person without saluting him, then look at the victim's shadow and point obufira all round it;
2. Go to the intended victim's homestead at night and plant obufira all round it; when the plants are in full bloom all the people living in the homestead will die;
3. Dig a hole into the victim's footprints and place obufira therein;
4. Infect a public spring with obufira and utter a spell while doing so, thereby killing all the people who drink water from that spring;
5. Collect the victim's excreta and mix them with obufira;
6. Utter curses like any ordinary man or woman (Wagner 1939:143).

However, the omufira can also administer medicine to a patient to counteract the effects of the destructive magic which he has employed. He can also cure the patient of ills with which

he has been afflicted by the evil magic of other persons, either abafira or abalosi. Often, malnutrition in young children is associated with obulosi or obufira. In such a case, curative measures taken by either omufira or an herbalist can be effective.

#### 4.1.7. Traditional Beliefs Associated with Health

Among the Abawanga, there were social norms and values that regulated the behaviour of the members of society. Violation of the accepted norms and values was manifested in poor health. For example, one condition that is taken to be a manifestation of a breach of certain norms is ishira. It was taboo for an adulterous parent to touch a nursing child before performing cleansing rituals which involved the drinking of herbs (amanyasi). Cautionary measures could also be taken before any offence was committed. This involved the sprinkling of amanyasi in cooking pots, in the house, and on the bed. This was to ensure continued good health of the nursing child. Failure to perform this cleansing ritual upon committing adultery and touching a nursing child was said to result in ishira, which manifested itself in the emaciation of the child, or even its sudden death. This sounds like marasmus or beri-beri.

The Wanga tradition allowed marriage of a widow to a younger brother, cousin, or son to the elder wife of the deceased husband. Such a marriage was, however, subject to the

performance of certain rituals. Failure to perform these rituals was believed to cause poor health, especially among children belonging to the man who married the widow. The poor health of the child(ren) is called ishira.

In Wanga society, the daughter-in-law was expected to show respect to her father-in-law, and vice-versa. However, should this relationship become strained, the two should not fight. Should these norms be violated when the daughter-in-law is lactating, and her breasts come into contact with her father-in-law, the nursing child's health is likely to deteriorate, and this condition is also called ishira.

Ishira also manifests itself in other ways. For example, when a daughter-in-law enters the bedroom of her parents-in-law and sits on their bed when the mother-in-law is not yet past childbearing age, either the mother-in-law or the daughter-in-law may no longer be able to conceive.

When a man commits adultery during the period of mourning for his own child, his wife may stop bearing children. This condition is also called ishira.

Lihera is a term which applies to the poor health of a child resulting from his mother's pregnancy while he is still breastfeeding. The nursing baby becomes lean and sometimes does not walk at the appropriate age. It is believed that the foetus through its jealousy or envy passes the illness to the nursing child through the breast milk (Olenja 1984).

A malnourished child may also be bewitched (okhulokwa). In

such a case, the sorcerer is believed to have healing powers.

In brief, in Wanga, episodes of malnutrition could be attributed to ishira, lihera and obulosi. The condition is treated by herbs and sorcery.

#### 4.1.8. Economic Activities

The Abawanga of Mumias practised mixed agriculture, that is, cultivation of multiple crops and livestock-keeping. They kept cattle, sheep, goats, and poultry. Cattle were the principal source of wealth. Bridewealth was demanded in the form of cattle. Cattle were also sacrificial animals. However, the people emphasised cultivation over animal husbandry. The traditional crops included millet, sorghum, sweet potatoes, peas, sesame, cassava, bananas, and a variety of nuts. With the introduction of maize, a gradual shift occurred from finger millet to maize as the principal food crop. Sorghum remained an important second crop and was usually broadcast together with maize. The production of cassava was enforced, particularly during the early 1940s as a famine reserve crop. Although cassava added variety to the diet, the overall nutritional effect is potentially detrimental.

Traditional vegetables included litoto or libokoyi (Amaranthus graecizans), emiro (Crotalaria sp.), tsisaka (Gynandropsis gynandra), lisebebe (Cucurbita pepo), and wildplants such as tsimboka (Amaranthus dubius), omurere (Corchorus sp.),

and mushrooms (see Appendix 1 for a complete list of crops including their English, Luyia and botanical designations). Wild fruits were mainly exotic guavas and mangoes and indigenous passion fruits. The fruits were mainly consumed by children who had the time to gather them.

#### 4.1.9. Diet

The dietary staple of the Abawanga consists of ugali (obusuma) made of either finger millet, sorghum, cassava or maize. Sometimes two or more of these products were mixed, for example, sorghum and cassava; sorghum, cassava and maize; or cassava and maize. Obusuma is accompanied by green vegetables, mushrooms, meat, chicken or fish. Finger millet was a highly valued grain crop because its taste is sweeter than that of sorghum. In addition to its utilization for ugali, it was used for beer brewing. In the present day it has been supplanted by maize. Wild fruits, vegetables, and other plants supplemented the diet, especially during food scarcity. Customarily, while entertaining friends a chicken should be slaughtered as an expression of hospitality.

#### 4.1.10. Eating Arrangements

Some changes have occurred in the traditional Wanga eating arrangements. In the past, the mother cooked food for all



household members, but they ate in two groups. The mother, her daughters, daughters-in-law, visiting females and small boys ate together in the cooking partition of the house (amaika), while the father, the older sons, and male visitors ate their meals in the front partition. The very young children were encouraged to eat ugali with vegetable soup or meat, chicken, or fish stew. Today, many households have a special house called (ijikoni) where food is cooked. Therefore, the mother or any other household member who might cook the food serves the household members in the front partition of the main house. Sometimes the (obusuma) is eaten by all from a common dish, especially in cases where household members are few. Other times the (obusuma) is dished separately and eaten in the same groups as described above.

#### 4.1.11. Food Taboos

Traditionally, food taboos were in existence. For example, it was held that eggs should not be eaten by children and their mothers. It was believed that children who ate eggs would be foolish and slow in learning how to talk. Pregnant women had to observe definite rules that pertained to food. They were to avoid eating meat from the ribs, back, and head of the cow, for example.

#### 4.1.12. Material Culture

Mud fortification for protection were common in Wanga. The people also practised the art of pottery and basketry. Women specialised in containers for household use such as water pots, cooking pots and dishes, for example. Men, on the hand, specialised in grain basketry and basket related crafts. Despite the diverse origins of the Wanga clans, they form a Luyia subnation with a common culture.

#### 4.1.13. Conclusion

It is against this cultural background that the contemporary social and economic background, with particular reference to nutritional outcome, is assessed. There are noteworthy changes in the household size. Households are much smaller today than they were in the past. Each co-wife and each adult son tends to establish his or her own household upon marriage and allocation of land by a man. Hardly do co-wives cooperate in productive, reproductive and consumptive activities although they may be living in the same homestead. Land tenure system and division of labour have also changed as the study clearly highlights. Although certain beliefs and practices as concern consumption have changed, others, for instance, witchcraft, ishira and lihera still persist as highlighted in chapter six.

SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF  
THE SAMPLE POPULATION

## 5.1 The Household

The unit of this study is a household. A household in this study includes a man, his wife or wives, their children, married sons and their spouses and children, relatives such as the man's/wife's sister(s) and brother(s), the man's/wife's sister's/brother's daughter(s) and son(s), the man's/wife's daughter's children and others, for example, herdsman, housemaids and workmen who may be residing together in a homestead, sharing meals and cooperating in common productive and reproductive activities. A household therefore in this study is regarded as a socio-economic unit. It is an approximate unit of this study because "nutrition is characteristically measured there, the division of labour by age and sex, and status can be directly observed, and budgets can be charted" (Netting et al 1984: xxii).

A total of 127 sample households were visited during fieldwork. The same number of respondents representing their households were interviewed. 102 were females while 25 were males. 64 respondents belonged to sugar cane growing households while 63 respondents belonged to non-sugar cane growing households. 85 of the female respondents were the mothers of

children aged five years and under. Ten female respondents were taking care of their grandchildren, either born out of wedlock or belonging to their divorced sons and daughters. Four grandmothers took care of children belonging to their divorced daughters, three grandmothers looked after children born by their daughters out of wedlock. Three grandmothers took care of the children belonging to their sons who had divorced their wives.

Out of 127 respondents, 112 (88.2%) indicated that they were married, 14 (11%) indicated that they were widows and one man (0.8%) indicated that the wife had left him. Of 127 households, 14 were headed by women and did not contain adult male members. A further 29 (22.8%) were de facto female headed household due to the absence of adult male members as labour migrants.

The ages of eight widows ranged between 50 and 62 years, two were in their 40s, two others were in their 30s and the last two did not know their ages.

The ages of the respondents ranged between 13 years and 76 years. The ages obtained, however, were not exact as there were no documents to support the ages that were quoted by the respondents. In cases where spouses were absent, the household representatives merely guessed the partners' ages. Confusion that arose in giving dates was exacerbated by prevalence in illiteracy.

## 5.2 Household Population

The size of the sample households ranged between one and thirteen members. The majority of households consisted of a husband and wife, their children and other kin, including sons' wives, grand children, wife's sisters, step children, wife's sister's children and husband's sisters' children. Two housemaids, a herdsman and four workmen were included in six households.

Table 3. Households by Number of Members

No. of Households	No. of Members
23	less than 4
88	4 - 8
15	9 - 13
0	more than 13

Mean household size = 5.6 members

The average household size is 5.6 persons. It was noted that polygyny which promoted larger households in the traditional set up is on the decline. Only 21 (18.6%) out of 113 husbands that were alive were said to be polygynous. Three had four wives each, five had three wives each and thirteen had two wives each. The wives of six of these polygynous men did not reside in the same homesteads. Three younger wives stayed with their spouses who were in the labour market away from home. The co-wives stayed on the same compound, prepared their own meals and cultivated their own fields allocated to them by their

husbands, thus forming their own households. Factors that encouraged polygyny in the past, such as availability of resources--land and cattle--are now very limited. Child labour, which was invaluable in the traditional household set up, has been withdrawn by formal education. In the present time, having many wives and children are not so important an indicator of a man's wealth as was the case in the past. Capital penetration into the household economy must also have a role to play in the dwindling rate of polygyny and decreasing household size.

### 5.3 Education and Occupation

Formal education has been regarded as the gateway to the labour market since the colonial era. High levels of education and professional training have been stepping stones to well paid jobs in the private and public sectors. The levels of education of the adult members of the sample households are shown below.

Table 4. Education of Respondents and Spouses

Education level	Men	%	Women	%
No Formal Education	34	12.0	44	15.5
Primary (Std. 1 - 8)	62	21.9	70	24.7
Secondary (Form 1 - 4)	34	12.0	18	6.4
High School (Form 5 - 6)	3	1.0	-	-
Post-High School Education	-	-	-	-
Missing	16	5.7	2	0.7
Total	149	52.7	134	47.3

Clearly, the majority of the husbands and the wives belonging to the sample households either attained primary education or did not attend formal school at all. Only 34 male adults and 18 female adults attained secondary education and three male adults attained high school education. None attained university education. Male adults in this case as members of the households who had attained the age of 18 years and above by the time of this study. As regards the labour market, the various jobs held by household members are shown in table 5 below.

Table 5. Type of Jobs Held by Household Members

Job	Men	Women
Teaching	5	6
Clerical work	5	-
Police	4	-
Extension work	3	-
Administration	5	-
Accountancy	1	-
Casual labour	17	-
Salesmanship	1	-
Others	7	-
Total	48	6

It was observed that 54 household members were in the labour market out of which only six were females employed as teachers. Limited involvement in the labour market by women may be explained in terms of limited access to secondary and post-secondary education and possibly limited job opportunities in the rural areas. Clearly, the majority of those in the labour market do not hold posts that fetch high income. This is a factor

dictated by low levels of education attained by the members. Differentiation in involvement in income generating activities is also quite sharp. More men were engaged in wage labour (7), petty trade (6), artisanal work (5), and tailoring (3) compared to 11 women who were engaged in petty trade. Women's limited participation in income generating activities may be partly explained by prevalence of illiteracy and lack of enterprising spirit and preoccupation by productive, reproductive and socialization activities which consume a lot of their time.

### 5.3. Pre-school Aged Children

The nutritional status of children aged five years and under was considered as an indicator of the household nutritional status in Mumias Division. Anthropometric measurements of 84 children aged five years and under were taken. 45 were from sugar cane growing households while 39 were from non-sugar cane growing households. The remaining 38% of deliveries were at different health centres, including Bungasi and Butere, and hospitals including mission-sponsored St. Mary's Hospital in Mumias. Of the home deliveries, 50 were assisted by local birth attendants while 12 were not at all. All but one of these children were fully immunised and any child with a recent history of illness had been given treatment at government-sponsored dispensaries, health centres, mission sponsored hospital or private clinics or by the purchase of over-the-counter



proprietary medicines in shops. It is surprising that despite the peoples' beliefs in obulosi, lihera and ishira, none of the cases of illness was referred to a traditional doctor. A probable explanation is that traditional medicine has been negatively regarded by Christians and therefore, although many people use herbs, they would not admit it for fear of being considered as un-christian. Further details on the health and nutritional status of the children are provided in chapter six.

In summary, in view of the fact that food security is a major theme of this study, a household which is the basic socio-economic unit among the Abawanga of Mumias Division is an appropriate unit of study. Considering the fact that children are members of the households and are susceptible to social and economic events of these households, their nutritional status is representative of that of the households. Background information with regard to age, marital status, education level, occupation, other demographic characteristics provided in this section gives highlights about the kind of population in question.

## 5.4 Food Production and Consumption

### 5.4.1 Patterns of Landholdings

In Mumias, most of the land is individually and privately owned by title deed, with male household heads being the Principal owners of record. Occasionally, the land is jointly

owned. The bulk of the land transfer is still through inheritance and the beneficiaries are sons. In fact all the respondents indicated that they lived on the ancestral land and this partly explains, as indicated in the subsequent paragraph, the smallness of the holdings in the area of study. The recorded size of the sample household landholdings range between nil and 4.4 hectares. An average sample household consists of 5.6 people who have an average of only 1.13 ha of agricultural land. Per capita landholdings are thus barely one-fifth of a hectare. Continued subdivision of land is giving rise to a decrement in the landowning households' ability to produce basic crops for their food supply. This subdivision in turn gives rise to household units headed by persons who neither own nor have access to land (GOK 1984/88:26). One sample household in fact owned no land at all and depended on rented land.

Undoubtedly, land is becoming a scarce resource as the population expands. The traditional ways of obtaining additional land such as through bridewealth or gift are restricted and in most cases it has to be purchased. Lack of adequate money to purchase land is a barrier to its acquisition. Strong attachment to ancestral land and lack of alternatives are factors that have played a role in the very limited outmigration that has characterised the area.

Hiring out of land for either food or cash crop production to those who are in need and can afford paying for it is sometimes necessary in order to obtain funds for more immediate needs such

as education, food and medical services. The annual rents paid for land hired for food crop production range from Ksh. 500 to Ksh. 1,000 per hectare. Land for cash crop production, particularly sugar cane, is rented for a much higher fee than that hired for food crop production. The rents in the former case are determined by varied factors ranging from the urgency of the matter for which the cash is required and the demand for land. The agreement takes into account the duration, the maintenance of the crop and the number of harvests.

The smallholder who opts to plant sugar cane apparently has a tendency to give preference to cash crop production at the expense of food crop production. In all, about 87 % of the land owned or controlled by sample households was under production. The remaining 13 % was either claimed by physical structures such as houses, or by pasture. The majority of non-sugar producers have too little land to subdivide it between sugar and food crops. Table 6 shows that 89 % of the non-sugar cane growers have less than 1 ha of land, compared with just 28 % of the sugar cane growers.

Table 6. Landholding Sizes in Sample Households

Holdings in Ha	Non-sugar		Sugar		Total	
	n	%	n	%	n	%
< 1	56	89.0	18	28.0	74	58.3
1-4	6	9.5	43	67.0	49	38.6
> 4	1	1.5	3	5.0	4	3.1
Total	63	100.0	64	100.0	127	100.0

According to the FAO/UNO recommended acreage of 3.5 per family, equivalent to 1.4 ha, one ha is too small for allocation both to sugar cane production and food crop production. It is even too small to produce enough food for domestic consumption.

Table 7. Land Utilization by Sample Households

Mode of Production	No. of Ho.	Under Sugar		Land Under Food		Fallow		Total	
		ha	%	ha	%	ha	%	n	%
Sugar	64	48.73	47.3	40.80	39.6	13.47	13.1	103.00	100
Non-sugar	63	-	-	28.99	91.7	2.63	8.3	31.62	100
Total	127	48.73	36.2	69.79	51.8	16.10	12.0	134.62	100

Mean size of holding: sugar 1.6 ha; nonsugar 0.49 ha;  
total sample 1.05 ha.

The non-sugar cane growers average plot size as reflected in Table 6 is 0.49 ha as compared with the average holdings size of 1.6 ha for sugar producers. These data suggest that small holdings size is particularly constraining for non-sugar growers.

#### 5.4.2 Farming System

An impressively wide range of food crops was reported as being produced by informant households in Mumias. The list includes maize, cassava, beans, sweet potatoes, finger millet, sorghum, simsim, bambarra nuts, groundnuts, soybeans, bananas, taro (cocoyam), and peas. Green vegetables include kale, cowpeas, pumpkin leaves, emiro, omurere, litoto or libokoi, and

tsimboka. Fruits include mangoes, pawpaws, avocados, pineapples, oranges, guavas, passion fruits, loquats and lemons. (A full list of cultigens with English, Luyia, and botanical names is provided in Appendix 1). Despite this long list of subsistence crops, many of the crops, such as sorghum, finger millet, taro or cocoyam, simsim, bambarra nuts, soybeans, rice and peas are grown by a minority of producers, as reflected in Table 8.

Table 8. Food Crop Production by Sample Households

Crop	Household					
	nonsugar		sugar		total	
	n	%	n	%	n	%
Maize ( <i>Zea mays</i> )	63	100	64	100	127	100
Beans ( <i>Phaseolus vulgaris</i> )	52	82.5	61	95.3	113	89.0
Bananas ( <i>Musa sp.</i> )	44	69.8	56	87.7	100	78.7
Vegetables	53	84.1	60	93.8	113	89.0
Sweet potato ( <i>Ipomoea batatas</i> )	47	74.6	52	81.3	99	77.9
Groundnut ( <i>Arachis hypogea</i> )	43	68.3	51	79.7	94	74.0
Cassava ( <i>Manihot utilissima</i> )	41	65.1	50	78.1	91	71.7
Fruit	30	47.6	30	46.9	60	47.2
Sorghum ( <i>Sorghum vulgare</i> )	22	34.9	21	32.8	43	33.9
Millet ( <i>Eleusine coracana</i> )	15	23.8	19	29.7	34	26.8
Bambarra nut ( <i>Voandzeia sp.</i> )	7	11.1	7	10.9	14	11.0
Simsim ( <i>Sesamum indicum</i> )	3	4.8	3	4.7	6	4.7
Soybeans ( <i>Glycine max</i> )	2	3.2	-	-	2	1.5
Taro ( <i>Colocasia sp.</i> )	1	1.6	2	3.1	3	2.4
Rice ( <i>Oryza sativa</i> )	1	1.6	-	-	1	0.8
Peas ( <i>Pisum sativum</i> )	1	1.6	2	3.1	3	2.4

It is also observed that in many cases more sugar producers grow most of the food crops at a greater percentage than nonsugar producers. For example, 95.3 percent of the sugar growers also grow beans while only 82.5 percent of the non-growing farmers do so; 87.7 percent of the sugar growers produce bananas compared

with just under 70 percent of the nonsugar farmers growing the same crop; 81.3 percent of the sugar farmers grow sweet potatoes while 74.6 percent of the nonsugar farmers grow them. These differences are not statistically significant, but they indicate that the greater land resources available to sugar producers do permit them to practise greater diversity in their total productive system. The difference arises then due to acute land shortage constraints faced by nonsugar growing farmers.

Although land hectareages allocated to each crop were not determined (and would be very difficult to determine due to the practice of intercropping), the observed food crop production was obviously not substantial enough to sustain the majority of households up to the subsequent harvest.

The average quantity of maize harvested during the second season (short rains crop, planted in August or September and harvested in December or January) was 2.5 bags per household; beans produced over the same period averaged just 0.43 bags per household. At the time of fieldwork between January and March 1990, 57.5 percent of households indicated that they were buying maize for domestic consumption. This is not to say that the remainder had stored maize. Over one third of the households were harvesting cassava, 28.3 percent were harvesting potatoes and 47.2 percent were harvesting bananas.

There are two planting seasons for most of the food crops in the Mumias area. The first planting coincides with the long rains which start either in February or March. The best planting

time for finger millet, sorghum, soybeans, groundnuts and sweet potatoes is February, at the beginning of the first rains. The planting season for maize, beans, fruits, pumpkins, cowpeas, taro and kale extends from February to April. The harvesting season for these crops ranges from May to September. For each individual crop the time of harvest is affected by the planting time and maturity rate, the amount and distribution of rainfall and conducive temperature and soil fertility. For example, beans that are planted in March may be eaten as green pods in May and are harvested as dry seeds in June. Groundnuts planted in February are generally harvested in July.

The second planting season coincides with the short rains. The best planting time for groundnuts and bambarra nuts is mid-July, in case rain falls at that time. The other food crops such as finger millet, maize, and beans are planted between July and September. The harvesting period falls between November and January.

Other crops such as bananas, cassava, avocados and mangoes are grown throughout the year, provided they receive adequate rainfall.

As already pointed out, the food harvests are generally meagre and therefore Mumias suffers fluctuations in the availability of food. Following from this, there is also seasonal variability in food consumption. Seasonal food shortages present a major problem in the area. Availability of local foodstuffs is naturally highest soon after the harvest of

the staples, and lowest in the interval between planting and harvesting the main food crops. The months of August and September, after the first harvest, and December and January, after the second harvest, exhibit the greatest availability of food from own production. On the other hand, the period between March and July, referred to as the 'hungry season', is characterised by significant consumption of root crops such as cassava and sweet potatoes, which are poor in protein and which are regarded as having low palatability and prestige. These tubers and roots are supplemented with purchased foods. This 'hungry season' also coincides with the long rainy season, when expenditure of energy in farm work such as land preparation, planting and weeding is at its peak. It was observed that during the 'hungry season' a number of households had root crops, cassava and sweet potatoes, which were either being harvested or were almost ready for harvest. Seventy percent of the sample households had cassava available and 65 percent had potatoes in their gardens. About one-third were actually harvesting cassava and almost 30 percent were harvesting potatoes by March. Fewer than ten percent of the households in the sample reported that they had stored maize at the time of data collection.

Low agricultural output of food crops is accounted for by a number of factors, among which are poor crop husbandry, vagaries of nature, the small size of the parcels of land owned and allocated to food production, and shortage of labour.

On the whole prevalence of malnutrition, particularly



protein-calorie malnutrition, was evident among children belonging to both categories of households. Anthropometric measurements showed that out of 84 children from 58 of the sample households, 26, or 31 percent, were stunted; that is, they had a low height-for-age in comparison with international reference standards based on well-nourished population. Seven children or just over eight percent were wasted, as indicated by a low weight-for-height, and 24, almost 29 percent, were shown to be both wasted and stunted by low weight-for-age combined with height deficits.

In summary, land allocation in sugar cane growing households favours sugar cane production to the disadvantage of food crops. This is supported by the larger proportion of available land devoted to sugar cane production. Food crop producing farmers, on the other hand, are constrained by serious land shortages. In fact, sugar cane growers have more land (0.64 ha) allocated to food crop production than the non-sugar cane growers, who average only 0.46 ha under food crop production. This in part explains why sugar cane growers grow more food crops than nonsugar cane growers do, as reflected in Table 7.

On the basis of what has been discussed in this section, the hypothesis that land allocation favours sugar cane production to the disadvantage of food crops, leading to serious deficit, low dietary diversity, and malnutrition, is partially supported. This is due to other intervening factors such as overall shortage of land, particularly among nonsugar cane growing households,

poor crop husbandry, and overuse, and vagaries of nature.

## 5.5 Labour

The capitalist era initiated changes that contributed to the re-definition of earlier gender and age-based systems of the division of labour in Mumias. The extension of the market system into the household economy was partially responsible for the system of adult male migratory wage labour (cf. Stitchter 1982). The kinds of jobs available at the time, for example, railway road construction, production of industrial and export crops, mining, and agricultural labour on plantations, were ascribed to men. Men, being household heads and decision makers, ventured into the labour market easily to meet these new demands. Other jobs that came up, for example, clerical work and teaching provided incentives to educate boys, as the parents saw such education as an investment and therefore gave preference to their sons to attend school as the whole family stood to benefit from their education. The women, by virtue of the nature of their culturally, and to some extent, biologically-defined roles as producers and reproducers, which were confining to rural homes, were left behind. Consequently, women assumed more domestic or rural roles and responsibilities than had been theirs previously, due to the absence of males whose duties they had to fulfil.

Women's workload and responsibilities have, ever since the beginning of the colonial period, increased further, due to

continued changes in the educational system which offers free primary education and requires school attendance by all school-age children through the primary level. The findings in Mumias Division show that virtually all school-age children are absent from their homes during the day, due to school attendance; they can only render services after school hours and during weekends and holidays. The situation has been exacerbated due to lack of co-operative or communal labour which traditionally supplemented family labour.

The introduction of the sugar scheme in Mumias has created further demands for labour. While the men tend to be deployed in the factory and elsewhere, the women remain at home, assuming many more tasks than they performed in the past because of the increased cash cropping tasks such as planting, weeding, and applying fertilizer to the crop. The findings of this research reveal that almost half of all male household heads participate in the labour market; of these, 14.2 percent are employed by the factory. Eleven percent of all the household heads are widows and therefore de jure household heads. De jure and de facto female household heads make up over one-third of the total; only about half of the sample households actually have full-time resident male heads. Thus 60 percent of the sample households depend primarily, if not exclusively, on women's labour for food production.

To determine how women spend their time, a time-allocation survey was conducted for 56 of the sample households over seven

consecutive days. The survey employed the random spot observation technique. Households were visited between 8 a.m. and 6 p.m., the hours when the people may be expected to be actively engaged in productive chores. The visits were unannounced and activities that were being performed were observed and recorded during the visit. Such 'on the spot' observations have advantages over other methods of studying time allocation. First and foremost, the technique enables the researcher to collect data for a large sample quickly. Second, the activities on the ground are observed and therefore the researcher does not rely on recall and reporting by participants, which is less reliable as memory may fail one and distorted information may be provided. Third, since the time of observation is unpredictable and brief, the behaviour of the participants is unlikely to be influenced. Finally, observations can be recorded in a coded fashion, facilitating computer entry and subsequent analysis (cf. Paolisso et al. 1989:219-220).

Time allocation data were collected between the months of January and March. Farm work undertaken during this period includes land clearing and breaking, planting, weeding, fertilizer application, and harvesting. It was observed that food and cash crop productive activities were undertaken by both adult men and women, and children assisted with farm work only on weekends. Over a period of seven days, a total of 132 persons worked a minimum total of 245 hours in cash and food crop fields. Of these 132 persons, 32 were men, 59 were women, and 41 were

children. The significant role of women as food producers is noteworthy, as demonstrated in Table 9.

Table 9. Time Allocation by Gender and Age

Task	Percentage of Time Spent by		
	Men	Women	Children
Cash crops	10	4	4
Food crops	15	17	3
Livestock	9	1	3
Domestic	0	34	8
Childcare	0	9	2
Shopping/Market	7	7	2
Leisure/Social	40	25	10
School	0	0	41
Wage Labour	8	1	1
Ill	7	1	5
Other	3	1	22

Totals may be greater than 100 due to rounding.

Women spent 17 percent of their total time compared to 15 percent of the total time spent by men on food crop production. In addition, women devoted their energy to cash crop activities such as planting, weeding, and fertilizer application. In this case men spent more of their time (10 %) compared to four percent time input by women. The findings also show that men devote more of their time than do women to cash-income-generating activities such as wage labour.

Although women spend almost one-half of their daylight hours in productive and domestic chores, as indicated above (Table 6), they do have time for socializing and leisure, which entails visiting, attending funerals, and resting. It should be emphasized that such social activities are very important; they

reinforce the bonds of reciprocity, serve as social investment, and are a hallmark of culturally-appropriate behaviour. Those who fail to socialize and interact with their friends, neighbours and relatives run the risk of sanctions, including accusations of witchcraft.

Men, however, devoted 40 percent of their "working hours" to such pursuits, and did no domestic work at all. The amount of time spent on domestic chores (women) and invested in social activities (men) reduces time that could be spent on food crop production and childcare activities. It is therefore not surprising that food crop production is too inadequate to sustain the households from the harvesting period of the first season to the harvesting period of the second season. The households are therefore bound to survive on purchased food which does not always meet nutritional requirements. The infants are disadvantaged as only nine percent of the mothers' time is spent on bathing and breastfeeding them. This situation is made worse by the withdrawal of child labour to schools. Children spend 41 percent of their observed time in school, and only two percent assisting their mothers with childcare. Most of the time, pre-school age children are sleeping, visiting, or playing.

The data also clearly show that more time is devoted to food crop production than to cash crop production. The explanation for low levels of household labour devoted to sugar cane production is twofold. First, due to mechanization, Mumias Sugar Company provides a substantial part of the labour required

for sugar cane production, including ploughing, first and second harrowing, and furrowing. The company also recruits and pays for labour invested in the harvesting of sugar cane. The charges for these factory-provided services are deducted from the payments for the sugar cane crop. This substantially reduces the need for household labour, which is mainly required for planting, weeding, and fertilizer application. The trend lately is that when furrowing is done, the local people who would like to plant short-maturity crops like beans and groundnuts are allocated portions of the prepared land by the landowner on request. As they plant their food crops they also plant sugar cane. The same people weed their portions at least once. This sort of arrangement lessens household labour burdens. However, subsequent weeding and fertilizer applications are done either by household members, or hired labour if the household is capable of paying for the services rendered.

The second factor in explaining the heavier labour investment in food crops is that the period of data collection coincided with the most important season for food production in the area, when informants' attention tended to be concentrated on food crop production.

Obviously, women in Mumias have access to very limited amounts of land for food production purposes. Credit facilities for the development of these small plots are out of reach for the majority, and often the decision to seek such facilities lies with adult men who own and control the land and who possess the

title deeds that serve as security. Even when credit is obtained the men decide on its utilization. The women are constrained further by lack of agricultural training, lack of extension services in the area, and lack of attendance at the barazas, or public meetings, convened by local authorities such as chiefs, assistant chiefs, and village elders. The findings reveal that four men attended such barazas while only one woman was able to do so. Although a number of male household heads do attend such meetings, it is uncertain how much of the information received is useful, or is communicated to other household members who did not attend.

Women do not attend such meetings due to a number of factors; their excessive workload, their lack of interest in or awareness of the value of what may be learned at such meetings, and their involvement with other social activities, such as funerals, school meetings, or women's group meetings.

Technological change has certainly favoured men, who use ploughs while the women continue to use the traditional hoe. This is in accordance with Boserup's argument that when a shift in technology, for example, the introduction of the plough, tractor, or fertilizer, takes place, males tend to take the lead in agricultural activity. All these factors contribute to the low level of food production in the area. On the basis of what has been discussed above, the hypothesis that women's time allocation to food and cash crop production and to other activities is likely to prejudice food production and to distance



women from their childcare activities receives some substantiation.

## 5.6 Income

An attempt was made to find out household income, the sources of such income, and the patterns of expenditure, but with very little success. The information provided here is based on the sugar cane income records of 37 households, which were obtained from primary sources. Income earned over the previous two years ranged from a low of Ksh. 1,449 to a high of over Ksh. 30,000. Mean household income from cane production over 24 months was Ksh. 15,515. The income earned was used for a variety of purposes, including the payment of debts, payment of bridewealth, purchases of clothing, bedding, utensils, food and consumer durables, and the payment of school fees. It is recognized, however, that this discussion is deficient, as returns to migratory wage labour, local wage labour, casual labour, petty trade, and other income-generating activities are not considered.

## 5.7 Conclusion

Landholdings are generally small. More land is, however, under sugar cane production than food crop production. Although diverse food crops are grown, they are produced in small quantities. Food crop production and sugar cane income are both meagre. Incidence of malnutrition is evident in both types of households: sugar cane and nonsugar cane growers.

The most crucial constraint that smallholders are facing in Mumias and particular y Musanda and Shikalame sublocations is the factor of limited production. Secondly, there is need for more labour on food crop plots in order to ease the burden of women, increase food crop production and minimise the rate of malnutrition.

## PRODUCTION, CONSUMPTION AND NUTRITIONAL STATUS

## 6.1 Consumption Patterns

Data on consumption patterns were collected from 51 of the sample households over seven days. Twelve-hour recalls were used to obtain information on the kinds of food eaten in the morning, at midday, and in the evening.

Consumption habits are almost similar in a number of households. In the case of the morning meal, tea is the basic component. It is often consumed as the sole breakfast item, but it may be accompanied by groundnuts, bread, maize and beans, sweet potatoes, cassava, taro, ripe bananas, cooking bananas, mashed beans and sweet potatoes and, very occasionally, rice, eggs or chapati. The results for the morning meal are presented in Table 10 below.

Maize, like beans, is eaten while green. Ears of green maize are roasted or boiled on the cob when fresh; but usually the grains are removed from the cobs prior to preparation and consumption. Maize removed from the cob is mixed with beans and boiled together to form staple food items, as already discussed. In most cases dry maize is ground and either ugali or porridge is made out of the flour.

Table 10. Morning Intake, 51 Households, Seven Days

Item	Frequency
Tea	245
Uji	122
Cassava	40
Bread	37
Bananas	34
Sweet potatoes	25
Groundnuts	15
Maize and beans	12
Taro	4
Maize	3
Sweet bananas	3
Rice	3
Eggs	2
Chapati	2
Irish potatoes	1

Ugali and porridge are also prepared from dried ground cassava, sorghum and finger millet, or a mixture of two or more components in combinations such as: cassava and millet; maize, cassava and millet; maize and millet; and cassava and maize. Finger millet is preferably prepared independent of any other component and, apart from ugali and porridge, it is mainly used for making local beer. Ugali can therefore be varied in terms of the basic ingredient(s), although the form remains the same.

In some other households, porridge replaces tea. It is noteworthy that these components of breakfast can be served for major meals, around midday and in the evening, and can also be served as snacks in between major meals. In certain households, breakfast is omitted altogether. Normally a cooked meal is missing whenever there is a food shortage or if the women are too busy to prepare it.

Table 11. Food Consumption, Main Meals, 51 households, Seven Days

Food	Frequency
Ugali and vegetables	446
Ugali and fish	115
Ugali and meat	47
Cassava	31
Maize and beans	22
Ugali and chicken	9
Ugali and eggs	5
Rice and beans	3
Rice and meat	2
Ugali and mushrooms	2
Ugali and Irish potatoes	2
Mashed sweet potatoes and beans	2
Ugali and milk	1

The staple foods in the area are maize, beans and cassava, the proportions, varying from one household to another depending on the season. Other foods include finger millet, sorghum, sweet potatoes, bananas and taro.

Beans are legumes that are eaten as green pods during the 'hungry season', especially in May, before the harvest which takes place mainly in June. Beans are, however, most commonly eaten as dry seeds. The consumption is not consistent throughout the year, as the harvest is meagre in many households and for those who harvest in plenty, beans are a source of income. Beans are normally mixed with green or dry maize and boiled together. The cooked mixture is eaten unaccompanied although a beverage such as tea or porridge might also be served. This food is eaten at any meal of the day, or may even be consumed between meals. At times a sauce or relish made of beans, called eshitiani, is

prepared and served with ugali. At other times, beans are cooked and mixed with boiled sweet potatoes and then mashed to form omushenye, which is served with or without tea or porridge.

Ugali and green vegetables such as kale (sukuma wiki), cowpeas leaves, omurere, emiro, tsisaka, pumpkin leaves, litoto, and tsimboka, is clearly the major dish. Vegetables are almost in daily use by a number of the households because most of them are obtained easily from the household gardens. Meat and fish are seldom eaten and chicken is almost a rarity, yet these are the foods that have high protein content and absorption rate which is required to maintain good physical health. Meat and fish in particular are out of the financial reach of many low-income households, because they are a relatively expensive source of both calories and other nutrients. Chicken is normally reserved for the most distinguished guest or significant occasion because it ranks highest in prestige as a complement to ugali. Moreover, the production of animal protein among the smallholders in Mumias is limited and is generally seen as a source of income rather than a source of food.

The production of plant protein in crops such as groundnuts, soybeans, and bambarra nuts is also not substantial. Furthermore, most of what is produced is for commercial purposes and therefore the consumption in the household is limited.

The foods which are commonly eaten, such as maize, cassava, sweet potatoes, and green vegetables, have relatively low protein values, as reflected in Table 12.

Table 12. Protein Values of Plant Foods

Food	Percent Protein
Soybeans	34
Groundnuts	23
Dry beans and peas	20
Maize, millet, sorghum	8-10
Dark green leaves	3-7
Cassava, other tubers	1-3

Source: King et al. (1972:3.5) Nutrition for Developing Countries with special reference to the maize, cassava and millet areas of Africa. Oxford University.

The diet of indigenous people in Mumias is therefore largely vegetarian, with little variation in the meal pattern or the components of meals. Due to poor harvests and low incomes, additional types of foods such as rice, and chapati, which must be purchased, are seldom eaten. Many other items, particularly fruits, are eaten between meals (more by children than by adults). Sweet bananas, guavas, mangoes, and papayas are all eaten, particularly bananas and papayas which are abundant and easy to obtain when in season.

## 6.2 Child Feeding

Breastfeeding of children is almost universally initiated by mothers in Mumias and is continued up to the age of two years or more for most children. Supplements are added after the age of six months. The supplementary foods provided to nursing infants are generally low in both calories and protein, consisting primarily of sweetened maize, sometimes cassava or millet and,

occasionally, finger illet porridge with or without milk. At times children are given tea with or without milk. Only rarely might they receive boiled cow's milk. Results of a survey of infant feeding practices are presented in Table 13.

Table 13. Infant Feeding in Sample Households

Food	Frequency
Uji	161
Ugali and vegetables	81
Tea	52
Uji and milk	47
Milk	24
Ugali and meat	20
Bananas	12
Fruits*	9
Ugali and fish	8
Bread	7
Eggs	5
Cassava	4
Beans	4
Groundnuts	4
Sweet potatoes	3
Ugali and chicken	2
Rice	2
Mashed potatoes and bananas	2

\*Include passion fruits, avocados, pawpaw, sweet bananas and oranges.

Special dishes for young children in Mumias households are lacking. Solid foods given to children consist mainly of those also consumed by the general household population and prepared from maize, millet and cassava served with vegetables, occasionally with meat or fish. This adult diet is often too bulky to allow the children to ingest enough of the nutrients



they need. Furthermore, cereal-based dishes may not satisfy the protein or the energy needs of infants and young children. Child feeding patterns are strongly influenced not only by the availability of food, but by the availability of the time required to prepare it. Some respondents indicated that very young children were fed in the morning, between seven and nine o'clock, in the mid-morning, at mid-afternoon, and in the evening, often as late as nine p.m. Many others were able to feed the children just three times per day, at the same times that other household members also had their meals. The breastfeeding babies depend on their mothers' milk at night, while older children content themselves with the evening meal that other household members are eating.

Mothers mainly are responsible for food preparation. Occasionally, they are relieved of this task by grown-up daughters or daughters-in-law. There is little indication that children aged five years and under are fed first, before adults are served with food, or given any preferential treatment in feeding. Among the sample households, only 20 percent indicated that children were fed first, 22 percent said that male household heads were served before other members, and the remainder stated that all members were served with food at the same time. There was no evidence that women eat before serving the rest. The eating arrangements were such that all the male household heads with mature sons and male guests were served at a separate table. The rest of the household members including young children ate

from the same dish. This means that the mother has to feed herself and the very young children who cannot feed themselves, at the same time. Undoubtedly, the mother and the children are bound to receive a lower proportion of the food served and, consequently, satisfy less of their daily requirements. However, since observations of snacking behaviour are not discussed here, and since the recall method focusing on meals makes it difficult to collect data on snacks, it is possible that women and children (as well as men) consumed food items other than at meal times and that these data were not captured by the diet surveys.

The younger children eating from the common dish are likely to be unable to eat fast enough to get an adequate share. Their ability to consume more food is limited and hence food with higher concentrations of calories is needed. They are therefore likely to suffer if they are not provided with special helpings to which they can turn when they are hungry. Moreover, the food eaten is of low calorie density, even for the adults.

### 6.3. Time Allocation

Although the kind of consumption patterns found in Mumias division may be attributed in part to such factors as mothers' lack of knowledge as to the needs of a child in the weaning and later periods; inability to produce or provide adequate protein rich and calorically dense foods such as milk, eggs, meat and poultry; and inability to budget for balanced diets, an important

factor to consider is the overburden of women. Women fulfil multiple productive and reproductive roles. they play the leading role as food producers and providers, and they spend a lot of their time on menial domestic tasks. In addition, women devote their energy to cash crop activities such as planting, weeding and fertilizer application and they must also make time investments in social relationships by visiting and attending funerals as outlined in the previous chapter. Women's overburden by these numerous time-consuming tasks and responsibilities deprives them of adequate time for food preparation and childcare practices. Even when a variety of special dishes for children is known and prescribed, there is little or no time to prepare them. Furthermore, the ingredients of such dishes may not be available, given low incomes and poor harvests. In the final analysis, it is the very women who need a lot of energy to carry out their duties and the children who are vulnerable whose welfare is affected.

#### 6.4 Food Habits

Some of the beliefs and practices regarding food among the Abawanga are changing. The commonest taboo relating to women and children, that against the consumption of eggs, is disappearing. Traditionally, children were forbidden to eat eggs because it was believed they would not talk fast and they would be foolish. This taboo was, however, a strategy for preserving the eggs of

sitting hens and therefore preventing the extinction of poultry (Latham 1965). Olenja (1984) highlights the same view of preservation or protection of poultry as the underlying reason for the prohibition on the consumption of eggs by women among the Abasamia of Busia District, Western Province. It was also pointed out that prolonged eating of ugali and uji prepared from cassava flour, cold food, and dirt were dangerous to the health of the child. Cold food is believed to cause worms in the child's stomach and, consequently, its swelling, which is believed to be a manifestation of malnutrition.

Generally, food taboos are fading away and even if they are respected in some households, they do not have a significant impact on food consumption patterns or nutritional status.

Food networks which were upheld traditionally are also changing due to food shortages. Traditionally, members of a homestead shared meals prepared in one of the household units within the homestead. Whenever a chicken was slaughtered in a household, the male head was entitled to eat specific parts of the chicken. The findings of this research show that this does not happen anymore. Food is shared amongst the members of a household, and other residents of the larger homestead can only be invited to eat if there is enough food.

## 6.5 The concept of Malnutrition and Treatment Options

Although poverty and the general lack of food are identified

as major factors in the aetiology of malnutrition, it is also argued by some scholars (cf. Taylor and Taylor 1976; Latham 1965; Olenja 1984; Reutlinger and Selowsky 1976) that the incidence of malnutrition is largely due to ignorance on the part of the members of society where malnutrition is widespread. Ignorance is seen as embedded in the cultural beliefs and practices relating to diet.

According to the research findings, 70 percent of the respondents indicated an awareness of the nutritional disease kwashiorkor, known in the Luo language as ayienya. None of the respondents gave a Luyia name for this condition. Ayienya was attributed to prolonged eating of one type of food, especially ugali or uji prepared from cassava flour, and an unbalanced diet in general. The answers given clearly show that the respondents relate the development of kwashiorkor to food. Concerning treatment, it was pointed out that the condition could be treated by giving the patient protein-rich foods such as eggs, milk and beans. The patient could also be treated in modern hospitals and by traditional medicines such as herbs which are boiled into a soup. In the case of traditional herbal remedies, the patient is first washed with the extract and then given some to drink.

As concerns marasmus, several names denoting several causes were given, including ishira, lihera and obulosi. Ishira, a curse (cf. Olenja 1980:12), is a condition which results when the father of the child marries a widow and fails to carry out cleansing rituals; when adulterous parents touch their nursing

children before they undergo certain customary cleansing rituals; or when the father of the child marries a widow and fails to carry out cleansing rituals or when a lactating mother's chest comes into physical contact with her father-in-law's chest.

The first two instances suggest that ishira results from a breach of moral values relating to sexual relations. It is thought to be an affliction induced by a breach of social norms, particularly the breach of adultery, on the part of either parent. In these instances, the condition is taken to be a manifestation of this transgression, and the child is the victim of wrath brought down upon sexual offenders.

Lihera, as already described, comes about when the mother conceives very soon after delivering a child. In such a case, traditionally the mother had to cease breastfeeding the baby. Automatically the child is deprived of protein and calories, nutrients critical for good health. If the baby is not given nutritious food including milk, it is bound to develop health complications which the local people term lihera.

A marasmic child is sometimes said to be bewitched, that is, okhulokwa. This is an explicit case of the use of supernatural power, witchcraft or sorcery, to ruin the health of the child.

The treatment of ishira, lihera, and obulosi, that is witchcraft, involves local herbs. Ishira, in particular, may be reversed by ritual cleansing using herbs, to rectify social and moral relations. However, omufira, the sorcerer, can also attempt to reverse the effects of obulosi, as noted above (see

section 4.1.6).

## 6.6 Nutritional Status

The incidence and severity of protein-calorie malnutrition in the study population was established by carrying out an anthropometric assessment of children under the age of six years from both sugar cane growing and nonsugar cane households. The results from the study population were assessed with reference to general international growth standards developed by the U.S. National Center for Health Statistics and adopted by the World Health Organization in 1984.

Weight, height, mid-upper-arm circumference, and triceps fatfolds were measured during the anthropometric assessment. Weight and height proved to be the most useful indices for assessing nutritional status, and for each child weight-for-height, height-for-age, and weight-for-age indices were calculated. These indices are expressed as Z-scores, that is, the number of standard deviations above or below the reference median. A Z-score of 0.0 is exactly on the median. A Z-score of -1.0 is one SD below the reference median and a Z-score of 1.0 is one SD above the median. According to Frisancho and Tracer, the method "...permits anthropometric cut-off points to be defined by extrapolation beyond the observed out percentiles of the original reference data" (1987:464). The five categories of nutritional status based on Z-scores and used in this study are recommended

by Frisancho and Tracer (see Appendix 2).

Tables 14, 15, 16 and 17 summarize the results of the anthropometric assessment of 84 sample children from 58 sample households.

Table 14

Distribution of Nutritional Indicators by Children from both Categories of Households: Sugarcane and Non-Sugarcane Growing.

Nutrition Level	Sugar Gr.H.		Weight-for-Age Non-Sugar Gr.H.		Total	
	n	%	n	%	n	%
	Z < - 1.6	13	15.5	11	13.1	24
- 1.6 < Z < - 1.0	10	11.9	7	8.3	17	20.2
- 1.6 < Z < + 1.0	20	23.8	16	19.0	36	42.9
+ 1.0 < Z < + 1.6	1	1.2	1	1.2	2	2.4
Z > + 1.6	1	1.2	4	4.8	5	6.0

Nutrition Level	Sugar Gr.H.		Height-for-Age Non-Sugar Gr.H.		Total	
	n	%	n	%	n	%
	Z < - 1.6	11	3.1	15	17.9	26
- 1.6 < Z < - 1.0	9	10.7	8	9.5	17	20.2
- 1.0 < Z < + 1.0	18	21.4	8	9.5	26	31.0
+ 1.0 < Z < + 1.6	2	2.4	3	3.6	5	6.0
Z > + 1.6	5	6.0	5	6.0	10	11.9

Nutrition Level	Sugar Gr.H.		Weight-for-Height Non-Sugar Gr.H.		Total	
	n	%	n	%	n	%
	Z < - 1.6	3	3.6	4	4.8	7
- 1.6 < Z < - 1.0	11	13.1	4	4.8	15	17.9
- 1.0 < Z < + 1.0	29	34.5	28	33.3	57	67.9
+ 1.0 < Z < + 1.6	1	1.2	3	3.6	4	4.8
Z > + 1.6	1	1.2	0	0	1	1.2

45 children were from sugar cane growing households and 39 were from nonsugar cane growing households. Table 14 reflects the percentage of stunted, wasted and underweight children in Mumias



in relation to the international reference standards based on large samples from well nourished North American populations. 13.1 percent of the children from sugar cane and 17.9 percent of the children from non-sugar cane growing households were rated stunted as their height-for-age Z-score was lower than - 1.6. Children of the below average height achievement with Z-scores between -1.6 and -1.0 totalled 20.2 percent of the sample. 10.7 percent were from sugar cane and 9.5 percent were from non-sugar cane growing households. 8.3 percent of the children were wasted, that is their weight-for-height was below -1.6 Z-score. 3.6 percent were from sugar and 4.8 percent were from non-sugar growing households. 17.9 percent were below average, although not wasted as their weight-for-height was between -1.6 and -1.0 Z-scores. Of 17.9 percent, 13.1 were below average, although not wasted as their weight-for-height was between - 1.6 and -1.0 Z-score. Of 17.9 percent, 13.1 were from sugar growing and 4.8 percent were from non-sugar growing households. 28.6 percent of the children can be considered underweight as reflected by low weight-for-age. 15.5 percent of these children were from sugar cane and 13.1 percent were from non-sugar growing households.

Table 15

Anthropometric Mean Z-score by Age

Household Mean Age in Months	Mean Z-score		
	H/A	W/A	W/H
Sugar 28.4	-0.516	-0.767	-0.506
Non-sugar 26.5	-0.767	-0.659	-0.215
Both 27.5	-0.633	-0.717	-0.3

The mean age for all children was 27.5 months and that for children from sugar growing and non-sugar growing was 28.4 and 26.5 months respectively as shown in Table 11 above. The observation is that the mean ages do not vary significantly. Since age is one of the major determinants of nutritional status, it is important that samples being compared have comparable age composition, as these do. The mean Z-scores of height-for-age, weight-for-age, and weight-for-height do not indicate serious variation in nutritional status between the two categories of households.

Children were clustered to find out whether age had an influence on the nutritional status as shown in Tables 16 and 17.

Table 16

Age of Children from Sugar Cane Growing Households by Mean Z-score

Age in Months	Mean Z-score		
	H/A	W/A	W/H
1 - 6	+0.26	+0.48	+0.29

7 - 12	+0.17	-0.38	-0.47
13 - 18	-1.00	-1.50	-1.20
19 - 24	-2.53	-1.20	+0.19
25 - 30	-0.10	-0.60	-0.60
31 - 36	-1.70	+1.70	-0.90
37 - 42	-2.03	-1.80	-0.79
43 - 48	-0.07	-0.42	+0.33
49 - 54	-1.87	-1.74	-0.73
55 - 60	-1.11	-1.00	-0.50

Table 17

Age of children from Non-Sugar Cane Growing Households by Mean Z-score

Age in Months	Mean Z-score		
	H/A	W/A	W/H
1 - 6	+1.5	+1.26	+0.52
7 - 12	+0.11	+0.11	+0.22
13 - 18	-0.9	-0.9	-0.44
19 - 24	-0.7	-1.6	-1.0
25 - 30	-0.15	+0.13	+0.33
31 - 36	-0.83	-1.22	-0.74
37 - 42	-3.01	-2.16	-1.0
43 - 48	-2.92	-1.99	-0.24
49 - 54	+0.56	+0.23	+0.06
55 - 60	-1.95	-1.3	-0.15

Despite lack of consistent pattern, the observation made from Tables 16 and 17 is that children between one and six months are better nourished than older children. This is the period during which the nursing child heavily depends on the mother's milk. After the age of six months, nutritional status as expressed by the Z-scores tends to decline, although some of the cell sizes in the Tables are too small to be reliable. The mean weight-for-height Z-score of children who had experienced physical illness immediately prior to the anthropometric assessment compared to + 0.02 mean weight-for-height Z-score of children who were not ill lends some support to the argument that

illness has a discernible impact on nutritional status. It was noted that children from both categories of households suffered from more or less the same diseases, such as stomachache, vomiting, diarrhoea, fever, cough, headache, rashes, skin disease, malaria, heart problems and measles as indicated by Table 18 below.

Table 18

Types of Illness by Frequency

Illness	Frequency	
	Sugar	Non-Sugar
Fever	20	20
Cough	10	5
Malaria	3	7
Diarrhoea	3	2
Vomiting	3	3
Stomachache	3	2
Measles	-	1
Headache	1	-
Heart problem	1	1
Skin disease	-	2
Rashes	3	1

To determine whether the difference between the nutritional status of children in sugar cane and non-sugar cane growing households is significant or not, the Chi-square test was performed using the following formula:

$$X = \frac{(o - e)}{1 \text{ d.f}}$$

where o = observed value

e = expected value

d.f. = degree of freedom

Table 19

## Height-for-Age by Households

Nutritional Level	Households		
	Sugar	Non-Sugar	Total
No. below - 1.6 Z-score	11 (13.9)	15 (12.1)	26
No. above - 1.6 Z-score	34 (31.1)	24 (26.9)	58
Total	45	39	84

$$X = \frac{(11 - 13.9)}{13.9} + \frac{(15 - 12.1)}{12.1} + \frac{(34 - 31.1)}{31.1}$$

$$+ \frac{(24 - 26.9)}{26.9}$$

$$\frac{(-2.9)}{13.9} + \frac{(2.9)}{12.1} + \frac{(2.9)}{31.1} + \frac{(-2.9)}{26.9}$$

$$\frac{8.41}{13.9} + \frac{8.41}{12.1} + \frac{8.41}{31.1} + \frac{8.41}{26.9}$$

$$= 0.6 + 0.7 + 0.3 + 0.3$$

$$X = 1.9$$

$$X = 1.9$$

$$d.f = 1$$

$$p < 0.20$$

Height-for-age Chi-square test shows that the difference between the prevalence of malnutrition in the sugar cane and non-sugar cane growing households is not statistically significant.

Table 20

## Weight-for-Age by Households

Nutritional Level	Households		
	Sugar	Non-Sugar	Total
No. below - 1.6 Z-score	13 (12.9)	11 (11.1)	24
No. above - 1.6 Z-score	32 (32.1)	28 (27.9)	60
Total	45	39	84

$$\begin{aligned}
X &= \frac{(13 - 12.9)}{12.9} + \frac{(11 - 11.1)}{11.1} + \frac{(32 - 32.1)}{32.1} + \frac{(28 - 27.9)}{27.9} \\
&= \frac{(0.1)}{12.9} + \frac{(-0.1)}{11.1} + \frac{(-0.1)}{32.1} + \frac{(0.01)}{27.9} \\
&= \frac{0.01}{12.9} + \frac{0.01}{11.1} + \frac{0.01}{32.1} + \frac{0.01}{27.9} \\
&= 0.0008 + 0.0009 + 0.0003 + 0.0003 \\
&= 0.0023
\end{aligned}$$

$$X = 0.0023$$

$$d.f = 1$$

$$p < .95$$

Weight-for-age Chi-square test shows results similar to those obtained in the case of height-for-age. The difference between the prevalence of malnutrition in the two categories of households, sugar cane and non-sugar cane growing is not statistically significant. As already indicated the two categories of households do not vary a great deal in terms of nutritional status. Therefore, the hypothesis that children in food crop growing households are likely to display better nutritional status than those in households where both sugar cane and food crops are produced is not supported.

## 6.7 Health Services and Water

In Mumias Division, there is one mission-sponsored hospital as well as four government-sponsored health centres, one government-sponsored dispensary, one rehabilitation centre and numerous private clinics at market and shopping centres. The government health centres are quite far apart and the people who live far away from them prefer seeking medical advice from nearby private clinics, paying for the services rendered. Others buy

medicine from the shops and administer these medicines to sick children and adults. Some seek medical assistance from the government dispensary. Of children with recent illness episodes who attended the anthropometry clinic, 52.1 percent had sought attention from private clinics, 45 percent were treated with medicine purchased from the shops and the remaining three percent of cases were taken to the government dispensary. The women who brought their children for anthropometric measurements did not indicate that they sought treatment from traditional herbalists. This does not mean, however, that herbs are not in use, in view of the fact that the people still associate lihera, obulosi and ishira with malnutrition. Furthermore, hardly did respondents reveal that their offspring suffered from malnutrition. This is due to the fact that most of the malnutrition revealed is sub-clinical. The children have a surface appearance of adequate nutritional health, but exhibit slower growth and lower bodily reserves of fat and muscle than do children who are optimally fed.

In Mumias Division, safe drinking water is available from the wells that have been established by Kenya Finland Company (KEFINCO) presently, Kenya Finland Western Province Water Supply Project (KFWWSP). The water has, however, to be fetched from the wells at a distance. Taking into consideration the fact that fetching is a task ascribed to females, mothers spent considerable time performing this and other tasks (see Chapter 5). This reduces the chances of having adequate time to perform

the tasks of cooking for the children and feeding them.

In summary, although diverse crops are grown in Mumias, the diet of the people is monotonous and unvaried. The feeding pattern of the children reflect that they are weaned on adult food which is poor in protein and inadequate in caloric density. The nutritional status of children in sugar cane producing households does not vary significantly from that of children in households which do not produce cane, leading to the conclusion that the sugar cane income does not make a difference to the health and nutritional well-being of children in the homes where such income is received.



## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 7.1 Summary

This study was prompted by the researcher's observation of the situation in Mumias characterised by sugar cane growing, land shortage, poor animal and crop husbandry, women's numerous chores and food shortages. Prior literature on Mumias suggests that nutritional problems exist, but does not go deep into the subject matter (Mwandhihi 1985; Barclay 1977; CBS 1984; Owinyi 1977). This literature attributes the nutrition situation to the agro-industry. This research was also prompted by conflicting literature on the impact of cash cropping on nutrition, as well as by the concern for the well-being of pre-school children, which is a national concern in Kenya.

The aim of the study was therefore to find the extent to which the sugar scheme in Mumias has affected food crop production and diversification, land and labour allocation, diet and nutritional status of the household and to determine the role played by food beliefs in the diet and nutritional status of children; and to explore the concept of malnutrition and its treatment options in the community.

The reviewed literature clearly reveals contradictory results of the impact of sugar cane growing on nutritional status. Whereas certain studies show positive association (Hoorweg 1981;

Nzioka 1984), others show negative (Niemeijer et al. 1985; Korte 1969; Wanjohi et al. 1978) and neutral association (Dewey 1979; Kennedy 1986).

Two models are used in this study. The first one is a simple conceptual Agriculture-Nutrition Model showing possible interaction between various variables: Cash cropping; and household factors, namely, food crop production, allocation of time and other resources such as land, labour, household income, expenditure, food sales and food price, and the influence of the interaction on household food security. Child nutritional status depends on the above factors in addition to child feeding pattern, time devoted to childcare, mother's nutritional knowledge, child's birth weight, child's health status and genetic endowment. The present study focuses on cash cropping, household time allocation, labour, food crop production, and infant/child feeding practices. The problem with the model is that it does not cater for cultural practices that are associated with nutrition and nutritional status. However, the assumption is that cultural beliefs are subsumed by child feeding practices. In effect, it is presumed that prohibited food is not given to the child. Beliefs associated with health are totally lacking.

The aetiology of malnutrition includes basic, underlying and immediate factors or causes. This study focuses on the underlying factors, especially household food security. The ideological cultural aspects such as beliefs associated with health and food are catered for by the ideological structure.

The model is appropriate as it gives all the possible factors that are connected with malnutrition and mortality.

Three hypotheses were formulated to guide the study and to be tested at the data analysis stage. It was hypothesised that: the allocation of land favours the cash crop to the disadvantage of food crops, leading to serious food deficit, lack of dietary variety and malnutrition; women's time allocation to cash and food crop production and to other activities is likely to prejudice food crop production and to distance women from their childcare activities; children in food crop growing households are likely to display better nutritional status than those in households where both sugar cane and food crops are produced.

Anthropological data collection techniques were used, namely, participant observation, interview schedules, focus group discussions and key informants. For the assessment of nutritional status, anthropometric measurements were taken. Problems were inevitably encountered in the field. A number of homes had to be visited many times to get respondents. Despite the fact that this provided an advantage as it facilitated participant observation, it was time consuming. There was reluctance on the part of some respondents to answer some of the questions on the interview schedule. In cases of total failure to respond to the interview, alternative households were randomly selected to replace them.

The data were analysed using descriptive statistical measures as well as Z-scores for the anthropometric data.

Chi-square test was used particularly to demonstrate association (or lack thereof) between mode of production and nutritional status of children aged five years and under. The programme that was used for data analysis of anthropometry was developed by the Centres for Disease Control and converted raw measurements into Z-scores. The anthropometric measurements were compared with standards established by the U.S. National Center for Health Statistics (NCHS) which have been adopted by the World Health Organization (WHO). These standards are used and recognized internationally. The Z-score method that reflects the health status of children by standard deviations from the median of the reference population was used.

The results show that land allocation in sugar cane growing households favours the cash crop. The findings reveal that the sugar cane growers have more land than non-sugar cane growers and they tend to allocate more land to sugar cane than food crops production. The non-sugar cane growers have much smaller parcels of land on which they grow food. The yields in both categories of households are unvaried. Both categories of households experience the 'hungry season' during which they heavily depend on the market. Although diverse crops are grown in the area, the diet of the people in Mumias is unvaried. Children aged five years and below are generally not given any special diet or preferential treatment.

Evidently, women's workload is too heavy for them to be productive and have sufficient time for food preparation and

childcare practices. Incidence of malnutrition was evident in both types of households and there was no significant difference between prevalence of malnutrition in both types of households.

## 7.2 Conclusions

In Mumias, the impact of cash cropping on the economic and health conditions of the local population is unclear. It is difficult to discriminate sugar cane growing households from food growing households in terms of nutritional status. The fact that both types of households face food deficits means that neither produces enough to sustain them up to the next harvesting season. The income from the cash crop does not make a difference in the nutrition of the households. Since land shortage is acute in many households, obviously the parcels that are allocated to sugar cane production are small. Heavy deductions that are made by the company as charges for labour and the cost of fertilizer and seedcane account for meagre cane income of about Ksh. 15,000 for every household that plants sugar cane, over a two year period. In any case, this cash income arrives in a lumpsum once every two years and it is difficult to spread it over the period that the sugar cane takes to mature. Moreover, by the time it arrives, the smallholders have accumulated debts and therefore the money is used to settle the debts and meet other immediate demands such as payment of school fees, purchase of household requirements and others. Consequently, the cash income fails to

ensure good nutrition. Cash crop income apparently does not have an impact on the nutritional status of the population of Mumias.

It is therefore erroneous to generalize about agriculture nutrition relationships as they vary from one situation to another, as evidenced by the findings of various researchers that have been done on the same subject.

### 7.3 Recommendations

Development is a multifaceted process which involves equitable distribution of resources aiming at the improvement of the population's standards of living. Rural development concerns itself with the uplifting of standards of living of the rural population. Programmes and projects that are meant to enhance rural development are designed by policy makers who need to take into consideration the needs and priorities of the affected population at grassroots level. "Bottom-up" rather than "trickle down" approaches are necessary for identification of the peoples' needs at policy level and the co-operation and participation of the population at implementation level. One of the basic needs that is essential for healthy citizens who account for the success of economic development is food. This basic need demands special attention in policy making and in the design of agricultural and agro-industrial projects in particular. Not only food production should be given priority in national economic development planning, but also nutrition and

health.

It is essential that nutritional goals are explicitly considered alongside other goals in the choice and design of policies, programmes and projects. In other words, nutrition should be inserted as an explicit objective in agricultural and rural development projects aimed at improving the well being of low income groups whenever it is feasible. This can be effectively done if more is known about the process by which expanded cash cropping and all the social and economic processes at large affect food consumption and nutrition and the likely importance of each of the principal process components in a particular situation.

This calls for assessment of existing rural projects, a process which is likely to shed light on the impact of social and economic variables on nutritional outcomes as well as enhance our understanding of the interaction of these variables. The results of these projects may help planners anticipate results of future similar projects.

Effective planning of agriculture and agro-industry also calls for the interdisciplinary co-operation of nutritionists, health workers, agriculturalists, social scientists, educational experts, economists and other workers. Their views on, for example, increased and improved production of certain foods, horticultural activities and home economics can be incorporated in policy making to ensure balanced diet for young children.

Projects in agriculture and rural development must not be

allowed to cause a deterioration of nutritional status. Quite unintentionally they could have harmful effects on food supply, food prices or incomes. Both policies and projects should be routinely examined for their nutritional effects including, if possible, their effect on groups that are not their direct beneficiaries. Where potentially deleterious effects are discerned, the offending portions of the projects should be reoriented or nutritional components should be added to offset the negative effects.

Apparently at the time the agro-industry was established in Mumias, the Kenya officials planning for the factory did not address themselves to the issue of inadequate land. In the initial stages of the establishment of the agro-industry, the land holdings of a smallholder who showed interest in sugar cane farming did not really matter. In fact, smallholders who had very small parcels of land were encouraged to have their parcels merged together to form what is called by the company a 'block'. Today, due to the threatening food situation, farmers are being advised to give food crops more attention. This is a measure that should have been taken right from the start. The Food and Agriculture Organization (FAO) recommended hectareage of 1.4 ha for subsistence purposes per family ought to be observed in places where cash cropping is introduced. The farmers need to be informed about the pros and cons of an agro-industry in order for them to take precaution against the potential shortcomings.

In cases of projects which have been identified by



researchers, there is need for modification to provide extension services that may be lacking in order to help increase production in household food gardens. In Mumias in particular, extension services provided by the company personnel focus on agronomic practices related to sugar production, such as planting, weeding, fertilizer application techniques together with the frequency recommended for the operations. Agricultural extension services focusing on food crop production as concerns field preparation, selection of seeds, planting, weeding and fertilizer application need the attention of the same personnel.

Many farmers are handicapped and less endowed with other resources and hence require incentives such as credit facilities preferably in kind: fertilizer, ploughing and transport rather than cash. Despite the fact that agriculture credit was made available in Mumias beginning in 1985, only a few farmers from Mumias Division have utilised the facility. It has been observed that the few farmers who use the facility misappropriate it. Some of the farmers actually sell the fertilizers and the seeds provided in times of need instead of utilizing them to develop their farms. In this case the purpose of the credit facility is defeated. It is, therefore, recommended that follow up is made by officers of the company specifically charged with that responsibility in order to ensure proper utilization of the credit facility. In fact before credit is approved, the smallholders' plots need to be inspected by the officers who can then report the potential of the plot to the company management

and after the approval of credit and delivery of fertilizers and seeds they need to go back to the plot and see the progress that has been made.

Another incentive may take the form of payment. Heavy deductions are made for the services rendered to the smallholders by the company such as surveying, ploughing, first and second harrowing, furrowing, harvesting and transportation, including the delivery of goods such as fertilizer and seedcane. Even though increments in producer prices are sometimes made, the difference between the new and the old payments is very small. The payments farmers are required to make need to be reduced in order for the farmers to benefit more, providing a greater incentive to work on their sugar farms. Thus, the review of sugar cane prices ought to take into account the changing economic conditions.

There are some farmers who are either lazy or too busy with other activities to tend their sugar cane. Some of them have sizeable parcels of land. Instead of terminating such farmers' contracts as per the company's regulation, the farmer could instead be requested to allow the company to cultivate the crop for him and share the proceeds between him for the value of his land and the company for the services rendered.

In view of the fact that many farmers in Mumias grow crops such as maize, beans, bananas and cassava, they need to be encouraged to grow more crops that are suitable in the area. Crops such as soybeans, bambarra nuts, millet, finger millet and

simsim ought to be grown by more farmers than is presently the case. On the side of cattle, veterinary officers have a task to perform. Zero-grazing needs to be encouraged in order for small holders to get their own milk instead of depending on purchased milk which is often neither affordable nor available. Moreover, such milk as is purchased is not necessarily adequate for child nutrition, or even fed to children. The findings of this study show that children were predominantly fed on porridge and tea without milk.

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APPENDIX I

Common Name	Local Name	Botanical Name
Cereals		
Maize	Amatuma	Zea mays
Millet	Amabele	Peunisetum americanum
Finger Millet	Obule	Eleusine corocana
Sorghum	Amabele	Sorghum vulgare
Rice	Omuchele	Oryza sativa
Roots and tubers		
Cassava	Emioko	Manihot esculenta
Sweet potatoes	Amapwoni	Ipomea batatas
Taro (Cocoyam)	Tsinduma	Colocasia
Legumes/Pulses		
Peas	Tsing'oli	Pitum sativa
Beans	Amakanda	Phaseolus vulgaris
Groundnuts	Tsinjuku	Arachis hypogaea
Bambarra nuts	Tsimbande	Voandzeia subterranea
Simsim/sesame	Tsinuni	Sesamum indicum
Soybeans		Glycine max
Vegetables		
Kale	Lisukuma	Brassica oleracea
Cowpeas	Likhubi	Vigna unguiculata
Pumpkin leaves	Lisebebe	Cucubia pepo
	Emiro	Crotalaria sp.
	Omurere	Corchorus olitorius
	Litoto/Libokoi	Amaranthus graecizans
	Tsimboka	Amaranthus dubious
	Tsisaka	Gynandropsis gynandra
Fruits		
Avacado pear		Persea americana
Bananas	Amaramwa	Musa sp.
Guavas	Mapera	Psidium guajava
Lemons	Tsindimu	Citrus aurantifolia
Mangoes	Maembe	Mangifera indica
Orange	Machungwa	Citrus sinensis
Passion Fruit	Matunda	Passiflora edulis
Pawpaws	Amapaipai	Carica papaya
Pineapple	Amananasi	Ananas cosmosus

## APPENDIX 2

Anthropometric classification for the evaluation of nutritional status based on age and sex-specific.

### Anthropometric Distributions Statistical Criteria By Age Sex-Specific

Z-score	Height-for-Age	Weight-for-Height	Muscle Area -for-Height
$Z < - 1.6$	Stunted	Wasted	Wasted
$-1.6 < Z < - 1.0$	Below average	Below average	Below average
$-1.0 < Z < + 1.0$	Average	Average	Average
$+1.0 < Z < + 1.6$	Above average	Above average	Above average
$Z < + 1.6$	Advanced	Heavy	High muscle