

**THE IMPACT OF SUGAR CANE FARMING ON
HOUSEHOLD FOOD SECURITY IN MUHORONI
DIVISION**

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NASHON OTIENO O. ALUOKA

SUPERVISOR: PROF. COLLETE A. SUDA

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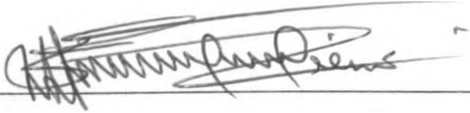


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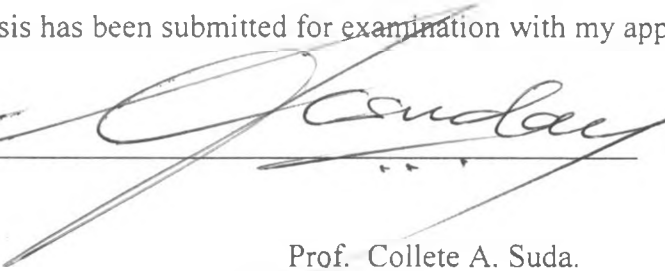
DECLARATION

I declare that this is my original work and has not been presented for award of a degree in any other University.

Signed:  Date 16/6/99

Otieno, Nashon O. Aluoka

This thesis has been submitted for examination with my approval, as University supervisor

Signed:  Date: 16/6/99

Prof. Collete A. Suda.

DEDICATION

This thesis is dedicated to my late grandfather, friend and inspirational namesake, Nashon Aluoka. And my loving and prayerful mother Jayne Ogolla; the two for whom I always wanted to live

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

ABSTRACT

CHAPTER 1: THE CONCEPT OF FOOD SECURITY AND AGRO-INDUSTRIAL SUGAR SCHEMES IN RURAL KENYA

1.01	Introduction.....	1
1.1	Problem Statement.....	4
1.2	Objectives.....	6
1.3	Justification Of The Study.....	7

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.0	Literature Review.....	9
2.0.1	An Overview Of Food Production And Shortages In The World	9
2.0.2	Famines And Agricultural Modernisation In Africa	12
2.0.3	Sugar Income And The Food Situation In Kenya	18
2.0.4	Women, Agriculture And Food	24
2.1	Theoretical Framework	31
2.1.1	Modes of Production Theory	31
2.1.2	Gender Perspective	38
2.2	Hypotheses	41
2.3	Definition of Key Concepts	41

CHAPTER THREE: METHODOLOGY

3.0	Research Site.....	43
3.0.1	Soils, Rainfall, And Agriculture.....	45
3.0.2	Economic and Social Organisation.....	46
3.1.0	Sampling.....	49
3.1.1	Multistage Area Sampling.....	49
3.1.2	Systematic Sampling.....	50
3.1.3	Judgement And Snowball Sampling.....	50
3.2	Data Collection.....	50
3.2.1	Interview schedule /The Questionnaire Method..	51
3.2.2	Direct Observation.....	52
3.2.3	Unstructured interviews.....	52
3.2.4	Secondary Data.....	52
3.3	Data Analysis And Presentation.....	53
3.3.1	Qualitative Techniques.....	54

3.3.2	Quantitative Techniques.....	53
3.4	Problems Encountered During FieldWork	54

CHAPTER FOUR: THE INFLUENCE OF SUGARCANE ON SUBSISTENCE FARMING AND HOUSEHOLD FOOD PRODUCTION IN MUHORONI

4.0	Introduction	56
4.0.1	General Socio-Economic Survey Of The Area	57
4.1	The Use Of Modern Technology In Sugarcane And Food Production In Muhoroni	60
4.2	Household Food Expenditures And Utilization Of Sugarcane Income In Food Production In Muhoroni	82
4.3	Gender And Food Production In Muhoroni	104
4.4	The Effects Of Wild animals On Food Production in Muhoroni	126

CHAPTER FIVE: CONCLUSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.1	Conclusions	141
5.2	Recommendations	146

BIBLIOGRAPHY

APPENDIX I	Census Of Farmers' Co-operative Societies And Women Groups
APPENDIX II	Questionnaire
APPENDIX III	Interview Schedule

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As the practice dictates, I take full responsibility for any criticisms that there could be on this study and owe my readers an explanation wherever I will be.

ABSTRACT

This study was undertaken to understand the interplay between sugarcane farming in Muhoroni and the situation of household food security in the area. In effect it sought to demonstrate how the dominance of the contractual cane farming in the area affects household subsistence in the region and at the end offer perspectives on how these production systems could be reconciled for sustainable human development.

In respect to rural agricultural development, the establishment of sugar schemes in Western Kenya over the years is seen as a significant contribution to the attainment of self-sufficiency in sugar for domestic market and also improvement in rural per capita income. Nonetheless the issue of food security in these regions has attracted little intervention from the development stakeholders, including the government.

The presence of large sugarcane farms holding much of the land in Muhoroni and the temptation of living on food purchases from the open market were among the reasons presenting the need for this study. The overriding assumption here was that these sugarcane farmers have been attracted to the cash crop at the expense of their own food needs.

The research into this problem was carried out in the Muhoroni sugar belt for four months. A reconnaissance and the pre-test of the research instrument preceded the data collection which covered 150 households drawn from a random sample of the population. The data was gathered using an interview schedule or questionnaire, unstructured interviews and Observation methods.

This was followed up by a later study, which targeted the management of the sugar firms, farmers' co-operatives and divisional government representatives. The data was then analysed using the SPSS computer package in order to measure the relationships occurring in the study.

The hypotheses employed in this research related to the spread of modern crop technology in Muhoroni, use of sugarcane earnings, women's financial empowerment and the issue of wildlife and food issues in the area. It emerged from the study that modern farming methods

relevant to subsistence agriculture have penetrated subsistence farming in Muhoroni. Many of these facilities, for example, the use of fertilisers, are shared directly between the two farming systems. Generally their use was seen as a factor of local limitations such as farm sizes, education and affordability rather than sugarcane farming.

This study affirmed that sugarcane earnings are the main source of livelihood to the people of Muhoroni. However, these incomes are received in one lump sum after a very long time (sometimes taking up to 3 years) and were often a target of expensive purchases and spending. Most households lack elementary accounting skills and fiscal planning and these leads to their decapitalization within very short time of the harvest. The farmers' co-operatives in the area are decayed and their functional capacities limited.

Although it is women who mainly provided the farm household with reproductive labour in addition to active labour participation in subsistence and sugarcane production, the study showed that they are least compensated for their effort. Women's access to sugarcane pay-off is paltry: largely in the form of cash remittances from their husbands who are the registered holders of the land title deeds. More women lack savings and credit facilities compared to their male counterparts and mainly depend on small-scale business and social support networks for certain specific development initiatives. This has led to the mushrooming of numerous income generating women groups in the area, most of which engage in sugarcane growing on leased farms.

Finally, wildlife is a big constraint to food cropping in the area cannot be overstated. Ninety percent of the respondents decried the destruction of food crops by wildlife of various species, which are harboured in the sugarcane populations.

In the last chapter, several recommendations have been suggested as to how both food and sugarcane production in Kenya can be enhanced through an integrated farming approach. Some of these include the revitalisation and strengthening of agricultural extension and veterinary services in the area, rationalisation of food policy and pricing mechanisms to make food cropping profitable and attractive to farmers and institutional capacity building for the social networks and marketing agencies in the area.

In addition, there is need to institute better Sugar production and marketing policies, which protect the domestic farmers against harsh trade realities which set in following the liberalisation tendencies of the national economy. At the same time, potential conflicts between wild game hibernating in the sugarcane farms and food farming should be addressed. The sum effect of a successful implementation of these considerations is bound to boost the attainment of sustainable development in the cane growing areas of Kenya.

THE CONCEPT OF FOOD SECURITY AND AGRO-INDUSTRIAL SUGAR SCHEMES IN RURAL KENYA

Many developing countries lack adequate foreign exchange to make purchases necessary to supplement their own food production, particularly during periods of world shortages. Although this is the fact on the ground, world food reserves are also constantly under threat from a rapidly rising population and affluence. Between 1983 and 1984 alone, about a third of the world's grain produce was fed to livestock (Foster, 1992: 139).

Several authors on this subject have suggested that the alternative to this position is to overstock the third world markets with locally grown food. This would not only bring down the prices of local food commodities but also reduce dependence on food imports, allowing these countries to build up reserves of food against bad crop years and enhance opportunities for food crops (Wortman and Cummings, 1978; Brown, 1974; Power, 1976).

The whole question of food security is a cultural issue. It is obvious that any cultural system that existed in history had always grown its food and built stores for any surplus produce. In fact, there is vast cultural knowledge on wild food resources that could either be foraged or hunted appears in most of the recorded ethnographical studies on ancient communities. Indeed, proper measures were put in place against unforeseen food shortages and the associated crises, depending on the specific cultural variations (Dahl and Hjort, 1976; Evans – Pritchard, 1956; Maundu et al, 1993).

Kenya has one of the lowest levels of food security internationally. With more than 40% of all the food energy in the country derived from cereals, it still relies on food imports ranging from rice, wheat, maize and sugar (World Bank, 1986:65; Republic of Kenya, Economic survey, 1996). Since 1980 when the country faced a serious famine, intermittent busts of famine have meant that the government has to use a lot of its foreign exchange savings in food imports. In 1984, maize yields failed in most parts of the country as a result of late arrival of rains (Githongo, 1996) and in 1997, Kenya imported some 7.1 million bags of maize to overcome domestic shortfall and avert a looming famine.

It is partly in an effort to save the much-needed foreign currency, which go into sugar imports as well that the government has stepped up the establishment of sugar schemes in Western Kenya. Apart from making the country self-sufficient in sugar, the agro-industrial development in this region also aim at improving rural per capita income. So far, eight sugar factories have been set up in western Kenya, namely Miwani (1964), Muhoroni (1966), Chemelil (1968), Mumias (1973), Sony (1978), Nzoia (1983), West Kenya Sugar (1989), and recently Busia whose construction is still underway. It is estimated that by 1979, a staggering 130,000 families in the Lake Victoria Basin were engaged in the sugar industry with a further 50,000 people employed directly by the sugar firms (Odada, 1979).

This point to the fact that the sugarcane industry is the lifeblood of Western Kenya, serving as the main source of income and employer in the region. As a result of this influence, farmers in these areas have tended to move into sugarcane cultivation and neglected subsistence farming. This transition together with the immigration of additional population into the region, mainly coming as job seekers in the sugar estates has contributed in one way or another to the disruption of the food balance in the sugar belt. It is clear that the demand for food in the region has steadily grown in keeping with the population growth but this has not been met with an equal effort from the farming households as most of them also begin to concentrate on a higher income earning crop, sugarcane, at the expense of subsistence agriculture.

In spite of this, a widely held perception on the sugar belt households is that they are food secure since they ought to be able to afford food at market prices from those who grow or sell the commodity. The other assumption has also been that these farmers have continued to grow sufficient food staples to supply their household needs. However credible evidence exists to show that these beliefs are misleading. For one, the gestation period of sugarcane is very long, 18 months, meaning that the income from the crop is too wide apart from one harvest to the next. The farmers are therefore faced with a serious dilemma between committing themselves to the cash crop which has a higher but variable income or increasing their household food cultivation which only ensures food supply for the family and occasionally a low-income when sellable surplus is realised.

Quite clearly, food availability is an individual family problem since it is at this basic level where it is required. Hence it is not enough for a nation simply to produce more food crops. Each household needs to be able to produce its own food as the purchased food

only enters it through the open market where it is prone to price fluctuations and other social limitations. This view explains why increasing individual household food production would be greatly important in bringing down the problem of hunger. As it were, the 1975 famine in Ethiopia raged on despite good overall grain production in the country as a result of low purchasing power of the households in the southern Ethiopia due to widespread poverty and poor administrative distribution of the available food supplies (Hussein, 1976).

Although sugarcane has long been grown in the lake region, traditionally for chewing and beer brewing (O'Conner, 1966), it was commercialised with the establishment of the sugar schemes in the region by the government in the 1960's. Eventually farmers in the area became interested in expanding cane production in order to maximise profits leading to declining attention and cultivation of subsistence crops. This is the backbone of the study.

Today, the crop which is cynically being referred to as the "Hunger-crop" in Latin America because of its close association to diminishing food conditions for its growers dominates the Muhoroni agricultural zone. In the same way, the characteristics of sugarcane farming in this area is quite similar to the summary provided by Thomas (1985: 7) about the Latin American sugar industry when he wrote:

Although it is frequently cultivated on the best soils, it is just as frequently associated with starvation, low wages, irregular employment and lack of job security.

1.1 PROBLEM STATEMENT

Considering its economic balkanisation, ecological diversity and heterogeneity of production and trade, the sugar belt is an area of unending scientific enquiry. None of these researches, however, can be said to have been exhaustive enough in evaluating the response of the rural community to the development of the sugar industry in the region. Of particular interest to this study was the assumption that sugarcane production has a positive effect on the socio-economic conditions of the recipient communities.

Sugarcane cultivation is currently the most predominant agricultural practice in Muhoroni. A little subsistence farming is also practised but this is merely to supply the farmers with their food requirements. The presence of large number of immigrant workers and their families in the sugar estates has kept food prices quite high due to constant growth in food demand. This enlarging market has not been met with a concomitant increase in food production which can satisfy it. Consequently many households in the region, particularly those in the low income bracket face seasonal food shortages as they are unable to afford the food staples in the open market at competitive bidding.

Despite the fact that the factory nucleus plantations are well maintained and enjoy good use of scientific technology - traction, treated seed varieties, fertilizer, chemical sprays and sprinkler irrigation during dry seasons, the general outgrower farmers are only familiar with some of these technology in so far as they apply to sugarcane farming alone. Worse off, some of the farm implements used are specific to sugarcane cultivation only. Although some machinery like tractors and chemical sprays can be shared by both farming systems, the farmers are incapacitated in using most of the machinery since they are expensive and sometimes ill-designed for the subsistence sector. This problem has made food production in Muhoroni to be resource based (land, labour) without any meaningful shift to science based agriculture which would heavily improve the activity.

The other problematic for the study related to the blind faith that the society has placed on the income earned from the sugarcane harvests. Many farmers believe that the crop is very profitable such that they can live comfortably with their families on the cash returns from the crop. However given that sugarcane matures for harvesting between 18 - 22 months after it is planted or harvested, this study was quite sceptical of this assumption. This scepticism has to do with the fact that it is usually very difficult to spread one's income

between the possible payments received by the family given the various issues, which compete for finances within a household. Without any interim income to these farmers, their financial capacities are quite uncertain. This predicament has exposed many families to seasonal food deficits especially in the long lapse before sugarcane is mature enough for harvesting and marketing. Also bad weather, poor farm maintenance and accidental fires, all of which are common phenomena in the area, sometimes frustrate expectations of good harvests.

Like is the case in most Kenyan societies, women are the traditional food producers in Muhoroni. This is typified by the alienation of most of the men from direct labour participation in the food farms while they aggressively look for employment in the sugar factories, usually as casual labourers. Sugarcane production is very labour intensive; hand labour is necessary for the planting, weeding, application of chemicals and fertilizers among others. Hence a lot of people, mainly men, are engaged by the factories to perform these duties. This trend normally leaves women as the central domestic production tenders in the sugar belt. In spite of this, the women farmers are inhibited in realising their full potential in this respect as they lack the necessary financial resources to do so. Since it is the male heads of the households who are registered as the owners of the family land (title deeds), they are the ones who receive payment for the marketed sugarcane. As such women, who only have usufructory rights over the farms, depend entirely on their husbands for remittances from such payments.

Finally, wild foods which are still a rich source of food to the rural children and the low-income households have become fewer and further apart due to clearing of more and more land for cane plantations. However, this effect has not been the same for wild animals, which used to inhabit the area. Wildlife, especially antelopes, gazelles, wild pig and impala live alternately in the sugarcane fields. These animals are known to occasionally destroy food crops leading to further decline in the per capita food output in the area.

These arguments show that the mere establishments of industrial development in a particular area may not necessarily insure food availability for the local population. It was with this contention in mind that an empirical research to determine the role of the new sugarcane industry on the crucial process of food production in Muhoroni became the basis of this study.

The research addressed itself to the following questions:

- Is subsistence production declining in Muhoroni?
- If it is, is the problem related to sugarcane farming in the area?
- Specifically, has the new farming technology being used in sugarcane production been of use to the small holders in subsistence agriculture?
- Has employment and cash income from sugarcane farming enhanced food availability for the sugar belt households?
- Do Women in Muhoroni have an access to the income from sugarcane farming, and how does this affect their food production capacity?
- Finally, to what extent are wild animals associated with the sugarcane plantations affecting food production in the area?

1.2 OBJECTIVES

The general objective of this study was to find out the impact of sugarcane farming on household food security in Muhoroni Division. Broadly, this it should do by showing the relationship between farming of the Cash crop and food availability at the household level.

The specific objectives were:

- 1 To determine the extent of the spread of farm technology and modern agricultural practices in the Sugar belt subsistence firms and how this relate to the level of food production in the area.
- 2 To analyse the various expenditure patterns of households in the Sugar belt with a view to finding out how they earn their income and meet subsistence costs
- 3 To investigate Women's access to income from sugar cane production and relate this to their food production roles
- 4 To examine the relationship between Sugarcane farming and food losses in Muhoroni Division.

1.3 JUSTIFICATION OF THE STUDY.

Many studies concerning the sugarcane industry in Western Kenya have been and are still being conducted in the area. Most of these studies have been done by scholars and policy researchers who are concerned with the Economics of sugar production per se; avoiding the implications of the industry to the rural societies involved in it.

For instance, Smith (1978): **The development of large scale integrated sugar schemes in Western Kenya**, Kaplinsky (1983): **Sugar processing: The development of a third world technology**, Odada (1979): **The role of the sugar industry in Kenyan Economy**, and Odada, Coughlin and Owino (1980): **Incentives and management for and integrated Agro-industry: Sugar and Sugarcane in Kenya**, reflect the traditional bias of economic analysis in the past studies on the region.

The scope of these findings is comparable to what other studies commissioned by NGO's and other organisations have done in this field. In this category, the reports by Gibb and Partners (1961) or Agro Invest (1976) were specifically on the feasibility of the sugarcane factories and jaggaries in Western Kenya, while Nyandat and D'Costa (1968) is an early account of the soils in the sugarcane pilot scheme in Kibos. The preoccupation of the early studies on this sector have mainly been with the agronomic, environmental and economic aspects of the industry. Generally a lot of work has been done on the viability of the sugar industries, trends in the sugar production and consumption leaving out the difficulties of cultural adjustments to the new agricultural systems taking place in the sugar schemes.

Given this situation, it was realised that an anthropological understanding into the whole establishments of the industry was necessary, not simply to evaluate it differently from the available studies but also to emphasise the centrality of the cultural organisation supporting the industry to its sustenance. In other words, the labour organisation that is involved in the industry basically reproduces itself through the existing food practices. This was the philosophical rationale for the investigation of the interaction between sugarcane cultivation and subsistence production in Muhoroni.

The conceptualisation of this study was also prompted, in part, by the serious decline in the performance capacity of two out of the three sugar factories in Muhoroni in the recent past. While Muhoroni factory recorded a declined crushing capacity to stand at 62.9% in 1996,

Miwani almost collapsed, and was operating at less than half of its utilisation capacity (40.7%) in the same year (Kenya Sugar Authority: 1996). The difficulties faced by these factories has mainly been due to inadequate plant design, improper management and technical operation (Coughllin and Ikiara: 1991, 173). This implies that the two factories often stopped for long hours without harvesting mature cane in their zones. Given that there were no marked decline in areas under sugarcane for these years in the growing zones, farmers suffered heavy financial losses in unharvested cane while the only remaining factory in the area, Chemelil, has completely been unable to cope up with the cane production. Consequently the farming households were lacking in financial savings to meet their domestic needs and other expenditures.

At the same time, available evidence particularly from the print media indicates that the local sugarcane industry is faced with serious crises. By mid 1996, the five main government companies in Western Kenay (Mumias, Chemelil, Sony, Muhoroni and Nzoia) held large stocks of sugar worth more than Kshs. 1 bn (U. S. \$ 17.2 m) because of cheap imported sugar which flooded the local market (Konrad Adenauer Stiftung, Harare: 1996, 41). The crisis is compounded by serious policy contradictions which appear to be encouraging local cane production on one hand but loosing out to economic liberalisation on the other hand while the local sugar market is faced with the glut due to cheap sugar imports. Meanwhile, the variations in the income capacity of the farmers has meant that their food needs, sooner or later also suffer in these conditions.

The above situation got worse with the long spell of drought in 1997, attributable, to weather disruptions by the "*El-Nino*" phenomenon which delayed planting of food crops while the farmers ran out of previous food stocks. At the same time, sugarcane fire accidents soared, effectively dealing a blow to many farmers' only source of livelihood.

In recent years, due to widespread rural unemployment, the sugar belt has been a host to unending immigration of people looking for economic opportunities in the area. This situation requires that adequate food is either produced locally or even transported from other areas to meet the growing demand. This study was an attempt to scientifically look into the possible contribution of the sugarcane industry to the general food situation in the area.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 LITERATURE REVIEW

Food has some of the most significant associations on our culture. The mere mention of food conjures up several images in our minds - a mother feeding her baby, a family eating some food or probably an important festival or ritual which too often culminates into some ceremony. This cultural centrality of food has made the topic a common place in several writings, particularly by agricultural economists studying trends in food production and supply. In anthropological circles, feeding practices and patterns of food production have been studied continuously as an on going concern in the discipline.

Food scarcity, leading to hunger and under nourishment, is a common thing in the Third World almost throughout the year. Among the most important reasons for hunger in the Third World is poverty, disparities of income and wealth and large family size. According to an estimate by the Food and Agricultural Organisation of the United Nations, some 10 million people die annually from hunger (Foster, 1992:3).

Accordingly, John Mellor, then the director of the International Food Policy Research Institute, the centrality of food is explained by the significant role it plays in the world economy. In the following foreword, he explained:

About 2 billion people benefit from the direct employment in food agricultural production or the indirect employment created by expenditures of those who directly labour in agriculture ... the price of food is the dominating determinant of what money is worth (Foster, 1992: xv).

2.1.1 AN OVERVIEW OF FOOD PRODUCTION AND SHORTAGES IN THE WORLD

The idea that a rural community has sufficient food potential of its own is not new. Too often the indigenous rural community is regarded to be less endangered by famines or starvation until it happens. Whereas this is the case, there are many recorded cases of famine in the world, which led to deaths of millions of people living in the rural areas. Examples of these include the Kashmir Famine in India, Ukraine Famine (1912-22) in Russia, Bengal Famine

and the historic Ethiopian Famine of mid 1980s. It is against this backdrop that the world is now striving to eliminate this menace and bring behind us the memories of starvation once and for all.

For several years, experts have predicted threatening world food crises mainly as a result of rapid population growth. About two centuries ago, Reverend Thomas Malthus developed a theory that population would increase until it outstrips food supply, then a disaster - pestilence or war, would come to restore the natural balance. He argued that since population increases geometrically whereas agricultural production increases arithmetically, population would grow to the limit of available resources and keep the world in poverty (Freeman, 1969; Hutchinson, 1969).

This view later gathered support among other scholars dealing with the issue of food supplies in the developing countries. Amin (1966) and Lowry (1970) argued that population growth in these countries, by creating a soaring demand for food, tends to reduce the contribution which food supply can make to economic development. Lowry wrote:

The continuation of high fertility in the face of the reduction of mortality, particularly in the economically less advanced regions is the crux of the population problem in the world today, and is an integral and essential factor in any realistic approach to the food outlook (Lowry, 1970: 6).

But for the increasing purchasing power, especially in the industrialised world, this view seemed extremely theoretical and pessimistic. In the developing nations, the "Green Revolution", emphasising on modern farm technology, is seen to have countered this argument. India, for example, recovered from its historical famines in the 1960s to become a good example of a grain exporting nation, in addition to holding enough buffer stocks for herself.

Nonetheless, developing countries continue to face problems of food supply, partly because they experience a steady population growth relative to that of food supply. Available archaeological evidence shows support for the fact that relatively fertile, well watered regions with a climate suitable for growing crops or rearing livestock have been most settled by the human population (Lowry: 1970). This is true of the same places in Africa, like the Nile Valley. This contention means, according to demographers, that humankind is unevenly

distributed over the surface of the earth, with densely populated agrarian economies being susceptible to problems of food scarcity and malnutrition due to unequal food supply.

Despite this, the Malthusian theory faced severe criticism from several scholars. Boserup, the Danish economist famous for her pioneering publication, Women's role in Economic Development (1970), has argued that increasing population does not bring about famine, but technological and social innovations necessary to promote changes in the economy (Boserup, 1981). According to her, since periods of technological innovation and expanding productivity have usually been accompanied by population increases, growth of population must have caused the increase in technology and production. She also observed that farming is most intense in the densely settled regions of the world - the sort of necessity is the mother of invention kind of maxim.

In this argument, Boserup has earned the support of Rodney (1989) and Foster (1992, 175ff) who also see population growth as a necessary ingredient in accelerating development. Evidence in this debate is not conclusive: The Pro-Malthus scholars have also claimed that population increases in these areas were preceded by development, making the argument rather cyclic.

Admittedly, population growth contributes to the supply of human resources and motivation, which is required in any development process. However, it is by itself an insufficient factor in the process of development. Also, high population growth alone does not explain the problem of food shortages around the world. At least not so when about one-third of the increased demand for food is accounted for by a "sharply increased use of grains for the animal products consumed in the affluent societies" (Aziz, 1952:2). In 1983 and 1984 alone, about 1/3 of the world's grain production was fed to livestock (Foster, 1992: 139).

When a population fails to feed itself, this is a serious indication of underdevelopment and not a disastrous numerical explosion, as some scholars would want to put it. Indeed, population growth has assisted changes in human society, supplying labour, skills and other resources required for development. However, it is not proper to ignore other non-human factors, which are also crucial to development. Interestingly, the developed world achieved food security and development when it had higher average population densities compared to those that obtain in many parts of Africa.

In a developing continent such as Africa, food is often scarce for most households. This has led Foster (1992) to comment that hunger related deaths need not occur in famines only, but that they happen daily unrecorded all around the world. To combat the hunger problem in this region, policies directed either towards treating the symptoms of hunger (food rationing, fair price shops, food aid, control of movement of food) or treating the causes of under nutrition (subsidise food production, lower the cost of food in market place by increasing quantity offered for sale, agricultural research and development programmes, financial grants to farmers) or both, should be implemented selectively in the agricultural sector of these countries.

2.1.2 FAMINES AND AGRICULTURAL MODERNIZATION IN AFRICA

Most of Africa lies within the zone of tropical climatic conditions. These regions are characterised by several climatic problems, which generally affect food production. Some of these vagaries are unreliability of rainfall, heat, humidity (which encourage spread of crop disease), soil infertility due to soil erosion and leaching and other human factors and diseases like malaria. This climate also promotes food losses due to fast insect infestation and mould growth, especially in the cereals during harvesting and storage periods (Abbot and Makeham, 1990).

Traditionally, the African economy was dependent on small-scale food production. Farmers operated efficiently at low-levels of production for subsistence based on farms and fallow-lands. The forest was in many African cultures a limitless wall, which could be taken temporarily as population expanded and farms grew sterile. There was no monoculture in any particular crop and commercial agriculture was non-existent. The farmers employed mixed farming, combining food crops and livestock. Due to this, the risks of pests and diseases were spread so that they could attack one crop and not affect the others. Also mixed farming spread labour requirements so that resources were used effectively (Ellis, 1993:96, Chambers, 1985). Staple crops included cereals, such as maize, finger millet, sorghum and tubers like cassava and sweet potatoes. Rhizomes, especially bananas, were also grown.

At the same time, it has been seen that mixed cropping may present a serious problem to the introduction of some modern techniques such as the use of herbicides. The practice generally discourages the use of chemical herbicides in subsistence farming (Oram: 1981).

Nutritional sufficiency in many African households was achieved by supplementing staple consumption with complementary non-staple food plants which included cultivated and foraged plants (Maundu et al, 1993). Foraged species traditionally used as vegetables among the Luo of Western Kenya were *obwolo* (mushrooms), *akeyo*, *mito*, *omboga*, *apoth*, *atipa*, and *nderma* among others. The growth of these plants depended on seasonal distribution of rainfall and the soil conditions.

In poor rainfall areas, farmers concentrated on drought resistant crops such as millet, sorghum and cassava. Shifting cultivation was practised in less populated area as a natural process of maintaining soil fertility.

The keeping of large herds was linked to the need to protect the household against effects of drought or epidemics as well as supplying the day to day food requirements of the family. A sufficient number of animals was necessary to survive a disaster in order that the household could exist while the herd was being rebuilt. Thus among the pastoral communities, a farmer could disperse some of his animals among friends and recall them during hardships (Dahl et al, 1976; Siddle and Swindell, 1990).

The dispersal of herds, either as loans or lease, helps those who are temporarily short of animals, and also spreads the risk of those with larger herds. This is referred to as *riembo jamni* among the Luo. In the dry season, when milk is scarce and food is running out, some of the herd would be bled for food. This would keep the family running during a threatening famine. Bleeding was not performed too frequently otherwise the vitality of the animal could be impaired. Among the Bahima in Uganda, only young males were bled, and Karamanjong also of Uganda did not bleed stud bulls, milking or pregnant cows or nursing calves (Dahl et al, 1976:172). Blood was taken only during severe dry seasons and the animal was then left to recover for as long as five months.

Among the Akamba, there were also drought resistant cereals which would be harvested for consumption only during threatening famines (Maundu et al, 1993). According to Siddle and

Swindell (1990), pastoral groups like the Maasai, also had a wide range of techniques and knowledge to survive famine threats. Some of these techniques of survival among the Maasai included:

Mobility, herd splitting, a knowledge of niches, division of labour and symbiotic relations with non-pastoral peoples...Also external support through raiding, transport and trading have traditionally been part of the pastoral practice and behaviour (Siddle and Swindell, 1990: 111).

Generally, people produced enough food to sustain themselves. The production process was controlled along lineage lines and accordingly, in the Luo patriarchy, this fell under the patriclan. In polyandrous families, women provided most of the workforce, and other food supplements through petty trade (Hay, 1976). In a way there was a well-built food security system protected by a cultural knowledge of plant and animal resources. Most of the rural dwellers still depend on these cultural niches for their living, especially, wild food plants such as fruits, roots and vegetables.

This subsistence organisation lost out to the new western civilisations introduced in Africa during colonialism. New food systems emerged as part and parcel of the new lifestyle in the period following de-colonisation. Local tastes changed to adopt the introduced food crops such as wheat, rice, maize, vegetables and a variety of other cash crop seeds including beverage crops like coffee, tea and sugarcane.

The local production of these food crops in Africa has not been able to match the growing demand, largely as a result of geographical, hydrological and climatological reasons. In fact, severe droughts, sometimes leading to famines have been the main scourge not merely in the Sahel region, but also in parts of East and Southern Africa, thereby causing untold hardships and sufferings. In a way, much of the world's food surpluses, are apparently being produced where they are not needed for consumption - the developed countries - and not where they are critically required, which are the famine stricken areas of the World, including Africa.

Thus the food deficit countries in Africa have been relying on food imports, especially of cereals like wheat, rice, and maize from these countries and other more advanced developing countries such as Argentina or Thailand. Under these circumstances, agricultural productivity in Africa, as in other parts of the world, has been targeted for improvement through several

policy strategies. American agriculturists Freeman (1969) and Power (1976) saw that greater international co-operation in policy establishments would promote agriculture in developing countries. In this regard, the roles of the World organisations, the World Bank, and Food and Agricultural Organisation (FAO) in 'revolutionising' farm output in developing countries should be strengthened. The two works went further to suggest some ways in which the world organisations could be useful in this effort. One of this would be to expand technical assistance and funding for food programmes and the other suggestion is to step up agricultural experiments and researches, which can increase food yields.

One point to note on the international agricultural efforts is that the high breeding hybrid maize seed in Kenya is a product of one such agricultural research co-operation that was sponsored by the Rockefeller Foundation, Britain's O.D.A. and the Agricultural Research Service of the United States. This seed has been adopted successfully in most parts of Kenya.

According to Brown (1963), World Bank (1990) and IFPRI (1981), farm output can be increased by only two methods - expanding the cultivated area and using existing land more intensively. These follow certain regional trends. For instance, all the three less developed continents - Asia, Africa and Latin America - have been historically more dependent on additions to the planted area than on yield increases. This is in contrast to the developed regions of North America, Western Europe, Oceania, and the former Soviet Block, which have been largely dependent on yield increases for additional grain output.

The use of existing land more intensively to improve yields may include some of the following characteristics; multiple cropping, fertilisation, irrigation, use of pesticides, use of improved seeds and, finally, farm mechanisation. This strategy requires greater capital outlay, although at the same time it is very reliable and promising in output. Asia has shown signs of depending on this approach and already Japan's cultivated land area has been steadily declining for decades (Brown, 1963: 100 ff).

During the 1974 UN Food conference held in Rome, the need to ensure that the benefits of modern agricultural technology - improved seeds, fertiliser, water supplies, appropriate use of machinery, better storage and marketing facilities - are extended to the whole farming community was debated as a basic priority in agricultural investment. By doing this, farmers, wherever they are located, would serve the vital purpose of improving the quality of life by

ensuring the availability of food and food products to those who need them. This point is underscored in the following extract from Aziz ed. (1975: 7):

A priority is to extend the benefit of already available knowledge to the entire farming community. The special needs of the small farmer may in some cases require more accurate knowledge, not only of farming systems but of personal and family needs - here the social scientists must be more effectively used.

This approach is quite critical to the low-income African countries where cash crops such as rubber, cocoa, tea and sugarcane have for decades received substantial attention from companies engaged in international trade as well as the governments, which depend on them for foreign exchange. There have been clear incentives to increase output and to seek better yields by these crops through research, fertilisation, irrigation, disease and pest control at the expense of basic food crops and animal species. As a result, food crops remain backward; no modern high yielding or intensive methods have been introduced and crops remain dependent on rainfall.

The ability of rural farmers to adopt modern farming techniques for better production has in the past been studied by the World Bank. According to its observation:

African farmers are extremely adaptable and efficient in managing a diverse and often difficult environment with limited resources available. (World Bank: 1990, 49).

According to Wortman and Cummings (1978), the problem of neglect of the food sector is a factor of several social-economic conditions prevailing in the third world. The first of these is that food production could in the past be expanded in most countries by increasing the area planted or grazed. This made intensive production of food staples an unnecessary economic venture.

The second reason to explain this relative neglect of food crops in terms of mechanization techniques, is that until recently, the cost of fertilizers was high relative to the value of basic food crops and the means of fertilizer distribution were not well established. In the mid 1960's however, costs declined with improvement in manufacturing and delivery and it became feasible to use fertilizers on food crops together with chemical control of diseases and pests.

Another problem is that the technical services of the developing countries and research has been the responsibility of the public sector which is commonly weak in the developing countries, hence their impact on production of food crops and animal species has been slight. And, finally, the widely held belief that the technology of the temperate climatic countries could simply be transferred to the developing countries only led to changes in policies and more investment in agriculture without any changes in biological components - varieties, pests and disease control measures of these crops.

Recalling that farm output can be increased by expanding cultivated area and also practising intensive farming (Brown, 1963), it should also be realised that there are physical and socio-cultural constraints which militate against the adoption of these options.

Local factors such as gravity of the farmland or level of literacy of the farmers or prevailing agricultural taboos do also affect these practices. Given these reasons, by 1963 Japan, with its limited cultivated area, was using more fertiliser and pesticides than the whole of Latin America or Africa. Also because of favourable physical factors that allowed it to turn to irrigation on a large scale, India almost trebled its grain output between 1950 and 1983.

Chambers (1995) also observed that the early colonial agricultural extension work and research in Africa tended to concentrate on the output of single crops thus affecting diversity in production. His remarkable analysis gives a further hindsight to the problem facing extension work in these countries:

Many of the researchers were foreigners (in colonial Africa) with background and training in agriculture of temperate climates, with large farms and mechanized row-planting, weeding and harvesting, where pure stands made economic and agronomic sense...mono-culture was practised by large plantation European settlers who influenced research policy (Chambers: 1995, 86).

Crop specific extension services do not cater for diversities that mark much of the farming systems in most rural sectors. Moreover, it appears that the dearth of agricultural extension in these areas have been exacerbated by the civil service retrenchment scheme in these countries. These problems are compounded by the lack of incentives, especially inadequate rural marketing infrastructure. Widespread farmers' illiteracy and the emigration of the younger

and physically stronger population to urban areas in search of employment have further affected subsistence agriculture in the rural areas.

Some studies, particularly Umalele (1975) and Oduol (1996) have even suggested that rural agricultural extension neglect women farmers in the course of their work. Faced with these limitations, African governments have responded positively, where appropriate, to farm modernisation and researches on more efficient production systems. These efforts have led to new varieties of seeds, usually cereals with resistance or sometimes tolerance to disease and physical stresses.

Agricultural extension services teaching new farming techniques are now being encouraged by many African countries. More attention is also being directed to grain storage, with many governments constructing modern silos for large-scale storage in the public sector. In a continent where at least 75% of the population grow their own food yet only 43% of the available land is cultivable (FAO, 1972:117), it is essential that we consider the constructive role that farm mechanisation can play in African agricultural production.

2.1.3 SUGAR INCOME AND THE FOOD SITUATION IN KENYA

New commercial crops were introduced in Africa with the penetration into the continent of European merchant capital by the early trading companies and explorers. Later, during colonisation of Africa by the imperial European powers, several far-reaching changes were introduced not only in the African farming system but also in the traditional land tenure system.

It was only a matter of time for the new commercial farmlands to get fully integrated into the international economy. This development has led to other changes, particularly in the labour relations of production. In the pre-colonial economy of Kenya, the economic spheres of men and women were autonomous and complimentary. Women were, for example, entitled to usufructory rights over land. This changed during the colonial period when land became alienated and individualised following the implementation of the Swynnerton plan of 1954, later reinforced in independent Kenya. The establishment of the white highlands and African reserves by the colonial administration interfered with the traditional residential organisation existing prior to the new rules. The problem of landlessness and other related social consequences were soon to set in.

In 1961, just prior to Independence, Kenya embarked on an ambitious programme of agricultural reform called the Million-Acre Settlement Scheme. This scheme provided for purchase of lands previously reserved for and occupied by the white settlers. The redistribution of these farms to the new buyers and the landless was done in line with the policy of individual single land tenure as promulgated in the Swynnerton plan.

In his report for 1965-66, the Director of settlement in Kenya stressed the government's commitment to making smallholders the mainstay of agriculture on the basis of the million-acre scheme. It is during this period that the Muhoroni settlement scheme was redesigned to be a mechanised sugar production quasi-estate with the settlers responsible for contiguous plots of sugarcane. Farms for foodstuffs were also set aside for the settlers (Chambers, 1969).

In subsequent years, the creation of these large sugar schemes emerged as one of the most significant government development plans for Western Kenya. Altogether four of them, Miwani, Muhoroni, Chemelill and Mumias, were created between 1966 and 1973 in a bid to meet the rural development needs of this region by emphasising the provision of incomes and employment by the factories. The successive development plans after 1973 have also recognised the fact that unless home production of sugar was expanded, Kenya would face a growing volume of imports (Republic of Kenya: 1966, 1969, 1973 and 1978). Hence three additional sugar mills have been set up in the same region. The three are Awendo (Sony), Nzoia, and Busia sugar industries. The latter is yet to begin milling cane.

Sugarcane was first planted on the settlement scheme on small holdings in 1964 for the harvest to coincide with the opening of the Muhoroni mill in 1965 and all plots had been allocated by the resettlement board by 1969. Consequently, the individual owners and farmer's co-operatives have expanded the farms under sugarcane to increase their commercial returns.

Cane production involves costly capital investment, especially where virgin land is involved. Heavy machinery is required in bush clearing, de-stumping, levelling and grading. The soil is then opened up by ploughing and harrowing, usually by wheel tractors, before seed cane is planted. The plant crop normally matures in 22 months while the ratoon crops mature in about 18 months. Since sugarcane is a semi-permanent crop, a careful selection of seed canes

varieties which is suited to geographical and climatic conditions of the area is necessary. Thus the factories usually sell to the farmers treated cane seed to control against the ratoon stunting diseases. However, most farmers are unable to afford the treated seed and so plant ordinary plant cane. This contributes to poor yields by the small outgrower farms. The same farmers are required to purchase fertilisers for their plantations from factories. However, this is hardly done, thereby leading to deteriorating yields and even poorer ratoon harvests for the smallholding farmers. In other words, a lot of money is required for the sugarcane farm maintenance, which restricts the profits.

Cane is harvested when it is considered mature and millable. This activity is highly labour intensive and is usually provided by labourers hired cheaply by the farmer. Sometimes the factory hire them. The harvested cane is loaded onto tractor trailers or lorries for transportation to the factories for milling (Odada et al, 1986).

The location of the cane factories within the areas of production has been explained as a combination of three factors. One, the crop must be crushed within 48 hours of harvesting time when its sucrose content is still high. The second reason is that the schemes are labour intensive and their location in the rural areas would ensure a relatively steady labour supply from the unemployed labour reserves. Finally, the rural location of these factories cuts down drastically on the money and time required in transporting sugarcane for milling (Turner: 1986). The sugar industry in Western Kenya, though it has made good attempts to achieve sugar self-sufficiency for the country, is faced with a host of problems, including climatic hazards such as rainfall failures, fire accidents due to drought, lack of capital for intensive production and erratic sugar marketing policies in the country. These problems and others have frustrated this goal. It should be noted that if Kenya were to achieve self-sufficiency in sugar, the country would save a lot of foreign exchange and may also earn more through export of the surplus. Such revenue would be too crucial for the country, especially during periods of severe food scarcity when importation of food may be necessary.

In spite of the problems facing the industry, studies show that additional fields are being alienated from subsistence use to cane production (Obiero, 1980; Kennedy, 1989). The government has also proposed to rehabilitate and expand the existing sugar factories, intensify research on the development of improved seed cane varieties and open more areas for sugarcane where possible (Republic of Kenya: 1994 - 96, 127).

The irony here is that little consideration as possible is directed to the bottlenecks, which these farmers face in their attempts to balance commercial agriculture and their subsistence. It has been pointed out in a study on rural poverty in Kenya by International Labour Organisation (ILO), that the transition from subsistence to market oriented farming causes the farm household to give up a steady, low income for higher but variable income. During the transition, the argument goes on, the farmers are too small, inexperienced and powerless to control their income effectively and, although average consumption may rise, the number of poor transitional households also decrease remarkably. On the other hand, production for market does not have definite significant impact on poverty (Greer and Thobekke, 1986)

Studies by Obiero (1980) and Coughlin and Ikiara (1991) contend that sugarcane farmers occasionally incur severe drawbacks in their cane income. The seriousness of this problem arises when crop failure occurs or when there is a breakdown at the factory (or the long maintenance recess) which can delay harvesting for a long period of time. This spoils sugarcane or simply makes it go dry in the farms, leading to great wastes and income losses by the farmers. However, since sugarcane monoculture is the main source of income to these farmers, they always expect to gain as much as possible from the industry. Given this attitude, they face hardships when these kinds of drawbacks are experienced, particularly since they depend on the cash income from sugarcane harvests to feed their families.

This view is lent more credence by the Agroinvest report (1976) which revealed among other things that:

There is no serious competition sugarcane faces from other crops or crop combination in terms of net margin per hectare. That is, the farmer has the highest pay off from sugarcane cultivation (Agroinvest, 1979: 28).

Thus, the farmers are firmly attached to sugarcane production for all meaningful income, which they possibly want.

Poor small scale farmers, unable to make ends meet and faced with lack of income due to poor yields from sugarcane, sometimes sell pieces of their land to rich farmers and other people. This trend is also encouraged by the emphasis put on land consolidation by the agricultural extension officers. In the case of the establishment of the South Nyanza Company

(Sony) approximately 2,500 hectares of land was bought from the local landowners to put up the factory and nucleus estate.

In a collaborative research between the government of Kenya, and the International Policy Research Institute (IPRI) on the effect of the new sugar scheme, it was found that “ although 71% of the relocated sample purchased land with the money received for the sale of their land, other items were also bought. Thus, the total amount of money received from the sale of their land was not re-invested in land. Moreover, land prices had escalated due to increased demand. The people studied even believed that their life had been worse since the creation of the sugar scheme (Kennedy, 1989) The following excerpt summarises his perception of the problem:

Payment for the sugarcane crop comes in one lump sum. Data from several studies have indicated that lump sum payments tend to be spent on non-food expenditures that are typically one time purchases. (Kennedy: 1989, 40)

The same study also concluded that in spite of the relative increment of income for the sugar farmers, malnutrition was still a problem in the area.

In one other recent study on the effects of sugarcane farming on smallholders in North Bunyala, Kakamega, Egesa (1994) noted that there has been a general decline in food production in the area. The fear of deteriorating food situation in the sugar belt can be linked to the whole issue of the sugar crisis in the country which has, in many instances, led to serious income losses to the sugarcane farmers.

The fact that the agro-industrial schemes have established large nucleus estates and housing in their areas of location has led to the development of the infra-structure and social amenities like telephones, electricity and water supply close to them. These facilities benefit the farmers as well as the workers. Other benefits of the factory welfare, which are likely to spread to other people, include the expansion of health and education facilities. It is because of these factors that the Western sugar belt has turned into an area of prime land interests, where other people are scrambling to purchase land for themselves. This has led to some writers to observe the following about the area:

There is a well-developed land market and increasing landlessness, as richer peasant farmers, government officials, teachers and shopkeepers acquire land by

purchase. The registration of land and division of clan land into private plots has been to the advantage of men, with the position of women becoming more precarious. (Siddle and Swindell, 1990: 34).

Another study on the sugar industry in Western Kenya concluded that the farmers earn very little income in relation to the minimum wages they can get from the readily available alternative jobs in the sugar schemes such as weeding, cane cutting, spraying and loading (Odada et al, 1986: 94). One implication of this is that the farmers have a lower purchasing power compared to the factory workers. In a way this is a problem that is felt often when the two groups have to buy the same foodstuffs at market prices. Moreover, there is no much focus on crops other than sugarcane in the sugar belt since the sugar extension programmes exclusively concentrate on cane production (Obiero, 1980). The sum total of this practice is the diminishing farm reserves for subsistence crops hence low food production.

Coughlin and Ikiara (1991) in looking at how the farmers in the sugar schemes earn their livelihood made the following observation:

a small farmer depending only on cane income would not subsist during these long waits (18 - 24 months between the harvests). Many leave their cane fields unattended as they look for wages as weeders, cane cutters or loaders on nucleus plantations and large farms. (Coughlin and Ikiara, 1991, 169).

This observation is closely related to the earlier argument on the inadequacy of living on sugarcane production alone. Many costs in sugarcane production are fixed and expensive. Once a household is committed to cultivating sugarcane, it must plough, plant, weed, use fertiliser and herbicides at market price. These costs do not vary much whether the households use loan contracts with the factories or go it alone. The net incomes fluctuate drastically and are sometimes negative depending with the yields obtained. A true picture of average costs and net returns to the farmers can only be obtained after deducting costs for mechanised services, fertilisers, herbicides, hired labour and cane transport used on the farms. When loan services are used, the accrued interest on the cost of inputs and services supplied to the farmers in turn reduce the estimate incomes. Hence different yields emphasises the wide variability of the net incomes in the households.

The clearing of more land for cane farms has meant that wild species have become fewer and further apart (Maundu et al, 1993). In view of the sugar income, new domesticated crops, which are purchased from the market, like *sukuma wiki* and cabbages have assumed greater local importance than other food staples.

Despite their advantages, the wild food resources have become associated with the poor and children. However, these food resources, especially wild fruits, are still preferred and some of them are now being sold in the market just like the 'new' crops.

The drama of famine involves not only hunger and death but also massive disruptions in the social fabric of the community. Normal relationships are strained, families disintegrate and the rich in the society may take advantage of the poor, exploiting them in the process. For peasants, especially the landless, the drop in food production also reduces the demand for their labour - the only resource they possess. Wage rates fall and the wage labourers find themselves at the mercy of those who offer work or who can buy some of their possessions (Foster: 1992, 5). The sugar belt households experience seasonal food crises due to some of the reasons we have covered here. Thus the sugar belt rural planners need to find new ways of supporting food cropping in these areas as one way of insuring against food poverty.

2.1.4 WOMEN, AGRICULTURE AND FOOD

Throughout Africa, there is adequate evidence to show that women are the main food producers. Such food production activities like planting, weeding and post harvests processing and marketing are usually designated to women (Amadiume, 1992, Boserup, 1973 and Momsen and Townsend, 1987). A women was also expected to produce food surpluses, beyond the needs of the household or lineage group in order to provide for her husband's guests and for feasts which accompanied the many ideological activities in the traditional African societies (Stitcher and Parpart, 1988:43). Although women's usufructory rights over land were recognised by the patriarchal unit, entirely to food farming, access to it depended on their acceptance of sexual roles and labour obligations socially attributed to daughters and wives. (Stitcher and Hay, 1984; Amadiume, 1992).

Women living in the rural areas are the primary food producers. It is a fact that in the households even where the total food production in a given year cannot meet its consumption needs, certain amounts of maize, millet, etc, are likely to be sold when short run cash shortages occur. For the most part, it is women who retain control of granaries and food stores and who allocate and dispose of the amounts produced by the household. Although women's earnings are much smaller than men are everywhere, many men still attempt to control the use of their wives cash. It is also commonly the case that women's income is used to buy basic needs in the household such as kerosene, salt and soap.

In the transition of household agricultural production for subsistence farming to commercial agriculture, African women have lost most of their traditional rights and privileges. With the introduction of the cash crop economy in Kenya, women lost their usufructory land rights while their workload increased, as male adults in the household positioned themselves to monopolise commercial farming. (Davison, 1988). In the case of Babukusu of Western Kenya, Nasimiya (1985) has argued that changes in land tenure system and agricultural innovation led not only to economic ranking of traditional crops and greater work load for the women but also to women's marginalisation in controlling the factors of production. Some traditional crops acquired market value, for instance, bananas were sold in their raw or ripen states. sim-sim, potatoes, peanuts, green grams, and vegetables also became commodities of trade.

Nevertheless, women's roles in the production of these crops were not affected by these changes. They still planted, weeded and harvested the food crops. In Contrast, women's dependence was not eliminated since they were at the same time denied control over land; their labour obligations increased as they combined commercial agriculture production and the traditional reproductive roles assigned to their gender.

In the case of cash crop economies, women's work tends to cluster around food farming for the household with small amounts sold on the market and entirely market, oriented activities in food processing and trade (Hafkin and Bay, 1976). However, the cultural configuration of patriarchy in these societies still constitute a major problem to successful women's fulfilment of their traditional obligations. As Stitcher and Hay observe:

The patriarchal household remains a prominent feature in African rural economies. Husbands manage the family farm, men keep the proceeds of the

export crop under their own control and expect that their wives' food crops and small cash earnings will be used to meet most of the family's daily consumption needs. Furthermore a woman's attempt to increase her earning capacity by engaging in independent economic activities is severely limited by lack of time and by customary prohibitions against a woman's right to own or control economic resources. (Stitcher and Hay, 1984: 17).

Modernisation policies involving capitalisation of agriculture has either neglected women or, where they are involved, exploited them. More often, male migration in search of jobs in the agricultural plantations has led to distressful plights for women and children who remain behind in the rural areas without any visible means of survival (Were et al, 1992). These two groups require the highest protein foods to sustain their daily activities and maintain good health. Sadly, they are the ones who are usually hit by starvation as they lack access to economic opportunities.

The fact that no migration is involved in the case of rural industrialisation does not mean that women suffer less exploitation where they live. In an effort to make ends meet, farmers move in and out of factory employment to engage in a variety of jobs. The necessity for households to combine several economic activities in order to subsist is more characteristic of women who invariably combine their non-farm jobs, domestic production and low paying plantation employment in order to sustain their households (Hafkin and Bay, 1976; Momsen and Townsend, 1978).

A strong factor that is today emerging to explain the poor state of food security in Africa is the fact that these countries lose a lot of its food output during the handling and storage process. The hot humid climate of many parts of Africa is notoriously favourable to insect infestation and mould growth in grain and the rapid decomposition of more perishable products like milk and fruits. This makes holding produce overtime more difficult and leads to devastating quality wastes. It is estimated that a minimum of 107 tonnes of food was lost in 1976 in Africa alone due to this problem (NAS, 1978; FAO, 1988; Abbot and Makeham, 1990).

It is clear that food losses are important to poor countries in terms of quantity and nutritional and economic loss. For example, a farmer may store grain to sell at a later date. If a portion is eaten by rodents or is damaged and becomes unsaleable, the farmer loses income he would

otherwise have gained. The farmer might be forced to buy extra food to replace the lost supplies. His diet also suffers if the food lost nutritional value (NAS, 1978). Food is also lost through spillage, contamination by pests and attacks by birds, rodents and animals.

It thus makes little economic sense to produce more food when no investment is made to reduce these losses. Controlling post-harvest food loss is linked in many complex ways to cultural beliefs and attitudes that underlie traditional ways of managing the post-harvest system. Traditionally, grains are aired by daily exposure to the sun to reduce the likelihood of mould growth and heating in storage. Rice was kept as paddy as the husk is resistant to insects. In most communities, structures of local materials, granaries or cribs were constructed to keep the grain dry and reduce the entry of rodents.

The cribs are fired or smoked occasionally to keep the grain supplies dry. Among the Luo, the granary is known as *dero*. Apart from the normal sun drying, cereals and other grain legumes, once dry, would be admixed with ashes or dry animal dung, to protect them from insect attack, and then stored in dry containers. This has been entirely a woman's responsibility in most of the farming communities.

Today, it is becoming increasingly hard to achieve total control of storage losses by these methods only. Increasing yields demand for construction of additional modern cribs for bulk storage or for the scarce harvests, which are available. Women, the main cultural actors in this area generally lack the resources to do this successfully. Even the agricultural extension services in Africa appear to reduce women's participation in agriculture through promotion of only homebound activities like home economies for the women (Uma Lele, 1975: 77).

Available studies on the impact of social change in Africa predict little future improvement of women status relative to that of men. According to Hafkin and Bay (1976), Stitcher and Parpart (1988), Stitcher and Hay (1984) and Oduol (1990), the potential of industrialization and agricultural development to make the status of women increasingly equal and not asymmetrical to that of men does not appear to be forthcoming. The reciprocal relationships of the village economy have deteriorated and women have unequal access to means of production. Even the cash returns received from the household cash crop farms go to the male patriarch in the family, not women. In very exceptional cases do women control this capital so that they can use it independently.

One explanation given to the social domination of women by men is that the interests of the traditional patriarchal organisations, or rather patriarchy, coincides with the articulation of capitalism. As the capitalist dominated state continues to extract surplus from the rural sector through its control over agricultural commodity markets and its penetration of the process of cash crop production, men and women are equally exploited, limiting their monetary incomes. However, the "male patriarchy" can use their own traditional class power to pass much of the burden on producing the rural surplus and subsistence onto women (Stitcher and Parpart, 1988; Einstein, 1979).

The Kenya government no longer guarantees the purchase of all grains offered for sale due to liberalisation of the grain and seed markets. However, where it has bought maize from the farmers, these are stored in silos. Here storage problems multiply and losses can accelerate rapidly due to the natural heating, which promotes rotting of the less dry maize. This arrangement ignores what storage facilities are available to the subsistence farmers who need food stores exclusively for the supply of their household consumption and normally depend only on their farm produce.

Women's role in agriculture, particularly food production and supply, should be strengthened. To neglect this is to cause a drag on economic growth and create imbalances in the distribution of the benefits of the growth that does occur (Uma Lele, 1975). Losses of grain and other food produce would be brought down to very low level by drying before storage, use of insecticides, solar techniques and other modern techniques at the household level. Given this view, data on women's management of this process is very essential in planning food conservation measures in most of the African societies. After all, these communities regard the post-harvest food processes as a woman's cultural domain.

Uma Lele (1975) and Were (1985) have argued that biased western conceptualisation of African women as domestic workers whose primary responsibilities are at home and not in the fields is the genesis of women's neglect in agricultural production during the colonial period and in the post colonial Africa. According to their view, the colonial programs on agriculture (land tenure, agricultural extension, credit etc.) were influenced by this background leading to negative consideration of women's contribution in agriculture. Under the circumstances, the new policy makers in Africa adopted a male oriented approach to production. This is a significant contribution to the debate but as seen above, it fall short of displaying the

culturally inherent relations of exploitation and domination seen at the household level of production over the time.

Evidence from many studies agrees that unequal allocation of household resources is a common problem in household agriculture although women, who typically are the disfavoured lot in this process, have actually been acculturated to concede to the arrangement. Lack of property relations aside the marginalisation of women by men in household financial decisions, and their heavy preoccupation with domestic reproduction has stifled food their production capacity.

In the view of Nzomo (1987), the whole issue of property ownership in the post colonial period is gendered in favour of men. In the book, Nzomo cited a study on the rural Luo community in Kenya which observed that women's usufructory rights on land were diminishing due to individualised land tenure system, especially for childless and widowed women with daughters. In the Sugarbelt, things are not any better for women. Instances of proceeds from the household sugarcane crop creating controversies between the widows and there in laws, and in certain cases, the adult sons, who claim control over the money have been registered. This is a further indication of the hostility, which meets women's independent control of financial resources in such households.

Nzomo has analysed the lending trends in the main public and private lending institutions such as Development Finance Corporation of Kenya (DFCK) and Industrial Commercial Development Corporation (ICDC) and concluded that women are less positioned to earn credit for themselves in these agencies. She argues that the requirements by these agencies, which attach lending to certain collateral such as land title deeds, liquidity and social status of the applicant disfavour women particularly those in the rural areas. She writes:

Despite their central role in the production and sustenance of Africa's rural economy, they are held hostage by a reactionary patriarchal land tenure system that obstructs them from participating and contributing more effectively in productive activities and their countries' economic development. (Nzomo: 1987, 117).

The aspect of women's central role in food production in the rural area is not new. Women have traditionally played these roles, including bearing and caring for children, cleaning,

washing, guarding the families' health and preparing food for the household. In many studies, it is argued that women's low status in society comes about because these activities are not accorded any economic value. Nor are women's work in the family farm or business, whether paid or unpaid recognised in the household income accounting (Silvard , 1985; Young et al, 1984; Lewellen, 1992).

In the observation of one agricultural analyst, the problem of African agriculture will never be resolved until the problems of Africa's women farmers are tackled (Harrison: 1990). However, recent literature on women in development indicates that women are actually attempting to solve their own problems by coming together in women groups. Rather than confront them at the household level where several socio-cultural demands still obtain, women have actually moved away to their social networks in order to assert themselves in the process of economic development. This enables them to manage their affairs without any fear of subordination and dependency.

Here, they gain new friends and share common experiences in a process that is reminiscent of the words of Silvard (1985):

Women are coming together to address problems that are often quite remote from their own lives. They are beginning to break through institutional barriers to help one another. They are looking ... with increased sophistication and power ... at issues of justice, development and peace. (Silvard: 1985, 7).

It is apparent that the question of food security has attracted a lot of attention from various scholars, resulting in just as many studies. These studies are, however, too general and theoretical, and do not demonstrate how the new commercial farming clearly relates to the households' subsistence requirements. Some pattern can be deduced from the available literature, which is of interest to our discourse.

The existing literature focuses on food production for the market so that the surpluses are interpreted in their monetary values, not their use as stocks to provide a buffer between the farmers and their varying food supply. This monetarization of food is treated universally as though it were socially accepted the world over. This is not the case for in the traditional African organisations, no crop was traded merely for profit maximization. One result of the universalization of capitalization of agriculture is that the production of food staples is neither

systemized nor prioritized in Africa since they are not the main income earners of foreign exchange for the countries.

Finally, the importation of food to meet national shortfalls, concepts of food aid and subsidies are extensively discussed in the existing literature. Although these types of food organisation are alien to the African cultural set-up, they may be compared to the ideas of reciprocity and redistribution (Ember and Ember, 1990; Siddle and Swindell, 1990). Particular emphasis should still be put on food abundance where it is consumed if Africa is to escape from the recurring effects of food poverty and income lapses in the continent. As part of this, the production of traditional food crops such as cassava, vegetables and potatoes should be increased along sides the “new world” vegetables and cereals.

2.2 THEORETICAL FRAMEWORK

As a guiding framework to this study, the Modes of Production Approach and the Gender Perspective have been used.

2.2.1 MODES OF PRODUCTION APPROACH

The modes of production approach have emerged as an alternative approach to, and a critique of the classical Marxist approach to development. The classical Marxist approach to production, for example, was more concerned with the analysis of the capitalist system than with pre-capitalist mode of production, thus giving very little attention to the latter.

Marx himself regarded the peasantry in the pre-capitalist production system as doomed, largely because its social structure was “amorphous and atomistic and therefore incapable of protecting itself against erosion by capitalism” (Klein, 1980; 14). However, this argument by Marx, when extended to the experience of the peasantry over the years, appears not to have been borne out by fact. Today, the peasant economic organisation is a significant base for surplus production in Africa, proving the resilience of the social group to capitalism (Amara and Tchuigoua, 1990; Ellis, 1988; Siddle and Swindell, 1990). The insistence by the dependency theorists that the capitalist world economy is a single unified system that incorporates all other forms of production was also another issue of concern to the proponents

of the modes of production theory. They rejected this argument, positing instead that each national economy is concrete, historically created social formation, comprising different modes of production co-existing within it. These modes of production are relatively autonomous and are at different stages of development. This fact points to the continued existence of pre-capitalist structures in rural African social formations (Suda, 1992).

Having looked at the conceptualisation of the system of production advanced by this theory, it is clear that the strength of the theory is in the way it analyses the precapitalist relations of production and the exploration of relations in the capitalist 'metropole' and the more exploited 'periphery' - the traditional dichotomy of the world's economy system as seen by the dependenciatists. The modes of production theory accept that pre-capitalist forms of production have survived within the capitalist system in the different social formations found in the world. The theory examines the transition from the pre-capitalist modes of production to the capitalist system in society. The central issues covered here include the changes related to the means of production (tools, resources, power, and techniques), relations of production in the social formations and how a social formation reproduce itself.

Several economic anthropologist and scholars, e.g. Crummy and Stewart (1981), Dalton (1967) and (1972), Firth (1981), Hyden (1980) and Rasmussen (1973), studied the modes of production which were prevailing in Africa before colonialism. These have generally come to be grouped as communal mode of production, herders and farmers, fishing and slave mode of production. Although they existed side by side, the communal mode of production was the most dominant characteristic of the African societies before colonialism. This shows that the African precapitalist social formations were marked by the existence of several modes of production, though often, one was dominant.

In the communal mode of productions, kinship, not residence, defined the form of production and distribution of surplus. The kinship social unit, clan or lineage controlled factors of production and resources such as land and labour. In spite of male hegemony in the patricians, women were rapidly integrated into the social groups and had usufructory rights to most, if not all of the resources. The principles of reciprocity and redistribution were remarkably characteristic of all activities in these societies. This can be seen from the following generalisation about the labour process in a pre-capitalist African society.

The African is rarely a full-time specialist in one occupation or in one production group. Not only is it typical for him to produce for himself a wide range of items he uses - his own house, tools, food, but during the course of a year, he is frequently a part time participant in several production activities. He may join sporadic work parties to do such tasks as clearing fields for friends, kin and chief, he may be of an age-set which is obliged to perform community services such as repairing roads, he may go on seasonal expeditions to extract ore from metals. In sum, it is frequently the case that during the year, an African will work in several production groups, not one of which is crucial to his own livelihood (Dalton, 1972: 46).

With the advent of colonialism and the subsequent structural changes, which were introduced, these modes of production experienced several changes. The slaves, formerly the primary source of surplus and most important form of investment in those societies most involved in market relations, gave way to peasantry. Land was becoming privatised and the development of individual land ownership took effect.

The demand created by European industries for vegetable oils, cotton, rubber, coffee, cocoa and other tropical products led to agricultural expansion in Africa, providing the stimuli for change from subsistence production in the rural areas of the continent. This promoted the peasantification of the African subsistence producers. In Kenya and Zimbabwe, the success of the peasant farmers kept down to size of labour supply and eventually led the colonial administration to restrict peasant agriculture in the interest of white farmers. In some societies, however, as Klein (1980: 13) has argued, "the difference between slaves and peasants was only the heavier obligations of the slave."

The conceptualization of this transition is useful in understanding the condition of sugarcane farming in western Kenya. This community is engaged in both subsistence and commercial agriculture and as a result, they have been partially incorporated in capitalist relations of production as well. However, it is clear that this production is not driven by the desire of profit accumulation *per se* as, in most instances, farmers are quite aware that the adoption of sugarcane and subsistence production, side by side is essentially to meet the living costs of their households.

The subsistence farmers in Muhoroni work either as tenants or small holders on their own farms. Usually, they rely on unpaid labour to tend their farms. On the other hand, some households also sell their labour, working either in large factory nucleus estates or in other out-grower farms owned by richer farmers. Some farmers also depend on cheap labour from relatives and friends. Not infrequently, certain farmers organise mutual work groups comprising relatives and friends who may work without any wage expectations as part of their reciprocal obligations in the society. These examples show that the communal modes of production, with several forms of kinship influences still persist within the emerging capitalist relations in the sugar belt.

Several processes can be included here to qualify the link between these households and the prevailing market orientation. Some of them can be drawn from Suda (1992), for example labour migration, where some members of the household move from home to sell their labour in cities and elsewhere, use of modern agricultural inputs by farmers who have access to credit facilities, sale of surplus produce by the farmers and, recently, the organisation of farmers into co-operative groups and other financial groupings to buy shares in the sugar factories which are expected to be privatised in the near future as part of the liberalisation programme by the government.

Another intriguing development in the Muhoroni Sugar Belt is the emergence of a clique of factory workers, especially those in the management, who get out of their way to lease or even buy land from the local community. These people also become sugarcane producers, a trend, which is noticeably encouraging the sale of land by poor landowners, some of whom later end up as squatters. There are also institutionalised squatters in the scheme having been settled by the Government in special areas when the settlement scheme was established in the 1960's. These squatters are basically subsistence producers although some of them eventually lease land for sugarcane production or end up as tenants of absentee landlords who work elsewhere. This gives them a chance of participating in sugarcane production, in addition to their subsistence activities.

Because it is difficult for most of the factory workers to meet the subsistence requirements of their households from cash income alone, many of these households are engaged in subsistence gardening to supplement their food purchases. This dilemma is parallel to Klein's

(1980: 16) description of the working and farming conditions of African in the apartheid South Africa.

The African worker did not and does not receive a wage that permits him to support a family or provide for his retirement. The African cultivator does not sell enough cash crops to feed and clothe his family. Both survive because they are underwritten by the peasant household's ability to feed and house its members.

Thus, the production of sugarcane in Muhoroni has created neither a full-fledged system of agricultural capitalism nor a peasantry. The two co-exist without a contradiction. However this view should not obfuscate the frustrations in the prevailing economic system. Already the emergence of wealthy elite who are buying land from the poor farm households shows that traditional disregard of the practice no longer holds. Also, the capitalist motivation of the sugar industry, for example, has forced the wages of the labour to be as low as socially possible while intensive farm mechanisation has occasionally led to displacement of some workers. Hence households engaged in wage labour find it hard to feed using their irregular cash earnings.

While this is the case, women have made only little inroads into the ranks of paid employment and independent financial opportunities in Muhoroni. This maybe directly associated with the asymmetrical socialisation constructs, which lay more emphasis on the educational success and upward mobility of male children than female. The slow pace of women's integration into paid labour force in the area can also be attributed to their long working hours in domestic reproduction.

While it can also be argued that women have very tenuous financial stakes in the sugarcane enterprise because they are not the registered holders of the land, which is the main factor of production in Muhoroni, this view is not indispensable. According to a leading African anthropologist, Archie Mafeje, individual property rights is not a necessary condition for development in Africa. Mafeje has argued that traditional African economy developed without any recognisable property relations. Indeed according to him, use rights deriving from community membership was the overriding principle in the old African mode of production.

Against this contention, Mafeje (1991) made the following emphasis:

The fact that individual families were units of production as well as of appropriation and could hold their plots of land in perpetuity as long as they were under use casts doubt on the suspicion by liberal economists and Marxists alike that the so called communal land tenure necessarily militated against the development of material forces in Africa. It is important to note that capitalist production has occurred in black Africa since the introduction of cash crops, without any significant changes in land tenure systems but more in land use. (Mafeje: 1991, 109).

This view contends that productivity is based on one's own ability and not the surrounding factors like means and relations of production. Without contesting the conceptual foundation of this argument, there is need to put certain records straight as they bear on modern farm use in Kenya. While the situation in the traditional production system was such that it permitted progress based on individual's initiative using communal tools of production, contemporary production pattern frustrates communality; personal ownership of the means of production is as much a factor in productivity as individual entrepreneurship, competitiveness and pursuit for accumulation. Hence resource differentiation would today automatically lead to unequal socio-economic development.

The position held by women in the sugarcane production system in Muhoroni, which from the early beginning was established on the capitalist free market model, evince this fact. Land in Muhoroni was bought mainly by male immigrants who later settled there with their families. A few women also bought land in the area and own them to this time. Nevertheless, the majority buyers were men, and abated by the patriarchal cultural practices in the area, the ultimate heirs of the title deeds in the region have been men. Therefore, women farmers lack any control over the very primary means of production in the area.

Land is the most critical resource in agricultural production although women have over the last generations been prevented from its ownership while at the same time it has come to be conceived in terms of individual property. This process has eroded women's usufructory rights to it, which traditionally was respected and preserved.

The founding of the sugar economy in Muhoroni consequently set in motion a salient rivalry between two production systems, one controlled by men (the cane sector) and another one under the women (subsistence sector).

In spite of this, the male head of the household has the final authority over resource (land, capital etc.) allocation and farming contracts with the sugar industries. The field data showed that men are more pre-occupied with the sugarcane farms where they spend a lot of time daily, even when their roles are only facilitatory and supervisory. On the other hand, the home plots/subsistence farms are regarded as women's assets. In other words, women entering the cane production process in Muhoroni do so mainly in their social capacities as sugarcane farmers' wives which imply that they do not exercise equal relations of production as their husbands. The society expects them to be satisfied with their roles in subsistence production and other activities which are incidental to household reproduction.

And even if women's usufructory land rights were still to operate as it did in the traditional system, this in itself is not enough to foster women's full participation in modern agricultural production. Credit is usually needed to encourage use of modern inputs, which is a big constraint to those without legal land rights. Also it can be argued that the farming systems in the two epochs are quite unrelated. Whereas there were no export crop production in traditional farming system, the sugarcane cash crop in Muhoroni provides a distinct industry with a commercial agricultural monopoly in the area, hence relegating subsistence agriculture. This development effectively cut out most of the women from earning relatively higher incomes from the new crop since they remain confined to subsistence activities.

On the other hand, there has been low adoption of farm mechanization techniques including fertilizer and chemical application in the area since these facilities are generally expensive and above the reach of the ordinary farm holders. It is, therefore, the use of hand and other traditional implements, which are prevalent in the cultivation and harvesting processes in the region.

In conclusion, the modes of production theory, is most suited to inform on the specific ways in which the small farm household is linked to the larger market economy and the internal dynamics operating in this process. This study used this approach in understanding these conditions, in relation to the rural sugarcane economy in Muhoroni sugar belt.

Finally, looking at the process of change, a major question is on the prevailing relations of production in society. To do this, another theoretical framework, the gender perspective, was be used.

2.2.2 THE GENDER PERSPECTIVE

Gender analysis deals with the study of construction of social relationships in the society. Broadly, this theory view the roles of men and women as socially defined, without any bearing on their biological abilities. The theory, though different from feminism, which views men as the main oppressors of women, shares a lot of ideas with the feminists as far as feminine consciousness is concerned (Hooks, 1984).

The gender perspective denies the feminist common approach, which sees women as living under conditions which are oppressive to them, and undermine their powers, that is, the victim approach.

Instead it is more concerned with women as agents of change, and who actively influence the course of development. In this way women are perceived as development actors and not victims. In so doing, this approach introduces the relational aspect, looking into the relationship between men and women involved in production. It is concerned with understanding the practical situation under which women and men do their work, with a view to making women the social partners of men. In other words, it addresses itself to a situation where women's reproductive and productive roles are recognised and rewarded without sex biases.

The early feminist conceptualisation of society, based on free competition between men and women (Evans, 1976; Wollstonecraft, 1985) created an environment of victimisation of men for the asymmetrical relationship which women find themselves in. Feminists attacked what they perceived to be male's hegemony in marriage, male's monopoly of skilled work and professions, low wages for women and campaigned for political equality between men and women (Banks, 1986; M'C Neil; 1987; Hooks, 1989).

One group of gender theorists, the socialist feminists, placed the abolition of gender inequality in the broader context of socialist transformation, which will also end class divisions in the society, thus emancipating society from the servitude of capitalism. This approach, it should be emphasised, argues that capitalism is oppressive to both men and women, and that

women's domestic exploitation through their unpaid labour and their economic dependence on the husband together with the authority which it gives to him, has a direct bearing to capital. Women are tied to housework so as to sustain the wage labourer, usually the husband and the labour she reproduces or her children (Eisentein, 1979: 49).

Other writers, Stitcher and Parpart (1988) and Young et al. (1984) point to the fact that capitalism makes workers dependant on the wage system but does not provide for the workers' full needs through commodity production. In addition, capitalism benefits from the sexual division of labour and the subordination of women. This is partly because women provide cheap labour, reproduce labour force and maintain them. This analysis is very relevant in understanding the background of relations of production in the sugar belt where women have been confined to low paying employment and domestic production, basically to sustain the labour force in the sugar industry. However, the process is better analysed by the gender perspective.

This framework guided us into understanding the labour conditions of women and their overall participation in farm agriculture in Muhoroni. Traditionally, African women were confined to domestic reproduction, using simple technology to produce the household food requirements. This led Boserup (1970) to introduce the term "female farming systems" in reference to those parts of Africa which exhibited active subsistence agriculture. Although her book revealed that women's labour was central to the African agricultural system, Boserup provided no theoretical analysis of subordination of women at the level of the household. Nevertheless, later scholars in this area have used the gender perspective to show that the patriarchal cultural configuration of African societies slighted women's roles in production. These studies have shown that women in Africa are victims of gender hierarchy in which they are powerless and suffer domination by men (Brydon and Chant, 1989; Amadiume, 1992; Pala Awori and Krystall, 1979).

Stitcher and Hay (1984) have observed that contemporary state institution in Tanzania such as co-operatives and export crop-marketing agencies, also discriminate against women. Hence women do not receive the seeds, credit, agricultural training and crop payments which are dispensed through co-operatives. In households, which grow export crops, husbands keep the proceeds from the crop yet women are expected to meet most of the family's daily consumption needs from their food crop production and other sources of income.

In most societies all over the world, factors of production have been effectively put under the control of one sort of patriarchal unit or the other. The patriarchal dominance of means of production, more often than not, reinforces hierachial structuring in the society, thereby failing to reward women's contribution to the production process, or simply overlooking it. The agro-industrial development in Western Kenya ought to be seen in this light. It is the contention of this theory that both men and women are involved in the development efforts, and while performing their productive and reproductive duties, they should be given the necessary resources to be able to perform them adequately and competently.

In the sugar belt, though women are mainly the household food producers, a few of them own large-scale plantations and are actively engaged in subsistence and other commercial agriculture apart from sugarcane farming. During agricultural peak seasons, for example, the rainy periods, when the sugar factories require more labour for the nucleus farm estates, women are recruited as casual labourers to provide hand labour for planting or weeding sugarcane, alongside the men. Women are also engaged in trade in food staples and other informal business. However women are still excluded from the technical jobs available in the factory. It is clear that most women in the sugar belt occupy marginal positions, which are low paying like weeding and planting. Also the absence of the working male from their household farms increase feminisation of agriculture. These issue invites more assistance to women involved in the production process so as to increase their contribution towards development (Brokensha and Little, 1988; Simmons, 1976).

This approach defends women's interest in the implementation of any project and ensures that both men and women benefit from the development initiative. This strategy fully integrates all the productive population, whether male or female in effecting change. Some scholars from this school of thought have put this view more candidly as follows:

As soon as men and women perceive that their interests and goals are shared, they can unite and exert more effective political influence. The task ahead is to convince the implementers and beneficiaries that the shared long-term objective for both men and women is economic growth with equity. (Buvinic et al, 1983: 31).

The perception of women as farmers' wives, cooks, bearers of children and housekeepers is opportune and misdirected. Using the gender perspective, this study has brought into focus

the analysis of women's contribution to food security and the extent of their integration in the sugarcane economy in Muhoroni.

It is important to note that the two theoretical approaches were used complementarily. This was found to be necessary because in its specific entirety, a single approach would not have captured the full analysis of the conditions of the household production activities in Muhoroni. The Mode of Production approach, for instance, while looking at the relations of production in a particular social formation, it fails to critically address itself to the gender conditions pertaining there. However, the gender perspective, adequately interprets what the former may leave out in such a case.

2.3 HYPOTHESES

1. Modern farm technology in Muhoroni is geared only towards sugarcane farming and therefore does not affect food production
2. Income from sugarcane is mostly used in non-food expenditures.
3. Women's limited access to cash from sugarcane production has led to reduction in Household Food crop production.
4. Sugarcane farms harbour wildlife, which are likely to destroy food crops and thus lead to poor harvests and lower food levels in the households.

2.4 DEFINITION OF KEY CONCEPTS

Income from sugarcane: This covers the earnings derived from the sugarcane crop, whether in the form of wages as a result of selling one's labour in the farms or the factories, or payment for the cane harvested. Households reported on their direct incomes from sales of harvested cane and related practices, e.g. sugar cane farm leases and contractual employment.

Women's access to cash from sugarcane production: In this study, the variable refers to the actual control of income gained from sugarcane production and cane related employment. Indicators of the variable includes sugarcane farm ownership, employment in the factories, involvement in home bound duties, sexual division of roles, etc.

Household food security: This refers to the availability of food in the house unit at any given time of the year so as to ensure a healthy life to the household members. The measurable indicators of food security are taken to be an available surplus, buffer stocks, land size under food production and the absence of obvious malnutrition related diseases (see questionnaire).

Household food crop production: This refers to the exploitation by the house unit, of the available resources (land, skills, money), for additional output in food crops and food purchases.

Modern farm technologies: This variable covers the new scientific innovations and implements, which are applied in agriculture. Measurable indicators of this included use of commercial fertilizers, irrigation, traction, chemical sprays, storage facilities and preservatives etc.

Non-food expenditures: The spending of disposable income on items and activities other than food requirements of the household. For example, spending on education, leisure, credit repayment, house repairs etc.

CHAPTER THREE

METHODOLOGY

3.0 RESEARCH SITE

Muhoroni division was established in nineteen ninety-four following the split of the old Muhoroni division into the new Muhoroni and Miwani divisions. Although the focus of this study is on the new Muhoroni division, most of the administrative statistics, which were available and relevant to it, were based on the old Muhoroni division. However, every attempt has been made to give those figures and descriptions, which only apply, to the site of study.

The total farmland represented by the division is about three hundred and forty square kilometres with a population of 53,570 distributed in some 11,688 households. The estimated population density is, therefore, about 154 people per square kilometre. The division is divided into six locations, namely, Chemelil (3,366), Muhoroni East (2,899), Koru (2,437), Tamu (2,119) and Muhoroni West (1,777) in their order of household population (GOK, Census Report: 1989). The sixth location is called Fort Ternan, which has been hived off the Koru location, but independent statistics on its household population and area are still unavailable.

Muhoroni division has continued to exhibit an upward population trend since 1979 when its population was only 48,715, increasing to 79,858 by 1994. It was projected to hit 85,298 by nineteen ninety- six (GOK, Kisumu District Development plan: 1994 - 96). This rapid increase in the area's population can be attributed to two factors: the provision of health services; clean water and other infrastructure by the sugar factories and also a large influx of immigrant workers and job seekers. Since the immigrants are normally predominantly men, the male population in Muhoroni has outstripped the female one.

3.0.1 SOILS, RAINFALL AND AGRICULTURE

Former lake sediments, commonly sands and clay soils, dominate the soils in Muhoroni. The dark brown cotton soils is found mainly in the plains while the upper zones of the division are marked with residuals of brown volcanic soils, hence the fertility of Muhoroni soils (Republic of Kenya, 1989 - 93).

Sugarcane, the most dominant crop in the area, does quite well in these soils under rain fed conditions. There are three sugar-related factories in the division. These are Muhoroni, Chemelil and the Agro-chemical and Food Company Ltd./ACFC at Muhoroni. The Miwani sugar mills is on the Muhoroni/Miwani border and is shared by farmers from the two divisions. This is by far the highest concentration of sugar industries in any administrative division in the country. The Muhoroni East African Sugar Industries Ltd. is the oldest of the two mills and was set to undergo a modernisation face lift as soon as possible according to information obtained during this exercise. By 1996, a total of 13,592 hectares was under cane farming in Chemelil and a further 12,893 hectares in Muhoroni. However, these figures are not exact to the administrative boundaries of the division (Kenya Sugar Authority: 1995), although they clearly indicate the dominance of the crop in the region.

The main food staples cultivated in Muhoroni are maize, sorghum, beans and finger millet. Farmers in the area also keep livestock. African *Zebu* and Boran cattle are the preferred stocks due to their tolerance to adverse weather conditions and diseases. Some high valued animals or the grade cattle are also kept in the Eastern Highlands of the sugar belt mainly Koru and Fort Ternan areas. Other livestock that are commonly reared in the region include sheep, goats and poultry. While sugarcane and maize cultivation, and zero grazing are practised in the high rainfall zones of the division, livestock rearing is the most reliable occupation in the areas of low rainfall of the Kano plains which run westwards of the division towards Kisumu. Cattle are important in the household economy because they are used for paying bride wealth during marriages. The long run survival of households from one generation to another is tied to this institution. This makes livestock not only to be an important cultural property but also adds to the prestige of keeping some of it by the farming households.

According to the statistical sugar year book for nineteen eighty five, Chemelil and Muhoroni received an average of 251.2 mm mean monthly rainfall in that year. Generally, mean annual rainfall around the region varies from 560 - 1630 mm. In 1996, Muhoroni town and its vicinity had about 1525 mm of rainfall. Mean maximum temperature range between 25 - 35 degrees Celsius while mean minimum temperature range between 9 - 18 degrees Celsius. The rains experienced in the neighbouring districts of Nandi occasionally swell the River Nyando (see map)

which is the main drainage system in the division, resulting in floods. The floods more often than not destroy crops and pastures, thereby affecting livestock. The river is often heavily polluted with insecticides, herbicides and pesticides which come from the farms and the factories - the poorly drained black cotton soils occasionally make it necessary to use ditches or furrows to handle the surplus water during rainy periods. At such times, it is also difficult to get cane out of the fields.

Finally, rainfall in Muhoroni assumes a bimodal pattern. Apart from March to June when it is very wet in the area, there are scanty and unreliable rains around September and October. In the very dry seasons, sporadic fire accidents normally burn down hectares and hectares of mature and young cane leading to factory congestion and terrible financial losses to the farmers

3.0.2 ECONOMIC AND SOCIAL ORGANISATION

The founding of the sugar settlement scheme opened up a new homeland, particularly for the Luo of Western Kenya who saw it as an opportunity to 'establish a degree of distance from the incessant Luo anthropology; the unceasing claims on their accumulations from relatives for money, hospitality, helping with bride wealth, funeral expenses and job - seeking. The Luo especially the emerging elite saw the sugar scheme as a haven of opportunities and with time, many of them acquired land in the sugar belt area.' Several landless people also moved into the new settlement to buy land or settle as squatters (Cohen and Atieno-Odhiambo, 1989: 54 - 53). People of other ethnic diversities such as Abaluyha, Agikuyu and Kalenjin also bought land and have settled there.

This transformation had two dire consequences, for the relations between the new settlers, their ancestral homes and their new neighbours, the indigenous Kano small holders. One of these was that the injection of capital into the purchase and operation of the new farms slowed the return of capital and income to the ancestral land. The second consequence is that a rift opened between the new settlers and the Kano small-scale farmers whose families had been in the area for a generation or more. The mere fact that the new settlers were also strangers even to themselves, having come from diverse geographical and cultural backgrounds show how fragmented the new Muhoroni society became. Cohen and Atieno-Odhiambo has described the new relations in the area during this time:

Once optimistic farmers, they (Kano indigenous farm holders) feel bypassed in their one-acre and two-acre holdings. At times the small holders have felt terrible effects from a full abandonment of food production for sugarcane. The satisfaction of the sizes of farm parcels has produced what appear to be significant feelings of class conflicts within small communities between those Luo owning 2000 acres and those holding only two or ten. (1989: 55/56).

This is still the state of affairs in Muhoroni. The social organisation of people is rather difficult to sketch out given all the diversities. Nevertheless, there are some commonalities, which can be narrated. Notable, among these is that the neighbourhood is conceptualised from the idea that the home is formed out of a physical representation of the patrilineage. Thus, households are referred to by names of the male adults or the husbands. Patrilineality is also given prominence in most of the activities, which go on in the area, for instance, residence and descent are patrilineal. The kinship social structures form the main medium of organising social support for all the main socio-economic activities in the area. The study revealed that most households in the area are members of certain groups, which fall under this typology. Such groups are locally known as *Buche Anyuola* or *Joka Kwaro* and were found to be the main focal point for mobilising resources and developing entrepreneurship. The same groups serve as centres of social and psychological security to their members.

The concept of the extended family, on the other hand, can be said to be on the decline in Muhoroni, particularly in the settlement scheme where the new landowners are physically de-linked from their ancestral homelands. Also, the general influence of urbanisation has not encouraged this practice in the area. However, it is still the norm in the indigenous Kano settlement, added to the fact that newly established households in Kano are founded, necessarily, next to their ancestral homesteads and so the continuity is automatically provided for.

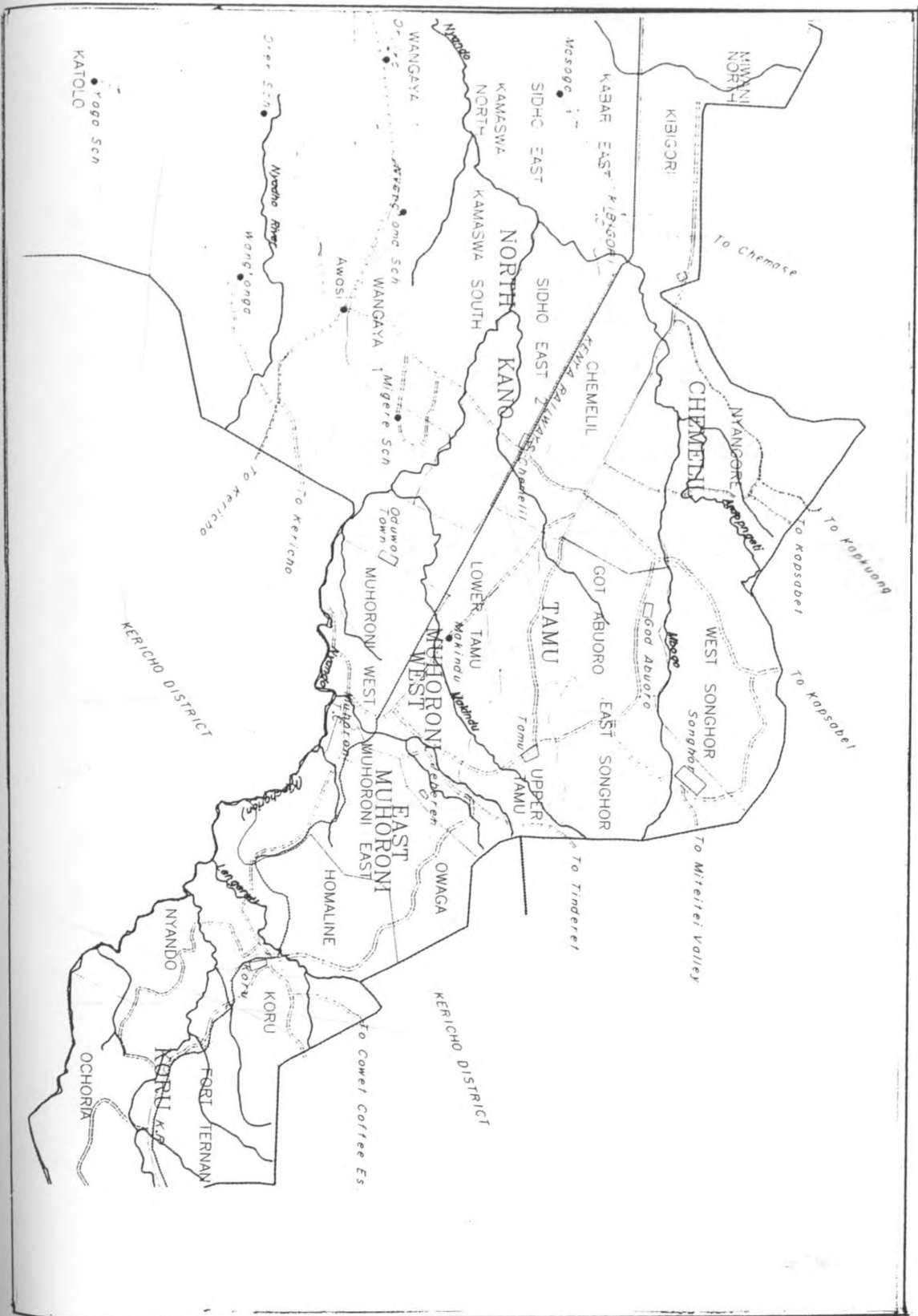
Another feature of the settlement scheme peculiar to itself and not the indigenous Kano settlement is the fact that there are women landowners in the area. That is, some women bought their own pieces of land and possess the title deeds. Thus, there are homesteads in the area that

are referred to by the women owner's name. The same thing obtains for compounds where the males are away, usually as migrant workers and businessmen in the urban areas. The problem of absentee landlords was found to be widespread in the division. In some instances, this is encouraged by polyandry since certain men decide to maintain separate homes, one in the settlement scheme and another one in the native homeland. Absentee land lordship in Muhoroni has left several farms in the hands of people other than their legal owners, a situation, which was found to be responsible for a slump in economic utility of some of the farmlands.

Informal business in Muhoroni is concentrated on food trade in the many markets, which have mushroomed in the area. Commodities sold in the markets are mainly agricultural produce such as maize, beans, potatoes and vegetables that come from other areas like Molo, Eldoret, Kericho and Tinderet. However, there are also locally produced food surpluses, which may be sold directly by the farming households. The main market outlets in the area are Awasi, Chemelil, Kibigori, Muhoroni and Koru.

Finally apart from agricultural production, the people in the area also practise hunting, particularly those drawn from the low-income category. Hunting is mainly practised in order to supplement food supply and safeguard crops against wild animals, and as a result take the form of combing the sugarcane fields seasonally in search of the animals.

MAP SHOWING MUHORONI DIVISION /RESEARCH SITE



Source: Survey of Kenya

Scale 1:10,000

Town Centre



Trading Centre



Provincial Boundary



District Boundary



Divisional Boundary



Locational Boundary



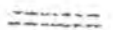
Rivers



Railway Line



Roads



3.1.0 SAMPLING

Generally, samples are used to estimate true values. For quite practical reasons, the coverage of samples rather than the whole population saves labour, time and money (Bernard, 1988; Moser, 1969). Sampling has been a traditional technique in social science research because it permits a higher level of accuracy than the full enumeration of the entire population. This accuracy is possible because sampling allows for more quality research, editing and analysis of the data.

The sampling population for this study was the entire households in Muhoroni Division. This is because households, apart from being a permanent feature in the study area, exhibit definite commitment to the issue of food security and therefore food cultivation. This is opposed to targeting individuals, some of who are a transient group seeking employment and may hardly be conversant with the issues of the study.

Further more, the statistical estimates for the existing households in Muhoroni were available for any reference. At the analysis stage, the use of individual household units was, therefore, not only convenient but also justifiable. This made our sampling more certain and easy. Lastly, households are more convenient to sample without fear of duplicity and lack of particulars to observe.

Both random and non-random sampling techniques were used in order to identify the informants and accomplish the study.

3.1.1 MULTI - STAGE AREA SAMPLING

The multi-stage area sampling method is an example of random sampling. It was adopted to give every unit of the population, that is, the household, an equal chance of being selected so as to ensure a representative sample for the study. The idea of multi-stage sampling was used to narrow the sampling field from a large heterogeneous chunk to small homogeneous ones that were relatively easy to sample directly (Bernard, 1988; Moser, 1969).

The six locations forming the administrative grids in the division (see description above) were treated as the first cluster of the study. A second cluster was formed out of the sub-locations picked from five of the six locations. Subsequently, the sample households were drawn from the various sub-locations at the third stage of clustering. Altogether a total of 150 households were identified from these clusters using the systematic sampling procedure for the interviews. This was done to achieve a greater randomness in the sample.

3.1.2 SYSTEMATIC SAMPLING

The systematic random sampling was quite convenient to the fieldwork since the concept was easy to pass on to the research assistant who helped with the interviews. To use the method, a local random start and the selection interval is determined before proceeding to interview the Kth household. This was done separately for the different locations in the study.

3.1.3 JUDGEMENT AND SNOWBALL SAMPLING

The judgement and snowball sampling method were used towards the last phase of the research in order to identify certain key informants for the follow up study. Unlike during the household interviews when a standard questionnaire was used, a different type of instrument; the unstructured interview method, was adopted for this part of the study. A pre-prepared interview guide was utilised in interrogating the informants, namely, the factory management, co-operative societies and divisional government officers. These latter informants had official data on some of the issues that were critical to the research, some of which had arisen out of the households' survey. Data gathered from these respondents were analysed qualitatively. Data gathered this way were found to be more elaborate and well informed as they bordered on the professional knowledge of the respondents.

3.2 DATA COLLECTION

Since this study relied mostly on primary data, both obtrusive and non-obtrusive methods were employed to gather the required information. The participant observation model was preferred

more as a strategy than a method of research (Nabila, 1974) so as to be able to win the confidence and co-operation of the respondents without arousing any suspicions. In a sense, it would have been quite risky to approach the respondents as a complete stranger as it was during this period that incessant and unexplained fires kept breaking out, destroying many farms of green sugarcane in the area. This means that such a plain approach may have failed in certain places, as one would have been suspected of ill motives.

The specific methods that were used to collect data from the households and later, other key informants, were the structured interview, unstructured interview and the observation methods.

3.2.1 QUESTIONNAIRE

A standard questionnaire covering a wide range of issues was administered to the respondents in a face to face interview. The questionnaire had closed and open ended questions to allow for probing as well as precision and efficiency during coding (Bernard, 1988, Prewitt, 1974). From the standpoint of the farmers, most of whom were found busy with their daily activities, this method was very convenient, as it is flexible on where it can be carried out. At least a few respondents were interviewed in the open field, either while herding cattle or supervising other work.

The questionnaire method was also preferred because it was found to be an effective means of eliciting information about a person's perceptions, beliefs, attitudes and anticipation. Those are mainly the kind of data that this study was interested in finding out. The method was also found to be indispensable in this exercise since it was a subtle way of investigating into the farmers' private affairs, which would otherwise be impossible to observe, such as household budgets, income estimates and intra-household relations. The whole investigation was carried out in Dholuo language for the better understanding of a majority of the informants. Those who were not fluent in this language were, however, interviewed in English. Although it was not much of a problem during the field study, confidentiality and anonymity was readily assured to respondents who, for one reason or another, were hesitant to give some information required in the research instrument.

3.2.2 DIRECT OBSERVATION

Observation, though a pervasive activity in our daily life, is a primary tool of scientific inquiry. This method was used to a limited extent purely to compliment the structured interview/questionnaire and the unstructured interview methods. Information which was captured easily and effectively using this method included heavy congestion at the sugar factory yards, over mature sugarcane fields, the socio-economic living conditions of the interviewed households, the farming technology used on the farms and destruction of food crops in the area by wildlife. The observation method was also useful in noting the type and pattern of food trade prevailing in Muhoroni at the time of the study.

In observation, the subject can be monitored continuously as correctly as possible. According to Moser (1969: 168), instead of asking people what they did, one can observe what they do and avoid cases of exaggeration prestige effects and memory errors. Thus, the problem of informants playing to the interests of the audience is safely reduced by using this method as compared to the possible distortions in interviewing.

3.2.3 UNSTRUCTURED INTERVIEWS

This method obtains when data are collected using informal but guided discourses. It can also be used excellently as a way of building rapport with the informants before using other instruments of research such as the questionnaire. The method was used consistently in the follow-up study, which involved the factory management, co-operative societies and the government representatives. An interview guide (appendix 3) was prepared to regulate this aspect of the fieldwork.

3.2.4 SECONDARY DATA

Data emanating from secondary sources such as books, journals, census reports, statistical abstracts, development plans and newspapers, provided a wealth of information upon which this study was founded and developed. Although sometimes such data are reeled by problems of

institutional bias, secrecy and outdatedness (Prewitt, 1974), these formed the basis for reference through out the study.

3.3 DATA PRESENTATION AND ANALYSIS

Both qualitative and quantitative techniques of data analysis were used in this study.

3.3.1 QUALITATIVE TECHNIQUES

Qualitative techniques were relied on to analyse the socio-metric relationships and other information collected from the field. Most of the data were measured on the ordinal scale hence the tendency to use the qualitative technique in many aspects of the presentation of the findings.

Also, this technique took care of the epic perspectives and folk analysis, which showed up during the research. This means that the analysis accommodated how the research population itself interprets or rationalises its situation. Generally, the consistency between how the obtained responses corroborate with other evidence found during the fieldwork indicated a valid association between the subjects of study.

3.3.2 QUANTITATIVE TECHNIQUE

This method was found to be useful in order to permit an easier comparability and summation of the data. The computer statistical procedure that was used for this exercise, SPSS, apart from providing the descriptive statistics (percentages, frequencies, modes and medians) was also used to establish various associations between some of the data. This was done by cross-tabulations and the results presented in the same forms of visible statistics and qualitative explanations.

3.4 PROBLEMS ENCOUNTERED DURING FIELD WORK

This research was carried out in two phases between February and June 1997. A reconnaissance study of the area was accomplished in February and data collected from 150 households between March and May. A follow up study using the unstructured interviews was made in the month of June targeting the factory management, farmers' co-operatives and the divisional administration in Muhoroni.

On the whole, the exercise was faced with a number of ordinary problems arising mostly out of the field situation rather than possible inadequacies of the research instrument.

Only a little financial facilitation was available for this study which made it a bit difficult to reach some parts of the division. Given the large size of the study area, expensive public transport was required in certain cases. However, using the bare minimum resources available, the activity was able to run successfully up to its completion. Financial scarcity was also felt as far as other miscellaneous field expenditures were concerned.

At the time of beginning this research, it was very dry, as the long rains had failed to arrive in time. This would have been expected to provide a conducive travel atmosphere for the researcher but for the debilitating heat which made the work uncomfortable and tiring. The long awaited rains came towards the end of the study in April but this one too had its toll on the work since it fell almost incessantly, thus delaying the last bit of data collection. Many farmers went back to active farming and finding them at home became difficult the more it rained. This problem being a natural occurrence, it could not be avoided easily. Persistence in the number of visits helped.

Another problem was in regard to the main research instrument, the questionnaire, which was fairly long. This had been retained deliberately for purposes of comprehensiveness and thoroughness in the issues, which were covered. This made the work tedious and exhaustive as an average interview took about forty minutes to accomplish. In many ways, however, apart from inquiring about future assistance to them, most of the informants were happy to be interviewed and did not bother so much with the issue of time.

Since the residents of Muhoroni were not expecting this study, in some places we missed respondents. In a few instances, the approached households were absent or unwilling to respond. This was mainly the case where the farm owners work far away in other places, usually the urban centres, leaving tenants to look after their farmhouses. The neighbouring households would then become the next recourse.

It appears that in certain parts of the division, some researches had been done earlier by other organisations. Households, which had participated in those researches, were wary of this particular study, claiming that the results of such exercise would be futile since they would not benefit them. Such households were assured that the University sponsoring this particular study is better placed to advise the government in designing suitable development agenda, which would benefit them. This won their confidence.

Another problem faced by this study was the issue of distractions and contradictions in responses received by the researcher. In a number of households, respondents, particularly women had other things to do besides the interview. They would be cooking, washing utensils or readying to tether livestock in the pasture. Where this was indicated earnest persuasion was used to earn maximum attention for the interview.

Certain contradictions were experienced during the interviews, especially regarding income earnings and expenditures. A respondent who had denied having any business as a means of supplementing her income actually produced a basket full of fish to sell to a customer who arrived for this purpose during the interview. This was mainly the case with households engaged in small-scale business like selling paraffin, rope-making and maize flour. This is probably because they did not regard these activities as any meaningful business. Where this was realised, appropriate corrections were made on the data.

Finally, the uncertainty of the purity of water that could be used for drinking and even bathing once out in the field was quite an intriguing question to settle. In circumstances of thirst, the sure recourse became school boreholes and taps, whenever they were near to the researcher.

CHAPTER FOUR

THE INFLUENCE OF SUGARCANE ON SUBSISTENCE FARMING AND HOUSEHOLD FOOD PRODUCTION IN MUHORONI.

4.0 INTRODUCTION

In this study, a total of 150 households were covered in an extensive field survey spanning over two months. Half of the informants were women and the rest men. A majority of the respondents had attained 50 years and above (54.7%), an occurrence which could be attributed to three reasons; the first is that according to the prevailing cultural norm in the studied community, it is the eldest members of the household who are normally relied upon for vast experience and knowledge in the society. Hence there was a tendency by many potential informants in the households visited to refer the exercise to the elderly around.

The second reason is that it is the same elderly people who traditionally like today, still legally possess the land ownership rights. The younger generation has to wait into old age before parcels of land are passed onto them as inheritance. For this reason, it was incidental that most of the respondents came from the senior age category.

Finally, most of the younger people in the location of study have not taken up sugarcane farming as their main occupation. Many of them are keeping paid employment elsewhere especially in the urban areas and rarely come back to the rural areas. Thus it was much easier getting elderly informants than younger people in the visited households. In this way, most of the informants reached were mainly drawn from the senior age group.

A majority of the sample population were married people (76.7%) with some of them keeping polyandrous unions, in which case, a man would keep two or more separate households for the respective wives either in the same locality or in different places. Widows formed 17.3% of the sample while the remaining respondents were unmarried.

The field data showed that 36% of the households in Muhoroni own other land elsewhere. Of these households, 9% have left the additional farm unused while the rest put them into some form

of agricultural activity. The additional farm lands mainly comprise of what were inherited in the native homeland before the household moved to their new farms in the settlement scheme. Households, which were not keen in farming in the native land holdings, explained that they concentrate their agricultural activities in their Muhoroni holdings because the former native areas are either infertile or susceptible to flooding during the long rains. While a majority of the households in the study possess between 5 - 15 acres of land (66.7%) followed by those with land between 16 - 25 acres (14.7%), only 4.6% of the households in the sample owned in the excess of 25 acres, less than 14% of the households covered in the study mainly squatters, keep small parcels not more than 5 acres in total land size.

A few areas in Muhoroni division had households living on quite minimal farm sizes. These were Koguta and Mutwala areas in Muhoroni East, Katenet and Tamu locations, Kopere and Kibigori in Chemelil location and some parts of the Koru location. Most of these areas, it was found out, began as squatter settlements more than 20 years ago for the landless families driven out by incessant floods in their former areas and other deprivation related factors. For example, the Kuguta village was founded around 1969 in order to settle the landless people who had been displaced during the establishment of the Muhoroni sugar factory. These people were settled on small farms ranging between 1 1/2 and 2 1/2 acres. However, up to the time of this study, these people had not been issued with land title deeds, and therefore they can still largely be defined as squatters. This has discouraged possible intensive agricultural investment in the small farms by the settled farming households.

4.0.1 GENERAL SOCIO-ECONOMIC SURVEY OF THE AREA

Analysis of household social amenities (water, cooking fuel, lighting), physical infrastructure (roof material, number of rooms, distance from tarmac) and economic characteristics (radio, bicycle) in the area revealed that substantial improvements are still needed to attain better living conditions in Muhoroni. Findings of the study showed that river/stream is the main source of water, being used by 63.3 % of the households compared to pipe water used by 27.3% of the informants. The remaining access to boreholes/well water. The main rivers in Muhoroni are Nyando, Mbogo, Tonde, Mutwala, Makindu and Oseng'-Teti.

Firewood and paraffin were the most dominant source of cooking fuel (70.7%) while only 8.7% of the households use solar/electricity as their source of lighting.

The common roofing material in the area was iron sheet (78.7%) followed by grass (20.7%). Earth/mud finished floors were most common (54.7%) and the rest, cement. While 74% of the households lived within 8kms to the nearest tarmac road. There is a relatively well developed transport network in the area. Two significant roads - the Nairobi to Kisumu and Kisumu to Eldoret main roads cross the division. Also the Mombasa to Kisumu railway line cuts through Muhoroni, making movement of goods and passengers in the area quite convenient and easy. Several respondents admitted owning bicycles (73.3%) and radios (85.3%) respectively. This can be treated to have been a fair indication of economic mobility among the studied households.

A significantly smaller proportion of the total farm area in Muhoroni is devoted to subsistence compared to sugarcane farming. A total of 119 households out of the 150 (79.3%) households in the sample use less than 3 acres of their land entitlement for subsistence agriculture while 64.7% of the same households owned sugarcane plots covering more than 5 acres. This farm plan strictly follows the original design laid down for the farmers at the acquisition of the farms in the 1960's when only 2 1/2 acres was considered to be enough for a household's subsistence occupation and the remaining portion (normally another 5 acres) would by regulation be put under sugar cane.

Nevertheless, most of the households in the area (84.7%) claimed that they were growing much of their food requirements. This allows them to save on what otherwise they would have to spend on buying foodstuff. Cereal grains, particularly maize and sorghum are widely cultivated in the area. On a typical farm holding, these crops are supplemented by sweet potatoes, cassava, groundnuts, beans and peas. Different kinds of vegetables are also grown by various households to meet their food needs. In the face of recent crises in the sugarcane industry farmers have also resorted to alternative crops such as bananas and fruits which can be sold in the peri-urban markets for additional income. All crops are grown under rain fed conditions.

Finally, it should be noted that educational and health infra-structure in the area has also benefited from the sugar economy since the factories have had to establish health clinics and schools to

cater for the needs of their workers. It was observed that a part from Muhoroni factory which does not allow outsiders to use the facility, Chemelil and Miwani open its clinics to commercial utilisation by other people. Asked to consider which health services between private doctors and the factory clinics were cheaper, 32% of the households said that the factory services are less costly. Although 50.7% of the respondents disagreed with this view, most of them were of the opinion that the factories should open the facilities to everybody to give an equal chance to those who would wish to exploit the health facilities.

The establishment of agricultural extension service by the Muhoroni Settlement Board provided the original land buyers with their first encounter with scientific farming. According to the original plan, the large-scale farms in Fort-Ternan, Tamu, Koru and God-Abuoro were to be used for sugarcane and dairy production. All the land buyers were provided with crossbred dairy cattle at a loan and veterinary services were easily obtainable. However with time, breakdown in agricultural extension services, financial constraints and incessant robberies of the livestock, mainly by the neighbouring Kalenjin pastoral community disrupted this plan. Intolerable climatic changes and the lack of clean water supply after the breakdown of Muhoroni settlement water network was also to blame for the failure of the project (personal interviews: various).

Consequently, most of the households shifted concentration to the less risky sugarcane sector. Compared to subsistence cropping, the sugarcane crop is more tolerant to weather changes for example, constraints due to high variability and unreliability of rainfall do not seriously affect it. Where rainfall comes with great intensity, leading to high run-off and erosion losses, the sugarcane crop with its deep rooting system is more resilient. It's not affected by birds or predating animals and has no bad weeds. Faced with limited capital for farm development, the farmers either lease out the farms or apply for factory loans. This is not possible with subsistence sector.

This background provides a broad overview on the prevailing living conditions in Muhoroni. It also highlights the general socio-economic impact of the sugarcane economy on the wider spectrum of the community's life. This knowledge would be invaluable in the subsequent discussion of the impact of the cash crop on household food security in the area.

4.1 THE USE OF MODERN TECHNOLOGY IN SUGARCANE AND FOOD PRODUCTION IN MUHORONI

Sugarcane farming involves mechanical operation right from the beginning until the crop is harvested. Costly capital investment is required for land clearing and grading. Also heavy machines such as crawler tractors are often used as well as wheel tractors and even ox-ploughs. Farm mechanisation in the cane plantations includes the use of mechanised weeding and chemical application (fertilisers, herbicides etc.). The first hypotheses of the study assumed that these production techniques have not spread into subsistence food agriculture in the area, leading to poor yielding non-mechanised farming in the sector.

To establish this, several indicators of technology transfer were enumerated. The respondents were asked about the problems they faced in their subsistence cropping and how they solve them. More focus was put on the spread in the use of commercial inputs, agronomic techniques, labour organisation and effectiveness of agricultural extension services in Muhoroni.

The interviewed households supported the view that food farming by themselves is quite critical to the survival of its members. Only one respondent, a retired college cateress, do not grow food crops since her family prefer purchasing manufactured foods.

Asked what kind of modern agronomic practices they use to improve their farms, 60.7% of the farmers said that they use mulching and inter-cropping. Several households (22%), were using crop rotation and inter-cropping. The crop rotation method was being practiced singly, by 4.7% of the respondents while another 10% of the households used inter-cropping. A paltry 2.7% of the households were farming without using any of these techniques. Informants who use these agricultural methods explained that doing so enabled them to maximise the use of their small food plots. Inter-cropping enables the households to grow two or more crops on the same piece of land at one and the same time. Plants that were commonly inter-cropped in the area were maize/beans, maize/sorghum and maize/potatoes.

The widespread use of this method in this area can be attributed to many factors; one of these reasons is its less sophistication. The method is not complex to most households as it does not pay any attention to crop specific or pure stands cropping. Also the method was a common feature in the traditional African farming practices.

The second explanation is the limited land area, which is available for food cropping in the area as most of the land is put under sugarcane. This has made the households to over-rely on their one or two acre subsistence plots for diverse food requirements. Hence in the hope of maximising production per unit of land, many of them grow different crops, either on row planting or randomly.

The last reason is that it is less expensive since all what is required are the different seed types and the availability of some piece of land where they are sowed. Further, the risk with one crop may not affect another making it to be a kind of crop insurance.

Some respondents in the study even claimed that they cultivate *sim-sim* around their maize plots to repel some wild animal species, which destroys the maize crop. They felt that the *sim-sim* plant releases a bad smell to the wild pig which deter it from foraging next to where the crop is grown. Yet in a few instances, it was observed that certain households plant food crops in the open rows between the sugarcane strands.

It emerged that the majority of the respondents prefer planting both hybrid and local cereal seeds (52%), only 39 out of the 150 enumerated households (i.e. 26%) had planted pure hybrid seeds in the previous year. Less than 22% of the informants admitted to using indigenous seeds and local composites. We observed that the households were largely familiar with the hybrid seeds, particularly the maize varieties. The analogy between this view and sugarcane farming system is useful but maybe superficial. In the case of sugarcane farming, the factories recommend their own scientifically tested breeds and chemically tested stalks for planting. This could as well provide the impetus for the same farmers to look for the recommended hybrid maize seeds during the crop season.

However the decision on the type of seed to be used by the household is dependent on many social and economic factors which should be appreciated in order to understand the changes

which are taking place in the region. Households using both the local composites and hybrid seeds argued that the local varieties mature faster than hybrid seed (12.7%) and can be relied on to stave off hunger after a long off-harvest period. According to 14% of the households, the local seeds were simply more affordable (cheaper) than the hybrid seeds and supplementing them reduces costs. Some of the respondents however claimed that either of the seed varieties are high yielding (17.3%) and therefore there are no major difference between them. In fact, they select the seeds from a previous maize harvest. A final 8% of the households falling in this category were unfamiliar with the places where they could obtain the hybrid seeds.

The data also shows that 22% of the covered population have resisted any shift from the local seed variety. This group claimed that apart from the quick maturity period of the variety, it could also be planted at any time of the year provided that there were rains unlike the hybrid varieties, which have fixed planting seasons. In addition to the two reasons, the seed was preferred because of its affordability and good yields.

Only 26% of the farming households in the study specifically plant hybrid seeds. These households prefer the seed because of its good sprouting and high yields. It is apparent from this evaluation that the new hybrid seed has met with a fair response in Muhoroni. This wide adoption of the seed indicates that the farmers in the area are prepared to adopt new technical advice if it is demonstrated to be rewarding.

Further information revealed that there are no scientifically improved breeds available for the root and tuber staples such as cassava and sweet potatoes, which are also popular with farmers in the area. The two crops contribute substantially to the food requirements among the households. Sorghum (particularly *serena*) and cassava can be grown successfully in the dry season according to the experience of some of the respondents but the two crops are also quite susceptible to destruction by predators like the wild pig and birds which are more rapacious during the dry spells due to increased lack of forages at that time. Nevertheless, persuaded by equal success in planting their local varieties, legume pulses especially beans, groundnuts and green grams are also commonly grown by the households. Some of the indigenous crop seeds in the area were given as *Achich-Achich*, *Nyamula*, Maize), *Andiwo* (Sorghum) and *Roscoco*, *Amin-amin* (Beans).

These data showed to a great length that the predominant use of local seeds in Muhoroni, especially in the case of grain cereals is dwindling. Many households in the study were adjusting to new scientific innovations in seed products and farm machinery, which can increase productivity.

When improved production technology are properly utilised, a higher increase is expected in crop yields. This occurs presumably as a result of relevant and beneficial resources being added to support productivity. Thus in this study, households' preferences in subsistence farm preparation was measured as another step in technological change. It was found out that 40.7% of the respondents prepare their farms by traction followed by ox-drawn ploughing (29.3%). A further 8.7% of the households or 13 out of the 150, use both tractors and oxen in farm ploughing. Some of the households actually prepare their farms using hand tools, mainly Jembes. There were numerous complaints among the informants about the high costs of farm machinery, which discourage the use of the technology in small-scale subsistence agriculture.

Table 4.1.1 is used to show the types of machinery used by the various households in subsistence farm preparation in Muhoroni. The high costs of hiring factors from private enterprises and the sugar factories (during off-peak agricultural seasons) to plough the subsistence fields have not permitted most of the households to make use of motorised traction method, thus it is only used by a few of the households, although a general rating of its use by the respondents showed that the technology is highly widespread.

However, as a policy, all these technological products (irrigation, fertilisers, herbicides, pesticides etc.) are used in the sugarcane farms to accelerate productivity. The goal of the sugar factories' extension policy is to encourage widespread adoption and use of these methods by the small holders as a means to increasing sugarcane production and supply. Hence the extension officers do not attend to the subsistence sector as such during their visits to the farmers.

Table 4.1.1 Machines used for farm preparation in Muhoroni.

Value Label	Frequency	Percent
Ox-drawn ploughs	44	29.3
Tractors	61	40.7
Tractors & ODP	13	8.7
Tractors & jembes	14	9.3
Hand Jembes	18	12.0
TOTAL	150	100.0

The large capital outlay involved in the process of using technological factors of production appeared to have alienated the low-income households, forcing them to rely on simple hand tools and their own physical strength to manage their production systems. As seen above, this was one of the main problems, which faced subsistence farming in the area. Other problems included water logging, soil erosion, and wild animals, farm infertility, harsh weather conditions and poor topography in certain parts of the area. These problems invite additional capital investment by the households although there is a considerable lack of agricultural credit from the financial institutions in the country.

According to several households questioned on the issue, the factory loan services are only limited to sugarcane development. This was confirmed by the management of the respective factories who argued that this is the case since their loan funds originate from the sugarcane development levy managed by the Kenya Sugar Authority. On the other hand, the farmers also lamented that bank loan interests are too high and not easy to service while they blamed the Agricultural Fund Corporation (AFC) for not providing them with farm loans whenever they applied for it.

Farming in Muhoroni follows the natural rain calendar. There was no evidence of substantial use of irrigation in the area, which otherwise would greatly mitigate the impact of weather instability. During the late dry season, serious short-term food deficits face many households leading to adverse effects on the poorer segments of the population. However a few farmers in the study (2%) use simple motorised irrigation techniques to exploit the horticultural potential of their farms so as to escape the pressure of lean food supply in the dry season.

One of such farmers, Mzee Karilus Onimo was making use of simple overhead irrigation in his two-acre vegetable plot. Another respondent, Pius Otiwa in Koru location uses generator driven water pumps to irrigate his farm on the bank of river Nyando. Both the respondents considered themselves to enjoy a comparative advantage in securing real income and food availability over their neighbours who do not use the same farming technology. Were these technology to be put in use, production in the drier areas of Muhoroni like Kibigori and Tamu would greatly improve.

Plate 1



A factory worker irrigating a nucleus cane farm in Chemelil. The sprinkler irrigation method is very expensive, hence unavailable to the subsistence farmers in the area.

The use of herbicides to control weeds in subsistence farms was also investigated. This was found to be very negligible, as 125 out of the 150 households (83.3%) had no knowledge of its use in the whole area. However they were familiar with the extensive use of this chemical input in the sugarcane farms.

Apparently, there has been more emphasis on the use of productivity inputs in so far as farm preparation and planting in the area is concerned. On their own rating, 73.3% of the households reported that the use of hybrid seeds in the area was relatively high. Another 51.3% of the informants said the same on the use of mechanized traction in farm preparation. This points to the elaborate technological preparations on the subsistence farms at the start of every new crop cycle in the area.

In regard to the analysis on crop management and storage in the area, it was found that most farmers ignore the new technological innovations available to them. Many households in the study (62%) rated the application of chemical fertilisers in the subsistence sector as being low while less than 46.7% of the informants thought that commercial pesticides/fumigants are highly utilised in crop pests' control in Muhoroni. As indicated earlier on, the adoption of the various technologies in crop productivity are dependent on a number of social and economic factors.

Some respondents told the enumerators that these methods are expensive and difficult to use. Yet according to other households, the availability of effective cultural substitutes is one reason why they do not take up the new options. These substitutes include animal manure in the place of chemical fertilisers and ashes for long term crop storage purposes. The substitutes involve little cash expenditure and no institutional methods of application are acquired which make them simple to use.

According to the survey, household labour organisation in Muhoroni is on the basis of age and gender, with the male adult making most of the decisions on farm management. Women and children were the main providers of subsistence labour especially in weeding and harvesting. Menial labour was common in tasks, which require hard physical strengths and costly expenditures, usually during farm preparation. Women and children also provided the much critical labour required during the post-harvest food processing in 46.7% of the households. In the remaining households (53.3%), men assisted in the post-harvest food processing tasks. This is another clear indication that women and children is the mainstay of subsistence agricultural labour in the area. It further implies that their capacities to handle these tasks, if reinforced with the necessary skills and technological support, would greatly improve food production in the area.

In spite of the household labour reserve, many farmers in the area still engage additional labour force in their farms. Up to 70.7% of the respondents admitted doing this. The hired labourers are useful for weeding (50.9%), planting, weeding and harvesting (26.4%), planting and weeding (20.8%) and weeding and harvesting (1.9%). Weeding requires concerted labour more than the other crop management processes since it should be done within a particular optimum season for a good yield to be realised. This explains why it appeared in this data with a higher frequency. During this period, households at the higher income levels can hire labour, freeing their household members especially the school-going children to concentrate on other duties. Many respondents claimed that they weed their farms twice before harvest (53.3%). Less than 44% of the respondents weed more than twice while a negligible percentage of the sample population (2.7%) only weed once before the crops are ready for harvesting.

Proponents of new productive technology and agricultural methods maintain that an efficient extension service is a prerequisite to broader farmers' acceptance of the new values in farming practices. It was therefore incumbent on the study to analyse how the main technological innovations in agriculture are made available to the farming households and whether the sugarcane economy plays any role in the process. It was found out that agricultural advisors had visited 74 out of the 150 informants (49.3%) in the previous year.

Asked to state the nature of these visits, it was revealed that agricultural field assistants from the Ministry of Agriculture were responsible for visits to 78.4% of these households (58 out of 74). However it was learnt that these extension workers were quite few and far between, thus in the households which they managed to reach, the contact hours were inconsistent and probably inadequate.

It was found that substantial farm visits in Muhoroni by the extension agents were concentrated around Muhoroni township and Koru. This is because the two areas are near the divisional administrative centre in Minara, a fact that encourages the field officers to work more around the areas at the expense of other places. The department inevitably faced with institutional weaknesses of financial scarcity and lack of supervision. Some of the

respondents even claimed that the scarcity of the extension agents is linked to the fact that many of them have retired in the civil service retrenchment scheme without any replacement.

On the whole, the extension workers are quite inadequate and their visits infrequent and spontaneous while veterinary services have virtually collapsed. A number of non-governmental organizations (NGOs) like USAID and NCKK have also assisted with agricultural extension work in the area.

Sugarcane extension officers from the respective factories on supervisory assignments had visited the remaining households (21.6%) in the category. According to them, the officers are specifically concerned with the progress of the out growers' farms managed through the factories' loan scheme, therefore ignoring the subsistence sector. However in the follow-up study, the factory management in Chemelil and Muhoroni refuted this claim.

At Muhoroni sugar, the manager for agricultural services maintained that their field extension officers are instructed to encourage their clients to inter-crop sugarcane with other food crops like potatoes, beans and groundnuts. Further, he observed that the factories do not extend loan services to households, which convert their subsistence home plots to sugarcane. Given the lure of sugarcane earnings and the inadequate capacity of the factories to implement these measures, it is still improbable that this position actually obtains in the area.

The fact that the factory extension officers ignore subsistence production in the course of their service delivery means that these households are denied new knowledge about the beneficial crop technology available to them in the sector. It was learnt that the public agricultural extension service in the area has slumped. Older respondents, some of whom had bought their land at the establishment of the scheme in 1960's recounted the efficiency of the extension program during that period.

Besides sugarcane, the early extension workers also advised the farmers on raising livestock and subsistence crops for their own domestic consumption. Although over the time, the programme also developed its own biases, for example the identification of particular households to be 'contact centres' where they concentrated their activities with a view that

such methods would diffuse to the neighbours. However, its focus was well thought out as it integrated both sugarcane and food cropping.

Data on the local participation of the households in communal activities which can promote the new agricultural opportunities show that although 28% of the respondents (42 out of 150) had attended some kind of agricultural extension seminars, the content of what they learnt were frequently repetitive and narrow. Their narratives affirmed that the training focus on modern farm preparation methods (deep ploughing, ox-ploughing, soil conservation) more than other equally significant courses like food storage procedures and income management. Most of the respondents who had attended such courses did so in government agricultural training centres in Maseno, Ahero and Yala. This may provide some explanation on why only a small proportion of the trained respondents (35.3%) view the whole programme as useful. Otherwise the rest of the households described it as either fair or confusing. At the time of the research, a fertiliser extension project was being undertaken in Koru at different points, primarily to promote the use of chemical fertilisers in the area.

Nevertheless, as shown in 4.1.2, 90.5% of the respondents who had attended the agricultural training seminars agreed strongly to the view that food production has benefited from the new innovations. This hypothesis is accepted at .0006 significance on the table.

The table also show that 67.3% (101 out of 150) of the households agreed strongly to the view that food production in the area had benefited from the new practices. For those respondents who hadn't attended the extension training courses, this view was held by just over half of the households (58.3%). This affirms the assumption that respondents who had attended the agricultural training sessions found the new practices to be more productive compared to the other households.

TABLE 4.1.2 showing association between respondents' attendance of agricultural training and their perception of the new farming practices

	Agree	Agree Strongly	Disagree Strongly	Row Total
Yes	4 9.5 2.7	38 90.5 25.3		42 28.0
No	32 29.6 21.3	63 58.3 42.0	13 12.0 8.7	108 72.0
COLUMN TOTAL	36 24.0	101 67.3	13 8.7	150 100.0

Significance level .0006

It emerged from the field data that the divisional agricultural structure is very critical for the advancement of farming in Muhoroni. According to the Divisional Social Development Assistant at the time of this study, Ms. Peris Okul, farmers in the area earn considerable guidance and motivation from the extension officers and social assistants who meet them in the local chief's *barazas*. The divisional office also holds periodical agricultural field days in certain strategic centres to demonstrate the new practices to farmers. A related approach in this effort has been the encouragement of competitive farming through individual prizes for the best farm produce displayed at the divisional agricultural show.

At another level of analysis, it was showed that the use of farm technology to improve soil fertility in Muhoroni is spread across all the households regardless of attendance of the agricultural training courses. 108 out of the sampled households (72%) had not attended such meetings at the time of this study but they far outnumbered their trained counterparts in using the various methods of improving farm productivity. In a way this alluded to the households' own preoccupation with implementing new technology that benefits them. However, the pattern may also be explained by the disproportionate samples of the two groups.

TABLE 4.1.3 showing the relationship between how the respondents improve their subsistence farms against their Participation in Agricultural Extension Training

	Attended extension training	Never attended extension training	Row Total
Fertiliser	5 33.3 11.9	10 66.7 9.3	15 10.0
Compost & Animal Manure	24 30.0 57.1	56 70.0 51.9	80 53.3
Wait	3 11.5 7.1	23 88.5 21.3	26 17.3
Apply filter mud	3 30.0 7.1	7 70.0 6.5	10 6.7
Fertiliser & Animal Manure	7 36.8 16.7	12 63.2 11.1	19 12.7
Column Total	42 28.0	108 72.0	150 100.0

Significance .3283

Despite this observation, it should be noted that of those households which 'wait' until their farms re-fertilise as a way of improving productivity (26 out of 150 or 17.3%) without using any inputs, only 11.5% were drawn from households that had attended agricultural training. This constitutes only 7.1% of the total number of households with such training. On the other

hand. households, which use the same method and at the same time had not attended such training, were 21.3% of the total composition.

This relationship is illustrated in Table 4.1.3 showing .3283 significance level. This means that there is a high association between the two variables since they only relate slightly at the level of the null hypothesis.

In order to establish the relationship between the new agricultural methods in the area and the households' sugarcane farm holdings, farm size under cane and the use of commercial inputs were cross-tabulated. This relationship is presented in Table 4.1.4 below.

TABLE 4.1.4 showing the relationship between Size of respondents' farm under sugar cane and the use of commercial inputs

	YES	NO	ROW TOTAL
Less than 5 acres	37 71.2 28.7	15 28.8 75.0	52 34.9
5-15 acres	80 95. 62.0	4 4.8 20.0	84 56.4
16-25 acres	8 100.0 6.2		8 5.4
26-50 acres	1 100.0 .8		1 .7
More than 50 acres	3 75.0 2.3	1 25.0 5.0	4 2.7
COLUMN TOTAL	129 86.6	20 13.4	149 100.0

Significance level .0013

According to the cell distribution, a more substantive use of commercial inputs in the subsistence sector in the area is discernible for households owning more than 5 acres of sugarcane. Although only a quarter (25%) of the households with excess of 50 acres under cane do not utilise the inputs in their subsistence farms, all the households owning between 16 - 50 acres of sugarcane farms at least use some commercial farm inputs. Less than 4.8% of the households owning between 5 - 15 acres do not use the commercial inputs compared to 28.8% in the same category from households with less than 5 acres of land under cash crop.

A number of reasons can be advanced to explain why more households owning small pieces of land under sugarcane (less than 5 acres) do not use commercial farm inputs compared to the other households. Apart from the unbalanced sampling ratio of the various households in the different land categories, large sugarcane farms may imply that the owners enjoy better financial status, which is a requisite in investments such as this one. Also big farms allow the households to devote adequate land to subsistence crops. When such farms are utilised properly, they produce good benefits to the farmers thus attracting more households with expansive land to adopt similar agricultural approaches.

At .0013 significance posted in the table, there is a slight relationship existing between the two variables when the null hypothesis is true in the population. As a result, the research hypothesis would be quite acceptable. In other words, households' sugarcane farm holdings are related to the use of commercial inputs.

A similar point can be drawn from Table 4.1.5. The table shows that 62.5% of the households which use cheap traditional fertiliser substitutes, such as compost and animal manure, own 5 - 15 acres of land under sugarcane followed by households with less than 5 acres of the crop (33.8%). The rest are households owning 16 - 25 acres (2.5%) and 26 - 50 acres (1.3%). These factors summarises the utilisation of the compost and animal manure by a total of eighty households (53.3%) in the sample. Another common way of improving farm fertility in Muhoroni was simply by leaving them for some time to gain fertility. 26 out of the 150 households (17.3%) employ this method. Of these households, 92.3% were drawn from respondents who own less than 15 acres of sugarcane farms. Two other households (7.7%) owning between 16 - 25 acres of farms under sugarcane also use the same method. Generally,

the compost/animal manure (53.3%) and fertilisers/manure (12.7%) were the most applied practices for enhancing farm fertility in the area.

Other alternatives to the above methods were application of chemical fertilisers (10%), filter mud (6.7%) and the combined use of chemical fertilisers and animal manure (12.7%). A few respondents explained that they normally use urea and NPK fertilisers although the high cost of doing this is currently forcing them to seek other cheaper alternatives.

When some of the households, which claimed that they 'abandon' their infertile farms to give them time to re-fertilise, were probed, it was found that only some of them actually do so. Infertile farms are prone to attack by destructive pests and weeds. One of the worst crop weeds that was prevalent in the area is locally known as *Kayongo* or the witch weed (*Striga*). When attacked by the weed, maize plants show wilting and yellowing of leaves; the crop become stunted in growth and may shrivel and eventually die. This leads to enormous yield losses for the affected farms.

Many respondents admitted that the weed is an important indicator of farm infertility. However, some of the informants believed that the weed disappears when the affected piece of land is converted into sugarcane cultivation for some time. This has in some aspects encouraged certain households to convert their infertile parcels of land into sugarcane.

In most households, it was learnt that the weed is controllable by effective uprooting and burning. Nevertheless, many households that were visited lacked proven means of dealing with the weed, and since a strange local taboo prohibits women, the mainstay of subsistence management in the area, from uprooting it, ostensibly because this would make them barren, they refrain from controlling the weed through these methods. In some places, the witch weed was said to be effectively controllable by intensive use of animal manure.

On the other hand, the use of filter mud to improve farm fertility in Muhoroni was widespread in spite of the fact only 6.7% of the sample population said that they use it. This was particularly the case before nineteen-ninety when the sugar factories imposed stringent restrictions on the movement of the mud, diverting much of it to their nucleus farms. Although this claim was also denied during the follow-up study with the respective factory

management, several households maintained that they were being compelled to look for alternative sources of fertilisers due to this condition. This partly explain why compost/animal manure has emerged as the main source of farm fertiliser in the area since chemical fertiliser is far expensive and unaffordable to most of the households (see table 4.1.6).

TABLE 4.1.6. Showing Methods of farm re-fertilisation in Muhoroni

Value Label	Frequency	Percent
Fertiliser	15	10.0
Compost & Animal. Manure	80	53.3
'Wait'	26	17.3
Apply filter Mud	10	6.7
Fertiliser and Animal. Manure	<u>19</u>	<u>12.7</u>
TOTAL	150	100.0

At the household's level, the decision on the type of farming to adopt is determined by several socio-economic factors. A majority of the respondents who do not use commercial inputs (chemical fertilizers, herbicides, and pesticides) claimed that they are too expensive (87.5%). Thus they resort to the less costly inputs which are culturally available (animal manure, ashes etc.). In extreme cases, some households abandon the use of productivity inputs altogether. A few households (10.5%) claimed that they simply do not know where to obtain the particular inputs, which they may require, hence they do not use them. While this excuse may look naive as well as irresponsible it suggests that there are certain problems with the marketing, distribution and supply of these inputs in the area.

The analysis of the extent to which modern farming methods had spread in Muhoroni made it necessary to investigate the possible association between the social conditions of the households and their responses to the new scientific farming methods. To do this, level of Education and Age of respondents were used against variables indicating such shifts. The cross tabulation of these findings is given in tables 4.1.7 and 4.1.8 as shown below.

TABLE 4.1.7: Showing the relationship between Education of the respondents and Use of Modern Farm Inputs and Hybrid Seeds in the area.

	TYPE OF CEREAL SEEDS PLANTED LAST YEAR			ROW TOTAL	USE OF COMMERCIAL FARM INPUTS		ROW TOTAL
	Hybrid	Local Seed Variety	Hybrid & LSV		USE CI INPUTS	DO NOT USE CI	
Below std 8	17	20	32	69	55	13	68
	24.6	29.0	46.4	60	80.9	19.1	59.6
	14.8	17.4	27.8		48.2	11.4	
Below Form 4	5	1	8	14	12	2	14
	35.7	7.1	14.5	12.2	85.7	14.3	12.3
	4.3	.9	7.0		10.5	1.8	
Form 4 and above	11	6	15	32	29	3	32
	34.4	18.8	46.9	27.8	90.6	9.4	28.1
	9.6	5.2	13.0		25.4	2.6	
Column Total	33	27	55	115	96	18	114
	28.7	23.5	47.8	100.0	84.2	15.8	100.0

Education as an agent of change permits the farmers to experiment with new innovations. In this study, it was presumed that the educated farmers would find it easier to accommodate profitable innovations in their farm practices more than the rest of the farmers. There were 115 households in the sample population (76.7%) representing the respondents who had received formal education. Most of them however had only attended primary education (60%). 12.2% of them had below Form 4 level of education and the rest (27.8%) did attain Form 4 education and above.

According to the table, it appears that there was a greater probability for respondents with Form 4 education and above to adopt hybrid seed in comparison with other farmers. Also a lesser percentage of households in this group use the local seed varieties or supplement it with the hybrid variety. It should be emphasised that in the case of the remaining households, they were typically planting the local seed breeds as much as they used hybrid seeds.

This suggests that they are more resistant to change and thus they still keep to the traditional cereal seeds. Another reason which can explain this behaviour is that the more educated respondents were more likely to have alternative income sources, for example, paid employment which would provide the much needed surplus funds to invest in profitable crop technology such as hybrid seeds.

In looking at how education level of the informants relates to the adoption of commercial farm inputs (table 4.1.8), a similar pattern is repeated. The contingency table show that although farmers who did not go beyond primary school have made remarkable strides in adopting the new methods (80.9%), the remaining 19.1% of the households in this group who do not use the inputs is still a poorer level of response compared to households where the informants were in school for a longer period of time. Indeed only 9.4% of the informants drawn from those with Form 4 education and above ignore the farm inputs. This performance concur with the view that farmers' level of education has a positive influence on the adoption of commercial farm inputs.

Finally, in table 4.1.8, an illustration of the relationship between the Age of the informants and the type of cereal seeds used by their households is shown. Incidentally more than half of the respondents had attained 50 years and above (54.7%). These people indicated that they mainly

plant both the hybrid and local seed variety (48.8%) compared to well over 65% of the younger farmers between 25 - 29 years of age who also do the same. Half of the respondents aged between 30 - 49 years (50%) plant both of the seed varieties while slightly more than this percentage of respondents aged between 40 - 49 years (52.6%) do the same.

Table 4.1.8 showing the association between Age of the Respondents and their choice of Seeds

	Hybrid	Local seed Variety	Hybrid & LSV	Row Total
25 – 29 years	5 21.7 12.8 3.3	3 13.0 9.1 2.0	15 65.2 19.2 10.0	23.0 15.3
30 – 39 years	5.0 19.2 12.8 3.3	8.0 30.8 24.2 5.3	13.0 50.0 16.7 8.7	26.0 17.3
40 – 49 years	4 21.1 10.3 2.7	5 26.3 15.2 3.3	10 52.6 12.8 6.7	19 12.7
50 years & above	25 30.5 64.1 16.7	17 20.7 51.5 11.3	40 48.8 51.3 26.7	82 54.7
Column Total	29 26	33 22	78 52	150 100.0

Significance level .6282

Although respondents in the upper age limits, 50 years and above, were also leading users of the local seed varieties (51.5%), they were also the bulk consumers of hybrid seeds in the area (64.1%). Other users of the hybrid varieties in their age categories were: 40 - 49 years (10.3%), 30 - 39 years (12.8%) and 25 - 29 years (12.8%). This pattern shows that the elderly respondents are shifting to new innovations that can be beneficial to their productivity more than any particular age category covered in the study. A suitable explanation to this phenomena is that farming is the main occupation for these group of people thus they would readily implement strategies which would maximise their output. For the rest of the

households, the informants might still be employable in other economic sectors, or activities, which in turn compromise their concentration on agriculture.

The second reason that can explain this pattern is the financial clout wielded by the elderly respondents in their households. Since the land title deeds are registered in their names, they are the legal proclaimers of the sugarcane incomes meant for the households. It was gathered during the field survey that most of the younger farmers in Muhoroni are much like sharecroppers. They can only farm on parcels of land given to them by their parents according to the laid down social prescriptions since they do not have land of their own. This is not an adequate motivation hence some of them choose to concentrate their energies elsewhere, for instance wage employment in the sugar factories or in the other urban centres.

Such were the households where the wives who are normally left behind to engage in domestic production depended heavily on occasional financial remittances from their husbands. As a result, they lack enough financial resources to exploit full agricultural potential of their smallholdings. It can also be argued that the pattern of responses showed in the table attests to the high level of agricultural exposure for the elderly respondents in the area. These people have watched the evolution-taking place in the agricultural sector in Muhoroni for a long time. Some of them have even participated in agricultural crop extension programmes or made contact with the extension officers. This give them a comparative advantage in adopting the new farming practices.

Nonetheless, the .6282 significance level points to only a slight relationship between the two variables since there is a high probability or dependable relationship in the variables when the null hypothesis is true in the population.

Many households in the area believed that they would implement the new farm practices if they were to get the needed facilities. This was the feeling of 52% of the households interviewed. However 18% or 27 out of the 150 households claimed that the methods are expensive and require good financial standing to implement hence only the high-income households would manage it. Some of the respondents were also of the opinion that it is the co-operators or farmers who are constantly visited by the extension officers who are in a good position to adopt the farming approaches (16%) while according to the remaining households

(14%), only learned farmers may have the interest to adopt the new techniques. This indicates that a majority of the households would readily adopt the new farming methods except for the financial handicaps which face them.

On the spread of these innovations, 49.3% of the households were satisfied that the extension staff were better equipped to do this. The other households felt that farm demonstration plots (26%), talks with neighbours (17.3%) and a combination of extension work and farm demonstrations (7.3%) should be used to enhance transmission of the new methods.

In the foregoing, it is evident that the effect of agricultural extension and the socio-economic conditions of the households are the main determinants in the spread of modern farming methods and technology in Muhoroni. It was apparent that the new agricultural techniques that are being used extensively in the sugarcane sector have also spread to the subsistence activity. A majority of the respondents in the study have adopted some of the new farming techniques but in several cases, this has been entirely out of their own desire to improve their output than the stimulation of extension work. Where financing was concerned, it is probable that the money was derived from sugarcane earnings.

According to the findings of this study, various farming innovations used in the sugarcane industry have found their way into subsistence agriculture. It may as well be the case that the sugarcane farmers have realised that using the improved technologies in the sugarcane plantations leads to increased cane yields and as a result, hold the same expectations for their food farms. In spite of growing cane extensively, it was learnt that lack of capital among the households is the main impediment to the adoption of new farm technology in Muhoroni. This seems to suggest that earnings from the crop fall below what is adequate for agricultural capitalisation and domestic expenditures in the households.

In many households (36%), the problem was so serious that even the management of the cane farms was a great problem to their owners. As such they have passed them out to the factories to manage them on a loan system so that the costs of farm management are deducted on harvesting. Hence it may be argued that cane farming has largely failed to stem the rising tide of rural poverty in Muhoroni. This has made low investment agricultural techniques such as

inter-cropping, mulching and crop rotation to be more popular in the area for farmers, who want to improve their farm output.

As seen earlier, most of the households in the study relied on their own labour to produce their food. It appears that at the subsistence level, the farmers are obsessed neither with realising a profit nor accumulating, but simply with cultivating enough food for themselves. To do this effectively, households which can afford scientific farming methods and implements (tractors, fertilisers, herbicides etc.) do so to extort maximum yields. However this was limited households which possess relatively higher financial capacity. This allows them to engage in other productive investments apart from farming. They may hire farm labour, freeing themselves to participate in other productive activities as well.

In conclusion, findings on this topic show that sugarcane farming has opened up opportunities for the farming households to learn new scientific farming approaches and use them in subsistence production. In most of the cases, the adoption of the techniques is selective and graduated, taking a long time to implement. Most of the households however, were victims of bad financial constraints, which depress their capacity to adopt the new methods. In any case, they can also use the available alternative cultural production methods, which require little cash expenditure.

4.2 HOUSEHOLD FOOD EXPENDITURES AND THE UTILIZATION OF SUGARCANE INCOME IN FOOD PRODUCTION IN MUHORONI

The potential effectiveness of enhanced household income to ensure food security for itself was investigated as a separate hypothesis of its own. It was conceptualised that extensive sugarcane farming in Muhoroni over the last three decades was most likely to facilitate better income returns to the farmers, in which case, they would be able to afford their food requirements from the open markets or invest adequately in the expansion of food production.

Sugarcane is generally assumed to be very profitable and able to provide a stable source of livelihood to the farming community. However if such income are not put into the relevant food needs, it may turn out not to be useful to the households' food requirements but instead meet other expenses. Two salient factors went along with this consideration: Not only does the sugarcane crop take a long time to mature, get harvested and milled by the factories, it occupies the arable fields during all this period without opening it to the other crops. It is not always the case that sugarcane is inter-cropped, a factor that explains the relegation of subsistence crops to relatively smaller home plots near the homesteads.

An investigation into this relationship involved understanding the possible sources of real income in the households and how it is expended. The expenditures by the households were measured variously in the research instrument using estimable categories to endear confidential reporting by the informants. Some of the test indicators included off-farm occupation, land leases, estimate surplus production and earnings, financial savings/loans and dispensations to other socio-economic commitments in the household. Food related expenditures in this study were used to refer to the general investments aimed at ensuring domestic food reserve, farm modernisation and extension, food purchases and storage.

Data gathered during this study revealed that 63.3% of the sampled households at the time of the fieldwork depended on food purchases to meet their consumption. A further 20.7% were supplementing their domestic stocks from the previous year's harvest (for cereals) or their current farm produce (particularly for vegetable) with food purchased from the market. Only 16% of the total households in the study were relying entirely on their farm produce to subsist.

These statistics point out the big deficits in locally produced food staples in the area presumably because of short falls in production. This has severe implications on the consumption patterns of the households, which depend on purchased foodstuff since they have to buy their food regularly. This is costly and difficult to maintain. Given the vast agricultural potential of the area, this revelation was surprising although some of the households insisted that the bleak food situation was a result of an unusual crop failure in the previous year due to harsh weather conditions and supply of bad seeds. They claimed that in the previous year, rains came too late accompanied with hailstones, wind and floods which damaged crops in the area.

Food products for sale in Muhoroni originate from as far as Kitale, Molo, Eldoret and Kericho. The main food markets included Awasi, Chemelil, Girimori, Koru and Ong'enge. Indeed the railway line and road network in the area provides the necessary incentive to food trade in the region. On the other hand, the National Cereals Board has maintained a depot in Muhoroni township which sell grain cereals to the local consumers. It was gathered that these food markets meet the needs of about 78% of the households in the study.

As expected, it was confirmed that payment from marketed sugarcane crop is the main source of cash income in the area. A few households were however also engaged in other commercial crops like sunflower, ground nuts and fruits to diversify their income. The proportion of these households formed 12.7% of the sample.

Several respondents also indicated that many people in the area were looking for other alternative sources of income apart from sugarcane earnings especially after suffering considerable financial losses in unharvested cane due to the crises facing the sector. At Koru, a respondent, Mama Nerea Okoo claimed that many people around her area were shifting to coffee farming although the coffee machinery is quite distant from them (see map). Another respondent Mama Sarah Yoga, leader of a local women group in Chemelil claimed that she had persuaded many members of the organisation to cultivate sunflower with the help of the Approtec Programme in Kisumu.

This dilemma was brought out more clearly in other subsequent interviews carried with the farmers' co-operative societies in the area. The manager of Muhoroni Farmers' co-operative society explained how sugarcane farming was increasingly being shunned in favour of other crops, as it is no longer profitable to most farmers. According to him, cases in which the farmers have lost money in unharvested cane were very common in the area while farm maintenance and management had become extremely expensive for individual farmers. As such even the activities of the co-operative societies are affected. As a result, this particular society had shifted their main activity from sugarcane to dairy marketing. In this effort, the Swedish government and the Kenya - Finland Livestock Development program has been very useful to them, granting the society some financial and technical support. This has contributed to income diversification to farmers who are able to sell milk to the society, albeit in a small way since livestock is raised on a minimal basis in the area.

About 36.7% of the respondents earn between Kshs. 0 - 2,000/= per month. A further 24% get between 2,001 - 4000/= monthly while 11.3% were earning Kshs. 4001 - 6,000/= per month. Only 42 out of the 150 households or 28% of the sample were receiving more than 6,000/= per month. In reaching at these figures, the respondents were asked to conceptualise their reasonable returns from annual crop marketing and other off - farm occupation. They were then required to work out estimates in monthly income from these figures. It is on the basis of such categorisation that analysis of how income from the sugarcane crop is used was made.

Apart from the above data, the collected information also contained the households' estimated annual earnings from sugarcane so that specificity could be achieved on this aspect during the analysis. In other words, while a general income data would be required to estimate the monthly income performances of the households irrespective of the time when they harvest sugarcane, and other additional financial sources, specific data on sugarcane earnings would be easily testable in terms of investments that require large capital outlay and long - term planning.

The study found out that only a small proportion of the surveyed households (12.7%) receive more than Kshs. 200,000/= per annum from sugarcane sales. Almost a similar percentage (12%) reported that they get between 150,000/= to 200,000/= yearly. The rest of the farming

respondents earn even lower incomes: Kshs 100,000/= to 150,000/= (27.3%), 50,000/= to 100,000/= (24%) and lastly households which earn less than Kshs. 50,000/= annually were 21.3%. Surprisingly, some four households (2.7%), respondents of whom were all female (see table 4.2.1) did not know how much they earn from marketed sugarcane per annum.

The mode value for this observation is 3000. It can be deduced that this is the income region about which the highest frequency of the households in this study fell.

TABLE 4.2.1 Estimated annual total earnings from cane among the sampled households

Value_Label	Frequency	Percent
0-50,000/=	32	21.3
50,000 -100,000/=	36	24.0
100,101-150,000/=	41	27.3
150,001-200,000/=	18	12.0
More than 200,000/=	19	12.7
Don't Know	4	2.7
TOTAL	150	100

The sale of surplus in the sample population was limited to 85 informants (56.7%). The rest of the informants did not have any surplus at all (25.3%) or choose not to sell it (18%). Instead households with food surplus which do not offer it for sale store it for future use. However only 39.3% of the total informants reportedly get food surplus normally. When asked to elaborate on the differential yield responses in the area, the households, which produce surpluses, pointed out that surplus production is contingent upon good farm preparation and the prevailing weather conditions.

As stated above, a majority of the respondents in the study depended on food which are brought by traders from outside the area (78%). Only 2% of the households (3 out of 150) buy food from other local farmers and also the traders from outside the area. According to the study, only 4% of the respondents were buying foodstuffs from the local farmers only whereas the remaining 16% of the households were self sufficient in food production. These findings emphasise the vulnerability of the households to adverse price fluctuations of the market

place. It also stresses the failure of the local producers to improve their production in order to capture the ready market provided by the large population in the area.

From the sale of surpluses alone, 19.4% of the respondents were receiving an additional income of more than one thousand shillings annually. A majority of the households which sell farm surplus got below this amount of money. These households constituted 34% of the studied sample while a negligible percentage of the households (2.7%) sold food surpluses but were unable to work out their annual earnings from this practice. The rest of the households (44%) were not selling food surpluses. It was established that several households were able to meet short-term fiscal deficits required to fill domestic budgets through selling food items in this way. For example, a household could sometimes sell part of its grains to buy pulses (e.g. beans) or vice-versa depending on what it produced in excess.

Field enumeration showed that traditional root staples like cassava and potatoes were the most common marketable surplus in the area. Others were fruits (especially bananas) and vegetable. This may be due to the fact that these crops have a less elastic demand at the household level yet they must be harvested within a particular period of time to avoid waste. At the same time, they can not be stored in any suitable way for a long time once they are harvested, the non-perishability of some of them notwithstanding. In depth probe into the issue also revealed that the permission of the husband would be sought before any big sales were effected. This would sometimes be in a situation where the household is faced with urgent financial crises such as raising school fees or meeting health expenses. In small-scale transactions, for example, marketing of vegetable and fruits, this was done as a routine obligation without the involvement of the husband.

The implications of this observation clearly brought out who exercises the ultimate financial authority in the household in cases where large financial exchanges are involved. Briefly, women did not control capital in the household, except where it has been produced by them separately. On the contrast they were found to be the main tenders of food crops at this level.

The research findings show that in a majority of the households, output in food production has either remained constant or deteriorated in the past years. In the preceding section, some of

the problems, which face subsistence production in the area, were discussed. According to some 109 households (72.7%) in the sample, which claimed that they had not seen any improvement in their farm output in the previous harvest, several factors work against improvement of food production in the area. Some of these factors were given as subdivision of land, particularly in the case of polygeneous households (12.3%), land inheritance and fragmentation (16%), bad weather and water-logging (22.2%), expansion of area under sugarcane (22.2%), and the bad effects of wild animals, weeds and pests (27.2%).

Nonetheless, 41 households (27.3%) of the sample were satisfied with the improvement in obtainable yields from their subsistence plots. Most of them attributed this to the large sums of money, specifically derived from their sugarcane earnings, which they invest in food crop production (61%). A fairly significant proportion (24.4%) in the same category related the improvement to the good agricultural practices, which they use. Lastly, there were some respondents who had extended their subsistence farms in the previous crop season, hence to them, this were the cause of the increase in harvests (14.6%).

It should be noted that the observations made by these households were all in a way linked to the use of money. Extending the cultivated area or raising land productivity through modern farming approaches suggests relative growth in the household farm expenditure. Money is required for ploughing, buying seeds and other implements, paying labour, etc. However, the point is that only a small proportion of the farmers was prepared to undertake such expenditures.

Households which had harvested their sugarcane plots less than 6 months before the study reported that only 37.5% in them had observed marked improvement in their subsistence output. The rest had not. This pattern is repeated for farmers, who had harvested their sugarcane between 7 - 13 months preceding the study, except that for them, an overwhelming majority (80%) had seen no improved yields. It was these two farming groups which would have been expected to be able to invest adequate funds in their food practices given that they had sold their sugarcane lately, and presumably had not depleted their earnings.

Interestingly, this was not the case. The same pattern is repeated for the other households irrespective of when they harvested their sugarcane crop.

The significance level posted on the table is .0939. This means that the two variables are highly dependable. This is because there is only a slight measure of association between the variables; month of last sugarcane harvest and improvement in food output, when the converse of this statement is true in the population. Briefly, the cell distribution show that the performance of the subsistence farms is not quite determined by the lag in time in sugarcane marketing.

TABLE 4.2.2 showing the relationship between period of Sugarcane harvest by respondents and improvement in food yields

Month of sugarcane harvest preceding study	Improved yields in food crop production	No improvement in food yields	Row Total
0-6 months	18 37.5 43.9	30 62.5 27.5	48 32.0
7-13 months	6 20.0 14.6	24 80.0 22.0	30 20.0
14-20 months	2 10.0 4.9	18 90.0 16.5	20 13.3
Over 20 months	15 28.8 36.6	37 71.2 33.9	52 34.7
Column Total	41 27.3	109 72.7	150 100.0

The income received by the households from sugarcane sales is spread too far between long harvests, which make it difficult to save. It was observed that due to constant machine

breakdowns at the Muhoroni factory and the partial collapse of Miwani mills, there was heavy congestion at Chemelil. According to the agricultural manager of Chemelil, the factory, which has a crushing performance of about-two thousand - five hundred tonnes per day, was incapable of coping up with the supply of mature cane from the region.

About half of the respondents (48%) had harvested their sugarcane more than fourteen months preceding the exercise, meaning that the ratoon crop would over mature in another few months if they are not harvested in good time. On the other hand, the factories reject over mature cane on the basis of low millability, high fibrousness and low sucrose content. This compounds the financial predicaments facing farmers in the area. As a result, food entitlements for the households also suffer considerably due to fluctuations in the purchasing power of the farmers.

Findings revealed that a majority of the households in Muhoroni (58%) take their mature sugarcane to Chemelil. This is followed by Muhoroni (34%) while Chemelil, Muhoroni and Miwani handle between them the remaining supply of millable cane. This attests to the constant congestion at Chemelil factory. Thus it was not surprising to get complaints about large financial losses in unharvested or rejected cane from some of the respondents.

Plate 2



A heap of sugarcane (fired and harvested) left behind in the farm. Farmers usually lose a lot of resources in undelivered cane such as this

Households, which normally harvest more food crops than they would require in the short-term (surplus), were mainly drawn from respondents owning small food farms. This is illustrated in Table 4.2.3. The table shows that the probabilities of getting crop surplus by the households in Muhoroni reduces with the increase in land area brought under food cultivation. Logically, this position may appear to present certain inconsistencies although such problems can be attributed to the sampling basis in the cell distribution. From the table, the availability of surplus produce is highly depended on the cultivated food area by the household. This assumption is accepted at .0515 significance.

TABLE 4.2.3 showing Sizes of respondents' subsistence farms against food surplus harvests

	Attain Food Surplus	Do Not Attain Food Surplus	Row Total
Less than 3 acre	41 34.5 69.5	78 65.5 86.7	119 79.9
3 – 5 acres	14 56.0 23.7	11 44.0 12.2	25 16.8
6 – 10 acres	3 75.0 5.1	1 25.0 1.1	4 2.7
More than 10 acres	1 100.0 1.7		1 .7
Column Total	59 39.6	90 60.4	149 100.0

Significance .0515

However, when annual earnings from sugarcane was measured against improvement in farm output, a less similar conclusion to the above argument was reached. Data on the subject showed that 72.7% of the households had observed no improvement in their food output. Of this number, 28.4% earn less than 50,000/= per year from sugarcane. This was followed in ascending order of income by the other households as follows: 50,000-100,000 (24.8%), 100,000-150,000 (21.1%), 150,000-200,000 (10.1%) and more than 200,000 (12.8%).

This indicates that the more money the households receive from sugarcane, the less likely that they observed any improvement in subsistence output. On the contrary, 27.3% of the sample households reported improvement in their subsistence farm output, most of them being drawn from households, which earn between a hundred thousand shillings to one hundred and fifty thousand shillings annually (43.9%). Households that earn between fifty thousand to a hundred thousand shillings (22%) then followed. The least proportion in this category were households getting less than fifty thousand shillings annually from the cash crop (2.4%).

In the same category, households earning between one hundred and fifty thousand shillings to two hundred thousand annually constituted 17.1% while the rest (more than 200,000/=) were 12.2%. This means that improvement in food crop output assumed a progressive proportion for the households up to the income region of about one hundred and fifty thousand per annum. Above this, there is a deteriorating representation of the households, which had improved harvests. These responses provide a strong indication of the negligibility of the gain made by the subsistence sector, if any, from the huge sugarcane earnings.

TABLE 4.2.4 showing relationship between respondents' Cane earnings and improvement of food crop yields.

TOTAL CANE EARNINGS	Yields improved	No improvement	Row Total
0-50,000/=	1 3.1 2.4	31 96.9 28.4	32 21.3
50,001-100,000/=	9 25.0 22.0	27 75.0 24.8	36 24.0
100,001-150,00/=	18 43.9 43.9	23 56.1 21.1	41 27.3
150,001-200,000/=	7 38.9 17.1	11 61.1 10.1	18 12.0
More than 200,000	5 26.3 12.2	14 73.7 12.8	19 12.7
Don't know	1 25.0 2.4	3 75.0 2.8	4 2.7
Column Total	41 27.3	109 72.7	150 100.0

Significance .0057

A majority of the households, which participated in the study, felt that since sugarcane farming is the main occupation in the region, they are duty bound to manage the ratoon plants even when the industry is not doing well. This is a capital-intensive venture, particularly where large farms are involved. Apart from reinvesting it on the sugarcane farms, 37.3% of the households also buy food and pay school fees with their payment of the marketed sugarcane. 20.7% of the households use the money to attend to the plantations and pay school fees.

This is followed by the proportion of merry makers who often use their earnings in leisure and may marry additional wives (14.7%). This is a very prestigious affair as it culturally bestows status in the Luo community. Women respondents were particularly quick to blame this opulent culture for depleting the finances received in cane payment. Apart from these expenditures, the period following sugarcane payment is also the time to refurbish houses, build better ones or make repairs to some 8% of the households covered in the study. Some respondents invested their income on business and also use it to pay school fees and develop their farms (12.7%). Finally the remaining households (6.7%) use this money to meet their debts and pay school fees.

Payment for the sugarcane crop comes in one lump sum. According to the survey, the households' incomes tend to be targeted on big one time spending (Fees, Business, Farm implements, Building etc.). A common business in the area was the development of small-scale housings in the peri-urban centres around the sugar belt to provide rental units for other business and residence.

School related expenses (fees, stationary, uniforms, and levies) take much of what would otherwise be the much-needed savings in the household. A majority of the informants appeared to spend on school needs whether or not they had their own children in school. This indicates the level of dependence, which is placed on the sugarcane income by the school goers in the community. When enumerated on the statement "Education is the key to life,": 88% of the respondents agreed strongly. Another 7.3% also agreed with the statement and only 4.7% of the households, citing soaring unemployment disagreed with the view.

In school related expenditures alone, 23.4% of the households spend in excess of fifty thousand shillings per annum. Incidentally the same percentage use less than five thousand shillings annually in educational expenses. This cadre is composed mainly of the households with primary school -going children. This is less expensive. The rest of the households (53.3%) use between five thousand and fifty thousand shillings annually in schooling expenses. The mode value for these figures is provided as 1000.

At the household level, common expenditures were concentrated on buying food items, paying for fuel, water and health expenses. 73.3% of the households spend between a thousand and three thousand shillings monthly on these requirements. This is followed by households, which use between three thousand and six thousand shillings monthly (16%). The remaining households (10.7%) use more than six thousand shillings monthly. The mode value for these expenditures is also given as one thousand. Same as what is provided for what the total households spend on farm development. Against the background of the meagre sugarcane income and other off-farm activities available to the farmers, it is improbable that the farming community in Muhoroni enjoys a reliable financial capacity to meet these commitments comfortably.

Asked how they planned to use the next cane earnings, 45.4% of the respondents indicated that they would pay off debts, school fees and develop their farms. Other plans include buying farm machinery/business (6.7%), school fees and refurbishing house (21.3%) business and fees (15.5%) and food purchases (2.7%). Notably, 8.7% of the households did not have plans for their next earnings.

These responses suggest that either only a small proportion of the informants prepare their domestic food stock using the money they receive from selling sugarcane or a majority of them had alternative sources of food supplies and therefore did not need to stock their reserves. On the face of it, most of the anticipated expenditures did not, at least directly, relate to food availability in the households. Most of the households in the study reported that they normally receive requests for assistance from members of their extended family wherever they harvest either sugarcane or subsistence crops.

An overwhelming majority (96.7%) claimed that relatives expect material and financial support from them during this time. It was gathered that such kind of requests should always be met earnestly since they are a cultural way of cementing kinship relations. Material gifts are therefore continually exchanging between relatives. This is known as 'sumo' in the cultural context of the studied community. This type of exchange was found to be a common feature in the area particularly in the short periods following crop harvest.

Keeping in mind the role played by sale of crop surplus in the income stabilisation of the Muhoroni households, 'it was important to establish the attitudinal perception of the respondents on how the enterprise relate with the ability to feed one's household. The same thing was done with the level of education of the respondents. It was found that the sale of crop surplus and level of education have a positive association with the households' ability to feed themselves. This is explained in part by the possibility of enhancement to the households' income by the intervention of the two factors. Tables 4.2.5(a) and 4.2.5 (b) below are used to illustrate this point of view.

TABLE 4.2.5 (a) showing respondents ability to feed their families against sale of food surplus by the household

	Disagreed	Disagreed strongly	Agreed	Agreed strongly	Row Total
Sell food surplus	7 8.2 70.0	29 34.1 76.3	25 29.4 71.4	24 28.2 82.8	85 75.9
Do not sell food surplus	3 11.1 30.0	9 33.3 23.7	10 37.0 28.6	5 18.5 17.2	27 24.1
Column Total	10 8.9	38 33.9	35 31.3	29 25.9	112 100.0

TABLE 4.2.5 (b)-showing respondents' ability to feed their families against their level of education

	Disagreed	Disagreed strongly	Agreed	Agreed strongly	Row Total
Below std 8	6 8.7 66.7	26 37.7 70.3	22 31.9 55.0	15 21.7 51.7	69 60.0
Below Form 4	1 7.1 11.1	6 42.9 16.2	4 28.6 10.0	3 21.4 10.3	14 12.2
Form 4 & above	2 6.3 22.2	5 15.6 13.5	14 43.8 35.0	11 34.4 37.9	32 27.8
Column Total	9 7.8	37 32.2	40 34.8	29 25.2	115 100.0

Findings of this study further revealed that financially distressed households and farmers who are out to win favours with the sugar management tend to lease out parcels of land to other people interested in growing sugarcane, especially middle level factory managers. By doing this, they may secure cane development loans when they need it, get their mature sugarcane to be harvested in good time or fix their children in some casual employment in the factory.

Twenty-eight percent of the enumerated households had either leased out some part of their land to other people or from them at the time of this study. Leasing was mainly done, as a way of raising quick money (90.5%) required by the household to meet urgent concerns. A few households (9.5%) lease out their farms as a cheaper way of developing them. In the latter case, it would most probably entail a joint farming procedure, which follow certain agreements that entitle the farm owner to a prescribed share of the earnings.

Alternatively, the ratoon plant can be left at a time when it is still profitable to manage so that the farm owner can do so on taking back the farm. This is known as 'pur-wa-bar' in the local community. It should be noted that the leased farms are almost entirely devoted to sugarcane (95%). Subsistence production account for the remaining proportion of land leases. This phenomenon tend to discourage food production as it clearly lead to more allocation of the available land to sugarcane crop regardless of the subsistence conditions in the leasing households.

Some of the households in the study observed that certain landowners in the area were also to blame for the under utilisation of the subsistence capacity of their farms. According to these respondents, people who own land in the area but do not stay there either because they keep business or employment elsewhere contribute to an incessant transfer of money from their sugarcane farms to the places where they live. While their farms may be settled by relatives or in some cases, squatters who are even unknown to them, this only encourages minimal subsistence cultivation since the largest parts of the land would still be permanently occupied by sugarcane. One of the respondents made the following observation on the issue:

What is unique here is the idea of people owning land in this place but staying away from the place. The absentee farmers may simply not be interested in subsistence agriculture at all.

There is a wide banking network in Muhoroni provided by the National Bank, Kenya Commercial Bank and the Co-operative Bank. Also additional financial services were available in the respective outgrowers' farmers companies in Chemelil and Muhoroni, and the Kisumu Rural Farmers credit and savings co-operatives society. With such a financial network, most households in this study had access to saving facilities (81.3%), hence the first level security against bad food seasons since households with financial savings may be able to buy and restock their domestic food reserves.

However, it was also found that high savings by the farmers were momentary; usually just after the cash crop harvests. At the same time, several respondents (46.7%) complained of heavy taxation of their income, and only a few households had begun saving money through their respective co-operative societies in preparation for the privatisation of the sugar factories.

The generalisations made by some of the respondents about how indebtedness deplete their income led to a careful focus on the loan accounts of the farm households. As noted above, there are many savings and credit institutions in the area which in itself is a likely incentive to households in financial dearth to look for loans from the institutions. However, a majority of the households in the sample had not received any loans in the two years preceding this study (62.7%). The remaining households were indebted.

About 38.2% of the households, which had acquired loans, harvested sugarcane more than twenty months before the research. This was followed by households that harvested their sugarcane plots less than six months before the study (32.7%). Other households in the similar group harvested their farms between fourteen and twenty months before the study (9.1%) and also between seven and thirteen months preceding the research (20%). It is evident from this demonstration (see table 4.2.6) that households which had harvested their sugarcane a long time ago were just as indebted as those which harvested recently. The same trend is repeated for respondents who had not received any loans. In other words, the loans/non-loans status of the households was not depended on the period of sugarcane harvest by the household. The relationship in this proposition is significant at the .4761 level using the null hypothesis. This shows that the two variables are not highly dependable.

Loan repayments can effectively hamper the ability of a household to feed itself. When expected financial returns are cut back in deducted loans, the household suffers considerably. In terms of real food purchases, stocking for domestic reserves becomes limited. Thus the households repaying farm loans are more unlikely to allocate adequate money for the household food consumption needs.

In this discussion, an attempt has been made to show how income from sugarcane production in Muhoroni is linked to food farming and availability. Several relationships associated with this hypothesis have been clarified and examined. From the findings, it was evident that a large part of the sugarcane income is destined to major one-time purchases and loan/debt repayments. A lot of money is routinely committed by the households into costly ventures

related to business, education, farming and households requirements that are not necessarily associated with expanding food production.

TABLE 4.2.6 showing the relationship between period of Sugarcane harvest by respondents and Loan advancements in the last two years

Month of sugarcane harvest preceding study	YES	NO	DON'T KNOW	Row Total
12 months	18 37.5 32.7	30 62.5 31.9		48 32.0
6 months	11 20.0 14.6	18 80.0 22.0	1 3.3 100.0	30 20.0
20 months	5 25.0 9.1	15 75.0 16.0		20 13.3
over 20 months	21 40.4 38.2	31 59.6 33.0		52 34.7
Annual total	55 36.7	94 62.7	1 0.7	150 100.0

Significance level. 0.4761

However in households where there were good financial allocation to subsistence production, good harvests were realised and in some cases, saleable surplus. Many households in the study had apparently not given focus to the potential of surplus sales becoming a viable earner of substantial income to them. Instead they would basically produce food crops for their own domestic consumption.

Although sugarcane is the leading income earner in Muhoroni, the view that such incomes fluctuate and are quite unreliable is greatly borne out by the field data. Hence where there are no clear alternative sources of financial support, transitory difficulties in ensuring food availability for the households may be experienced.

In many households, the most common way of gaining alternative finances was through wage labour. Employment of this nature was particularly sought by the male folk since normatively, they are taken to be the breadwinners in the households. In the local parlance, such intermittent wage employment is referred to as '*orak*' or '*amali*', which interpret loosely as a temporary occupation. Those who are willing to sell labour are hired by financially well placed farmers to weed their farms or perform other farm duties. The sugar factories also recruit them as casual labourers in more or less the same duties.

There is a high degree of seasonality in food availability in Muhoroni. This means that the households go through a cycle of repleting and accumulating stocks during the peak seasons and using up the reserves in lean periods before the following harvest. In the less well to do households, it was possible to receive foodstuff from households with surpluses as loans, especially cereals, during deficit periods and return after the harvest. However to be able to do this, one must have built a good relationship with the neighbours and proved to be credit worthy. This strategy is a form of positive reciprocity and can be quite useful in sustaining poorer members of the society or generally households facing uncertain food stresses.

Another tactic which households in Muhoroni used to cope up with financial and food shortages during the off-crop season was farm leasing. Households faced with threatening food or monetary problem oftenly looked around for people who can lease their farms. At times, the distressed households leased off farms with mature cane since harvesting of the crop is no longer certain enough to many farmers as a result of congestion in the factories. Usually, such arrangement leads to heavy losses by the farmers as they sell off their income entitlements at a throwaway price to the leasees. However, the most common leasing procedure was the '*pur-wa-bar*' whereby the household allocates some fallow quota of their farm to the leasee to develop. This practice has shrunk the available arable farms in certain households leading to less subsistence production.

This experience was apparent in the many responses, which claimed that the large-scale farmers are better placed to ensure adequate food entitlements for their households than the small holders do ostensibly because they earn large incomes whenever they harvest. This came in response to the attitudinal question: " We are able to feed our families from the money we earn."

Physical vagrancy such as adverse weather conditions also affect yields, which in turn influence the household incomes. Long dry spells not only mean low sugarcane yields and weight, but it is also associated with fire outbreaks which can thoroughly undermine the factory harvesting plan and the farmers expectations. Unscheduled cane fires lead to critical income losses to households, which fail to transport their cane to the factories in time and the rest of farmers whose mature cane, cannot be harvested as the factories adjust their programmes to accommodate burnt cane.

This study was conducted during the long dry spell just before the long rains, which normally begin around February but delayed at this time up to around April due to the onset of the El Nino weather phenomenon. During this time, reports of accidental cane fires were as common as the sight of long stretches of uncollected or rejected burnt cane in the farms and along the roads. Hundreds of acres of sugarcane were lost in fires in Tamu-God Abuoro area in March and after that it went on almost every day in different parts of the area for a long time. The problem was more terrible in the zones that mill their sugarcane at the under performing factories of Miwani and Muhoroni.

The latter for instance, was crushing about five hundred tonnes of sugarcane per day out of a possible crushing capacity of two thousand tonnes. This was blamed on the old age and technical break downs in the machinery, which was put up in 1964. Farmers unable to transport their burnt sugarcane to the factories in time cut and pulled them out of the farms to give way to the ratoon growth. Sometimes the factories also rejected the sugarcane on the basis of the time lapse. Such cane are returned to the farm or unloaded onto the roadside. Regrettably, these would now be used as mere source of fuel/firewood in the households.

In spite of this, a majority of the respondents indicated that they continue to grow the crop in hope that a good yield later on when harvested at the optimum time would erase any losses which they may have incurred. This belief is risky as it can easily lead to loss accumulation, which one cannot recover in the end. However, it was apparent from many responses that the households are no longer keen on realising huge profits from the crop but quite simply with surviving. Analysis of the cane income expenditures showed that it finds its way into diverse uses, particularly in financing educational expenses of family members and relatives. The balance is often not adequate to cover principal investments in other productive units such as business while at the same time maintaining the ratoon crop.

Plate 3



The researcher standing next to a Sugarcane farm (notice the dry leaves) Periods of droughts usually dry off standing cane leading to financial losses.

In fact for some households, sugarcane cultivation had become a coping strategy to meeting school-related expenditures. Any substantial savings were, therefore, dependent on the total yield output realised and probably, differences in land holdings.

In the view of one of the respondents, Mama Dorin Agutu, "Sugarcane income enters the household with a lot of impact and soon it disappears." - (*Odonjo gi teko kendo ofuyo*). However, subsistence farms are like cows, which you can milk for a long period of time.

As nearly all households attested that they stay with other relatives apart from their own children (59.3%), this was an additional evidence of the reciprocal kinship obligations in the area. According to Luo customs, it would be wise to spend upon other relatives, even raising their children since doing so is like investing on them. The argument here is that the children may be of help to their social parents at another level in the future. In other words, such bonds are a security against fate and destiny. This is why it was a common feature in the area as the farming households are considered to be more endowed economically.

Also, it is a normal obligation for older children who have secured employment or married daughters to send money to their parents and other dependants left behind at home. In certain cases, married men leave behind their wives and children in the rural areas so as to reduce on the costs of living in the urban centres. Such husbands periodically send remittances to their wives who stay back home for sustenance. Financial remittances and resource distribution such as these are influential variables in the household food economy in Muhoroni, especially during periods of drought and short falls in yield output. Uncertain expenditures such as funerals and illness only aggravate this problem. Nevertheless, this practice is not a one way traffic; from home, the urban dwelling workers carry with them items such as maize flour, dried fish and chicken but on their shuttle back, they would carry manufactured commodities like sugar, salt, tea, bread and milk for their rural relatives. Thus the rural household food economy is intractably related to a wide array of social-cultural characteristics.

To help fight food insecurity in the rural areas, the ability of the households to afford their food at market prices should be considered as a pertinent issue. Sugarcane farming in Muhoroni has provided a suitable but not sufficient condition for achieving this. Indeed, the research findings show that unless urgent steps are taken to change the situation, under performance of the sugar factories, production and marketing problems facing the industry would lead to cyclic poverty in the area.

4.3 GENDER AND FOOD PRODUCTION IN MUHORONI

The next assumption to be tested in this study is related to the view that women are traditionally the main domestic producers in the rural Kenyan communities. Therefore as a matter of strategy, an improved per capita for women should be expected to support their roles significantly, including investments which aim at increasing household food production. This study sought to establish how the sugarcane economy in Muhoroni has assisted women to accomplish this role and therefore influenced food supply in the area.

In the study, half of the respondents were women. This enabled the collected data to be easily disaggregateable by gender so as to permit accurate comparison and analysis. Sugarcane cultivation, it should be emphasised, occupies the possible maximum land allocation in the area since the respective households often want to optimise their income. It was therefore essential to find out if the growing of the cash crop has actually accommodated women's participation and whether there are any reliable financial transfers from the crop to women in subsistence production.

About half of the female respondents (50.7%) felt that the sugarcane farms in the area were owned jointly between the men and their wives. They reasoned that this is the only plausible criterion of ownership, which follows bequethment of a family property such as land. In general, households in the study, which held this view, comprised 48% of the total responses. A further 41.3% of the women respondents clearly showed that only men own sugarcane farms in the area. Only 15% of the households, 40% of, which were female, observed that any interested party could own sugarcane farms in Muhoroni. This mainly referred to land held by people who bought them rather than farms passed out through family inheritance.

These figures notwithstanding, 42% of the total households in the study asserted that it was mostly men who owned sugarcane farms in Muhoroni. This is a clear indication that to a large extent, women in the area enter into the sugarcane industry merely as social partners rather than principal farmers. It was observed that the sugarcane factories and farmers' co-operatives prefer to deal with the individual landowners rather than their agents in transacting the issues related to cane cultivation and marketing. Except for the case of widows, this approach alienates women's participation in sugarcane farming. Indeed it denies them the decisive authority over finance derived from the cash crop.

On the other hand, paid employment which in many cases is associated with the development of such sugar firms in any area appeared to be unavailable for the local households. This has left most of them with no alternative but to concentrate on their farms. A remarkable majority of the informants (77.3%) reported that most people in the area work in their own farms. A few households (11.3%) were of a different opinion, claiming that the sugar factories in the area employ most of the people. This represents the same percentage of respondents (11.3%) that felt that a majority of the people in the area opts for employment outside Muhoroni.

This distribution pattern was to a large extent the observation of many respondents in the study irrespective of their gender. This could imply some form of equal accessibility to these opportunities by the male and female respondents who were enumerated. Table 4.3.1 below is used to show the various responses.

TABLE 4.3.1 Table showing where most people in Muhoroni work by Gender.

Gender of the Respondents	In their own farms	Paid Employment	Sugar factories	Row Total
Male	59 78.7 50.9	8 10.7 47.0	8 10.7 47.1	75 50.0
Female	57 76.0 49.1	9 12.0 52.9	9 12.0 52.9	75 50.0
Column Total	116 77.3	17 11.3	17 11.3	150 100.0

According to this part of the study, a majority of the households in Muhoroni basically derive their income from sugarcane production. Thirty four percent of the respondents were earning their livelihood from growing sugarcane and doing business. The sugarcane crop as mentioned earlier, has a long gestation period (about 18 - 22 months) which makes it difficult to spread payment for the marketed produce over a long period of time. During this time, some households resort to small-scale business ventures for survival.

On the whole, business was a common means of survival in the area. In certain households, it even had surpassed sugarcane as the main income earner for the family. This is because business provides a steady and regular flow of income more than sugarcane. Other augmentary sources of income to the households included sale of labour or wage labour, sale of crop surplus, social support (group structures, financial remittances etc.) and to a negligible extent, social benefit or pension.

More than twenty percent of the households depended on income drawn from sugarcane cultivation and wage labour (24.7%). This was followed by sugarcane and social support (17.3%), sugarcane and sale of food surplus (17.3%) and business wage labour and social support (4%). In about 2.7% of the households (4 out of 150), sugarcane and pension provided the main source of income.

Types of small scale business ventures in the area included the following:- commercial ox-ploughing, rope making, shop keeping, bee keeping, milk hawking, sales of fish/vegetable, poultry, sale of firewood/charcoal, commercial tree nurseries and rental housing.

Increases in domestic income levels enable the households to afford foodstuffs in greater quantity and quality. At the same time, the households can also maximise their own output since they are facilitated so as to invest on desirable farm technology. This is why it became crucial for the study to understand how household income distribution play into women's roles in domestic production.

When Gender was cross tabulated with the main sources of income, it showed that more women than men (73%) depended on social support for possible supplementary incomes to the available sugarcane returns for the households. (Table 4.3.2). This was a clear indicator to women's economic vulnerability in the area, added to the fact that men (see preceding section) mainly control the sugarcane profits. It was also gathered that job opportunities available in the factories and the sugarcane plantations disfavour women as most of the opportunities are regarded as menial tasks, for example machine ploughing, clearing land, harvesting and loading of sugarcane.

TABLE 4.3.2 showing the Two major sources of income to the Muhoroni Households against the gender of the respondents

	S/Cane & Business	S/Cane & Sale of surpluses	S/Cane & Labour	Business & Social support	Business & Sale of labour	S/Cane & Domestic surplus	S/Cane & Pension	Row Total
Male	21 28.0 41.2 14.0	7 9.3 26.9 4.7	27 36.0 73.0 18.0			16 21.3 61.5 10.7	4 5.3 100.0 2.7	75 50.0
Female	30 40.0 58.5 20.0	19 25.3 73.1 12.7	10 13.3 27.0 6.7	2 2.7 100.0 1.3	4 5.3 100.0 2.7	10 13.3 38.5 6.7		75 50.0
Column Total	51 34.0	26 17.3	37 24.7	2 1.3	4 2.7	26 17.3	4 2.7	150 100.0

Significance .0002

A majority of women in Muhoroni were quite financially dependent on their husbands. Except for the case of widows, who automatically becomes the legal heir of the household's assets upon demise of the husbands, fiscal authority and related transactions on cane farming were largely in the hands of the men. This prevailed with the tacit encouragement of the dominant patriarchal institutions controlling the farming enterprise in the area such as the out growers' companies and the farmers' co-operative societies. This explains why in spite of equal sampling proportion, it was again women that cited business and social support as the main source of income in the same table. The effects of these disproportionate income entitlements in the household imply that where the male financial providers are not keen in the development of subsistence production, the sector can be left behind in yield improving technology.

Having to wait for this cycle to complete before they eventually assume central legitimacy in the control of the household finances may have been a plausible explanation to women's eagerness to land ownership by themselves in the area. It was women respondents who least felt that they would reject the idea of women also owning farms in the area (10.7%) when the subject came up in the course of the study. This suggestion arouse hostility in a significant proportion of the male respondents (29.3%) when in fact no woman at all in the sample thought that it was a bad idea. Some of the women respondents were critical of the sugar factories for failing to employ them in certain positions (e.g. driving, cane loading) ostensibly because these duties require menial strength. They maintained that if such opportunities were opened to women, they would be able to do them with the same perfection as their male counterparts.

Since unemployment emerged as a critical issue in the area during the study, the problem was further investigated by probing the respondents. According to the findings, rampant discrimination (ethnicity, nepotism, sexism) in factory recruitment (54%), lack of time for full time employment (14.7%), lack of specialised training (12.7%) and corruption (9.3%) were the main reasons for lack of employment for the area residents served by the sugar firms. Worthy of note, however, is the fact that more women than men cited lack of time (59.1%) and inadequate training (55.6%) in enumerating the hindrances they face in seeking employment.

This points to the routine domestic preoccupation, which leave women with little time to engage in alternative employment. As well, they were lacking in suitable training, which could enable them to participate in formal employment. This may imply that the households covered in the study put little emphasis on girls' education and secondary training. Ironically 66.7% of the households which could not explain the reasons for their unemployment were female, indicating how far removed they are from the issue! These responses are shown in Table 4.3.3.

TABLE 4.3.3 showing existing obstacles to factory employment in Muhoroni against the gender of the respondents

	Discrimination	Corruption	Lack training	Lack Time	Don't Know	Row Total
Male	47 58.0 31.3	6 42.9 4.0	8 44.4 5.3	9 40.9 6.0	5 33.3 3.3	75 50.0
Female	34 42.0 22.7	8 57.1 5.3	10 55.6 6.7	13 59.1 8.7	10 66.7 6.7	75 50.0
Column Total	81 54.0	14 9.3	18 12.7	22 14.7	15 10.0	150 100.0

Further analysis show that there were no major dissimilarities in the sale of crop surplus by either female or male respondents in the study. However the male respondents were by far less represented in the category of households which were not selling any surplus at all. In other words, more of the women respondents struggle to manage crop sales so as to raise more money to meet their household obligations, a thing which most of the male respondents did not, possibly because they had alternative sources of income other than surplus food marketing. These findings are illustrated following table

TABLE 4.3.4 Showing Sale of food surplus in Muhoroni against the gender of the respondents

	Yes	No	Row Total
Male	49 83.1 57.6	10 16.9 37.0	59 52.7
Female	36 67.9 42.4	17 32.1 63.0	53 47.3
Column Total	85 75.9	27 24.1	112 100.0

It should be noted that 47.1% of the respondents who were selling surplus produce indicated that they jointly owned the piece of land they lived in (wife/husband). This constituted 35.7% of the total households in the study. On the other hand, where the men were considered to be the sole landowners (34.8%), a majority of them were as well selling crop surpluses. However it only made up 28.6% of the total households in the study.

These categories combined formed 86.6% of the sample. In the rest of the household (13.4%), it was claimed that any interested person irrespective of sex is entitled to land ownership in the area. A majority of these respondents (86.7%) were able to obtain and sell food surpluses as well. These figures show that the jointly owned farms were able to perform slightly better, probably as a result of the motivation provided by the sense of ownership that both the men and women attach to their piece of land. This motivates the household to work effectively as a cohesive unit.

Generally, female respondents in this study appeared to be earning little income from sugarcane marketing compared to their male counter parts. As a result, they lacked the required agricultural capital outlay thus greatly impeding their contribution in terms of productive investments relevant to food production in the area.

According to table 4.3.5, sex and total earnings from sugarcane were highly dependable as per the findings of the study. At .0200 significance when the null hypothesis is true in the population, the proposition is accepted as a true explanation of income distribution in the area.

In comparison to men who earn more than one hundred and fifty thousand shillings annually from sugarcane (33.3%), female respondents in the same group were about 16% of the total sample. Notably, women respondents who did not even know the amount of money received in their households annually from cane marketing (2.7%) were all women (see table 4.3.5).

TABLE 4.3.5 Estimated total earnings from Sugarcane against Respondents' Gender (estimates in Kenya Shillings)

	Less than 50,000	50,001 to 100,000	100,001 to 150,000	150,001 to 200,000	More than 200,000	Don't Know	Row Total
Male	19 25.3 12.7	13 17.3 8.7	18 24.0 12.0	13 17.3 8.7	12 16.0 8.0		75 50.0
Female	13 17.3 8.7	23 30.7 15.3	23 30.7 15.3	5 6.7 3.3	7 9.3 4.7	4 5.3 2.7	75 50.0
Column Total	32 21.3	36 24.0	41 27.3	18 12.0	19 12.7	4 2.7	150 100.0

Significance

2.000

The fact that data gathered from the study also showed that more women than men strongly disagreed with the view that they are able to feed their families from their sugarcane earnings (42.7% to 26.7%) alludes to a significant disparity in the financial capacities of the two groups. Only a few women compared to their male colleagues felt confident in their ability to feed their households (48% to 65.3%). Whereas this view may have been limited to the informants' perspectives on direct food purchases and stocks, it was clear that even then, women respondents were less confident in their ability to provide adequate food in the households. Yet over half of the households in the study (64%), across the gender categories, agreed that women are the main food producers in the area. It was found that men tend to concentrate on the sugarcane farms leaving food production almost entirely to their wives. Some of the female respondents even claimed that their husbands 'disappear' into sugarcane activities immediately after the subsistence farms are cleared and ploughed.

Findings on the financial credit and saving patterns among the households revealed that women seldom have any money left for savings. Neither does they particularly benefit from the credit facilities aimed at farm development. Fifty-one female respondents (68%) compared to forty-three male respondents (57.3%) in the study had not received any farm loan as at the time of the fieldwork. Only twenty-three women (30.7%) against thirty-two men (42.7%) were servicing loans taken in the previous two years for agricultural development. As for savings, a 58.7% majority of the women respondents did not have access to financial savings. Nevertheless this closely compares to the men, about half of who also lacked any savings (53.3%). These findings are contained in tables 4.3.6 and 4.3.7

Table 4.3.6 Gender of the Respondents against Loan advances in the previous two years

	Received Farm Loan	Not Received Farm Loan	Don't Know	Row Total
Male	32 42.7 58.2 21.3	43 57.3 45.7 28.7		75.0 50.0
Female	23.0 30.7 41.8 15.3	51.0 68.0 54.3 31.0	1.0 1.3 100.0 0.7	75.0 50.0
Column Total	55 36.7	94 62.7	1 0.7	150 100.0

While this is the case, the relationship presented in table 4.3.7 is only slightly dependable interpreted against .8715 level of significance provided on it.

TABLE 4.3.7 showing households' accessibility to financial savings against the gender of the respondents

	Do have savings left	Usually have Savings left	Rarely have any savings	Very rarely have any savings	Row Total
Male	14 18.7 53.8 9.3	21 28.0 52.5 14.0	12 16.0 52.2 8.0	28 37.3 45.9 18.7	75 50.0
Female	12 16.0 46.2 8.0	19 25.3 47.5 12.7	11 14.7 47.8 7.3	33 44.0 54.1 22.0	75 50.0
Column Total	26 17.3	40 26.7	23 15.3	61 40.7	150 100.0

Significance .8715

In order to find out whether additional evidence was available to support the underlying assumptions in this hypothesis, other data on women's domestic roles were sought. It came up that woman and children in Muhoroni provided the main labour requirements in the household subsistence activities. In post-harvest food processing, their contribution was indispensable. Women and children in 46.7% of the enumerated households were involved in this process, which comprise the processing, storage and marketing of the harvested crop. These tasks were largely being seen as women's obligations in the area. Hence it was only in other farm duties like planting and weeding where male participation was willingly conceded. It should be emphasised that commercialised labour in several households made some of the gender lines in labour organisation in the area irrelevant as

anybody could offer their labour duties regardless of their sex. Some of the women informants complained that their urban dwelling husbands frustrate their effort, thus the under-exploitation of the agricultural potential of their farms. According to their view, men who ignore domestic subsistence farming, or intermittently send little money to their wives who remain at home do not motivate production in the rural areas.

In depth probe on the issue revealed that households where women's participation in decisions on how the available household income is expended tend to integrate extensive subsistence production into their agricultural budget than other households. This is backed by the traditional view that women would be insistent on making useful financial allocation for subsistence production in the budget since they are mainly involved with the activity.

The much-held view that men have various alternative sources of finance presented another line of analysis. The first idea was by examining differences in level of education between the male and the female respondents in the study. This was done with a view to predict on the alternative sources of income, which may be available to the population under study. This analysis revealed that a majority of the women respondents (89.4%) attended only primary education. This compares very disfavouredly to the men, of whom only 39.1% attained just this level of schooling.

It appears that like in many other rural Kenyan communities, female education was not well developed in the area. Hence the women were married off so as to be homebound where as the men had been conditioned to attain higher levels of education. In other words, it was assumed that the women would welcome the opportunity to be housewives - wives of farmers - rather than learned farmers themselves, for instance.

Knowing that academically successful respondents tended to have a clear advantage in gaining employment in the sugar factories in the area (see previous section), the possibility of women's career stagnation and financial dependence is again given credence by this situation. Alternatively, this raised the possibility of men, upon whom household financial standing are strongly pinned, being given special attention and encouragement by the society, hence their consequent academic success which enhance their financial position in the households.

TABLE 4.3.8 Level of Education of Respondents against two major sources of the household income

	S/Cane & Business	S/Cane & Social support	S/Cane & Sale of labour	Business & Social support	Business & Sale of labour	S/Cane & Domestic surplus	S/Cane & Pension	Row Total
Below Std 8	23 33.3 54.8	11 15.9 84.6	19 27.5 57.6	2 2.9 100.0	4 5.8 100.0	10 14.5 58.8		69 60.0
Below From 4	4 28.6 9.5	1 7.1 7.7	4 28.6 12.1			3 21.4 17.6	2 14.3 50.0	14 12.2
Form 4 & above	15 46.9 35.7	1 3.1 7.7	10 31.3 30.3			4 12.5 23.5	2 6.3 50.0	32 27.8
Column Total	42 36.5	13 11.3	33 28.7	2 1.7	4 3.5	17 14.8	4 3.5	115 100.0

Table 4.3.8 suggests that most of the informants who learnt beyond form four (46.9%) were engaged in business and sugarcane cultivation. This also applies to respondents with more than primary level of education (28.6%) or even below (33.3%). However when other sources of income, apart from business and sugarcane profits were considered; most of the households which depend on social network (84.6%), Sugarcane and Sale of labour (57.6%), business and social support (100%), business and sale of labour (100%) and sugarcane plus sale of domestic surplus (58.8%) were drawn from informants who had attained only primary schooling.

It is remarkable that all pensioners among the households had attained more than this level of schooling while a significant proportion of the households earning their livelihood from sugarcane cultivation and wage labour (42.3%) are also drawn from this category. This caters for the number of respondents in formal employment in the sugar industries and other economic sectors (teachers, civil servants, clerks etc.). These findings confirm that the more educated the respondents were, the broader their employment opportunities grow, hence income diversification. Once again, it should be noted that the only informants in the cell distribution whose main source of income outside sugarcane cultivation was social support were all women.

A possible explanation to this position appeared when the household daily time budget was analysed. It was learnt that more men than women spend more hours in market production and leisure. And yet, this was the reverse when it came to home production. As a point of emphasis, it should be recalled that home production does not attract any financial value, hence women in the study spent more time in duties that earn little, if at all, in real income. These are demonstrated in the Table below:

Table 4.3. 9 showing Domestic Time Budget in Muhoroni against the Gender of the respondents

Hours spent in market production per day					
	1 - 4 hrs	5 - 9 hrs	More than 9 hours	Nil	Row Total
Male	9	34	32		75.0
	12.0	45.3	42.7		50.0
	33.3	45.3	68.1		
Female	18.0	41.0	15.0	1.0	75.0
	24.0	54.7	20.0	1.3	50.0
	66.7	54.7	31.9	100.0	
Column Total	27	75	47	1	150
	18	50	31.3	0.7	100.0
Hours spent on home production per day					
	Nil	1-4 hrs	5 hrs or More	Row Total	
Male	68	7		75.0	
	90.7	9.3		50.0	
	88.3	13.0			
Female	45.3	4.7			
	9.0	47.0	19.0	75.0	
	12.0	62.7	25.3	50.0	
Female	11.7	87.0	100.0		
	6.0	31.3	12.7		
Hours spent in Leisure per day					
	Nil	1-4 hrs	5 hrs or More	Row Total	
Male	13	42	20	75.0	
	17.3	56.0	26.7	50.0	
	28.3	53.2	80.0		
Female	8.7	28.0	13.3		
	33.0	37.0	5.0	75.0	
	44.0	49.3	6.7	50.0	
Female	71.7	46.8	20.0		
	22.0	24.8	3.3		

Market production in this study was measured by the proportion of time spent on employment, sugarcane farm management, and business, raising livestock, vegetable production and marketing. In this regard, 32 out of the 75 men interviewed (42.7%) were spending more than nine hours against only 15 women out of the same number of respondents (20%) who did the same. About half of the male respondents, (45.3%) engaged in market production activities for between five to nine hours compared to 54.7% by the female respondents. Finally only 12% of the male respondents against 24% of their female counterparts spend less than four hours in market production. Further, one of the female respondents (1.3%) did not spend any time at all in market production.

These statistics show that women's involvement in market production was more partial compared to men. A majority of women respondents spent too little time in the market oriented activities suggesting that they may not have had active and direct roles in this sector. On the other hand, men's participation in the same sector were characterised by high time expenditure (more than 5 hours) and a higher representation. In fact, this may be an additional illustration to their keenness on activities, which have certain capital gains!

The data on the households' time budget showed that 26.7% of the male respondents in the study spent about five hours every day on leisurely activities. Leisure in this study was taken to comprise time spent on recreation, social activities, resting and personal care. On the contrast, only a small percentage of women respondents (6.7%) found time out for leisure for about five hours every day. In 42 households where the respondents were male (28% of the sample), 1 -4 hours was being spent on leisure daily. Less than 17.3% of the male respondents spend no time at all in leisure. At the same time, 49.3% of the households where women were the respondents spent 1 - 4 hours in leisure daily (about 24.7% of the sample). While in a remarkably significant majority of the same households, 44%, the women respondents claimed that they did not have time to rest. In other words, a majority of the women respondents were more pre-occupied with other activities that they did not have any time left for their leisure.

As far as home production is concerned (cooking, childcare, household chores etc.), it was observed that these activities have attracted little male participation (9.3%) meaning that in most households, these responsibilities are shouldered by women. Accordingly, only seven male respondents out of the seventy five male respondents enumerated on this aspect admitted that they perform limited home production tasks, but for less than four hours per

day. The rest (90.7%) avoid these duties and probably prefer to do other things. However most of the female respondents were involved in this sector, almost as a routine, with 25.3% of them dedicating not less than five hours of their day to these activities. Only 12% or nine out of the female respondents had nothing to do with home production duties.

These findings demonstrates the inability of women in Muhoroni to make significant in roads into more awarding activities of market production. It was clear that most of the women who did so were only involved on part-time basis, mainly in food market activities and basic subsistence production. Considering the impact of cultural sanctions prevailing in the community, women in the area are confined in home production activities

Women's roles in household management involve repetitive and tedious assignments, which consume a lot of time. This is one reason that confined a majority of the female informants to activities, which did not leave them with time for any leisure. It is also apparent that at the same time, women in the area lacked rational avenues of gaining adequate financial capacities to handle their production units, which is largely confined to food cultivation and distribution.

Plate 4



Pile of rejected Sugarcane. These end up being used as firewood by the locals (women usually perform this tedious and routine work)

Having considered these facts, it would also be crucial to analyse the actual position of the women in the area's household sugarcane economy. Thirty-four out of the seventy five women respondents enumerated on the issue of women's access to earnings from the sugarcane held the opinion that they are deprived of the money received from the marketed cash crop. This view was supported by an additional seventeen male respondents. A few households (3.4%), mainly comprising of women informants were more timid in their responses preferring to state that they did not know whether women in the area earn anything from sugarcane harvested by the household.

Respondents who believed that women are not deprived of the financial rewards from the cash crop were largely men (76%) against a percentage of 49.3% of the women respondents. The proponents of this view argued that the benefits that accrue from the harvested cane reach all the household members, whether they handle the money or not. Such benefits may be in terms of food purchases, house repairs, payment of school fees or other material investments. Hence the issue of how the money is distributed once it is received from the factory was irrelevant according to their view. This was a long held perception among many people in the area. Although just a belief, it could promote the reluctance of the male recipients of the cane income to involve other members of the household in their financial decisions. In effect, this weakens women's capacity to influence expenditures in their household.

One of the respondents in this study, Mzee Moses Angura, a polygeneous large scale farm holder with more than a hundred acres of land explained why he would be reluctant to involve his wives in financial decisions of the household. According to him, proceeds from the farm trickle down to his wives in the various ways in which money is ordinarily spent within a household. In any case, the enterprise can not cater for the personal views of the wives since they do not hold the land title deed. However, sometimes he may share the income with them but this is entirely dependent on himself.

In yet another interesting response, James Okumu, a small holder in the area claimed that, "It is women and their children who finish the sugarcane payments. No one can deplete the entire income alone." This observation is vague, but like the above argument, it does not deny the lack of direct financial control by women in the area. Indeed it suggests that men normally monitor its distribution and expenditure in a way that include all members of the household.

In spite these arguments, some respondents held even more cynical and uncompromising views. A female respondent Fleria Ageng'o complained that women get little, if at all, in cash gains from a household sugarcane harvest. She claimed that a majority of women in the area do not even know the colour of a cheque but would only tell that payment for their supplied sugarcane has been received from the changing life style of their husbands. It was learnt that polygeneous households suffer most from this rigid financial authority of the husbands since the many wives may all be depended on him for their financial needs.

The findings show that disputes related to distribution of the cane payment sometimes arise in the households. A majority of these disputes, it was revealed, involve wives and their husbands (49.4%). This category includes polygamy-related conflicts over income distribution. Other financial disputes that were common in the area involve children and their parents (29.2%), children and their widowed mothers (9%) and joint farmers (12.4%). It was learnt that widows are very susceptible to financial wrangles because the adult sons and other relatives oftenly claim for their share of the cane proceeds whenever mature cane are harvested and supplied to the factories. The gross level of unemployment, which leaves sugarcane income as the principal income earner in the area, exacerbates this situation. Only 40% of the households reported knowledge of such disputes in the area. The village headmen and even Farmers' co-operatives handle most of these conflicts domestically although some of them spill over for arbitration in the law courts. Thus they did not appear to be very much known by the respondents.

As a result of the frustrating experience with their financial expectations from the household sugarcane establishments, women in Muhoroni are apparently shifting their economic base from the household level to commonly organised income generating centres. It can be argued that this is a deliberate strategy to initiate alternative and more responsive centres of capitalisation for the women that are independent of their families. Hence the findings showed that over half of the households in the study (92 out of 150) or 61.3% either participates or knew some women's income generating groups operating in the area. Other social groups in the area which were also engaged in income generation included mixed welfare organisations (22.7%), youth groups (10%) and church associations.

Some women in the study would practice limited productive cash cropping outside the household unit (in social groups) but refrain from tasks, which can be interpreted to present direct affront on male dominance in the household. Without the requisite resources, women's contribution in the household production system is reduced, as they are unable to use beneficial crop technology and implements, which require elaborate finances.

This view was implicit in an interview with the Divisional Social Development Assistant. She estimated the number of registered women groups in Muhoroni to be about three hundred. These are quite many and too close within the administrative locations. Some of the women groups deal directly with food related activities like raising subsistence/vegetable crops, livestock, poultry and bee keeping. According to the offices, certain women groups in the area have in the past been assisted by NGOs like Africa NOW, CARE (K) and Maendeleo Ya Wanawake. The Kenya -Finland corporation also handles certain programmes in collaboration with certain women groups in the area. Such support has placed the women organisations at the centre of socio-economic development in the region, allowing them to create and control their own economic space.

Ironically, it was sugarcane cultivation that attracted most of the women's income - generating groups (38.1%). It was learnt that most of the women groups manage the crop on leased land, either acquired through the local administration or their own social network. These attest to the desire by women to engage in independent income sources that are not tied to the cultural aprons of the society as would be the case with the household means of production.

Another informal fund - the pooling strategy or the merry-go-round was found to be popular with about 23.8% of the respondents who participated in the study. This exercise which is locally referred to as '*Nyoluoro*' ensure short - term medium loans to members in financial distress. Memberships in such groups were more restricted. Normally it was regulated by the degree of social distance, confidentiality and kinship bondage between and within the group members. However, such groups provide a new and cheerer unit of production to women whose potentials have been depressed by the traditional norms and regulations.

The women come together in a sense of inequality of opportunity and traditional subordination to improve their own lives. Although in the operational sense some of the

women groups also include men (usually husbands of the other members), these income - generating organisations are the new loci of women's economic productivity and solidarity in the area.

Other women groups were involved in small-scale business, horticulture and poultry (33.3%.) Finally a few of the women groups were making simple profits out of managing unique income units like cattle dips, tree nurseries and the Bamako initiative (B.I.) health dispensaries (6.1%).

The last area to be considered in this section that is also related to women's roles in the household food production in Muhoroni is linked to the post-harvest processes among the sampled households. It was found that a majority of the respondents use sacks and drums to store their food grains (84.7%). Only a small minority (11.3%) of the sample was using the modern rodent-preventive granary while an even narrower percentage (4%) of the respondents used traditional cribs. However, where either granaries or the cribs were in use, this was normally in the early harvesting period when farmers hurry up to clean their fields of any crops. Subsequently, food cereals are processed and sun dried before they are stored in the sacks and drums. In depth probe on the issue revealed that the method is more popular with the respondents because sacks and drums are more convenient and safe since they are stored in the house. Also they are cheaper to use, in terms of the time, money and energy required in setting them up.

It was learnt from certain respondents that termites often destroy granaries/cribs unlike the sacks and drums. Apart from these reasons, the preference for sacks and drums was also linked to the idea that the facilities ensure accurate predictability and stock-taking which are necessary for long term planning by the households. Finally in a few households, the method was found to be more suitable than the rest since they only realise small yields which do not require elaborate storage techniques.

Whatever the storage mechanisms used by the various households, a majority of the informants were keen on using modern preservatives to store their cereals. Ninety-eight out of the one hundred and fifty respondents (60%) use sun drying and commercial pesticides (mainly super actril) to preserve their produce. This was followed by the proportion of households, which use firewood ashes (30.7%), which is a traditional method of grain preservation in the community. The remaining households (9.3%) use both the

modern storage fumigants/pesticides and ashes depending on their financial abilities as at the period of harvesting and the amount of food grains to be stored. This stage of food processing also requires a reasonable capital outlay to reduce on wastes of yield to rodents and other predators.

In conclusion, it should be noted that most households in Muhoroni grow their own food crops and satisfies their hunger in direct relation to their efforts. This observation invites concerted action in building the capacities of women who traditionally bear the role of food production in the household. In a broad outline, it was apparent that the only lump sum capital available to the households is derived from sugarcane farming although the enterprise is firmly in the hands of men. Hence the distribution of this income is at the prerogative of the eldest male in the household. Following the above arguments, it would be plausible to suppose that domestic food production in the area would improve considerably, in the longer term, if women's cash entitlements were consolidated. This approach will certainly free the potential of women's productivity in subsistence food agriculture.

Increasing assistance to women tends to mean that they should also own land and possess title deeds. On the contrary, there is need to restructure the existing laws, institutions and expenditures so that women's needs are fully recognised and met. The potential pay offs for the household is high: not only in general agricultural production but also in food security, which is a matter of traditional concern to them. This would in turn promote their accessibility to opportunities, services and control of the economy.

4.4 THE EFFECTS OF WILD ANIMALS ON FOOD PRODUCTION IN MUHORONI.

A wide range of ecological conditions exists in the long stretch of land, which forms the Muhoroni sugar belt. The relatively high amount of rainfall received in the area is conducive to the growth of large thickets and bushes overlying the hills and uncultivated fields around the region. These environments encourage animal habitation. Although sugarcane farming is rapidly changing the ecological landscape of Muhoroni, many animal species which used to live in the area have found habitat in the sugarcane farms and the isolated bushes around the area. These animals, it was found out, are a great menace to subsistence food production in Muhoroni.

Food losses in Muhoroni were broadly investigated so as to establish the contribution of wildlife to the phenomena. In the preceding section, the analysis had been centred on the other factors, which also lead to food losses in the area and how the respondents handle them. Asked whether wild animals were to blame for the food problem among them, households, 90% of the respondents replied in the affirmative. They explained that wildlife damage food crops in various ways even before they mature for harvesting and also then, certain animal species still damage the crops in the open fields. The study revealed that the main food staples in the area, maize and beans were also the principal targets of the wild game invasion.

Over the past years, the main predating animal, which is associated with the cane plantations, and has destroyed a lot of food crops in the area is the wild pig. The informants claimed that the animal begin to feed on the maize crops from the time the kernel appear until the crop is harvested and thus destroys them in the process. It also feeds on root tubers like cassava and potatoes, completely destroying them as well. This has denied a number of households the two crops, which happen to be the leading food supplements in the area. Apart from maize and beans, the cultivation of other pulses (groundnuts, peas, soya beans, green grams etc.) are not spared either; small game animals especially antelopes and Impalas which roam in the night are quite destructive when they come across vegetable farms and pulses. Many households that took part in the survey complained that they were being forced to give up on the cultivation of some of the plants because the foraging wild game sometimes completely damages them.

It was learnt from the respondents that most of these animals hibernate in the sugarcane farms during daytime only to invade the nearby farms at night. This leads to serious devastation of the crops. Animal invasion of the farms assumes a normal routine during the crop season hence its disastrous magnitude. Considering other pressure on the subsistence sector in the area, and given the population growth within the households (reproduction) wild animals,' contribution to food losses is a significant obstacle to adequate food supply in Muhoroni. This is the highlight of this section. The predating animals in the area were identified in the local parlance as 'mbidhi' (wild pig), 'mwanda' (antelope), 'Ngau,' 'Abur' (Impalas), 'Ong'er,' 'Dol' and 'Kima' (monkeys).

Other significant causes of subsistence crop losses in Muhoroni besides wild animals are birds and rodents (42.7%), bad weather (40.7%) and insects and moulds (16.7%). Ratlike rodents referred to as 'Anyier,' 'Fuko' and 'Chiewo' (porcupines) which also live in the sugarcane farms were another source of bad food losses for farmers in the area. These ruminant animals dig the topsoil and forage on the roots of the crops. After some time, the affected crops wilt and die off with regard to weather problems, many households complained about its unpredictability and adaptability. Farmers who live next to rivers or streams complained of flooding and erosion in their farms during the long rains. In other places, spring water ('achiya') burst in the farms, making it difficult to tender. Incidentally, on probing the households on how they solve this problem, it was learnt that in some cases, such parcels of land are converted into sugarcane since it is more tolerant to weather changes. This has led to further domination of arable land by sugarcane hence affecting food production and supply.

Given the widespread nature of the problem, it was necessary to find out how the farmers handle it. It was observed that most households in the study had evolved different means of handling the problem including the construction hedge fences around the farm plots. At least 45 out of the studied sample of 150 households (30%) had constructed some kind of fence around their farms to deter the animals. Many households were of the view that the wire link fence is the only fool proof mechanism that would contain the wild game menace. But like all other agricultural technology, it requires a good capital outlay to put up a fence around the farm. As well, this approach cannot accommodate some of the cultural and social dynamics in the area such as land fragmentation due to family inheritance, land leasing and the plight of the squatters.

These hindrances notwithstanding, the fencing method was widely preferred in Muhoroni and was only second to the cheap traditional practice of watching over the subsistence fields at night (31.3%). Sometimes the well-to-do households employ casual guards to keep watch over their food plots and scare away animals, which stray into the cropped area. In small vegetable plots, animals could be scared away by lighting bonfires rather than actually keeping vigil overnight in the farms. The other commonly used methods in the area were hunting/traps/scarecrows (16%), dogs (4%) and total avoidance of the seed which are frequently damaged by the wild game (2%). The remaining proportion of the households (16.7%) either did not have any means of warding off the animals or simply did not experience the problem.

Characteristically, the adoption of any of the suggested solutions was dependent on several socio-economic factors. For example, the 1977 wildlife act which prohibited free hunting made the method to operate clandestinely and less frequently in the area. Although hunting was actually a cultural sport and a food resource in the community, the activity has declined not only because it became associated with primitivity but also due to the fear of prosecution by the government among the hunting households. During the study, we came across some of the hunting bands combing the sugarcane plantations for wild life. Hunting in the area is practised cautiously and intermittently following areas where animals are reported to damage food crops.

In the dry off-harvest season, the practice is heavily relied on as a process of food exploitation by the low-income households, particularly the very small scale farm households in Awasi and the rest of the low land areas in Muhoroni (see map). Many households in the area apparently do not look upon game animals as a potential source of food but think of them merely as predators. The fact that wild game is potentially an important and beneficial source of food did not appear to mean much to these households according to the study.

It was learnt from the divisional social development assistant that the respective chiefs of areas affected by the wild animals are normally required to raise the complaint with the districts' wildlife office for formal intervention. Despite the fact that such a channel can provide a decisive move in controlling the problem, action do not usually follow immediately for some unspecified reasons. As such it remains to the individual farm households to solve the problem in their own ways. As for the households, which watches

over their subsistence farms, bad weather still present their worst problem. Weather conditions like rain and extreme cold in the night affect the watchmen and increase their vulnerability to attacks by common diseases like flu, cough and malaria which is likely to compound the cost involved in scaring away the roaming wildlife. In other words, the wire-link fencing method, though expensive to most households, remain as the most reliable and convenient means of preventing wild animals which forage on the plants and damage food crops in the area.

Tables 4.4.1 and 4.4.2 and the respective graphs summarises the solutions to crop destruction by wildlife in Muhoroni and the problems associated with implementing them.

TABLE 4.4.1 Showing suggested solutions to wildlife destruction of food crops in Muhoroni

SOLUTIONS	FREQUENCY	PERCENT
Hunting/Trap/Scare		
Crows	24	16.0
Watch at night	47	31.3
Dogs	6	4.0
Fencing/Hedging	45	30.0
Avoid certain Crops	3	2.0
Not Applicable	25	16.7
TOTAL	150	100

TABLE 4.4.2: Showing problems associated with the suggested solutions

	FREQUENCY	PERCENT
Ban free hunting	18	12.0
Weather diseases	42	28.0
Expensive & Time Wasting	65	43.3
Not applicable	25	16.7
TOTAL	150	100

According to table 4.4.2, most of the respondents claimed that implementing the suggested solutions is expensive and time wasting (52%). The other problems linked to the exercise were bad weather and diseases (33.6%) and the ban on free hunting (14.4%). These data indicate that the main reason why wild game is still an obstacle to the full exploitation of the subsistence potential of Muhoroni is because farmers in the area lack money to effect the preventive measures, which would curtail the problem. At the same time, the respondents regarded such an exercise as time wasting. This is more to do with the feeling that there is no justification in the animals' destructive tendencies in the first place than the purposiveness of the method. The farmers felt that the animals can be kept at bay if there is enough good will by a majority of them to do so but not isolated cases. Indeed it was learnt that some animals manage to jump over the fences or dig through them. It was this observation that made some households to avoid certain crops in favour of others depending on the types which are normally destroyed by the animals.

Hence there are cases where wildlife have prevented suitable area from being exploited for food agriculture. Fallow high quality land associated with the menace or the total avoidance of particular crops presents realistic fears of food decline in the area.

In order to find out the association between the farm holdings under sugarcane and responses on problems faced in subsistence food production, the two variables were cross-tabulated. Table 4.4.3 shows the results.

Table 4.4.3: Showing Size of planted cane by the holdings against problems facing their subsistence agricultural practice

	Water logging & Erosion	Wild animals	Infertility/ pests & weeds	Farms too Small	Weather/bad Topography	Poor seeds	Expensive inputs /manure	Row Total
Less than 5 Acres	8	7	14	6	6.0	1	8	50
	16.0	14.0	28.0	12.0	12.0	2.0	16	35.2
	30.8	23.3	35.9	66.7	50.0	12.5	44.4	
	5.6	4.9	9.9	4.2	4.2	0.7	5.6	
5 - 15 acres	17.0	19.0	20.0	3.0	6.0	7.0	9	81
	21.0	23.5	24.7	3.7	7.4	8.6	11.1	57
	65.4	63.3	51.3	33.3	50.0	87.5	50	
	12.0	13.4	14.1	2.1	4.2	4.9	6.3	
16 – 25 acres		3	3			1		7
		42.9	42.9			14.3		4.9
		10	7.7			5.6		
		2.1	2.1			0.7		
26 – 50 acres	1							1
	100							0.7
	3.8							
	0.7							
More than 50 Acres		1	2					
		33.3	66.7					
		3.3	5.1					
		0.7	1.4					
Column Total	26 18.3	30 21.1	39 27.5	9 6.3	12 8.5	8 5.6	18 12.7	142 100

Significance level. 0.2796

According to the table, a greater percentage of complaints about the animal problem are drawn from households with farms ranging between 5 - 15 acres (63.3%), followed by respondents with less than 5 acres (23.3%). Only 10% of the households owning between 16 - 25 acres reported that wildlife damage their crops. A final 3.3% of the households faced with this problem own more than 50 acres of land. It is apparent from these statistics that the small scale farming systems consisting of less than 15 acres of land were the ones faced most by the problem of crop destruction by the wild game. This can be explained by the fact that respondents in this category may not possess adequate disposable funds, which are needed for the implementation of the safe preventive measures against the roaming wildlife.

The large-scale farmers are able to earn large amount of money when they harvest their sugarcane in good time. At the same time, they maybe in a better position to secure capital through loans guaranteed against the farms. Generally, the sample of households with more than fifteen acres of land in the study were also disproportionately smaller than the category of households owning less than fifteen acres of land. However, more importantly, the roaming wild animals adversely affected all of the households.

The relationship summarised in the table posted a significance level of .2796. These affirm that the size of sugarcane farms is highly related to the wild animal invasion of food crops. Thus sugarcane cultivation influence crop destruction by wildlife in the area.

It was observed that most households in Muhoroni owned less than 15 acres of land (80.7%). This encompasses the majority holdings in the area, which follow the land settlement design that allocated two and a half acres of home plots and seven and a half acres of sugarcane plots to the original settlers in the scheme. The sugarcane plots form contiguous fields a little distance away from the residential plots, hence making an uninterrupted habitat for the marauding animals which target the isolated subsistence food crop areas.

In terms of relating the area brought under food crops and the effect of animal destruction, it appears that the percentage of households whose farms are threatened by the menace increases in direct proportion to the size of land put under subsistence (see table 4.4.4). The point here is that with a greater crop carrying capacity, the large farms are more

exposed to the wild animals. The effect of this is that subsistence farms which are more than 3 acres in size experienced a higher magnitude of this problem according to the distribution of the responses in the table compared to households owning smaller subsistence plots. However, this interpretation also does not take into account the imperfect sampling in this instance which over-represented farmers with small parcels of land.

Table 4.4.4 Showing Wild life destruction of Food crops in Muhoroni by Size of the Farms

	Yes	No	Row Total
Less than 3 acres	106 89.1 79.1	13 10.9 86.7	119 79.9
3 - 5 acres	23.0 92.0 17.2	2.0 8.0 13.3	25 16.8
6 - 10 acres	4 100 3		4 2.7
More than 10 acres	1 100 0.7		1 0.7
Column Total	134 89.9	15 10.1	149 100.0

Improvement in farm output, which substantially tackles the problem of household food insecurity, was handled as a factor that potentially hinges on the wildlife problem. This study show that only 39 households which have experienced growth in the food output admitted that destruction of their crops by wild animals was in fact part of the problems they were faced with. This form 95.1% of all the households that had experienced improved production in their subsistence farms.

On the other hand, a majority of the studied households had not achieved any improvement in their food crop yield output (109 out of 150), with 88.1% of them claiming that wild animals damage their crops. These figures imply that although most of the households in

the study did not get improved yields, even those which did were heavily subjected to the problem of wildlife interfering with their subsistence farms.

When the relationship between yield improvement and destruction of the crops by wildlife was measured, the obtained level of significance was .3285 as shown in table 4.4.5.

Table 4.4.5: Wildlife crop destruction in Muhoroni by trends in Food Output

	Farms that experience Wildlife destruction	Farms that do not experience Wildlife destruction	Row Total
Crop yields increased in the previous year	39	7	41.0
	95.1	4.9	27.3
	41.0	13.3	
	28.9	1.3	
Crop yields did not increase in the previous year	96.0	13.0	109.0
	88.1	11.9	72.7
	71.1	86.7	
	64.0	8.7	
Column Total	135	15	150
	90	10	100.0

Significance. 0.3285

This is the probability level in the relationship when the null hypothesis holds in the population. Therefore improvement in farm output and farm invasion by animals was found in this study to be highly dependable.

One of the concerns raised by some of the informants in the course of the study was how their subsistence activities could be protected from wildlife invasion. Although they were aware of the advantages of fencing and other practices of deterrence, they claimed that some of these methods are quite expensive and way above them. At the same time, not enough publicity had been given to the fact that the district administration can intervene in the problem by using the game wardens. Some of the households even admitted that they were reluctant to make complaints to the local administration ostensibly because it's bureaucratic and scepticism over the measures that are likely to be taken by it over the issue. Thus such decisions appeared to have been left at the whims of the local agricultural office and the low-level administrators.

On the other hand, the brief contacts, which some of the households have with the agricultural extension workers through the chiefs' *barazas* and infrequent visits to their farms were unlikely to address, the problem caused by wild games in the area. This view is supported by the information contained in the contingency table 4.4.6, which measured this relationship.

Table 4.4.6: Crop destruction by Wildlife in Muhoroni against Farm Visitations by Agricultural Officers

	Farm crops destroyed by Wildlife	Farm crops destroyed by Wildlife	
Visited by Agricultural Staff	66	8	
	89.2	10.8	74.0
	48.9	53.3	49.3
	44.0	5.3	
Households not visited by Agricultural Staff	69.0	7.0	
	90.8	9.2	76.0
	51.1	46.7	50.7
	46.0	4.7	
Column Total	135	15	150
	90	10	100.0

The table shows that in spite of being visited by agricultural advisors in the previous years, 89.2% of the 74 households in this category (or 66 households) still experienced food losses to wildlife. Similarly 90.8% of the households which had not been seen by the extension officers blamed wild animals for destroying their crops. There were a total of seventy-six households in the study that had not been visited by the extension officers in the previous year. The remaining households (10%) did not view wildlife as a source of food losses to them, probably as a result of properly fencing their farms or farming in more secure area, for instance, next to the main roads.

At the same time, the proportion of households in the area which earn food surpluses and also lose part of their expected yields (36.7%) was much lower than households without surpluses but which also lose their crops to animals (53.3%). In the case of other households, those which neither had surplus nor lost part of their crops to animals were significantly fewer (7.3%) indicating that the chances for a household which do not experience problems with wildlife to produce surpluses is equally slim. However the sample for this category were quite few and therefore unrepresentative. Similarly, only

2.7% of the households with surpluses were not subjected to crop interferences by wildlife, meaning that there is only a slight influence of the wildlife on the farm output.

The food sector in Muhoroni encompasses a complex interaction of crop and livestock production in most of the households. This mixture enables the households to obtain alternative food sources during bad harvest seasons and off-farm periods as some of the herd can be traded periodically to build up food stocks. Also the animals provide the farm households with direct dairy products such as milk and geese in addition to the much-needed beef when some of them are slaughtered.

A majority of the households (79.3%) kept ruminant livestock particularly cattle, sheep and goats. Sugarcane farming has encouraged many households in the area to acquire livestock so as to reduce cultivation costs due to the availability of draft animals. On the broader social context, the livestock could also be loaned out (especially cows) on usufructory terms to other households, which lack livestock. These exchanges mainly occur during difficult seasons especially following dry weather when there is dearth of food and pasture in many places. After the situation has normalised, the lent animals are returned to the owner.

This practice is known as '*riembo-jamni*' in the local terminology or 'sending livestock away.' It provides a means of consolidating relations while at the same time ensuring a prudent dispersal of the herds during unforeseeable risks. Livestock were found to be a common source of earning livelihood to many households, which also sell livestock products to supplement their income.

This study revealed that different breeds of livestock are kept in the area depending on the influence of socio-economic and technical changes affecting the households. In the relatively cool and wet high altitude areas of Koru and Fort Ternan, several households were keeping the exotic/indigenous cross bred cattle which were lacking in the lower drier regions around Chemelil, Kibigori and Awasi (see map). In these drier zones, there was a greater tendency towards rearing indigenous stock of sheep and goats, probably to offset possible crop losses caused by unfavourable ecological conditions in these areas.

Social network owed to marriages, free exchanges or reciprocities and income generation groups also determine livestock redistribution patterns in the region. Hence dowry, family inheritance and group purchases were responsible for the acquisition of cattle/livestock by

not less than 21.8% of the respondents in this study. Other households mainly bought their livestock (67.2%). The rest (10.9%) acquired them through dowry and purchase.

The relationship between the tendency towards the mixed economy (animal and crop agriculture) and food losses to wildlife has been analysed in the next table. The two variables relate at 1.0 level of significance. This means that the keeping of livestock in Muhoroni does not depend on households' crop losses to wildlife and vice-versa.

Table 4.4.7 showing Farm crop destruction by Wild animals by Households keeping Livestock in Muhoroni.

	Farm Crops get destroyed by Wildlife	Crops are not destroyed by Wildlife	Row Total
Households keep livestock	107	12	119.0
	89.8	10.1	
	79.3	80.0	
	71.3	8.0	
Households do not keep livestock	28.0	3.0	31.0
	90.3	9.7	
	20.7	20.0	
	18.7	2.0	
Column Total	135	15	150
	90	10	100.0

Significance level 1.000

This analysis shows that wildlife destruction of food crops in the area does not bear an association with the practice of livestock production among the households. However, as seen earlier, the animal menace is clearly related to the size of cropped area.

Food crops damaged by wildlife are mainly used as livestock feed (47.3%) while a significant proportion of the households (33.3%) just consume them, even if it entails the addition of Sorghum onto it to improve its taste. The latter observation particularly applies to food crops spoilt by ruminants in the fields, which as a result become more vulnerable to rot and fungus attack. Crops that are destroyed by wildlife in the fields are usually of very little human use since in some cases only the plant stalks remain. These are harvested and then fed on livestock. Mature cereals and tubers/root crops, which are not so much spoilt by the animals, can also be dried and mixed with other grains and milled for normal consumption in the household. Lastly, the remaining respondents (19.3%) sell food crops

spoilt by the various agents to traditional liquor brewers who use them to make alcoholic brews - 'kwete' or 'busaa.'

In conclusion, it should be emphasised that wildlife as an obstacle to extensive food production in Muhoroni can only be controlled by the farming household themselves putting up the suitable deterrent measures. This should be reinforced at that basic level. In the medium term, this would greatly help to ensure a rising food supply and eventually increase in income from crop sales by the farmers

According to the findings, crop destruction by wildlife has locked out many households in Muhoroni from exploiting the full potential of their farms. Despite this situation, most of the households in the area lack enough resources to put into agricultural investment and subsequently, the capital outlay required for fencing the subsistence plots.

In the traditional farming system, predating animals could be contained through hunting. Some informants narrated to us how hunting bands went about this exercise without unnecessarily killing the animals so long as they would be pushed away from the cropped fields. There were strict regulations guiding hunting which ensured that no animal species could be decimated through the practice. For example, only mature and notorious animals were hunted down and killed, not just any of them. There were also some people who possessed esoteric knowledge about the animals and were able to capture the notorious wild game live and depending on the prevailing taboos either slaughter it for food or not.

In one way or another, deterrence practices available to the households must be sanctioned by the local administration so as to ensure that any method used also protects the wildlife. Wildlife conservationists usually advance three reasons to justify the importance of safeguarding the animals. The most referred to reason is that wild game is part of the biodiversity upon which society depends. Diverse natural ecosystems serve people by helping to keep air clean, recycle nutrients essential for agriculture and soils and control disease among other contributions.

A related but more politically potent argument is that biodiversity is worth a lot of money. Wildlife is treated as significant foundations to the tourism industry in Kenya and as such steps are taken to keep them from extinction.

Finally, for many, whether to hunt down animals or not is a matter of ethics. All forms of life should be respected and therefore not destroyed for whatever reason.

All these differing views have influence on the government's protectionist position on wildlife, which has made controlling their destructive tendencies, a rather difficult task. This has exacerbated the problem of declining food supply in Muhoroni. In practice, the respondents appeared to be powerless in their efforts to control the situation. Certain households in Koru, frustrated by the adaptive tactics of the wild animals in the face of the deterrence measures, which they were putting in place against them, claimed that they had stopped cultivating food crops in farms that are far away from their homestead. A gang of monkeys had caned to death a dog which they tethered to scare away the animals by barking, while the small animal species like antelopes kept changing tactics, even if it meant foraging on the crops in the early dawn after the night guards have left the farms.

This means that new approaches are required to maintain the ecosystem and at the same time prevent losses to the people living in the area. A report by the World Resources Institute on world resources (1988; 89) suggests that these efforts should incorporate the local people into the decision making process so as to reflect the local objectives, to ensure long term sustainability of the mechanism.

But, why of all reasons would food security in Muhoroni continue to suffer just to enable the survival of wild game? It is the contention of this study that the production system in Muhoroni is yet to completely unreel itself out of the traditional farming conceptualisation which saw such obstacles as a way of life - fate and luck, whichever. Floods, hippos or birds destroy a lot of food resources annually in the countryside. This has come to represent a form of co-existence, which the poor households have reluctantly accepted to live with. It is the same situation in Muhoroni with the farm households resigning into accepting any level of yields which they get, at least to stabilise the household food needs during the harvest season before they undergo the cycle again.

This particular section of the study is still obscure from most researchers dealing with the issue of food security. A lot of work is required in this direction. However the government remains with a big margin to manoeuvre in this respect. It would help if it proceeded to assist the sugar belt households dealing with this problem once and for all. This would greatly reduce on-farm food losses and bolster food availability in the region.

CHAPTER FIVE

CONCLUSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.0 Introduction

In this section, An attempt is made to summarise these findings so as to expose the gist of the study. As expected the research touched on a number of policy issues and other new findings upon which several recommendations have been proposed for the attention of the concerned policy makers and implementers of rural development strategies.

5.1 Conclusion

In this study on impact of sugarcane growing on household food security in Muhoroni division, it was found out that many households in the area experience a sort of clashing interests between growing sugarcane and producing enough food crops for their own consumption. Sugar cane dominates most of the cultivable land allocation by the households. Majority of the households are small and medium holders owning less than fifteen acres of land. As an old land settlement regulation, most of the households set aside only two and a half acres of land for subsistence and residence while the rest went to sugarcane. In the course of time, population growth and family land inheritance in the area has led to fragmentation of land and demand for more food supply thereby putting greater pressure on land use.

Generally, Muhoroni is an area of mixed farming with the respondents depending not only on food crops and sugarcane to survive but also a widespread support from domestic supply of livestock products. The sugarcane economy in Muhoroni has clearly led to the penetration of modern farm technology into the subsistence farm sector.

Most of the households, which participated in the study, use at least certain forms of commercial inputs such as chemical fertilizers, storage pesticides and hybrid seed varieties to improve farm production. However this does not mean that there has been a total shift by the households to improved farm technology in regard to the food production in the area.

Many respondents admitted to using traditional farming approaches, indicating their persistence in the farming system found in Muhoroni.

It was learnt that the households, which are reluctant to abandon these traditional farming practices, do so because of the high relative costs involved in adopting the new innovations. Whereas the use of farm implements like simple hand tools, animal manure and preservative ashes is cheap and affordable to most households, the new biological, chemical and machinery technology are expensive and therefore require large capital outlay. This was the main determinant in the household's choice of the productive inputs.

Similarly, some advanced farm inputs used in the sugarcane farms were far more expensive for local use in the subsistence sector. For instance, herbicides to combat weeds and farm irrigation are largely unused in the subsistence sector. This means that the good drainage system in the area provided by River Nyando and its tributaries is not exploited for crop use. Farm weeds are tackled basically by hand weeding, while the seed varieties used annually are the same races, not much because they have been found to be most suited for the area but due to their market dominance. In other words, new innovations such as the *Katumani* seeds, which can be suitable for the drier parts of the area, are not used. This limits the households to planting cereal seeds in one crop season (during the long rains), when in fact they can attempt a double season using appropriate seed varieties so as to exploit the bimodal rain pattern in the area.

It appears that the respondents' single pre-occupation is to produce enough food to feed their household without looking at the possibility of achieving saleable surpluses. There were no proper incentives put in place to encourage food production and as such, it is difficult that the households, left alone, would improve their production even to meet the expanding market created by immigrant labor population in the area. This can be partly explained by high-income expectations associated with sugarcane which keep the households glued to sugarcane farming at the expense of improving their subsistence activities.

On the other hand, mixed farming makes it possible for the farm households to reduce on overall farming costs. Not only do free animal manure provide a good substitute for chemical fertilizers, animal draft power is cheaply provided by the bullocks. Hence animal plowing was popular with many households in the study while in some cases it complemented machinery traction. Two factors can be advanced to explain the high level of

machinery use in land preparation in Muhoroni. One is that all the sugarcane plantations in the area are heavily plowed by large machinery and it therefore simply inconceivable for any household not to pick up the comparative suitability of this method of land preparation. Therefore many households in the study usually reserved money for traction, even over a long period of time waiting for the planting season.

The second reason for the spread of machine based farm preparation in Muhoroni is the high accessibility of tractors for hire as a result of constant use of such machinery in the sugarcane sector. At Chemelil sugar factory, ploughing loan services can be offered to interested households during low work season in the sugar nucleus farms.

Finally, the adoption of these farming technologies was also tied to the socio-economic conditions of the households. The analysis showed that variables such as Age and Level of education of the respondents were influential factors in determining choice of the farm technology. Nevertheless, mass participation of the households in the improved farming approaches has also been encouraged by the extensive agricultural extension work in the area.

In looking at the income status of the farm households, the study confirmed that sugarcane is the dominant income earner in the area. However owing to recent uncertainties in the sector it has become very unreliable. Serious income constraints in sugarcane production occur as a result of delayed payments of delivered cane and occasional financial losses in unharvested or rejected cane. Other problems such as unexplained fires, high costs of production, high loan interests and taxation exacerbates this problem hence reducing framers' profits and causing irreconcilable fluctuations in savings and spending.

Consequently there has been a proliferation of small-scale business ventures in the area, which provide augmentary income to the households. Most of the common businesses in the area are connected to food marketing. High business returns are however associated with estate development (plots) and shop keeping. Other sources of off-farm income were wage employment and social assistance. It was noted that remittances from family members who work outside the area, usually in the urban centers provided useful fillers in domestic savings. Although often quite intermittent and inadequate, it was a significant source of support to several women respondents in our study. Further consumption responsibilities

were expected in the many households that look after other dependants, usually, relatives seeking for better opportunities (employment, schools) in the area.

The study exposed a tendency by the households in Muhoroni to give more priority to the maintenance of the sugarcane farms, (inputs, labor, etc.) which absorb a critical portion of the payments received from the previous harvests. In food spending, expenses were generally limited to ploughing and random purchase of inputs and seeds in certain households. A few households also hire labour for weeding, scaring away wild animals and other related farm duties. Nonetheless, the lump sum cane payment is a target to many demands, especially school fees, house repairs and leisure. School fees and related educational expenditures attracted large and regular financial allocations. This is because only sugarcane is held as an investment that is able to provide substantial money to meet the regular fee schedules, while at the same time, the households highly regarded educational achievements.

In an attitudinal test meant to find out about this, 88% of the households strongly agreed to the view that, 'Education is the key to life.' In only a few households did food expenditures get direct attention as a matter of priority. But still other expenses particularly on educational activities dominated.

As the evidence related to the proposition on the role of enhanced household income on food security suggests, the large spending on non-food requirements do not permit adequate financial allocation to food production activities. In any case, high interests accruing in agricultural service loans which was a very common characteristic with the farming system in the area leaves the households with very little profit from the harvested crop.

A significant majority of the households in the study (36.7%) were found to be indebted, with an overwhelming majority (96.4%) using the loans on sugarcane production. Alternatively, the loanees respondents were beneficiaries of the sugarcane development fund, which is administered through the sugar factories. However, this can also indicate that there were no substantive agricultural credit directed towards subsistence production in the area. This is a clear disincentive to the low-income households lacking in the capacity to use productive approaches that require broad financial investment.

This study also delved into the accessibility of income returns from harvested sugarcane to women in Muhoroni. This was done in line with women's proven roles as the main providers of food needs in a household. It was found out that most of the households actually do not exist as single production units as the men turn to full time occupation in the sugarcane sector while women increasingly became full time domestic producers. In many respects, the husband and wives act as separate units, competing to maximize their own incomes. This in a way give men the freehold to all financial transactions connected to the household sugarcane farms, although they do share part of the income with other members of the household but this entirely depends on the individual.

Without land titles or security of tenure, women's access to credit has been limited, hence limiting their scope for using purchased inputs and other technology. At the same time, they lacked opportunities outside the domestic production circle where they could earn additional incomes. The household production process alienates women from pertinent decisions on how household finances can be utilised. In effect women's main production unit, the subsistence sector can be easily neglected at the expense of cane development. This process has left women to continue being economically dependent on their husbands for all initiatives, which they undertake including food production.

This experience has drove women to search for alternative production units. It is the contention of this study that this is the role played by the numerous women groups in the area, which are aggressively taking up sugarcane cultivation as a leading income-generating activity. Women groups provide the members with vibrant forums for resource mobilization, savings and investment. In some cases, they were also creditors, offering small loans for short-term needs by the members.

Finally, the general relationship between subsistence farming and wildlife management in Muhoroni was examined. We observed that the area harbors different species of wildlife, which stray into the food farming areas at night and forage on the crops.

These episodes lead to serious crop losses and minimal food yields by the affected households. The animal which range from wild pigs, antelope, impala and rodents have blackmailed some of the vulnerable households into planting only seeds which are less likely to attract heavy destruction by the animals. Thus pulse seeds (beans, groundnuts and green grams) and some types of traditional crop tubers are not planted in certain parts of the area.

On the contrast, cereal grains are harvested at an additional cost because costly preventive measures must be undertaken to deter the wildlife. It is possible that the ecological readjustments which are taking place with the establishment of the sugar scheme in the area has led to the disappearance of vital pastures and other vegetation, thus exposing food crops to the great danger of providing the needed fodder for the wild game.

There is little institutional assistance in dealing with this problem making the households resort to hunting, night guards, tying dogs and lighting bonfires to deal with the situation. Fencing of the farm plots is a recommendable solution to the problem but most of the households can not afford it.

5.2 RECOMMENDATIONS

Food availability in the areas dominated non-food agricultural commodities such as the sugar belt require deliberate efforts aimed at improving food production which more often becomes the casualty of the new cash crop economy. In light of these findings, the following recommendations for an integrated approach to the agricultural development in Muhoroni have been proposed as a matter of policy reference and further research: -

1. Policies, which lead to high yield output and food price incentives, which may strongly influence food production and entitlements, should be implemented as a matter of urgency. Some of the policy areas, which have significant short run impact on food production, include technological change, enhanced resource ownership and sound yield management practices. Policy measures such as those which can expand use of farm technology for food crops, may increase the quantity of food available while others which make food crops more profitable to the producers tend to increase their involvement in subsistence

If the local food prices can be increased, more farmers would increase their production, leading to plentiful domestic supply and surpluses. This strategy should be worked out without creating artificial market food shortages and consumption deficits to the producer, for example, by providing government subsidies and lowering taxes on the inputs used in food production.

Efforts should be made to reduce import demand for grains and promote substitution of domestically produced food, including traditional staples like millet, sorghum and cassava. Direct import restrictions and associated price increases may lead to significant expansion in domestic food production where food crops can be grown profitably.

2. To broaden the base and accelerate the growth of farmers' acceptance of the modern farm technology, a review of agricultural extension in the area is required. This should reflect the economic value of food production using the new innovations, increase agent/household ratio and consider combined approaches to disseminating the new farming technology. Most respondents argued for simple extension programmes that can be followed easily and which can permit them to review the history of the crop technology that is being implemented.

The productive inputs (fertilizer, seeds, and machinery) should be made to be more affordable and accessible to a broader section of the subsistence producers. Farmers need to know about the options available to them and must have timely access to the necessary inputs. The marketing infrastructure should be rehabilitated and strengthened so that the farmers can benefit from increased production.

3. Credit facilities or grants, including food subsidies, guaranteed on the standing cane should be provided to food distressed households to defray short-term food deficits in the households and enable them to survive the bad seasons. On the other hand, the farming households also need extensive educational on financial management and basic accounting if they are to effect reasonable and sustainable planning for their cane earnings. The inability of the respondents to put their money into wise expenditures was a fundamental constraint to the general development of the area.

Some of the households spend a lot of money in unnecessary leisure's that can be avoided, for instance, additional marriages are arguably an anachronistic priority in the prevailing economic circumstances. In certain particular instances, the respondents could not even comprehend their tax breakdowns or the factory loans availed to them. The agricultural extension in the area could tackle this problem by incorporating these skills in their training services.

Apparently not enough attention has been paid to institutional agricultural credit towards development of small holder subsistence producers in the area. Consequently programs to facilitate credit services to the small holders are required to bolster agricultural investment - such as buying plows, hiring extra labour for weeding, buying improved seeds, fertilizers and other productive inputs, fencing the plots from the predating wildlife and so on.

4. Other advanced farm technology such as irrigation, though expensive, can be utilised on a small-scale experimental basis as a means of extending cultivation to areas that are too dry for normal agriculture. This should be possible given the good drainage network in the area provided that the capital required for that purpose and the necessary technical assistance can be obtained.

5. Stringent measures are urgently required to address the persistent problems of accidental cane fires, frequent factory breakdowns and congestion, delayed cane harvesting and payment of supplied cane and the unending glut in the domestic market due to excessive sugar importation into the country. Only by doing this would the twin issues of enhancing cane profitability and food security for the producing households be achieved

6. Several Farmers' co-operative societies and Income generating organisations were covered in this study (see appendix 1). The Farmers' co-operative play critical roles in the production and marketing of agricultural produce (sugarcane, livestock products) in Muhoroni. The co-operatives provide agency services in farm management, cane harvesting and delivery, in addition to processing farmers payments from the factories. On the other hand, the income generating groups were very important in savings' mobilization and credit, particularly for women.

However these organizations requires skilled leadership and entrepreneurial capabilities in order to develop and sustain themselves. Many of the co-operatives are faced with imminent collapse due to lack of funds, mainly owing to delayed commission recovery (co-operatives) from the sugarcane factories. The barely skilled co-operative staffs in the area are poorly remunerated while their offices lack adequate equipment for efficient service delivery.

The various Women development institutions and Farmers' Co-operative Societies should be revamped. Training in entrepreneurial skills, accounting, leadership and basic co-

operative organizational skills are essential in this connection. Financial support by government and inter-governmental organizations with the capacity to assist should intervene.

Acknowledgement and where possible strengthening women's economic operations should play a pivotal role in boosting food security in areas where policies towards cash crop production potentially alienates women's acquisition of the farm profits. As far as resource ownership is concerned, the government should support Women interested in sugarcane/cash crop farming so as to expose them to the available independent financial opportunities. Also where the title deeds are only registered in husbands' names, women's right to traditional share of land should be acknowledged and protected.

7. Policies, which reconcile the potential conflicts between sugarcane farming and food production, should be looked into in order to curb the wild game menace in the sugar belt. More information, however, is still required on how this menace can be handled without infringing into the interests of wildlife conservationists and ecological balance in a given area. The Kenya Wildlife Service should be involved in finding a lasting solution to the problem in a way that would ensures the co-existence of the animals and the farmers without the former being a hindrance to food farming activities.

8. Finally according to these findings, improvement of infrastructure in Muhoroni is an urgent necessity. The feeder roads, health facilities and schools in the area need rehabilitation in keeping up with the population growth in the area. The sugar milling firms should take part in building these infrastructures as a matter of moral necessity since they draw their sustenance from the area. Similarly, crop cess should be used directly by the factories to improve the feeder roads instead of waiting for the moribund town councils covering the area to do so. This would reduce bureaucracy and corruption, which are some of the factors to blame for the poor state of feeder roads in the area.

In conclusion, the Muhoroni sugar belt has the potential to reverse the present decline in subsistence production in the area and satisfy its food requirements. However this requires the government and other stakeholders to give high priority to an integrated agricultural approach in the area. As a first step, the government must decontrol land use in the sugar belt so that the farm holders can cultivate crops of their choice without any fear of undue coercion or intimidation.

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APPENDICES

APPENDIX 1

CENSUS OF FARMERS CO-OPERATIVE SOCIETIES AND WOMEN

GROUPS COVERED BY THE STUDY.

A. FARMERS' CO-OPERATIVE SOCIETIES

1. Kisumu District Rural Farmers Sacco Society
2. Muhoroni Farmers Co-op Society
3. Koru Farmers Co-op Society
4. Tamu farmers Co-op Society
5. God-Abuoro Farmers Co-op Society
6. Nyang' Farmers Co-op Society
7. Songhor Farmers Co-op Society
8. Nyando Sacco Society
9. Muhoroni Sugarcane outgrowers Company
10. Chemelil Sugarcane outgrowers Company

B. WOMEN GROUPS

1. Lwala Women's group
2. Oseng - Teti Women's group
3. Jaber Women's group
4. Got Nyadundo Women's group
5. Kware Women's group
6. Bad - Oseng Women's group
7. Miongwe Women's group
8. Tido Women's group
9. Toyo Women's group
10. Saka Women's group
11. Yaw - Pachi Women's group
12. Oridre Wopmen's group
13. Okello - Kwe Women's group
14. Konyri - Kendi Women's group
15. Oula Women's group

16. Holo/Siany Women's group
17. Bango Women's group
18. Mavuno Bora Women's group
19. St. Aloys Women's group
20. Koru Township Women's group
21. Makindu Women's group
22. Ridoka Women's group
23. Chemelil Women's group
24. Nyakoko Women's group
25. Owaga Women's group
26. Furaha Women's group
27. Yago Self Help group
28. Huruma Women's group
29. Tangne-ang'e Women's group
30. Bimos Women group
31. Minara Women's group
32. Bongu Women's group
33. Daaraja Mbili Women's group
34. Daraja Women's group
35. Gatundu Women's group
36. Maendeleo ya Wanawake
37. God Nyithindo Women's group
38. Imara Women's group
39. Cool Inn Women's group
40. Tonde Women's group
41. Muhoroni East Kanu Women's group
42. Kibigori Women's group
43. Nyadundo Women's group
44. God Teng Women's group
45. God - Abuoro Women's group
46. Kanyadem Women's group
47. Seme Women's group
48. Lwala Catchment Women's group
49. Chuth Ber Women's group

I am conducting a survey on sugarcane growing to gather your views about the industry and how it relates to food security in this area. I would be grateful if you could spare some time to answer a few questions which I shall be putting to you.

Background

1. What is your name? _____

Religion? _____

Ethnic Affiliation? _____

2. Which is this location? _____

3. Indicate your age

25 - 30 Years 30-40 years 40 - 50 Years 50 Years and above

4. What is your marital status

Single Widow Married others (specify)

5. Please indicate your level of education

Upto Std 8 Upto Form II Upto Form IV Form IV and above

6. What is your occupation?

Farmer Non farmer

7. Do you grow sugar cane

Yes No

If Yes, estimate your entire farmland under sugarcane

Upto 5 acres 5 - 15 acres 15 - 25 acres More than 25 acres

8. What is the total area of your land?

15 - 35 acres 35 - 50 acres More than 50 acres

9. Do you own any other land?

Yes No

If Yes, how big is the farm? _____

If Yes, what do you grow on it? _____

11. For how long have you lived in this area?

- Less than 5 Years More than 5 Years

12. When did you begin growing sugarcane?

- Less than 2 years ago 2-10 years ago More than 10 years ago

Why did you begin growing sugarcane?

- Advised by extension officers Inherited sugarcane farm(s)
- Persuaded by friends
- Settlement scheme regulations so requires My land is only suitable for sugarcane
- More profitable than alternative crops Other reasons

To which factory do you sell your cane?

- Chemelil Muhoroni Miwani

PERSONAL ENUMERATION DATA

13. Water source

- Tap Well River
- Other

Fuel (cooking)

- Paraffin Firewood

Roof

- Grass - thatched Iron sheet

Floor

- Mud Cement

Rooms

- 2 3 More than 3

Distance from nearest road _____

Cow shed

- Yes No

Bicycle

- Yes No

Electricity/solar

- Yes No

Radio

- Yes No

been your major problems? (List in order of seriousness)

- Lack of credit Low profits Labour shortage
- High prices of inputs (fertilizer, herbicides) High cost of production
- Drought Pests and diseases Management
- transport Other (specify)

What steps have you taken to solve these problems _____

Do you experience any of these problems with your subsistence farms?

- Yes No

If yes answer

Which ones _____

Steps taken to solve them _____

15. How do these agricultural land use (above) survive during times of drought? Explain your answer.

By use of:

- Channel irrigation Sprinkler irrigation
- Natural capilarity Plants wither off

16. Which of the following agronomic practices do you use at the moment as an adjustment to the environment?

- Shifting cultivation Intercropping(Maize/beans)
- Crop rotation Mulching
- Other (specify)

Describe the benefits of your choice of above _____

Use and estimate in fraction of less than 1/4, 1/4, 1/2, 3/4 and more than 3/4 of its size in your entire farmland).

Food crop	less than 1/4	1/4	1/2	3/4	More than 3/4
Maize					
Rice					
Sorghum					
Millet					
Beans					
Potatoes					
Cassava					
Groundnuts					
Vegetable					
Fruits					
Other (specify)					
Total					

18. For the crops identified here, do you use any of the following inputs?

- Herbicides Pesticides
 Fertilizer Hybrid seed

Give reasons for your answer _____

19. Which, if any, of the following people visited your farm last year to advise you on any agricultural methods and its application?

- Sugar company staff co-operative society staff
 Agricultural extension staff Other (specify)

How many visits, if any, do such advisors make to your farm per

- week Month Year

Did you find the pieces of advise relevant or useful to you?

- Fair Useful Very usefu
 confusing No use

20. Who does the following duties in your farms? (indicate by matching the answers 1, 2, 3, 4 in the boxes provided)

1. Men 2. Women 3. Children

4. All of the above

Post-harvest storage and marketing

21. How do you rate the use of the following farming technologies in this area?

	High	Medium	Low
Use of Hybrid seeds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pesticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fertilizers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Herbicides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irrigation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. Are you satisfied with the yields of food crops obtained in this area?

Yes No

Give reasons for your answer. _____

23. What type of cereal seeds did you plant on your farm last year?

Hybrid
 Local seed varieties

Give reasons for your answer. _____

24. How do you rate the local seed yield?

High Medium
 Low Quite high

Three times More than 3 times

26. How do you carry out weed control in your maize and vegetable farms?

Hand weeding Chemicals (herbicides)

Mechanised weeding

27. Do you employ additional labour for your subsistence farms?

Yes No

If Yes, what duties are they hired for?

Planting Weeding

Farm inputs (fertilizer, sprays etc) Harvesting

28. Do you have your own equipment for:

Ploughing? Spraying? Others? (specify)

Explain your answer _____

29. Which of the following machines do you use to prepare your farms?

Ox-drawn plough Tractors Hand Jembes: Other (specify)

30. In your opinion, do farmers who use scientific technology and inputs such as fertilizers and sprays earn better crop yields than those who do not?

agree Not at all The difference is minimal

Agree strongly

31. How do you ensure that your foodcrops yield better than previous harvests?

use commercial fertilizers (Nitogen, Phosphate etc) use compost manure

Apply filter mud Wait until the farm refertilizes.

32. Have you ever attended any agricultural extension training?

Yes No

If yes, were the following items discussed during the meeting?

Food storage process Income management

Modern agricultural methods (specify)

33. What kind of farmers use the modern farming technologies in this location? Tick any two

Factory nucleus estate sugarcane farmers with large farms

Any farmer who gets the facilities Farmers in infertile and dry areas

Yes No

Indicate whether any of the following explanations relate to your answer to the above question

- The farming techniques are profitable in the long run
- The farming techniques have little effect on food production
- The techniques can be substituted adequately by other cultural practices

35. In your opinion, how can the new agricultural practices like farm technologies and inputs to be shared more equitably by all farmers in this area?

- Farm demonstration plots Talks with neighbours
- Use of explanatory posters and pamphlets Visit by agricultural extension staff

WILDLIFE AND FOOD CROP PRODUCTION

36. In your experience, are losses of food yields in the farms and during storage a problem to farmers in this area?

- Yes No Don't know

37. Are some of the losses due to destruction of the crops by wild animals?

- Yes No

If Yes, what animals are these? _____

38. A part from wild animals, what are the other causes of food losses in this area?

- Insects and moulds Rodents (rats et Weather (rain, heat etc)
- Livestock Other

Describe your answer above, indicating which crops are destroyed by which agents and the extent _____

39. Of all the causes of food losses suggested here, which ones are more serious? Rank your answer

40. How do you use cereals 'spoilt' during storage?

- Sold as animal feed Sold to beer brewers
- Just eat them Other (specify)

41. What would you say are the benefits of wild animals to your household food activities? Explain

Use of insecticides

build modern cribs

sell to government for public storage Other (specify)

43. Explain how you would solve the problem of wildlife destruction of food crops? What problems would you face? _____

44. Do you keep any livestock?

Yes

No

If Yes, which type of livestock do you keep? Mention type and number

Traditional

Grade

45. How did you acquire your livestock?

Dowry

Inherited

Purchase

'send aways'

46. How do you feed your livestock?

Pasture

Paddocks

Zero grazing

'Kamba'

INCOME EXPENDITURE AND HOUSEHOLD FOOD SECURITY

47. Where does your household mainly get food from?

Purchase

Farm

Forages (bushes, fallow farms)

If purchase, how often is the food bought?

Always

rarely

occasionally

If purchase, where does the food come from?

other local farmers

traders who bring them from outside this area

48. What is your monthly income. Break down your total earnings on the basis of the following:

0 - 2000 Kshs

2000 - 4000 Kshs

4000 - 6000 Kshs

over 6000 Kshs

Business Employment

Artisanry Other (specify)

Estimate how much you earn from the above activities and any other sources of income

Activity	Specification	Estimate the earnings in Kshs
Business		
Employment		
Artisanry		
Relatives		
Other(specify)		

50. Have you leased out any piece of land to anybody else?

Yes No

Reason for lease _____

Crops grown by leasee _____

51. Do you grow any of the following cash crops? Estimate your total earnings from each of the crops annually.

Coffee Cotton

Rice Other (specify)

52. What is the estimated total earnings from sugarcane plots for your household per year?

	Acre(s)	Month of harvest	Tonnes	Debit
Farm I				
Farm II				
Farm III				
Farm IV				
Total				

53. What is the estimated total income from other farm activities by the household?

	Area (acres)	Month of harvest	weight	credit
Maize				
Finger millet				
Sorgum				
Beans				
Cassava				
Potatoes				
Vegetable				
Fruits				

54 Has income from food production and other non-farm sources improved since you began growing sugarcane?

Yes No

Give reasons for your answer _____

55. Estimate on the average how many sacks you used to harvest of each of three following crops annually, before and after engaging in sugar production. Include changes in farm size

	Farm size		Harves	
	Before	After	Before	Alter
Maize				
Sorgum				
Beans				

56. Do you have any member of your household in gainful employment?

Yes No

If Yes, answer - How many _____

Relationship to interviewee _____

Monthly income _____

57. (a) Are there any household members who eat any meal outside the home?

Yes No

If Yes, fill the following table.

relationship of member to the interviewee	Number of times meals is eaten away from home (eg lunch, breakfast, supper)	Foods eaten	cost of meal

58. How many children do you have in school?

Primary school _____ Colle Secondary school _____

How much did you spend on the following items for your school going children this year?

	Term I	Term II	Term III
School fees			
Books & stationery			
Building levy and others			

59. During the past 2 years, have you received a loan to run your farm?

Yes No

If Yes, which farm was this?

Sugarcane farm Farms under crops other than sugarcane

	Amount (Kshs)	Period of loan
Sugar company		
Co-operative society		
Bank		
Friends		
Relatives		
None		
Other (specify)		

60. Do you have saving facilities for your income?

Yes No

If Yes, where do you save? _____

61. Has there been incidences of the following diseases in your household in the recent past?

Kwashiakor Marasmus

Diarrhoea Scurvy

62. On the average, what is your monthly expenditure on the following items.

Items	Average monthly expenditure
Housing (Repair, furniture etc)	
Health	
Water	
Fuel	
Farm development	

63. In your opinion, what would a farmer in this area typically do after receiving payment for sugarcane delivery?

Marry additional wife/husband Refurbish house

Buy food for storage Host ceremonies/sacrifices etc

Bank the money Other(specify)

Explain your answer above _____

64. Do you have relatives who do not stay in the sugarcane belt?

Yes No

If Yes, where do they live? _____

What kind of support, if any, do they expect from you?

Material (e.g food) Moral support (Prayers)

Financial Other (specify)

Examples (last assistance offered and date)

65. What do you intend to do with your next sugarcane earnings?

66. Where do most people in this location work?
 In their sugarcane farms In the sugar factories and nucleus farm
 In paid employment elsewhere Other (specify)

67. Who owns sugarcane plots in this area?
 Men and Women Women only
 Any interested party

68. What is the source of income in your household?
 Sugarcane production? Wage employment
 Business Other (specify)

69. List in order of importance, your personal sources of financial support
 Income from sugarcane Economic assistance from kins
 Economic assistance from social network or groups
 Income from trade in produce other than crops grown in the family farms
 Income from sale of labour (employment)

70. What problems do you face in marketing or selling part of your food surplus?
 Lack of transport facilities Food losses during storage
 Taboos against selling crops grown by the family. Low food prices
 Household disputes on the use of earnings

71. Do you normally have any food surplus from your farms?
 Yes No

Explain your answer _____

72. Tick which activities you typically engage in from daybreak to nightfall every day.
 (For each, show your answer in terms of the fraction of the day spent on the activity e.g. hunting - 3/4)

Activity	Hours/day
Market production	
casual employment	
sugarcane production	
livestock raising	
formal employment	
business	
Vegetable production	
post-harvest marketing	

childcare	
fetching water/fuel/food	
household chores	
Leisure	
personal care (eating, bathing, visiting etc)	
recreation (planting with children etc)	
church activities	
social activities/festival, story telling)	
sleeping	
Drinking	
Other (specify	

73. How do you feel about doing the activities which you have identified above?

Dissatisfied

Satisfied

Have no choice but to continue with the same things I am doing.

Looking for other options.

74. If you were out to look for a job in the sugar factories, what do you think would be your greatest obstacle you would face in gaining employment?

Discrimination. Sex Ethnic Age

Illiteracy

Lack of career training

Lack of time for factory employment

75. Do you discuss these problems with other people?

Yes

No

How often do you discuss them?

Weekly

Frequently

Rarely

76. Do you regard disputes over income from sugarcane as an issue in this area?

Yes

No

Kindly explain your answer _____

77. Who mainly provide the labour for the following duties in the sugarcane plantations owned by the factories?

Clearing land

Women

Men

Children

Ploughing

Women

Men

Children

Planting

Women

Men

Children

Weeding

Women

Men

Children

Harvesting

Women

Men

Children

Explain your answer _____

households which depend on sugarcane earnings for their livelihood?

Low sugarcane prices

Low factory wages

Delayed cane harvesting

disputes on the use of the earnings.

79. In instances of any financial disputes in the household, who do the people involved resort to for arbitration?

Village headman

head of co-operative society

extension service officer

other government officials

80. Which method of storing harvest is commonly used by farmers in this area?

Rodent - preventive granary

Sacks and drums

traditional cribs

Put them together in one of the rooms

Which of the above methods do you personally use? _____

Explain your answer _____

81. Which method of preserving grain do you use?

Sun drying and pesticides

Sun drying and ashes or cow dung

Sun drying only

Others (specify)

Explain your answer _____

82. It has been suggested elsewhere that women should gain more access to ownership of sugarcane plots and cash income from the crop. What would be your reaction to this?

Reject the idea

It would be okay

It would be so bad

It would be very good

83. Does any member of your household participate in any of the following social activities?

Gift giving

reciprocal labour parties

Ritual festivals e.g sacrifices

Welfare groups' meetings

84. Are there any income-generating groups in this area?

Yes

No

If Yes, what organisations are these

Women groups

Youth groups

Church organisations

Farmers' unions

85. Which income generating projects do these groups engage in?

Sugarcane farming

Operating posho mills

Trade

Handicrafts and artistry

Other (specify)

86. Kindly give your opinion on the following statements by ticking the relevant box provided against it

Disagree Disagree Agree Agree
 Strongly Strongly

Women are deprived of financial rewards from sugarcane production

Women are the main food producers in this area

Households with members in the income generating groups find it easier to feed themselves

Women who have more say on the use of cash income received in their households tend to produce more food for the families than other women.

There is no competition between land set aside for sugarcane and land for other crops

15

The use of traditional granary is the most appropriate method of storing cereals.

New agricultural practices have been useful to food production in this area.

Sugarcane farming in this area has led to reduction in food production

There is an inadequate labour participation of sugarcane workers in their own household farms

The sugarcane factories do not pay adequately for our labour

Farmers should be allowed to form financial co-operatives to keep their money

We are able to lead our families
from the money we earn.

--	--	--	--	--	--

To economise on food, we grow
most of our food requirements

--	--	--	--	--	--

Before the next sugarcane harvest,
there is seldom any money left
for savings or to put aside.

--	--	--	--	--	--

To save money, we go to the factory
health clinics rather than to
private doctors.

--	--	--	--	--	--

Inflation is depressing me, it
is as if we cannot afford anything
we want

--	--	--	--	--	--

We can afford to send our
children to schools of our choice

--	--	--	--	--	--

Education is the key to life

--	--	--	--	--	--

Thank you very much !!!!!

INTERVIEW GUIDE

This guide would be used to extract information from those people in the factory management, namely Agricultural manager, outgrowers' manager and the Harvesting manager. Also the interview guide would be administered to co-operative societies' representatives and the Divisional officer, Muhoroni.

A

- i) In your opinion, has food production in this area increased or deteriorated after the farmers' involvement in sugarcane farming ?
- ii) Are there food losses associated with the presence of sugarcane farms in this area? Elaborate your answer.
- iii) What do you consider to be the advantages and disadvantages of sugarcane farming related to foodcrop agriculture in this area.
- iv) Kindly describe the common financial issues raised by the sugarcane farmers you deal with. Are these issues reducible to the farmers' household food conditions?

B What is the Organisation/Govt doing in regard to the improvement of:

- i) Food crop agriculture
- ii) Farmers credit and banking
- iii) Women's participation in sugarcane farming.

C

- i) How has your organisation been dealing with the problem of wild animals associated with sugarcane farms and which destroy food crops?
- ii) Has your field extension officers contributed anything to enhance subsistence farming in the places they visit? Elaborate your answer.
- iii) What in your view, can be done to increase food production by farmers this area?