HOUSEHOLD FOOD SECURITY AND NUTRITIONAL STATUS OF TOBACCO AND NON-TOBACCO GROWERS IN MARGINAL AREAS OF EMBU DISTRICT.

BY

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A Thesis Submitted in Partial Fulfilment of the Requirement, for the Master of Science Degree in Applied Human Nutrition, University of Nairobi, College of Agriculture and Veternary Science, Faculty of Agriculture, Department of Food Technology and Nutrition, Unit of Applied Human Nutrition.

Nairobi, October 1995.

DECLARATION

I, **MUGO JAMES THUO**, hereby declare that this is my original work and has not been presented for a degree in any other University.

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DEDICATION

This work is dedicated to my dear mother Jane Wangui, my loving wife Susan Wangui, and children Nahson Thuo, Jane Wangui and Judy Muthoni for their prayers and suffering they endured in my absence.

ACKNOWLEDGEMENT

I wish to grant my appreciation to the staff of the Unit of Applied Human Nutrition at the University of Nairobi, for the assistance they offered throughout the Msc course.

I am most thankful to Nairobi University, GTZ (German Technical Cooperation), IDRC (International Development Research Centre) for funding this study.

Exceptional thanks go to my primary advisors Dr. Nelson Muroki, Sandra L. Baldwin, and Robert K. Mwadime for their precious guidance and support throughout the research period.

I am grateful to Dr. W. Klaver of International Agriculture Centre in Waneningen and Dr. J. Hoorweg of ASC (African Studies Centre Leiden) for their advise and critical comments during different stages of the investigation and writing.

I appreciate the good collaboration of the local administration in the study area without which the study would have been extremely difficult to conduct.

Gratitude goes to field assistants, members of focus groups and all those who participated in the field work for their hospitality.

I recognise the generosity of Nairobi University for offering me scholarship.

Lastly I wish to express my sincere love to my family for the patience, encouragement and care which contributed much to my success.

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ABBREVIATIONS

ANP	Applied Nutrition Programme.
ACC/SCN	Administrative Committee on Coordination - Subcommittee on Nutrition.
ASAL	Arid and Semi-Arid Lands.
ASC	African Studies Centre.
ANTHRO	Anthropometric Calculating Programme.
B.A.T	British American Tobacco Company.
CRSP	The Collaborative Research Support Program.
CBS.	Central Bureau of Statistics.
dBIII	Data Base Version Three.
FAO	Food and Agriculture Organisation.
GTZ	German Technical Cooperation.
GoK	Government of Kenya.
H/A	Height - for - Age
HH.	Household.

IDRC	International Development Research Centre.
IFPRI	International Food Policy Research Institute.
IGADD	International Authority on Drought and Development.
Kshs	Kenya Shillings.
NHCS	National Health Centre for Statistics.
NGO	Non Governmental Organisation.
NTG	Non-Tobacco Growers.
SPSS	Statistical Package for Social Scientists.
SD	Standard deviation.
TG	Tobacco Growers.
UNICEF	United Nations International Children's Emergency Fund.
WHO	World Health Organisation.
W/H	Weight - for - Height.
W/A	Weight - for - Age.

DEFINITIONS

Cropping system. The crops a farmer grow (those who grow tobacco are referred to as tobacco growers and those who do not grow tobacco as non-tobacco growers).

Small-scale farmers. Farmers who own at most, 5 acres (2.5 hectares) of land and live on this land with their families. They cultivate the land, keep animals and may also be engaged in other economic activities.

Tobacco growers. Small-scale farmers who grow tobacco and other crops. They may or may not be registered by the British American Tobacco Company (BAT).

Non-tobacco growers. Small-scale farmers who grow all other crops except tobacco.

Marginal Areas (also called medium potential). Those areas where the production of annual field crop is limited severely by lack of available moisture, but where the use of early maturing and adapted crop varieties could make crop production sufficiently reliable for an increased population (Marginal districts are gazetted in Kenya).

Household. A group of people living together on their farm and eating from one pot. In this study, only those households with a child between 12-60 months were included.

Preschooler. A child aged between 12 to 60 months.

Total Household Income. The sum of all cash received in the household from all

sources during the crop year 1991/92 (starting from the 1991 short rains to 1992 short rains).

Off-farm Income. Income from sources other than the sale of farm produce.

Household food security. Access to adequate food for a healthy life for all household members throughout the year.

Household food accessibility. The ability of a household to produce or purchase enough food for a healthy life for all its members throughout the year. In this study, accessibility is measured by the amount of food produced from own farm and amount of income received in the household in a year.

Food available per household. The physical presence of staple food (maize and beans) in the household at the time of research (in number of days the food will last as estimated by household respondent).

Underweight child. A child with weight - for - age (Z score value) of less than or equal to -2 standard deviation of the mean of a reference child of the same age given by National Centre for Health Statistics.

Stunted child. A child with height-for-age (Z score) value of less than or equal to -2 standard deviation of the mean of a reference child of the same age given by National Centre for Health Statistics.

A wasted child. A child with a weight - for - height (Z score) value of less than or equal to -2 standard deviation of the mean of a reference child of the same height given by National Centre for Health Statistics.

ABSTRACT

This study examined the difference in household food security and nutrition status of tobacco and non-tobacco growers in marginal areas of Embu district.

The survey was conducted on a random sample of 146 households of tobacco growers with 176 preschoolers and 154 households of non-tobacco growers with 174 preschool children.

Data were collected using structured questionnaires, focus group discussions and anthropometric measurement were also taken.

The study revealed that there was no significant difference in amount of calories produced per year between the two groups.

Tobacco farmers had significantly more food available for household use. This was because, unlike non-tobacco farmers, tobacco farmers do not sell most of the harvest.

There was no difference in the proportion of household income spent on food although tobacco farmers had significantly higher income.

The prevalence of stunting and underweight was higher in non-tobacco growing households, but there was no significant difference in levels of wasting.

The factors which seem to influence nutritional status differ by cropping system. For tobacco growers the factors were, household income, amount of calories available for household use, age of the child and household size. For non tobacco growers the factors were, age of the child, mother's age, household size,

the number of days the mother is involved in sale of labour, total land cultivated, and total calories available for household use.

It was concluded that tobacco growing is compatible with household food security and nutrition in marginal areas.

CHAPTER ONE

INTRODUCTION

1.1 Problem Identification and Definition.

The food problem in the world exists as a result of high population increase, poverty, low agricultural production, and an inadequate policy environment. In recent years, population increases in Kenya's high potential zones have put pressure on the land, causing overcrowding and migration to marginal areas. This has caused destruction of the fragile environment, such as through increasing soil erosion, deforestation and soil salinity. As a result, crop failure, food insecurity and malnutrition are, in many areas, inevitable. The government is concerned over the high levels of malnutrition and food insecurity in marginal areas and has embarked on development policies aimed at alleviating these problems (GoK, 1990) through, for example, creation of the Ministry of land reclamation, promotion of drought adapted and early maturing crops, irrigation schemes and encouraging diversified income sources.

In Embu District, small-holder farmers in marginal areas, have introduced tobacco as one source of income. With the importance of this undertaking in the household's food security, their ability to acquire food and the nutritional status of their pre-school children need to be investigated.

Despite many studies that have investigated the impact of cash crop

production on nutrition, the findings remain contradictory. Some suggest that cash cropping has a negative effect on nutrition and household food security (Mwadime, 1992; Aberra, 1991; Kinyingi, 1988; Taha, 1979.). Other studies suggest that cash cropping has no effect on nutrition and household food security (Brun , Geissler and Kennedy, 1991; Kennedy, 1989), while others support the idea that cash cropping improves household food security and nutrition (Immink and Alarcon, 1992; Kennedy and Cogill, 1987; Anderson 1985). Most of the studies were undertaken in schemes or in areas of large scale production or where farmers are forced to grow a certain crop. Research is, however, required in order to examine the nutrition situation and household food security among small-scale farmers in areas where crop restriction is not enforced. This study examines the nutrition situation and household food security of small-scale tobacco and non-tobacco growers in marginal areas of Embu District.

1.2 Justification of the Research.

In marginal areas of Embu district, as in many parts of rural Kenya, the majority of households depend on both own produced and purchased staples for their daily nutrient intake. The unreliable and inadequate rainfall accompanied by low use of farm inputs and small farm sizes (which continually reduce in size as a result of population increase) result in food production not enough to satisfy

household needs to the next harvest. Accessibility to financial sources is therefore important to the survival of many households. Cash crop production is a potential source of income, not only to the producers of the crop but also to neighbouring non-producers who may provide agricultural labour. Hence, there is even more need to determine the household food security (in terms of physical as well as financial access) and other factors possibly associated with the nutrition status of small-scale tobacco and non-tobacco growers.

1.3 Benefit of Study

The study provides information on the consequences of tobacco growing on household food security and nutrition among small-scale farmers in medium potential areas. The information could assist in the optimization of household food availability in marginal areas and provide insight for agricultural policy in cash cropping areas. The study will also provide baseline data for future studies which is useful to policy makers, nutritionists, agriculturalists and non-governmental organisations (NGOs).

1.4 Study Objectives.

a. To determine the difference in household food security between tobacco and non-tobacco growing households.

b. To determine factors affecting nutritional status of preschool children in tobacco and non-tobacco growing households.

1.5 Sub-Objectives.

To achieve these objectives the following specific objectives were formulated.

a.1 To determine total calories available for household use from own farm production.

a.2 To determine total household income.

b.1 To determine nutritional status of preschool children using anthropometric indicators.

b.2 To determine factors associated to nutritional status of preschool children in the study area.

1.6 Study Hypothesis.

1. There is no difference in mean calories available for household use from own food production between tobacco and non-tobacco growing Households in Embu.
2. There is no difference in prevalence of malnutrition of Preschool children in tobacco and non-tobacco growing households in Embu.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Malnutrition is directly linked to inadequate dietary intake and disease, which in turn result from the interaction of many underlying factors. UNICEF has cited insufficient household food security, inadequate maternal and child care, and unhealthy environment as the underlying causes of malnutrition (UNICEF, 1990).

In marginal areas, insufficient household food security and inadequate policy environment are the main causes of malnutrition.

In these areas food is mainly accessible either from own production or purchases. The farmer decides what to produce, how to produce it and the resources to use. Some farmers decide to produce their own food, while others decide to grow cash crop and use the income gained in purchasing food. In areas where crop restriction is not imposed, farmers may decide to grow both cash crop and food crop. The ability of the farmer to make the right decision is very important if households are to be food secure.

2.2. Cash Crop Farming and Nutrition

The issue of cash crops and nutrition has remained contradictory. In Kenya studies done in Mwea, Ahero and Limuru found a negative

relationship between cash crop production and child nutrition (Mwadime, 1992; Kinyingi, 1988; Niemeijier, 1985;). In these studies cash crop growers were not only living in an environment which was unfavourable to their health but also they were mainly restricted to growing one crop in the scheme.

Other studies conducted in Western Kenya found no significant difference in nutritional status of sugarcane growers and non-sugarcane growers (Kennedy, 1989) but a similar study conducted in Philippines found that sugarcane growers had better nutritional status than non-sugarcane growers (ACC/SCN, 1989). The difference was attributed to self selection bias because sugarcane growing favoured those with production resources (land and capital). Also, sugarcane growing reduced food production in the area causing food prices to increase.

In Malaysia farmers involved in rice production increased their caloric intake as a result of improved income (Hazell, 1983). Similar findings were reported by researchers in Gambia, Sri Lanka, and Guatemala (Immink and Aclarcon, 1992; Braun et al, 1989; Longhurst, 1985.). In these studies the improved nutritional status was associated with good management of the project especially on the side of public health.

The introduction of commercial agriculture usually fail to improve nutrition due to poor planning and implementation of the projects (Lunven 1982). Lunven recommended the inclusion of nutritional aspect during the planning and implementation of any

agricultural projects if nutritional status of the community is to be improved.

There are a number of reasons why agricultural projects may fail to improve nutritional status of a community, for instance, the social and cultural factors which affect the ability of the household to adjust to change, such factors include, food taboos, and/or religious beliefs.

The person controlling the extra household income determines which foods to be purchased and the proportion of income to be spent on food. Studies have observed that, some households would continue with their previous eating patterns even with introduction of new crop or a cash economy (Kennedy, 1989; Andersen, 1985; Lippe and Collins, 1977;).

The change in cropping system may affect the role of some household members. It may increase the women's workload and deny them adequate time for food preparation and child care, or worse still, the increased labour require an increase in calorie intake which in most cases is not provided (Mwadime, 1992; Kennedy and Oniang'o, 1990; Kinyingi, 1988). Hence, the poor nutritional status of the community.

The mode of payment can also contribute to poor nutritional status as Jerome and others (1980), explained.

> "The cash crop tend to kill the traditional life of the villagers; It merely puts money in their pockets for a short period in the year, during which time they enjoy themselves. When the money gets scarce, months before the next harvest, they find themselves short of everything"

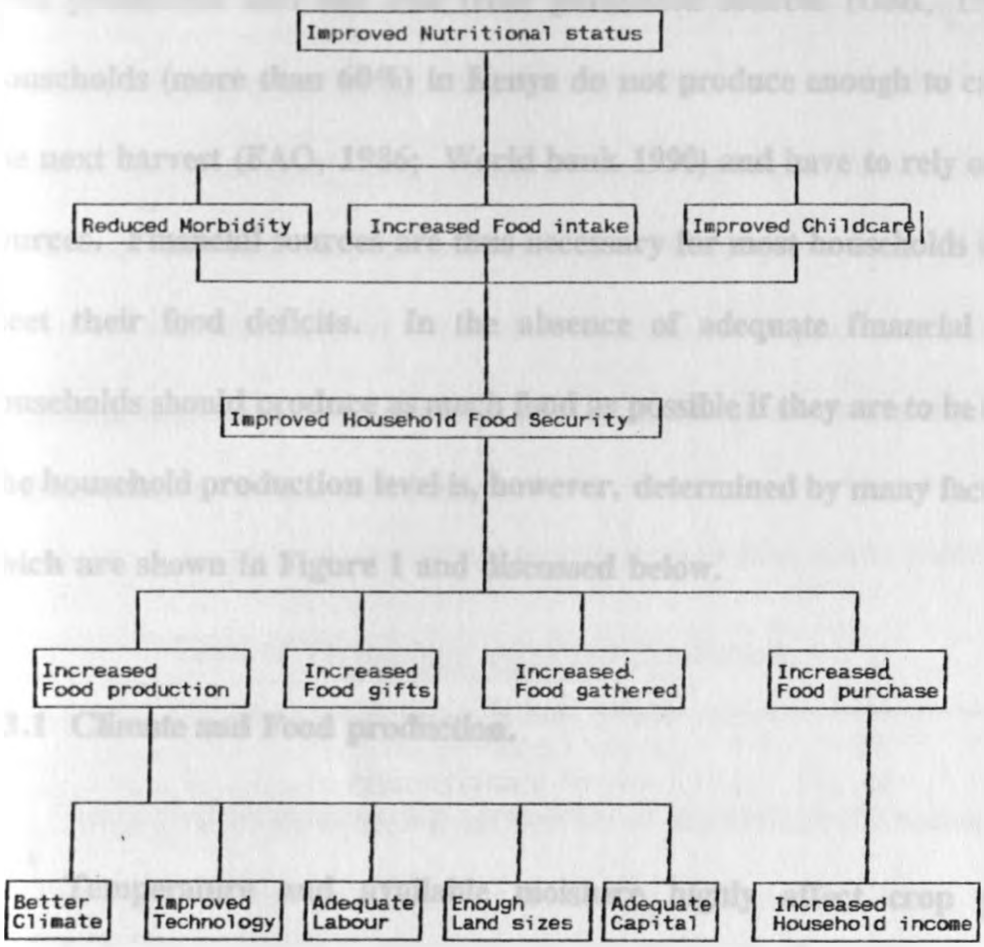
and in cases where an agricultural project is implemented many lack explicit consideration of nutritional consequences in their implementation (Lunven, 1982). Therefore, the nutritional impact of a cash crop project can vary from place to place and on type of crop grown. This explains the reason why different studies on the effect of cash crop on nutritional status of the community have different findings.

2.3 Tobacco Farming and Nutrition

Literature on nutritional aspects of tobacco growing in Kenya is scarce. The only elaborate work done was a study on economic aspects of tobacco growing (Oyugi, 1984; Bazinger, 1981). The two researchers commented on effect of tobacco growing on maize production. Oyugi, (1984) found that tobacco growing was more profitable than other agricultural enterprise in Migori and it had no negative effect on maize production. Bazinger, (1981) on the other hand found that tobacco growing had negative effect on maize production in Kunati valley in Meru. Unlike the previous studies, in this study, tobacco (a cash-crop) growing is considered as a source of income to otherwise unemployed rural households and specifically the contribution of tobacco growing to household food security and nutrition. The following are the factor which affect household food security and nutritional status of farming community.

FIGURE .1

FACTORS THAT AFFECT HOUSEHOLD FOOD SECURITY AND NUTRITIONAL STATUS.



Adapted from UNICEF, (1990)

In many rural households in Africa, the food consumed is mainly from produced and purchased sources. In Kenya, the Integrated rural survey of 1977 found that, in marginal areas, 42% of food consumed in the household is from own production and the rest from purchased sources (GoK, 1977). Many households (more than 60%) in Kenya do not produce enough to carry them to the next harvest (FAO, 1986; World bank 1990) and have to rely on purchased sources. Financial sources are thus necessary for most households to be able to meet their food deficits. In the absence of adequate financial base, rural households should produce as much food as possible if they are to be food secure. The household production level is, however, determined by many factors some of which are shown in Figure 1 and discussed below.

2.3.1 Climate and Food production.

Temperature and available moisture highly affect crop production. Households in areas with unstable rainfall and high temperatures, may have inadequate yield to last until the next harvest, if the necessary resource base (land and capital) is not adequate or is poorly managed (Bratton, 1987). In Kenya, water is the major limiting factor in agricuitural production and the greatest source of uncertainty for the farmer. In general, rainfall tends to decrease with a decrease in altitude and is also unreliable from year to year. The areas of low

rainfall are also those with the least reliable distribution and experience drought periods on a regular bases. Drought reduces household ability to produce or purchase food, for instance livestock usually die, crops planted usually fail and households are left without any measures to guard against threats of food insecurity (Longhusrt, 1987). This usually leads to deterioration of nutritional status of the community and sometime disruption of families (Kusin et al 1984). To amend this situation farmers used to cultivate more land (Lynam, 1979), However, with the current event of decreasing per capita land holding, this is becoming impossible. Improved technology has become an important factor for food production as discussed below.

2.3.2. Level of Technology and Food Production.

Improved technology for agriculture is increasingly becoming important due to the decrease of per capita land holding, and more so due to the increase in desertification. The technology include increasing the productivity per unit land by use of more inputs associated with improved yield eg.improved seeds, use of fertilisers and pesticides, and better water management through irrigation. A study conducted in Egypt showed that improved agricultural technology improved

own food production and nutrition of participants. Improved seeds enhanced genetic vigour of the local varieties, fertilisers increased soil fertility, and water reduced the effect of seasonality (Galal, et al 1987).

In order to improve food security in marginal areas the above four agricultural inputs should go together as witnessed in Asia during "The Green Revolution" (FAO, 1986). However, most rural households in Kenya spend little or no inputs in food crops (Lynam, 1979; Hunt, 1975). The reason could be associated with not only the lack of appropriate extension services and the cost of the inputs relative to farm income but also the risk associated with use of the new technology which in most cases is meant for temperate climate in developed countries. A study conducted in Malawi showed that the production of a new variety of American bean seed could not meet the full range of household needs and had detrimental nutritional effects under farming conditions in Malawi (Ferguson et al, 1990). Although the seeds had higher yields, they were easily affected by drought and/or pests. This resulted in increased risks of crop failure and/or spoilage during farm storage (Dugdale and Payne, 1988).

Emphasis should be to improve traditional local food crops (eg. millet, sorghum and root crops) as a means of improving household food security of the small-scale farmers and the rural poor. In Kenya, a great deal of effort has gone

into improving productivity of maize than any other food crop (IGADD, 1990). Although early-maturing and more disease resistant varieties have been made available, their extension in semi-arid areas can be detrimental if done at the expense of sorghum and millet. Sorghum for instance can withstand drought and do better in a wider range of soil conditions than most other cereals in semi-arid areas (Coulter, 1979; Lynam, 1979; Hunt, 1975). In fact both millet and sorghum are also more nutritious than maize (WHO food tables Appendix B2).

2.3.3 Labour and Food Production

Since most households in marginal areas in Kenya do not use any additional inputs, (Mbithi, 1981) the basic production inputs in use are land and labour. Land is more or less fixed and the amount of crop harvested is largely influenced by labour inputs. The increased need for cash in marginal areas has led to increased out-migration of male adults and school leavers in search of employment (Lynam, 1979). This if in large scale could result to a shortage of labour especially during the labour peak periods. The income earned by absent adult men is not all used for the welfare of the household or if it is, it may not be enough to hire extra labour or to fill the deficit in own food production.

Whenever men out-migrate, women and children carry the labour burden and more so in poor households (Yotopoulos and Mergos, 1986; Tagwireyi, 1986) In such cases women find themselves in a dilemma either to use the available time to provide household agricultural labour, or for child care and other domestic activities. The choice is more difficult for mothers with more than one infant. In most cases, the time is balanced between the tasks. Hence, poor child care services and nutritional status (Mcguire and Popkin, 1988; Chandhury, 1986;).

More research is, however, needed to investigate whether, rural households efficiently use the available family labour and resources to optimize household food production. The assumption we hold for now is that more household adult labour would increase agricultural production (if adequate land is available) for easily and cheaply accessible food and in most cases income.

2.3.4 Land Size and Food Production

Land is a key factor in agricultural production. Normally, households with no access to adequate land are food insecure (UNICEF, 1992; Baer, 1990; Kennedy and Cogill, 1987; Mason, et al, 1984; Nabarro, 1981; Haaga and Mason, 1981;). In most areas, land holding and ownership is related to cultural land inheritance patterns. High population growth has thus resulted in land fragmentation. Lynam, (1979) observed that farmers in marginal areas and with

land sizes less than 2.0 hectares (5 acres) have difficulties in providing adequate food for household consumption. In rural Malawi, households cultivating less than 0.7 hectares were able to produce only 37% of their required calories (UNICEF, 1992). This indicate that households in marginal areas would require larger farm sizes if they are to meet their food needs. The implication is, more and more deforestation will continue and the problem of desertification will increase.

In most Sub-Saharan countries inheritance of land and other production resources discriminate against women who are basic providers of food in the household. This limits women's power in the control of household resources and can affect household food availability (Bennett, 1988; Macguire and Popkin, 1988; Dey, 1984.).

2.3.5 Household Assets and Food Security.

Whenever households are unable to produce enough food to sustain their survival, they develop ways and means of acquiring the extra food needed. One way is to rely on food aid, or food gifts, or develop other means of food acquisition such as food gathering, or sale of household assets and livestock (Campbell et al, 1990; Nestal, 1986).

In marginal areas livestock and other household assets are

valued as "food insecurity absorbers" Animals are sold for cash or slaughtered for food during famine crises (Campbell et al, 1990). Farmers with many animals (including birds) perceive themselves as food secure thus risking overgrazing and soil erosion.

The increase in population and decrease in range land has created problems for farmers with large herds of animals. The quality of the animals has decreased while many have died as a result of recurrent drought. The resource base of most households has hence reduced, leaving many families with more reliance on off-farm employment or exploitation of available natural resources to earn or raise the income needed to purchase food.

2.3.6 Off-Farm Employment and Household Food security.

The income earned through off-farm employment contributes to improving the household's financial access to food. Through this, households with inadequate farm production may meet the food deficit from purchases, which as stated earlier, may comprise more than half of the household food requirement in marginal areas (GoK 1977). Regular source of income increase household purchasing power,as farmers may be able to purchase and use farm inputs and/or hire labour. This way more land may be planted, weeded and harvested on time, leading to higher farm production.

Mbithi (1971) stated that over 67% of the income in marginal areas was from off-farm employment as opposed to 26% in high potential zones in Kenya. This does not, however, imply that households living in marginal areas have better access to off-farm employment or to higher income, to the contrary, in many cases they rely on illegal business (charcoal burning, beer brewing) which are detrimental to the environment and social welfare of the whole society (UNICEF, 1992). This does not mean that the ASAL society is made up of offenders. Most households earn their income by working in the large farms or estates as labourers while others exploit the natural resources (quarrying, weaving, curving, craftwork, leatherwork, brick making and beekeeping). The income earned, when well managed, assists to improve household food security.

CHAPTER THREE

BACKGROUND INFORMATION.

3.1 The study District

Embu District is one of eight districts in Eastern Province The district occupies an area of 2,714 sq Km of which 2,442 sq Km are available for agriculture (appendix A7).

The altitude ranges between 575m to 4,570m above sea level (including part of Mt. Kenya.). Embu town, the District headquarters, is approximately 160 Km North-East of Nairobi.

The district is divided into ten agro-ecological zones as shown below;

AGRO-ECOLOGICAL ZONES OF EMBU DISTRICT

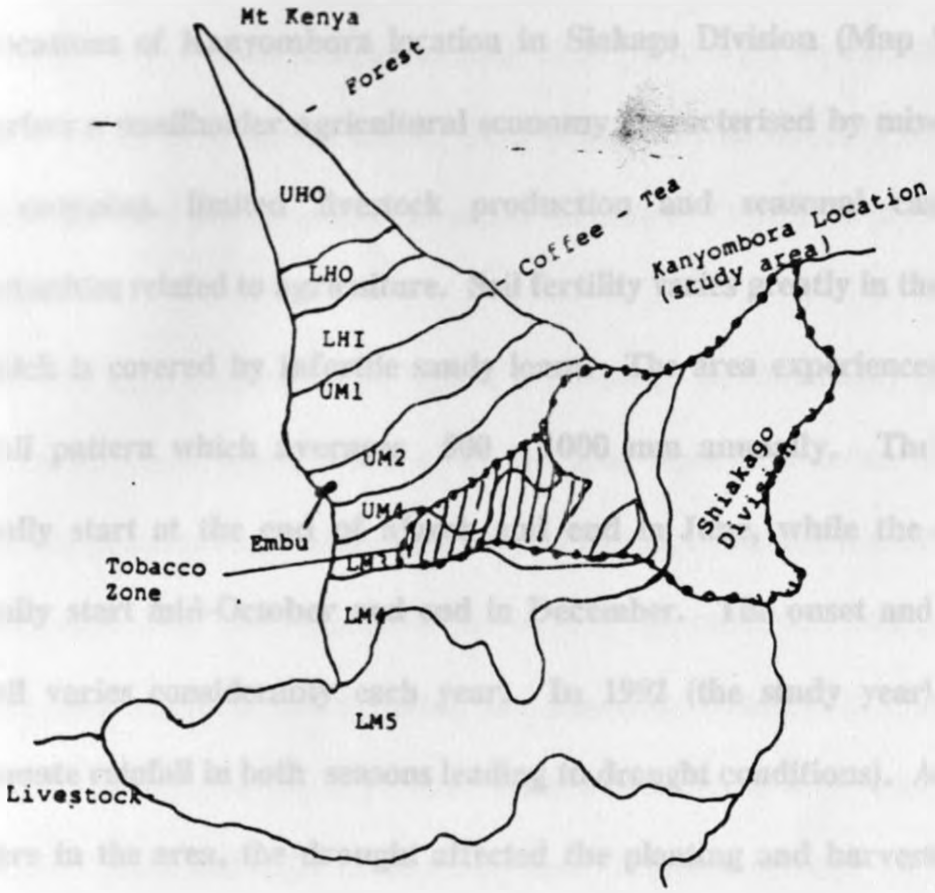
KEY	AVERAGE RAINFALL PER
UHO = Forest reserve	
LHO = Forest reserve	
LH1 = Tea-Dairy Zone	1750-2000
UM1 = Coffee Tea Zone	1400-1800
UM2 = Main Coffee Zone	1200-1500
UM3 = Marginal Coffee Zone	1000-1250
UM4 = Sunflower-Maize Zone	960-980
LM3 = Cotton Zone	900-1100
LM4 = Marginal Cotton Zone	980-900
LM5 = Livestock Millet Zone	700-800

UHO, LHO, LH1, UM1, UM2 constitute the productive (upper Embu) and UM3, UM4, LM3, LM4, LM5 constitute the marginal zone (lower Embu). The study site was situated in the lower part, in Siakago Division, one of four divisions of Embu District.

Adapted from; Farm management handbook of Kenya Vol II (available in GTZ Farm Management Department.

MAP 1

AGRO-ECOLOGICAL ZONES OF EMBU DISTRICT



KEY		AVERAGE RAINFALL PER YEAR.
	= Study area	
	= Siakago Division boundaries	
UHO	= Forest reserve	
LHO	= Forest reserve	
LH1	= Tea-Dairy Zone	1750-2000
UM1	= Coffee Tea Zone	1400-1800
UM2	= Main Coffee Zone	1200-1500
UM3	= Marginal Coffee Zone	1000-1250
UM4	= Sunflower-Maize Zone	960-980
LM3	= Cotton Zone	900-1100
LM4	= Marginal Cotton Zone	980-900
LM5	= Livestock Millet Zone	700-800

Adapted from; *Farm management handbook of Kenya Vol II (available in GTZ Farm Management Department.*

3.2 Study Area.

The study was carried out in Nguthi sub-location which is one of the two sub-locations of Kanyombora location in Siakago Division (Map 1).The area comprises a smallholder agricultural economy characterised by mixed food and cash cropping, limited livestock production and seasonal casual labour opportunities related to agriculture. Soil fertility varies greatly in the area, most of which is covered by infertile sandy loam. The area experiences a bimodal rainfall pattern which averages 500 - 1000 mm annually. The long rains normally start at the end of March and end in June, while the short rains normally start mid-October and end in December. The onset and amount of rainfall varies considerably each year. In 1992 (the study year) there was inadequate rainfall in both seasons leading to drought conditions). According to villagers in the area, the drought affected the planting and harvesting time of both cash and food crops (Appendix A). The amount of food harvested following the long rains was below average. The extension of short rains to January and February (1993) lowered the quality of tobacco harvested (a crop which requires intense rain for a short period).

3.3 Study Population.

The main ethnic group in the study area is the Mbeere people. There are

also Kikuyus from Central Province who have settled in the area. In 1979, there were 38,230 people in Siakago division with a population density of 49 persons per sq km, higher than Kenya's average of 33 persons per sq km, the population density varies with sub-locations. It is projected that by 1993 the population would be 63,450 people with a population density of 73 persons per sq km (GoK, 1988).

The main occupation in Nguthi is farming. Brothers may live and farm their father's land together and divide the land when their father dies. Women are predominantly responsible for food production, child care and other domestic duties, while men are responsible for cash crop production and livestock but, women and children assist during the planting, weeding and harvesting of tobacco. Women in the area have formed working groups which rotate on members' farms and assist in farm activities. A group member can sell her turn to a neighbour if she need money. There is demand for such group labour, especially in tobacco growing households. School leavers rarely work on their parents' farms. They prefer to work on their neighbours' farms and get cash payment for their personal needs.

3.4 Agricultural Production.

Most of the agricultural land in the study area is adjudicated and farmers

have their title deeds. In some cases, land is registered in the father's name and farmed by sons communally. Most farmers with land sizes less than five acres cultivate all their land. Farmers use oxen for cultivation, and those without oxen use simple hand tools or hire a plough.

Although tobacco is the main cash crop in the area, the majority of farmers do not grow it. Brothers may live in the same compound but practise different farming system i.e one growing tobacco while the other does not.

3.4.1 Food Crop Production.

Maize is the dominant food crop in the area. Sorghum, millet, cowpeas and pigeon peas are also grown. Maize is intercropped with cowpeas and beans. Harvesting of the long rain maize is done in July and August. The second crop of maize (short rains) is planted in October and harvested in January and February. The recommended hybrid varieties are hybrid 511 and 512 for long rains and 'katumani' for short rains. During a normal year the yield of maize is estimated at 342 kg/acre during the long rains and 263 kg/acre during the short rains if farmers use all the recommended agricultural practices. However, most farmers do not use the recommended inputs as these tend to be too expensive for them.

3.4.2 Organization of Tobacco Growing

Flue cured tobacco is the dominant cash crop in Nguthi sub-location and it is planted near the residential house for constant care. Tobacco is grown during the short rains (tobacco season) which runs from October to December. Generally, tobacco production is labour intensive and households with adequate labour and technologies (i.e ox-ploughing, pesticides, fertilizers) realise high yields.

Land preparation for tobacco growing starts in July, followed by planting, weeding, harvesting, curing and selling. The last four activities run concurrently from the month of December up to April in many cases. Peak periods of labour demand are during the land preparation, transplanting, weeding and harvesting. The farmers are paid by cheque on delivery of cured tobacco leaves according to the condition of the cured tobacco (Appendix B).

3.4.2 The Role of British American Tobacco Company (BAT) in Nguthi

B.A.T is the authorised tobacco buyer in the area. The company assists farmers by providing loans of seeds, fertilisers and pesticide. The loan is given on condition that, a farmer allocate a minimum of 0.25 acres for tobacco, have a tree nursery and all the inputs provided by B.A.T must be used for tobacco

growing (Appendix B). Although BAT encourages planting of trees, there is increased destruction of indigenous trees in the area, a factor largely contributed by flue curing of tobacco. The rate of deforestation is higher than afforestation.

The company provides extension services to tobacco farmers. The extension workers provide technical advice on tobacco growing, e.g they recommend farmers for loans, give demonstrations on tobacco growing and supervise the use of loaned farm inputs. Tobacco farmers are encouraged to rotate tobacco with cereals (i.e maize, sorghum, millet) so as to avoid nitrogen build-up and organic matter in the soil, this has allowed tobacco farmers to diversify crop production.

3.5 Infrastructure.

Kanyombora market is 22 km off the Embu - Meru tarmac road. The murram road to Kanyombora traverses the tobacco growing area and joins the Embu-Meru road at Ena market. The remaining roads in the study area are poor and they become impassable during the rainy season, except the ones which used to be maintained by the Rural Access Road Programme. Public transport to the study area is scarce and unreliable.

The main market in Nguthi is Ishiara which is about 6 km from Kanyombora. Electricity, telephone and health facilities are available at Kanyombora market. Banking services are provided by a mobile Kenya

Commercial Bank at Ishiara market on Tuesdays and Fridays. Auction facilities for livestock are available at Ishiara market. There is a grain store at Ishiara which is maintained by National Cereal and Produce Board.

Some households in the study area have untreated tap water. Currently the Applied Nutrition programme of Kenya Freedom from Hunger is involved in building water storage tanks in areas where tap water is not accessible. This non-government organization is also actively involved in other community development projects.

CHAPTER FOUR

METHODOLOGY

4.1 STUDY DESIGN

A cross-sectional survey of both descriptive and analytical nature wa conducted in marginal areas of Embu District from October 1992 to Februar 1993. Two study groups were selected:

a. Small-scale tobacco growing farmers.

b. Small-scale non tobacco growing farmers.

4.1.1 Inclusion Criteria

The households were categorized into tobacco growers and non-tobacco growers. The following criteria were strictly followed:

a. A household was classified as a tobacco grower if the household grew tobacco the past two years and it had a tobacco crop in the farm at the time of the study.

b. A household was classified as a non tobacco grower if the household had not grown tobacco for the last two years.

c. All households owned land less than five acres (2.5 hectares)

d. All households had a child between 12- 60 months of age.

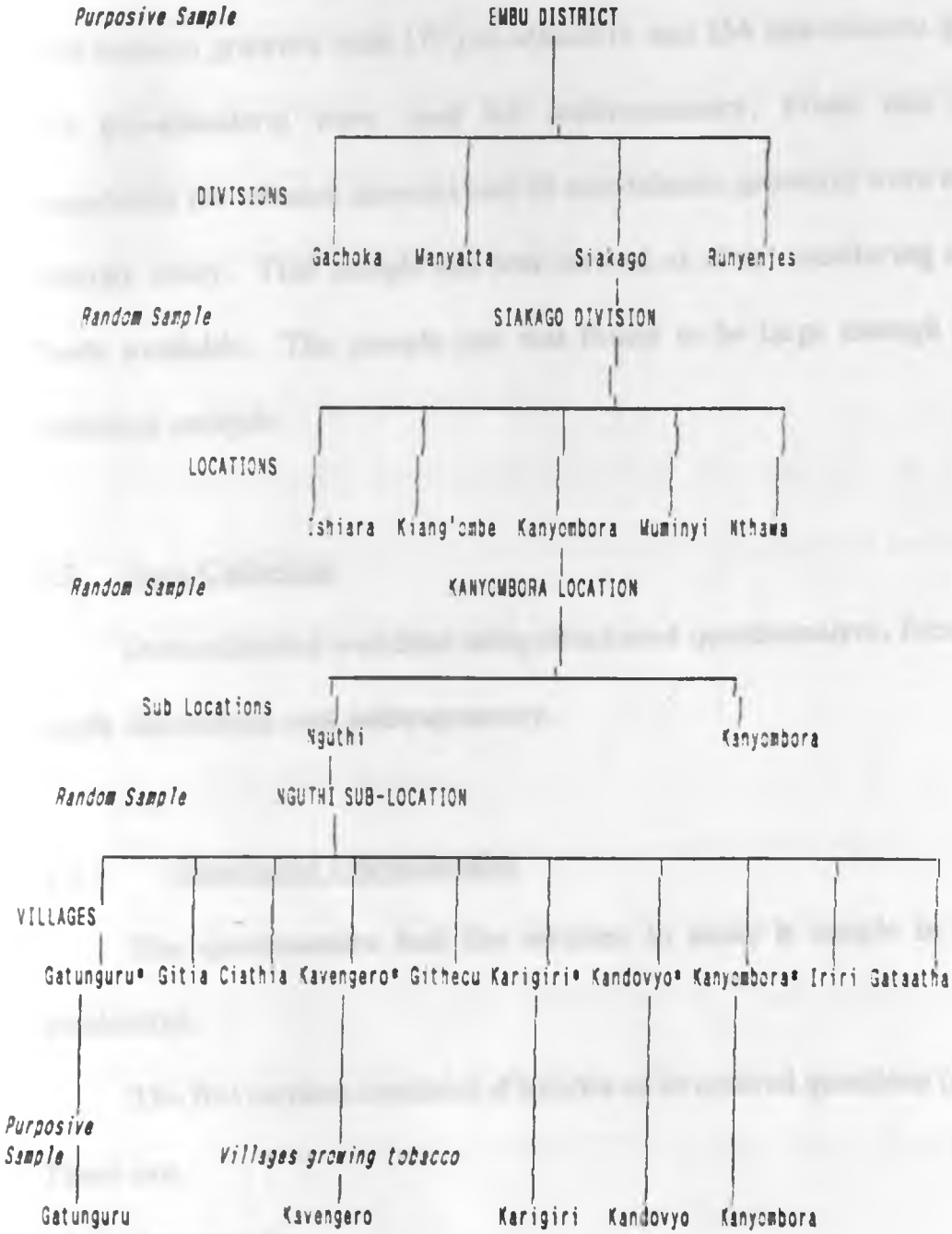
4.1.2 Sampling Techniques

The study district was purposively selected because the organization which financed the research (GTZ) had an interest in the Embu District, and the researcher desired to focus on tobacco as a cash crop.

The study site within the district was arrived at by multistage random sampling. Embu District has four divisions and each division has an area where tobacco is grown. The divisions were allocated random numbers. A lottery was conducted, and Siakago Division was selected. Among the two locations which farm tobacco in Siakago, Kanyombora location was randomly selected. Similarly, Nguthi sub-location of Kanyombora location was randomly selected using the same procedure. The study was conducted in the five villages growing tobacco (Figure 2).

The sampling unit was the household. From each village, households qualifying for the study were systematically interviewed by starting from different corners of a village (as per above criteria). This was done until the sample size required per village was realized. The figure below summarizes the sampling method in the district.

FIGURE. 2 **Diagram of Sampling Technique**



4.1.3 Sample size Determination

A convenient sample size of 350 pre-school children from 300 households (146 tobacco growers with 177 pre-schoolers and 154 non-tobacco growers with 174 pre-schoolers) were used for anthropometry. From this sample 120 households (60 tobacco growers and 60 non-tobacco growers) were used for food security study. This sample size was arrived at after considering the time and funds available. The sample size was found to be large enough to allow for statistical analysis.

4.2 Data Collection

Data collection was done using structured questionnaires, focus groups, in-depth discussions and anthropometry.

4.2.1 Structured Questionnaire

The questionnaire had five sections to make it simple to prepare and administer.

The five sections consisted of a series of structured questions (Appendix C). These are,

1. demography.
2. household income and expenditure.

3. crops production.
4. morbidity.
5. child anthropometry (weight and height). Interviews were conducted by trained enumerators to the respondent, who in many cases was the mother of the children under fives in the household. Children's measurements of weight and height, were also taken.

4.2.1.1 Demographic Information

The demographic information included; sex and age of all household members, occupation of parents, the relationship of household members to head of household and education levels of parents.

4.2.1.2 Household Income

Information on yearly household income were asked to the parents of the under five years. The different sources of income for the household were identified. Household income and expenditure on food during the month of research was recorded using recall method. The months of recall were October, November, December 1992 and January 1993 for both tobacco and non tobacco growers.

4.2.1.3 Food Production

Information on land ownership and the amount of land cultivated was collected. Parents were asked to recall the crops they grew during the last two season and to account for the amount of food harvested, sold, donated and spoiled after harvest.

4.2.1.4 Morbidity

Information on the health status of all children 12-60 months for the last seven days was collected. Parents were asked to recall the illness, how it affected food consumption, and the method used to treat the illness.

4.2.1.5 Anthropometry

The nutritional status of all children 12-60 months was assessed by taking height and weight. The researcher did all the measurements. Weight were taken using a 'Salter scale' which was calibrated every morning at Kanyombora market using a one kilogram stone. The weights were taken to the tenth of a kilogram. Two measurements were taken for each case and the average calculated. Children were weighed without clothes except a vest and pants. All weights were later corrected for this by subtracting 140 gms. This corrective weight was arrived at after measuring twenty vests and pants collected from children at Kanyombora growth monitoring centre on a growth monitoring day.

Heights or lengths were measured with a length board. This board could easily be converted to a height board. The length board had a sliding head-rest and a tape measure attached to the side. The child was well positioned with knees and chin held straight. The researcher read the height or length to the nearest 0.1 centimetre. Health cards from growth monitoring centres were used to record a child's date of birth. All ages were verifiable using the cards.

4.2.2 Focus Group

The objectives of the focus group discussions was to collect general information on effects of tobacco growing on, household food availability, sources of income and income controls in the household, labour distribution by gender and the factors that affect crop production in the area. The researcher guided the discussion while a field assistant recorded the discussion using a tape recorder and through writing. The results of the focus groups are integrated in all sections where they are relevant.

Three focus groups discussions were held on Sunday afternoons. One group was composed of eight tobacco growers; four men and four women not related by marriage. Another group was composed of nine non tobacco growers; four men and five women also not related by marriage. A third focus group was composed of four tobacco growers and four non tobacco growers. In this third group participants were selected from the previous two groups and must have

actively contributed in the previous meetings. Members in all groups were above thirty years old, and were residents of the area for at least 20 years. This period was expected to be long enough for the group to give reliable background information.

4.2.3 In-depth Interviews

During the pilot phase of the study, two women informants were identified. Interviews were held, separately, in their homestead and centred on historical events and changes they had witnessed since the introduction of tobacco in the area. The information was recorded with a tape recorder. The results were used to validate the structured questionnaire.

4.3 Research Activities

In August 1992, the principal investigator obtained a research permit. Thereafter, the study objectives and methodology were introduced to the local authorities. The pilot study was undertaken in the month of October. The general information about the study area was collected from, GTZ (Farm Management Unit), Embu District Agriculture Office, the District Nutrition and Home Economic office, Plan International office and Applied Nutrition Programmes in Embu (Freedom from Hunger). The study boundaries were identified by the researcher with assistance from the local leaders.

Two field assistants each with a minimum of four years of secondary education, able to speak the native language and willing to work under difficult conditions, were recruited and trained by the researcher. Training covered interpretation of questionnaire into the local language, methods of interaction with household members, interviewing techniques and coding of the questionnaires. During data collection one field assistant collected information on demography, expenditure, household income and food production. While the other assisted the researcher to collect data on anthropometry and household characteristics. At the end of the day, the survey forms were checked for recording errors and completeness. Any questionnaire which had errors or was incomplete was repeated the following day.

4.4 Data Analysis

The data were analyzed using computer programmes named below;

a. Dbase III+ software was used for data entry and cleaning.

b. SPSS (Statistical Package for Social Scientists) was used for analysing data.

C. The Anthro programme was used to calculate the nutritional indicators from anthropometry measurements as compared to the National Centre for Health Statistics (NHCS) references as designed by WHO.

The following methods were used to analyze data;

4.4.1 Nutritional Status

The anthropometry indicators were used to assess the nutritional status of pre-school children. Height for age expressed the height of the child as a percentage of the expected height for a standard child of that age. Weight for Height expressed the weight of the child as a percentage of the expected weight for a standard child of that height. Weight for Age expresses the weight of the child as a percentage of the expected weight for a standard child of that age as given by (NHCS).

These three indices reflect different, although not independent, aspects of nutritional status (Waterloo, 1976). Weight for Height indicates the degree of wasting and is used to estimate the extent of acute malnutrition and the need for immediate attention. Height for age, reflects the nutritional history of the child (i.e stunting) and low height for age indicates chronic illness or inadequate dietary intake, relative to need over a long duration i.e the possible chronicity of malnutrition. Weight for Age presents a combination of wasting and stunting, and it is a useful measure of nutritional progress in a community of mixed age composition.

4.4.2 Food Security

To identify food insecure households, calories from own production and proportion of household income spent on food were

considered. To be able to determine the difference in household food security between tobacco and non-tobacco growing households, total calories produced was added to total calories purchased with the available income for food. This was expressed as a percentage of household calorie required. The following is the working procedure.

1. Food available for household use was calculated by subtracting amount of food sold, donated, and spoiled after harvest from total production per year. Food available was then converted to its calorie value using WHO food conversion rates (Appendix B).
2. Household daily calorie requirement was calculated by adding WHO recommended daily calories for specific age group in the household (Appendix B).
3. Households which could not meet 80% of their calorie requirement from own food production were considered food insecure.
4. The percentage of household income spent on food was used as an indicator of financial accessibility for food. Households which spend more than 60% of their income on food were considered food insecure.
5. A Food adequacy index of the area was calculated by adding calories available from production source and calories which could be purchased with available income for food

(using the cost of cheapest meal at the time of research). This was expressed as a percentage of household calorie requirement as calculated in step two.

Households which could not meet their calorie requirement were grouped as food insecure. This was an underestimate of food insecure households in the area, bearing in mind that available calories from own food production and available for food income were used on reducing bases through the year.

6. T-test and chi-square tests were used to test the difference in the two cropping systems.

4.4.3 CORRELATION ANALYSIS

Pearson'r correlation of independent variables with specific nutrition indicators as the dependent variables was carried out using SPSS. This was to identify factors which potentially affect nutritional status of preschool children in the two cropping systems.

NB; 1. All food crops produced were converted into their calorie equivalent using WHO nutrition conversion rate (Food composition tables Appendix B.

2. Household daily calorie requirement were calculated by adding daily calorie requirements of specific age groups in the household (appendix B.

CHAPTER FIVE

RESULTS

The results of the study are presented in two sections. The first section gives the quantitative description of the study population. The second gives the result of focus group discussions. Information from focus groups and in-depth discussions is also used to enrich background information and explain quantitative data.

5.1 General Characteristics of the Study Population

The general characteristics of the study population are given in Table 1. A total of 300 households were interviewed 146 households with 177 preschool children grew tobacco and 154 households with 174 preschool children did not grow tobacco.

In total, tobacco growing households had significantly more people with an average of 6.8 persons (SD 2) per household compared to 5.6 persons (SD 2) in non-tobacco growing households ($P = 0.004$). Also parents in tobacco growing households were older than those in non-tobacco growing households. However, the only significant age difference was for fathers ($P = 0.04$).

Fathers in tobacco growing households were older. They also spent fewer years in school (6 years SD 2) compared to (8 years

SD 2) non-tobacco growers (P = 0.03). As a result, 86% of father in tobacco growing households had no regular employment compared to 68% in non-tobacco growing households (P = 0.03).

During the month of research, 61% of mothers in non-tobacco growing households sold labour compared to 33% in tobacco growing households (P < 0.001).

TABLE 1

GENERAL CHARACTERISTICS OF THE STUDY POPULATION

CHARACTERISTICS	CROPPING SYSTEMS /GROWERS			
	TOBACCO	NON-TOBACCO		
# of HH in the study	146	154		t
# of children < 5 years.	177	174		t
% of sick child.	38	36		
Father's age (years) (average)	36	33	*	t
Mother's age (years) (average).	30	29		t
Mean # of children < 5 years.	1.7	1.3		t
HH size (average)	6.8	5.6	*	t
% Of mothers selling labour.	33	61	*	X^2
% of fathers without regular employment.	86	68	*	X^2
Years mothers spent in school (average).	5	6		t
Years fathers spent in school (average)	6	8	*	t

* Significance at $p< 0.05$ X^2 = Chi-square t = T-test

5.2 Food Production Variables

All households in both cropping system owned land which was partly or wholly cultivated during the previous two seasons (Table 2). The land sizes among non-tobacco growers was, however significantly smaller ($P < 0.001$).

The two farming groups show different trends in food crop cultivation in different seasons. During the short rains non-tobacco farmers had significantly more land under food crop (0.7 hectares) compared to (0.4 hectares) for tobacco growers ($P < 0.001$), but interestingly the total land size under food crop per year did not differ. This was because tobacco farmers used significantly more land for food crop during the long rains which compensated the loss they suffered during short rains when most of their cultivated land was under tobacco ($P < 0.001$). Likewise land productivity varied with seasons with non-tobacco growers harvesting significantly more maize per hectare during the short rains ($P < 0.001$). This was counteracted by the higher production per hectare obtained by tobacco growers during the long rains. As a result there was no significant difference in land productivity per hectare per year. The productivity for beans remained the same for both groups in the two seasons, with tobacco farmers producing significantly more beans per hectare in both seasons. However the

annual per capita food production did not differ except for beans.

TABLE 2 LAND USE AND PRODUCTION OF STAPLE FOODS BY SEASON AND CROPPING SYSTEM.

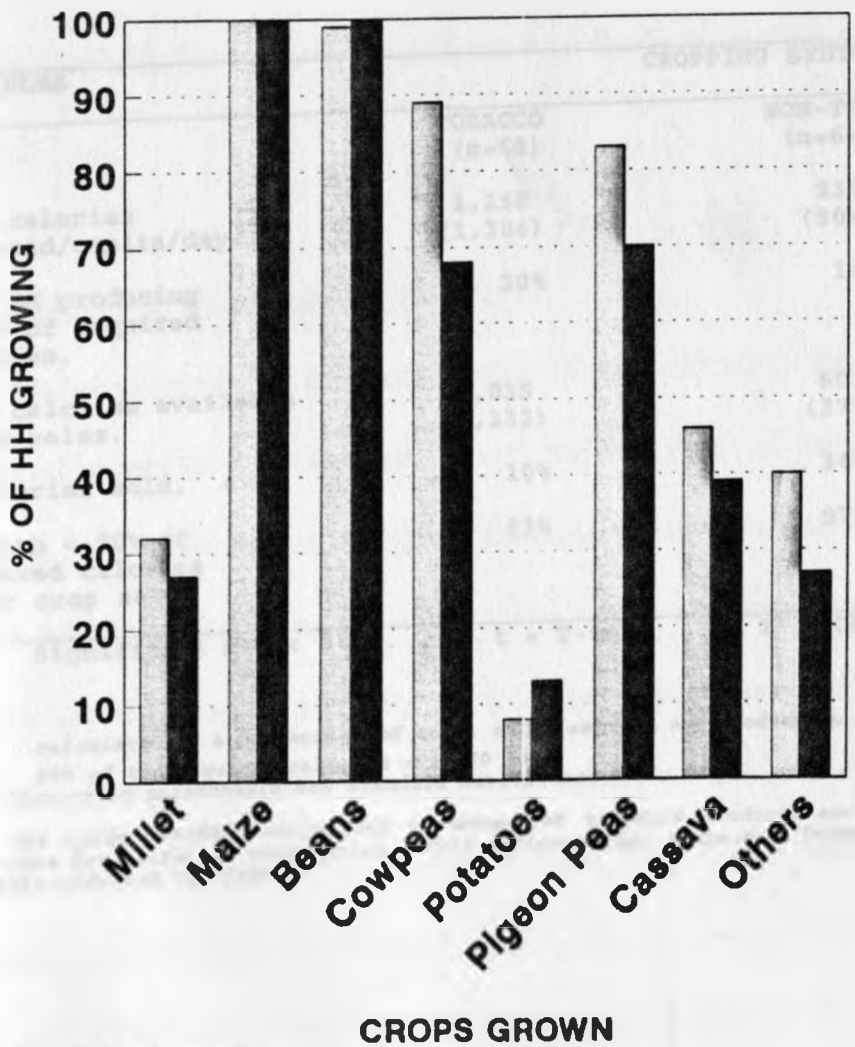
VARIABLES	SHORT RAINS n=60		LONG RAINS n=60		TOTAL n=60	
	TG	NTG	TG	NTG	TG	NTG
Land size in hectares.	1.3	0.8 *	1.3	0.8 *	2.6	1.6*
Land cultivated %.	85%	87%	85%	87%	85%	87%
Land under food crop in hectares.	0.4	0.7 *	1.1	0.7 *	1.5	1.4
Maize produced kg/hec.	373	419 *	245	215	618	634
Beans produced kg/hec.	265	185	148	113	413	298
maize produced kg/capita.	20	44 *	44	21 *	64	65
Beans produced kg/capita.	16	21	31	13 *	47	34
Maize harvested in kg.	118	230	258	111	367	341
Beans harvested in kg.	92	110	172	61 *	265	171*

* Significant at P< 0.05. T-test

Note the low land productivity during the long rains. This was as a result of drought that affected the whole of Eastern Africa. The drought seem to have affected non-tobacco growers more.

All farmers diversified in food crop production in both cropping systems as shown in Figure 1 below. But for each crop planted, the percentage of households growing tobacco were higher, except for potatoes and to a little extent beans, but the differences were not significant.

FIG 3; DISTRIBUTION OF CROPS GROWN BY CROPPING SYSTEM.



The above figure displays the proportion of household growing a particular crop.

5.3 Food Security from Own Food production

The daily calories produced per capita, proportion of households which could not meet 80% of required calories from own production, proportion of calories sold and proportion of households which could not meet 80% of required calories after crop sales are shown in Table 3.

TABLE 3 CONTRIBUTION OF OWN FOOD PRODUCTION IN PROVIDING PER CAPITA DAILY CALORIE REQUIREMENT.

VARIABLES	CROPPING SYSTEM		
	TOBACCO (n=60)	NON-TOBACCO (n=60)	
Mean calories produced/capita/day.	1,158 (1,306)	933 (501)	t
% of HH producing < 80% of required calories.	20%	10%*	X^2
Mean calories available after sales.	1,035 (1,233)	609* (377)	t
% calories sold. +	10%	34%*	X^2
HH with < 80% of required calories after crop sale.	83%	97%	X^2

* Significant at P< 0.05. t = T-test X^2 = Chi-square

\+ *calculated as a percentage of total calories from own production per household.*

NB; *80% of the required calories = 1,760 kcal.*
Figures in parenthesis are standard deviations.

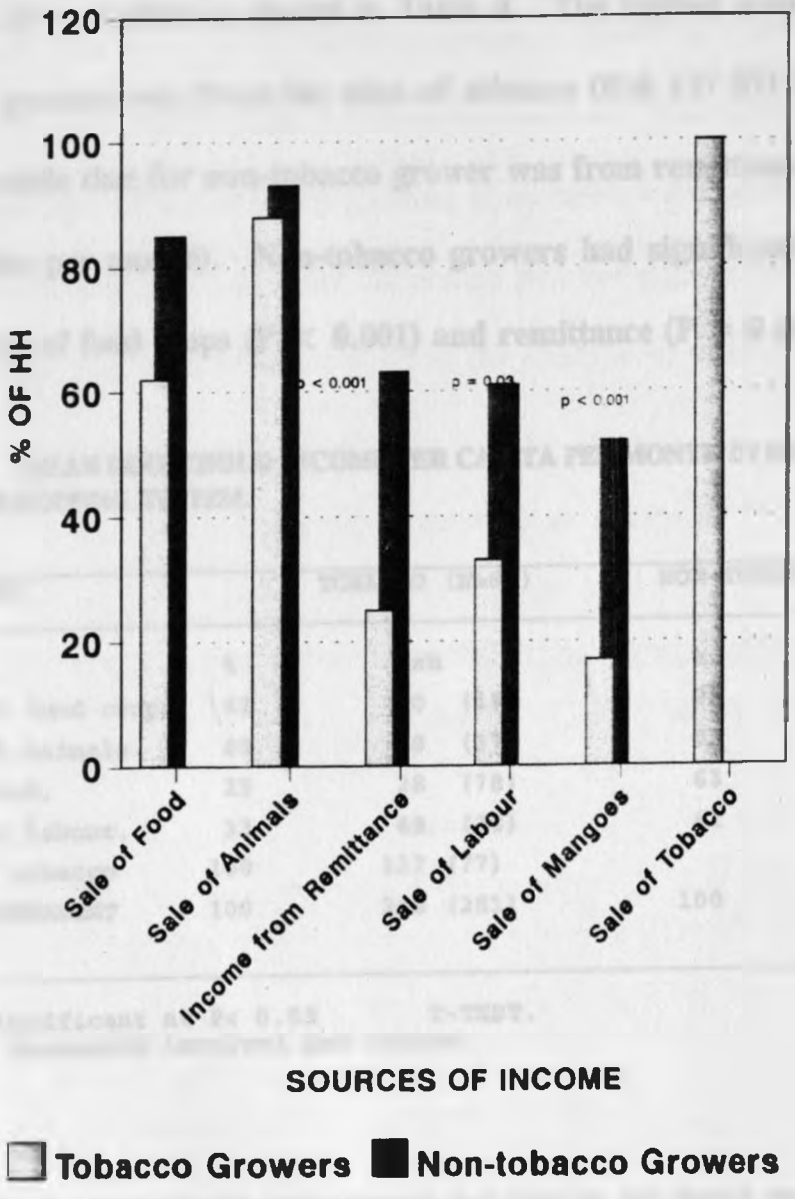
Note the large standard deviations in amount of calories produced and calories potentially available for household consumption. This indicate that there were farmers who produced a lot and this affected the mean

Surprisingly, most households produce enough to last up to the next harvest. However, 20% of tobacco growing household could not produce enough to last to the next harvest compared to 10% of non-tobacco growing households ($p < 0.05$). However, most households sold their produced calorie and as a result, 83% of tobacco growing household were food insecure compared to 97% of non-tobacco growing households. This implies that more households not growing tobacco sell most of their produced calories. Hence the difference in calories available for household use from own food production was significant ($p = 0.01$).

5.4 Sources of Household Income

There are a variety of income sources within the study groups and they are presented in section 5.9. Frequencies of major sources of income are shown in Figure 4. For each source of income the proportion of households involved was higher among non-tobacco growers. The most popular source of income in tobacco growing households other than tobacco sales were sale of animals (88%) and sale of food crops (62%) in order of popularity while in non-tobacco growing households sale of animals (93%), sale of food crops (85%), sale of labour (61%), remittance (63%) and sale of mangoes (52%) were the most common sources of income. The difference of proportions of households involved was significant for remittance ($p < 0.001$), sale of labour ($p = 0.03$), and sale of mangoes ($p < 0.001$).

FIG 4; DISTRIBUTION OF HOUSEHOLD INCOME BY CROPPING SYSTEM



5.5 Household Income

On average non-tobacco growers got significantly less permanent income from all source, (Ksh 162 SD 127) compared to (Ksh 246 SD 281) for tobacco growers ($P < 0.001$) as shown in Table 4. The highest source of income for tobacco growers was from the sales of tobacco (Ksh 127 SD 77 per capita per month) while that for non-tobacco grower was from remittance (Ksh 74 SD 103 per capita per month). Non-tobacco growers had significantly higher income from sales of food crops ($P < 0.001$) and remittance ($P = 0.006$).

Table 4 MEAN HOUSEHOLD INCOME PER CAPITA PER MONTH IN KENYA SHILLINGS BY CROPPING SYSTEM.

VARIABLES	TOBACCO (N=60)		NON-TOBACCO (N=60)		
	%	Ksh	%	Ksh	
Sales of food crops.	62	10 (19)	85	33 (35)	*
Sales of animals.	88	28 (37)	93	28 (34)	
Remittance.	25	28 (78)	63	74 (103)	*
Sales of labour.	33	49 (38)	61	54 (65)	
Sale of tobacco	100	127 (77)			
TOTAL PERMANENT INCOME.	100	246 (281)	100	162 (127)	*

* Significant at P< 0.05 T-TEST.
% Of household involved per source

NB; The minimum income requirement per capita per month was Ksh 1,140.00 as calculated by Focus Group. (Appendix A2).

5.6 Household Expenditure on Food Based on the Months of Research

The percentage of household income spent on food during the month of survey did not differ in the two farming groups as shown in Table 5. However, 82% of tobacco growing households were spending more than 60% of their income on food while 80% of non tobacco growing households were spending more than 60% of their income on food. The difference was not significant. This implies that more than two third of households in the study area were food insecure.

Table 5 HOUSEHOLD EXPENDITURE ON FOOD BY CROPPING SYSTEM.

Variable	percent of households	
	Tobacco	Non-tobacco
HH spending < 60%	18%	24%
HH spending > 60%	82%	80%

* Significant at P< 0.05. Chi-square

5.7 Household Food Security .

The proportion of households whose resources could not meet the minimum calorie requirement is given in Table 6. The results reveal that 20% of tobacco growing households were not able to meet their daily calorie requirement from both purchased and produced sources while 40% of non-tobacco growing households could not meet their calorie requirement from both purchased and produced sources. The difference was significant at (P = 0.02).

TABLE 6 PROPORTION OF HOUSEHOLDS WHOSE RESOURCES COULD NOT MEET HOUSEHOLD CALORIE REQUIREMENT

VARIABLES	TOBACCO	NON-TOBACCO
% of hh not able to meet calorie requirement from own food production after crop sales.	83%	97% *
% of hh not able to meet calorie requirements from purchased sources	82%	80% *
% of hh not able to meet calorie requirement from both purchased and produced sources. (after sales)	20%	40% *

* Significant at P< 0.05.* Chi-square

NB; The minimum income requirement per capita per month was Ksh 1,140.00 as calculated by Focus Group. (Appendix A2).

In this section it can be deduced that, (i) there is no significant difference in amount of food produced in both cropping systems in annual bases, (ii) households not growing tobacco sell most of their produced calories and as a result more households are left food insecure from own food production source. Hence there is a significant difference in amount of calories available for household use, (iii) on average households growing tobacco have significantly higher permanent income although more households not growing tobacco are involved in each source of income. (iv) more households not growing tobacco are food insecure compared to those growing tobacco,(v) generally tobacco growers have more production resources than non-tobacco growers.

5.8 Focus Group Discussions

Results from the focus groups indicate that the main reason for growing tobacco was to increase household income while the reasons for not growing tobacco were, inadequate labour and lack of production resources (eg. land). Christian beliefs were also mentioned as a reason for not growing tobacco. The factors which affect food production in the area are; climate, inadequate capital to buy farm inputs, inadequate land, inadequate extension services especially for non tobacco growers and inadequate labour.

5.9 Economic Activities in Nguthi

According to focus groups the following are the major economic activities in Nguthi sub-location.

SOURCES OF INCOME FOR TOBACCO GROWERS

ACTIVITY	PERSON CONTROLLING INCOME
Sale of cash crops	Men.
Bee keeping	Men.
Sale of cows	Men.
Regular employment	Men and Women.
Farm labouring in Nguthi	Men and Women.
Beer Making and selling	Men and Women.
Sale of goats	Men and Women.
Sale of small animals and chicken	Women.
Sale of food crops	Women.
Sale of animal products	Women.
Making sisal products	Women.
Sale of mangoes	Women.

SOURCES OF INCOME FOR NON-TOBACCO GROWERS

ACTIVITY	PERSON CONTROLLING INCOME
Sale of cows and goats	Men.
Farm labouring in upper Embu	Men.
Bee keeping	Men.
Making and selling charcoal	Men.
Regular employment	Men and Women
Sale of food crops	Men and Women.
Farm labouring in Nguthi	Men and Women.
Beer making and selling	Men and Women.
Collecting and selling fire wood	Men and Women.
Sale of small animals and chicken	Women.
Sale of animal products	Women.
Making and selling sisal	Women.
Sale of mangoes	Women.

frequencies of major sources are in figure 4

Although the above economic activities seem to operate in Nguthi, there are a number of factors which hinder their expansion as described by the focus groups.

Charcoal production is against the chief's order. Furthermore, it requires one to have access to trees which is scarce in marginal areas. Where trees are available, they are far from the consumers or market. Though charcoal burning is practised, most people do not risk making charcoal on commercial scale.

Livestock trading is a better enterprise as a money multiplier and a household security for food as found among Maasai (Nestal, 1986), but it carries the risk of loss. An unlucky trader may find himself saddled with stock for several weeks which he is unable to dispose of at a satisfactory price and of course in this case there is also a risk of overstocking and diseases. Similarly a problem of range land arises. Livestock traders suffer a great deal during drought periods because prices fluctuate and livestock die in great numbers. Hence a few people venture in this enterprise.

Bee keeping is a viable enterprise in Nguthi, if well managed and with a market it can provide extra income for the household. Due to the increased deforestation and bush clearing for cultivation, bee colonies are on the decrease and bee farming has indeed reduced. This combined with poor market has left only few farmers keeping bees for commercial purposes.

Working in quarry involve selling and loading sand. The activity is mainly carried out by those who own land in the valleys where quarries are available. Poor roads limit access to the valleys. The demand for building stones is limited, so is the absorption of the labour force into the enterprise.

Farm casual work involve working in a neighbour's farm for cash payment. Casual work is mainly available during labour peak periods and in most cases labourers are lowly paid (Ksh 30) per day. Demand for casual labourers is scarce during the months of less farm activities, in addition, most food crops are not labour intensive. More households not growing tobacco sell their labour.

Business in trading small-farm products, like selling mangoes, chicken and vegetables are limited. Other businesses like tailoring, shopkeeping, carpentry, masonry, handcraft and leatherwork require skills and capital which most people do not have, hence few people participate in business.

Cash crop production is a possible means of improving household income. The major cash crops favourable for this ecological zone are tobacco, cotton, sunflower, sisal and castor oil. Cotton is a labour intensive crop but the marketing is poor. Farmers are not paid on time. Sometimes it takes six or

more months before farmers are paid. There are no facilities for cotton farmers either in kind or cash and the extension services are also poor. Nevertheless, some farmers grow the crop.

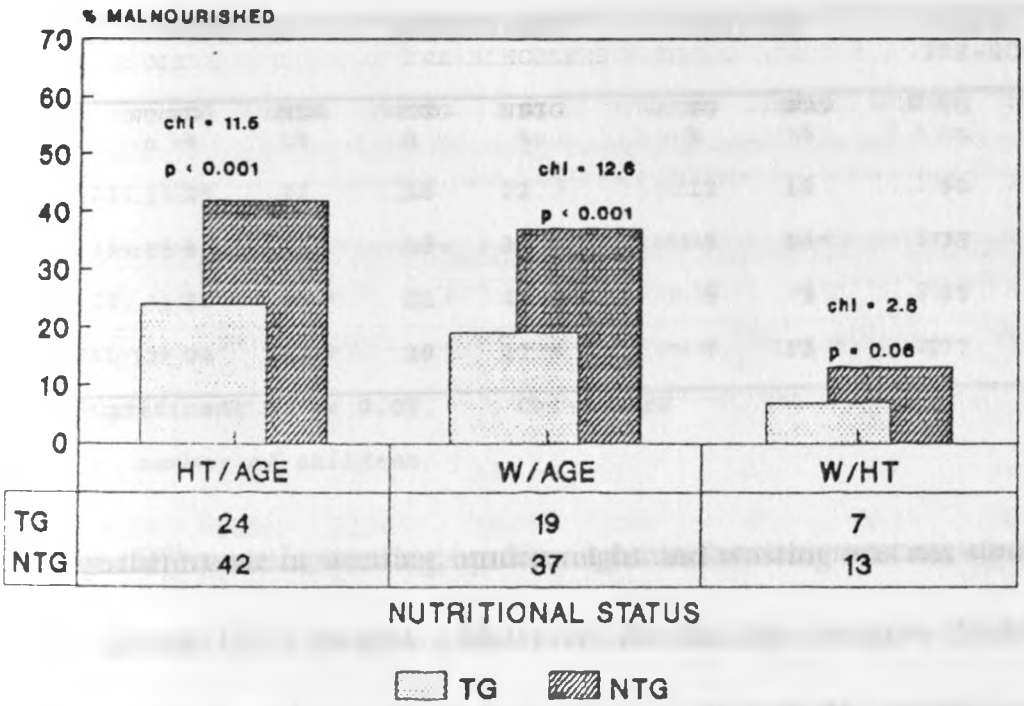
Sunflower is a feasible cash crop in the area but the problem of predators (birds) thwart its expansion.

The scant market for sisal and castor oil hinder their popularity. Hence most households in Nguthi prefer growing tobacco.

5.10 Nutritional Status

The percentage of preschool children below -2 standard deviation of accepted international standards is shown in Figure 5. The three nutritional indicators used in this study indicate that more children in households not growing tobacco were malnourished.

FIG 5: PREVALENCE OF MALNUTRITION BY CROPPING SYSTEM



5.11. Nutritional status by age

When the nutritional status of the preschool children was stratified in three age groups (Waterloo et al, 1977), children of tobacco farmers were found to have an overall better nutritional status for each age category (Table 7).

TABLE 7. PREVALENCE OF MALNUTRITION AMONG PRESCHOOL CHILDREN BY AGE AND CROPPING SYSTEM.

AGE	STUNTING		UNDERWEIGHT		WASTING		NUMBER OF PRE-SCHOOLERS	
	TG %	NTG %	TG %	NTG %	TG %	NTG %	TG n	NTG n
12-23.	18	22	18	22	12	19	50	32
24-35.	13	31*	16	39 *	5	16*	38	51
36-60.	32	55 *	21	41 *	5	9	89	91
TOTAL	24	42 *	19	37 *	7	12	177	174

* Significant at p< 0.05. Chi-square

n = *number of children.*

The difference in stunting, underweight and wasting was not significant for the age group 12-23 months. However, for the age category 24-35 months, the difference in underweight and stunting was statistically significant at p= 0.03.

In age category 36-60 months, the difference in stunting and underweight were significant (p = 0.004) and (p = 0.008) respectively.

5.12 Nutritional Status by Land Size.

The prevalence of malnutrition among preschool children by land size and cropping system is given in Table 8. In both cropping systems the prevalence of malnutrition decrease with increase in land size. However, more children in non-tobacco households were malnourished in all cases. But the difference was not statistically significant at (p = 0.05).

TABLE 8. MALNUTRITION AMONG PRESCHOOL CHILDREN BY LAND SIZE AND CROPPING SYSTEM.

LAND SIZES	STUNTING		UNDERWEIGHT		WASTING		PROPORTION OF PRE-SCHOOLERS	
	TG %	NTG %	TG %	NTG %	TG %	NTG %	TG %	NTG %
0.5-2.5	21	37	21	32	7	7	22	65
2.6-5.	14	27	20	23	4	14	78	35
TOTAL.	24	42 *	19	37 *	7	12	100	100

* = Significant at P < 0.05 Chi-square

5.13 CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES WITH SPECIFIC NUTRITIONAL INDICATORS

The Pearson'r correlation matrix given below shows the relationship between independent variables and nutritional status as dependent variables. They give the relationship between the independent variables with nutritional indicators used in the study. But they do not automatically imply causal relationship.

Table 10.

PEARSON'R CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES WITH SPECIFIC NUTRITIONAL INDICATORS

VARIABLES	NON-TOBACCO GROWERS			TOBACCO GROWERS		
	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ
Age of child	-0.5596*	-0.4690*	-0.1521	0.5474*	- 0.5180*	-0.3058*
Mothers' age	0.1825	0.2941*	0.2826*	0.1534	0.1740	0.1417
Household size	-0.0731	0.1115	-0.2548*	0.0958	0.1984	0.2588*
Income from labour	-0.1968	-0.2847*	0.2552*	0.2110	0.2148	0.1713
Number of children	0.0756	0.2117	0.2473*	-0.0405	0.0203	0.0868
Permanent household	0.1810	0.2442	0.1984	0.3018*	0.2249	0.0766
Produced calories	0.0338	0.0124	0.0211	0.3149*	0.0722	-0.2382*
Calorie available	0.1550	0.3530*	0.3954*	0.5247*	0.5059*	0.3419*
Land size	0.2110	0.2148	0.1713	0.1968	0.2847*	0.2552*

* Significance at p < 0.05.
N = 60

The age of the child was significantly correlated with level of stunting and underweight in households not growing tobacco and also in households growing tobacco. This implies that older children had higher chances of being

malnourished. Similarly, mothers age was positively correlated with the levels of wasting and underweight in households not growing tobacco. This implies that children of younger mothers had a higher chance of being malnourished.

In non-tobacco growing households the result show that the relationship between the number of children and levels of wasting was negative and significant implying that children in larger households were more likely to be wasted.

Children whose mothers were selling labour were more likely to be underweight and wasted in non tobacco growing households. Also children in households which produce few calories and with smaller land sizes were more likely to malnourished in both tobacco and non-tobacco growing households.

From the two correlation tables it can be deduced that, more factors are associated with nutritional status of pre-school children in non tobacco growing households.

CHAPTER SIX

DISCUSSION

6.1 Introduction

This study examined the difference in household food security and factors which affect nutritional status of small-scale farmers in Embu district. It concentrated on tobacco growing as a cash crop in marginal areas of the district.

The two study groups dwell in the same environmental conditions, face same ecological conditions, have same cultural practices and in most cases, have the same background. They also share the available facilities (health, education, infrastructure and government services) in the community. However, a number of factors seem to operate in Nguthi which lead to some families decide to grow tobacco while others don't.

6.2 Economic Activities and Entry into Tobacco Growing.

According to the results of this study farmers enter into tobacco production because it is an income generating activity. In the division, the other alternatives means of earning income such as food and livestock sales are risky, employment is scarce and burning charcoal or brewing beer is illegal. The opportunities of regular employment exist either in existing institutions in or

outside the division or in self employment outside the farm. Within institutions, one would be required to have formal or technical skills. Households with fewer educated members as found among the tobacco farmers also have fewer members in full time off-farm employment. This has also been found in studies conducted by Wanrooy (1959) among tobacco growers in Indonesia, British Honduras, Mexico and Sudan. Even in recent years Kennedy, (1989) observed that, farmers who entered into sugarcane production were mainly the unemployed.

The uneducated in Nguthi as in other marginal areas have been migrating to high productive areas to work in the tea and coffee growing households or estates. The drop in world coffee prices has reduced the demand of the cheap farm labour in these areas and is forcing the large uneducated labour force for alternative sources of income. The alternative is either to stay in Nguthi and exploit the resources available or to move to urban areas through-out the country. Those who opt to stay in Nguthi have several alternatives for household income as reported by the focus groups.

This study found that, those who enter tobacco production are those who have access to large sizes of land and adequate labour force. This finding is similar to observation made by Kennedy and Cogill (1987) among sugarcane farmers in Southwestern Kenya. Probably, farmers with large land sizes can afford to grow cash crop and still have more land for food crops. However,

unlike the sugarcane production, tobacco growing is a crop that is in the farm for only half of the year and that is during the short rains. This leaves half year of much more rains (long rains) for the same land and labour to be used for food crop production. In fact this study indicates that in non-tobacco growing season (long rains), the tobacco growers produce more food per unit land than their compatriots (section 5.2). This may be due to higher labour input or higher use of farm inputs or could be due to residual fertility of tobacco fertiliser.

Households growing tobacco are generally larger than households not growing tobacco. They are also the households of older spouses with more children. There is a likelihood that these households had a higher labour force. Also, tobacco is a crop which requires intensive care at all stages of its production. More to the care, is for the household to have the capital required for hiring labour. A household head with permanent off-farm employment which could not allow him to reside in his farm, was more likely to be a non-tobacco growers. A finding also reported by Oyugi (1987) in Migori District of Kenya. Therefore availability of labour is a necessary factor considered before a household entered into tobacco production. Another factor which seems to hinder expansion of tobacco crop is the religion of the household head. Some Christians in the study area have a belief that tobacco growing is against their faith. It is

difficult to intervene in these households unless through the church. For these households, alternative cash crops would suffice.

In this section it can be concluded that entry into tobacco production was not a random process.

6.3 Household Food Security and Tobacco Production.

It is surprising to find that there is no significant difference in the total average yearly calorie production between tobacco and non-tobacco growers. This study established that the reason is due to the fact there is no significant difference in total average land under food crop within a year. The significant difference in amount of land under food crops in tobacco season (short rains) is compensated for during non tobacco season (long rains) when tobacco growers have more land under food crops. Also during the non tobacco season, tobacco farmers use the extra labour and farm inputs for food production, hence more calories are produced.

The behaviour of teenagers not willing to work in their parents' farm and instead work for tobacco farmers may continue into food production time and affect availability of labour in non-tobacco growing households. As a result, non-tobacco growers would plant and weed late, leading to poor harvests. Another

reason could be, tobacco growers receive extension services from both B.A.T employees and government extension workers. B.A.T sources are directed to tobacco growers only. Government extension workers tend to pay more attention to tobacco growers because they are economically well off, partly because these are the people who are more likely to implement the recommendations given and more so because they have the capital and experience.

B.A.T provides fertilisers to tobacco farmers. After tobacco season, most of the land previously under tobacco is planted with food crops. Due to the residue fertilisers used for tobacco, food crops tend to do extremely well. In fact the crops grow faster and evade the effects of drought. This may explain why in the research year, tobacco farmers harvested much more food during the long rain (non-tobacco season) which was inadequate.

During the tobacco season (short rains), non-tobacco growers produce more calories than tobacco growers. This was expected because during tobacco season, tobacco farmers use the most fertile part of their farm for tobacco production. Also all the available production resources are used for tobacco production hence the reduced yield of food crops.

6.4 Sale of Food Crops From Own Production

Unlike tobacco farmers, non-tobacco farmers sell most of their produced calories (section 5.3), because food crops acts as a source of income. Also in non-tobacco growing households men control the production and sometimes the sale of food crops while in tobacco growing households men are more involved with the better paying tobacco. Other studies have found that men take over the best income earning enterprise in the household (Pottier 1990). This may explain the reason why there is increased sale of food crops among non-tobacco growers.

The sale of food crops at harvest would mean purchasing the same but at a higher retail prices. This is more detrimental for non-tobacco households because their per capita calorie annual production was even lower to satisfy their calorie requirements. Men are also known not to spend most of their income on food (Mwadime, 1992; Kennedy and Cogill, 1987; Tripp, 1984). Hence non-tobacco growers has much more chances of purchasing less food.

6.5 Household Ability to Purchase Extra Calories

This study found that over 80% of households in both cropping systems were spending more than 60% of their income on food, a higher proportion than that found by the Integrated Rural Survey of 1977. (GoK, 1977). This implies that over 80% of households had income source which could not meet their

household needs. This is serious considering that the Integrated Rural Survey of 1977 found that, 58% of food consumed in the household was from purchased sources (GoK,1977). This implies that adequate financial sources are necessary, if households are to be food secure in this area.

6.5 Nutritional Status.

The nutritional status of preschool children in Nguthi is worse than expected, most likely because the study was conducted after a period of food scarcity experienced not only in the District but in the whole country.

The results of this study show that the overall nutrition situation in the two farming groups is different. More children among non-tobacco growers were below the set cut-off points. Hence the second hypothesis which stated that "there is no difference in prevalence of malnutrition of Preschool children in tobacco and non-tobacco growing households is not valid. This is not surprising, considering that a significantly higher proportion of households in non-tobacco growing households had inadequate food.

Interestingly the nutritional status of preschool children in age category 12-23 months is similar. This suggests that feeding practise during this period are not different in both areas. However, growth differences are observed after 24

months of life, with the non-tobacco growers including more malnourished children. It was observed that, during the early age (0-23 months) mothers in non-tobacco growing household carry their infants with them to their place of work. This implies that the infant get similar care as those of tobacco growers, hence no significant difference in infants nutritional status. But from the age of 24 months the child is big enough to be left home with other siblings who may underfeed him, unlike the child of a tobacco grower who is with the mother most of the time. Since casual workers are assured of lunch at their place of worker, the child of a tobacco grower is also assured of three meals per day unlike the child of a non-tobacco grower who might do without lunch, because the mother is out working in a tobacco growing household.

Also likely is the fact that mothers may favour the younger child at the expense of the older one, because the older child is not breast feeding, hence increased chances of the older child becoming malnourished (researcher's observation).

The overall poor weight performance among children of non-tobacco growers in all age categories leads to the assumption that the low underweight starts at the time of birth (low birth weight) possibly because of poor nutrition of the mother during pregnancy (CRSP, 1987; Jansen et al, 1984 ; Vermeersch, 1981). Also, due to poor child care practices, children of non-tobacco growers fail to catch up growth unlike children of tobacco growers.

The analysis in the second part of this study indicates that households regarded, from the nutritional status of their children, as more vulnerable tended to produce less food and to spend a higher proportion of their income on food. Previous research in marginal areas of Embu has shown that the quantitative intakes of food are below FAO/WHO recommended intakes (CRSP, 1987). Therefore, efforts to increase food accessibility by increasing productivity of land and labour through crop diversification, can have beneficial impact on nutritional status of pre-school children. Such efforts should, however, recognize that farmers in the study area are neither purely subsistence farmers nor purely commercially motivated.

6.6 Land size and Nutritional Status.

The amount of land a household cultivate is positively correlated with nutritional status of preschool children in both tobacco and non-tobacco growing households (section 5.8). As relates to this factor, attempt to improve nutritional status of preschool children in this area should be targeted on farmers with smaller land sizes since it is in this group that malnutrition is most prevalent and serious. Such attempts must recognize that seasonal variation in food supply,

unemployment, and sale of food from own food production are the main causes of food insecurity in the study area.

6.7 The Age of the Parents and Nutritional Status

The positive and significant relationship between parents' age (especially the mother) and levels of wasting and underweight indicate that children of younger parents are more likely to be malnourished. This is logical because it is households of older parents that have accumulated production resources such as land, capital and labour, hence better household income and access to food. If we consider the advantages of tobacco growing (section 6.3), it is clear that, the older parents do not sell their labour, instead they hire labour from younger people, hence they have more time for child care.

6.4.3 Mothers' Workload

Maternal workload determines the quality and quantity of child care. In this study, children whose parents sold labour were more likely to be malnourished. This is illustrated by the negative correlation between income from labour sales and all nutritional indicators. The reasoning behind this association is that mothers usually leave their children with the siblings who may provide inadequate child care and even underfeed the child. In this study (section 5.6) it was noted that a higher proportion of mothers in non-tobacco growing

households were casual labourers. The involvement of mothers in other work outside the compound affect the time given for child care (Chadhury 1986). In most cases tobacco is grown near the farmers' residential home and mothers in these households are perhaps, able to monitor the care given to their children as they work, unlike non-tobacco grower who in most cases go to work in a neighbour's farm. Secondly mothers in tobacco growing household prepare food for the labourers, so in most cases children in tobacco growing households are assured of at least three meals per day unlike children in non-tobacco growing households.

In this section it can be concluded that it is not the cropping system perse that improves the nutritional status of the preschool children but those factors such as (land size, age of parents, child care practices, resources available for food production and maternal workload which contribute to the nutritional status of preschool children.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATION

7.1 CONCLUSION

The purpose of promoting small-scale agriculture is to improve household food accessibility and nutrition of the community. In Nguthi, agricultural growth strategies have generally been compatible with improved food security and nutrition. A combination of tobacco and food crops has led to increased household food accessibility in the area in the following ways;

1. It has generated additional funds for small-scale farmers.
2. Since small-scale farmers generally grow both food and tobacco, the increased profitability of the farm has reduced the tendency of selling staples.
3. Increased income of farm households, enhances the ability of farm families to acquire food in the market, especially when food crops fail or in situations where land-holdings are too small to sustain the household.
4. Tobacco growing has created employment, which likely brought major beneficial impact on increased food accessibility.

There is a positive association between tobacco growing and nutritional status of preschool children, although this evidence is sketchy because the

improved nutritional status maybe related to factors related to entry into tobacco production.

The factors which seem to influence nutritional status differ by cropping system. For tobacco growers the factors were, household income, amount of calories available for household use, age of the child and household size. For non-tobacco growers the factors were, age of the child, mother's age, household size, the number of days the mother is involved in casual labour, total land cultivated, and total calories available for household use.

7.2 RECOMMENDATIONS.

(a) Although there are great difficulties in improving food security and nutrition in the study area due to climatic conditions, those concerned with food security and nutritional aspects of the community should work with the community and create awareness on the importance of on farm food storage. The community should realise the need to reduce sales of food crops. This need to be done in a way that does not disable other household necessities that demand cash, such as primary health care.

(b) Coordinating child care activities with agricultural programmes and projects is an attractive idea for improving nutrition. Such agricultural/child care activities should include credit with nutrition education programs and extension services directed toward women in poor households, with some food

security and nutrition messages integrated.

(c) The Ministry of Culture and Social Services should set up a campaign to educate the youth on the importance of assisting their parents on farm activities (planting, weeding and harvesting) in the household in order to increase food productivity of land and labour.

(d) Food security can be raised significantly by increasing household income and production potential of vulnerable households.

(e) Appropriate methods of curing tobacco which do not consume a lot of firewood should be researched on.

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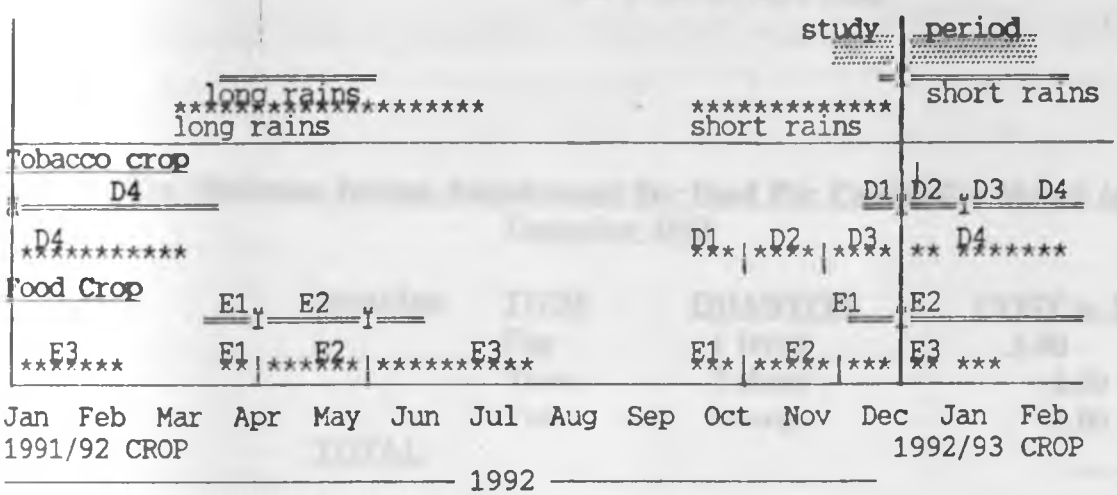
CROP SEASON CALENDER COMPARING RESEARCH YEAR WITH A NORMAL YEAR 1991/1992



Research period

Activities during research year.

********* **Activities during normal year**

Tobacco Crop		Maize and Beans	
E1	**Planting.**	**D1**	**Raising of seedlings.**
E2	**Weeding.**	**D2**	**Planting**
E3	**Harvesting**	**D3**	**Weeding.**
		D4	**Harvesting**

The above crop season calender compare activities carried out during the research year with the normal year. There was a drought during the research year which affected the planting and harvesting time.

During the long rains, farmers had poor harvest and during the short rains the planting time was delayed. The short rains extended to march 1993 and this affected the harvesting and quality of tobacco, which requires intensive rain for a short time.

APPENDIX A2

The Minimum Income Requirement For Food Per Capital Per Month in Nguthi December 1992

	ITEM	QUANTITY	COST in Ksh	
Breakfast	Egg	1 fried.	3.00	
	Toast	2 slices	2.00	
	Tea	1 mug	3.00	
TOTAL				8.00
LUNCH	Ugali	500gm		8.00
	Sukuma (Kale)		4.00	
	Egg	1 fried	3.00	
TOTAL				15.00
SUPPER	Ugali	500gm	8.00	
	Sukuma		4.00	
	Egg	1 fried	3.00	
TOTAL				15.00
TOTAL PER DAY				38.00
38.00 X 30 DAYS				1140

NB; *The calculation is based on a balance diet as suggested by the focus group.*

APPENDIX A3

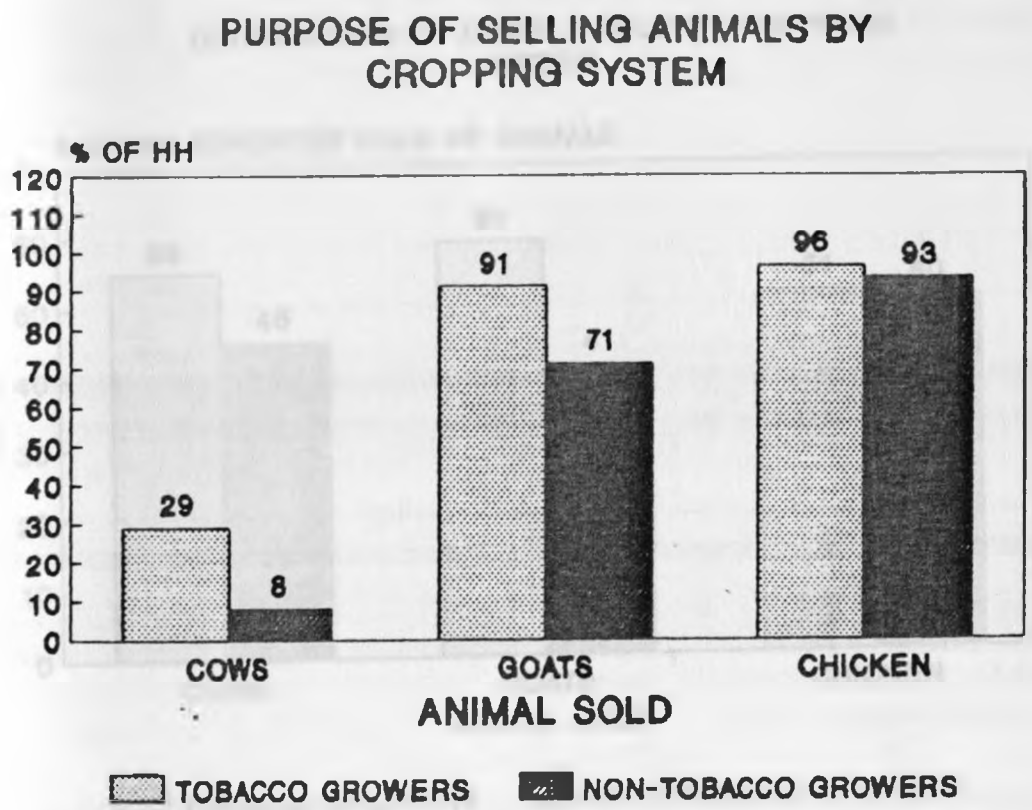
PEARSON'R CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES WITH SPECIFIC NUTRITIONAL INDICATORS

VARIABLES	NON TOBACCO GROWERS			TOBACCO GROWERS		
	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ
Sex	-0.0668	-0.003(	-0.0561	-0.1556	-0.1824	-0.1540
Age of child	-0.5596*	-0.469(*	-0.3521	0.5474*	- 0.5180*	-0.3058 *
Mothers' age	0.1835	0.2941*	0.2826*	0.1514	0.1740	0.1417
Father's age	0.1309	0.1774	0.1353	0.1257	0.1108	0.0692
Mother's education	0.1104	0.1341	-0.1023	0.0006	-0.0712	-0.1319
Household size	-0.0731	0.1115	-0.2548*	0.0958	0.1984	0.2588 *
income from labour	-0.1968	-0.2847*	0.2552*	0.2110	0.2148	0.1713
Number of children	0.0756	0.2117	0.2473*	-0.0405	0.0203	0.0868
Birth order	-0.0022	0.0452	0.0677	0.0636	0.1554	0.2166
permanent household	0.1810	0.2442	0.1984	0.3018*	0.2249	0.0766
Land cultivated	-0.1236	-0.1501	-0.1109	-0.0764	-0.1075	-0.1144
income spent on food	-0.0334	-0.0662	-0.0734	-0.2407	-0.1693	0.0256
produced calories	0.0338	0.0124	0.0211	0.3149*	0.0722	-0.2382 *
calorie available	0.1550	0.3531*	0.3954*	0.5247*	0.5059*	0.3419 *
Health of child	-0.0532	-0.1505	-0.1952	-0.3235*	-0.4402*	-0.4526 *

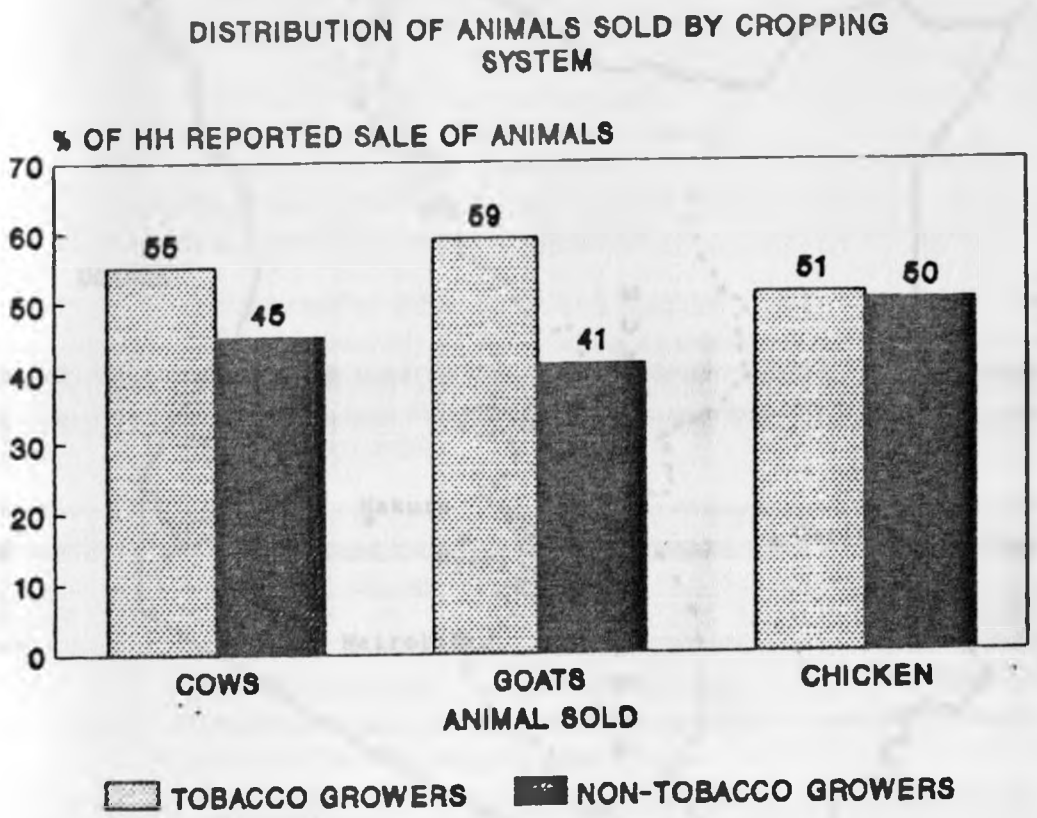
* Significance at p < 0.05.

N = 68

APPENDIX A4

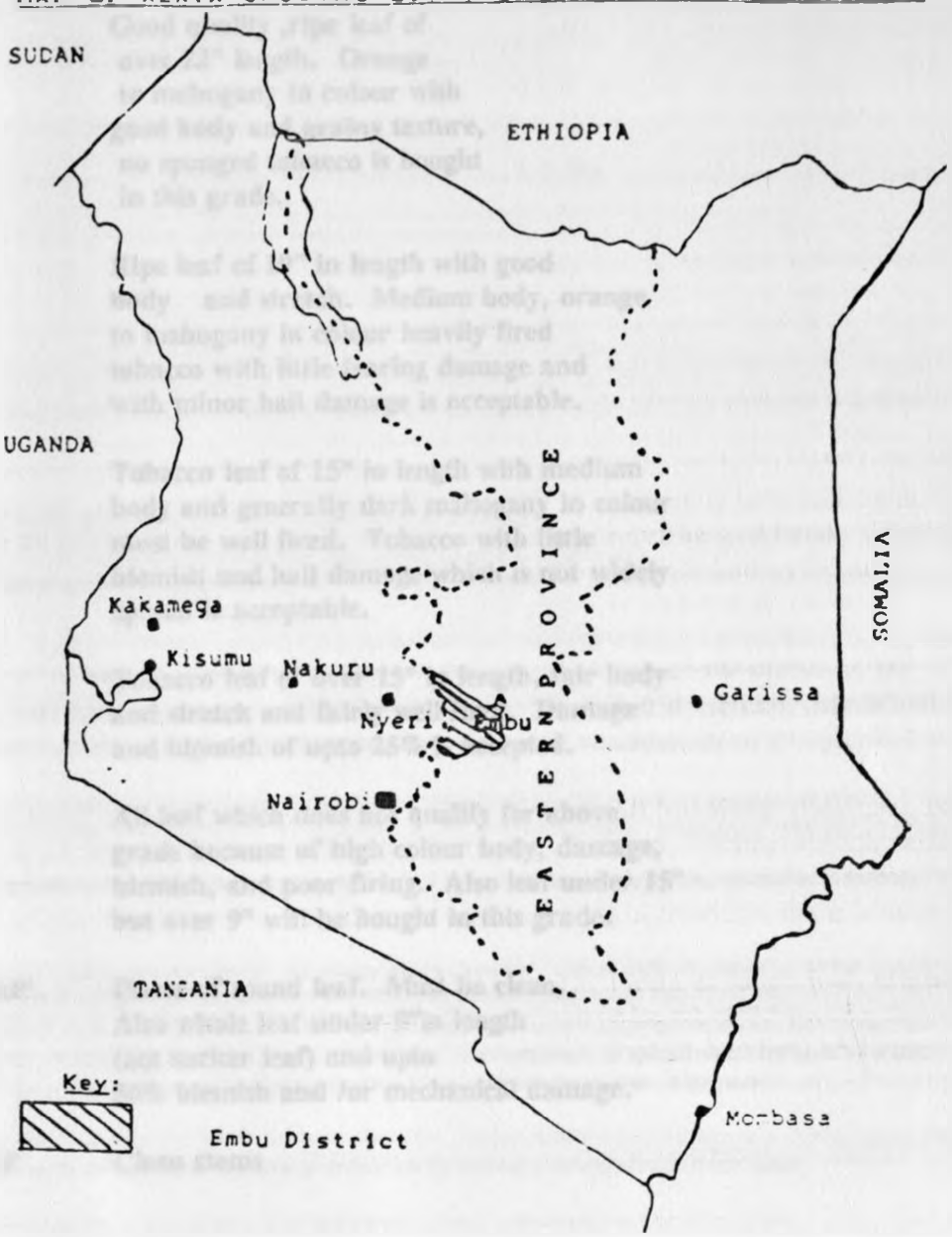

PURPOSE OF SELLING ANIMALS BY CROPPING SYSTEM
% OF HH
120
110
100
90
80
70
60
50
40
30
20
10
0
29
8
91
71
96
93
COWS
GOATS
CHICKEN
ANIMAL SOLD
TOBACCO GROWERS
NON-TOBACCO GROWERS

APPENDIX A5


DISTRIBUTION OF ANIMALS SOLD BY CROPPING SYSTEM
% OF HH REPORTED SALE OF ANIMALS
70
60
50
40
30
20
10
0
55
45
59
41
51
50
COWS
GOATS
CHICKEN
ANIMAL SOLD
TOBACCO GROWERS
NON-TOBACCO GROWERS

APPENDIX A6

MAP OF KENYA SHOWING LOCATION OF THE STUDY DISTRICT



Adapted from Embu Development plan 1989-1993

APPENDIX B

GRADE	DESCRIPTION
'P'	Good quality ,ripe leaf of over 22" length. Orange to mahogany in colour with good body and grainy texture, no sponged tobacco is bought in this grade.
'I'	Ripe leaf of 19" in length with good body and stretch. Medium body, orange to mahogany in colour heavily fired tobacco with little tearing damage and with minor hail damage is acceptable.
'II'	Tobacco leaf of 15" in length with medium body and generally dark mahogany in colour must be well fired. Tobacco with little blemish and hail damage which is not widely spread is acceptable.
'III'	Tobacco leaf of over 15" in length, fair body and stretch and fairly well fired. Damage and blemish of upto 25% is accepted.
'IV'	All leaf which does not qualify for above grade because of high colour body, damage, blemish, and poor firing. Also leaf under 15" but over 9" will be bought in this grade.
'SCRAP'	Pieces of sound leaf. Must be clean. Also whole leaf under 9"in length (not sucker leaf) and upto 50% blemish and /or mechanical damage.
'STEM'	Clean stems

SOURCE *B.A.T LEAF CENTRE ENA*

FARMER'S NO ..... CONTRACT NO .....

B. A. T. KENYA LIMITED

LOAN AND TOBACCO GROWER AGREEMENT TO GROW ..... HECTARES

OF FLUE CURED TOBACCO In the year .....

and produce ..... Kgs.

THIS Agreement is made BETWEEN:-

1. Name ..... I. D. No. .....

   Address .....

   .....

2. Name ..... I. D. No. .....

   Address .....

   .....

3. Name ..... I. D. No. .....

   Address .....

   .....

(ALL hereinafter jointly and severaly called the Borrower) of the part

AND B. A. T. Kenya Limited (hereinafter called the company) of the other part,
WHEREBY the parties hereto agree as follows:-

1. Subject to the terms and conditions of this Agreement the company at the request of the Borrower has been agreed to make arrangements to make available on loan to the Borrower materials and services, up to a maximum value of K. Shs. ..... (hereinafter called the Loan) to be used or applied solely towards:-

   (a) the growing of those varieties of leaf tobacco recommended by the Company.

   (b) the construction of leaf curing barns (s) and handling shed (s) and or the provision of seedlings, fertilizers, insecticides and other items shown on the Company's list of authorised seasonal farm inputs.

2. Only the signatories to this agreement will be permitted to sign for materials or charges on behalf of the Borrower.

3. The Borrower will repay the loan to the Company at the minimum rate of 50% of the value of his annual sale of tobacco and will complete repayments of the loan within a maximum period of one year from the date of this agreement. Repayments shall be made by deduction of the appropriate sums, (being not less than 50% of the value of the Borrower's sales of tobacco) from proceeds of sale of the Borrower's tobacco, by the Company at such times as the Company shall in its absolute discretion determine.

4. The Borrower agrees to use and apply the loan solely for the purposes mentioned above and in so doing undertakes to follow all reasonable instructions given by the Company's employees in that resect.

5. The Borrower agrees to grow tobacco only during the official growing season which is from ..... to ..... and he will not grow tobacco during the closed season not will he grow any types or varieties of tobacco other than those approved by the Company.

6. The Borrower will propagate, cure and handle the tobacco in accordance with the advice provided by the Company's employees and further agrees that all the said tobacco will only be offered for sale to the Company.

7. The Company will provide supervision and advise on all crop operations and the Borrower shall follow all such advice.

8. The Borrower agrees to plant 1000 eucalyptus trees or any other variety which from time to time shall be approved by the Company each year until he has established 3000 growing trees at a spacing of 2m X 2m for each ½ Hectare of tobacco he is authorised to grow.

9. All materials, supplies and equipment loaned to the Borrower under this agreement shall remain the property of the company until the loan is paid for by the Borrower – PROVIDED ALWAYS that in the event of the Borrower committing any breach of this agreement, all sums due by the Borrower to the Company shall immediately become payable without notice and without demand and the Company may exercise any right or remedies to remove and take away any materials, supplies or equipment which are subject to this Agreement from any place where the same shall be kept or stored.

10. The Company will purchase up to ..... Kgs. of tobacco in the season at the grade price prevailing at the time of purchase provided that the tobacco conforms to the Company's published specifications.

11. All cheques will be made out in the name of the Borrower and no one else. The company informs the borrower that it is a serious breach of this CONTRACT for the borrower to sell tobacco belonging to other farmers. Should the borrower be caught doing this the Company reserves the right to charge the loan outstanding on the other farmer's account immediately to the borrower's account.

12. This agreement cannot be determined by the Borrower until he/they has/have paid all outstanding monies to the Company or made acceptable arrangements to repay all monies. The borrower agrees that should he cease to grow tobacco he will immediately repay all loans due and outstanding to the Company. Should he fail so to do and at any time thereafter commence growing sugar or any other crop (s) he shall be deemed ipso facto to have authorised the company by virtue of this agreement to recover such sums as shall be due and outstanding from such other person, body corporate or authority, that shall finance buy, manage, supervise the growing of sugar or any other crop (s).

IN WITNESS WHEREOF the parties hereto have hereun to set their hands the .....

..... day of ..... one thousand nine

hundred and .....

Signed by the said:) _____

) _____

) _____

In the presence of: Name) _____

Address) _____

Signed by the Area/Divisional) _____

Manager of B. A. T. Kenya Ltd.) _____

) _____

In the presence of Name:) _____

Address:) _____

FOOD COMPOSITION TABLE

CTA

ECSA

FOR ENERGY AND EIGHT IMPORTANT NUTRIENTS IN FOODS COMMONLY EATEN IN EAST AFRICA

The symbols after each nutrient or energy value provide an indication of the contribution that a food can make in supplying that nutrient or energy – insignificant contribution ○ = minor contribution ● good source the relative contribution is represented by the number of symbols

COMPOSITION PER 100 GRAMS EDIBLE PORTION (– = not analyzed)	ENERGY kilojoules	ENERGY (kilocalories)	PROTEIN grams	CALCIUM milligrams	IRON milligrams	VITAMIN A micrograms	THIAMIN milligrams	RIBOFLAVIN milligrams	NIACIN milligrams	VITAMIN C milligrams
CEREALS & GRAIN PRODUCTS										
1. Maize, yellow immature on cob, fresh	685 ●●	166 ●●	5.0 ●●	18 ○	1.8 ●	60 ●●	0.16 ●●	0.08 ●	1.3 ●●	8 ●
2. Maize, white whole kernel, dried	1443 ●●	345 ●●	9.4 ●●	16 –	[illegible]	0 –	0.33 ●●	0.10 ●	2.2 ●●	0 –
3. Maize, yellow whole kernel, dried	1477 ●●	353 ●●	10.4 ●●	13 –	[illegible] ●	25 ●	0.32 ●●	0.12 ●	1.7 ●	4 ○
4. Maize, white on cob, toasted	1523 ●●	364 ●●	8.0 ●●	2 –	3.0 ●	0 –	0.02	0.09 ●	2.2 ●●	0 –
5. Maize, flour, 60-80% extraction	1397 ●●	334 ●●	8.0 ●●	6 –	1.1 ○	0 –	0.14 ●	0.05	1.0 ●	0 –
6. Maize, meal (unga wa mahindi)	1427 ●●	341 ●●	9.3 ●●	17 –	4.2 ●	4 ○	0.30 ●●	0.08 ●	1.8 ●●	3 ○
7. Maize, meal (dona)	1435 ●●	343 ●●	10.0 ●●	12 –	2.5 ●	0 –	0.35 ●●	0.13 ●	2.0 ●●	3 ○
8. Millet, finger, whole grain	1318 ●●	315 ●●	[illegible]	[illegible] ●●	17.0 ●●●	[illegible]	0.18 ●	0.11 ●	0.8 ●	1 ○
9. Millet, finger, flour	1331 ●●	[illegible]	[illegible]	315 ●●	54.0 ●●●	4 ○	0.22 ●	0.10 ●	0.8 ●	0 –
10. Millet, bulrush, whole grain	1418 ●●	339 ●●	[illegible]	22 ○	21.0 ●●●	4 ○	0.30 ●●	0.22 ●●	1.7 ●	3 ○
11. Rice, lightly milled, parboiled	[illegible]	333 ●●	[illegible]	9 –	1.7 ○	0 –	0.25 ●	0.03	2.8 ●●	0 –
12. Rice, milled, polished	[illegible]	[illegible]	[illegible]	9 –	1.7 ○	0 –	0.10 ●●	0.03	2.8 ●●	0 –
13. Sorghum, whole grain	[illegible]	343 ●●	[illegible]	26 ○	11.0 ●●●	[illegible]	[illegible]	0.15 ●	3.3 ●●●	0 –
14. Sorghum, flour	1400 ●●	307 ●●	[illegible]	28 ○	10.0 ●●●	3 ○	0.28 ●●	0.09 ●	3.4 ●●●	0 –
15. Wheat, whole, parboiled	1381 ●●	330 ●●	[illegible]	54 ○	6.1 ●●	0 –	0.36 ●●	0.09 ●	3.8 ●●●	0 –
16. Wheat, flour, 85% extraction	[illegible]	340 ●●	[illegible]	36 ○	3.8 ●●	0 –	0.37 ●●	0.08 ●	2.8 ●	0 –
17. Wheat, flour, 70% extraction	[illegible]	333 ●●	[illegible]	27 ○	2.2 ●●	0 –	0.07	0.04	1.0 ●	0 –
Wheat products:										
18. White bread	1004 ●●	240 ●●	[illegible]	37 ●	1.7 ●●	0 –	0.16 ●●	0.06	1.0 ●	0 –
19. Brown bread	974 ●●	233 ●●	[illegible]	43 ●	2.2 ●●	0 –	0.20 ●●	0.08 ●	2.1 ●●	0 –
20. Cakes	1384 ●●	337 ●●	[illegible]	[illegible]	1.0 ●	0 –	0.14 ●	0.03	1.0 ●	0 –
21. Pancakes	552 ●●	132 ●●	[illegible]	[illegible]	[illegible] ○	0	0.04	0 –	0.3 ○	0 –
STARCHY ROOTS, TUBERS & FRUIT										
1. Breadfruit, pulp, raw	414 ●	99 ●	1.5 ○	20 ○	2.0 ●●	2 ○	0.08 ●	0.05	0.7 ●	31 ●●●
2. Cassava, bitter, fresh	577 ●	138 ●	1.2 ○	68 ●	1.9 ●●	5 ○	0.04	0.05	0.6 ●	31 ●●●
3. Cassava, meal	1331 ●●	318 ●●	1.6 ○	66 ○	3.6 ●●	0 –	0.06 ●	0.05	0.9 ●●	4
4. Plantain, ripe, raw	536 ●	128 ●	1.2 ○	8 –	1.3 ●	130 ●●●	0.08 ●	0.04	0.6 ●	20 ●●
5. Potato, raw	313 ●	75 ●	1.7 ○	13 –	1.1 ●	4 ○	0.07 ●	0.03	1.3 ●●	21 ●●
6. Sweet potato, yellow, raw	456 ●	109 ●	1.6 ○	33 ○	2.0 ●●	300 ●●●	0.09 ●	0.04	0.7 ●	37 ●●●●
7. Sweet potato, pale, raw	456 ●	109 ●	1.6 ○	33 ○	2.0 ●●	6 ○	0.09 ●	0.04	0.7 ●	37 ●●●●
8. Taro/Cocoyam, raw	393 ●	94 ●	1.8 ○	51 ●	1.2	0 –	0.10 ●	0.03	0.8 ●	8 ●
9. Turnip/Swede, raw	75	18	1.0 ○	38	0.5	2 ○	0.04	0.05	0.5 ●	75 ●●●●●
10. Yam, fresh	464 ●	111 ●	1.9 ○	52 ●	0.8	2 ○	0.11 ●	0.02	0.3	6 ●
11. Yam, flour	1297 ●●	310 ●●	3.4 ○	20 –	1.1	0 –	0.10 ●	0.08	[illegible] ●●●●	0
GRAIN LEGUMES & LEGUME PRODUCTS										
1. Beans/peas, fresh, shelled	435 ●	104 ●	[illegible]	[illegible] ○	1.8 ●	20 ●	0.15 ●●	0.15 ●●	1.8 ●●●	25 ●●
2. Beans, dried	1339 ●	320 ●	[illegible]	[illegible] ●	8.2 ●	2 –	0.37 ●●	0.16 ●	2.4 ●●	1 ○
3. Beans, green in pod, raw	146 ○	35 ○	[illegible]	[illegible] ●	1.4 ●	30 ●	0.08	0.12 ●	0.5 ●	27 ●●●
4. Bonavist/Hyacinth bean, dried	1272 ●	304 ●	23.0 ●●●	[illegible] ●	8.0 ●●	10 ○	0.54 ●●●	0.14 ●	2.3 ●●	0 –
5. Chickpea, whole seeds, raw, dried	1326 ●	327 ●	20.0 ●●●	[illegible] ●	11.0 ●●	10 ○	0.48 ●●	0.16 ●	1.8 ●●	8 ○
6. Cowpea, mature pods, dried	1331 ●	318 ●	23.0 ●●●	80 ●	5.0 ●	2 ○	0.90 ●●●●	0.15 ●	2.0 ●●	2 ○
7. Cowpea, young green pods, raw	163 ○	39 ○	3.7 ●	54 ●	1.4 ●	78 ●●	0.14 ●	0.10 ●	1.0 ●	24 ●●
8. Kidney bean, red, dried	1339 ●	320 ●	22.0 ●●●	120 ●	8.2 ●	1 ○	0.37 ●●	0.16 ●	2.4 ●●	1 ○
9. Lentil, dried	1360 ●	325 ●	25.0 ●●●	84 ●	7.0 ●	10 ●	0.41 ●●	0.19 ●	2.2 ●●	0 –
10. Mung bean, green, dried	1347 ●	322 ●	24.0 ●●●	100 ●	7.0 ●	10 ●	0.52 ●●●	0.20 ●	2.4 ●●	0 –
11. Mung bean, black, dried	1305 ●	312 ●	24.0 ●●●	110 ●	8.0 ●●	8 ○	0.48 ●●	0.21 ●	2.3 ●●	0 –
12. Pea, dried	1251 ●	299 ●	22.0 ●●●	90 ●	10.0 ●●●	2 ○	0.86 ●●●●	0.17 ●	3.0 ●●●	0 –
13. Pigeon pea, dried	1263 ●	300 ●	20.0 ●●●	160 ●	8.0 ●	8 ○	0.72 ●●●●	0.14 ●	2.9 ●●●	0 –
14. Soya bean, dried	1703 ●●	407 ●●	34.0 ●●●●	165 ●	6.1 ●	9 ○	0.71 ●●●●	0.25 ●	2.0 ●●	0 –
15. [illegible] bean, dried	1381 ●	330 ●	21.0 ●●●	130 ●	–	5 ○	0.12 ●	0.10 ●	3.0 ●●●	2 ○

3. Coconut, immature kernel, fresh	799	191	2.0	29	1.8	0	0.08	[illegible]	0.6	8
4. Coconut, mature kernel, fresh	1640	392	3.6	21	2.5	4	0.03	0.01	0.6	2
5. Groundnut, dry	2393	572	23.0	49	3.8	2	0.79	0.14	15.5	1
6. Melon seeds, without coat	2489	595	26.0	53	7.4	0	0.10	0.12	1.4	--
7. Pumpkin seeds, without coat	2414	577	23.0	57	2.8	3	0.15	0.12	1.4	2
8. Sunflower seeds, without coat	2477	592	20.0	100	7.6	0	1.36	0.16	3.3	--
VEGETABLES & VEGETABLE PRODUCTS										
1. Amaranth leaves, raw	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	300	0.05	0.42	1.2	50
2. Amaranth leaves, cooked	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	200	--	--	--	34
3. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	0.11	0.09	0.6	9
4. [illegible] leaves, raw	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	52
5. [illegible]	544	130	[illegible]	[illegible]	[illegible]	5	0.17	0.14	2.0	7
6. Cabbage	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1100	0.04	0.04	0.8	8
7. Cassava leaves, raw	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	800	0.25	0.60	2.4	310
8. Cauliflower, raw	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	0.06	0.09	0.5	[illegible]
9. Cucumber, raw	[illegible]	14	[illegible]	[illegible]	[illegible]	0	0.02	0.01	0.3	14
10. [illegible] leaves, raw	[illegible]	45	[illegible]	[illegible]	[illegible]	460	0.20	0.37	2.1	50
11. Eggplant, raw	126	30	[illegible]	[illegible]	[illegible]	8	0.05	0.05	0.5	9
12. [illegible] leaves, raw	84	20	[illegible]	[illegible]	[illegible]	340	--	0.13	0.8	0
13. Leaves, pale green	109	26	[illegible]	[illegible]	[illegible]	170	0.04	0.04	0.3	54
14. Leaves, medium green	105	25	[illegible]	[illegible]	[illegible]	300	0.04	0.16	0.7	41
15. Leaves, dark green	243	58	[illegible]	[illegible]	[illegible]	650	0.15	0.53	1.2	60
16. Lettuce, raw	84	20	[illegible]	[illegible]	[illegible]	325	0.08	0.18	0.4	10
17. Mushrooms, fresh	121	29	[illegible]	[illegible]	[illegible]	0	0.10	0.40	4.0	3
18. Okra, pods, raw	146	35	[illegible]	[illegible]	[illegible]	31	0.04	0.08	0.8	47
19. Okra, leaves, raw	243	58	[illegible]	[illegible]	[illegible]	140	0.25	2.80	0.2	50
20. Onion, shallot, raw	159	38	[illegible]	[illegible]	[illegible]	0	0.02	0.04	0.2	11
21. Peppers, capsules, sweet green, raw	184	44	[illegible]	[illegible]	[illegible]	125	0.12	0.15	2.2	140
22. Peppers, capsules, sweet red, raw	184	44	[illegible]	[illegible]	[illegible]	125	0.12	0.15	2.2	140
23. Pepper, leaves, raw	305	73	[illegible]	[illegible]	[illegible]	650	--	--	--	2
24. Pumpkin, squash, raw	96	23	[illegible]	[illegible]	[illegible]	200	0.05	0.02	0.5	8
25. Pumpkin, leaves, raw	105	25	[illegible]	[illegible]	[illegible]	175	0.08	0.06	0.3	80
26. Sweet potato, leaves, raw	205	49	[illegible]	[illegible]	[illegible]	510	0.10	0.28	0.8	70
27. Taro, leaves, raw	129	31	[illegible]	[illegible]	[illegible]	500	0.17	0.35	0.8	11
28. Tomatoes, raw	92	22	[illegible]	[illegible]	[illegible]	75	0.06	0.04	0.6	26
29. Turnip, leaves, raw	142	34	[illegible]	[illegible]	[illegible]	250	0.02	0.25	0.8	62
FRUIT										
1. Avocado, raw	142	121	1.4	19	1.4	90	0.05	0.15	2.0	18
2. Baobab, ripe, raw	1167	279	2.2	285	7.4	12	0.37	0.06	2.1	270
3. Banana, ripe, raw	343	82	1.5	9	1.4	20	0.03	0.03	0.6	9
4. Citrus, orange/tangerine, raw	184	44	0.6	28	0.1	120	0.02	0.03	0.2	46
5. Citrus, grapefruit/pomelo, raw	142	34	0.8	21	0.8	4	0.05	0.03	0.2	44
6. Citrus, lemon/lime	167	40	0.6	19	0.7	2	0.03	0.02	0.3	45
7. Dates, dried	1230	294	2.7	82	9.4	5	0.06	0.15	1.8	0
8. Groundcherry/Cape gooseberry, raw	241	58	2.8	55	0.9	200	0.15	0.05	1.6	4
9. Guava, raw	192	46	1.1	24	1.3	48	0.06	0.04	1.3	325
10. Mango, ripe, without skin	251	60	0.6	24	1.2	400	0.03	0.05	0.4	42
11. Mango, unripe, without skin	230	55	0.5	7	1.4	60	0.02	0.03	0.2	86
12. Papaya, raw	125	30	0.4	21	0.6	75	0.03	0.03	0.4	52
13. Pineapple, fresh	201	48	0.4	16	0.4	15	0.06	0.03	0.1	34
14. Pomegranate, fresh	272	65	1.6	12	1.0	7	0.09	0.06	0.4	24
15. Tamarind, dried	920	220	5.0	165	2.2	10	0.18	0.09	0.6	9
16. Tree tomato, raw	186	45	1.5	71	0.7	15	0.04	0.03	1.0	25
17. Watermelon	92	22	0.5	8	0.3	42	0.04	0.05	0.1	8
SUGARS AND SYRUPS										
1. Soft drinks, commercial	188	45	0	[illegible]	[illegible]	[illegible]	--	--	--	--
2. Sugar cane	226	54	0	[illegible]	[illegible]	[illegible]	0.02	0.10	0.1	3
3. Sugar	1569	375	0	[illegible]	[illegible]	0	0	0	0	0
MEAT, POULTRY & EGGS										
1. Bacon, fat, whole side	2619	626	9.1	13	1.3	0	0.40	0.10	1.9	0
2. Beef, moderately fat	979	234	18.0	11	3.6	25	0.26	0.15	4.0	0
3. Egg, hen	586	140	12.0	45	2.0	200	0.10	0.30	0.3	0
4. Goat, moderately fat	715	171	18.0	11	2.3	0	0.17	0.32	5.6	--
5. Heart, beef	439	105	17.0	9	4.8	42	0.28	0.28	2.7	1
6. Kidney, beef	485	116	14.0	13	4.6	300	0.28	1.50	5.8	10
7. Liver, beef	573	137	19.0	8	10.0	840	0.50	3.00	10.0	15
8. Mutton, moderately fat	1075	257	17.0	10	2.0	10	0.12	0.17	3.1	[illegible]
9. Pork, moderately fat	1707	408	12.0	11	1.8	--	0.60	0.14	3.1	--
10. Poultry, for example chicken	577	138	20.0	10	1.1	85	0.10	0.15	3.7	0
11. Tuna	334	80	16.0	100	1.0	--	0.20	0.50	3.0	--

FISH & FISH PRODUCTS				
1. Crustaceans, crab, lobster, prawn	397 ●	95 ●	18.0 ●●	
2. Fish, dried	1067 ●	255 ●	47.0 ●●	
3. Fish, average fat	481 ●	115 ●	22.0 ●●	
4. Small dried fish, degen	1335 ●	319 ●	44.0 ●●●	
MILK & MILK PRODUCTS				
1. Milk, cow, whole	331 ●	79 ●	3.8 ●●	145 ●●●
2. Milk, cow, skimmed	159	38	3.5 ●●	130 ●●●
3. Milk powder, cow, whole	1937 ●●	463 ●●	28 ●●	1000 ●●●
4. Milk powder, cow, skimmed (DSM), vitamins A enriched	1494 ●	357 ●	36.0 ●●●	1260 ●●●
5. Milk, goat	351 ●	84 ●	3.4 ●●	160 ●●●...
6. Buttermilk	130	31 ·	3.0 ●●	120 ●●●
7. Summer baby food milk powders, average	1816 ●●	434 ●●	15.7 ●●	330 ●●●
OILS & FATS				
1. Beef suet	3766 ●●●●●	900 ●●●●●	0 –	
2. Butter, from cow's milk	2825 ●●●●●	676 ●●●●●	0 –	
3. Ceroolet oil	3766 ●●●●●	900 ●●●●●	0 –	
4. Fish liver oil	3766 ●●●●●	900 ●●●●●	0 –	
5. Ghee, clarified butter	3699 ●●●●●	884 ●●●●●	0 –	
6. Lard/shortened fats	3728 ●●●●●	891 ●●●●●	0 –	
7. Margarine, fortified	3125 ●●●●●	747 ●●●●●	0 –	
8. Red palm oil, fresh	3732 ●●●●●	892 ●●●●●	0 –	
9. Red palm oil, stale	3732 ●●●●●	892 ●●●●●	0 –	
10. Salad oil	3766 ●●●●●	900 ●●●●●	0 –	
11. Sunflower oil	3766 ●●●●●	900 ●●●●●	0 –	0 –
OTHER				
1. Beer, local	105 ●	25 ●	0.2 –	0 –
2. Caterpillars, dried	1640 ●●	392 ●●	53.0 ●●●●●	185 ●●
3. Coconut milk	88	21	0.2 –	24 –
4. Termites, fresh	1414 ●●	338 ●●	20.0 ●●●●	12 –
5. Yeast, baker's dry	218	52	11.0 ●	25 ●

RECOMMENDED DAILY INTAKES (WHO)

For adults energy requirements are given for light (L), moderate (M) and heavy (H) work

			ENERGY kilocalories		PROTEIN grams	CALCIUM milligrams	IRON milligrams	RETINOL EQUIVALENTS micrograms	THIAMIN milligrams	RIBOFLAVIN milligrams	NIACIN milligrams	VITAMIN C milligrams
women	1		1900		13.5	500 800	5-10	300	0.3	0.5	5.4	20
	2		1100		13.5	400 500	5-10	250	0.5	0.8	9.0	20
	3		1300		19.5	400 500	5-10	250	0.5	0.8	9.0	20
	4		1500		17.5	400 500	5-10	300	0.65	1.06	11.7	20
girls	5 7		1800		21	400 500	5-10	300	0.7	1.1	12.1	20
	7-10		2100		27	400 500	5-10	400	0.9	1.3	14.5	20
	10-12		2300		34	600 700	5-10	575	1.0	1.6	17.2	20
	12-14		2400		43	600 700	8-16	725	1.2	1.7	18.0	27.5
	14-16		2500		52	600 700	8-16	750	1.2	1.78	19.8	30
	16-18		2500		56	500 600	5-9	750	1.2	1.8	20.3	30
boys	5 7		1700		21	400 500	5-10	300	0.7	1.1	12.1	20
	7-10		1900		27	400 500	5-10	400	0.9	1.3	14.5	20
	10-12		2200		38	600 700	5-10	575	0.9	1.4	15.5	20
	12-14		2400		44	600 700	10-20	725	1.0	1.5	16.4	27.5
	14-16		2700		48	600 700	13-26	750	1.0	1.5	16.4	30
	16-18		2900		52	500 600	14-28	750	0.9	1.4	15.2	30
		L	M	H								
men	18-30	2800	3200	3650	48	400 500	5-9	750	1.2	1.8	19.8	30
	30-60	2550	2900	3400	48	400 500	5-9	750	1.2	1.8	19.8	30
	> 60	2100	2400	2800	49	400 500	5-9	750	1.2	1.8	19.8	30
women	18-30	2000	2300	2350	41	400 500	14-28	750	0.9	1.3	14.5	30
	30-60	2050	2150	2400	41	400 500	14-28	750	0.9	1.3	14.5	30
	> 60	1800	1900	2150	41	400 500	14-28	750	0.9	1.3	14.5	30
pregnancy (3 months)			+ 285		+ 6	1000 1200	14-28	750	+ 0.1	+ 0.2	+ 2.3	30
lactation (4-6 months)			+ 500		+ 17.5	1000 1200	14-28	1200	+ 0.2	+ 0.4	+ 3.7	30

[illegible]	[illegible] ●●	0 06 ●	[illegible]	2.6 ●●●●	0 –
[illegible]	[illegible]	0 07 ●	[illegible] ●●●●	6.2 ●●●●●	0 –
[illegible]	[illegible]	0 06 ●	[illegible]	2.8 ●●●●●	0 –
[illegible]	[illegible]	0 10 ●	[illegible] ●●	6.0 ●●●●●	0 –
0 –	40 ●●	0 04	0 21 ●●●	0 1	1
0 1 –	0 –	0 03	0 18 ●●	0 1	0 –
0 8 ○	300 ●●	0 25 ●	1 30 ●●●	0 7	0 –
1.0 ○	1500 ●●●	0 45 ●	1 53 ●●●	1 1 ●	17
0.1 –	25 ●	0 06 ●	0 22 ●●	0 4 ●	1
5.8 ●●●	0 –	0 05 ●	0 15 ●●	0 1	1
0.1 –	300 ●●	0 44 ●	0 44 ●●	3 6 ●●	39 ●
[illegible]	0 –	0 –	0 –	0 –	0 –
[illegible]	730 ●●●●●	0.01 ○	0.08 ●	0.1 ○	0 –
[illegible]	0 –	0 –	0 –	0 –	– –
[illegible]	146000 ●●●●●	– –	– –	– –	– –
[illegible]	310 ●●●●	– –	0.01 ○	– –	– –
[illegible]	0 –	0 –	0 –	0 –	0 –
[illegible]	660 ●●●●●	0 –	0 –	0 –	0 –
[illegible]	13000 ●●●●●	0.01 ○	0 02 ○	0 –	– –
–	2400 ●●●●●	– –	0.01 ○	0 –	– –
0 –	0 –	0 –	0 –	0 –	0 –
0 –	4 ○	0 –	0 –	0 –	0 –
0 3 –	– –	0 02	0 01	0 4 ●	0 –
2 3 ●●	– –	0 17 ●	1 30 ●●●●	6 0 ●●●●●	0 –
0 3	0 –	0 –	0 –	0 –	3 ○
1 0 ●	– –	– –	– –	– –	– –
5 0 ●●	0 –	0 71 ●●●	1 70 ●●●●	11 0 ●●●●●	0 –

The content of eight important nutrients is shown Deficiencies of any of those cause severe health problems

- **Protein** is necessary to build up and maintain body tissues. Deficiency causes severe malnutrition especially in infants and children.
- **Calcium** is necessary for building strong bones and teeth.
- **Iron** is an essential part of red blood cells. Deficiency, which occurs especially in women and growing children, causes tiredness and lowered performance. Iron present in animal products is absorbed better than iron in plant foods.
- **Vitamin A** is needed for healthy eyes and for healing after infection or injury. Mild deficiency causes night blindness. Severe deficiency leads to permanent blindness and increased severity of pneumonia and diarrhoea. Measles infection increases the need for vitamin A. The content of vitamin A is expressed as retinol equivalents. 1 microgram retinol equivalent = 1 microgram retinol = 6 micrograms beta-carotene = 12 micrograms other provitamin A carotenoids.
- **Thiamin** (vitamin B_1), **Riboflavin** (vitamin B_2) and **Niacin** (nicotinic acid) are vitamins, which play a key role in many reactions in the body. These reactions include those which make it possible to use the energy in food.
- **Vitamin C** has many important functions, most notably in connective tissue (wound healing). The deficiency disease is known as scurvy.

CTA Technical Centre for Agriculture and Rural Cooperation of ACP under the ECP Convention of Lomé

ECSA Food and Nutrition Cooperation, a programme of cooperation between countries of East, Central and Southern Africa in which issues related to food and nutrition are discussed, planned and implemented

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APPENDIX C

UNIVERSITY OF NAIROBI.

UNIT OF APPLIED HUMAN NUTRITION.

EMBU STUDY

A COMPARISON OF FOOD ACCESSIBILITY AND NUTRITIONAL STATUS OF PRESCHOOL CHILDREN OF TOBACCO AND NON-TOBACCO GROWING HOUSEHOLD, IN MARGINAL AREAS OF EMBU DISTRICT

NAME OF ENUMERATOR_____

DATE._____

HH NO/____/_____/___/____

[CIRCLE] Tobacco grower=1, Non-tobacco grower=2

INSTRUCTIONS

QUESTIONS SHOULD BE DIRECTED TO THE HUSBAND, WIFE OR ANY MATURE ADULT WITH ADEQUATE INFORMATION ON DETERMINANTS OF HOUSEHOLD FOOD SECURITY.

IN THE PERMANENT ABSENCE OF THE ABOVE MENTIONED SKIP THE HOUSEHOLD AND GO TO THE NEXT HOUSEHOLD.

[WRITE CLEARLY AND LEGIBLY, USE PENCILS MARK ONLY, USE ERASERS TO CHANGE IF NO ANSWER CAN BE OBTAINED, FILL THE SPACE IN RESPECTIVE FIELD WITH (00).

EXPLAIN TO THE MEMBERS OF THE HOUSEHOLD THAT THE STUDY IS FOR ACADEMIC REASONS ONLY AND THEY WILL ENJOY THE BENEFITS FROM STUDY FINDINGS.

THE BRACKETS [ ] INDICATE INSTRUCTIONS OR EXAMPLES FOR REPEAT CATEGORIES AND SHOULD NOT BE READ.

[CIRCLE THE NUMBER CORRESPONDING TO THE RESPONSE MENTIONED WHERE [APPLICABLE]

EMBU STUDY

DEMOGRAPHY INFORMATION

INTERVIEWER_____

HH NO./___/_____/____VILLAGE_____

[circle] Tobacco =1 Non-tobacco=2

1. Name of household head_____
   GENDER; [circle] Male =1 Female =2

2. Please specify the names of members of this household above 10 years and indicate who is employed, their occupation , education level, marital status, relation to the household head,and area of residence [USE THE TABLE BELOW AND THE CODES GIVEN]

Name	[illegible]to	marit st.	Resid	Ed	Occ/daily act

Residence status
1 = permanent
2 = once/week
3 = once/month
4 = others specify

relation to HHH: 1 = Self; 2 = husband; 3 = wife; 4 = daughter; 5 = son; 6 = brothers; 7 = others specify

Marital status: 1 = single; 2 = married; 3 = separated; 4 = widowed; 5 = others

occupation/daily activity: 1 = farmer; 2 = driver; 3 = business; 4 = housewife; 5 = others specify

3. How many members of this household are

   0-10 years #|_____|_____|

   10-20 years# #|_____|_____|

   More than 20 years # |____|____|

4. Is there any of them who is employed?
   [circle] Yes=1 No=2

HOUSEHOLD INCOME

INTERVIEWER_____

HH NO./_____/_____/___/VILLAGE_____ [Circle] Tobacco=1

Non tobacco=2

[if not employed skip to question 8]

5. Do they send/bring money home? [circle] Yes=1 No=2

[If yes] How often do they send money home (the one who sends more regularly)?

[circle]

Once every month =1 Once every three months=2 Once every year =3 Others specify_____

6. Approximately, how much is sent per month?

Kshs |___|___|___|___|___|

7. Since the last tobacco harvest did you get credit from anywhere [circle] Yes=1 No=2

[If yes] indicate type of credit from where.

i. _____ _____

ii. _____ _____

8. What was the total income for this household per month [last month].

Kshs_____

9. **What are the main income generating activities in this household [Record the main income generating activities for this household in order of importance since the last tobacco season. The code for activities is below table]**

Sources code	Amount/day	Amount /month

Sources code

1=Sale of animals, 2=Sale of labour

3=Sale of home craft 4=Business/specify

5=Salaries husband 6=Salaries wife

7=Sales of farm produce specify 8= Others specify

HOUSEHOLD EXPENDITURE FOR FOOD.

INTERVIEWER_____

HH NO.___/____/____/_____VILLAGE_____

[circle] Tobacco=1 Non-tobacco=2

10. Of this income, how much did you use for food last month Ksh._____

11. Which month did you use the highest amount on food last year._____

12. Which month did you use the least amount on food last year._____

Which foods did you purchase most frequently since the last tobacco season.1._____2._____3._____ 4._____

13. Do you have any food now? [circle] Yes=1 No=2

14. [If yes ask] Which month did you start experiencing food shortage._____

15. Which month did you deplete food from your own production_____

16. Who controls the use of food in this household [Circle] husband=1 wife=2

Others specify_____

Who controls the purchase of food in this household [Circle] husband=1 wife=2

Others specify_____

17. What are the three main sources of food in this household [Probe for ranking]

1._____ 2._____

3._____

18. What are the three major income expenditures in this household? [Probe for ranking] which consumes the highest proportion.] and indicate approximately how much was spent and the proportion.

Major income expenditure	Approximate amount Ksh.	Proportion
1._____	_____	_____
2._____	_____	_____
3._____	_____	_____

FOOD PRODUCTION

INTERVIEWER_____

HH NO./___/____/___/VILLAGE_____

[Circle] Tobacco=1 Non-tobacco=2

19. How much land is rented or borrowed (total)#|___|____| acres.

20. How much land do you own here and else where (total size)

|___|____| acres

21. How much land do you cultivate # |___|____| acres

22. How much was under food crops [short rains]|___|____| acres.

[long rains]|___|____| acres.

23. What are the three main problems that affect food availability in this household? [rank them]. 1_____ 2 _____ 3_____

[Questions to be asked to tobacco growers only.]

24. How much land is under tobacco # |___|____| acres

How many kgs did you harvest /____/___/____/____/

Total income from tobacco sales Ksh.____/____/____/____/

What was the major expenditure of this income [record in page 4 question 18]

25. What proportion of a day do you spend on tobacco activities during the harvesting period.

[circle] Whole day =1 Half a day =2

Others specify _____

Does this affect food preparation in this household. Yes=1 No=2

26. Approximately how many trees did you use for curing tobacco last season # of medium size trees [probe if they were medium]_____.

27. How many trees did you plant last season and are growing|_____|_____|

FOOD PRODUCTION

INTERVIEWER_____

HH NO./____/____/____/VILLAGE_____

[CIRCLE] Tobacco =1 Non-tobacco=2

28. Please tell me the crops you grew the last tobacco season (long rains) and how much was harvested, amount donated,amount wasted amount sold, price, month of harvest and month household depleted foods.

CROP [check]	Amount harv. in debes during tobacco season	Amount harv. in debes during non tobacco season	Total Amount donated in debes	Total Amount wasted in debes	Total amount sold in debes	PRICE IN Ksh.	Amount for household use in debes	Amount in Kgs	Amount in Kcal.
MILLET									
MAIZE									
BEANS									
PIGEON PEAS									
POTATOES									
COWPEAS									
BANANAS									
CASSAVA									
OTHERS									

29. Please tell me the number of animals you have, the number you sold since last tobacco harvest, price and what was the money used for.

ANIMAL	NUMBER	NUMBER SOLD	PRICE Ksh.	Major expenditure

EMBU STUDY.

ANTHROPOMETRY AND MORBIDITY DATA.

[THIS FORM SHOULD BE USED FOR EACH CHILD BETWEEN (12-59 MONTHS IN THIS HOUSEHOLD]

HH NO._____ INTERVIEWER_____DATE_____

[Circle] Tobacco =1 Non-tobacco =2

1. **Name of the child_____Sex___M/F Age_____yrs_____ months**

   Exact date of birth |_____|____| |_____|____| |____|____|

   day month year

[verify the date with growth monitoring card or birth certificate]

2. **How many children are under five years in this household**

   # |_____|

3. **What is the birth order of this child |_____|**

WEIGHT

Weight kg tolerance +/- (0.1kg)

a_____ b_____

HEIGHT

Height cm tolerance +/- 0.5cm.

a_____ b_____

4. **Has the [Mention name of the child] been sick for the last 7 days.**

   [if yes ask] what illness._____

5. **Was the child taken to the hospital**

   [circle] Yes =1 No=2

6. **Mothers age in years_____**

QUESTIONS TO BE ASKED DURING FOCUS GROUP DISCUSSION.

1. What changes have you witnessed since tobacco growing started in this area.
   a) in terms of household food availability.
   b) in household income.
   c) in labour distribution in the household by gender.
   d) in income controls.

2. What are the major sources of household income in this area.

3 What factors affect crop production in this area.

4. Please can you recall the last period of food shortage.
5. When was it?
6. Was it severe?
7. What foods were consumed during the last period of food shortage?
8 Who supported the food insecure households?
9. What do women do to cope with food scarcity during the famine
   a) Prevent occurrence of food deficit.

10. What do men do to cope with food scarcity during the famine.
    a) Prevent occurrence of food deficit.
11. Which months of the year were the busiest on the farm in order of intensity and what level of gender involvement.

Month.	Activities.	Who does the job
_____	_____	_____
_____	_____	_____
_____	_____	_____