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Globalization and Structural Change in Rural Economies

RuralStruc Program – Phase II

February 2010

The RuralStruc Program on the '***Structural Dimensions of Liberalization in Agriculture and Rural Development***' is a joint initiative of the World Bank, the French Cooperation (the French Development Agency, the Ministry of Agriculture and Fisheries, the Ministry of Foreign and European Affairs, the Agricultural Research Centre for International Development (CIRAD) and the International Fund for Agricultural Development). It is managed by the World Bank.

With a duration of three years (2006-2009), its objective is to propose a renewed analysis of the processes of liberalization and economic integration – going beyond the only commercial dimension – and their impacts on agriculture and the rural sector of developing countries. It also has the mandate to bring an updated vision of the situation of rural economies in terms of levels of wealth and diversification. The results obtained will make it possible to improve the dialogue between national and international partners and to provide orientations for the agricultural and rural policy debates.

The Program adopts a comparative approach across seven countries – Mexico, Nicaragua, Morocco, Senegal, Mali, Kenya and Madagascar – which correspond to different stages of the process of liberalization and economic integration. The Program's work is conducted with teams of national experts and researchers. Two phases were implemented: a first phase providing an overview of each country's dynamics (2006-2007), and a second phase comprising sectoral and regional case studies, supported by rural household surveys (2007-2009).

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ACKNOWLEDGEMENTS

EXECUTIVE SUMMARY

The RuralStruc Program is a multi-donor supported program managed by the World Bank and designed to develop a renewed analysis of the consequences of liberalization and economic integration on agriculture and rural development in developing countries. The program is based on a cross-country comparative approach that allows insights gained from individual country levels to be shared across the globe.

The program's main objective is to improve and strengthen the knowledge base on liberalization and its structural dimensions, and to inform the current debate amongst donors and between donors and local stakeholders on the structural dimensions of liberalization and consequently provide a basis for better policy-making.

The study was guided by three hypotheses. First, there exists differentiation of agricultural production and marketing structures as a consequence of the global restructuring of agro-food markets and international competition. Second, there exists a process of reshaping rural economies due to the increasing role and development of non-farm activities including transfers. Third, there exist risks of transition impasses arising from difficulties of adaptation to the changing environment for the households and the rural economy in general, due to the weakness or lack of economic alternatives outside the agricultural sector.

The program was carried out in two phases. The first phase was undertaken between April 2006 and January 2007, while the second phase commenced in October 2007. Phase I involved country overviews based on desktop studies. The overview covered the evolution of agricultural market structures, farm structures differentiation and corresponding evolution, the risks of transition impasses and adjustment options and the evolution of agricultural policies and pertinent institutions. The results of phase I revealed a lack of information on the processes of integration into modern value chains and the diversification of rural activities. These results formed the basis of phase II of the program. The second phase involved fieldwork to collect data through regional case studies, selected value chain analysis, and rural household surveys.

In implementing the program, three distinct regions were identified using several criteria and characterized as winning, intermediate or losing. The winning region refers to an area that is performing well after market liberalization. It is well connected and close to the markets for both inputs and outputs. It has an integrated commodity chain and a good level of public goods, such as infrastructure and natural resource endowment. A winning region's agricultural sector is thriving thereby earning reasonable income for the rural households. Nakuru North district was identified as a winning region. An intermediate region is where the effect of liberalization may not have clearly been delineated either as a winning or a losing. As a consequence, sub-sectors within the region exhibit varied performance while development pathways rely greatly on the policies adopted and implemented. Bungoma district was identified as intermediate region. On the other hand, a losing region is defined as an area that is performing poorly after liberalization and market reforms. Rural household incomes in such regions have continued to decline especially after liberalization. Such a marginalized region exhibits poorly integrated commodity chains and poor level of public goods including road infrastructure. Nyando district represented the losing region.

The a priori choice of Nakuru North district as winning region was informed by several considerations. The region has good soils suitable for agricultural activities like sheep and dairy farming, and the production of tea, coffee, vegetables and other horticultural crops. The region is also fairly well served by good public investment in facilities such as roads, electricity and water. The good road network offers good access to regional trade between Nakuru North and Nairobi, Nakuru town, Nyeri, Nyahururu and other surrounding large towns like Naivasha and so a good market for agricultural produce. This has made it easy for small dairy and horticultural farmers to reach

consumer markets in time as these commodities are highly perishable. Electricity is fairly distributed throughout the district which has factories for processing tea and tomatoes. Apart from good access to commodity markets, Nakuru North has substantial employment opportunities as well.

The core livelihood of the people of Bungoma is agriculture, dominated by the production of maize, beans, potatoes, and sorghum. Sugarcane, tobacco and coffee are the cash crops in the region. Intensive horticultural activities like passion, tomatoes, onions, citrus and capsicum take place in Sirisia and Kimilili divisions. Inadequate storage and marketing facilities hamper the development of horticultural production. However, despite the region's potential, it is characterized by high poverty rates. Bungoma shares borders with Uganda, which also produces maize. The cross-border trade with Uganda generally depresses maize prices in the region. The continued production of maize in Bungoma district may not be sustainable without supportive policies. This situation applies to the sugar industry as well. The multiplicity of constraints to rural and agricultural sector development in the face of favourable agro-ecological conditions were key considerations in choosing Bungoma district as an intermediate region, where well thought out and implemented public policies could result in major productivity and welfare gains.

Nyando district was a priori chosen as a losing region for several reasons. First, it has poor infrastructure such as all-weather roads and electricity, which have made development of the fishing industry challenging. In addition, although it is estimated that about 27,550ha of land is available for agricultural expansion, agricultural sector in this region is not performing well, resulting in low food production. The district relies on food imports from the neighbouring districts to supplement locally produced food. Nyando remains disadvantaged particularly because previous major crops and industries such as cotton and textiles, sugar cane, and rice have either collapsed or are in extremely poor state. The district also relies on traditional animals instead of improved ones that would be more economical and beneficial to rear. Therefore, the situation in Nyando District, where agro-ecological conditions are not favorable and challenges exist in terms of provision of food, infrastructure, and employment opportunities, indicates looming possibilities of transition impasse. There are very limited exit options out of poverty, which means that alternative employment opportunities need to be sought outside the region.

In order to provide the necessary background to put rural households into context, information was collected on the main characteristics of the selected regions and selected agricultural chains within the regions. Dairy, maize and sugarcane commodity chains were selected for Nakuru North, Bungoma, and Nyando, respectively, all of which have shown a change in structure after liberalization. The main aspects of change relate to the elimination of government institutions in the chain and increase in the number of players which has improved competitiveness and prices received by farmers.

In addition, household surveys were conducted in the survey regions. The sampling process for the household survey followed the multistage systematic random sampling procedure combined with sampling probability proportional to size. The first stage was the selection of regions/districts that portray winning, intermediate and losing characteristics. The second stage was to select three divisions in each district again to reflect those winning, intermediate, and losing areas. In some cases, this categorization of areas was done up to the location level. A total of 904 households were selected, 300 in Nakuru North, 303 in Nyando and 301 in Bungoma.

Information gathered from the regional and household surveys as well as value chain reviews, sheds light into the expectations outlined in the hypotheses. With regard to the differentiation of agricultural production and marketing structures as a consequence of the global restructuring of agro-food markets and international competition, a number of issues emerge. First, nearly all the households have sales of some crop type, indicating that they are somewhat connected to markets, but the degree of market insertion is low. This is particularly so among the poor who show a greater propensity to emphasize production for self-consumption especially for staples rather than for the

market. Second, there is very little differentiation with respect to market access and restructuring of the agricultural value chains. The integration process is very limited since commercialization is mainly through traditional modes of marketing such as local markets and middlemen. Contractualization remains at very low levels, with most of the outlets being characterized by informal arrangements. In addition, contractual arrangements are crop-specific and localized, being found mainly in areas where crops like sugarcane have been traditionally handled by companies operating as monopsonies. Therefore, there is relatively low integration of households into modern value chains even in the winning region. Third, barely any product transformations and value addition takes place on the farm. Overall, these observations indicate that very few changes have been observed in farm production and marketing methods as a consequence of the global restructuring of agro-food markets and international competition.

The second hypothesis relates to a process of reshaping rural economies as rural households adapt through diversified activity and income strategies. Results show that diversification is a common characteristic among the rural households. Agricultural diversification is high, but production is dominated by staples. Activities on the farm are also diversified, with households engaging in crop and livestock production, as well as hunting, fishing and gathering activities. In addition to having diversified production activities on the farm, households also have off-farm activities, which contribute a larger share to household income in the winning and losing regions. However, the type and importance of off-farm activities vary according to local contexts. For instance, in the winning region, it is clear that the rural economy is being reshaped as households engage in off-farm activities, particularly self-employment. In contrast, though the losing region exhibits a larger share of income from off-farm activities than on-farm activities, the low levels of income indicate that diversification serves more as a survival strategy in this region. In addition, the poorest 20 percent of the households are less diversified due to lack of opportunities and assets to engage in the diversification process, hence exhibiting the existence of poverty traps. In summary, although activity and income diversification is widespread, off-farm activities would serve as an option out of poverty only in areas with a conducive environment that creates demand for activities offering higher returns.

It was hypothesized that risks of transition impasses would arise in situations where households and the rural economy would fail to adapt to the changing environment due to lack of employment alternatives outside the agricultural sector. This phenomenon was observed in the Nyando and Bungoma regions. The prevailing local constraints in Nyanza in terms of low factor and asset endowments and poor access to public goods and infrastructure, reflect a case of marginalization, where a lot of concerted efforts in terms of policy and resource mobilization are critical to ensure sustainability, and pull households out of poverty. Given the survival-like strategies observed in this region, a good starting point would be to keep staple foods cheap and accessible for such households. In addition, Bungoma region, may also exhibit risks of transition dead-end due to its heavy reliance on agriculture for generating household incomes. The region has high on-farm income shares but also very low total household incomes, which are an indication of limited opportunities for gainful employment off the farm.

Overall, due to the importance of agriculture in generating incomes and employment, agriculture will remain a part of the solution in seeking effective pathways out of rural poverty. Beyond poverty reduction and ensuring food security, agriculture must play a central role in the economic transition. Although, there is strong activity and income diversification, opportunities outside agriculture are limited in some cases. Additionally, diversification off the farm is associated with employment creation in the informal sector, which is marked by low productivity and low returns that do not allow for asset accumulation and increase in consumption. Therefore, focusing investment in agriculture will keep food cheap and accessible, and stimulate productivity increases in rural areas. This will in turn raise real wages and create rural demand that will stimulate a dynamic rural economy, which will be the long-run pathway out of rural poverty. This is clearly needed in order to increase the employment absorption capacity of agriculture and other sectors linked to it within the

broader rural economy, given the on-going demographic transition associated with a high number of economically active people entering the labor market.

INTRODUCTION

The RuralStruc Program is a three-year collaborative project of the World Bank, the French Cooperation and the International Fund for Agricultural Development (IFAD) with a main purpose of developing a renewed analysis of the consequences of liberalization and economic integration on agriculture and rural development in developing countries. It is a comparative study that looks at the processes of differentiation and integration of the agricultural and rural sectors after liberalization across seven developing countries (Mexico, Nicaragua, Morocco, Senegal, Mali, Kenya and Madagascar) perceived to be at differing stages in the process of economic transition and structural change.

The debate on the real consequences of liberalization and global integration remains as diverse as the people involved. Perhaps even more contentious are the likely effects of these processes to the rural populations of target countries given their limited access to information and markets both locally and globally. Yet not much empirical evidence exists on how rural households and even more broadly rural economies have reshaped and adjusted due to these processes of integration. It is within this broader perspective that the RuralStruc Program was initiated to help improve and strengthen the knowledge base on liberalization and its structural dimensions and thus inform and feed debate amongst donors, governments, and other stakeholders for better policy making. The program aimed at investigating the characteristics of economic transition and potential structural difficulties within the context of globalization.

To achieve the objectives of the study, the RuralStruc program was conceived against three main interrelated hypotheses:

- The restructuring of the global agri-food markets and international competition does reinforce the process of differentiation and segmentation of rural economies with respect to production, marketing, transformation and distribution structures.

- There exists a reshaping of rural economies as rural households adapt to the changing environment through diversification of income strategies, increasing role of off-farm activities and development of both private and public transfers (e.g. remittances and social safety nets, respectively).

- There are possible marginalization trends as a result of these differentiation processes and possible adaptation difficulties which could lead to risks of transition impasse and dead ends in the process of structural transformation.

The entire RuralStruc Program was implemented in two phases. The First Phase was undertaken between April 2006 and March 2007 and was aimed at generating broad country overviews based on desktop studies and reviews of the evolution of the liberalization process. Available secondary data on the role of agriculture, market structures, evolution and differentiation of farm structures, risks of impasse and possibilities of adaptation were collected and analyzed.

The Second Phase of Ruralstruc commenced in October 2007 and was aimed at improving the analysis of each country by providing new information and knowledge to allow a better understanding of the implications and consequences of the global restructuring of the agri food markets on the process of differentiation and re-composition of the rural economies. To achieve this objective, the data collected during the second phase consisted of regional case studies, value chain reviews and rural household surveys. The rural household surveys were to allow a better understanding of the diversification of economic activities, reshaping of rural households, role of agriculture and the existing rural non-farm activities, contractualization and the processes of differentiation and integration.

The results of the First Phase showed some regional differences in asset endowments, distance to markets and past policies leading to the identification and characterization of three imprecise but significant types of regions/farms (those able to successfully compete within new markets (winning); those that tend to be marginalized due to lack of assets (losing); and a middle category whose future is dependent on the evolution of institutional and economic environment (intermediate). For the Kenyan case and the analysis presented in this report, Nakuru North was selected as a winning region, Nyando District a losing region, while Bungoma represents an intermediate region[1]. Details on the selection criteria and rationale are discussed later.

The choice of Kenya for the cross-country study was relevant given that the country implemented the Structural Adjustments Programs (SAPs) of the 1990's and is still struggling to encompass the entire policy package as evidenced by the frequent reversals on some of the key policy prescriptions under liberalization. On the other hand, the waves of globalization and economic interdependence could have differing consequences on individual countries which are important to analyze. In addition, the Kenyan economy remains heavily dependent on agriculture with the sector contributing about 24% of the Gross Domestic Product (GDP) and employing about 80% of the population directly and indirectly. The questions on the extent of income diversification, differentiation of rural economies and possible adaptation difficulties are indeed relevant issues for the country today.

The rest of the report is organized as follows. Part 1 has two chapters. Chapter 1 discusses the justification of selected regions and value chains while Chapter 2 presents the organization of fieldwork and the data collection process. Part 2 forms the core of the second phase and has five chapters which broadly discuss the observed differentiation processes and their consequences. Chapter 3 outlines the key characteristics of the Kenyan economy that impact on the agricultural sector. Chapter 4 discusses the main characteristics of the selected agricultural chains while Chapter 5 presents the main characteristics of the selected regions based mainly on the household survey. A discussion on the existing processes of differentiation among rural households is presented in Chapter 6 while Chapter 7 provides insights on households' vulnerability and prospects for agriculture in the selected regions. Finally, conclusion and policy recommendations are presented in Part 3.

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[1] The map showing the locations of these regions in Kenya is presented on page 21.

PART I -

METHODOLOGY

This first part of the report focuses on the methodological aspects of the second phase of the RuraStruc program. It provides the justification of the selected regions and value chains, and details on how the surveys were conducted and how data was analyzed.

CHAPTER 1 - JUSTIFICATION FOR THE SELECTED REGIONS AND VALUE CHAINS

1. Basis of Selecting Study Regions

To gain an in-depth understanding of the evolving rural structures and the corresponding adjustments by rural households in view of liberalization, specific regions were identified for the study based on agreed criteria; the ability of the regions to illustrate different rural household situations in Kenya. These regions are those that, following the liberalization and market reforms, reflect winning, losing or intermediate position. Therefore, market access and the local conditions formed the basis of selecting the regions. The aim was to depict the existing diversity of the adaptation process to the changing national and global context. The selected regions are discussed below.

1.1. Winning Region

The winning region refers to an area that is performing well after market liberalization. It is a region well connected and in close proximity to markets for both inputs and outputs. It illustrates the successful side of liberalization and the corresponding market reforms. It has an integrated commodity chain and a good level of public goods such as infrastructure as well as natural resource endowment. A winning region's agricultural sector is thriving thereby earning reasonable income for the rural households. In terms of local conditions, the winning region has high demographic density and good climatic conditions such as good soils and rainfall. Based on these criteria, Nakuru North District[2] in Rift Valley Province was selected to represent the winning region in the study. The district was also considered to be logistically appropriate since it is well served by good roads and shorter distances from Nakuru town. In addition, horticultural activities and dairy farming that are found in similar regions such as Murang'a and Kiambu districts are also found in Nakuru district. The research team also had research experience in the district making it easier to access.

1.2. Intermediate Region

The intermediate region was defined as a region that is in-between the wining and the marginalized or losing regions. Whereas the agricultural sector performance depends on many factors including climatic conditions, other factors such as globalization, adopted sectoral policies and the process of integration of regional trade define the fate of rural households in such a region. The effect of liberalization may not have clearly delineated the region either as winning or losing. As a consequence, sub-sectors within the region exhibit varied performance while development pathways rely greatly on the existing policies. Bungoma District[3] in Western Province, which compares well

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[2]Kiambu or Murang'a District in Central Province would have scored high as a winning region; they are in close proximity to Nairobi City and have good infrastructure and thriving coffee and dairy farming. However, these areas have lately suffered from insecurity which has forced many residents to migrate from the villages and farms to urban areas. Thus, besides the absence of many households in the rural areas, the research team's safety could not have been guaranteed. The insecurity in this region worsened following the post-election violence, making it impossible to select any of these areas.

[3] Embu District in Eastern Province would have scored highly as an intermediate region; it has medium-level milk and tea production, with relatively good infrastructure and market access. However, the region is over-researched and there is a serious problem of farmer fatigue. It also located near Nairobi, the Capital City.

with other similar regions, was selected. Bungoma is one of the largest maize-producing regions in Kenya and also has significant production of sugarcane undertaken under estate arrangement.

1.3. Losing or Marginalized Region

A losing or marginalized region is an area that is performing poorly after liberalization and market reforms. It is marginalized and poor in public goods and services and has poorly integrated commodity chains. The agro-ecological conditions in terms of soils, rainfall and land tenure are not favourable and, therefore, the region requires major investments to improve productivity. Rural household incomes in such regions have continued to decline especially after liberalization. Low rural household incomes in these areas are further constrained by limited or inadequate non-farm activities. The region selected to portray the loss resulting from liberalization was Nyando District[4] in Nyanza Province. Nyando is far from Nairobi and, therefore, there are less pull-effects and attractions from Nairobi. The population of the area is growing and presents more challenges in future in terms of provision of food and social amenities. Given its high poverty level, poor arable land due to flooding, soil erosion, and lack of industries resulting in serious unemployment, Nyando perfectly reflects a losing region.

2. Description of and Justification for the Selected Study Regions

In this section, we present a discussion on the characteristics and justification of the selected regions. The discussion revolves around main economic activities, employment opportunities, infrastructure, public investment, public policies which influence development of the regions, existing opportunities for and constraints to agricultural production and marketing and integration with other regions.

Additionally, each of the three regions was further divided into winning, intermediate, or losing region at the division or location level. This further classification was only meant for sampling purposes and not data analysis, as explained later in the section on sampling procedure.

2.1. Nyando District

Nyando district was curved out of Kisumu district in Nyanza Province of Kenya. The district is divided into five administrative divisions namely, Miwani, Muhoroni, Nyando, Lower Nyakach and Upper Nyakach. The district is located within the Lake Victoria basin and thus has a small shoreline (11km long) to the southwest where it touches on Lake Victoria. The Lake Victoria basin is a major source of food, energy, drinking and irrigation water, shelter, transport, and a repository of human, agricultural and industrial waste. A long the shoreline there are six beaches where small-scale fishing[5] activities take place. Nyando is also an agricultural area consisting of a series of hills and scarps to the South, and the Kano Plains going down to Lake Victoria in the Northwest. There are Awach and Nyando Rivers which, under normal circumstance, provide water for rice growing by irrigation in the plains.

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[4] Kwale and Kilifi Districts at the coast, with the collapsing agricultural industries for cashew nuts and poor households, would have perfectly matched the description of a losing region. Due to logistic problems, however, it was not possible to have easy access in the regions.

[5] However, there are only 365 fishermen actively involved and utilizing these 6 landing sites! There are also only 95 fish ponds owned by 75 fish farmers in the whole district.

The average farm size is about 2 ha (Agriculture Office Nyando, 2008). Food crops are produced mainly for subsistence and the common food crops include maize, groundnuts, beans, sorghum, cassava, sweet potatoes and some horticultural crops such as tomatoes. Cotton and rice are produced as cash crops but in small scale. The main cash crop is sugar cane, which is produced by individual households and estates owned by the milling factories in Muhoroni, Miwani, and parts of Nyando divisions. While dairy farming and coffee production can be suited in the higher altitudes of the district (Nandi Hills and Nyando Plateau) the households have not fully taken advantage of this due to poverty – poverty incidence in Nyando is about 61 percent according to the National Census data for Kenya and is among the highest in the country. The high incidence of HIV/AIDS in this region has been cited as one of the reasons for the high poverty levels. Other agricultural activities in the district include small-scale rearing of zebu cattle and chicken.

Public investment in Nyando is low. The region is only served by a road network of 25km (bitumen), 128.8km (gravel), and 818.4km (earth) (Nyando Statistical Office, 2008). With the problem of flooding, access to markets and market information becomes challenging. The farmers therefore may not fetch good commodity prices, further lowering their agricultural incomes and worsening their poverty condition. Piped water is accessible to only 11,624 households in and around the urban towns. Often during drought the residents have to walk long distances in search of water or rely on water from ponds, which is shared with livestock. This means that majority of the households consume water from nearby rivers[6] and ponds, and are susceptible to water borne diseases. The poor infrastructure has resulted into poor development of other sectors such as the Jua Kali, trade and industry.

Although Nyando is located near Kisumu, the third largest City in Kenya after Nairobi and Mombasa, it poor agro-ecological conditions hindering successful agriculture limits its ability to benefit from the market provided by the urban population. The most likely substantive benefit may be through the supply of unskilled labour to the City, which was estimated in 2002 at 57,860[7].

Agricultural sector in Nyando is not performing to the required level, resulting in low food production. The district relies on food imports from the neighboring districts to supplement local production. There is also over-reliance on sugar cane for income, neglecting other crops. This has led to a negative impact on farmers' income levels and socio-economic status especially following the collapse of the sugar industry. After the collapse of rice and cotton sectors following liberalization, cotton and rice growing was also abandoned by farmers, thus worsening their income levels. In terms of livestock, the district relies on traditional animals instead of improved ones that would be more economical and beneficial to rear. Due to poor farming practices coupled with lack of concern for environmental conservation, the district suffers from severe soil erosion and environmental degradation.

Fishing as a source of food and income has been affected by the encroachment of lake water by hyacinth. In addition, there is a problem of fish marketing due to the collapse of fishermen cooperatives in the region[8]. Lack of infrastructure like all weather roads, electric power, hygienic landing sites and beaches has meant that the fishing industry has not been exploited to its full potential.

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[6] The average distance to the nearest portable water point is 2km.

[7] This is in comparison to total labour force estimate of 166,619 by the Nyando District planning office, 2002.

[8] Of the 96 different types of cooperatives in the district, 34 are dormant and 11 have collapsed in the 12 years.

As a losing region, Nyando district performs poorly after liberalization. It remains exceptional particularly noting that previous major crops and industries such as cotton and textiles, sugar cane as well as rice have either collapsed or are in extremely poor state. These scenarios in Nyando district, where opportunities for employment within and outside the agricultural sector are limited, indicate looming possibilities of transitional impasse.

Nyando region was divided further into three areas also defined as winning, losing or intermediate. Upper Nyakach was selected as a winning area, while Nyando division represented an intermediate area and Miwani division a losing area. Annex 1 presents a detailed discussion on these areas.

2.2. Bungoma District

The larger Bungoma is district is in Western Province of Kenya. The district has recently been subdivided into four districts; Bungoma North, Bungoma South, Bungoma East, and Bungoma West. For the purposes of this study, the subdivisions were disregarded and the larger Bungoma district was included. The district has 10 administrative divisions; Bumula, Central, Chwele, Kanduyi, Kimilili, Malakasi, Ndivisi, Sirisia, Tongaren, and Webuye; and 44 locations and 108 sub-locations.

Bungoma district has good soils and generally abundant and well distributed rainfall, making it agriculturally productive area. The average farm size is between 1.2 and 2.024 ha (Agriculture Office Bungoma, 2008). The core livelihood of the people of Bungoma is agriculture, dominated by the growing of maize, beans, potatoes, and sorghum. Sugarcane, tobacco and coffee are the cash crops in the region. Intensive production of horticultural crops such as passion fruits, tomatoes, onions, citrus and capsicum take place in Sirisia and Kimilili divisions. However, inadequate storage and marketing facilities hamper the development of horticultural production. Tobacco and sugar cane are produced through contract farming and are the main cash crops in the region.

Livestock production is also a major economic activity in the district. There large numbers of local cattle, poultry and dairy cattle producing meat, milk, eggs, hides and skins. The high population of mostly poor producing livestock has exerted a lot of pressure on grazing lands, which has led to further low livestock productivity.

Other economic activities include mining – stone crashing for ballast – along the Bungoma-Malaba road, brick making and quarrying due to abundance of stones in the district. Fishing is also done in the existing dams, rivers and streams, and fish trading is a major enterprise for quite many of people in the district. Commerce, general wholesale and retail are concentrated in urban areas and offer employment and income for those who cannot be in the formal employment sector. At the cottage industry level, there exists oil processing and pottery.

In terms of employment, about 52 percent of Bungoma residents are engaged in agricultural activities dominated by small-scale holdings, while 28 percent are in wage employment. Bungoma, Webuye, Kimilili and Malakisi towns provide the bulk of wage employment in the district. The industries in the region providing employment opportunities include Webuye Paper Mills, East Africa Heavy Commercials, Nzoia Sugar Company, Malakisi Ginnery, British American Tobacco and Mastermind Tobacco factories and Kitinda Dairies for milk processing.

On infrastructure, Bungoma district has a road network of 1313.4km with 990.1 km of classified roads and 323.2km of unclassified roads. Of the classified roads, 165.6km are tarmacked. Most of the classified roads in the district are either murrum or earth roads. This makes them impassable during rainy seasons, making transportation of agricultural produce and other goods difficult. It is estimated that about 100km of roads in the district are under-utilized because of lack of river crossings and proper bridges. However, most roads in the sugar growing areas are over-utilized. A part from the road networks, the district also has a rail line which passes through to Malaba town, with main stations in Bungoma and Webuye towns. The district also has two Air Strips at Bungoma and

Webuye towns which are under-utilized and mostly vandalized. However, when well functioning, the airstrips provide good air communication with other parts of the country. Electricity grid passes through all the major towns - Bungoma, Webuye, Kimilili and Malakisi – and serves the industries well. The district has abundant water resources; there are 12 water supply schemes and 549 water points comprising hand dug wells, boreholes and springs. Tap water is available in the towns and in some rural areas. Despite housing a paper mill, Bungoma distict has no gazetted forest and relies on timer imports from neighbouring districts of Mt. Elgon, Uasin Gishu and Kakamega. This is despite the existing potential for private agro-forestry and timber production.

Therefore, the choice of greater Bungoma district as an intermediate region was well informed, given these attributes of the region. Also, high poverty rate that is in complete contrast to the region's potential also informed its choice. Bungoma shares borders with Uganda, which also produces maize. The cross-border trade with Uganda generally depresses maize prices in the region. The continued production of maize in Bungoma district may not be sustainable without supportive policies. This situation applies to the sugar industry as well. Most regions in Kenya were intermediate agricultural performers prior to liberalization. However, the onset of liberalization coincided with a decline in the agricultural sector which was attributed to liberalization. The multiplicity of constraints to rural and agricultural sector development in the face of favourable agro-ecological conditions makes Bungoma district worthwhile case where well thought out and implemented public policies could result in major productivity and welfare gains.

As an intermediate region, Bungoma was further classified into three areas with Bungoma North as winning, Bungoma South as intermediate, and Bungoma West as losing. Bungoma North is divided into two divisions, Kimilili with 4 locations (Kamukuywa, Kibingei, Kimilili and Maeni) and Tongaren with 6 locations (Kabuyefwe, Kiminini, Mbakalo, Naitiri, Ndalu and Tongaren). Both divisions were categorized as 'winning' areas. A detailed discussuin regarding this classification is presented in Annex 1.

2.3. Nakuru North District

Nakuru North district was curved out of the original greater Nakuru district in Rift Valley Province. It is administratively divided into two divisions; Bahati and Mbogoini. The main economic activities in the district are dairy and crop farming. The crop enterprises include wheat, maize, millet, beans, pyrethrum, tea, coffee, potatoes and vegetables. Beef cattle ranching and bee-keeping are also practiced especially in the lower elevation areas of the district. The average land holdings in Nakuru North is three hectares but there is continued subdivision of land that has had significant influence on both crops and livestock enterprises.

A part from agricultural activities, Nakuru North has forest covers and mineral deposit in certain areas and these offer additional/alternative economic activities for the households. Mining activities are stone quarrying and diatomite mining. In addition to offering employment, stone mining has also made it possible for households in the area to construct stone-walled houses, which improves their well-being since not much of their income will be going into house maintenance and repairs. The many towns located around the district such as Nakuru, Gilgil and Nyahururu with many businesses, industries and Jua Kali activities also present many employment opportunities for Nakuru North people and also offer demand for agricultural products. Similarly, within the district along the Nakuru-Nyahururu highway, several towns are emerging offering the locals an opportunity for commerce and employment. The industries like Kabazi Canners and Subukia Tea and Coffee Ltd utilize agricultural commodities produced in the area, and provide employment and income to the locals. The presence of the Rift Valley with its wonderful sceneries like the Menengai Crater and the valley viewing points also attract tourists into the area. This provides self-employment opportunities in the wood-carving and other cultural artifacts and vending the same to the tourists.

Nakuru North is fairly well served by good public investment in facilities such as roads, electricity and water. In terms of road infrastructure, there is 207.4 km of classified roads in the district, with about 100km of tarmac roads. This good road network offers good access to regional trade with Nairobi and Nakuru which are the largest and fourth largest towns respectively in Kenya, Nyeri, Nyahururu and other surrounding large towns. This has made it easier for small holder dairy and horticultural farmers to reach consumer markets in time as these commodities are highly perishable. The fairly well distributed electric power lines throughout the district has made it easier for farmers to operate agricultural machines such as milk coolers, chicken brooders, chaff cutters, milking machines and animal feed mixers. In addition, in areas such as Kabazi and Bahati locations, the presence of tea and tomato processing factories has encouraged the farmers to continue producing these commodities as they are assured of the market. Piped water traverses the district fairly well.

With the relatively well developed infrastructure that make access to large markets relatively easy, Nakuru North district, although characterized as a small-holder agricultural production area, depicts well a successful or winning region after liberalization. Both horticulture and milk production have continued to perform well in the district. Moreover, being in proximity to the large towns, people of Nakuru North have an added advantage of access to available employment opportunities off the farm in those towns.

Nakuru North, as a winning region, was divided further into two areas, with Bahati division being classified as winning and Mbogoini as intermediate. None of the divisions would qualify as a wholly losing area. Detailed discussion on this further division of Nakuru North is presented in Annex 1.

3. Selection of the Commodity Chains

In accordance with the results of the first phase of the program and the ensuing emphasis on the pre-dominance of sub-regional and national agro-food markets both in terms of household income and employment, the main food chains were used to facilitate analysis of farmers' strategies. The agricultural commodities selected are maize, milk and sugar cane.

The choice of maize was based on its being the main staple food crop in Kenya and forms the main diet of every Kenyan household. It constitutes 3% of Kenya's Gross Domestic Product (GDP), 12% of the agricultural GDP and 21% of the total value of primary agricultural commodities (Government of Kenya, 1998). Maize is both subsistence and a commercial crop, grown on an estimated 1.4 million hectares by large-scale farmers (25%) and smallholders (75%) in almost all parts of Kenya. Given that maize production and consumption cut across the three selected regions, its situation was considered in all the regions. However, because it is produced in bulk in western Kenya, its production, consumption and trade was of interest in Bungoma. Maize is the staple food crop of all households in Bungoma and doubles as the main cash crop for some households especially in Tongaren division.

Sugarcane is grown in Western Kenya areas of Mumias and Nyanza. However, the production is also concentrated in Nyando District areas of Awasi, Ahero, Chemelil, Muhoroni, Miwani, stretching to Kibos. The production of sugarcane in this region is through small scale households unlike in Western province where its production is through large scale estate farming supplemented by out growers' associations. Therefore, the commodity chain problems and relations would be better understood by focusing on small-scale Nyando producers.

The selection of sugar cane in Nyando was because it is the predominant cash crop in this losing region, to the extent that the fortunes of Nyando inhabitants are therefore closely tied to the fortunes of the sugar industry. In addition, sugar finds its way on every Kenyan consumer's breakfast table. Sugar cane production is also a sensitive issue because of the large number of the livelihoods involved. This why in Kenya sugar cane is viewed as a political crop because of its use by connected

politicians especially in financing elections. It is estimated that Nyanza Province constitutes about 13 percent of Kenya's population. In addition, three districts, Kericho, Nandi and Transmara, in the neighboring Rift Valley province also grow some sugarcane. Nyanza rural areas have about 854,285 households, majority of who depend on sugarcane.

Of all the cash crops that are cultivated in the district today, none has had such significant social and economic impacts on the rural households as has the sugarcane crop. Sugarcane competes with food crops for land allocation, time, money, labour and farm inputs. In a majority of cases, farmers devote much more of their energies, time and money on sugarcane farming at the expense of food crops. Ironically, there have been serious and perennial delays in harvesting the sugarcane crop when it reaches maturity. This means that the sugarcane crop ties up resources such as capital and land for long periods of time without indemnifying farmers. A very serious outcome of such delays is farmers' failure to receive their payments. Even after delivering the cane, farmers are usually never paid on time. This is an aspect of the cane crop that has created the "web of poverty" in many households in the area.

Finally, in Nakuru North district, the main focus was on the dairy value chain. The choice of dairy was due to the fact that in every family, milk finds itself in their diet. It also constitutes a major source of household incomes in this region since in every household, it is likely that at least one cow is kept to provide milk for household consumption. From the nutritional consideration, milk scores highly compared to other agricultural commodities. It is also a commodity whose production can be undertaken by rural small-scale farmers in smaller land holdings.

Of the many perishable agricultural commodities, milk has also the potential of being skimmed/dried and stored for future consumption or export, thereby reducing possibility of wastage. Moreover, due to the common drought episodes in Kenya, milk importation has been done especially following liberalization. In fact, milk is one agricultural produce, in which significant commercial activities have been exploited by low-income traders following liberalization of the dairy sector. Therefore, the effect of liberalization could also be well captured by studying milk from a region where its production is high.

CHAPTER 2 - ORGANIZATION OF FIELDWORK AND DATA COLLECTION

This chapter presents the general organization of the fieldwork. It contains information on site identification, sampling procedure, data collection, processing and analysis, as well as limitations of the survey.

1. Site Identification

On April 19th 2008, scheduled appointments were made with the District Agricultural Officers (DAOs), District Statistical Officers and the District Monitoring and Evaluation Officers and discussion done to understand the administrative units and the situational analysis of the selected districts. From the discussions, an insight was gained into the inherent local socio-economic conditions of the regions. The main reason for meeting the local administrators was to bring into the survey, the political will, and for the Assistant Chiefs to assist in mobilizing the local village headmen/headwomen in assisting with the preparation of the village household listings.

The contacts for the District Officers (DOs) in the study area were obtained from the District Commissioners (DCs) located at the various District headquarters. Using these contacts, discussions were done with various DOs concerning the administrative structure and the socio-economic conditions in their respective Divisions. Similarly, contacts for the various area Chiefs and Assistant Chiefs were obtained and visits and discussions made with the local administrators.

Through the Chiefs, Assistant Chiefs were impressed upon to assist, together with the village heads, the research team in preparation of the household listing in each village. Follow-ups were later made, through the phone and in person, to ascertain the progress of the listing exercise before the actual survey began.

2. Sampling Procedure

The sampling process followed the multistage systematic random sampling procedure. The first stage was the selection of regions/districts that portray winning, intermediate and losing characteristics. The second stage was to select three divisions in each district again to reflect those winning, intermediate, and losers[9]. During this selection, priority was given to the diversity inherent, the existing opportunities, market access, production and constraints, land access, size and population density. The discussions and the situational analysis led to the selection of 3 divisions in each region.

For purposes of greater control, a two stage Sampling Probability Proportional to Size was used to stratify the primary sampling units. Then an up-to-date size estimate of all the primary sampling units, the sub-locations, was obtained. The listing of households for each village, in each of the three divisions in each region, was then obtained and household sampling done proportional to size. The sample size was 300 households in Nakuru North, 303 in Nyando, and 301 in Bungoma, giving a total of 904 households (Table 1). After accounting for outliers, 873 households were selected for analysis.

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[9] It should be noted that where necessary, a third level of screening, at the location level especially in Bungoma and Nakuru North District, was done due to the expansive nature of the district and the small size of the resultant districts after the recent sub-division. However, this was only meant for sampling purposes and not for purposes of data analysis.

In each sub-location, household listing was serialized by numbering the villages first and then the household heads orderly. The sampling interval was computed by dividing the sub- location total number of households with the sample size of respondents for each sub-location. The first observation (household head) was randomly selected then the subsequent respondents selected based on the interval.

In this study, the household was defined as a family living together, eating together, and making farming and other household decisions as a unit. Where the head of the household was absent, the next household on the list was selected until the desired sample size was achieved. The survey instruments were first pre-tested in Rongai division of Nakuru district. The reason for this choice was access, convenience and prior research experience in the area by the research team. A random selection of 40 farmers was used to pre-test the questionnaire after which the necessary modifications were made.

Table 1: Number of household interviewed and selected for analysis

Province	Region/District	Division	Location	No. of households interviewed	Total No. of households interviewed per province	Total No. of households selected for analysis per province
Rift Valley	Nakuru North	Bahati	Bahati	102	300	289
			Dundori	62		
			Solai	27		
			Kabazi	49		
		Mbogoini	Subukia	60		
Nyanza	Nyando	Miwani	Nyangoma	34	303	285
			North East Kano	41		
			Ombeyi	42		
		Nyando	North East Kano	14		
			East Kano	30		
			Kakola	30		
			Onjiko	21		
			Kakmie	3		
		Upper Nyakach	Thur Dibuoro	34		
			West Nyakach	36		
			South Nyakach	16		
	Muhoroni	Muhoroni	North East Kano	2		
Western	Bungoma	Sirisia	Namwela	25	301	299
			Sirisia	30		
		Kanduyi	Bukembe	49		
			East Bukusu	67		
		Chwele	Mukuyuni	24		
			Namwela	1		
		Kimilili	Maeni	23		
			Kibingei	32		
			Kimilili	34		
		Bumula	Napara	16		
Total					**904**	**873**

Figure 1 shows the general location of the study sites but other detailed maps for each selected region are provided in subsequent sections.

Figure 1: Map Showing the Locations of the Study Regions
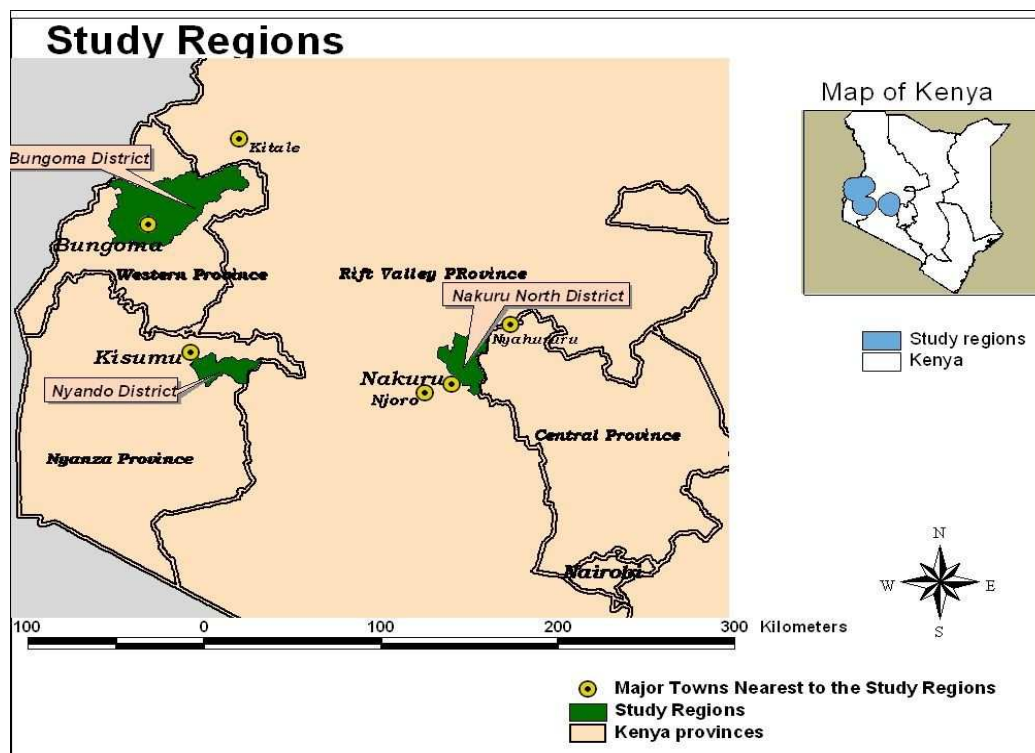
2.1.   Sampling for Nyando Region

In Nyando District, 303 households were sampled and subsequently interviewed. Upper Nyakach was selected as a winning division, while Nyando division represented an intermediate area and Miwani division a losing area. A total of 87 rural households were sampled and interviewed in Upper Nyakach division as shown in Table 2. In Nyando Division, a total of 69 households were sampled and interviewed as shown in Table 3.

Table 2: Sampling Units for a Winning Area - Upper Nyakach Division

Location	Location Category	Sub-location	Number of households in sub-location	Number of households to be interviewed
Thur Dibuoro	Losing	Andingo Opanga	1,110	13
		Upper Kadianga	1,019	12
		West Koguta	1,085	12
West Nyakach	Intermediate	Nyongonga	1,214	14
South Nyakach	Winning	Lower Kadianga	1,029	12
		East Kadianga	2,223	24
Total			**7,680**	**87**

Source: Rural Survey, 2008

Table 3: Sampling Units for an Intermediate Area - Nyando Division

Location	Location Category	Sub-location	Number of households in sub-location	Number of households to be interviewed
Onjiko	Losing	Kakmie	839	9
		Kobongo	776	9
East Kano	Intermediate	Achego	995	11
		Katolo	1,045	12
Kakola	Winning	Kakola Ombaka	850	10
		Kakola Ahero	830	9
		Tura	760	9
Total			**5,185**	**69**

Source: Rural Survey, 2008

Miwani division, which was selected as a losing region had a sample of 144 households[10] as shown in Table 4.

Table 4: Sampling Units for a Losing area - Miwani Division

Location	Location Category	Sub-location	Number of households in sub-location	Number of households to be interviewed
Ombeyi	Winning	Kore	1,244	14
		Irrigation	815	9
		Kango	1,015	11
		Ramula	1,027	12
		Obumba	627	7
Nyangoma	Intermediate	Kamswa South	1,166	13
		Wangaya I	1,279	14
		Sidho East II	1,157	13
North East Kano	Losing	Wangaya II	1,072	12
		Kabar Central	992	11
		Sidho East I	604	8
		Kabar West	787	9
		Kabar East	956	11
Total			**13,641**	**144**

Source: Rural Survey, 2008

All the sampled sub-locations in the Nyando region are shown in Figure 2

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[10] Ideally, only 141 respondents were supposed to be interviewed if the total sample for the division was to be 300. However, in Kabar West sub-location, some three female households found their neighbours being interviewed and defiantly insisted that they too must be talked to. The male household who was being interviewed also exerted pressure on our female enumerator that the three must also be interviewed. Since these household names were in our household listing, the enumerator relented and interviewed them.

Figure 2: Map of the Study Sites in Nyando District

2.2.   Sampling for Bungoma Region

Bungoma region presents a complicated case because the recent subdivision of districts has left them as small units. It was interesting to discover that an entire new district could fall into one category of losers, intermediate or winners. Contrary to what was done in Nyando region, categorization was done in locations within the divisions. Again, this screening up to location level instead of division level was meant only for sampling and not data analysis, thus data analysis remains at regional level. Given this condition, moving to location level, in fact was practical and still realistic, and enables us to capture and understand the homogeneity and heterogeneity of the divisions and thus, the entire Bungoma region.The map in Figure 3 shows all the study sites within Bungoma region.

Figure 3: Map of the Study Sites in Bungoma District

Bungoma North was selected as the winning locality, Bungoma South as the intermediate locality and Bungoma West as the losing locality. Table 5 shows the selected areas within Bungoma North. The selected study sites in Bungoma South district are presented in Table 6 and Table 7 shows the study sites that were selected in the losing area of Bungoma West.

Table 5: Selected Study Sites in Winning Area - Bungoma North District

Division	Division Category	Location	Location Category	Sub-location	Number of households in sub-location	Number of households to be interviewed
Kimilili	Winning	Kimilili	Winning	Kimilili Rural	3,262	21
				Township	2,811	13
		Kibingei	Intermediate	Chebukwabi	3,700	25
				Kibingei	1,337	9
		Maeni	Losing	Sikhendi	1,474	10
				Nasusi	1,832	12
Total					**14,416**	**90**

Source: Rural Survey, 2008

Table 6: Selected Study Sites in Intermediate Area - Bungoma South District

Division	Division Category	Location	Location Category	Sub-location	Number of households in sub-location	Number of households to be interviewed
Kanduyi	Winning	East Bukusu	Intermediate	West Sang'alo	2,545	16
				East Sang'alo	2,169	18
				Namwacha	1,968	17
				Mwikhupo	2,370	16
		Bukembe	Winning	Kongoli	1,574	12
				Namirembe	1,308	9
				North Sanga'lo	2,851	19
				Ndengelwa	1,417	9
Bumula	Intermediate	Napara	Losing	Bitobo	864	6
				West Siboti(Khasolo)	1,559	10
Total					**18,625**	**131**

Source: Rural Survey, 2008

Table 7: Selected Study Sites in a Losing Area - Bungoma West District

Division	Division Category	Location	Location Category	Sub-Location	Number of households in sub-location	Number of households to be interviewed
Chwele	Winning	Mukuyuni	Winning	Kuywa	1,694	11
				Kibichori	1,009	7
				Mukuyuni	932	6
Sirisia	Losing	Namwela	Intermediate	Central Namwela	1,135	7
				South Namwela	1,883	11
				Menu	871	7
		Sirisia	Losing	North Kulisiru	2,457	16
				South Kulisiru	2,048	14
Total					**12,029**	**79**

Source: Rural Survey, 2008

2.3. Sampling for Nakuru North Region

Nakuru North was classified as a winning district in terms of gains after liberalization. The District is divided into two Divisions, Bahati and Mbogoini. To give their characterization, and to facilitate sampling, Bahati division was classified as a winning area and Mbogoini as an intermediate division. The two look fairly the same and none would qualify as a losing division. However, considering the locations, the tri-modal screening was possible and was therefore applied. The various locations in the two divisions were then classified under the categories of winning, intermediate and losing areas. This screening up to location level instead of division level was meant only for sampling and not data analysis. As already been mentioned in Bungoma, moving to location level was necessary and still realistic to enable the capturing and understanding of any homogeneity and heterogeneity of the divisions in Nakuru North. A total of 300 respondents were interviewed from the district. The study was carried out in the winning area of Bahati division in the sites shown in Table 8.

Mbogoini division is made up of only Subukia location and the study sites selected for this location are as shown in Table 9.

Table 8: Selected Study Sites for a Winning Area - Bahati Division

Division	Location	Location Category	Sub-Location	Number of households in sub-location	Number of households to be interviewed
Bahati	Bahati	Winning			
			Wendo	2,200	14
			Bahati	4,000	25
			Kabatini	4,100	26
			Chania	1,500	10
			Kiamaina	4,200	27
	Solai	Losing			
			Kilima	2,600	17
			Ndungiri	1,600	10
	Dundori	Intermediate			
			Dundori	9,800	62
	Kabazi	Winning			
			Rugongo	2,500	16
			Kabazi	2,300	15
			Munanda	2,900	18
Total				**37,700**	**240**

Source: Rural Survey, 2008

Table 9: Selected Study Sites in an Intermediate Area - Mbogoini Division

Division	Division Category	Location	Location Category	Sub-Location	Number of households in sub-location	Number of households to be interviewed
Mbogoini	Intermediate	Subukia	Intermediate	Subukia East	5,000	32
				Wei	4,400	28
Total					**9,400**	**60**

Source: Rural Survey, 2008

All the study sites in Nakuru North region are shown in Figure 4.

Figure 4: Map of the Study Sites in Nakuru North District
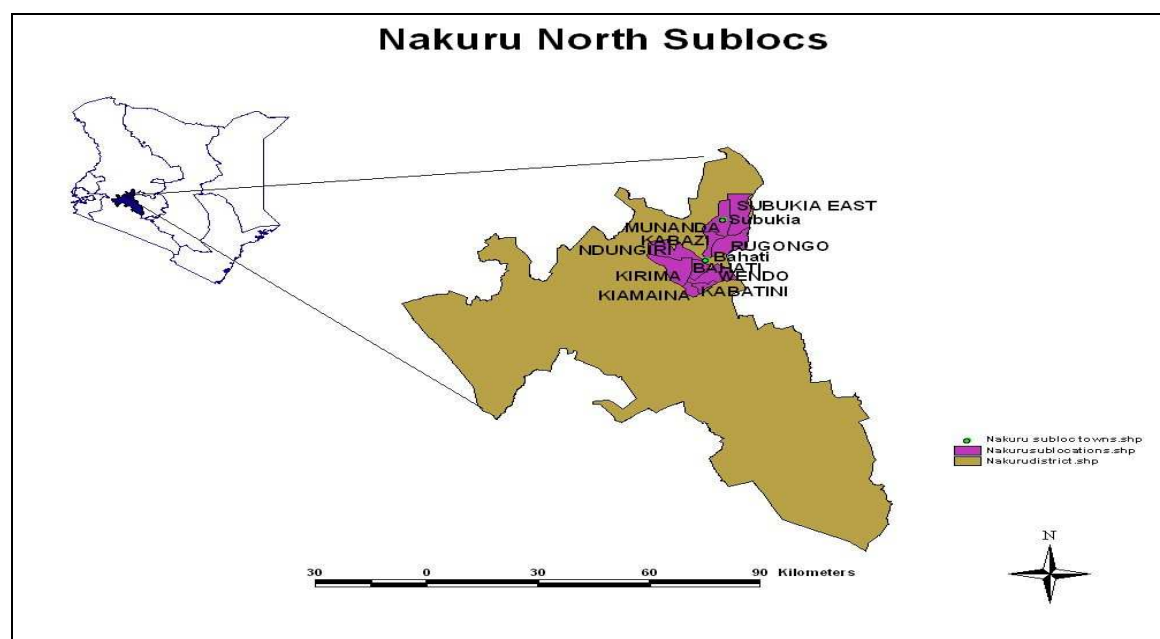
3. Data Collection, Processing and Analysis

Data collectors or enumerators were transported each morning to the Sub-location where the survey was to be conducted that day. They were dispatched once the village heads had assembled. Each village head then was assigned to each enumerator. On arrival at each respondent's homestead, the enumerator requested to be directed to the house of the named respondent. In cases where the respondent had migrated or was deceased, the enumerator, using the household listing for that particular village, picked the next household on the list. On arrival in the house of the respondent, the enumerator greeted the respondent by name in the local language of the respondent. In most cases, the village head and/or the area Assistant Chief would introduce the enumerator and explained the purpose of the visit. The respondent would then be requested by the enumerator if s/he was willing to participate in the survey.

Once the respondent agreed, then the people accompanying the enumerator were then requested by the enumerator to step outside the house or to move a distant from where the interview was taking place. From there on, the enumerator administered the questionnaire. On completion, the enumerator then thanked the respondent for having agreed to participate in the study and having spared his or her time to answer the questions. Then the enumerator moved to the next respondent's homestead as appearing in the list.

In addition to the primary data, other existing data sets important for this study were also used. The extent of the usefulness was explored during the analysis and the complementarities utilized fully. This secondary data included databases from Tegemeo Institute for Agricultural Policy, Kenya Dairy Board (KDB), International Livestock Research Institute (ILRI), Kenya Sugar Board (KSB), National Cereals and Produce Board (NCPB), the Kenya Household Integrated Survey (KHIS), and other relevant sources. These were filtered and used to strengthen the discussion of the data analysis and commodity chains.

As data collection progressed, the regional coordinators, research assistants, and enumerators converged together every evening and went through each questionnaire for validation. The validated questionnaires were serialized to reflect the regions. At the same time data entry templates were prepared at the data entry centre. The templates were tested using pre-testing questionnaires to ensure

it was running. The validated questionnaires were shipped from the field to a central data entry centre. Data entry was supervised by the task team leader. On completion of data entry, processing and validation were conducted. Data analysis and interpretation was conducted using descriptive statistics and defined indices. Analysis was done using the SPSS software.

4. Representativeness of the Survey

In terms of representativeness of our survey, majority of the variables we collected data on were similar to those which other existing data sets have collected information in the past. For instance, the KHIS data set has information of the socio-economic variables describing the household characteristics both in rural and urban areas. Furthermore, Tegemeo Institute's dataset is made up of rural survey of agricultural households comprising of both farming and non-farming households. This is the case with the RuralStruc rural survey dataset. However, this dataset differs from the ILRI dataset which comprises only of households with livestock.

Moreover, the sample size of RuralStruc survey was 904 households. This is comparable to the existing Tegemeo Institute's household survey of 1300 households given that it is a panel dataset and with natural attrition, it keeps on reducing. In terms of picking the national and regional trends, our survey is representative enough because it covered three out of five main agricultural active regions in Kenya, Nyanza, Western, Rift valley, Eastern and Central Provinces. At regional level, between 75-100 percent of the divisions were selected within a district. For instance, in cases where the district had just been carved out and was, therefore, too small, like in the case of Nakuru North, all the divisions were picked and sampling conducted at the sub-location level.

Finally, concerning the output of our dataset, our results concerning chain and household characteristics, and the general regional analysis are similar to existing past research. Our results are therefore comparable to those on commodity chain analysis in other regions such as Kegode (2005), Ondiek et al (2003) and Gamba et al (2004) on sugar cane sector; Argwings-Kodhek (1999), Rates (2003), Wangia, et al (1999) on maize sector; Karanja (2002) and Thorp et al (2000) on milk sector. Also, our findings on the relationship between household characteristics and income inequalities among households within the same region, corroborates those of Suri (2007) and Kimenju (2008). Much of the representativeness of the regions in terms of data analysis is discussed in the later chapters.

5. Limitations of the Survey

5.1. Difficulties faced by the fieldwork team

The implementation of the survey was beset by a number of difficulties. The political campaigns and the subsequent post-election violence in the early part of the year caused a delay in the expected time of implementing the survey in Kenya by five months. Eventually, the exercise commenced at a fragile time when normalcy was setting in but with a high level of uncertainty. This affected the selection of enumerators because they could only be sent to areas where they were not considered hostile. When data collection started, there was a lot of suspicion from the respondents. They were not sure of whether to talk or not. On many occasions, some were unwilling. Much time was spent in convincing them to cooperate. Even after accepting to respond, there was a high likelihood of abandoning the interview midstream. The enumerators were asked to be patient and understand the emotions of the moment. Such a fragile situation delayed the survey implementation process.

The sampled regions were expansive and so logistics were a challenge. There was also confusion on administrative boundaries because new districts had just been declared and/or created during the election campaigns and no one was quite clear about them. The study stuck to the old boundaries.

The listing of households was the most exhausting. The household lists were long and the researchers depended on the local administrators to verify the availability of the selected households. Because of this, the need for concurrent activities arose. The survey began in the areas where listing was completed as listing progressed for other areas. Indeed, the headmen, Chiefs and their assistants demanded payment for the work. This also delayed the process.

There were general navigational problems in all the regions. Due to flooding, particularly in Nyando, there were problems of accessing selected respondents. Instead of driving, the team was forced to wade, and at times circumvent impassable sections using longer routes. Attempts to drive kept the team stuck for hours in the mud.

In Nakuru North, and Bungoma, effects of post election violence curtailed the freedom and movement by researchers. Under normal situations, enumerators would work alone, but this time, they had to be accompanied by the chief and/or his assistants in every village.

The extreme poverty in a number of households required sympathy and not interview. The researchers had to be philanthropic in such cases, offering some financial support during or after the interview. It was not brotherly to undertake an interview and leave while a householder member was lying there sick for lack of transport to take him/her to a nearby health center for treatment.

There was a strong evidence of respondent fatigue. A national household survey had just been completed with them and coupled with the prevailing uncertainty after elections, the respondents were distinctly not in the mood for interviews.

Additionally, interviews were based on declarations of the household members, primarily, the household head, with no possibility to measure farm areas and outputs. The interviews also occurred at time "t" and are therefore just a snapshot. It is therefore not possible to compare information collected with previous data.

5.2. Crop and Livestock Prices

A major purpose of the rural household data was to allow the calculation and categorization of rural incomes in assessing how rural economies are reshaping as a result of the global restructuring. Such computation of total (global) household incomes would require calculations of value of production for crops and livestock and incomes from non-farm activities. When inconsistencies existed in the collected prices of crops and livestock products, it was decided that prices from other sources which correspond to the period of the survey be used. In this case, the crop prices used in the computation of incomes discussed in this report were drawn from a household survey11 conducted by Tegemeo Institute in November 2008, which captured producer prices for 2007/2008 cropping year. This cropping season did overlap with the one for which data was collected under the RuralStruc program. The prices used were district median prices for Nakuru (for households in Nakuru North), Bungoma (for households in Bungoma) and Kisumu (for households in Nyando).

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[11] The Income Indicator Survey tracks income changes for 1000 rural households and is conducted after every two years from 2004. The price data used in the analysis for RuralStruc was obtained from the survey which was conducted in 2008, with the reference period as 2007 cropping year.

The Tegemeo Indicator survey, however, did not have prices for 47 out of 95 crops. These crops were, however, not major among the surveyed households and represent very few cases (343 out of a total of 5681 cases). The prices collected during the survey were used to value production from these crops.

For livestock products, sale prices collected at household level were used. For households with sales but no price data, regional medians for those who made sales were used. For products where regional median prices were not available (no sales/sale prices), sample medians were computed[12].

5.3. Final sample: Negative global incomes/extreme values for incomes

Although a total of 904 households were interviewed, the results of the analysis discussed in this report are based on 873 households (289 households for Nakuru North, 285 for Nyando and 299 for Bungoma). For consistency with the aggregated Mini-database prepared for comparison purpose at the international level, we excluded 20 households (3 households in Nakuru North, 16 in Nyando and 1 in Bungoma) with negative global incomes. 11 households with outlier[13] values in at least one income component were also excluded from the analysis to eliminate their effects on the aggregated results and computed statistics.

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[12] Price Lookup tables (SPSS files) for both crop and livestock products were compiled and are available.

[13] Identification of extreme value was done using the explore command in SPSS, the construction of box plots and the analysts' judgment

PART II -

DIFFERENTIATION PROCESSES

This part presents the core results of the second phase of the project. It first sets the scene of the main chains and their restructuring and then the characteristics of the selected regions based on the field surveys. This general approach is important in giving the necessary background to put the rural household back in their context and to better understand their opportunities, constraints and challenges as well as their strategies. It also helps the discussion on the main hypotheses of the program regarding the differentiation processes and their consequences.

CHAPTER 3 - CHARACTERISTICS OF KENYAN ECONOMY IMPACTING ON AGRICULTURAL SECTOR

In this section, we discuss the status of the national social and economic conditions with the main objective being to portray how they are intertwined with the agricultural chains and the regions. The information presented relates to minimum wages, average income per capita, commodity prices and poverty rates. In addition, information is also presented on agricultural yields and prices for the selected agricultural commodities.

1. Sectoral Contribution to Gross Domestic Product

The economic growth of Kenya can be best explained in the context of external shocks and the internal challenges under which the economy has to respond. Five phases are discernible: a rapid growth phase over 1964-73; an era of external shocks (1974-79), a period of stabilization and structural adjustment in the 1980s characterized by partial implementation of the SAPs; an era of liberalization and declining donor aid (1990-2002) characterized by the withdrawal of government from controlling of the economy (GoK, 2002-2008) and a post liberalization era from 2003 and thereafter. Kenya's GDP is derived from various sectors: agriculture and forestry; manufacturing; building and construction; trade, hotel and tourism industry, mining; electricity and water transport and communication; finance and real estates and the services industry.

In agriculture, the newly independent government had successfully distributed productive land to small farmers and promoted the cultivation of cash crops. The sector was impacted by oil shocks experienced during pre-liberalization, which slowed sectoral growth. From early 1980s, implementation of the SAPs led to a relatively increased growth rate of agricultural GDP and the national GDP. The trends of growth of real GDP mirror the agricultural GDP growth trends indicating the important contribution of agriculture to the economy.

The overall economic growth has been positive as shown in the Figure 5. Between 1963 and 1980, the economy grew at an average real growth rate of 11.3 percent, 10 percent in 1981 to 1992 and 2.0 percent from 1993 to 2002. The country's' real GDP in 2005 was estimated at Ksh.1172.1 million signifying a 5.8% increase from 2004 (CBS, 2006). The real GDP has been on increase since independence.

The percentage contribution of agriculture compared to other sectors has been on the decline. While sectors such as transport and communication, services and trade have been growing, agricultural sector has been declining and recorded negative values in some years. Whereas agriculture's share contribution to the real GDP declined during the three periods (pre-liberalization, transition and liberalization, being 0.35, 0.31 and 0.27, respectively), the share for the service sector increased from 0.19 in 1964-80 to 0.20 and 0.21 in 1981-92 and 1993-2002 periods as shown in the Table 10.

Figure 5: Trends in Real Gross Domestic Product

Kenya's AgGDP and Real GDP trends, 1964-2002 (Kshs. Billions)
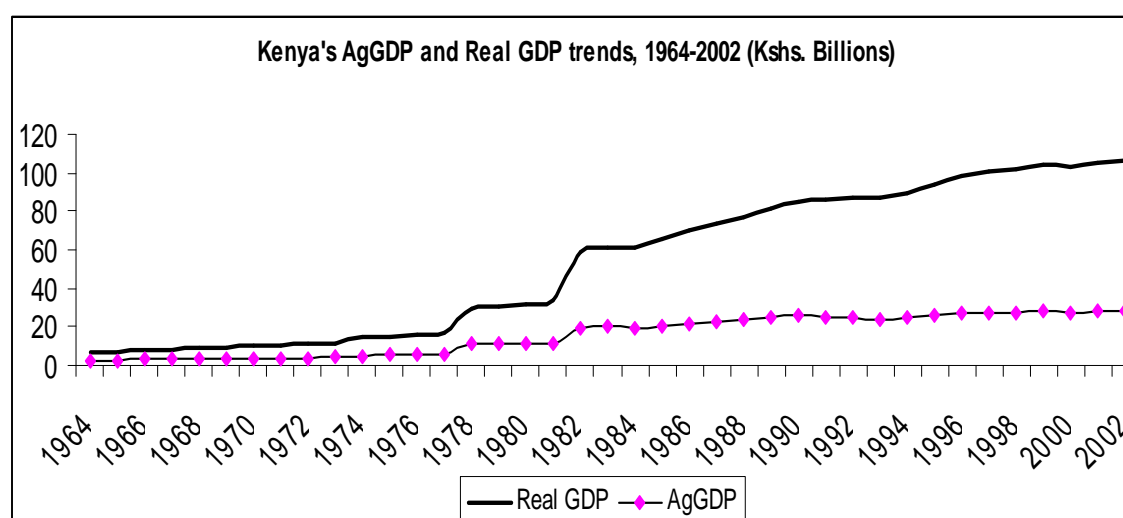
Source: Economic Surveys (1964-2002)

Table 10: Sector Share to Real GDP in Selected Periods

Period	Agriculture & Forestry	Building $ Construction	Water & Electricity	Finance, ownership/ dwellings	Trade & Hotels	Manufac- turing	Trans- port & Commun	Service Industry
1964/80	0.35	0.05	0.02	0.11	0.1	0.12	0.07	0.19
1981/92	0.31	0.05	0.02	0.15	0.11	0.13	0.06	0.20
1993/02	0.27	0.04	0.02	0.18	0.12	0.13	0.06	0.21

Source: Economic Surveys (1964-2002)

Agriculture contributed 25.81% to the real GDP in 2004 which was less than a share of 26.61% in 2003 (CBS, 2006).

The real GDP mirror agricultural GDP: growth rates have had similar trends since independence as shown in Figure 6.

The period 1973/74 was characterized by the first oil crisis, which reduced the share of agricultural contribution to GDP from 34% in 1973 to 31 % in 1974. This declining share trend was, however reversed by the coffee boom in 1976/78 which increased the share from 32.19% in 1976 to 37.36% in 1978 and nearly doubled the agricultural contribution towards the GDP in both real and nominal values (Government of Kenya, 1989-93).

However, immediately after the second oil shock in 1978/79 the share reduced to 35.71%. Since then, the share has been declining and not even the mini coffee boom of 1986 had any significant effects. The agricultural GDP grew at an annual rate of 12.55% in 1963/80 at 8.18% in 1992/80 and 1.32% in 2002/93 periods. The declining competitiveness of the agricultural sector against the other economic sectors is partially attributed to the poor production technologies, fluctuating prices in the international markets, high production costs and imperfect agricultural information flow have led to low agricultural returns and consequently exit of productive labour force from agriculture.

Figure 6: Real Agricultural GDP and Real GDP Annual Growth Rates
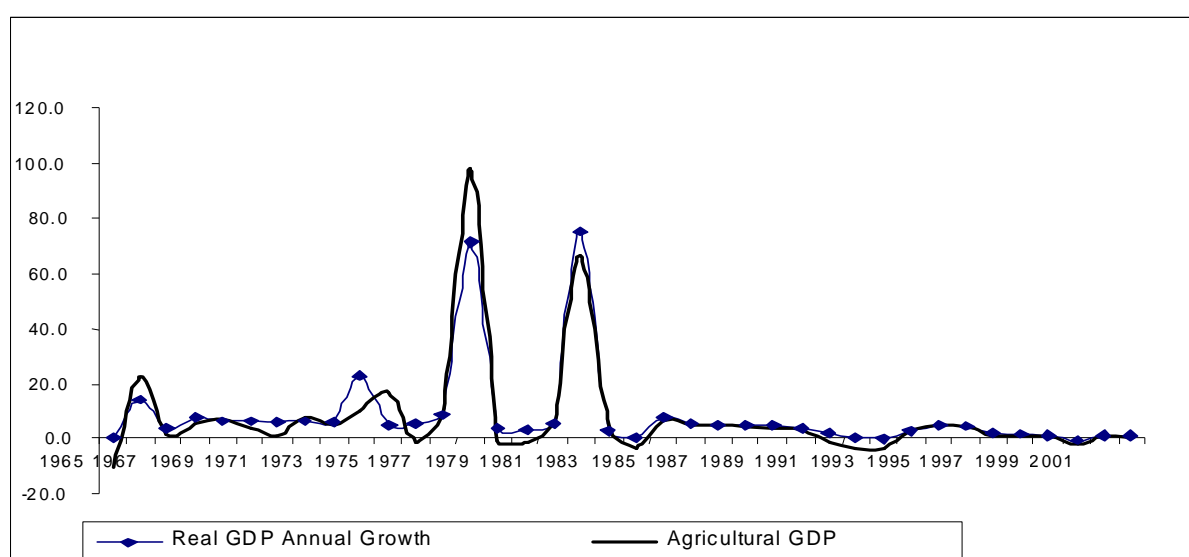
Source: Economic Surveys (various Issues)

2. General Agricultural Commodity Price Trends

2.1. Inflation Trend

The increase in commodity prices has negatively affected rural households since agricultural production has been severely affected by tremendous increases in fuel prices apart from the devastating impact of the post-election violence. The rising inflation is a major factor driving commodity prices. (Average inflation in January 2008 was 24 percent and rose to 31 percent in June)

The trend of inflation indicates an increase from a low of 2.7 in 1964-73 to levels of annual average rates of 12 in 1970s and 1980s, as depicted in the Table 11. This was attributed to the expansionary monetary policies which were as a response to the external shocks of oil crisis and coffee booms. The passive monetary policies under the oil crisis and coffee boom were responsible for the rapid money supply in the 1970s while deficit monetization was the main driver over the 1980-1995 periods (GoK, 2002-2008). Budget deficits averaged 4.5 percent of GDP in the 1970s, rose to a 5.5 percent in the 1980s and peaked at 9 percent in 1989. Deficits remained high until 1994. The large financing requirements exerted continued pressure on inflation and exchange rates and strained trade and financial liberalization policies. Stabilization succeeded in bringing down the deficits in the latter part of the 1990s, averaged 1 percent but rose again in 2000-2001.

Table 11: Money Supply and Inflation

	1964-73	**1974-79**	**1980-89**	**1990-95**	**1996-2000**	**2001-2004**
Inflation rate	2.7	12.1	12.3	23.1	8.9	6.9
Money supply growth %	-	20.7	12	27.2	13.2	9.28
GDP growth rate	6.6	5.2	4.1	2.5	2	3.3*

Source: National Development Plan, 2002-2008

* Averaged for the annual growth rates under SNA

2.2. Average Prices and Yield for the Selected Commodities

At the national level, the average yield for dry maize at the time of survey was 32.5 million bags, dairy milk was 108,114 million litres whereas, and the average yield of Sugarcane was 341,252 tones. Dry maize in Kenya is retailed in terms of a 2 kg tin (*gorogoro*). In terms of prices, one kilogram of dry maize was fetching Ksh.17.50 at the time of the survey in 2008. Maize is usually sold to the National Cereals and Produce Board (NCPB) in 90kg bag.

However, the payment for commodity deliveries is usually done on the spot. Most of milk produced is usually sold to the cooperative societies, although some small-scale dairy farmers prefer to retail milk to households due to their low production capacity and the need for immediate payment. At the time of the survey, a litre of milk was trading at Ksh.15.20 through the cooperatives whereas, the same quantity was being hawked to consumers at ksh.25. This is contrast to the price of processed milk sold at retail shops and supermarkets where a litre of milk was Ksh.66. This large difference between the unprocessed milk and processed packaged milk drives consumer preference for unprocessed milk in addition to established consumer tastes for higher BFC (butter fat content) in unprocessed milk.

Sugarcane is usually sold in tones to millers, who extract and process sugarcane for transmission to the wholesalers and retailers. Small-scale sugarcane farmers are in some form of non-written, non-formal contractual arrangement with the millers. At the time of the survey, a tone of sugarcane was selling at an average price of Ksh.2,570. Once processed, a kilogram of sugar was retailing at ksh.65. Sugarcane farmers experience a major problem of payment for deliveries as the processors do delay payment to farmers.

Commodity prices have increased quite significantly during 2008. As at June 2008, dry maize was trading at Ksh.21.25 per kilogram, with packaged processed milk currently trading at Ksh.80 per liter. During this period, one kilogram of processed sugar was retailing at Ksh.70.

2.3. Kenya's Employment Structure

The 1998/99 Integrated Labour Force Survey (ILFS) shows that Kenya's total labour force was 77.4% (15 million) of the population aged 15-64 with the majority (57.95 of the active population) in the 20-39 age (CBS, 2002). Currently there are estimated 17.1 million economically active people in Kenya (FAOSTAT).

Table 12: Growth Rate Trends in Kenya's Labour Force

Period	Pre- liberalization 1961/80	Transition 1981/92	Liberalization 1993/02	Post- liberalization 2003/04
Economically active population	3.11	3.84	3.08	1.88
Economically active in agriculture	2.63	3.47	2.23	1.23
Non-agricultural population	5.48	5.19	4.17	3.25

Source: FAOSTAT

The economically active population growth rate was 3.11% in 1961/80, 3.84% in 1981/92 and declined to 1.88 in 2003/04. The decline in recruitment into economically active bracket could be a result of a number of factors among them the aggressive family planning campaigns that have reduced the number of family members per household and the effects of terminal diseases such as HIV/AIDS and so on. The decline in the proportion of economically active people in agriculture over

time is indicative of alternative opportunities available in non agricultural sectors. Although there is an apparent decline in the proportion in non agricultural population over time, the non agricultural population is twice that in agriculture in 2004. This is suggestive of the development of other sectors that drive the economy, probably due to effects of liberalization. This trend has implications for the future of agricultural sector to absorb people, of to continue offering jobs for the rural households.

A greater focus on the capacity of employment absorption by sector is shown by the trends of employment in the various sectors. The major employment sectors rapidly growing are communication/social services/personal services and wholesale/retail trade which are intensely competing agriculture/forestry. While the growth for all sectors were positive, agriculture sector employment declined in the 1980s but the trend reversed as from mid 1990s. Employment in the non-agricultural sectors has been tremendous with the services sector surpassing agriculture as from 2001, as shown in the Figure 7.

Figure 7: Private Sector Employment
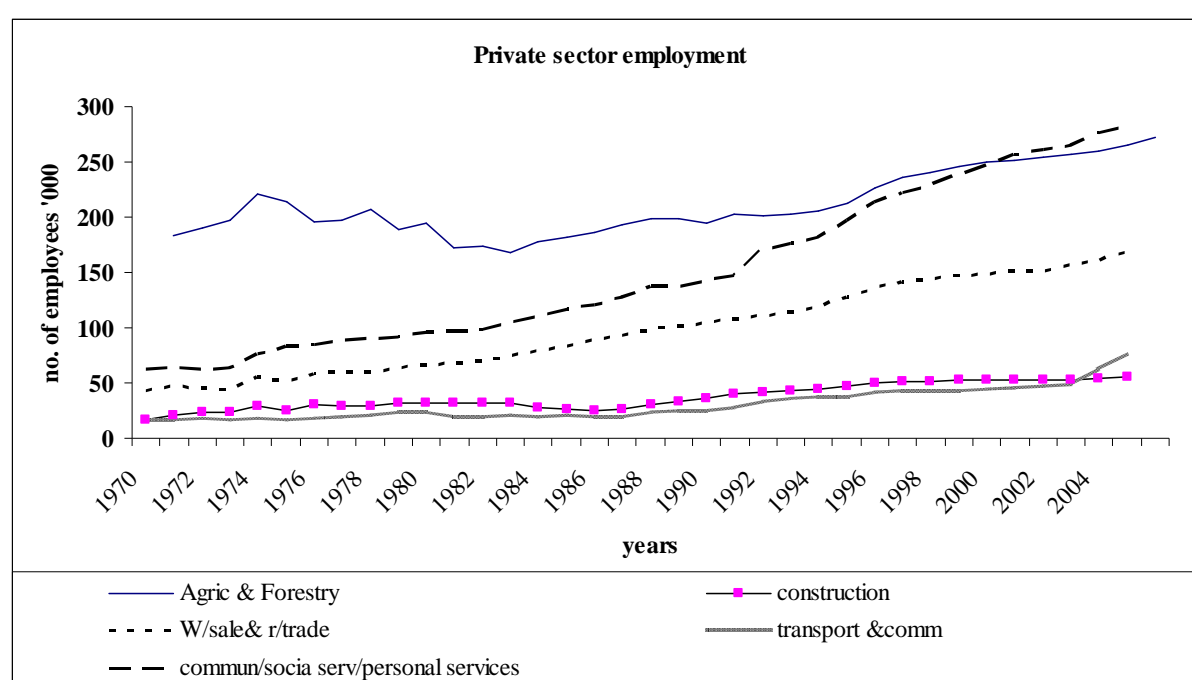
Source: Economic Surveys (various Issues)

The pool to draw future labour is the 15-24 age groups. Figure 8 shows that their number has been consistently rising between 1985 and 2008. This implies that there will continue to be a rising labour force in Kenya and job creation in both agriculture and non agriculture sectors may not have the requisite absorption capacity. In fact, the Kenya Economic Report (2009) documents some of the key employment challenges as high youth unemployment and rapidly growing labour force. The Report states that unemployment is highest within the age groups of 15-19 and 20-24 at about 25 per cent and that youth unemployment is more than double the national unemployment rate.

Figure 8: Trend in the Number of Persons Aged 15-24 Years
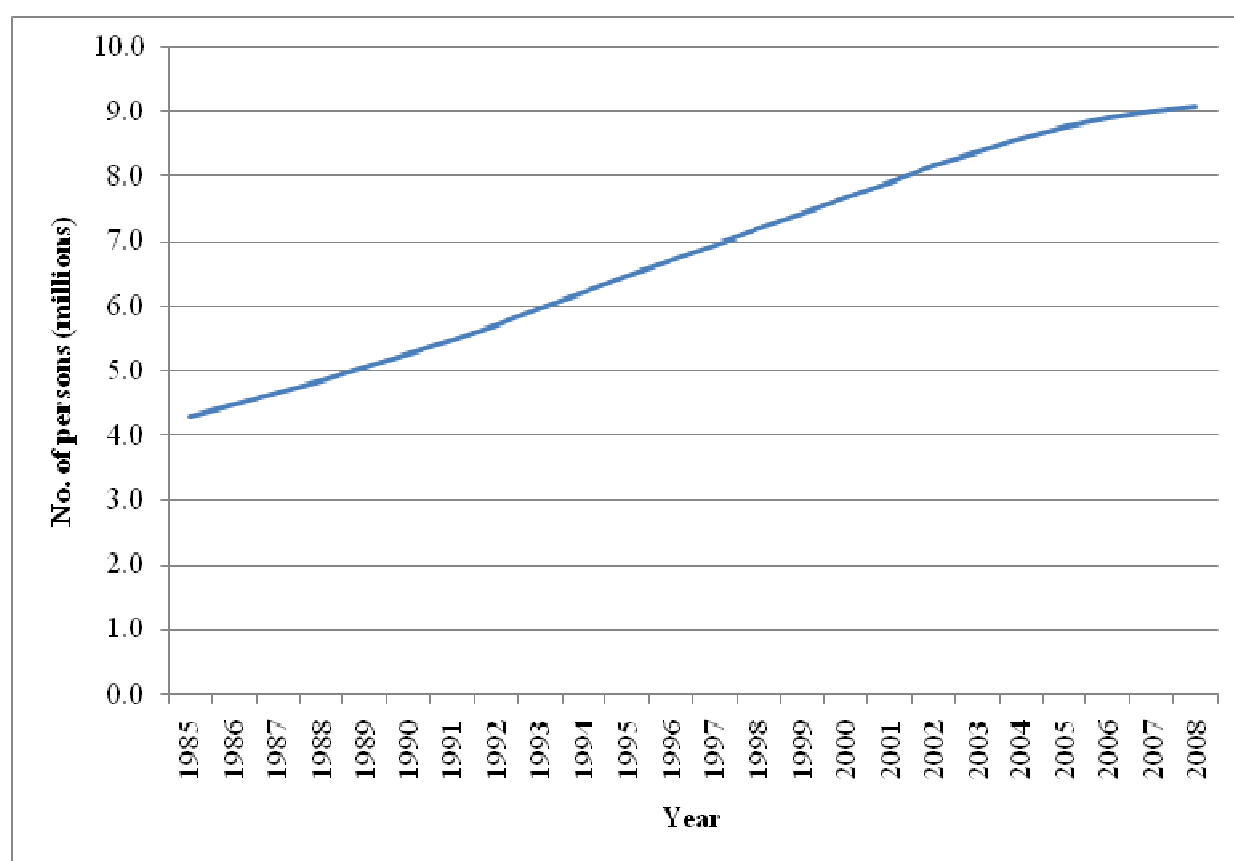
Source: The World Bank's data bank

2.3.1.   Rural and Urban Unemployment in Kenya

There were 1.8 million unemployed people in 1999 with the number of unemployed females almost double that for males (CBS, 2002). The unemployment ratio was estimated at 0.49. The urban areas absorbed 57.7 percent of the unemployed (CBS, 2002), as shown in Table 13. It is safe to assume that unemployment has increased owing to the declining agricultural productivity in rural areas. Urban and rural unemployment rate have risen to 25.1%, and 9.4%, respectively. The overall unemployment in the country was 14.6 percent. In a country where unemployment is increasing in non-agricultural sectors and the prospect of agriculture in absorbing labour is low, the future may be bleak for the youth.

Table 13: Distribution of the Unemployed Persons (Aged 15-64)

Region	%Male	%Female	%Total	Unemployment rate %
Rural	56.1	36.4	42.9	9.4
Urban	43.9	63.6	57.1	25.1
Total	**100**	**100**	**100**	**14.6**

Source: CBS, 2002

2.3.2.   Minimum Wages in Kenya

At national level, the minimum wage for skilled labour is higher than that for unskilled labour. According to the Kenya Economic Survey (2008), the monthly basic minimum wages for agricultural industry in 2007 averaged Ksh 3,396, with unskilled employees earning a minimum of Ksh 2,536 and their skilled counterparts earning a minimum of Ksh 3,562 on average. The unskilled employees include stockman, herdsman and farm labourers while the skilled employees include farm foremen, clerks and vehicle drivers.

3.   National Incomes and Poverty

3.1.   *National Income per Capita*

The average gross national income per capita in Kenya in 2007 and 2008 averaged Ksh 48,867 and Ksh 54,875 respectively (Economic Survey, 2009). The national income per capita has been on the rise in the last five years from Ksh 3,6991 in 2004, Ksh 40,056 in 2005 to Ksh 44,754 in 2006.

3.2.   *National Poverty Level*

Poverty has been a major problem in Kenya as a whole with most households living below the poverty threshold. The urban poverty increased much more rapidly than rural poverty between 1992 and 2000 probably due to the rural-urban migration and the unemployment problem in urban areas (Table 14).

Table 14: Rural and Urban Poverty Incidence

Year	Rural	Urban	National
1992	47.9	29.3	44.8
1994	46.8	29.0	40.3
1997	52.9	49.2	52.3
2000	56.0	49.2	52.6

Source: WMS, 1994, 1997, ERS

According to the National Bureau of Statistics (Statistical Abstract, 2007), the poverty rate declined to 46 percent. The Kenyan poverty threshold was estimated to be Ksh.1,239 while the absolute poverty threshold stood at Ksh.2,648 during the same period. The rural poverty rate was 53 percent and was higher than the urban poverty rate of 33.7 percent. The absolute poverty rate was 43 percent. The decline in poverty rate followed the implementation of the Economic Recovery Strategy, the government's economic development strategy for 2003-2007, that saw the upward turn of the economy since 2003. The Kenya vision 2030, which is the new development strategy for the country, projects further reduction in poverty following the anticipated enhanced economic growth of between 8 and 10 percent.

Higher poverty incidences in rural areas may be attributed to the lower incomes in rural areas compared to those in urban areas and the low level of infrastructural investment and severe unemployment in rural areas. The high poverty rate in the rural areas has affected the rural households' welfare and livelihood with the situation being worsened by the low per capita incomes. Two of the regions in which we conducted the survey (Nyando in Nyanza, Bungoma in Western) have poverty rates higher than the national average and many other regions, as shown in the Figure 9. In fact, according to the Kenya Integrated Household Budget Survey (2006), poverty seems to have accelerated nationally and in almost all regions following liberalization.

Figure 9: Regional Rural Poverty Trends in Kenya
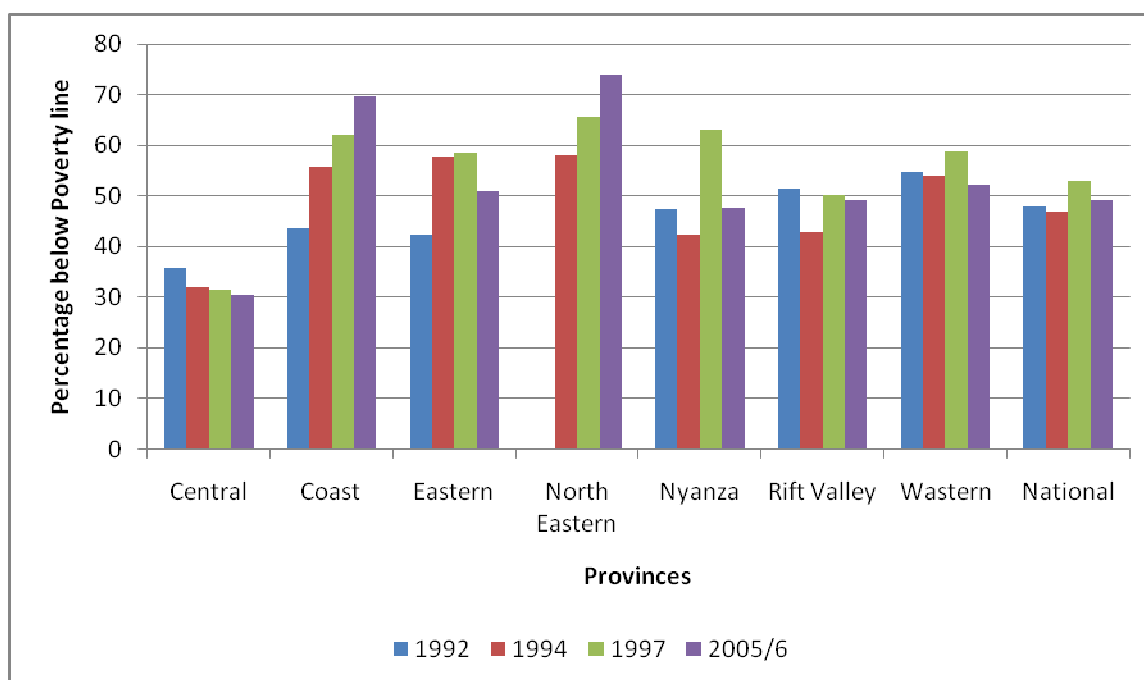
Source: Kenya Integrated Household Budget Survey, 2006.

4.   Commercial Agreements Affecting Kenya's Agricultural Sector

Kenya has entered into different trade agreements both regionally and globally. The terms of engagement are outlined in each of the signed agreements. Some of the organizations are discussed below.

- **Common Market for East and Southern Africa (COMESA)**

Common Market for East and Southern Africa (COMESA) was established in 1993 with a major focus of enhancing internal and external trade within the member countries through overcoming barriers encountered by individual member countries. It is now a 20-member country agreement with an estimated total population of 385 million people. COMESA region has perhaps led to the African continent becoming the leading destination for Kenya's exports. This may be attributed to the creation of a Free Trade Area in the COMESA region, in October 2000, which entailed the removal of all internal trade tariffs and barriers. Exports to COMESA have increased from Kshs. 51.4 billion in 1997 to Kshs.56.7 billion in 2000 representing an increment of 10.3%. Imports decreased from Kshs. 6.6 billion to 5.2 billion during the same period. COMESA has also facilitated the establishment of the African Trade Insurance Agency (ATIA) to insure investments against potential risk. Recently, COMESA members formed a customs union with a common external tariff. The most important markets for Kenya are Uganda and Tanzania each making up a third of the exports, followed by the Democratic Republic of Congo with 16% in 2003.

- **East African Community**

The East African Community (EAC) is a regional intergovernmental organization between Kenya, Uganda and Tanzania. The 'new' EAC is a revival of the original EAC, a customs union that was established in 1967 but collapsed in late 1970s. The three member states had a combined GDP of $31.4 billion and a population above 90 million (Meredith, 2005). It entailed a customs union effective January 2005 with a common tariff at 0, 10, and 25 percent for raw materials, semi-processed and finished products, respectively.

Since the transformation of East African Co-operation into a community in 1990, Kenya's exports to the region have grown from 8% in 1990 to 24.4% in 2000. Increased trade is expected following the transformation of East African Community into the East African Customs Union through elimination of internal tariffs and establishment of common external tariff. This is expected to increase the integration of the economies of these countries, including their agricultural sectors.

- **Intergovernmental Authority for Development**

The Intergovernmental Authority for Development (IGAD) endeavours to achieve regional co-operation and economic integration for the countries in the horn of Africa sub-region through the promotion of food security, sustainable environmental management, peace and security, intra-regional trade and improved infrastructure facilities. It also entails capacity building in the areas of conflict prevention and alleviation and mitigations of humanitarian crises. Security is paramount for agricultural activities, and the people of these countries can develop the confidence to continue cultivation, assuming other necessary institutions are in place.

- **African Caribbean and Pacific – European Union**

Kenya became a signatory of the African Caribbean and Pacific ACP-EU (the famous Lome Convention) in 1975. The ACP-EU trade pact had both trade and aid provisions and was based on the colonial links between the ACP countries and their former colonial masters. The trade pact provided for non-reciprocative trade and aid between these two parties and almost 97% of ACP exports were allowed duty free access to EU markets. The trade agreements were renewed every ten years and aimed at increasing the export income of the ACPs, promoting industrialization and accelerating economic growth. The Lome IV Convention expired in 2000 and was succeeded by the Cotonou Agreement that was extended to 2008 after which Economic Partnership Agreements (EPAs) will be effected. In this regard, the ACPs will be required to sign the EPAs (Ronge, 2006). EPAs are designed for consistency with WTO provisions. Its negotiations in regional blocks and the requirement for reciprocity places Kenya in a precarious position. This is due to the prominent position Africa holds in Kenya's exports especially recognizing competition that will arise since these products are manufactures. In addition, the situation presents a contrast owing to the fact Kenyan's regional partners export raw materials to the European markets.

- **African Growth Opportunity Act**

The African Growth Opportunity Act (AGOA) is trade agreement between US and designated 37 Sub-Saharan African countries including Kenya. The Act came into place in the year 2000 and was expected to be in place for 8 years but was amended to cover up to 2015. Under this Act, the high duties and restrictive quota that have been imposed on exports of textiles have been lifted (GoK, 2002-2008). The only problem is that this is a short term agreement. In fact, the cotton sector in Kenya collapsed in the years following liberalization implying that the firms locating in Kenya that are accessing the USA market through AGOA must import cotton.

- **World Trade Organization**

The World Trade Organization (WTO) came into effect in 1995 as a successor to the General Agreement on Trade and Tariffs (GATT) to facilitate global free trade and provide forum and mechanisms resolving trade disputes. Kenya is a member since the inception of the Marrakech Agreement of 15th April 1994 signed in Morocco and completed in 31st December 1994 when accession to WTO was completed.

Kenya is a signatory to all WTO agreements among them- the General Agreement on Trade and Tariffs (GATT), Agreement on Agriculture (AoA), General Agreement on Trade and Services (GATS), the Agreement on Textiles and Clothing (ATC), and the Agreement on Trade-Related Intellectual Property Rights (TRIPS). Again, these agreements may lead to further integration of Kenyan economy with other countries. However, the extent to which the rural economies are affected with these economies needs further analysis.

5. Food Price Crisis and Agricultural Activities

The prices of agricultural commodities, including staples of many Kenyan diets, have risen sharply over the last few years, with the sharpest rises being within the past eighteen months. Since 2006, the prices of many food crops in Kenya have more than doubled, and continue to rise. The factors leading to increased prices and the resultant food crisis are diverse and complex. Most factors have impacts on the supply of food and/or the demand for food. The supply of food may be affected by land and water constraints, under-investment in rural infrastructure and agriculture, lack of access to fertilizer and irrigation, trade policies, weather disruptions, and political crisis such as war and clashes. Factors that affect the demand for food include rising energy prices, population growth, globalization of food markets, and changing diets. The current food crisis is, in the simplest terms, a result of rapid growth in food demand in conjunction with a decline in the growth of food supply.

Since 2006, Kenya has been hard-hit by the food crisis and this phenomenon may have impacted on the team's survey of the commodity chains and households. The price trends has been felt nationally and in the surveyed regions of Nyando, Bungoma and Nakuru North Districts. The following section discusses how the current food price crisis may impact on the rural livelihood and aggravate their vulnerability to shocks and poverty.

5.1. Rising Food Prices and Food Security

Kenya imports fertilizers and food, and the national poverty rate stands at 46%. Periodic drought, dependence on rain-fed agriculture, low agricultural productivity, and frequent conflicts undermine local food production, contribute to food insecurity, and create greater dependence on food aid. For example, the December 2007 post-election conflict in Kenya disrupted production and trade, and displaced farmers and laborers, which caused the normally food-secure regions of Central and Western Kenya to become food insecure. The conflict resulted in a post-harvest loss of 300,000 metric tons of maize[14]. Although Kenya is not fully dependent on food imports such as rice, the combination of factors makes it especially vulnerable to higher global food prices. Recent research (Ivanic, et al., 2008) in nine developing countries found that higher prices of staple food commodities were associated with a significant increase in poverty. This increasing poverty and food security have led to an immediate need for food aid in Kenya.

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[14] See Kenya Food Security Outlook: April to September 2008, http://www.kenyafoodsecurity.org, on January 15th 2009.

According to Plan International (2008), 3.5 million people in Kenya need emergency food aid, due to severe food shortages caused by drought. Some people are dying from famine-related causes and there are high levels of malnutrition among children and mothers, and rainfall failure has killed huge numbers of livestock in rural areas. Unfortunately, however, food aid volumes are near a 50-year low and the higher food prices mean that money dedicated to food aid simply does not provide as much food as in the past (Blas, 2008). To emphasize on the problem, the Kenya government has, on 16th January 2009, declared the food shortage, a national emergency.

One might expect higher food prices to benefit rural farmers and lead to higher incomes and increased production, but in Kenya this is not necessarily the case. It is difficult for small farmers to increase production in response to higher prices for several reasons, including: lack of available land, inadequate irrigation, rising fertilizer prices, inability to get insurance and credit, reluctance to risk investment with no guaranteed return, and eviction due to post-election violence. In fact, despite the higher prices of the foods they are producing, farmers in some parts of Kenya have actually planted less this year.

For some years, Kenya has been one of the most food-insecure regions in the Africa. Food security, defined as when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life, is a broad and complex measure[15]. It can be captured through three dimensions: food availability, food access, and biological utilization/absorption of food (Von Braun et al., 2008). For Kenya's poor, who typically spend 50 to 70 percent of their budgets on food, higher food prices lead to reduced food consumption as well as a less nutritious diet. Projections from the Famine Early Warning Systems Network (FEWS-NET) indicate that the severity of food insecurity will increase in parts of East Africa, especially Somalia, eastern Ethiopia, and northern Kenya, in the third quarter of 2008.[16]

5.2. Demography and the Current Food Crisis

Population growth, urbanization, the growth of the middle class and associated changes in consumption patterns, migration and wage employment, large family size, and HIV/AIDS are the demographic factors likely to contribute to the current food crisis in Kenya. Population growth has been reported as one of the main contributors to increasing food demand. Population factors like size, growth, distribution, and composition, may affect both the supply and demand for staple food. Population growth has been the most discussed demographic dimension of the food crisis because of its very direct impact on the growth in food demand.

Last year the world population grew by 1.2 percent and is expected to reach 7 billion in 2012 and 9.3 billion in 2050. Demand for food is projected to double by 2030 and 20 percent of that increase is attributed to population growth (FAO, 2004). Neither population growth nor food production is evenly distributed across the globe. For example, the total fertility rate, a measure of the average number of children a woman will have over her lifetime, was 4.9 in Kenya in 2007 (East Africa: 5.5) compared to the world average of 2.7 (Huab and Kent, 2008). Rural fertility is particularly high and

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[15] According to USAID (1995), *food availability* is achieved when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through household production, other domestic output, commercial imports, or food assistance. Food access is ensured when households and all individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends on income available to the household, on the distribution of income within the household, and on the price of food. Food utilization is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Effective food utilization depends in large measure on knowledge within the household of food storage and processing techniques, basic principles of nutrition and proper childcare, which might be lacking in many rural households like the ones we surveyed in Kenya.

16 See, Famine Early Warning Systems Network (FEWS-NET) website.

when combined with declining mortality, is resulting in rapid population growth. The current Kenyan population of approximately 38 million is projected to increase to 51.3 million by 2025.

Previously, technological improvements in agriculture allowed food production to comfortably exceed population growth, resulting in declining food prices. The relationship between population growth and food security is not limited to increased demand for food. Population growth can also have an impact on the food supply and access. In Kenya as in many countries, population growth has been associated with land fragmentation and resettlement schemes in fragile rural environments that directly affect food production. Specifically, land fragmentation can contribute to inefficient and destructive farming practices and increased cultivation of marginal land, which often reduces food production.

- **Growing Middle Class and Changes in Consumption**

The World Bank estimated that by 2030, 1.2 billion people in developing countries—15 percent of the world population—will belong to the global middle class, up from 400 million in 2005 (Leibtag, 2008). Rising incomes are often accompanied by changing food preferences. There is a greater emphasis on the consumption of meats, fruits, and vegetables and a move away from traditional staples. Thus, global trends are characterized by not only a growing demand for more food but also for different types of food. The growing demand for meat leads to a disproportionate increase in demand for maize and protein feed needed to produce meat. For instance, Trostle (2008) has found that producing one pound of beef requires seven pounds of maize feed for livestock.

The growth of the middle class and economic growth in Kenya have also increased its energy demand, thus affecting agricultural production costs. Rising petroleum use can contribute to rising oil prices, and has affected food production in two ways. First, rising fuel prices can increase the cost of fertilizers, fuel, and pesticides used in agriculture. This can cause the prices of agricultural products to increase, and in certain places cause output to decrease as producers cut back input use. Moreover, the rising oil prices can increase the demand and production of biofuels as substitutes for oil. The increased demand for and production of maize, which is converted to ethanol, may divert croplands away from food production and contribute directly to the rising prices of maize and other staple crops (Martine, et al., 2007).

- **Urbanization and Food Demand and Supply**

Kenya is becoming increasingly urban, and by 2030, more than half of the population will be living in urban areas. Future population growth is expected to occur almost exclusively in urban areas. According to Huab and Kent (2008) and UN (2006), 19% of Kenyan population is urban, reaching 33% in 2030, and the population growth rate between 2005 and 2010 is estimated to reach 4% (urban) and 2.3% (rural)17. Furthermore, the pace of urbanization will grow the fastest in regions that currently have low levels of urbanization, such as in Kenya. Consequently, these regions will have a growing nonagricultural population that relies on purchased food and is susceptible to increases in food prices.

Urbanization is also associated with increased consumption of meats, fruits, and vegetables. In Kenya, while the middle classes are growing in cities like Nairobi, Mombasa and Kisumu there is little evidence so far that the urban poor, who are the majority, are changing their food preferences to the higher-priced products.

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[17] Compared to 25% of Tanzania population is urban in 2008 reaching 39% in 2030, and the population growth rate between 2005-2010 is estimated to reach 4.2% (urban) and 2.2% (rural).

Urbanization is also often associated with decreases in food supply due to a loss of agricultural land and dietary diversification. The expansion of urban space tends to affect farmlands because many cities and towns are located in rich agricultural lands. Urban growth is increasingly becoming land-intensive. Urban space grows faster than urban populations, evident as urban sprawl. Kenyan cities and their growing populations also increasingly compete with the agricultural sector for scarce water resources, resulting in less water for irrigation. For example, rapidly growing demand for water for domestic and industrial activities in the larger towns has led to the damming of large rivers to ensure urban water supply. Decreases in the water available for agriculture will further inhibit the ability of rural farmers to increase food production, particularly in rural Kenya.

5.3. Commodity Exchanges and Food Price Crisis

There are three fundamental aspects to price trends in the market: first, actual underlying factors of supply and demand, second, expectations regarding the underlying fundamentals, and third, market conduct such as speculation and/or manipulation. The reason for having commodity exchanges is to create a fair, orderly and efficient system for matching supply and demand in order to enable price discovery. However, what influences price discovery are the other two factors: expectations and market conduct.

Expectations and how they are formed and informed is a science unto itself. However, part of what a commodity exchange can and must do is to regulate market conduct, which is its purview. To do so, in addition to creating the trading mechanisms to match supply and demand, an exchange also sets up certain risk management instruments designed to ensure that market conduct is in alignment with the principles of a fair, orderly, and efficient marketing system. These instruments, based on the rules of a commodity exchange and market surveillance and compliance monitoring, have to do with setting limits on trading positions, adjusting the margin deposit requirements, price circuit filters to limit price movements, among others. The role of market regulation is to ensure that exchanges do indeed carry out this function.

Currently what is happening on global commodity markets suggests that all three of the above factors are coming into play to influence dramatic upward price movements. That is, the well known shifts in the underlying fundamentals having to do with historic lows in global cereal stocks, reduced production in major Western countries, higher demand linked to bio-fuels and rising energy prices, and the rising income effect. In addition, rising expectations and the involvement of hedge funds in the commodity markets both contribute to the situation. What commodity exchanges need to do is to ensure that the market conduct is not out of line with fair and orderly price discovery. The exchanges take appropriate measures such as raising margins, and pushing for compulsory delivery in food grains. These measures are intended to curtail food market speculation.

The need to improve domestic markets remains an imperative with or without a global food price crisis. The forecasts that price trends are likely to continue due to structural shifts in the underlying fundamentals of global supply and demand in the foreseeable future imply that producer countries such as Kenya must look to this as a medium to long-term opportunity to expand production and exports to the global market. To the extent that a commodity exchange provides this incentive, then it is very timely that the workings of Kenya Agricultural Commodity Exchange (KACE) is strengthened and spread across Kenya, especially in the rural areas.

This effort can solve the problems facing those adversely affected by higher prices. While the exchange will over time enable the better alignment of supply and demand and similarly better regulate market conduct, it will not solve the short term problem of the urban poor and rural net buyers who must be supported by increased safety net programs. So the dual strategy is to develop the KACE to provide short term solutions to market conduct and medium term solutions to price discovery and incentives while also accelerating short terms solutions to the food price crisis.

CHAPTER 4 - MAIN CHARACTERISTICS OF SELECTED AGRICULTURAL CHAINS

This chapter details the characteristics of the selected commodity chains both at the national and global level, making reference to the overview presented in the report for the first phase. The main data used relate to production and supply conditions, domestic production versus imports, transformation and related agro-industries, value addition (agricultural and agro-industrial) and employment (number of farms engaged in the production, number of employees in the marketing and the agro-industry). These aspects are discussed within the specific commodity chain in each region.

The chapter also documents the description of the value chain in terms of the economic agents involved at the different stages of the chain (chain mapping), the main strategic stakeholders and the main characteristics of the price structure. Additional information presented in this chapter is on the restructuring processes in terms of the main changes in chains' organization after liberalization (market regulations, new marketing rules, new comers) and the development of contracts and its effects on the functioning of the chain in term of the number of producers and the type of contracts.

Most of the food commodities have short chains with less sophisticated handling. Only dairy industry which targets the local market has a relatively sophisticated handling chain due to the perishable nature of milk and milk products. Export marketing chains; primarily entail production and simple processing such as drying, pulping and milling. Little flavouring is done in the country. There are a lot of unexploited value addition prospects in the export value chains however these are constrained by tariff escalations.

Prior to 1980, domestic and international agricultural marketing was highly controlled through marketing boards to protect consumers and producers. The liberalization period witnessed gradual government withdrawal, greater private sector participation in markets and provision of services. The primary objective of agricultural marketing boards was to improve the level of prices and hence income accruing to producers. The secondary objective was to reduce variability in prices and bring about equity in marketing opportunities for producers.

The degree of compulsion to which producers were subject to legal powers varied between different commodities and areas. With such boards in place, it was possible to transform the agricultural output and input marketing system and determine commodity prices and hence the level and stability of food prices. However, these created monopoly power, especially in agricultural processing industries, making reforms inevitable. Economic reforms led to influx of new participants in the market thus enhancing competition. Price fixing in the free market was now largely left to the market forces. However, government parastatals continued to have the advantage of the already established infrastructure and distribution systems to influence market prices. Even after liberalization and restructuring, some of these hitherto powerful entities enjoyed large market shares and indirectly determine the level of prices.

Whether through marketing boards or through a free market, Kenyan agricultural markets/products are characterized by trade involving primary commodities which undergo further processing within or outside the country. About 90 per cent of Kenyan exports are in raw or semi-processed form (Republic of Kenya, 2009) resulting in loss of value and employment. The limited ability to add value to agricultural produce, coupled with high production costs makes Kenyan agricultural exports less competitive in global markets. The perishability, seasonality and geographical nature of any agricultural produce determine the extent and intensity of handling between the production and consumption points. Most food commodities, with the exemption of dairy, have very short chains with less sophisticated handling.

1. Dairy Commodity Chain Analysis

Kenya has one of the largest dairy industries in sub-Sahara Africa. Progress in the dairy industry has spanned over a period of 90 years and has undergone various evolutionary stages. In the first 60 years, it was dominated by large-scale farmers, while in the last 30 years, smallholder farmers have increasingly grown in this sector, contributing over 80% of the total milk production. The dairy industry has evolved through three market periods:

- For the period up to 1969, the industry operated as an open market with various independent dairies.

- Between 1969 and 1992 and primarily due to the rationalization of the dairy industry by the Government, a monopolistic market situation was created.

- From 1992 the Government liberalized the industry which saw the emergence of different industry players.

The first two periods involved government control over the industry. In this era, the government provided the policy guidelines, set prices, determined the behavior of parties in the industry and set the market rules and all other regulations in the industry. The Kenya Co-operative Creameries (KCC) was the monopoly in the marketing of the milk and dairy products and enjoyed protection from the government..

But currently, the dairy industry is regulated by the Kenya Dairy Board, established under Section 4 of the Dairy Industry Act Cap. 336 enacted by Parliament in 1958. It is from this Act that the Board derives its mandate. This scenario has then limited the monopoly enjoyed by KCC and has opened opportunity for other players to come into the market.

Kenya for the most part, is self sufficient in milk production. Presently, national milk production stands at 3.1 billion litres per annum, and that is more than adequate for local consumption. Current trends in milk production and consumption, if sustained will see increased surplus given the country's capacity and potential. This growing surplus has the basis of renewed efforts to expand exports of milk and milk products into the regional markets especially the expansive COMESA trading block.

Cow milk is the main milk-type produced in Kenya although some milk is also obtained from camels and goats. Kenya has an estimated cattle population of 13 million heads with dairy, mainly grade cows, amounting to 3.3 million. The industry is based mostly on small-scale milk production. About 600,000 smallholders produce some 70% of the country's marketed milk. About 56% of this milk is sold in unprocessed form in the free-for-all informal market, despite concerns about hygiene and safety to the consuming public.

The Government of Kenya, in recognition of the role of private sector in spearheading industrialization, has put in place a policy framework to foster of a conducive environment for private sector participation in dairy industry development. The dairy industry has potential for substantial growth and increased contribution to the Kenyan economy. This can be achieved through the use of investment opportunities available which include artificial insemination, dipping and clinical services, rearing of livestock for dairy products and milk processing for local and regional markets.

While liberalization effectively downplayed the ban on unprocessed milk sales, dairy households living close to urban areas started selling unprocessed milk to urban consumers. Some of the informal milk traders (vendors and hawkers) collect milk from their neighbours and supply to urban areas. Newly established private processors have also entered the milk market and collect raw milk

from dairy households, dairy cooperatives, and other traders. There have also been shifts in membership from KCC to the new private entrants occasioned by delayed payments from KCC, among other issues. The increasing number of new entrants in a liberalized market has pushed most small milk traders from the peri-urban to rural areas where they now source their milk.

The opening of the milk market with liberalization did not come without cost. Indeed, issues of hygiene and adulteration did arise with small traders whose nature and volume of sales could not finance modern cooling facilities. In addition, it has been found that new entrants immediately after the collapse of KCC were mainly producer-cum-traders with large scale traders/processors lagging behind given the capital required to invest in trucks and cooling facilities and the need for an established marketing chain and brand name. The results of the survey did however show that the frequency of problems related to milk marketing has declined as private traders gained experience, and more trust-based and long-term relationships were established between traders and dairy households and between traders and retailers. With time, many large-scale traders who gained capital and experience in raw milk marketing have gradually enlarged the scale of their business (Kodhek and Karin, 1999).

1.1. Pre-liberalization Period

With the technological constraints to commercial milk production well in the way of being addressed, the producer's attention was shifted, in the early 1910s, to the issue of marketing. This resulted in the establishment of organized milk marketing initially starting in 1912 when settler-dairy farmers around Lumbwa area —presently, Kipkelion in Kericho District—joined to form the Lumbwa Co-operative Society in emulation of dairy farmers in Australia and New Zealand (Government of Kenya, 1965). The society was charged with the collection of members' milk for collective processing and marketing.

The system was further adopted by settler-dairy farmers around Naivasha area in 1925 to form the Naivasha Co-operative Creamery and later in 1928 by farmers around Nanyuki area to form the Nanyuki Co-operative Creamery. The three co-operative creameries operated independently of each other and were export-oriented. This however changed following the economic downturn of the Great Depression of the 1930s. The collapse of international markets for dairy products forced the three creameries to turn their attention to the domestic market.

However, the effective domestic market was very small, with limitation imposed by the measures taken to secure a supply of cheap labour for settler agriculture. The measures inhibited the development of an adequate cash economy among the indigenous people and in effect held the purchasing power of the largest segment of the population at very low levels. The collapse of international markets in these circumstances gave rise to distributional conflicts among the three creameries regarding domestic market share allocation.

The need to resolve this conflict was for the next three decades to increasingly shape the country's milk marketing institutions. Of particular significance to the development of the industry, the conflict compelled the three area-based cooperative creameries to merge forming the Kenya Co-operative Creameries Limited (KCC), an organization that would hold decisive impacts on the evolution of the country's dairy marketing institutions for the next three decades ending in 1992. Indeed, from 1931 to 1992, the story of Kenya's milk marketing policy became the story of the KCC.

The merger of the creameries was a strategic structural change that, by introducing a hierarchy between the primary societies and an apex processing creamery, made possible the inter-organization of the societies to allow decision at a single leadership level. The apex organization also provided scope for representing farmer's problems to the administrative authority.

With special reference to smallholder dairying, the new government after independence recognized that in addition to the structural change in land ownership, a combination of factors was crucial for building a sustainable basis for increased milk production. These are the enhancement of milk production traits of smallholder dairy herd; optimization of smallholder farm conditions for maximum realization of the yield advantages of improved dairy cattle; and improved milk market access. These factors were based on the recognition that the yield advantage of grade cattle is realizable only when combined with the appropriate dairy production management and secondly, that the potential for increased productivity of smallholder dairy can be realized only in conjunction with an efficient marketing system.

1.2. Milk Marketing

Immediately following independence, the dismal market participation by smallholders, became an issue of political concern. The problem was, however primarily interpreted as a conflict between the large and small-scale producers over the patronage of KCC (Bates, 1989; Leys, 1975). The possibility that the problem may not have been with smallholder's limited access to KCC, but with the absence of an appreciable alternative market outlet was not admitted. Instead, the government saw its task as redressing the inherited inequalities in producer prices and market opportunities between the large and small-scale dairy producers. This is clearly reflected in the terms of reference of a commission of inquiry constituted under the authority of Gazette Notice No. 31 of July 1964 to define appropriate institutions to resolve the issue. The terms included, among others, to ensure that equitable price structure is established taking into account the interest of all dairy farmers (Government of Kenya, 1965).

The inquiry judged that the existing institutional arrangements were very complex and that they favoured large-scale producers over small dairy farmers (SDF). Although the three-tier pricing system used by KCC since 1954 was justified as a way of minimizing supply and price fluctuations, it implied price discrimination against SDF by restricting their access to urban markets. This is because the SDF could not achieve the quantity guarantees required to qualify for the premium price. Furthermore, since it was increasingly becoming difficult to qualify for a quota, the system conferred relative's benefits on those already awarded quotas through creation of a goodwill value in the transference of quotas from one farmer to another.

To reduce the large-scale bias in access to urban markets, the inquiry recommended a statutory control of prices. However, the pricing structure was not changed until 1970. In that year, the quota pricing system was abolished and in 1971, a uniform pricing (pan-seasonal and pan-territorial) was introduced. This was part of broad instruments designed and implemented for most agricultural commodities regarded as being key to the country's agricultural development.

The KCC was identified as the vehicle through which to implement the statutory controls of milk prices. At the same time, private dairies dealing in raw milk were shut down and bulk sale to institutions by producers were forbidden. In this respect, the KCC's virtual monopoly rights, which had been nominally in force since the enactment of the Kenya Dairy Industry Act, in 1958, were reaffirmed. In order to guarantee market outlet to all dairy farmers, the KCC was mandated to accept all milk delivered to its processing plants subject to minimum specification of quality delivery schedules. Accordingly, the KCC expanded its capacity to achieve the national network commensurate with its new role.

The other obvious benefit was that by cushioning the farmer from price fluctuations associated with free market force, the system offered a stable marketing system. Analysis of the prices for the period 1971-1992 indicates lower fluctuations in real price, with a coefficient of variation of about 13.5, as compared to nominal prices with a coefficient of variation of 57.2. The analysis, however, reveals that in real terms, the producer prices declined at an average annual rate of 1.36% per year over the same period.

The control over raw milk supply operated as follows: all other licensed milk processors were denied the right to procure raw milk supplies directly from farmers. Instead, they were required to place an application with the KCC, which then made arrangements for a number of farmers to deliver a specified amount of milk to the applicant. The KCC then invoiced the processor for a price that left a margin for the "services" rendered to the processor. The effect of all this was that other processors were at considerable competitive disadvantages when compared to KCC. Further, KDB was gradually weakened financially and its role in the industry significantly reduced.

For the emerging state, this had great influence on the design of economic policies. In particular, direct government interventions (through marketing boards and parastatals) coupled with statutory control of production and marketing was considered the policy option most consistent with broad national goals including improving income distribution and spatial egalitarianism (de Alcantara, 1993). However, the strategy, while justifiable during the transition period when the country was undergoing structural reform to increase economic participation of indigenous Kenyans, it was clearly not sustainable in the long-run. The un-sustainability of the strategy started showing in the late 1970s coinciding with severe socio-economic crisis precipitated by the oil crisis.

The Kenyan dairy industry reforms begun in 1987 with the launching of a process to divest the government from the provision of breeding services followed in 1988 with initiation of a process to divest it from the provision of clinical services. In 1989, the manufacture and sale of feeds was liberalized while in 1991, a process to divest the government from the management of cattle dips was started. The process was finally completed in 1992, with the liberalization of the marketing of milk. The next section presents some of the changes that have occurred since this process took place, so as to increase the participation of the private sector in the dairy industry.

1.3. *Immediate Post Liberalization Period*

1.3.1.   Private Milk Processing

Since 1992, appreciable progress has been made in the development of private and co-operative milk processing with the emergence of several new plants. Their development first started on large-scale dairy farms (including Brookside, Ilara, and Delamere Dairies), which afforded a head start through foundational supplies from own herds. These progressed fast into taper integration sourcing some fraction of raw milk input from their own vertically integrated dairy farms and the balance from market supply from farmers. The number of processors has also increased over the years now stands at about 45 and they all depend heavily on market supply from farmers.

Initially, the private processors favored at-factory-gate deliveries of raw milk supplies. However, increases in individual and combined capacity, and the attendant competition for supplies, placed a challenge for an increased ability by individual processors to guard against under-utilization of installed capacity. Individual processors are thus faced with the pressure to actively cultivate procurement arrangements favourable to creating steady milk supply relations with farmers. This may well lead to invariable linkages between milk procurement and inputs and services delivery systems as processors act under the stimulus of the desire to create a competitive position.

Currently, processors do seek formal contracts with collective farmer groups. Our surveys show that although this trade has also attracted traders who buy raw milk from the farmers to resell to processors, the latter seem to prefer procuring supplies from farmers through dairy farmers cooperative societies (DFCS) and other forms of collective milk marketing because they are more dependable in comparison to middlemen, who seek trade relationships only during times of high milk supplies.

1.3.2. Sale of Raw Milk in Urban Areas

The issue of whether sale of raw milk in urban areas should be legalized and encouraged, as part of enhancing dairy market competition and hence dairy marketing efficiency, has featured prominently in the country's public debates. To place the debate in proper perspectives, it should be recognized, as already discussed, that even before the liberalization of the industry in 1992, sale of raw milk was a legal activity in the "unscheduled" areas as defined in the Dairy Industry Act. Producers have always sold milk directly to milk deficit households and institutions in the neighbourhood of the producing households.

Similarly, DFCS could resell raw milk to households, institutions, hotels, and restaurants in their respective "area of operation". However, sale of raw milk in the "scheduled" areas, which corresponded closely with the urban areas, was illegal and KDB was mandated with the responsibility of monitoring the areas to ensure compliance.

1.3.3. Milk Market Conditions

Milk market liberalization policies were announced in 1992 and this opened up the processed milk market, which was until then monopolized by KCC. The main aim of liberalization was to encourage private investments (including co-operatives) in milk processing and marketing and also deregulation of both producer and consumer prices.

The trend however has changed with the decline of KCC and influx of many small-scale milk processors. Generally, informal milk outlets are shown to absorb most of the milk from smallholder farmers accounting for over 56% of the total milk sold, while formal market accounted for 14% of all the total milk produced. Brokers, traders/hawkers, transporters, co-operatives and farmer groups are identified as the most important participants at the rural markets. Cooperatives remain the main channel for collecting milk destined for the formal market.

The quantity of milk processed has increased rapidly owing to reforms in the dairy sector. In 2005, an estimated 10% was processed with the remaining percentage marketed through the informal sector as shown in Table 15 below. The informal sector continues to dominate the marketing chain in the dairy industry.

Table 15: Processed and Unprocessed Milk

Year	Milk production (Mn lts)	Milk processed (Mn lts)	% of processed
2001	3,051	152	5
2002	3,129	144	5
2003	3,207	197	6
2004	3,323	274	8
2005	3,455	340	10
Total	**16,165**	**1,107**	**7**

Source: Kenya Dairy Board (Various Issues)

1.4. Milk Commodity Chain in Nakuru North

Nationally, the country has a surplus in milk. Stable milk market prices and use of modern dairy techniques by dairy farmers have seen milk production in Kenya shoot to 3.7 billion liters up from 2.5 billion five years ago. According to the Kenya Dairy Board, Kenya was the only country in the region with surplus milk. Currently, Kenya's per capita availability of milk is four to seven times higher than for other countries in the region (Africa Science News Service, December, 2007). Officially, recorded quantities of imported milk products (mainly milk powder) are relatively insignificant and should not affect the local market (Muriuki, 2003).

The major challenge currently has been on how to meet the expanded market demands in the East African region since the 400 million liters of milk being processed annually is not sufficient. The country is prevented from benefiting fully from the expanded market because of global competition, low level of cooling and attainment of international standards (Africa Science News Service, December, 2007). Though many marketing chains have evolved following liberalization, it is still unfortunate that the Kenya Dairy Board (KDB) is still empowered to license some market intermediaries such as raw milk traders. The main policy issue in milk marketing relates to the licensing and regulation of the many players in the raw milk trade. The dairy industry is still, by and large, dominated by the pre-liberalization mindset. For instance, trade in raw milk is still deemed illegal even when nothing in the law explicitly outlaws it (Muriuki, 2003).

The milk marketing chain in Nakuru North is fairly simple. In most of the dairy producing areas, milk collection is organized along collection routes such that individual farmers deliver the milk to the pick-up point or marketing agents collect the milk directly from the farms. At the milk collection stage, both aluminium and plastic containers are used. Smallholder farmers prefer to use plastic containers citing their low cost and convenience. However, in large-scale areas, where large quantities of milk are handled, most farmers use the aluminium cans. Total milk production in Nakuru North district in 2007 amounted to 1,360,400 litres. Of this, 299,288 litres was sold directly to hotels and milk bars; 353,704 litres to mobile traders; 503,348 litres as direct sales to consumers; and 204,060 litres to cooperatives as shown in Figure 10.

Figure 10: Milk Marketing Chain in Nakuru North
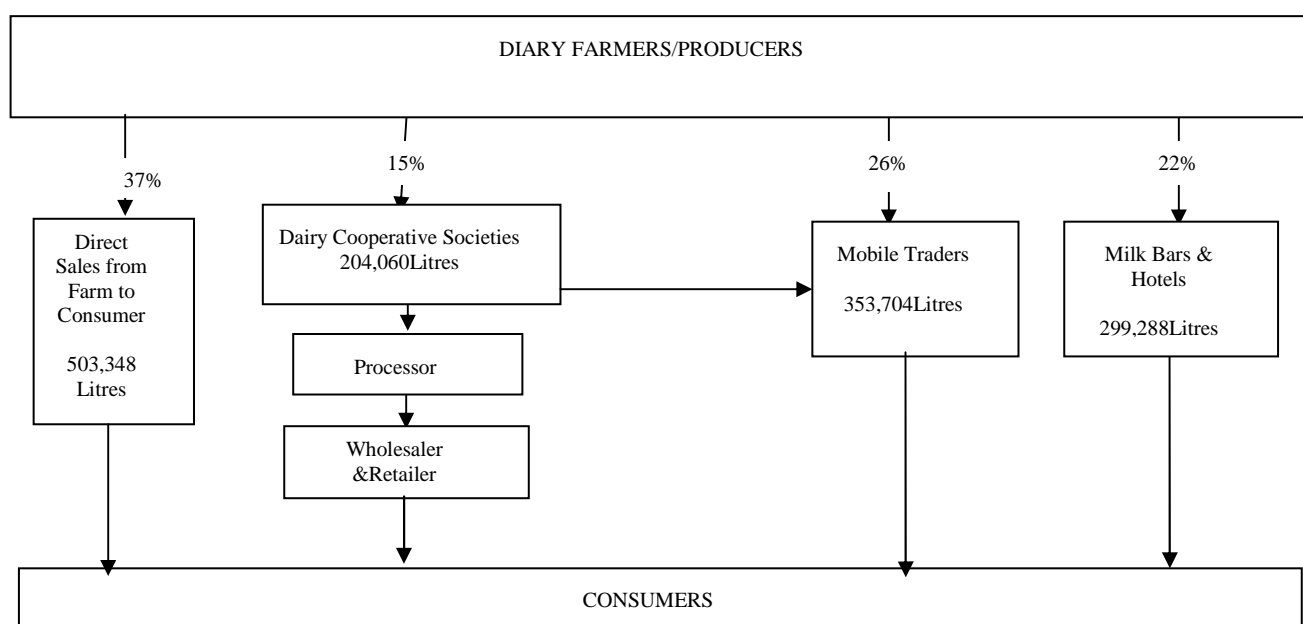
Source: Commodity Survey, 2008

Milk marketing in Nakuru North district typically reflects the national trends. Karanja (2003) reveals that informal market outlets are the most dominant, accounting at least 80% of the total milk sold. The co-operatives, self-help groups and direct sales to processors were the formal milk marketing channels, which absorbed around 20% of the milk sold. The study identified five major milk outlets and these were Brokers, Traders/hawkers, Transporters, Co-operatives and Farmer groups and Processors.

The milk market chain in Nakuru North exhibits characteristics of a perfectly competitive market. Due to liberalized market, farmers have opted for outlets that give them higher margins. In 2007,

only 15% of milk was sold to formal markets (cooperatives) while the bulk (85%) ended up in informal markets. The key informal players in the market were milk bars and hotels (22%), mobile traders (26%), and direct sales to consumers (37%). This affected both the morning and evening milk. The farm-gate milk prices in informal markets are higher than those offered by the formal marketing channels, thus explaining the preference by producers. Milk sold to neighbours and the one hawked by the farmers had the highest price while milk sold directly to processors was paid the least price. These price differentials may explain why most smallholder farmers prefer the informal marketing channels (Karanja, 2003). Other factors driving the continued importance of the informal market are traditional preferences for fresh raw milk, which is boiled before consumption, and unwillingness to pay the costs of processing and packaging. By avoiding pasteurizing and packaging costs, raw milk markets offer both higher prices to producers and lower prices to consumers (Thorpe, et al., 2000).

As discussed above, the milk price structure is determined by the type of outlet available to producers and there exists clear variations in the farm gate prices offered by different outlets. The farm gate price given by formal outlets ranged from Kshs 18.80 to Kshs 20 per litre depending on the buyer. Hawkers bought between Kshs 18 and Kshs 25 per litre depending on the distance from Nakuru town. Direct sales to milk bars and hotels ranged from Kshs 22 and Kshs 25. In some cases, milk hawkers did some mini bulking and then sold between Kshs 28 and Kshs 30 per litre to the final consumers. The amount of value added by these agents ranged from Kshs 10 to Kshs 12 per litre.

The current price for processed and packed milk is Kshs 60 per litre for liquid milk while yoghurt sold for between Kshs 80 to Kshs 110 per litre in the supermarkets. Processors had the highest amount of value addition ranging between Kshs 62 and Kshs 90 per litre. This wide range in the prices reinforces the need for value addition at the farm level.

2.   Maize Commodity Chain Analysis

Maize is the key food crop in Kenya, constituting 3% of Kenya's gross domestic product (GDP), 12% of the agricultural GDP and 21% of the total value of primary agricultural commodities (Government of Kenya, 1998). Although maize is mainly produced to meet food needs, Nyangito et a., (2002) indicates that about 90% of Kenya's population depends on it as an income-generating commodity. Maize is also produced in almost all parts of the country

According to the Ministry of Agriculture (MOA), National Cereals and Produce Board (NCPB) and other sources, as Kenya's staple food and synonymous to food security, a lot of emphasis has been laid on this crop. The area under Maize cultivation is approximately 1.6 million hectares with a maximum production in a good season of about 34 million bags and this drops to 18 million bags during drought years. The small-scale farmers account for about 75% of the total maize production in Kenya, with large-scale farmers producing the remaining 25 % (EPZ Kenya, 2005). The current maize production stands at 32.5 million bags a decrease from 34.6 million bags produced in 2006 (Economic Survey, 2008).

2.1.   Performance Prior to Liberalization

Prior to the liberalization of agricultural markets, maize markets were characterized by strict government controls. Pan-seasonal and pan-territorial fixed prices for food grains were the order of the day. Inter-district movement controls prevailed. These interventions resulted in major market distortions. Spatial and temporal market integration was impaired, producer incentives were stifled and consumers adversely affected.

The primary motivations for the controls were to stabilize producer prices and, relatively, to protect white settler producers from being undercut by cheaper African production. But the controls on inter-

district maize movement also had the effect of restricting grain access to traders, millers, and consumers in deficit districts through informal channels. By restricting supplies, the controls also raised the price of the limited quantities of grain that were sold informally in these deficit areas.

Maize marketing in this period therefore consisted of both the formal and informal systems operating side by side. The formal maize marketing system was strictly regulated and managed by the Maize Board. The Maize Board did not provide a consistent outlet for maize of all farmers and consequently did not supply maize to many of the deficit rural areas, and the vacuum left by the board was the niche and opportunity that the informal system filled.

The formal marketing system was mandated to purchase all maize offered for sale, this amounted to 50% of all marketed maize in the country and 25% of total domestic maize production. The board operated through a network of Primary Marketing centers (PMCs) purchasing (21%), cooperative societies (23%), agents (3%) and individual farmers deliver directly to the Board (53%) as shown in the figure below.

Figure 11: Pre-Liberalization Maize Market Structure
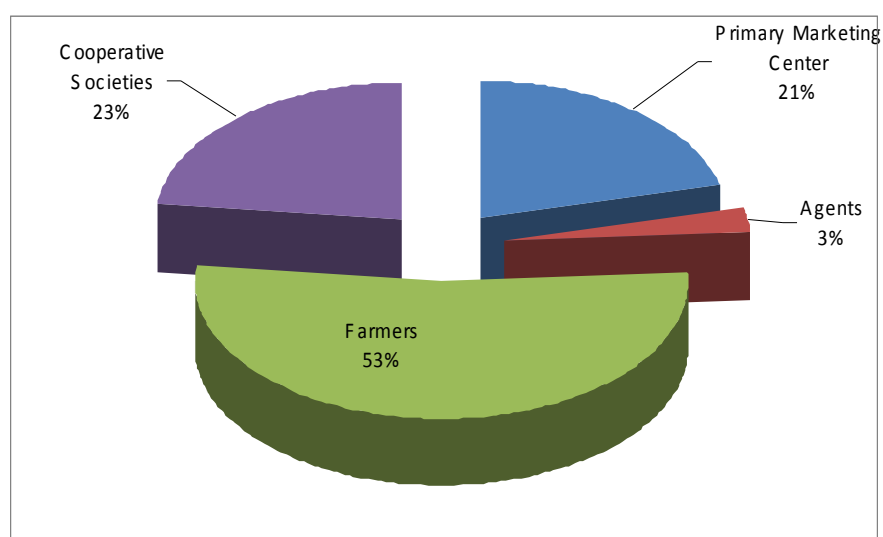
Source: De Groote et al, (1999)

The main source of maize supplies in urban areas was therefore the state Maize Board, which sold maize only to registered buyers. Selling grain to a relatively small number of large-scale buyers had distinct advantages to the Government, because this reduced per unit transaction costs (compared to selling small amounts to numerous buyers) and, more importantly, facilitated the implementation and monitoring of price controls on maize meal. Therefore, the rise of a few large industrial maize processors to link downstream distribution activities into the official maize marketing system created a convenient and easily-managed system of supplying the urban population with staple food at prices easily controlled by the state (Mukumbu and Jayne, 1994).

The monopoly powers of the state-controlled Maize Board made maize the property of the state once harvested. In addition, the Board controlled maize movement by imposing movement permits that had to accompany any shipment of maize packaged in more than the standard one bag (90kg). This was to be severely replicated later by increasing tenfold the number of bags to ten 90kg bags under the Cereal Sector Reform Program (CSRP) in 1988/1989.

The government set the prices of maize at various levels of the marketing chain from producers, traders, NCPB, millers, wholesalers and consumers. The monopolistic powers, inefficient management in addition to the suppressed normal market function and private sector involvement brought up serious issues that included poor stock management and underutilization of storage capacity, excessive management and unnecessary transport cost, debts and inability to pay farmers promptly for deliveries.

It was eventually costly for the government to enforce the controls and as a result it incurred losses amounting to Ksh 1.8 billion in 1986/87 in addition to losses of Ksh 3.5 billion incurred in the previous five years. These losses were later written off under the CSRP. The losses and inefficiencies were later to form the basis for many studies and liberalization

2.2. Post Liberalization

In Kenya, maize market reforms began around the same time when the Cereals Sector Reform Program (CSRP) was embarked on in 1987/88.

The liberalization of maize marketing was implemented in four major areas (De Groote et al., 2001):

- Elimination of the movement controls on maize.

- Reduced food security stock and price stabilization roles of the NCPB

- Institutionalization of government units for improved market information and food security policy planning.

- Implementation of three changes in government policies affecting road construction and maintenance, to ensure future sustainability of the key market to market linkage roads, the upgrading of which would be financed with local currency funds under the KMDP.

The reform process intensified in the early 1990s when, under pressure from international lenders who supported the economic and policy reforms as part of the country's structural adjustments, the government implemented far-reaching reforms in the maize sector. These included, among others, the removal of the movement and price controls on maize trading, deregulation of maize and maize meal prices, elimination of direct subsidies on maize sold to registered millers (Jayne and Kodhek, 1997) and the liberalization of trade in both internal and external markets.

The reforms undertaken also included the elimination of movement permit and thus necessitating free movement of private traders transporting maize across districts. The functions of the National Cereals and Produce Board (NCPB) were split to allow it to undertake commercial and social functions such as the maintenance of the National strategic reserves. The reform process was expected to increase the role of the private sector in maize marketing. This was to be achieved in part by reducing the role of the publicly financed NCPB from that of a monopoly buyer and seller of maize to one that combined commercial maize trading activities with that of maintaining strategic national food reserves. The policy change was expected to foster efficiency in maize marketing by encouraging more private sector participation in the market.

Although the reform process has been marked by a series of advances and reversals regarding the level of participation by the private sector in maize marketing, the uncertain policy environment and frequent government intervention such as trade controls on maize imports and exports through use of tariffs and bans also affected the extent of cereal market reforms and the response by the private sector. The reluctance on the part of the government to free maize marketing fully, emanated from

the fear that liberalization could expose maize producers and consumers to the unfair practices and price uncertainty assumed to be associated with private sector grain marketing (Kodhek et al., 1993).

2.3.   Post Liberalization Market Position

Maize is produced in almost all parts of the country. Out of any year's total production, 15 million bags are retained for home consumption while the balance is marketed to meet the household cash needs. Maize consumption in the country is currently estimated at around 36 million bags per year.

Since the liberalization of the maize sub-sector in December 1993, production deficits have continued to be recorded in the range of two and six million bags. Over the years, the deficit has been bridged through unrecorded cross border trade. For example, during the 1997/98 season, Uganda declared 643,800 bags (58,000 MT) of maize exports to Kenya (these were not indicated in the Kenyan records). In addition to the unrecorded trade, the deficit has been met through official cross border trade and offshore imports that have amounted to 24.4 million bags (about 2.2 million MT) between 1997 and 2001. The principal sources of these imports were, South Africa, Zimbabwe, USA and Argentina (RATES, 2003). For the period between 1989 and 2002, official maize exports totalled 805,000 MT (NCPB sources).

Nationally, maize production has been fluctuating with a general declining trend between 1985 and 2005 as depicted in Figure 12 below. The fluctuations in production during pre- and post - liberalization are not significantly different suggesting that the causes are likely to be attributed exogenously to weather and other environmental factors. The major decline noticed in 1993- 1994 was attributed to drought. A consistent picture emerges that Kenyan maize production peaked during the mid- to late-1980s. Maize production has varied since 1990 between 24 and 33 million bags (2.1 to 3.0 million tons) per year, and has averaged 2.4 million tons in the 13 years between 1990/91 and 2002/03 against a consumption of 30 to 34 million bags (Jayne, et al., 2005). Between 2005 and 2007, production was sustained above 30 million bags. The estimated maize production declined by 6.1 per cent to 32.5 million bags in 2007 from 34.6 million bags produced in 2006 (Economic Survey, 2008). The output in 2008 was expected to even decline further following the disputed Presidential election of December 2007 and the subsequent post-election violence and displacement of people in many parts of the country. The violence resulted also in injuries, deaths, displacement of both livestock and persons and destruction of farm produces. This event significantly disrupted the market trends and structures hence compromising household food security of most families.

Figure 12: Maize Production Trends in Kenya, 1985-2005
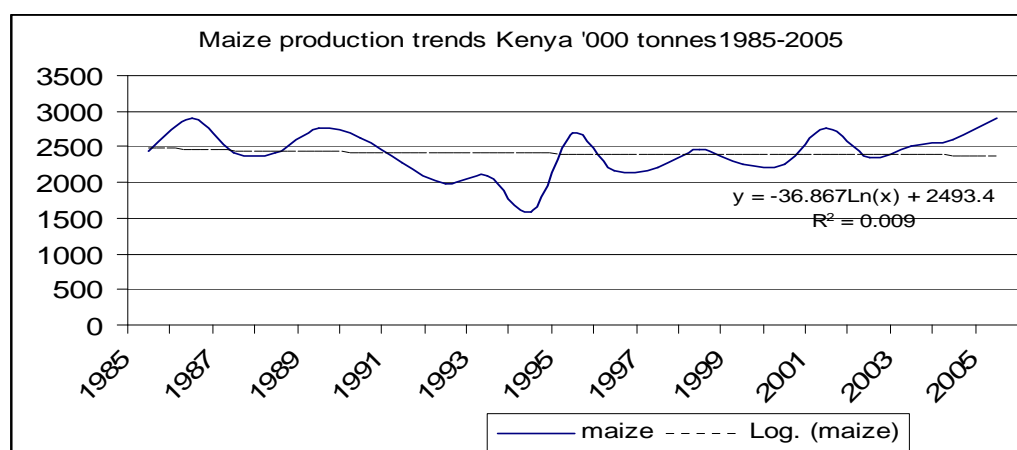
Source: Economic Surveys, 2006

2.4.   Post Liberalization Market Structure for Maize

The national post-liberalization market structure is presented in Figure 13.

The number of channels has expanded from a paltry four channels to a multi-channel marketing system in an effort to link producers and consumers. Even in pre-liberalized period, Kenya has had two parallel maize marketing systems. However, starting in 1988, the government partially liberalized the maize market by allowing unregulated private trade in maize within the country at prices determined by market forces. Private maize trade occurred before that time, but it was suppressed by controls on inter-district trade (Jayne et. al., 2005).

Figure 13: Post liberalization Market Structure for Maize in Kenya
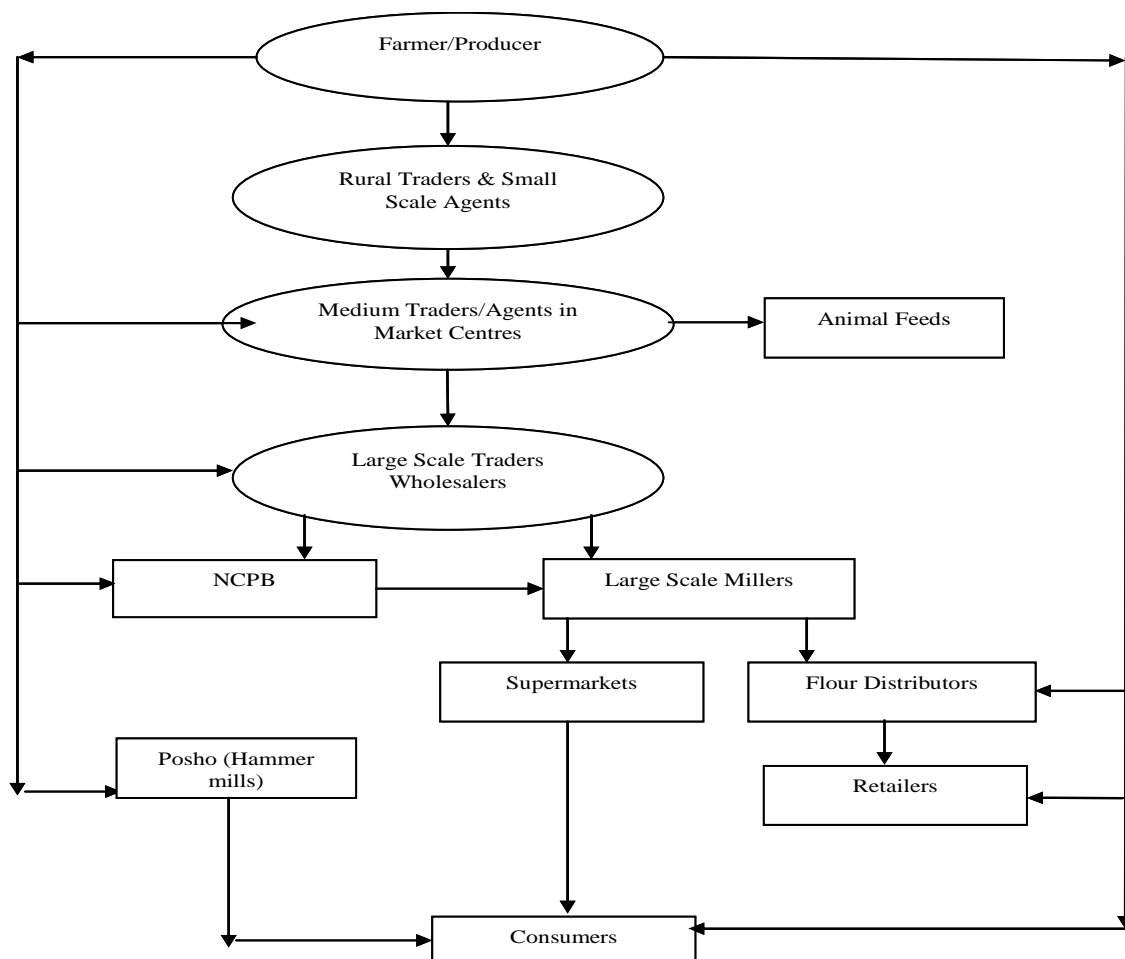
Source: Commodity Survey, 2008

Throughout the 1980s and up to the mid-1990s, the official marketing system involved purchase and sale of maize by NCPB,at prices set by government. The board was given financing to purchase between 3 and 6 million bags of maize per year. These amounts are considered to have been roughly 50 to 70 percent of total domestically marketed maize output.[18]Partial controls on private transport of maize across district boundaries enabled the NCPB to garner much if not most of farmers' surplus maize. However, after these controls were eliminated in 1995, NCPB had to offer prices above market levels in order to acquire much maize.

Since 1995 to date, official producer prices have been typically set higher than market prices during the post-harvest months when farmers in the maize breadbasket zones sell most of their maize (November to February). By absorbing much of the surplus maize off the market, it is likely that the NCPB's operations affect parallel market prices and quantities. There is no evidence to show that the quantities purchased have significantly changed from 50-70 percent. The rest of the agents buy 30-50 percent of domestically marketed output. By taking more maize off the domestic market than injecting into it through sales, the NCPB is likely to have put upward pressure on wholesale maize market prices.

2.5. Maize Revenues

As shown in Figure 14 below, maize revenue has been generally increasing since liberalization of the industry in early 1990s. Liberalization brought higher purchase prices which, although fluctuating over time, have remained above the pre-liberalization period. The revenues are a direct replica of market prices. Although other factors like declining productivity; less than optimal use of inputs and inconsistent crop husbandry practices such as timely planting and weeding do clearly play a role, it is apparent that prices are the key determinants of maize revenues.

Figure 14: Maize Revenue
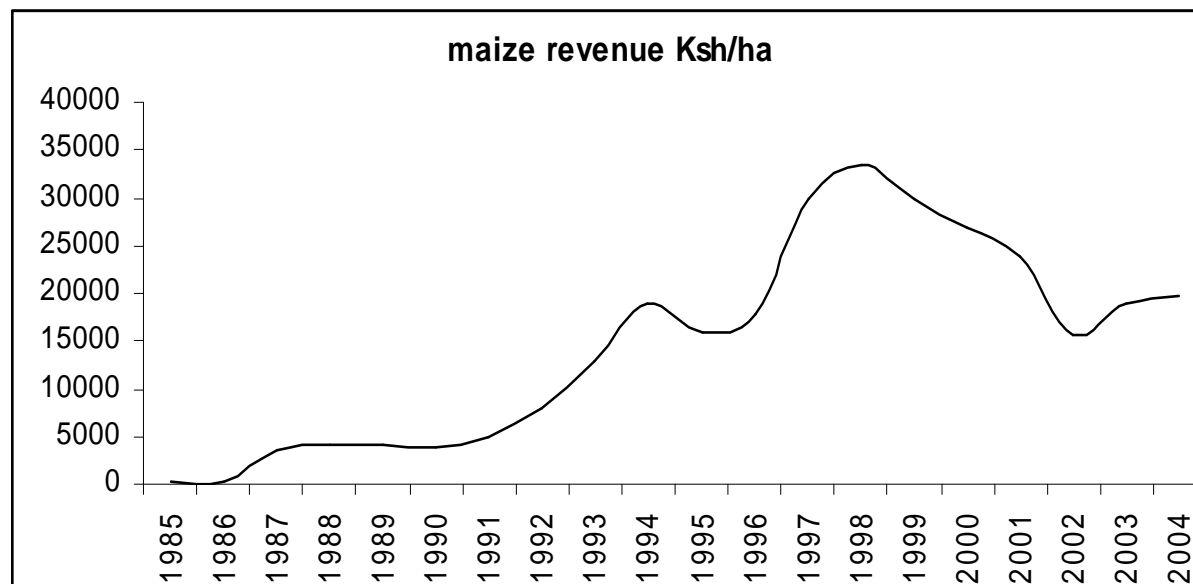
Source: Republic of Kenya. Economic Surveys (Various Issues) and FAOSTAT.

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[18] Accurate estimates of total marketed maize output often difficult to determine

Figure 15: NCPB Purchase Price (Ksh/90-kg bag) During the Post-Harvest Months[19]
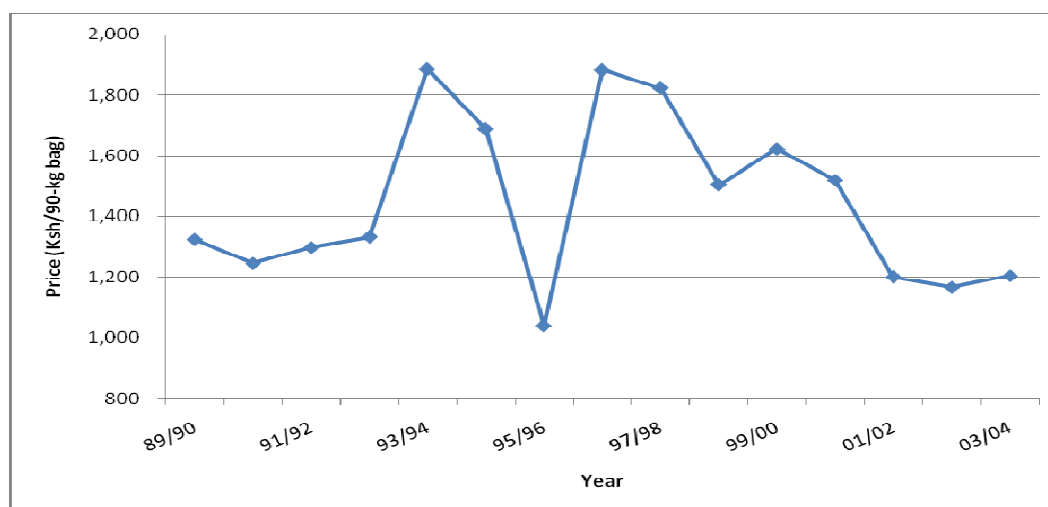
Source: NCPB and Ministry of Agriculture Market Information Bureau data files.

2.6. Maize Commodity Chain in Bungoma

Maize is the predominant crop in Bungoma and is produced through a diverse range of technologies. However, there has been a high level of adoption of modern maize production technologies such as the use of hybrid seed and fertilizers although in varying degrees according to household resources and education levels. This results in a wide range of productivity levels from 1000 – 2000 kgs per acre for the low input users to 4,000 kgs per acre for high level input users.

The total area devoted to maize in Bungoma in 2007 was 55,549 ha (MoA, Bungoma, 2008) yielding approximately 2,116,745 bags that was higher than the long term average of 1.6 million bags. There are approximately over 26,000 maize producers in Bungoma. While it was possible to establish the numbers of medium/agents/lorry traders, maize millers, large traders and NCPB depots, it was not possible to establish the numbers associated with small scale traders because they are numerous ranging from those who trade with as little as 10 kilograms to 5 bags of maize. They are not necessarily stationed in a stall but   they are everywhere even in the villages operating from their own houses. In order to standardize, the results were presented in percentage market shares. What follows is a description of the Maize commodity chain analysis for Bungoma District.

Maize marketing in Bungoma before liberalization was the preserve of NCPB (97%), as shown it Table 16. During the control period prior to 1989, industrial millers were the primary buyers from the NCPB; millers could legally acquire maize only from the NCPB (Jayne, et al., 2005). The medium traders and agents did not exist because they were prohibited through partial controls on private transport of maize across district boundaries. Other outlets including institutions could only ask for 1% or less. The only other outlet was the small-scale traders who took away 2%. The controls were restrictive and impoverished farmers due to delayed payments by NCPB.

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[19] The prices are for November To February

Table 16: Proportions of Maize Handled by Market Agents in Bungoma Before and After Liberalization

Market Player	Proportion before	Proportion after	Amounts (90 kg bags) traded in 2007
Small scale Traders	2%	15%	317,511.8
NCPB	97%	25%	529,186.3
Others (institutions, etc)	1%	10%	211,674.5
Medium/agents/Lorry Traders	0%	40%	846,698.0
Millers	0%	10%	211,674.5

Source: Rural Survey, 2008.

Note: Figures for before liberalization were obtained from verbal communication with a key informant.

The post liberalization period (Figure 16) shows the rise of new channels and the proportions of maize they acquire from the producers. The outlets have improved access to markets and farmers can develop independent preferences.

Figure 16: Post liberalization Maize Commodity Chain Bungoma
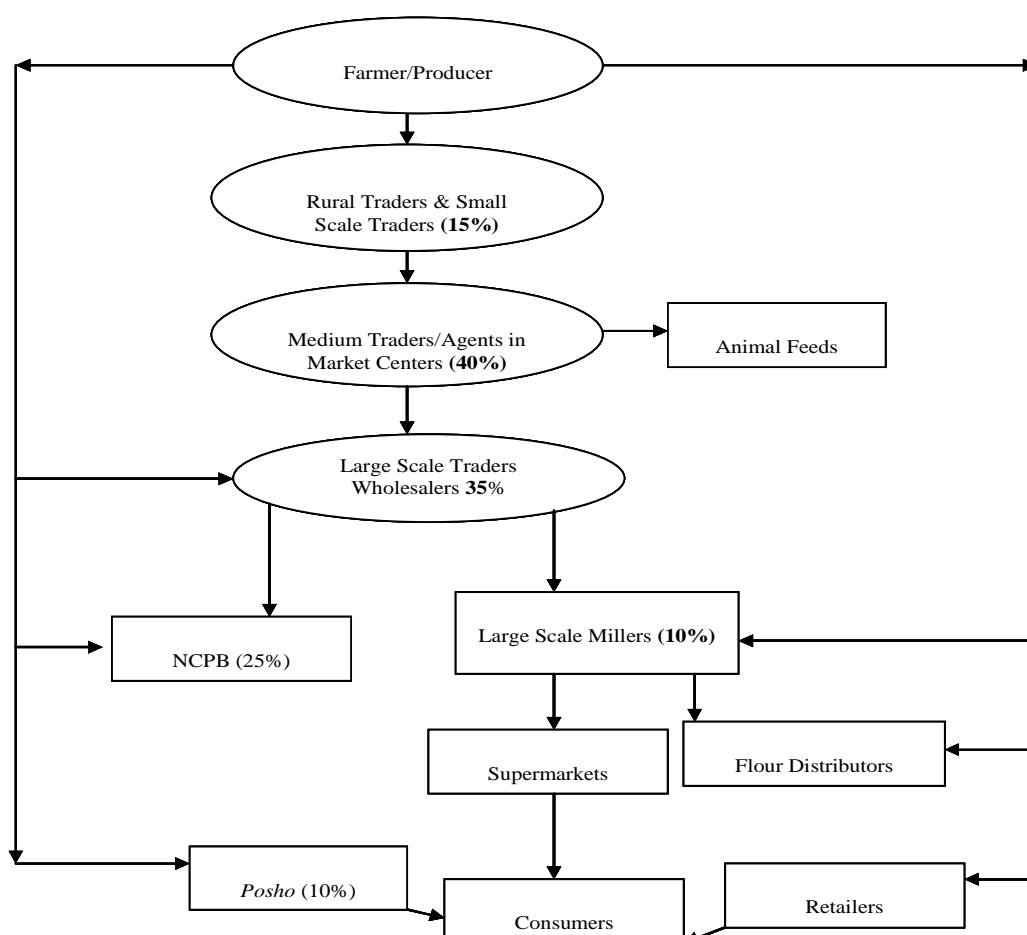
Source: Commodity Survey 2007

Although the number of market agents has increased, risks caused by price instability could act as a barrier to entry in maize marketing. Traders avoid buying and stocking huge stocks due to the price volatility. The millers are forced to deal with low stocks sometimes, as low as less than a week's stock to avoid this price volatility. A major concern by the government before the liberalization of the maize marketing was that price fluctuation could have adverse effects on poor maize consumers and producers (Nyoro, et al., 2002).

Group marketing arrangement is rare in the grains sector. In the entire sample, there was no evidence that cooperatives or any other organized farmer groups were involved either in grain sales or purchases. Farmers in grain marketing regions have made none of such initiatives.

Formation of cooperatives or other farmer organizations in grain marketing could improve farmer's bargaining power. They also could serve as a vehicle through which market services like market information and arrangement of commodity sales in the conventional spot, forward or futures and options market could be handled. The cooperatives or other farmer organizations will be required to bulk up smaller volumes from farmers and traders if they are to benefit in trading in commodity exchanges and in arranging future contacts with millers and other commodity traders.

As already mentioned, there was literally one channel (the NCPB) before liberalization. The medium traders and agents did not exist because they were prohibited through partial controls that restricted private transport of maize across district boundaries. The liberalization of the grain market set in motion the different agents we can see today in the various parts of the chain. The access to any of the agents depends entirely on the volume of maize possessed. The role each agent is explained below.

2.6.1.   Small-scale Maize Traders

Small-scale traders existed even before liberalization. It is an intricate team of itinerant traders who either station themselves or move around the villages buying in small quantities (gorogoro or 2 Kg tin) and stock them to the desired quantities for onward shipment to different outlets. Before liberalization, their role was insignificant but today, they command 15% of the marketed maize volume in Bungoma because of their versatility. This channel is a better option for the small scale producers who do not have large volumes of maize to sell. If they were to sell to agents that take larger volumes, they would have to combine with many others to fill the desired volume. It would indeed be a futile exercise for a household to perform such a task. Apart from eliminating the burden of transportation costs for small-scale maize producers, traders operate strictly on cash basis. The badly needed cash is brought to the doorstep of the producer.

The traders stationed in designated market centres receive supplies from small-scale farmers as well as bicycle traders who link the main market with the remote areas and rarely incur transport costs since farmers usually deliver maize to them. Nevertheless, they are required to pay varying amounts to the respective councils as service charge. At the time of , the price per gorogoro was Kshs 17.50 or Kshs 8.75 per kilogram of maize (780 per 90 kg). They later sold to consumers at between Kshs 25 to Kshs 30 per gorogoro (1080 -1350 per 90 kg). The NCPB prices were Kshs 1300 per 90 kg bag. RATES (2003) revealed that small traders can operate across seasons and it has been shown that they have a value of 20-40% in the chain.

2.6.2.   Medium/ Agents/Lorry Traders

The role of NCPB in the region has been eroded by the medium traders and they currently enjoy the largest market share (40%). This category of maize traders, usually operate in both Bungoma and the Busia/Malaba border points. They are endowed with slightly higher financial resources than the small-scale traders and most of them own trucks for transporting maize. They also own, rent or put

up temporary stores in the major producing regions or border points. This is an outlet accessed by small and medium farmers with more than 10 bags. It is not economical for this category of traders to deal with little quantities. The small-scale traders who have collected and bulked the little quantities do sell to them.

Because of their market share, this category of trader seeks market information, enter into supply contracts with millers and other institutions and sometimes sell to NCPB. Because they possess storage facilities, they are in a position to speculate. Their optimum purchase is up-to 300 bags a day during the harvesting period. Like the small-scale farmers, their profits are higher during the off-season and they often pay cash to their clients. They bought maize at Ksh 800 per bag and sold to millers at Kshs 1300 per bag. RATES (2003) estimated that the amount of value added ranges from 12 to 14 %.

2.6.3.   Large Scale Traders and NCPB

NCPB is still a major player buying 25% of maize volume in the year. It has stringent standards that farmers must oblige to, for example, the grain delivered must have a moisture content of 13 percent with minimum amounts of broken or rotten grain. If these conditions are not met, then the farmers must bear the cost of standardization. The introduction of new channels was thus an alternative to producers in case of failure to meet these standards.

The NCPB and other large-scale traders mainly procure their maize from large and medium scale farmers and traders and pay by bank cheque. For this reason, small-scale farmers and traders find it difficult to sell to this category of buyers. However, these traders pay slightly more than others thus benefiting the large farmers and traders. The set price for 2007 was Kshs 1300 per 90 kg bag.

To handle the desired volumes, large scale traders, own or rent storage facilities in the major producing areas in Bungoma and at the nearby border points such as Malaba and Busia. In addition, they rent space from NCPB. They sell to millers and to other national markets. Through their intricate marketing system, large scale traders add value between 10 to 31% within the chain (RATES, 2003). The main reason why sellers prefer to sell to millers is because their prices are slightly higher than those of many agents so long as the seller delivers the maize.

2.6.4.   Maize Millers

After liberalization, the millers acquired access to maize producers and other market agents. They decide at what point of the market chain to enter. Milling is the main component in value adding to maize and the by-product (maize meal) the main staple diet for most Kenyans. There are two types of millers serving the maize industry and operating in Bungoma; the hammer/posho miller and sifted maize miller. Maize milling industry is divided into three milling categories namely; large scale sifted maize millers, small scale granulated maize millers; and hammer/posho millers (whole meal maize millers). The specific volumes handled by each of these agents could not be easily established. In total, millers comprise 10% of total maize market. Their contribution to value in the chain is 17-22% (RATES, 2003).

3.   Sugarcane Commodity Chain Analysis

The sugar industry plays a key role in the agricultural sector in Kenya supporting about 200,000 small scale farmers directly and about 6 million Kenyans indirectly (Ministry of Agriculture, 2007). Sugar is also a major food commodity with national consumption of over 700,000 MT against a local production of about 500,000MT. This results in an annual deficit of over 200,000MT which is usually met through imports.

Sugar is among the most policy-distorted commodities in Kenya and many other countries. Protection is very high in most sugar producing countries, both developing and developed alike. Much of the protectionist policies have emerged as a result of defense against policies that subsidize exports and depress world market prices, and partly due to uncompetitive but politically powerful sugar economies. Within OECD, countries with high protection include Mexico, Poland, and Turkey. Amongst developing countries, China has import restrictions that generally keep domestic prices higher than world market prices. India, the largest producer of sugar has a heavily regulated domestic sugar market and high import tariffs to protect local producers.

In Africa, Kenya is among counties with high tariffs and import quotas to protect domestic sugar producers. In Kenya, for example, the government must approve all sugar imports and exports. In order to promote sugar production, the government has been widely involved in the expansion of sugar production through investments in sugar cane growing schemes and factories, among other initiatives.

The production of sugarcane in Kenya has regional distribution with Western, Nyanza, Coast Provinces dominating sugarcane production for the last three decades. In addition, three districts, Kericho, Nandi and Transmara, in the neighbouring Rift Valley province also grow some sugarcane. Both Nyanza and Western rural areas have 1,465,285 households, majority of who depend on sugarcane.

Kenya has six operational sugar milling factories, with three of them located in the Nyando region (Chemelil, Muhorono and Miwani). The six milling factories have the following sugar milling capacities: Mumias Sugar 9,000 TCD, Nzoia 3,000 TCD, West Kenya 900 TCD, Muhoroni 2,200 TCD, Chemelil 3,000TCD and South Nyanza 2,400TCD (Kenya Sugar Board, 2007). The industry has over 200 jaggeries with capacities ranging from 1 ton to 30 tones of sugarcane per day. They are a source of employment to the rural areas and produce jaggery sugar, which is used in production of white rum. The jaggeries are recognized in the Sugar Act (2001) as millers, but their operations are not coordinated, a factor that makes it difficult to get reliable data on their operations.

3.1.   Pre-Liberalization Period

Following independence, heavy government involvement in sugar was based on various reasons including the need for self-sufficiency, foreign exchange, and savings as well as social and economic development through employment and wealth creation in rural areas. Initial policies of land subdivision and import substitution pursued by the Kenyan government led to protection of the domestic sugar industry. It is during this time also that Kenya became a signatory of the famous 1975 Lome Convention, which granted Kenya an export quota to European Union (EU). Later, this quota was withdrawn and distributed to other ACP countries due to Kenya's inability to supply. A number of factories were built prior to independence and the subsequent periods. The capacity of the operational factories and the year in which they were constructed are presented in the Table 17.

Table 17: Installed Capacity of Sugar Factories in Kenya

Sugar Factory	Year Built	Capacity Tones of cane per day
Chemelil Sugar Company Ltd	1968	3,500
Mumias Sugar Company Ltd	1973	8,400
Nzoia Sugar Company Ltd	1978	3,250
South Nyanza (Sony) Sugar Co. Ltd	1979	2,400
West Kenya Sugar Company Ltd	1981	900
Muhoroni Sugar Company Ltd	1966	2,200
Miwani Sugar Company Ltd	1922	1,500
Total		**22,150**

Source: Kenya Sugar Board

The Kenyan sugar sub-sector prior to liberalization was made up of multiple players as shown in Figure 17. The players in this value chain include producers, processors, suppliers of agrochemical machinery and equipment, input suppliers, industrial users of sugar, importers of sugar, wholesalers, traders, research institutions, producer associations, lobbying groups, individual and institutional consumers. This broad description of the industry demonstrates the importance placed on sugarcane as an economic activity with multi-functional roles, in the development of rural economies in Kenya.

During the pre-liberalization period, sugarcane was supplied to the factories under loose contracts negotiated between the farmers and out-grower institutions on the one hand and these institutions and the factories on the other. In the case of jaggery manufacture, the supply was direct between farmers and the jaggery producers. Most factories had a nucleus estate, which covered a few thousand hectares and produced cane mainly to supply seed-cane to the farmers. To improve cane development, farmers were organized into out-grower organizations which were expected to contract and organize cane production and supply to the factories and also channel back inputs and payments to farmers. This made economic sense as smallholders owning less than 4 hectares produced nearly all cane originating from the out-growers. This scenario however implied that sugar cane producers were by default, tied to specific co-operatives and millers in the zones in which they were located. Producers could not deliver sugar cane outside their zones. This situation was however interfered with when some mills collapsed leaving producers in the respective zones without any outlets.

Figure 17: Sugar Commodity Chain Prior to Liberalization
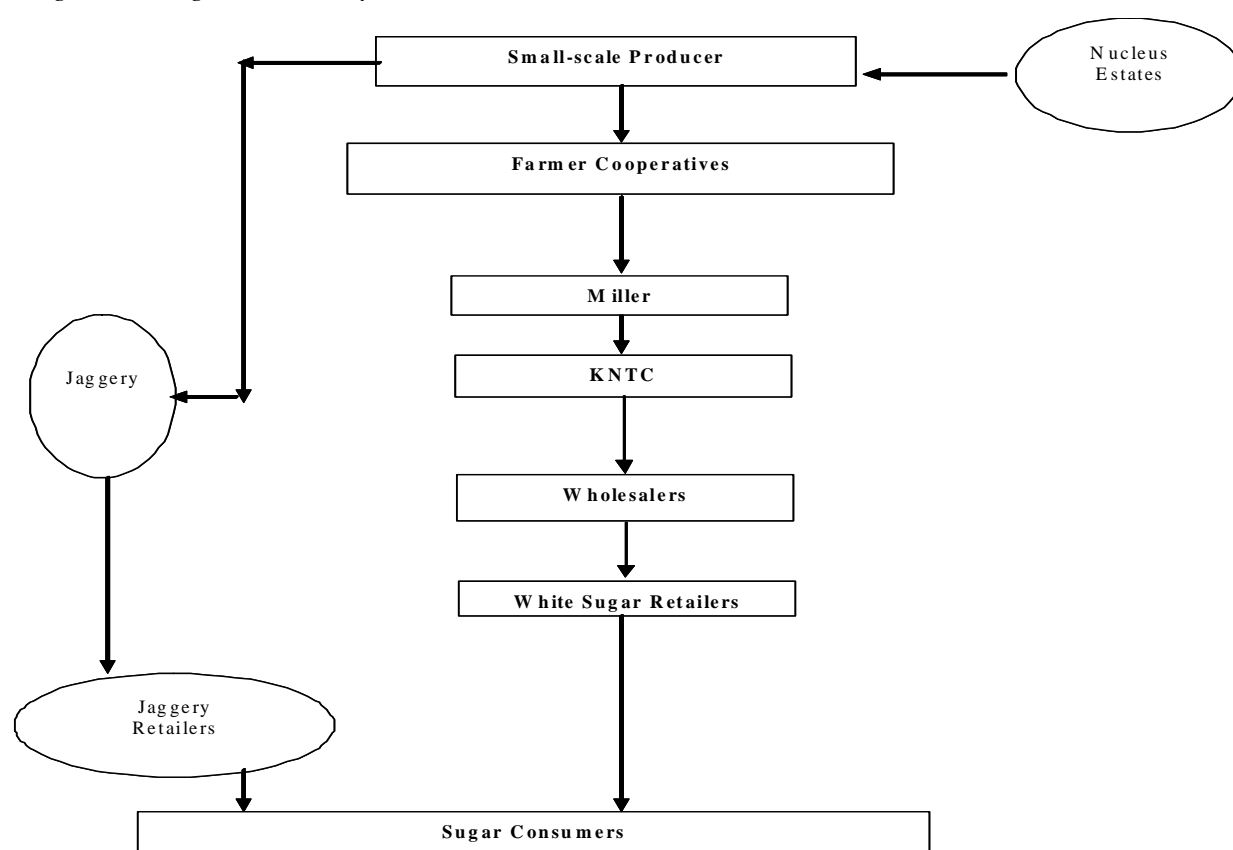
Source: Commodity Survey 2008

Before the liberalization of the sector in early 1990's, all sugar manufactured in the country was sold to Kenya National Trading Corporation (KNTC) for distribution throughout the country (EPZA, 2005).

3.2. Post- Liberalization Period

Following liberalization in 1992/93 and the continued consolidation of regional trading blocs, the major concern that has emerged within Kenya's Sugar sub-sector revolves around its capacity to maintain a sustainable level of competitiveness. Kenya's domestic sugar industry produces amounts that are inadequate to satisfy local demand. While it is estimated that the domestic demand for sugar stands at 700,000 MT, local production is estimated to be around 700,000 MT. Yet despite this shortfall, Kenya is a signatory to the (ACP)-EU trade protocol that allows it to export 17,000 MT of sugar to EU every year. The shortfall of about 200,000 MT is met through trade agreements with the COMESA states and from illegal imports. Apart from Kenya, other sugar producers within the COMESA region do so at a lower cost making Kenya less competitive in the region. While it costs between 450 and 600 dollars to produce a tonne of sugar in Kenya, this figure is only about 250 dollars per tonne in other COMESA countries (notably Malawi, Sudan and Mauritius).

The survival of the Kenyan sugar sub-sector rests on its ability to weather competition particularly from member trading partners within the regional trading blocs who are, by law, exempt from various taxes and levies that would usually be incurred by non-members. The recent moratorium, negotiated in the last COMESA meeting, allows the country to continue its trade-inhibiting practices for a limited period and it therefore behoves the sub-sector stakeholders to ensure it evolves into a competitive position within the specified period.

The government's request for an extension of the COMESA importation quota for an extra four years was granted in 2008 amid protests from other producing countries that Kenya was being given preferential treatment at the expense of free trade within the giant bloc. The quota, which is likely to be the last one, expires in 2012. At the expiry of the quota, the sector will be opened to free market competition, a situation that could see an influx of cheap imports into Kenya thus hurting domestic production. COMESA has advised Kenya to privatize the sugar sector as one of the steps towards improving competitiveness and production before the expiry of the four-year safeguard period.

The net effect of increased imports from the regional trading blocks' partners has been to exert a downward pressure on the domestic price of sugar cane to levels that are unattractive to local producers.

Deficits in the Kenyan sugar industry have persisted despite growth in production over the years especially with liberalization. Sugarcane production increased from 1.7 million MT in 1975 to 4.8 million MT in 2005 (Kenya Sugar Board, 2005). The area under cane has grown from 40,000 ha in 1970s to 133,000 ha during the liberalization era. Trends in annual sugarcane production and sugar consumption over time are presented in Table 18.

Table 18: Sugar and Cane Average Annual Trends

Period	Pre-liberalization 1970/80	Transition 1981/92	Liberalization 1993/02	Post-liberalization 2003/05
Sugar production (tones)	187.9	310	405.8	484.5
Average consumption (tones)	-	414.8	592	676.4
Per capita sugar consumption (Kgs)	-	19.5	20.6	20.6
Average deficit (tones)	-	-33.8	-186.1	-197.0
Area under cane (Ha)	40,060	95,660	112,271	132,967
Cane output (Tonnes)	-	3711.6	4031.1	4555.3

Source: Republic of Kenya, Economic Surveys. (Various Issues)

Unfortunately, despite the growth in area under cane, cane productivity (output per unit area) has been declining as shown in the figure below. This can be attributed to the reduced area harvested, inefficiencies in cane harvesting, poor cane varieties, lack of inputs, and mismanagement of state-owned sugar factories, changing weather regimes, diseases and sub-optimal fertilizer use.

Figure 18: Cane Productivity Trend
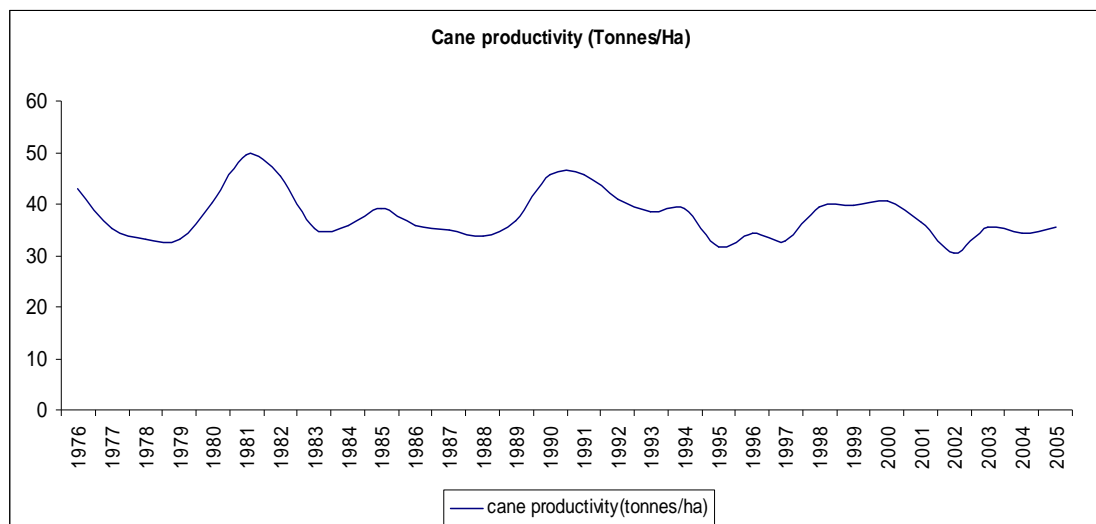
Source: Republic of Kenya, Economic Surveys. (Various Issues)

3.2.1.   Current Sugar Situation

Sugar production rose by 9.4% to 520,404 MT in 2007 from 475,670 MT in 2006. This is the highest production achieved since inception of the sugar industry in Kenya, surpassing the previous highest record of 516,803 MT attained in 2004. The increase in 2004 represents a 15% increase over the 2003 production level of 448,489 MT. This was mainly due to favourable weather conditions, increase in the area under cane production in estates owned by millers such as Mumias and an aggressive recruitment of farmers by millers.

There are two types of sugarcane farmers; out-grower/miller financed (contracted), and self-financed (non-contracted). The traditional sugar cane growing areas i.e. Muhoroni, Chemelil, Mumias and Sony consist mostly of contracted farmers. In this case, a large number of the farming operations are carried out by the out-grower companies or millers in addition to the provision of inputs at cost plus interest.

The national trend seems to show that except for the coastal region, there is not much fluctuations in the area under sugarcane even with liberalization. It would have, however, been expected that with increasing consumer demand arising from an increasing population, a corresponding increase in the production of sugar cane would have been recorded in the intervening period. It can be seen from Figure 19 that the sugar growing region of Nyando lags in terms of area under cane coverage, with Muhoroni area being the least in this respect.

Cane deliveries exhibited a similar pattern to the area under cane remaining mostly flat but declining in the year 2000 as indicated in Figure 20 below. The general trend of deliveries to all the factories rose from 1994/95 to 1998 and then began to decline. This is an indication of the response of farmers to a liberalized market. Increased deliveries imply increased payments and thus improved livelihood.

Figure 19: Area under Sugar Cane (1992-2001)
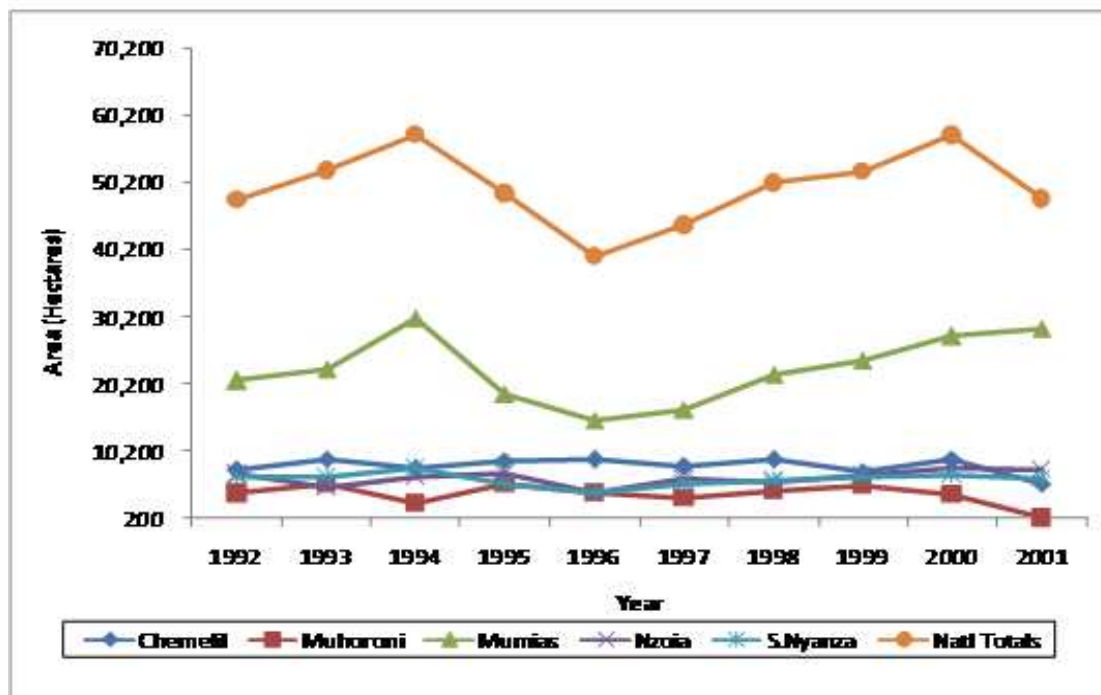
Source: Kenya Sugar Board data (1992-2001)

Figure 20: Sugar Cane Deliveries
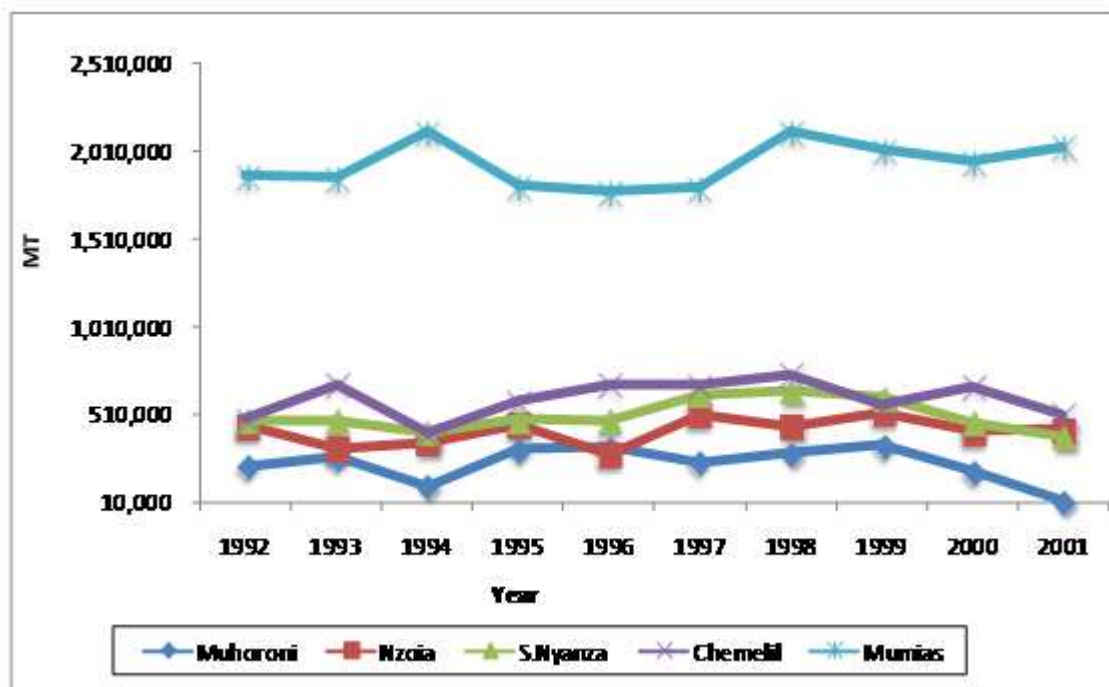
Source: Kenya Sugar Board data (1992-2001)

The crop productivity for sugar cane expressed in yields as Tonnes of Cane per Hectare (TCH) has been on a declining path from a peak experienced in the 1995/97 seasons. The indication is that with good prices, farmers can compensate lower yields by increasing acreage to boost deliveries. Cane yields across factories are shown in Figure 21 below:

Figure 21: Sugar Cane Yields
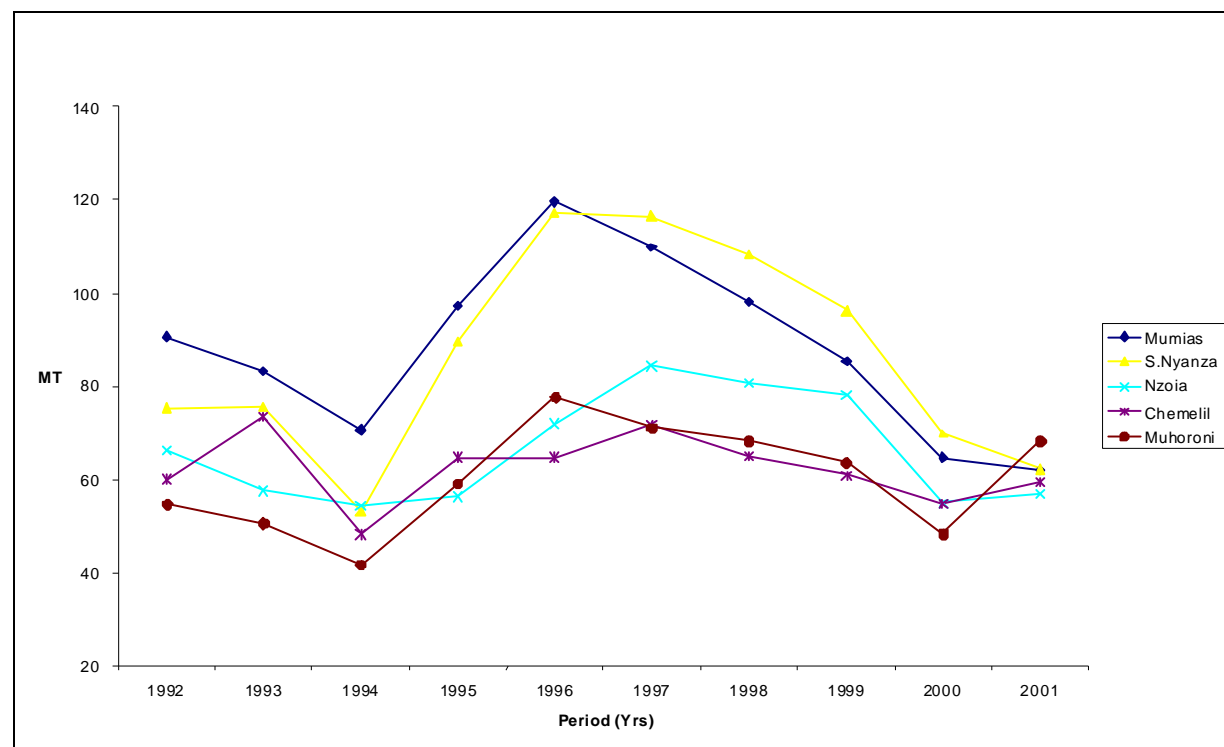
Source: Kenya Sugar Board data (1992-2001)

The continued decline into the 2000/01 cropping season and beyond does not lend itself to explanation from a rainfall perspective. Continuous cane growing under mono-cropping depletes soil nutrients and reduces soil vegetative matter. This results in degradation that cannot be addressed by fertilizer alone. In the bulk of sugar production systems, this is yet to be addressed and is partly responsible for the yield declines across the board since the schemes were first begun a quarter century ago. The declines in the older schemes are even greater such that farmers who could initially harvest up to four ratoon crops can now only get two ratoon crops.

Sugar cane is a gross feeder and requires a high level of fertilizer application that smallholder farmers are unable to sustain due to the high costs involved. The high cost of fertilizer among other inputs has continued to be a source of concern in the sugar cane industry. It is certain that the rate of increase in fertilizer prices and other inputs greatly surpass the rate of increase in the returns. Poor land preparation methods especially in areas with deep soils and where oxen was used for ploughing, also contribute to low productivity.

The more serious concern is with respect to the input supply system. Most contracted farmers indicated that the inputs supplied to them through out-grower companies or Millers were often priced higher than those available through the open market. It is normally considered that the acquisition of inputs in bulk by the out-growers and Millers would confer some element of scale economies and result in lower prices to the farmers as an accruing benefit. This does not appear to be the case. It can be argued that the major cause of the decline in sugar cane productivity over the years has more to do with the application of less than optimal levels of inputs than general crop husbandry.

More recently, according to the national sugar data (Kenya Sugar Board, 2006), there has still been gradual decline in the yield of cane in all sugarcane growing zones in Kenya. The decline is attributable to delayed payment to farmers who were unable to plough back resources to cane development. The decline is partly attributable to reducing area under cane development occasioned by pressures from population growth and social requirement by the local communities that has led to splitting of land to small uneconomical pieces for sugarcane production. In Miwani, most of the land that was used for sugarcane production (approximately 30,000 acres) is now lying fallow.

3.2.2.   Post Liberalization Sugar Commodity Chain

The post-liberalization sugar commodity chain derives from the one before (Figure 16) with the significant changes being the removal of the KNTC, the entry of middlemen and the inclusion of the other industry players. Sugar imports get in contact with the locally produced sugar at wholesaler/and or large-scale retailer stage in the chain. Due to the porous border points, smuggled sugar also finds its way into the chain at large-scale and small-scale retail level.

Following the liberalization of sugarcane sub-sector, the commodity chain has evolved over time. Although there has been creation of new private milling companies in other regions like Soin in Kericho and West Kenya in Kabaras, Nyando region has suffered from the collapse of its two milling companies, Miwani and Kibos.

With the advent of liberalization, factories are now free to sell their sugar through appointed distributors and wholesalers. They have adopted a number of methods for distribution including wholesalers, agents, retailers, and even individuals. There are more than 5,000 private wholesalers who buy sugar directly from factories. Individual traders can also buy from factories (EPZA, 2005). Product range has been expanded to include production of molasses, brown sugar and other by-products like bagasse.

Figure 22: Post Liberalization Sugar Commodity Chain
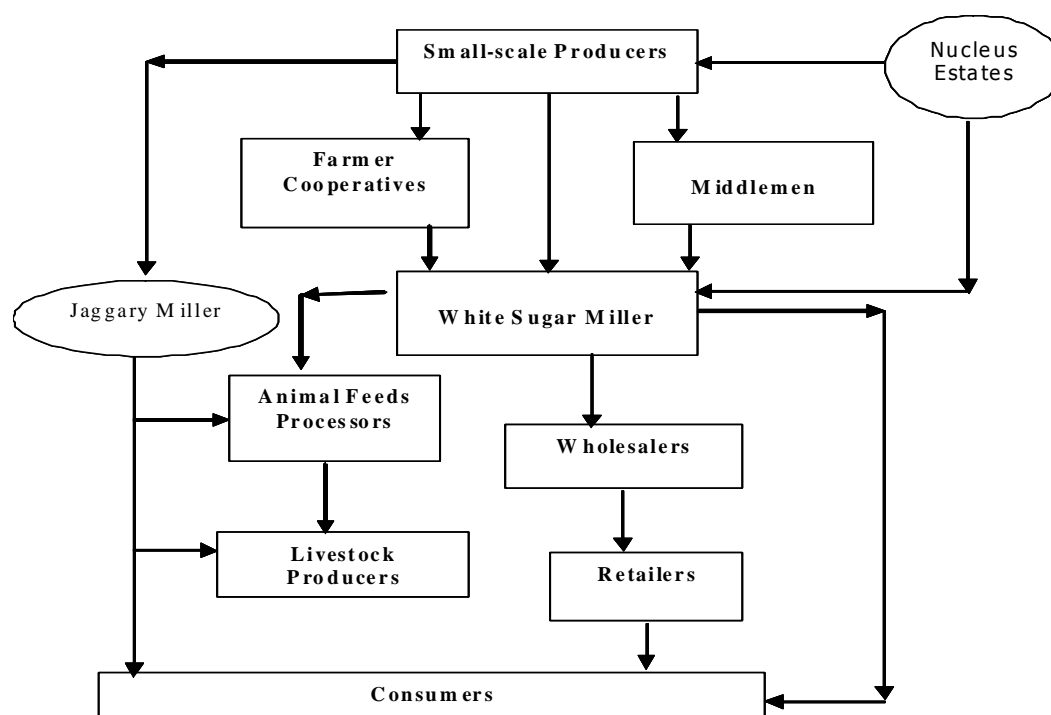
Source: Commodity Survey 2008

Producer cum middlemen have also emerged in sugar zones especially where the millers have collapsed. These middlemen buy sugarcane at relatively lower prices of between Ksh.1,100 and Ksh.1,250 per tonne compared to the millers' price of Ksh.2,200 (in 2007) and Ksh.2,700 per ton during the time of survey in early 2008. These agents buy cane from farmers in one zone and sell to the millers in another zone. They argue that the price difference is meant to cover their transport cost, (even though some distances are less than 20kms) and are unwilling to be hired by the farmers to offer transportation services alone. This amounts to exploitation of the farmers, and indeed one of the negative outcomes of the free market under liberalization.

Sugar millers are also involved in the production of molasses as a by-product from the sugar processing. Molasses is used by the millers themselves in ethanol production. It is also meant for use by livestock farmers, especially dairy farmers, who mix it with dairy feeds. This has also led to the emergence of animal feeds retailers who now stock the molasses produced by the sugarcane millers. During the time of the survey, molasses was retailed at Ksh.300 per 20-liter jerry can. Similarly, bagasse, which used to be burnt by the millers, has now found new uses. This can now be used to generate fuel used to power boilers for the millers as well as being sold to the national electricity power transmitter, Kenya Power and Lighting Company (KPLC) Ltd. In addition, bagasse can also be sold to paper manufacturing industries and ceiling/soft board manufacturers. Further, the operations of the jaggery millers which were not prominent during the pre-liberalization period have now emerged as significant players and do also produce molasses in addition to the jaggery.

Unfortunately, cane farmers do not fully benefit from all the activities undertaken by cane millers during and after crashing of sugar cane. For example, farmers do not share in the returns earned by the millers from the sale of by-products from sugar processing. Millers purchase and pay for sugarcane on the basis of expected sugar production while assuming that the returns from any by-products of sugar processing are worthless. This has led to gains in returns for the millers/factories against relatively low farm earnings by smallholder sugarcane farmers.

3.2.3. Trends in Sugar Prices Following Liberalization

Between 1998 and 2007, both the ex-factory and consumer prices increased significantly and moved in tandem while the producer prices barely changed. This price gap is an indication of the marginalization that sugarcane producers have suffered and thus becoming the most vulnerable group in the sugar value chain in Kenya. Thankfully, this and other imbalances between producers and other players have given rise to a lobby group – the Kenya Sugar Growers Association (KESGA). Further, the gap between ex-factory prices and consumer/retails prices is significant (see Figure 22), an indication of modest returns to middlemen and other traders.

According to Kegode (2005) imported sugar lands in Kenya at a CIF price of KSh. 23.30 per kg. After paying relevant duties, importers then sell the sugar to wholesalers at KSh.48 while the consumer ultimately pays KsSh.76 per kg[20]. Thus, contrary to popular belief, sugar consumers in Kenya do not benefit as much from the so-called cheap sugar imports as a result of these high mark-ups to importers and other players in between. This may also be attributed to the inefficiencies inherent in the administration of sugar import quotas that open room for cartels to monopolize the business thus generating enormous economic rents at the expense of both producers and consumers. ActionAid (2005) indicate a margin of between 47 to 50% for the importers. Further, the sugar value chain in Kenya is much longer than in other COMESA countries, a factor that has contributed to relatively lower margins for producers and higher prices to the consumers (COMESA, 2005).

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[20] This scenarios has ever since changed and sugar is currently retailing at approximately Ksh 10 per kg

Figure 23: Sugar Prices during 1998-2007
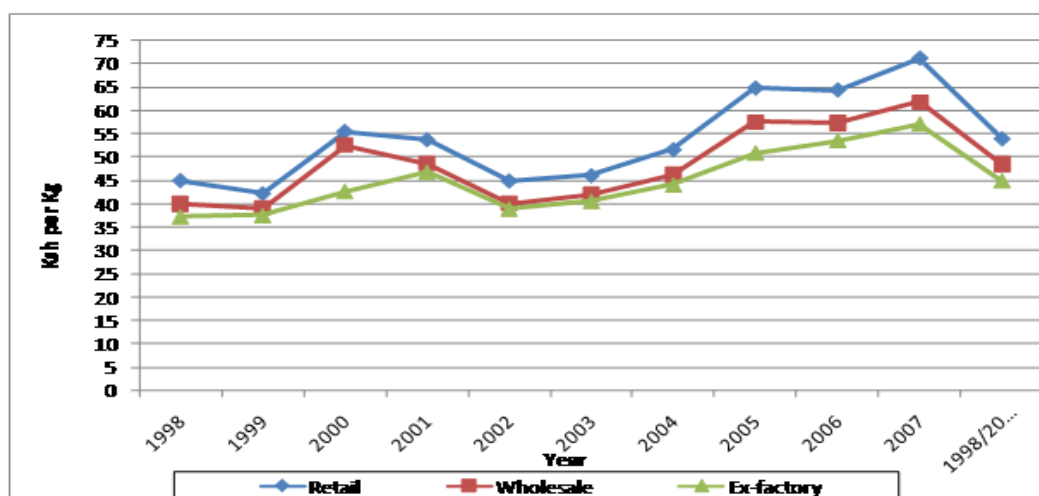
Source: KSB Year Book of Sugar Statistics (various)

3.2.4. Liberalization and Import Surges

As has been mentioned earlier, the Kenya domestic sugar production is well below consumption thus necessitating importation.. In addition, the existing sugar factories have specialized in white mill sugar and therefore the industrial users of white refined sugar have always to import for their manufacturing needs. Over the years, the level of sugar imports has varied for numerous reasons. Nonetheless the Kenyan threshold of COMESA sugar is 200,000 metric tones, which is shared between white mill sugar and white refined sugar for industry use. In the recent past, the 200,000 metric tons threshold has been divided into: 89,000 for domestic use and 111,000 MT for industrial use (KSB, 2005).

Cases of import surges started occurring in the early 1990's. The total sugar imports grew in volume from 65,816 metric tons in 1996 to 171,308 metric tons in 1998 and 249,336 metric tons in 2001. However, the volume declined to 182,225 metric tons in 2003; 167,234 metric tons in 2005; 166,280 metric tons in 2006 before increasing to 230,011 metric tons in 2007 (KSB, 2007).

The surveillance of sugar imports has been controversial and difficult to administer due to smuggling activities especially around the borders. During the survey in Nyando region, sugar from Brazil and other unknown sources, was found retailing in several shops in Kisumu, Sondu and Katito towns. This sugar was most likely not captured by the national statistics. Generally, some of the sugar imports that come into the country are not captured by official statistics due to smuggling especially along the Kenya - Somalia borders and also through the Lunga Lunga Tanzania – Kenya border points. The undocumented sugar further complicates estimates and data for sugar imports. The multiplicity of regional trading blocks makes it difficult to police how much sugar is coming in from Tanzania that does not meet rules of origin under EAC, COMESA and SADC customs union.

The frequency and severity of sugar import surges is a manifestation of weak trade surveillance systems and trade remedy measures required by the government to deal with high incidence of import surges in Kenya. According to FAO (2005), sugar import surges have a negative correlation with drop in employment in the sugar sector. For instance, Kegode (2002) estimates that the import surges have contributed to loss of over 30,000 jobs (directly) and affected over 150,000 households. The most serious decline occurred in Miwani, where almost all employees lost their jobs and Muhoroni, which has been in receivership since 2001.

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3.3. Sugar Revenues

There has been a general increase in sugar sales in the recent times. Sales were recorded at 520,404 metric tons in 2007 compared to 475,670 metric tons in 2006, representing an increase of 9.4%. The sales for 2005 were 466,959 metric tons compared to 523,224 metric tons in 2004. This was still higher compared to 485,215 metric tons in 2003. Closing stocks were lower in 2004, at 5322 metric tons, compared to 14,536 metric tons in 2003. This may be a reflection of more aggressive marketing efforts. Of the sales achieved in 2007 and 2006, Nyando region represented by Chemelil accounted for 54,282 metric tons and 52,722 metric tons, while Muhoroni accounted for 38,036 metric tons and 32,145 metric tons, respectively. This small contribution is attributed to the collapse of sugar mills in the region such as Kibos and Miwani which has affected not only the production but also sales.

Despite declining sugarcane productivity, national farmers' revenue from sale of cane has been increasing as shown in the figure below. This is attributed to the increasing producer price, which seems to have counteracted the effects of the decline in productivity. It may be suggestive that increasing cane prices could be due to liberalization as there is a sharp rise from 1992/93.

Figure 24: Sugar Revenues, 1978 - 2006
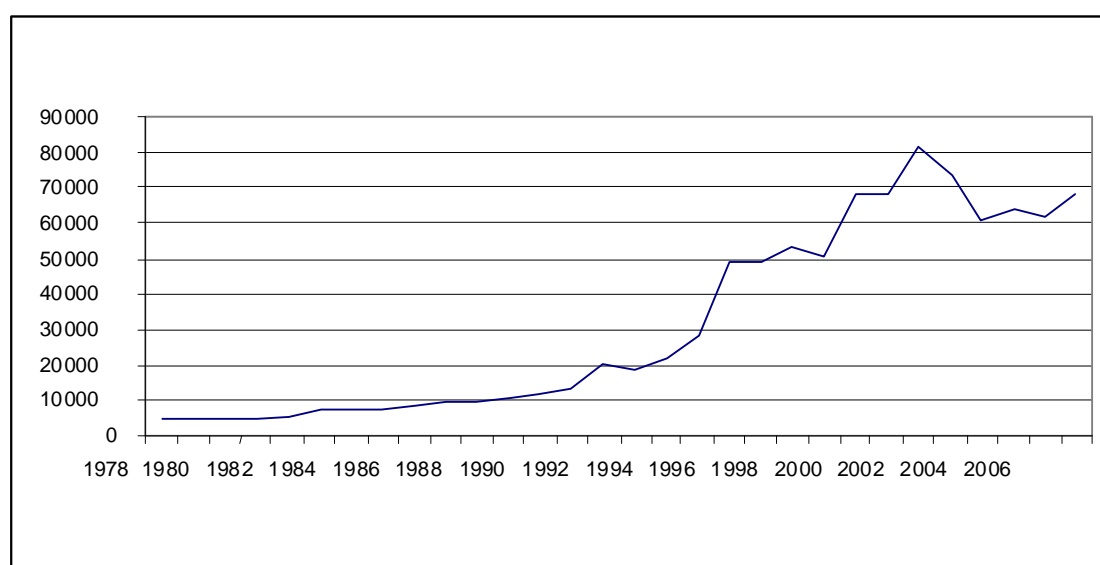
Source: Economic Surveys (Various Issues).

Given the opening of the domestic market to imports from COMESA and the corresponding favourable treatments, the existing high producer prices are unsustainable. The country has been offered a moratorium up to 2008 to restructure its sugar industry. This moratorium was recently extended to 2012 following a string petition indicating the country's position and a new restructuring programme. The lapse of the moratorium implies the sugar industry has to reform by 2012 to remain competitive. There is an increasing likelihood that inefficient cane producers and millers will be forced to exit the sugar industry.

3.4. Segmentation and Competition in the Sugar Market

During fieldwork for this study, observations were made of different levels of segmentation and penetration for the different milling company's white mill sugar. After liberalization, each miller has established the marketing and distribution system through various licensed agents. The local millers are moving into packing their own sugar. The new concept of sugar branding is an important strategy for securing and protecting domestic brands over imported sugar. Mumias, Sony, Chemelil have

between 10-20% of their sugar branded into packages (ActionAid, 2005) that are distributed through the supermarket and wholesalers supply chain.

Branding has an impact on local sugar's vulnerability to imports. Unbranded and bulk sales by locally manufacturers increase susceptibility to imports as most imported sugar for domestic use is in bulk and unbranded. Local millers mainly sell in bulk to retailers who then break the bulk and sell in smaller packages e.g. quarter, half, one kilo and two kilo packages. In bid to cope with the competition, imported sugar is also coming in small packages and branded. The common sizes in retail outlets are one kilo and two kilos.

Retailers such as supermarkets prefer selling branded sugar over unbranded sugar. A quick market check in Kisumu city's supermarket chains revealed that in addition to these branded local sugar, the supermarkets were selling their own branded sugar but with no origin of source or miller that produced it.

The survey team also found that some supermarkets were buying locally milled sugar from the region and branding it with the name of those supermarkets. The entry of supermarkets into branding of sugar is likely to grab the sugar millers' market penetration strategy for unbranded sugar. The branding of sugar seems to be an effective strategy for building local brand support and may also serve as a mechanism for fighting unregulated sugar imports. Unbranded sugar is more vulnerable to quality adulteration through mixing of poor quality raw sugar and processed mill white sugar. There are also cases of sugar smuggling across the border, which may result of prices for such sugar being lower than locally produced sugar.

Urban sugar consumers are more concerned with the quality packaging and aesthetic aspects of products, with price not being a critical factor in their decision-making. Due to their low incomes, the consumers of sugar in the rural areas are more strongly influenced by the price of sugar over other factors such as packaging. Sugar millers, which have branded their sugar have wider distribution network and penetration countrywide and are more vulnerable to adulteration by sugar importers, who are competing to sell their imported sugar. Import surges through price transmission signals are able to affect the sugar producing regions in Nyanza Province, where Nyando is located.

The spatial location of domestic production, consumption and imports is a key determinant of who is affected by an increase in sugar imports and to what extent. Both the consumers and producers are impacted through the price of sugar. The impact changes with distance from the point of imports and is invariably evident along the domestic sugar value chain. Most of the sugar imports in Kenya come in through the ports of Mombasa as well as along the border points. The price transmission through the import surges can affect the market share of domestic sugar, leading to slow moving inventory, huge accumulation of debt, which ultimately affect producer income, finally contributing to poverty through food insecurity and threatened livelihoods. Sugar brands with the largest distribution network are most vulnerable to sugar import surges and smuggling. This is likely to apply also for Nyando region with its major sugar miller, Chemelil, having branded its sugar.

3.5.   *Sugarcane and Household Livelihood*

In the sugarcane growing areas such as Nyando, sugarcane is the main source of employment. Employment in sugarcane industry include: direct sugarcane farming, input supply, manual weeding, cane and sugar transport, sugar milling factory, agro-chemical industries such as the Kisumu Molasses Plant, the Agro-Chemical and Food Company, equipment suppliers, molasses distribution, schools and hospitals. Nonetheless, sugarcane growing has not been productive enough to absorb all the labour available in this region. Agriculture contributes about 52.1 percent of employment in the region, with larger proportion of it being direct employment in sugarcane farming.

The non-farming sugarcane employment spread across the milling, transport, technical service providers, grocery shops, and education and health sectors. In the past 13 years, the factories, sugarcane plantation and the industry has employed between 43,000 and 75,000 (KSB, 2007). Between 1995 and 2007, employment and wages in the sugar sub-sector dropped by over 70%, affecting over 35,000 households.

In Kenya, feeder roads maintenance in the sugarcane growing areas is the responsibility of the sugar milling factories. Through an arrangement where the millers are charged 7% of their turnover by the government as Sugar Development levy (SDL), 2% is remitted to the millers for roads maintenance (Ondek et al., 2003). The Sugar Development levy of 7% is meant for cane development and roads maintenance. It is ploughed back through Kenya Sugar Board. Consequently, some factories such as Mumias Sugar Company, in Western Province, have invested in road maintenance equipments for rural feeder roads.

In rural Nyando, there is deteriorating levels of poverty arising from the declining cane yield, non-payment of sugarcane, deteriorating infrastructure of feeder-roads, increasing insecurity, and HIV/AIDS pandemic. This deterioration in poverty indicators has negatively affected the households. According to the Economic Survey (2007), over 64.5% of the household live below the poverty threshold. This is characteristic of Nyanza Province given that, out of a total of 209 constituencies, 33 from Nyanza were rated among the poorest. All these constituencies form the sugar zone.

3.5.1. Sugarcane and Food Security

In Nyando region, the income from sugarcane gives them the economic power to buy food when subsistence crops fail due to flooding. As a result, delayed cane delivery payments lead to nutritional problems as well as food inaccessibility, taking into account that the sugarcane in the region takes 24 months to mature. Usually, harvesting is not done on time, meaning that the farmers can take up to 36 months before receiving the first crop payment. This negatively impacts on food security and income generation in the region.

Related to the problem of food security, is enrolment in schools as sugarcane farming acts as social collateral in schools and hospitals. The schools, the community and friends can offer credit on premises that when cane is harvested, it will be paid to them. Land sizes and population density also fuel food insecurity in the region. The average land holding of 3.08 acres for Nyando is low compared to that in neighbouring regions such as Rift Valley with an average of 6.5 acres. Additionally, the household size of 5.7 in Nyando is high compared to the highest household sizes of 5.2 in rural areas of Eastern province. This large population density exerts a lot pressure on family income and other resources leaving most families below poverty threshold. On the other hand, cash crops such as cotton are no longer a substitute with the collapse of the industry leaving sugarcane as the only source of income for most people in the region.

Sugar milling factories also provide a social safety net through the provision of health services and support education services. Before the collapse of Miwani Sugar factory, it supported three primary schools, one secondary school, and a hospital with a capacity 110 beds. Even in other sugar regions like in Western province, Mumias Sugar factory supports one primary school, a secondary school and a hospital. The provision of social infrastructure by sugar industries is thus a strong component of the single commodity economy of Nyando region.

3.5.2. Distribution of Sugar Benefits

Sugarcane production benefits many people and institutions according to Economic Survey (2007) and KSB (2006). However, these documents show that only 36% of industry cash flows are transmitted to the farmers, even though on average they only generate 2% profits on their production operations. The government draws an average of 22% of the industry cash flows in form of taxes, excise duties, and levies. Traders and suppliers draw on average of 24% while cash flows related to

employees is 11%. These cash flows are transmitted through the banking infrastructure, sugar credit Saccos, shopping centres, educational institutions, health care and in the sugarcane producing towns.

The 22% of the industry cash flow from the sugarcane sub-sector contributes largely to the government in form of VAT, SDL and cess. For instance in the year 2007, total VAT remittances amounted to KSh. 2.9 billion, up from KSh. 2.4 billion in 2006. Corporate tax to income to the government was Ksh.560 million in 2007, up from KSh. 61.5 million in 2003. Payments to the SDF amounted to KSh. 1.3 billion in 2007, while excise duties was Ksh.124 million in the same year. The government is a major beneficiary of revenue streams from the sugar sub-sector. This is excluding the dividends, which the government earns from the ordinary shares it owns in the state-owned sugar millers.

3.6. Sugar Industry Debts

The shrinkage of the sugar industry is best demonstrated by the reduction in remittances from the sector to government, suppliers, the business community and social welfare in the areas in which the mills are located. Following the import surges since the 1990s, the sugar sector experienced high debt positions, which led to nonpayment of taxes and the inability of government to provide adequate services to the sector. Consequently, two of the millers in the region, Miwani and Muhoroni, were placed under receivership between 2000 and 2001. The debt portfolio in the sugar sub-sector is highly leveraged making it practically difficult to attract new investments in the sector.

Sugar millers are currently owing Ksh.37 billion to the government (49%), banks (7%), farmers (9%), external factories (3%) and other creditors (32%) and the debt accumulation also inflicted injury to producer's ability to meet their food security, social welfare and overall impact on poverty indicator evidenced elsewhere in this report (KSB, 2007). As indicated earlier, of all the debts owed in the sugar sub-sector, 49% (KSh.37 billion) were debts in form of remittance defaults. In 2005, the government in an effort to revive the sugar sector waived numerous millers' debts in form of unremitted tax. Nevertheless the debts are still a major burden.

3.7. Opportunities for Sugarcane Value Chain Development

The Kenyan sugar industry opens many opportunities for investment because the market is available locally and the country enjoys favorable climatic conditions for cane production.. There is also the availability of affordable rural labour and a regulatory framework in place through the Kenya Sugar Board. There exists also the access to the regional market like the EAC, AU, SADC and COMESA. The country has a strategic location on the East African coast. There is also an investment protection and insurance since Kenya is a member of MIGA and ICSID, which guarantees against expropriation of private property. There is also a robust financial system, especially efficient capital/stock market and portfolio managers.

The following are some of the investment opportunities available in the sugar sub-sector in Kenya.

- Establishment of white sugar refineries to meet the domestic demand of industrial sugar.

- Establishment of new small factories serving smaller zones, especially in high potential areas.

- Financial support to the small-scale out-growers.

- Rehabilitation and expansion of existing sugar factories to meet the rising demand and production of sugar surplus for export.

- Existing factories to process by-products, and the utilization of sugar byproducts:

    o Bagasse for electricity generation, production of briquettes, paper industry, and fuel to supplement steam to provide energy for the factories.

    o Molasses to supplement for livestock feeds, alcohol production viz ethanol, and vinegar production

    o Filter cake can be used as an organic fertilizer and as soil conditioner.

    o Expansion of existing irrigation programs for higher yield.

    o Expansion and rehabilitation of the road infrastructure in the sugar belt.

    o Improving the drainage system in flood-prone zones of Nyando and then diversifying the range of produce from cane land.

    o Production and marketing of organic sugar

CHAPTER 5 - MAIN REGIONAL CHARACTERISTICS OF THE SURVEY SAMPLE

1.   General Description of the Sampled Households

This section presents a description of the households in the three surveyed regions with a view to explore their similarities and differences with regard to selected socio-economic characteristics. These characteristics are presented in Table 19. In order to allow comparison between regions, household incomes were converted to adult equivalent and per capita terms. However, because the per capita measures account for differences in household sizes but not composition in terms of age, incomes per adult equivalent[21] are used throughout the report to explore income structure and diversification of the households. As shown in Table 19, there exist regional variations in income levels, with households in Nakuru North having significantly higher mean global and farm income per adult equivalent and per capita compared to both Nyando and Bungoma[22]. The income levels are consistent with the a priori choice of Nakuru North as a Winning region.

On demography, Nakuru North has the highest household size but the lowest dependency ratio, indicating a lower proportion of very young and old people in this region compared to Nyando and Bungoma. Also, the education index of the household members is higher in Nakuru North compared to the other regions, which is consistent with its selection as a winning region. The indices for social capital are much higher in Nyando. An examination of group membership indicates that for all regions, religious organizations make up 34% and 28% respectively of all types of groups in which either a household head or partner have membership. For Nyando, these figures are even higher; 49% and 44% for the head and spouse, respectively. Therefore, although the network index is high in Nyando, it is not necessarily associated with economic benefits that would make households in this region better off.

Farming is an important activity in the surveyed regions, as evidenced by the high number of households with farming activities and the number of economically active persons with agriculture as the main economic activity. However, land sizes are small, with very little irrigation taking place, but the equipment index shows that households' production activities are relatively capital intensive. Additionally, the index of economic specialization shows that households in Bungoma are relatively much more specialized with the main activity contributing 55.6 percent of global income. Most households are not engaged in formal contracts, except in Bungoma where there are some contracts for sugarcane and coffee growers. On use of modern technical packages such as fertilizer and improved seed, Nakuru North and Bungoma have high levels of adoption among the households, while in Nyando a paltry 5% of the households have adopted the technologies.

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[21] Details on computation of adult equivalents are provided in Annex 2.

[22] The overall mean global income per adult equivalent of Ksh 40,196 is however generally consistent with results from the Tegemeo panel data (Ksh 39,424 and Ksh 47,584 for 2004 and 2007, respectively).

Table 19: Selected Characteristics of the Sampled Households[23]

	Nakuru North	Nyando	Bungoma	Overall
Global Income/AE	76,766	22,424	21,790	40,196
Global Income/capita	67,070	19,321	17,892	34,638
Farm Income/AE	26,784	9,563	11,044	15,771
Farm Income/capita	23,395	8,176	8,988	13,493
Demography				
Size of the household	5.66	5.43	5.57	5.55
Dependency ratio	0.61	1.35	1.30	1.09
% of male-headed households	83.39	69.47	88.96	80.76
Human capital				
Education index of household members	2.06	1.77	1.65	1.82
Social capital				
Network index of household head	0.66	1.35	0.51	0.83
Network index of spouse	0.68	0.82	0.54	0.68
Agriculture				
Index of economic specialization	33.4	37.6	55.6	
No. (%) of households with farming activities	289 (100%)	285 (100%)	299 (100%)	873 (100%)
No of EAP working in agric as main activity	1.40	0.91	1.46	1.26
Total farm area	1.45	1.32	1.33	1.37
Total irrigated land	0.15	0.19	0.03	0.12
Equipment index	0.70	0.97	0.83	0.83
% of households with formal contracts	5.54	2.46	25.08	11.23
% of households adopting modern technical packages	94.77	5.43	71.92	58.13
Credit				
% of households that had credit	15.22	9.12	9.03	11.11
Amount of credit (Ksh)	24,201	4,809	15,555	14,909
Migration				
% of households with migrants	64.0	43.5	29.4	45.48
No of long-term migrants/AE of household	0.37	0.11	0.13	0.20
No of short-term migrants/AE of household	0.03	0.04	0.03	0.03
No of migrants sending remittances	0.57	0.35	0.29	0.40
Assets endowment				
Quality of housing index	0.88	0.18	0.19	0.41
Facility welfare index	0.59	0.13	0.11	0.27
Durable goods index	1.35	0.72	0.66	0.91

Access to credit is generally minimal among the households, as evidenced by the low percentage of households that had credit. Regionally, a higher proportion of households in Nakuru North than in Nyando and Bungoma had credit. They, in addition, had larger amounts of credit than their counterparts in the other regions.

Migration is also one of the income-earning activities for the households in the three regions, particularly in Nakuru North, though the number of migrants is generally small. Most migrants are long-term, and a reasonable proportion of them send remittances back home.

The asset endowment indices suggest that households in Nakuru North are relatively better-off than those in other regions, which may partly explain why the region has a lower index of economic specialization; better assets endowment enables households to engage in diversification processes.

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[23] Documentation on how all the indices are computed is provided in Annex 3.

2. Household Income Structure and Diversification

Rural households are often engaged in multiple income-generating activities, a phenomenon that is generally observed in many rural areas. It is sometimes referred to as livelihood diversification, and usually implies that households maintain their on-farm activities as well as participate in off-farm activities. This diversification is often seen as a risk-reducing strategy which households employ in order to deal with an uncertain environment. Other reasons for diversification include existence of capital constraints and the need for coping strategies in order to respond to crisis. Diversification has the potential to sustain livelihoods as well as pull households out of poverty. However, the actual impact of diversification on household welfare depends on the portfolio of possible off-farm activities and the returns to such activities.

The sources of household income can be broadly classified as on-farm and off-farm, where the former consists of income from agricultural and livestock production, hunting, fishing and gathering activities, and transformation of agricultural products, while the latter comprises of agricultural labour, non-agricultural wage employment, self-employment, public and private transfers (including remittances), and rents. This classification suggests that households diversify out of agriculture through non-farm activities and migration.

As in many other rural economies of developing countries, most rural households in Kenya combine farming with other off-farm income generating activities for their livelihoods as shown in Table 20. The table shows that households across the three regions combine agriculture with some off-farm activities ranging from agricultural labour to non-agricultural labour and self employment activities. A good proportion of households do also receive transfers from migratory labour.

Table 20: Number and Percentage of Households by Income-generating Activities

Activity	Nakuru North		Nyando		Bungoma	
	Number	%	Number	%	Number	%
Agricultural production	288	99.7	284	99.6	298	99.7
Livestock production	262	91.0	262	92.3	278	93.0
Hunting, Fishing and gathering activities	0	0	35	12.3	20	6.7
Transformation of agricultural products	0	0	0	0	0	0
Agricultural Labor (agricultural wages)	28	9.7	49	17.2	24	8.0
Non-agricultural labor (non-agricultural wages)	98	33.9	162	56.8	101	33.8
Self-employment	224	77.5	86	30.2	124	41.5
Public transfers	3	1	2	0.7	2	0.7
Private transfers	95	32.9	73	25.6	44	14.7
Rents	122	42.2	146	51.2	78	26.1

In all the regions, most households were involved in agricultural and livestock production. Nearly 100% of households are engaged in crop production, while over 90% have livestock production activities. This indicates that on-farm activities are a significant part of households' portfolio of activities and play an important role in the rural economy in these regions. However, the importance of off-farm activities varies across the regions. For instance, self employment is more common in Nakuru North and Bungoma, non-agricultural employment in Nyando, while the percentage of households involved in rent activities is high in Nakuru North and Nyando (42% and 51%, respectively). Also, private transfers are received by a relatively higher proportion of households in Nakuru North and Nyando (33% and 26%, respectively), indicating a moderate role of migration as an additional income generating activity in these regions. Overall, no households are involved in transformation of agricultural products, indicating lack of value addition activities for these households. Few households engage in hunting, fishing and gathering activities, while even fewer ones depend on public transfers.

Further, the table indicates a relatively lower proportion of households engaged in agricultural labor across the three regions, possibly an indication of the low capacity of rural farms to hire in additional labor and low differentiation among farm households. In addition, this activity is highly seasonal and is likely to be developed in regions where labor intensive crops are produced and where there are large commercial farms or estates. This may explain the slightly higher importance of agricultural labor in Nyando, a sugarcane growing region. Non-agricultural wage employment opportunities exist, with a higher percentage of participation in Nyando, which can be attributed to the presence of sugarcane factories that employ a substantial number of people. There are three sugar factories in Nyando namely Chemelil, Muhorono and Miwani, with a capacity of 3,500, 2,200 and 1,500 tonnes of cane per day (TCD), respectively (Export Processing Zones Authority, 2005).

The preceding results show that rural households in the surveyed regions engage in different income-generating activities. However, activity diversification does not necessarily translate into income diversification. We, therefore, explore income levels and shares of the various activities in household income across the regions. In order to allow for an effective overview and comparison of income levels and distribution among households and across regions, income levels and shares are reported on per adult equivalent basis. The results are presented by region for the three regions; Nakuru North (winning region), Nyando (losing region) and Bungoma (intermediate region).

The level of income (Ksh) per source per adult equivalent for the three regions is presented in Table 21. Generally, households in the three regions have diversified sources of income, both on-farm and off-farm. The mean income is greater than the median for the different sources of income. Where differences between the two statistics are substantial, it implies that there are relatively high income values for those sources that tend to pull the mean in the direction of the right tail of the distribution. The minimum and maximum values as well as the high standard deviation indicate that the incomes are spread out over a large range of values. The minimum values for agricultural production, livestock production and self-employment are negative, indicating the presence of households making net losses in these activities[24]. There was no income at all from transformation of agricultural products. In Kenya, on-farm transformation of agricultural products is not a common practice. The product that sometimes undergoes value addition in some communities is milk, which is processed into an equivalent of yoghurt. However, marketing of home-processed milk in those communities is usually not common.

The mean household global income per adult equivalent was significantly higher in Nakuru North than in Nyando (t=7.970….p=0.000). Household global income levels in Nyando and Bungoma were not statistically different. Households in Nyando and Bungoma, however, have a slightly more diversified portfolio of income generating activities compared to those in Nakuru North, given that at least some households in Nyando and Bungoma engaged in hunting, fishing and gathering activities. Across the different income sources, households in Nakuru North have higher income levels from agricultural production, livestock production, non-agricultural labour, self-employment, private transfers and rents than those in Nyando and Bungoma. Statistical tests showed that households in Nyando have significantly higher income levels from fishing, hunting and gathering and agricultural labour than those in Nakuru North and Bungoma, while households in Bungoma have significantly higher incomes from livestock production than households in Nyando. Other than these differences, households in Nyando and Bungoma have statistically same levels of income from the other sources.

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[24] For agricultural production, the reported value is the net crop income, and under some circumstances, costs can exceed value of production. Income from livestock production was calculated as the sum of the net sales of animals (sales-purchases) and the value of livestock products (milk, eggs etc.), minus the costs of production. Net animal sales may be negative, reflecting the fact that a household has purchased but not sold an animal, while costs may also exceed value of livestock products, leading to negative values of livestock income. Self-employment comprises of income from businesses and trade, and losses in such activities can lead to negative incomes for some households.

These results indicate that in terms of income levels, Nakuru North is way above Nyando and Bungoma, consistent with its being a winning region in comparison to the two regions. Nyando and Bungoma do not, however, exhibit much difference in terms of income levels despite Bungoma being classified as intermediate and Nyando a losing region.

Table 21: Level of Income Source per Adult Equivalent (Ksh) by Region

Region	Source of Income	Mean	Median	Deviation	Minimum	Maximum
Nakuru North	Agricultural Production	14,198	6,450	22,982	-6,172	188,259
	Livestock Production	12,586	6,616	19,418	-10,149	128,750
	Hunting, Fishing and gathering activities	0	0	0	0	0
	Transformation of agricultural products	0	0	0	0	0
	Agricultural Labor (agricultural wages)	723	0	2,706	0	25,000
	Non-agricultural labor (non-agricultural wages)	11,888	0	26,687	0	214,286
	Self-employment	35,901	10,811	92,882	-62,130	765,957
	Public transfers	33	0	473	0	7,885
	Private transfers	461	0	1,523	0	17,442
	Rents	976	0	3,561	0	44,118
	Global income	**76,766**	**41,231**	**108,531**	**533**	**803,760**
Nyando	Agricultural Production	8,220	1,902	24,959	-2,519	320,807
	Livestock Production	571	0	3,467	-12,500	27,101
	Hunting, Fishing and gathering activities	773	0	3,528	0	24,000
	Transformation of agricultural products	0	0	0	0	0
	Agricultural Labor (agricultural wages)	1,001	0	3,094	0	21,687
	Non-agricultural labor (non-agricultural wages)	7,293	1,613	14,286	0	97,297
	Self-employment	3,962	0	15,220	-38,698	133,007
	Public transfers	3	0	41	0	620
	Private transfers	118	0	342	0	2,765
	Rents	482	62	1,083	0	8,242
	Global income	**22,424**	**10,415**	**38,593**	**261**	**412,546**
Bungoma	Agricultural Production	8,907	4,878	11,534	-4,784	79,087
	Livestock Production	1,982	212	5,638	-10,116	58,404
	Hunting, Fishing and gathering activities	155	0	1,023	0	13,953
	Transformation of agricultural products	0	0	0	0	0
	Agricultural Labor (agricultural wages)	489	0	1,955	0	14,754
	Non-agricultural labor (non-agricultural wages)	5,836	0	13,062	0	92,308
	Self-employment	4,052	0	9,716	-12,435	100,541
	Public transfers	8	0	127	0	2,190
	Private transfers	89	0	294	0	1,870
	Rents	272	0	926	0	10,811
	Global income	**21,790**	**14,591**	**24,279**	**187**	**214,287**

The mean of the shares of income source per adult equivalent by region are as shown in Fig 24.[25] These means as well as other statistics on shares are provided in Annex 4.

The largest contributors to global income in Nakuru North are self-employment (33.4%), agricultural production (24.4%), livestock production (20.6%) and non-agricultural labor (15.4%). Shares of agricultural wages, rents, and transfers in global income are dismal, while no household has any income from hunting, fishing and gathering activities or from transformation of agricultural products.

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[25] The means of shares were computed by summing individual activity income shares across all households and dividing by total number of households. Note that these means cannot be computed directly from Table 21 because such a computation would yield shares of regional mean income and not means of shares.

Self-employment comprises of income from businesses and trade. Its high share in global income in Nakuru North is due to the close proximity of the surveyed locations to Nakuru town (approximately 17 km), and other smaller towns within the district along the Nakuru-Nyahururu highway such as Subukia, Bahati and Kabazi which provide opportunities for trade and commerce.

Figure 25: Means of Share [%] of Each Income Source per Adult Equivalent by Region
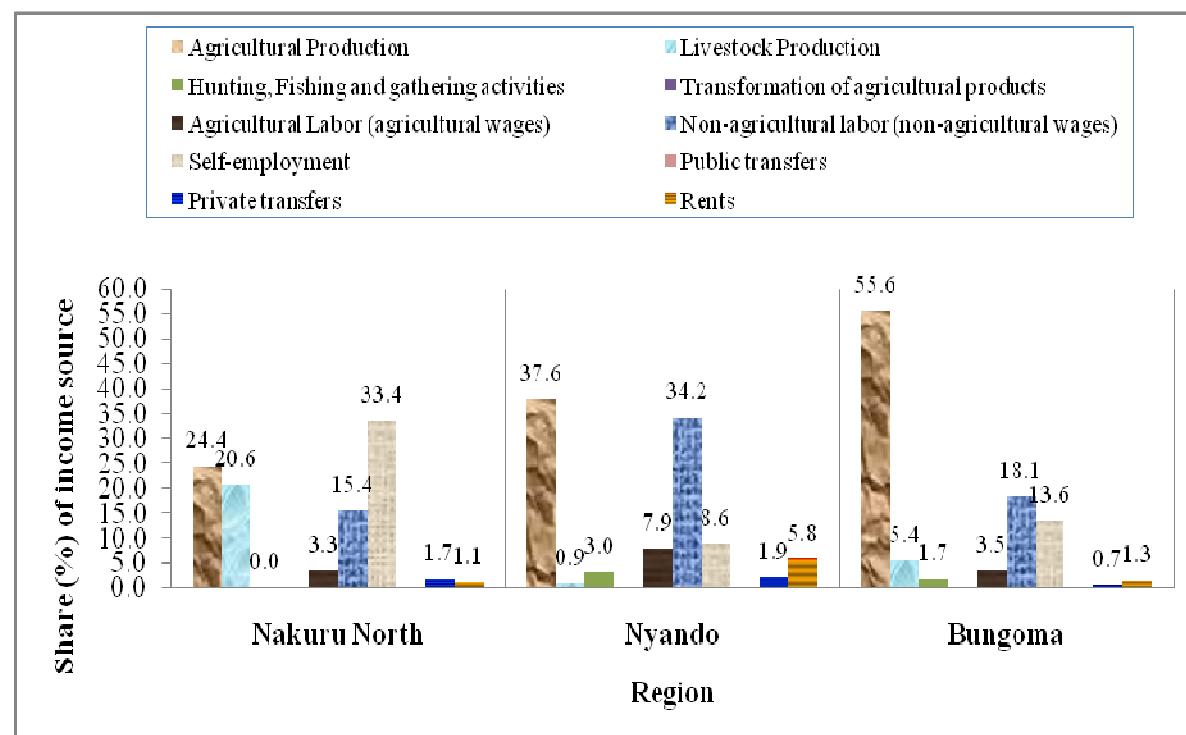
Relatively high agricultural incomes in Nakuru North can be explained by the well developed production of maize and horticultural products, particularly tomatoes. The presence of a vibrant dairy industry results in high livestock income shares. Eighty-two percent of households in Nakuru North own cattle compared to 68% and 67% in Nyando and Bungoma respectively. The climatic conditions in Nakuru North and particularly Bahati area are suitable for sheep and dairy farming. The modest income from non-agricultural labor (15.4%) can be attributed to the presence of local industries such as Kabazi canners, and Subukia Tea and Coffee Ltd, which provide many waged employment opportunities[26]. The Kabazi Canners Company operates throughout the year, while the Subukia tea and coffee processing facility operates for some months of the year. Despite the high share of agricultural and livestock income, there are no transformation activities taking place, implying that value addition hardly takes place on-farm.

In Nyando, agricultural production has the highest share (37.6%) in household global income, and is followed closely by non-agricultural labor with a share of 34.2%. Although income sources are diversified, these two sources of income account for a combined total of 71.8% of the global income. Agricultural labor, self-employment and rents make a small contribution, while the contribution of the other activities is negligible, and no income is generated from transformation of agricultural products.

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[26] The minimum wage in towns other than Nairobi, Mombasa and Kisumu averaged Ksh 4,792/month in the year 2007

The non-agricultural wage employment opportunities in Nyando arise from the sugarcane factories in the area and also in Sondu town, which is the site of two multi-billion shilling hydroelectric power generation projects in the area (one still in construction phase), which have provided the locals with paid employment. Sondu/Miriu Hydro Power Station is operational and generates 60 megawatts of electricity.

Compared to the other regions, Bungoma has agricultural production contributing exceptionally highly (nearly 56%) to household global income. The next two important sources of income in the region are non-agricultural labor and self-employment, contributing 18.1% and 13.6% respectively to household global income.

The shares of on-farm, off-farm and rents[27] in household global income across the three regions are presented in Figure 26. In the overall, on-farm and off-farm income shares in household global income stand at 49.9% and 47.4%, respectively. The difference in the shares is, however, not statistically significant (t=0.947, p=0.344), implying equal contribution from both farm and off-farm activities for these households. Regionally, however, off-farm activities in Nakuru North account for about 53.9% of the global income, compared to 45% from on-farm activities. Where shares of off-farm activities dominate those of on-farm ones, it means not only that opportunities exist outside agriculture, but that these diversification alternatives have reasonable returns that allow households to earn higher incomes. The existence of alternatives is often the case in areas like Nakuru North, which are close to a major town and are also well-connected to this major town as well as other smaller towns through a good road network, providing good opportunities, particularly for businesses. Also, in Nyando, on-farm activities contribute 41.5% of the global income while off-farm activities account for 52.6%[28]. However, unlike in Nakuru North and Nyando, most of the income in Bungoma comes from on-farm activities (62.7%) compared to off-farm activities (35.9%).

From the results so far discussed, clear variations in income levels across the regions are observed. The household mean global income in Nakuru North is about 3.5 times higher than that in the two regions. Household global income levels in Nyando and Bungoma are not statistically different. The high income gap between the winning region and the other two regions implies important differences in level/stage in economic development across these regions. A part from the earlier discussed reasons as to why different activities are important in different regions in respect of income contribution, socio-economic characteristics of the households (see Table 19) can also contribute to the variations in the overall income levels across the regions. Some of these characteristics are further explored in the ensuing paragraphs.

The number of economically active persons among households in Nakuru North is higher than in Nyando and Bungoma, as evidenced by a significantly lower dependency ratio in Nakuru North than in Nyando (t=8.87, p=0.000). The mean dependency ratios in Nyando and Bungoma are not statistically different. This is consistent with Tegemeo's panel data, which shows dependency ratios for Nakuru, Bungoma and Kisumu (from which Nyando was curved) to be 0.60, 0.83 and 0.79 respectively in 2007. Nakuru North also has significantly more economically active persons working in agriculture than Nyando (t=6.793, p=0.000), while the number is statistically the same in Nyando and Bungoma. The differences in dependency ratios are important in terms of available productive

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[27] Rents are excluded from on-and off-farm income. This is because rent has components of both on- and off-farm income, since it is calculated as the sum of the value of rents from agricultural land, non-agricultural land, agricultural equipment and property. The share of rents in global income and the share of agricultural rents in total rents is very minimal, and its exclusion unlikely to significantly affect the observed patterns in household income generation.

[28] This classification excludes income from rents as in the case of Nakuru North

capacity and may partly explain why Nakuru North has relatively higher incomes compared to the other regions due to a gain from what is termed as the "demographic dividend".

Figure 26: Share of Global Income per AE from Farm, Off-farm and Rent Activities
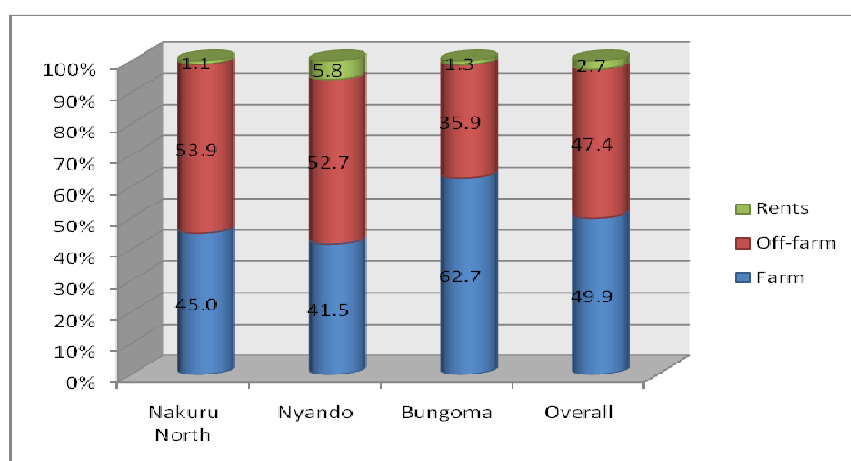
On human capital, households in Nakuru North are more educated than households in Nyando and Bungoma. On the other hand, households in Bungoma are more educated than those in Nyando, as evidenced by significantly higher mean education index for Bungoma than Nyando (t=3.044, p=0.002). It can be deduced that households in Nakuru North compared to their counterparts in Nyando and Bungoma have higher levels of human capital.

The number of migrants sending remittance was significantly higher in Nakuru North than Nyando (t=2.89, p=0.004), while in Nyando and Bungoma the number was not statistically different. This explains the high average private transfers in Nakuru North relative to the other regions.

A higher proportion of households in Nakuru North compared to Bungoma and Nyando adopted modern technical packages. This implies that agricultural productivity levels in Nakuru North compared to the other regions are not at par, since the modern technical packages have a bearing on increased productivity. This can partly explain why income levels from crop and livestock production is significantly higher in Nakuru North relative to the other regions. In addition to higher adoption rate of modern technical packages, a higher proportion of households in Nakuru North relative to those in Nyando and Bungoma had credit. The amount of credit received was also higher in Nakuru North. It is important to note that availability of working capital is important to farmers in acquiring productivity enhancing inputs and to non-farm businesses for smooth operation. Rural financial services, therefore, are an important component in the set of services necessary for agricultural productivity growth and growth in the rural non-farm sector for increased rural incomes.

3.   Distribution of Household Income

The distribution of household incomes in the three regions is explored in this section to provide an understanding of the distribution of households along the income ladder. Households in each region were classified into five classes (known as quintiles) of global income per adult equivalent, with each quintile consisting of 20% of the sample of households in each region. But before exploring the distribution of incomes, the characteristics of the households by income quintiles across the regions are examined to provide an understanding of how they are diversified in terms of their socio-economics.

3.1. Household Characteristics by Income Quintiles across Regions

Selected socio-economic characteristics of the households by income quintiles across the regions are summarized in Table 22, with details provided in Annexes 5, 6 and 7. Results show that in general, households in the lower quintiles have slightly more members compared to their counterparts in the higher quintiles. Households in Nakuru North have lower dependency ratios for all quintiles compared to the other regions but larger household sizes for the lowest and fourth quintiles. There is no clear pattern on dependency ratio across the quintiles within Nakuru North and Bungoma, but it is generally declining up the income ladder in Nyando.

The percentage of households headed by males is fairly lower in Nyando compared to the other regions, but it generally increases across the quintiles in all the regions. In addition, the education index of the household members increases across quintiles but is generally higher in Nakuru North. This index is usually assumed to approximate the management ability of the household. The network index which is meant to capture the level of social capital is much higher in the losing region.

Table 22: Selected Household Characteristics per Adult Equivalent by Region (Means)

Region	Socio-economic characteristic	Quintiles of Global Income per Adult Equivalent				
		Lowest	2	3	4	Highest
Nakuru North	**Demography**					
	Size of HH	6.79	5.57	5.35	5.75	4.84
	Dependency ratio	0.58	0.71	0.62	0.71	0.43
	% of HH whose head is male	75	84	76	91	90
	Human Capital					
	Education index of HH members	2.0	2.0	2.0	2.0	2.3
	Social Capital					
	Network index of head and spouse	1.14	1.16	1.22	1.50	1.69
Nyando	**Demography**					
	Size of HH	5.98	5.11	5.42	5.32	5.33
	Dependency ratio	1.53	1.48	1.48	1.17	1.08
	% of HH whose head is male	58	61	63	72	93
	Human Capital					
	Education index of HH members	1.7	1.7	1.8	1.7	1.9
	Social Capital					
	Network index of head and spouse	1.81	2.16	1.91	2.18	2.81
Bungoma	**Demography**					
	Size of HH	5.46	6.14	5.12	5.62	5.52
	Dependency ratio	1.43	1.21	1.44	1.22	1.22
	% of HH whose head is male	83	90	90	92	90
	Human Capital					
	Education index of HH members	1.6	1.7	1.5	1.7	1.8
	Social Capital					
	Network index of head and spouse	0.86	0.87	1.15	0.85	1.47

3.2. Income Distribution

Gini indices based on global income per adult equivalent for the three regions are 0.51, 0.56, and 0.48 for Nakuru North, Nyando and Bungoma, respectively. This indicates that income inequality exists within the regions, and that there is some variation in inequality across the regions as well, with the losing region (Nyando) showing the highest inequality, while Bungoma - the intermediate region - shows relatively lower inequality in income distribution. The intra-region distribution of

income is explored through income differences across the income quintiles. A comparison of income per adult equivalent across the quintiles within a region gives an indication about how differentiated economic development is in that region.

In the preceding section, it was observed that households have diverse income-earning activities, which differ in terms of their potential returns, and so will have different influences on the level of income generated by households. In order to understand the relationship between activity diversification and income generation, the income structure by income quintiles is examined. Quintile ratios[29] of the mean global income are used to assess the differences in income distribution between the poorest and richest groups.

Average income per adult equivalent across quintiles of global income disaggregated by region is presented in Table 23. In Nakuru North, the mean global income for households in the highest income quintile is 20 times higher than that for the households in the lowest quintile, while it is about 3 times higher than for the households in the fourth quintile. The inter-quintile increase in average global income seems to be fairly constant for the four quintiles but is slightly higher between the fourth and fifth quintiles (Figure 26). The quintile ratio is highest for income from self-employment and lowest for income agricultural labor. In Nyando, the lowest quintile has very low levels of income across all sources. The average global income for the highest quintile is 35 times that for the lowest quintile. The disparity in quintile ratios is highest income from self-employment, followed by income from hunting, fishing and gathering. The quintile ratio in Bungoma is 23, but is particularly high for income from non-agricultural labor and self-employment.

Across the regions, the levels of global income per adult equivalent in the lowest quintile are smallest in Nyando, averaging at Ksh 2,023. Bungoma has the lowest global income for the highest quintile, which is less than the average for the 4th quintile and is just a quarter of the average for the fifth quintile in Nakuru North. The increase in global income across the quintiles seems to follow a nearly linear fashion for quintiles 1 to 4 but with a huge jump between quintiles 4 and 5, particularly in Nakuru North (Figure 27).

Figure 27: Average Global Income per Adult Equivalent by Quintiles


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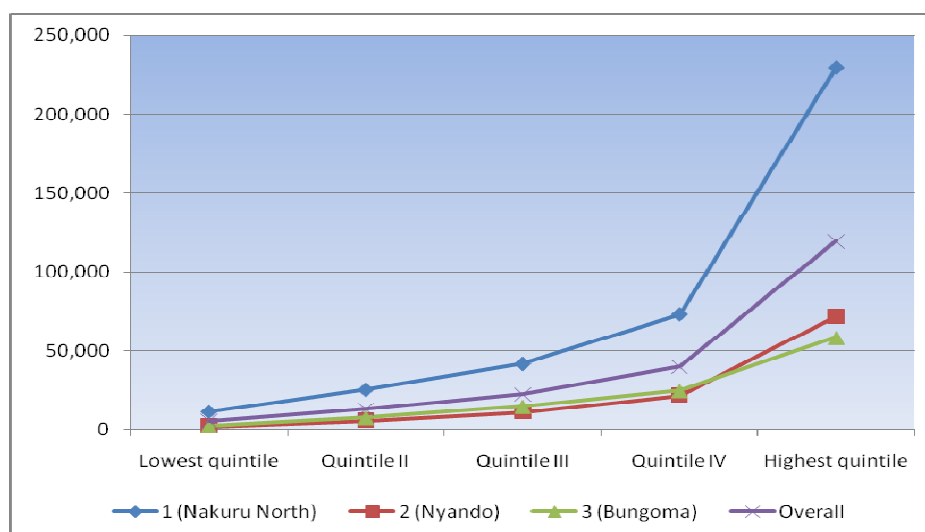
[29] Quintile ratio is defined as the ratio of the mean income received by the 20% of the households with the highest income (top quintile) to that received by the 20% of the households with the lowest income (lowest quintile).

Table 23: Average Income Structure per Adult Equivalent by Region

Region	Source of Income	Lowest quintile	Quintile II	Quintile III	Quintile IV	Highest quintile	Total
Nakuru North	Agricultural Production	3,060	6,500	10,318	17,908	33,013	14,198
	Livestock Production	2,450	6,334	9,308	15,661	29,000	12,586
	Hunting, Fishing and gathering activities	0	0	0	0	0	0
	Transformation of agricultural products	0	0	0	0	0	0
	Agricultural Labor (agricultural wages)	686	1,253	940	735	0	723
	Non-agricultural labor (non-agricultural wages)	1,245	3,869	7,695	13,288	33,160	11,888
	Self-employment	3,504	7,298	12,781	24,082	131,280	35,901
	Public transfers	0	0	3	0	163	33
	Private transfers	516	296	407	668	418	461
	Rents	84	213	488	1,168	2,910	976
	Global income	**11,545**	**25,762**	**41,941**	**73,511**	**229,946**	**76,766**
Nyando	Agricultural Production	964	2,048	3,477	6,647	27,962	8,220
	Livestock Production	-255	193	840	1,432	644	571
	Hunting, Fishing and gathering activities	52	139	315	602	2,756	773
	Transformation of agricultural products	0	0	0	0	0	0
	Agricultural Labor (agricultural wages)	178	436	1,402	834	2,156	1,001
	Non-agricultural labor (non-agricultural wages)	621	2,189	3,841	8,663	21,152	7,293
	Self-employment	154	301	239	2,844	16,274	3,962
	Public transfers	0	0	0	6	11	3
	Private transfers	70	136	131	214	40	118
	Rents	238	216	514	569	874	482
	Global income	**2,023**	**5,658**	**10,761**	**21,809**	**71,867**	**22,424**
Bungoma	Agricultural Production	2,346	4,493	7,133	11,145	19,311	8,907
	Livestock Production	-168	452	1,311	1,876	6,402	1,982
	Hunting, Fishing and gathering activities	142	108	30	454	39	155
	Transformation of agricultural products	0	0	0	0	0	0
	Agricultural Labor (agricultural wages)	59	381	1,238	410	349	489
	Non-agricultural labor (non-agricultural wages)	199	1,097	2,090	6,014	19,686	5,836
	Self-employment	-94	1,013	2,658	4,759	11,854	4,052
	Public transfers	3	0	0	36	0	8
	Private transfers	33	34	116	110	151	89
	Rents	33	127	233	270	694	272
	Global income	**2,553**	**7,706**	**14,808**	**25,075**	**58,485**	**21,790**

Figure 28: Average Share [%] of Each Income Source per Adult Equivalent by Quintile and Region
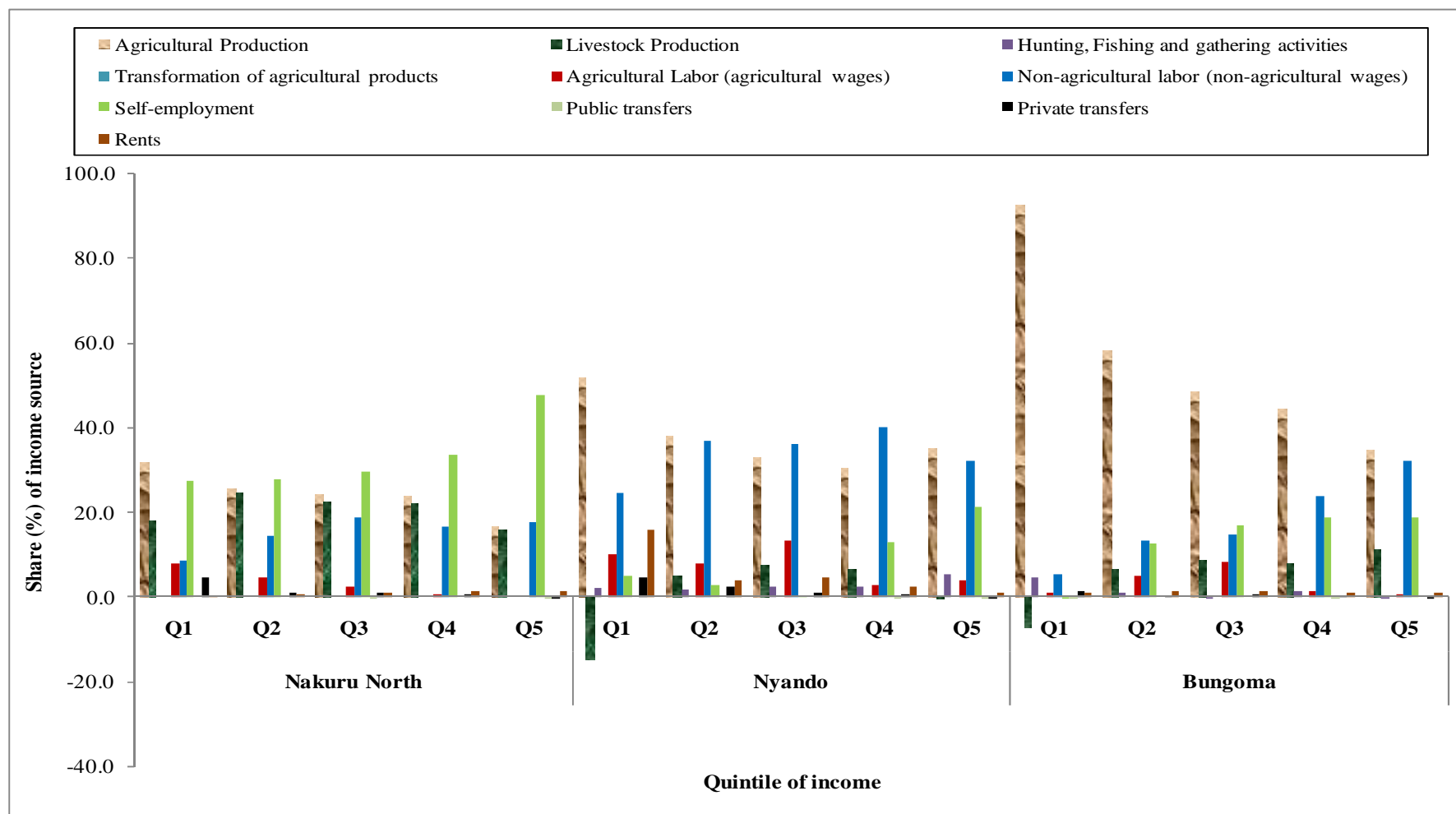
The shares of various income sources by income quintile and region are shown in Figure 28. Agricultural production is the main source of income for the poorest households in Nakuru North, and its contribution declines steadily from the lowest to highest quintile. On the other hand, the richest households derive the largest share of their income from self-employment. Self-employment has the highest share in all the quintiles except the lowest one, and this share is particularly high in the fifth quintile. Self-employment relates to business activities such as agricultural trading (75.8%), retail/shop keeping (5.5%), ploughing (1.4%), and posho milling (1.4%). This pattern across quintiles reflects the fact that better-off households have the capacity to invest in activities with higher returns and that generate higher incomes. These often require much larger investments in human, financial, and infrastructural capital, which the relatively poor may not adequately afford.

While agricultural labor as well as private transfers are moderately significant alternative sources of income for the poorest households in Nakuru North, their contribution decreases with income and is virtually non-existent for the high quintile households. On the other hand, and as expected, the share of rents just as with self employment and non-agricultural wages increases with increase in income.

In Nyando, the patterns are rather mixed for most activities. The share of agricultural production generally decreases across the quintile groups up to the 4th quintile, then rises slightly for the highest quintile. The lowest quintile has negative share of livestock income, but it becomes positive for the other quintiles though very small for the highest quintile. The proportion of agricultural labor increases for the first three quintiles and then declines. There is no clear pattern for both self-employment and non-agricultural labor. There is, however, a general decrease in both private transfers and rents[30] across quintiles.

The shares of income per source by quintiles in Bungoma show that households in the lowest quintile obtain an overwhelmingly large percentage (over 90%) of their income from agricultural production, with this share decreasing with increase in income. Agriculture though remains the most important source for the second to fourth quintiles, with the highest quintile deriving most of the income from agricultural production and non-agricultural wages in nearly equal proportions. As in Nakuru North, the share of self-employment and non-agricultural wages increase with income, a pattern also observed for livestock income. No clear pattern is observed for agricultural wage, rents and hunting, fishing and gathering.

Overall, the results show that there is great disparity in incomes across the quintiles in all the regions and poorer households mainly depend on agricultural production for income. On the other hand, income for households in the highest income quintile is mainly from self-employment and non-agricultural activities, but their importance varies across the regions. This is perhaps due to the varying local contexts/environment in terms of natural, economic and institutional endowments which determine the range of opportunities available to households for off-farm diversification. Additionally, household endowments in different types of capital may play an important role in determining the nature and significance of activity diversification across income quintiles.

Kenya's rural nominal poverty line in 2007 was estimated at Ksh 1598/month (Suri et al, 2009). Based on this threshold, it is observed that households in the lowest income quintile in all the regions have average monthly global income levels below this threshold, indicating that these households are locked up in poverty traps. In addition, households in the 2nd and 3rd quintiles in Nyando and Bungoma are also poor according to this definition. Given that agricultural production is the major contributor to these households' income, moving out of poverty by these households will require

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[30] A high proportion of rents in this region come from renting out land possibly for sugarcane production and could be an explanation for the observed pattern. The cost of renting land averaged Ksh. 4,200 /ha per season in 2007. This translates to about Ksh. 8,400/ha per year.

more emphasis on actions that can develop agriculture in these regions. In addition, improving infrastructure and institutions that can facilitate these households diversify more into the non-farm sector can also be important.

3.3. Income Concentration

In order to shed more light on diversification patterns across quintiles, two income concentration indices were computed; C1 and C2. The index C1 is the share of the most important source of income (i.e. the source with highest share in the global income), while C2 is the share of the first two most important sources of income. An examination of C1 across the quintiles reveals a wide variation, with C1 ranging from 28% to 92.7 % (Table 24). Agricultural production is the most important source of income in all the quintiles in Bungoma; the lowest, 2nd and highest quintiles in Nyando; and the lowest quintile in Nakuru North. Self-employment is the most important income source for most of the quintiles in Nakuru North, while non-agricultural wage employment activities are most important for 2nd and 3rd quintiles in Nyando.

The shares in household global income of the two most important income sources, indexed by C2, also vary by regions; 57.8% in Nakuru North, 71.8% in Nyando and 73.7% in Bungoma. This implies that the two important sources of income do not necessarily capture the entire income diversification process in these regions, indicating that other activities are also quite important for income generation. Self-employment and agricultural production and are the two most important income sources for most of the households in Nakuru North. In Nyando and Bungoma, agricultural production and non-agricultural wage employment are the two most important income sources for the majority of the households.

Table 24: Income Concentration by Region and Quintiles

Quintiles						
Region	**Income source**	**Lowest**	**II**	**III**	**IV**	**Highest**
C1						
Nakuru North	Agricultural Production	31.9				
	Self-employment		28.0	29.7	33.9	48.1
Nyando	Agricultural Production	51.6	38.1			34.9
	Non-agricultural wage			36.2	40.4	
Bungoma	Agricultural Production	92.7	58.4	48.6	44.4	34.8
C2						
Nakuru North	Agricultural production & Self-employment	59.4	53.7	53.9	57.7	
	Agricultural production & non-agricultural labor					65.8
Nyando	Agricultural Production & Non-agricultural labor	76.5	75.2	69.3	70.9	67.4
Bungoma	Agricultural Production & Non-agricultural labor	98.3	71.9		68.4	73.8
	Agricultural Production & self-employment			65.6		

In summary, there is relatively strong diversification of income sources at the household level, with the exception of households in the lowest quintile in Bungoma and Nyando; C1 and C2 levels of 92.7% and 98.3% respectively in Bungoma and 51.6% and 76.5% respectively in Nyando. It appears that poor households are less diversified, which contradicts the commonly-held view that households diversify as a risk-management strategy. In this case, it may be that such poor households lack opportunities or the capacity to engage in diversification. They may lack room for maneuver, and are sort of trapped in agricultural production (especially in Bungoma), which they depend on to meet their basic food security needs as well as other livelihood requirements.

4. Structure of Farm Income and Characteristics of Farm Income Classes

This section focuses on on-farm diversification and explores the importance of on-farm activities in the range of activities in which rural households engage for income generation. Farm income consists of income from agricultural and livestock production, hunting, fishing and gathering activities, and transformation of agricultural products. Three farm income classes (known as terciles) were constructed based on farm income per adult equivalent. Various household characteristics are reported by terciles for the three regions (Table 25)

Preceding analysis shows that on-farm activities contribute 45%, 41.5% and 62.7% of household global income in Nakuru North, Nyando and Bungoma, respectively. However, results in Table 25 show that Nakuru North has consistently higher mean farm incomes per adult equivalent for all the farm income terciles. In the highest tercile, the mean farm income in Nakuru North is Ksh 60,078, which is more than double that for Nyando (Ksh 25,678) and Bungoma (Ksh 24,986).

The households in the lowest compared to their counterparts in the highest farm income tercile have lower percent of male heads across all the regions. Also, in Nakuru North and Bungoma, the education indices of the household head and the most educated person in the household increase with increase in farm income. These indices are relatively higher in Nakuru North compared to other regions.

In terms of assets endowment, farm size per economically active person increases with increasing farm incomes for all the regions. Nakuru North has smaller farm sizes per adult equivalent compared to the other regions. This relatively poorer access to land may partly explain the pattern of diversification out of agricultural production and into self-employment in Nakuru North.

Both the size of cattle and small ruminant herds increase with increase in farm income levels across all the regions. The various indices that proxy household wealth/welfare (quality of housing, facility welfare, and durable goods) are also consistent with the distribution of farm income, their levels generally increase with increasing levels of farm incomes.

The equipment index, which is a proxy for capital intensity of a household's production, increases as the farm incomes increase in all regions, but is relatively higher in Nyando. Similarly, the percent of households receiving institutional and technical support also increases as the levels of farm incomes increase.

In terms of the shares of farm income coming from different activities, there is a general decline across the quintiles in the percent share of farm income contributed by staples in all the three regions. However, the share of staples is particularly high in the lowest terciles in Nyando (84.5%) and Bungoma (95.7%). This is consistent with the earlier finding that households in the lowest global income quintile in these regions have a large share of income from agricultural production, which is then dominated by production of staples. This finding reinforces the earlier explanation that such households have little room for maneuver outside farming, and must depend on it for their livelihood and especially food security. Conversely, the contribution of non-staple food crops to farm income, though much lower, increases with the levels of total farm incomes in Nakuru North and Bungoma. There is also a significant presence of livestock production, particularly in Nakuru North.

The percent contribution of agricultural wages, non-agricultural wages and private transfers (remittances) to global income decreases as the levels of farm incomes increase in all the regions. The contribution of private transfers, however, is very minimal, the highest being 3.3% for the lowest tercile in Nyando.

Table 25: Characteristics of Farm Households by Terciles[31] of Farm Incomes

Characteristics	Nakuru North			Nyando			Bungoma		
	Tercile 1 (Lowest)	Tercile 2 (Middle)	Tercile 3 (Highest)	Tercile 1 (Lowest)	Tercile 2 (Middle)	Tercile 3 (Highest)	Tercile 1 (Lowest)	Tercile 2 (Middle)	Tercile 3 (Highest)
Farm incomes (Ksh)	4,088	16,295	60,078	(106)	3,118	25,678	1,504	6,563	24,968
Demography									
Size of HH in AE	5.98	5.54	5.45	5.58	5.33	5.39	5.69	6.04	4.98
Dependency ratio	0.72	0.61	0.50	1.51	1.23	1.30	1.33	1.36	1.21
% of HH whose head is male	79.2	85.6	85.4	67.4	62.1	78.9	85.9	92.0	89.0
Human capital									
Education index of the head of HH	1.49	1.65	1.96	1.41	1.33	1.40	1.52	1.63	1.68
Education index of most educated people of the HH	2.66	2.78	3.05	2.11	2.09	2.07	2.11	2.34	2.42
Social capital									
Network index of head and spouse	0.93	1.25	1.85	2.13	2.03	2.36	0.89	0.97	1.26
Assets endowment									
Size of farm (ha/ EAP)	0.26	0.32	0.54	0.33	0.47	0.74	0.36	0.45	0.58
Area of land under rainfed condition (ha/EAP)	0.22	0.29	0.45	0.25	0.39	0.54	0.35	0.43	0.55
Area of lowlands (ha/EAP)	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.01	0.01
Area of pastures (ha/EAP)	0.00	0.00	0.01	0.01	0.01	0.04	0.07	0.00	0.00
Size of cattle herd (number/EAP)	0.20	0.42	0.77	0.74	0.97	1.95	0.29	0.51	0.71
Size of the small ruminant herd (number/ EAP)	0.55	0.71	1.03	0.89	1.62	3.00	0.20	0.39	0.37
Quality of housing index	0.69	0.92	1.03	0.21	0.16	0.16	0.14	0.19	0.23
Facility welfare index	0.51	0.53	0.74	0.16	0.10	0.11	0.12	0.09	0.11
Area of own land parted for rental and sharecropping	0.12	0.12	0.31	0.03	0.05	0.15	0.07	0.09	0.22
Savings (Ksh/ EAP)	5,629	6,739	10,802	1,217	2,688	5,028	3,827	4,025	5,271
Durable goods index	1.08	1.37	1.59	0.73	0.58	0.85	0.58	0.65	0.76
Intensification level									

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[31] Terciles are based on household farm income while the quintiles in the previous section are based on household global income

Characteristics	Nakuru North			Nyando			Bungoma		
	Tercile 1 (Lowest)	Tercile 2 (Middle)	Tercile 3 (Highest)	Tercile 1 (Lowest)	Tercile 2 (Middle)	Tercile 3 (Highest)	Tercile 1 (Lowest)	Tercile 2 (Middle)	Tercile 3 (Highest)
Equipment index	0.46	0.78	0.86	0.74	0.88	1.26	0.61	0.82	1.04
Cost of fertilizer (Ksh/ha)	5,240	4,973	5,570	27	296	451	3,283	8,395	5,706
Irrigation ratio	0.13	0.09	0.17	0.11	0.12	0.18	0.03	0.02	0.03
Total amount of credit (Ksh/ EAP)	1,026	5,021	7,601	918	845	3,781	2,349	3,317	4,325
% of household receiving institutional and technical support	18.75	21.65	40.63	25.26	33.68	44.21	16.16	33.00	36.00
Characteristics of agricultural production: % share of farm income from…….									
Staples	31.7	30.5	19.6	84.5	65.3	42.8	95.7	45.4	24.5
Non-staples	11.8	12.3	22.7	23.5	17.9	31.4	18.9	37.1	48.5
Livestock production	52.2	46.6	49.4	(15.0)	13.4	13.2	(19.9)	14.3	20.3
Other sources of income: % share of global income from…………….									
Transformation of agricultural products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Agricultural wages	6.7	2.8	0.3	14.4	6.3	2.9	6.0	3.5	1.0
Non-agricultural wages	22.2	14.6	9.5	53.8	29.8	19.0	27.3	16.1	11.1
Self-employment	39.6	34.0	26.7	9.1	10.7	6.1	18.1	16.5	6.2
Private transfers	3.0	1.3	0.8	3.3	1.9	0.6	1.0	0.7	0.5
Public transfers	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Rent	0.7	1.2	1.4	8.6	5.8	3.0	1.2	1.7	1.1

5. Agricultural Diversification by Regions and Income Quintiles

In this section, we examine further patterns of agricultural diversification by main categories or types of crops that households produce, with a focus on the percent of households producing different crops and the contribution of the crops to crop income. The main crops in each category are as follows: staples (maize, beans, bananas, sweet and Irish potatoes); vegetables (kales, cowpea leaves, indigenous vegetables, and tomatoes); fruits (avocado, mangos, pawpaws, guava, oranges and lugard); traditional exports (tea and coffee); and, other products (sugarcane, nappier/elephant grass and groundnuts)

Table 26 shows that almost all households (over 97%) in all quintiles and in all regions produce staples. Share of staples in crop income are above 40% and in some cases as high as 94.5% (Table 27). However, there is a quintile effect in the case of staples in all the regions, where the mean share of staples in crops income decreases up the quintiles.

A large proportion of households in Nakuru North and Bungoma produce fruits and vegetables, but their shares in crop income are minimal (Table 27). More than 25% of the households in Bungoma produce coffee which is a traditional export but its contribution to crop income is small. The dismal performance of coffee in Bungoma can be linked to the overall gloomy performance of coffee in Kenya in the recent past. A study by Kibaara et al (2008) observed that the gloomy picture of the once vibrant coffee sector is a result of declining prices of coffee in the world market in the early 1990's, mismanagement of coffee co-operatives and high cost of production. Overall, staples have the largest share in crop income across all the quintiles, followed by vegetables and fruits for the lowest quintile and other products for the remaining quintiles. In summary, these results show that households diversify crop production on their farms, with heterogeneity among the regions, which can be explained by variations in ecological conditions and development of markets, and farmers' linkages to such markets. However, it is clear that production of staples dominates the rest of the crops.

Table 26: Number and Percent of Households Producing Major Crops

Region	Crop type	Lowest quintile		Quintile II		Quintile III		Quintile IV		Highest quintile	
		No.	%	No.	%	No.	%	No.	%	No.	%
Nakuru North	Staples	57	100.0	58	100.0	58	100.0	57	98.3	57	98.3
	Vegetables	41	71.9	45	77.6	41	70.7	47	81.0	42	72.4
	Fruits	30	52.6	29	50.0	25	43.1	30	51.7	27	46.6
	Traditional exports	0	0.0	5	8.6	4	6.9	6	10.3	2	3.4
	Other products	28	49.1	40	69.0	29	50.0	28	48.3	24	41.4
Nyando	Staples	56	98.2	57	100.0	57	100.0	56	98.2	57	100.0
	Vegetables	17	29.8	12	21.1	13	22.8	15	26.3	17	29.8
	Fruits	18	31.6	17	29.8	22	38.6	23	40.4	18	31.6
	Traditional exports	0	0.0	1	1.8	1	1.8	1	1.8	0	0.0
	Other products	18	31.6	15	26.3	28	49.1	20	35.1	29	50.9
Bungoma	Staples	59	100.0	59	98.3	59	98.3	60	100.0	60	100.0
	Vegetables	28	47.5	40	66.7	47	78.3	46	76.7	45	75.0
	Fruits	35	59.3	40	66.7	42	70.0	45	75.0	48	80.0
	Traditional exports	17	28.8	20	33.3	20	33.3	17	28.3	15	25.0
	Other products	22	37.3	29	48.3	37	61.7	37	61.7	49	81.7
Overall	Staples	172	99.4	174	99.4	174	99.4	173	98.9	174	99.4
	Vegetables	86	49.7	97	55.4	101	57.7	108	61.7	104	59.4
	Fruits	83	48.0	86	49.1	89	50.9	98	56.0	93	53.1
	Traditional exports	17	9.8	26	14.9	25	14.3	24	13.7	17	9.7
	Other products	68	39.3	84	48.0	94	53.7	85	48.6	102	58.3

Table 27: Shares (%) of Various Crop Types in Total Crop Income

Region	Crop type	Lowest quintile		Quintile II		Quintile III		Quintile IV		Highest Quintile	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Nakuru North	Staples	68.3	85.1	64.0	55.9	68.6	65.4	51.5	49.8	40.9	49.6
	Vegetables	10.9	2.1	10.2	1.6	10.8	1.1	16.6	2.3	27.0	4.1
	Fruits	8.2	0.0	4.9	0.0	1.1	0.0	4.4	0.0	6.8	0.0
	Traditional exports	0.0	0.0	3.8	0.0	3.2	0.0	5.0	0.0	2.9	0.0
	Other products	12.5	0.0	17.1	20.1	16.3	0.0	22.5	0.0	22.5	0.0
Nyando	Staples	94.5	99.7	82.5	100.0	76.1	98.1	74.2	97.3	66.7	88.3
	Vegetables	1.4	0.0	0.7	0.0	0.9	0.0	0.9	0.0	2.0	0.0
	Fruits	3.0	0.0	4.0	0.0	5.4	0.0	7.1	0.0	0.7	0.0
	Traditional exports	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	Other products	1.0	0.0	12.7	0.0	17.5	0.0	17.8	0.0	30.5	0.0
Bungoma	Staples	67.9	80.3	51.9	54.3	41.5	49.0	41.9	34.8	47.8	26.7
	Vegetables	8.2	0.0	13.7	7.6	23.7	7.5	15.7	4.7	1.5	4.0
	Fruits	8.7	0.5	5.4	1.7	6.7	1.6	7.5	1.4	5.7	0.8
	Traditional exports	11.9	0.0	13.1	0.0	9.3	0.0	8.4	0.0	6.0	0.0
	Other products	3.3	0.0	15.9	0.0	18.8	3.5	26.5	2.9	39.1	30.7
Overall	Staples	76.8	88.9	66.0	65.9	61.9	66.7	55.4	55.9	51.7	47.1
	Vegetables	6.9	0.0	8.3	0.0	11.9	0.4	11.3	1.0	10.0	1.2
	Fruits	6.7	0.0	4.8	0.0	4.4	0.0	6.3	0.0	4.4	0.0
	Traditional exports	4.0	0.0	5.8	0.0	4.3	0.0	4.6	0.0	3.0	0.0
	Other products	5.6	0.0	15.2	0.0	17.5	0.0	22.4	0.0	30.8	3.8

CHAPTER 6 - EXISTING PROCESSES OF INTEGRATION AMONG RURAL HOUSEHOLDS

This chapter discusses the process of integration into markets and agricultural chains among the surveyed rural households. Access to and linkage to markets is a main feature of economic development and it affects the patterns of such development. One of the options available for farming households in the context of the global agri-food markets restructuring, is to integrate into profitable value chains, and modern marketing systems characterized by development of formal contracts and other related institutions. The extent to which households are involved in the integration process relies on market access as well as on local contexts/factors such as agro-ecological conditions, infrastructure development, existence of private sector actors and value chain development processes. In this chapter, we explore the level of commercialization, the share of self-consumption in production and contractualization among these rural households.

1. Agricultural Commercialization

1.1. Level of Commercialization

The number and percent of households with sales of major crops is presented in Table 28. Results show that the percentage of households with sales[32] differs by crop type, region and quintile. Almost all the households have sales of some crop type, indicating that they are somewhat connected to markets. Despite this general trend, a lower proportion of poor households, however, had sales of various crops, suggesting that they may be directing all their resources to food self-consumption, and thus portraying merely a survival strategy.

The importance of commercialization by households is shown by examining the proportion of crop sales (i.e. percentage of sales value to value of production for each crop type) as shown in Table 29. There is wide variation in proportion of sale for the various crop types across quintiles and among regions. For instance, the mean proportion of sales for staples ranges from 2.9% in the second quintile in Nyando to 58.7% in the highest quintile in Nakuru North, and is particularly low in Nyando across all the quintiles. There is a quintile effect for sales of staples in all the regions, where the proportion of sales generally increases with increase in income. There are also modest to high proportions of sales of vegetables in Nakuru North, and fruits in Nyando and Nakuru North.

These results show an overall high commercialization of crop products particularly fruits, vegetables and logically traditional exports while commercialization of staples varies greatly across regions and quintiles. Except for vegetables and other products in the highest quintile, nearly all households sell less than 50% of their production. An exception to this is found in the highest quintile group in Nakuru North where sales of most crop types are above 50% of production. The lower values of proportion of sales for other products in this quintile emanate from sugarcane and groundnuts, which are the main crops in this category, but are insignificant in Nakuru North. A frequency on crops grown in Nakuru North indicates that sugarcane and groundnuts account for 0.7% and 0.1%, respectively, of all the crops grown in this region, which compares very poorly with the case for other crops like maize (15.3%), beans (14.8%) and potatoes (9.9%).

The degree of commercialization for various crop types can also be evaluated from the proportion of total value of crop production that is self-consumed. Table 30 presents the share (%) of self

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[32] The percent of households with sales is based on the number of households that produced the crop in question.

consumption of various crop types in households' total value of crop production. Results show that while the share of self-consumption in total crop production is small for most crop types, it is high for staples, particularly in Nyando and Bungoma and for the lower income quintiles across the three regions, and is also modest for other products in Nakuru North. For instance, staples' share in total value of crop production stands at 86% for the lowest income quintile in Nyando, compared to 24.4% for the highest income quintile in Nakuru North. This is consistent with the low shares of sales for staples in Nyando presented before, and also confirms the view that poorer households produce crops that are consistent with their survival strategy of meeting their food security needs first.

Table 28: Number and Percent of Households With Sales of Major Crops[33]

Region	Crop type	Lowest quintile		Quintile II		Quintile III		Quintile IV		Highest quintile	
		No.	%	No.	%	No.	%	No.	%	No.	%
Nakuru North	Staples	38	66.7	46	79.3	45	77.6	51	89.5	52	91.2
	Vegetables	19	46.3	30	68.2	20	50.0	29	64.4	35	83.3
	Fruits	15	57.7	17	65.4	10	43.5	14	48.3	18	75.0
	Traditional exports			4	80.0	4	100.0	6	100.0	2	100.0
	Other products	7	26.9	4	10.3	5	17.9	3	10.7	4	17.4
Nyando	Staples	4	7.1	10	17.5	12	21.1	20	37.0	21	36.8
	Vegetables	2	11.8	1	9.1	3	25.0	2	13.3	7	41.2
	Fruits	7	77.8	5	62.5	9	69.2	14	77.8	5	62.5
	Traditional exports			0	0.0	1	100.0				
	Other products	6	50.0	10	76.9	17	77.3	14	82.4	23	82.1
Bungoma	Staples	37	63.8	39	66.1	42	71.2	45	75.0	47	78.3
	Vegetables	17	60.7	23	57.5	36	76.6	30	65.2	33	75.0
	Fruits	13	43.3	13	37.1	19	52.8	23	57.5	19	44.2
	Traditional exports	12	92.3	19	100.0	18	94.7	15	100.0	13	100.0
	Other products	9	64.3	19	79.2	23	69.7	23	69.7	35	76.1
Overall	Staples	79	46.2	95	54.6	99	56.9	116	67.8	120	69.0
	Vegetables	38	44.2	54	56.8	59	59.6	61	57.5	75	72.8
	Fruits	35	53.8	35	50.7	38	52.8	51	58.6	42	56.0
	Traditional exports	12	92.3	23	92.0	23	95.8	21	100.0	15	100.0
	Other products	22	42.3	33	43.4	45	54.2	40	51.3	62	63.9

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[33] This is the percent of households with sale of a crop type/total number of households producing that crop type

Table 29: Proportion of Sales (% of Sales Value to Production Value) by Crop Types

Region	Crop type	Lowest quintile		Quintile II		Quintile III		Quintile IV		Highest quintile		Total	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Nakuru North	Staples	25.3	15.5	34.6	35.8	37.3	40.2	48.8	53.0	58.7	65.2	40.2	41.7
	Vegetables	29.7	0.0	49.7	60.3	40.4	26.9	52.0	68.3	69.7	79.7	47.4	60.0
	Fruits	35.9	26.2	45.8	55.3	37.8	9.7	33.7	0.0	52.0	74.5	40.8	43.6
	Traditional exports			80.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	94.1	100.0
	Other products	21.3	0.0	5.8	0.0	5.9	0.0	4.8	0.0	20.0	0.0	10.4	0.0
Nyando	Staples	3.8	0.0	2.9	0.0	7.6	0.0	14.7	0.0	16.2	0.0	9.0	0.0
	Vegetables	7.0	0.0	0.0	0.0	12.4	0.0	12.5	0.0	33.0	0.0	14.6	0.0
	Fruits	41.7	50.0	45.0	57.4	40.8	47.0	49.1	63.5	44.7	33.3	45.3	50.0
	Traditional exports			0.0	0.0	100.0	100.0					50.0	50.0
	Other products	41.9	29.3	74.3	100.0	61.5	99.5	73.6	100.0	80.5	100.0	69.8	100.0
Bungoma	Staples	13.9	1.6	18.6	10.2	18.9	11.8	23.4	15.1	21.6	15.0	19.3	10.3
	Vegetables	28.9	15.5	31.0	22.3	38.7	43.0	38.0	23.2	42.8	47.2	36.5	30.3
	Fruits	26.7	0.0	21.2	0.0	28.0	26.9	29.8	5.2	30.4	0.0	27.4	0.0
	Traditional exports	85.9	100.0	99.8	100.0	100.0	100.0	93.8	100.0	100.0	100.0	96.2	100.0
	Other products	51.5	57.2	49.2	49.8	49.1	50.0	59.1	81.7	68.1	92.0	57.4	68.3
Overall	Staples	14.4	0.0	18.7	5.6	21.1	9.9	28.7	19.3	30.9	20.5	22.9	8.8
	Vegetables	24.5	0.0	37.4	29.5	35.1	27.1	40.7	42.9	51.5	66.2	38.0	27.7
	Fruits	32.9	29.1	33.2	32.5	33.6	31.7	34.9	25.5	38.5	28.2	34.8	28.4
	Traditional exports	85.9	100.0	91.9	100.0	100.0	100.0	95.5	100.0	100.0	100.0	94.9	100.0
	Other products	33.9	0.0	33.5	0.0	37.4	0.3	43.5	9.2	61.8	92.8	43.0	9.8

Table 30: Share (%) of Self Consumption of Various Crop Types in Households' Total Value of Crop Production

Region	Crop type	Lowest quintile		Quintile II		Quintile III		Quintile IV		Highest quintile		Total	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Nakuru North	Staples	55.5	56.0	39.4	33.9	37.3	31.2	28.3	21.1	24.4	18.8	37.0	29.1
	Vegetables	4.1	2.3	4.2	1.5	6.8	1.8	4.3	2.6	2.3	1.4	4.3	1.7
	Fruits	5.5	1.2	1.7	1.1	7.9	1.5	2.9	0.8	6.4	0.8	4.7	1.1
	Traditional exports			0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
	Other products	21.8	12.1	32.9	32.3	28.3	26.8	32.5	29.2	38.6	39.7	30.9	27.1
Nyando	Staples	86.0	98.5	79.5	96.6	71.4	94.3	63.8	71.5	55.4	60.5	71.3	90.1
	Vegetables	3.8	2.6	2.9	2.5	2.3	1.5	2.5	2.2	1.8	0.7	2.7	1.7
	Fruits	11.7	5.1	13.4	9.3	12.1	8.4	10.3	1.6	1.4	0.9	10.1	3.9
	Traditional exports			11.1	11.1	0.0	0.0					5.6	5.6
	Other products	13.2	11.9	14.0	2.3	6.4	0.0	9.2	0.0	1.9	0.0	7.5	0.0
Bungoma	Staples	65.9	70.2	46.3	43.7	43.2	40.1	36.6	27.3	31.5	22.2	44.6	41.6
	Vegetables	11.0	7.9	12.8	8.8	9.5	5.7	8.1	4.9	5.8	3.9	9.3	5.9
	Fruits	7.3	6.5	6.0	3.3	6.9	2.9	4.8	2.1	2.3	1.1	5.3	2.6
	Traditional exports	5.4	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	1.0	0.0
	Other products	3.6	1.5	9.2	5.5	9.3	4.5	10.7	1.7	8.7	1.8	8.9	2.3
Overall	Staples	69.0	75.3	54.9	49.1	50.6	42.4	42.4	29.8	37.0	23.9	50.8	44.4
	Vegetables	6.3	3.4	7.7	3.0	7.6	3.2	5.7	3.3	3.7	1.8	6.2	2.7
	Fruits	7.2	4.3	5.2	2.4	8.2	2.8	5.3	1.4	3.5	0.9	5.8	1.9
	Traditional exports	5.4	0.0	0.6	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.9	0.0
	Other products	14.9	4.3	22.2	17.3	14.8	4.9	18.2	4.3	13.8	1.6	16.7	5.0

From the preceding discussion, agricultural (crop) production is overwhelmingly oriented toward staples production and self-consumption of these staples remains high, particularly for the poorest households. Additional information on the share of the main staple (maize) in total crop production sheds more light on staple production, sales and self-consumption. Results in Table 31show that the share of maize in total crop production is fairly similar across the regions, with mean values of 37.3%, 35.5% and 33.1% in Nakuru North, Nyando, and Bungoma, respectively. These figures are generally low in Nakuru North and Nyando compared to those on shares of staples in total crop income, which are 58.7%, 78.8% and 34.5%, in Nakuru North, Nyando, and Bungoma, respectively (see Table 27). This implies that households in these two regions depend considerably on other staples in addition to maize for consumption. In Nakuru North, these other staples include beans, Irish potatoes and bananas, while in Nyando, they comprise of rice, beans and bananas. There is a quintile effect within the regions for the share of maize staple in total crop production, with lower quintiles having higher shares of maize in total crop production than do higher quintiles. This emphasizes the poor's greater propensity to emphasize production for self-consumption rather than for the market.

Table 31: Share (%) of Main Staple (Maize) in Total Crop Production

Region	Quintile of household	Mean	Median	Deviation	Minimum	Maximum
Nakuru North	Lowest quintile	45.1	43.0	20.3	8.6	84.2
	Quintile II	36.5	34.1	22.9	0.2	100.0
	Quintile III	34.8	29.8	23.7	0.2	97.3
	Quintile IV	35.0	27.1	25.3	0.0	94.2
	Highest quintile	35.1	27.0	24.1	0.0	90.1
	Total	**37.3**	**33.7**	**23.5**	**0.0**	**100.0**
Nyando	Lowest quintile	38.0	38.2	22.2	0.0	100.0
	Quintile II	44.7	34.8	29.9	4.6	100.0
	Quintile III	37.4	27.1	32.6	0.0	100.0
	Quintile IV	31.2	21.6	29.7	0.0	100.0
	Highest quintile	26.0	16.6	25.2	0.0	98.7
	Total	**35.5**	**30.5**	**28.7**	**0.0**	**100.0**
Bungoma	Lowest quintile	49.0	50.3	24.0	0.0	91.9
	Quintile II	32.3	34.5	20.4	0.0	76.7
	Quintile III	30.8	28.1	23.6	0.0	94.3
	Quintile IV	25.7	17.3	21.7	0.0	99.4
	Highest quintile	28.0	15.0	28.0	0.0	100.0
	Total	**33.1**	**28.9**	**24.9**	**0.0**	**100.0**
Overall	Lowest quintile	44.1	41.9	22.6	0.0	100.0
	Quintile II	37.7	34.3	25.0	0.0	100.0
	Quintile III	34.3	28.2	26.9	0.0	100.0
	Quintile IV	30.6	22.0	25.8	0.0	100.0
	Highest quintile	29.7	19.9	26.0	0.0	100.0
	Total	**35.3**	**30.8**	**25.8**	**0.0**	**100.0**

1.2. *Modes of Commercialization*

Previous findings show considerable market orientation in the surveyed regions. For households that indicated sales of crops, we discuss the nature of market outlets through which they sell. The channels that were reported are local markets, middlemen, wholesalers, agro-industry, and cooperatives. Table 32 shows that overall, much of the sales is through local markets and middlemen, accounting for over 60% of the total value of farm income. These outlets represent the traditional mode of marketing, which implies that most of the sales are through informal arrangements. Very little farm produce is sold to wholesalers and cooperatives. Regionally, the largest share of farm products in Nakuru North are sold through middlemen and directly in local markets, while in Nyando

and Bungoma, the major marketing outlets are agro-industry, middlemen and local markets. Sales to agro-industry are significant in Nyando and Bungoma and are related to sugarcane in both regions and coffee in Bungoma. Sugarcane accounts for 82% of all crop sales to agro-industries in Nyando, while it accounts for 43% in Bungoma. Also, in Bungoma, coffee accounts for 44% of all crop sales to agro-processors in this region. The coffee agro-processors here refer to the cooperatives/factories where farmers deliver their coffee for wet milling. Each coffee cooperative may have a number of wet mills but all dry milling for coffee from this area is done in Nairobi. In Nakuru North, there are only 30 cases of crops sold to agro-industries, with maize accounting for 20% of these.

Table 32: Proportion (%) of Sales by Type of Marketing Outlet

	Nakuru North			Nyando			Bungoma		
	Median	Std Deviation	Mean	Median	Std Deviation	Mean	Median	Std Deviation	Mean
Share of farm income from direct sale to local markets	.00	36.80	19.72	.00	45.18	31.93	17.30	41.94	38.42
Share of farm income from direct sale to middlemen	97.50	42.13	67.06	.00	43.70	28.40	.00	35.19	21.45
Share of farm income from sale to wholesalers	.00	12.76	1.85	.00	.00	.00	.00	8.71	1.15
Share of farm income from sale to agro-industry	.00	19.87	5.87	.00	46.65	37.59	.00	38.87	25.49
Share of farm income from to cooperatives	.00	11.31	1.79	.00	3.13	.27	.00	18.69	5.10
Share of farm income from sale to other channels	.00	15.56	3.71	.00	12.45	1.82	.00	22.41	8.39

2.   Contractualization

Access to and integration into markets is seen as an important component of strategies aimed at improving household incomes and livelihoods. Contractualization is one tool for fostering commercialization and integration into markets, particularly through modern value chains that are emerging such as in the horticultural industry. However, formal contracts come with stringent requirements that can be a great opportunity for the producers who are able to respond and adjust to these requirements, but can also present a considerable risk of marginalization for those who are not.

The characteristics of households with and without formal agricultural (both livestock and crop) contracts across the regions is presented in Table 33. There are very few households with contractual arrangements, namely 10 in Nakuru North, 11 in Nyando and 64 in Bungoma. Across the sample, 90.3% of the households reported that they did not have any contractual agreements, showing very low levels of contractualization. This reflects a low intensity of the integration processes in the surveyed regions, even in the winning region of Nakuru North. Generally, farm contracts are not common in smallholder farming, especially for food crops, in Kenya, with most contract agreements being for high value crops where the contracts are mainly between farmers and agro-processors and exporters. Even in Nakuru North where vegetables and fruits account for 22.7% and 13%, respectively, of all crops grown in the region, few contracts have been reported. For crops like tomatoes and avocadoes which may be expected to be grown under contract, results show that nearly 70% of them are sold to middlemen, and the transactions are not through contracts.

The results also indicate that there is no difference in mean household size between households with at least one agricultural contract and those without. Most of the households are male headed, and the trend is similar across the regions and between categories of households with a contract and those without. There is no clear pattern on the education indices between households with and without contracts.

Generally, households with contracts have a higher asset endowment compared to those without contracts, particularly with respect to size of farm and area of land per EAP under rain fed agriculture. However, there is no clear pattern in the case of size of cattle and ruminant herds, and quality of housing and facility welfare indices.

Table 33:Characteristics of Households with Contracts

	Nakuru North		Nyando		Bungoma	
	HH with at least 1 contract	HH without any contract	HH with at least 1 contract	HH without Any contract	HH with at least 1 contract	HH without any contract
# of HH	10	279	11	274	64	235
Demography						
Size of the HH	5.62	5.66	5.63	5.43	5.79	5.50
Dependency ratio	.55	.61	.89	1.36	1.48	1.24
HH whose head is male	81.3	83.5	85.7	69.1	85.3	90.2
Human capital						
Education index of head of the HH	1.88	1.69	1.00	1.39	1.73	1.57
Education index of most educated people of the HH	2.56	2.85	2.00	2.09	2.40	2.25
Social capital						
Network index	2.00	1.30	2.00	2.18	1.03	1.04
Assets endowment						
Size of farm per EAP	.47	.37	.64	.51	.71	.38
Area of land under rainfed condition per EAP	.44	.31	.44	.39	.70	.35
Area of lowlands/EAP	.00	.00	.00	.01	.01	.01
Area of pastures	.01	.01	.00	.02	.09	.00
Size of the cattle herd	.49	.46	1.05	1.23	.62	.47
Size of the small ruminant herd	.84	.76	.61	1.87	.32	.32
Quality of housing index	1.11	.87	.09	.18	.20	.18
Facility welfare index	.57	.59	.00	.13	.08	.12
Area of own land parted for rental and sharecropping	.13	.19	.00	.08	.18	.11
Savings	11851.19	8333.60	9777.78	2992.17	5359.16	3926.06
Intensification level						
Equipment index	1.28	.67	1.98	.94	.97	.78
Cost of fertilizer per ha	6228.84	5189.05	494.00	253.84	3920.34	6482.94
Irrigation ratio = irrigated land / size of the farm	.10	.13	.28	.14	.00	.03
Total amount of credits per EAP (ksh)	16562.50	3830.49	1666.67	1856.32	2773.89	3538.41
% of households receiving technical advice	50.0	25.6	28.6	34.5	49.3	21.4
Characteristics of agricultural production (%)						
Share of the farm income coming from staple crops production	23.02	27.48	39.17	64.66	31.59	62.92
Share of the farm income coming from non-staple crops production	36.19	14.38	42.84	23.81	57.49	27.30
Share of the farm income coming from livestock production	36.40	50.14	3.80	4.04	12.37	2.52
Other sources of income (%)						
Share of global income coming from transformation of agricultural products	.00	.00	.00	.00	.00	.00
Share of global income from agricultural wages	1.79	3.37	.00	8.07	1.24	4.23
Share of global income from non-agricultural wages	14.26	15.49	7.78	34.90	15.99	18.84
Share of global income from self-employment	26.33	33.87	8.63	8.65	12.63	13.88
Share of global income from private transfers	.17	1.78	.16	1.98	.39	.85

Table 34: Income Distribution and Level of Contractualization

Number of households by level of contractualization	Nakuru North			Nyando			Bungoma			Total
	Terciles of farm income									
	Lowest	II	Highest	Lowest	II	Highest	Lowest	II	Highest	
HH without contract	96	93	90	93	95	86	95	80	60	790
HH with less than 25% of farm income coming from production under contractual arrangement		1	2			4	1	10	7	25
HH with 25 - 50% of farm income coming from production under contractual arrangement		2	1			1	1	2	12	19
HH with more than 50% of farm income coming from production under contractual arrangement		1	3			4	2	8	21	39
Total	**96**	**97**	**96**	**93**	**95**	**95**	**99**	**100**	**100**	**873**

Table 35 shows crop types that had contracts. While contracts involving traditional exports are formal, those for vegetables are essentially informal, except in Nakuru North. Bungoma has a relatively high number of cases of formal contracts for other products which in this case represent sugarcane. This is an indication that the nature of contracts and agribusiness practices differ not only across crops/products but regions also. Some of the requirements for the contracts vary as shown in Table 36.

Table 35: Types of Contracts by Region and Crop Type

Region	Crop type	Nature of contract	
		No. of Informal contracts	Formal/Written contracts
Nakuru North	Staples	0	1
	Vegetables	3	2
	Traditional exports	2	5
Nyando	Staples	0	1
	Other products	2	2
Bungoma	Vegetables	4	0
	Traditional exports	0	7
	Other products	7	61

Table 36: Types of Contracts and their Requirements by Region and Crop Type (%)

Region	Type of contract	Purchase guarantee with prior fixed price	Payment at delivery	Payment pegged on quality
		No. of contracts	No. of contracts	No. of contracts
Nakuru North	Informal	0	2	4
	Formal/Written	2	3	5
Nyando	Informal	0	2	1
	Formal/Written	2	1	2
Bungoma	Informal	7	5	2
	Formal/Written	31	17	17

CHAPTER 7 - HOUSEHOLDS' VULNERABILITY AND PROSPECTS FOR AGRICULTURE

This chapter discusses household vulnerability by examining the evolution of the economic situation of the households for the last five years, prospects for gainful employment in agriculture, and employment alternatives out of agriculture. Household vulnerability refers to an indication of a household's exposure to risks and shocks, and its ability to cope and recover from the impacts of such risks. These risks may be modified by the processes of restructuring due to liberalization and deeper economic integration. Results on vulnerability analysis are based on survey information relating to the evolution of households' economic situation.

1.   Evolution of Household Economic Situation

One measure of the evolution of the households' economic situation is the evolution of food security as perceived by the households. Indeed, a significant share of households (over 60%) considers that their food security, in terms of quantity as well as quality, has remained the same over the last 10 years (Figure 29). Over 20% of the households reported that their food security situation had deteriorated. Across the regions, Nakuru North reported the highest percent of households showing improvement in their food security situation. The general adverse evolution in food security is one of the characteristics of the high vulnerability of households.

Figure 29: Evolution of Food Security (% of Households)
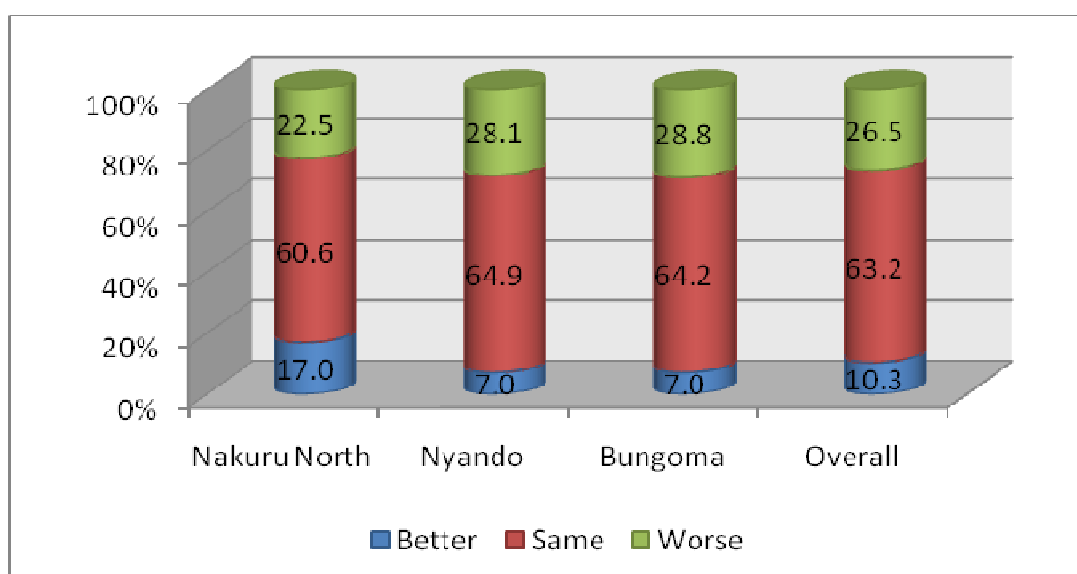
Household's ability to cover health expenses is also an important measure of household vulnerability. The surveyed households were asked if they have been able to meet their health expenses. Overall, 19% said that they have 'always' been able to meet their health expenses while 58% and 22% reported that they are able to meet their health expenses 'sometimes' and 'often', respectively (Figure 30). Nakuru North had the highest percent (41%) of households who have been able to meet their health expenses adequately and comfortably.

Figure 30: Household Ability to Meet Health Expenses
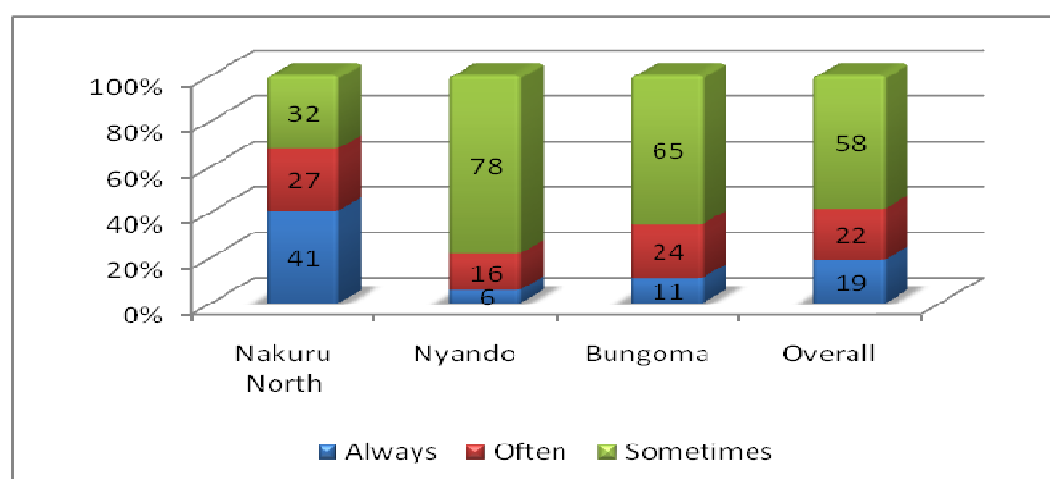
With regard to household's ability to cover school expenses, Nakuru North had 39% of households reporting that they were able to meet these expenses while, Nyando reported the lowest percent (Figure 31). Overall, the bulk (58%) of households are only able to cover school expenses in some instances but not always.

Figure 31: Household's Ability to Cover School Expenses
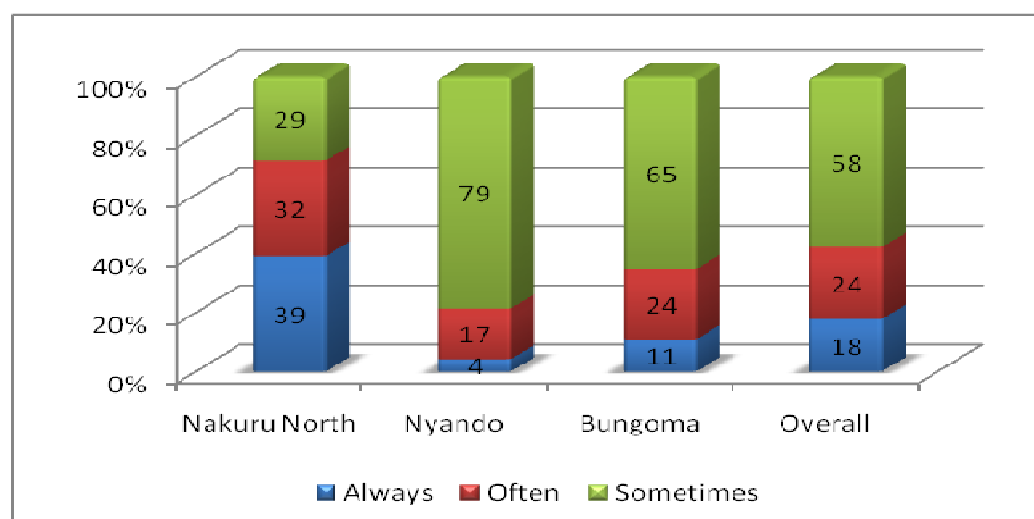
In Nakuru North and Nyando, over 60% of the households reported that they expect their livelihood conditions to become better in the next 10 years (Table 37).

Table 37: Expectations on the Evolution of Livelihood Conditions (% of Households)

Region	Better	Same	Worse	Don't know
Nakuru North	63	14	13	10
Nyando	62	6	17	15
Bungoma	53	4	26	18
Overall	59	8	19	14

Also, households were asked about their land sales. Overall, only 11.1% of the households reported having sold land (Figure 32). Bungoma accounts for a better proportion of these, with 14% of the households in the region having sold land. Nakuru North and Nyando had 9% and 10.4% of households, respectively, that have sold land.

Figure 32: Percentage of Households Selling Land
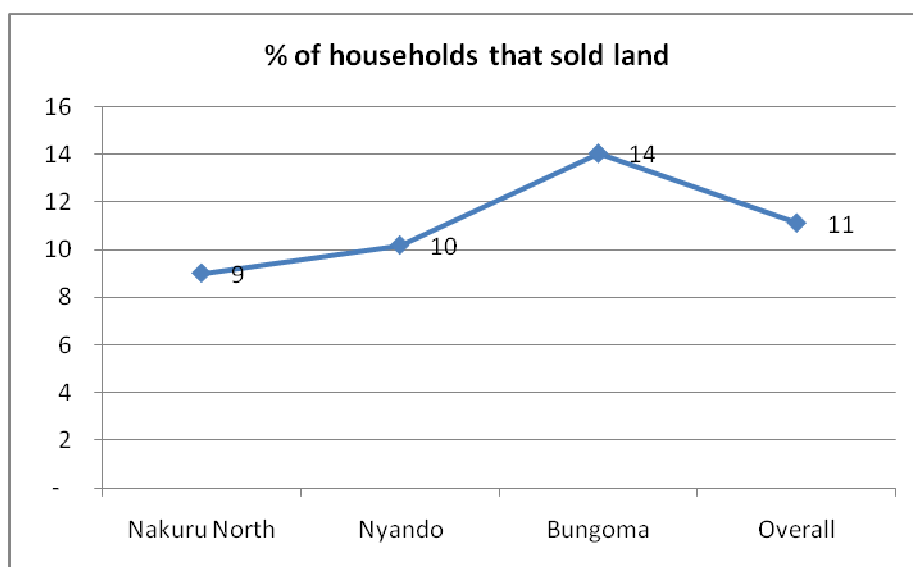
In summary, Nakuru North has the highest proportion of households that have been able to meet their health and school expenses, and whose food security situation has improved. Therefore, households in this region are less vulnerable because they have more opportunities for income diversification.

2. Household Expenditure

Patterns of household expenditure can also inform on household vulnerability. Figure 33 shows total household expenditure by region and quintiles of global income per adult equivalent. Generally, the total household expenditure increases across quintiles in all the regions. Little difference in expenditure exists between the first and the second quintiles, but there is a huge gap between the lowest and the highest quintiles for all regions and particularly in Nyando and Nakuru North. Bungoma has the lowest expenditure levels, while the expenditure for the first three quintiles is highest in Nyando.

In Figure 34 is presented the mean expenditure on food by quintiles of global income per adult equivalent across the regions. The expenditure on food generally increases with income, and is higher in Nyando compared to the other regions. The expenditure on food by the highest quintile households in Nyando is high and is nearly twice as much as that spent by their counterparts in Nakuru North.

Figure 33: Mean Household Total Expenditure (Ksh per Year) by Region and Quintile
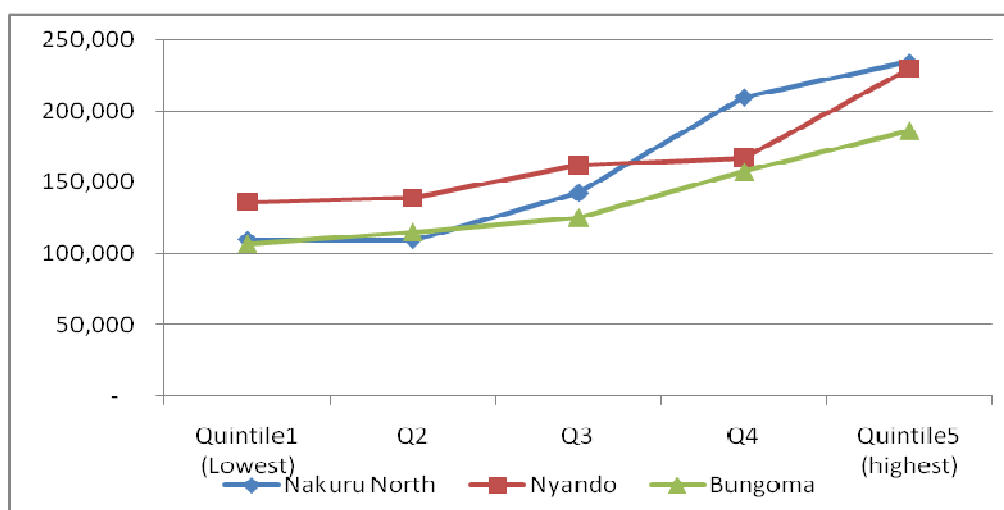
Figure 34: Mean Household Food Expenditure (Ksh per Year) by Region and Quintile
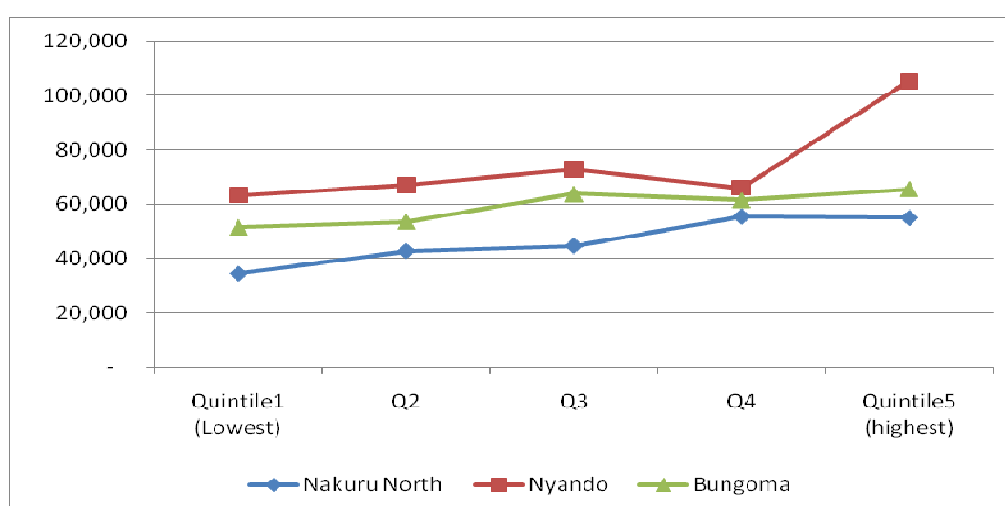
The share of food expenditure in total household expenditure is shown in Figure 35. The mean share of food to total household expenditure are generally highest in Bungoma, followed by Nyando and then Nakuru North. Overall, these shares decline with increase in income, with a more noticeable decline in Nakuru North. The poorest 20% of the surveyed households spend 39-49% of their annual budget on food, which is consistent with the notion that the poor spend a relatively larger share of their budget on food compared to the rich. Additionally, the share of the value of self-consumption in household food expenditure is 51.2%, 34.5% and 38.8% in Nakuru North, Nyando and Bungoma, respectively. This suggests that households in Nyando and Bungoma depend more on the market for their food needs, and will be more likely to be affected by changes in market conditions compared to those in Nakuru North. Overall, these results suggest that households in Bungoma region are generally more vulnerable given the higher shares of food in total expenditure.

Figure 35: Shares of Food to Total Annual Household Expenditure by Region and Quintile
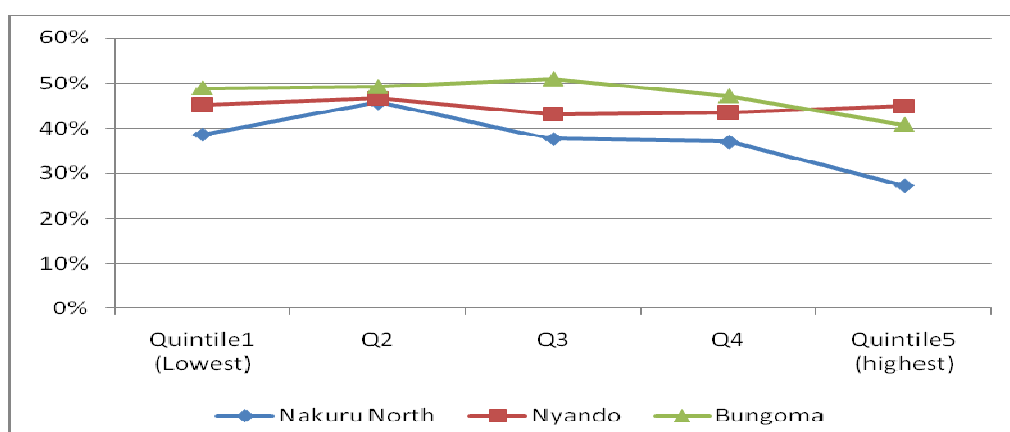
3. Trajectories of Economic Activities and Prospects for Agriculture

The trajectories for the surveyed households and the prospects for agriculture can be mapped out by examining the economic activities of the household head, the parents of the head and the wishes of the head for his children. Table 38 shows that in all the regions, parents of the household head were overwhelmingly involved in agriculture as the main source of income. Majority of the household heads also have their main economic activity within the agricultural sector. On parents' desires for their children in future, results show a low and declining (across generations) appeal for agriculture compared to salaried employment, suggesting that agriculture is not viewed as a base for a good standard of living.

Table 38: Trajectories of Economic Activities (% of Households)

	Nakuru North	Nyando	Bungoma	Total
Activity of the parents of the household head				
Agriculture	96.0	91.3	94.9	94.1
Trade		4.7	0.7	1.8
Handicraft	0.4	0.4	0.3	0.4
Construction		0.4		0.1
Other	3.7	3.3	4.0	3.7
Main economic activity (sector) of the household head				
Agriculture	75	61	67	68
Services	18	22	24	22
Industry	4	5	1	3
Construction	2	3	3	3
Trade	1	3	1	1
Other		6	4	3
Projects for the head of households' children				
Agriculture	17.3	30.4	23.3	23.8
Employee	69.8	50.4	72.6	64.3
Individual worker	12.9	19.2	4.1	11.9

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4. Prospects for Gainful Employment in Agriculture

Several findings from this study can be used to inform on the prospects for gainful employment in agriculture, and the role it will continue to play in the livelihoods of rural households. First, the shares of on-farm income in total income are significantly lower in Nakuru North and Nyando, indicating the importance of off-farm activities for income generation and household diversification strategies, particularly self-employment in Nakuru North and non-agricultural labor in Nyando. However, poorer households overwhelmingly depend on agricultural production for income generation, hence the need for continued and improved support for various on-farm activities in order to improve the livelihood conditions of these households. One option that can improve prospects for gainful employment in agriculture is promotion of value-addition activities on the farm, an activity which is basically non-existent among the surveyed households. At the household level, minimal value addition particularly for staples would include solar drying, sorting and grinding of some products into flour. Some households also venture into business-related value addition for maize. They run hammer (posho) mills where maize grain is milled into posho meal, which is cheaper and more nutritious than the flour milled and packaged at the commercial mills. However, the investment capital required for these high end business activities is prohibitive for most households. More value addition can be done collectively by households at the village or regional levels. For instance, milk is consumed and sold as liquid milk, but households can get together and set up small-scale processing industries that could turn milk into other products such as ghee and butter that have a longer shelf life. Such activities would again require high start up capital and good management of group dynamics to ensure success.

In addition, available opportunities that enable households to increase their off-farm earnings can play a role in increasing investment in agriculture using off-farm incomes to exploit the existing potential of agriculture as a source of income. For most households however, available off-farm activities are mainly a result of a push factor to low return, petty trade activities mainly as a survival strategy with hardly any surplus for reinvestment on the farm and/or elsewhere.

Further, direct improvements on agricultural activities through increased productivity and competitiveness could result in better prospects for agriculture. This, however, remains a big challenge as agricultural productivity for most crops in Kenya and the rest of SSA has stagnated over time, and most agricultural commodities are unable to compete well in the regional and global markets.

5. Migration as an Employment Alternative Out of Agriculture

Migration is one of the alternative off-farm activities outside agriculture. It offers an opportunity for income diversification of rural households. Household members often migrate to cities, other regions, or outside the home country to engage in income earning activities. Such migrations become important through the amounts of remittances sent back and their impacts on livelihoods. The percentage of households with migrants by region and duration is presented in Figure 36. The results show that Nakuru North has the highest proportion of households with migrants, and most households across the regions have more long-term compared to short-term migrants.

Figure 36: Percentage of Households with Migrants by Region and Duration
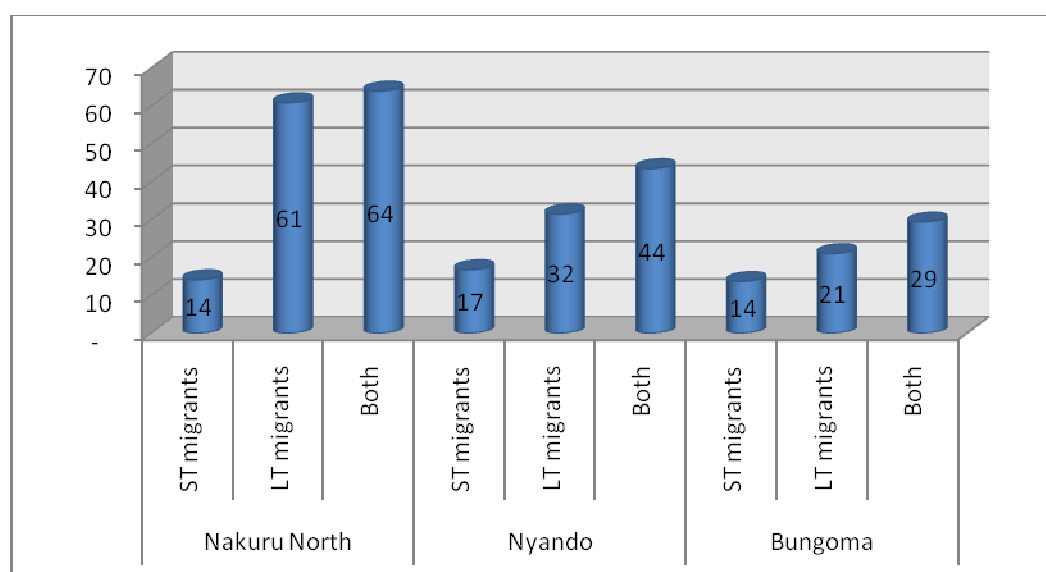
As Figure 37 shows, domestic migration dominates international migration, with most of the migrants moving to other places within the country besides the capital city. Thus, destination choices for migrants are not very different across the regions.

Figure 37: Percent of Migrants to Various Destinations by Region
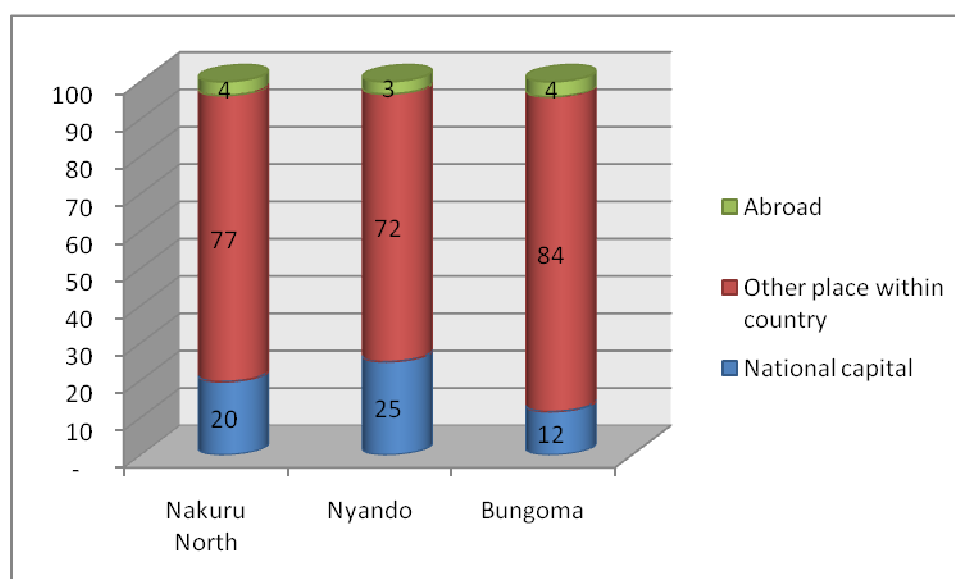
The main reasons for migration are presented in Table 39. Results show that search for employment and marriage in the case of long-term migrants and search for employment and schooling for short-term migrants are the main reasons for migration. This suggests the inadequacy of agriculture in providing adequate job opportunities within the survey regions.

Table 39: Reasons for Migrating

Reasons for migrating	Region 1 Nakuru North		Region 2 Nyando		Region 3 Bungoma	
	Short-term	Long-term	Short-term	Long-term	Short-term	Long-Term
To find land	6.3	2.8		2.1	3.7	4.1
To find a job	64.6	53.2	54.1	63.6	33.3	31.3
To go to school	10.4	2.1	31.1	11.4	38.9	10.9
For security reasons				1.4	5.6	0.7
Married	18.8	40.2		19.3	13.0	51.7
Visit			8.2	0.7		
Studies			4.9	0.7	1.9	
Separated/divorced		0.2				1.4
Business		0.4				
Disagreements		0.2			1.9	
Stays with relative		0.2				
Preaching				0.7		
Own household		0.2				
Managing own farm		0.4				
Guardianship					1.9	
Lottery		0.2				
Training			1.6			
Total	**100**	**100**	**100**	**100**	**100**	**100**

Migrations in search of employment are most often related to different activities across regions and duration of migration, but the services sector absorbs most of these migrants (Table 40). While short-term migrants in Nakuru North and Bungoma are in the services and agriculture sectors, those in Nyando are in services and business. Long-term migrants in Nakuru North are mainly employed in business, service and agriculture sectors, while those in Nyando are in services, industry and business sectors, and those in Bungoma are in agriculture and services. The agriculture sector employs both short- and long-term migrants in Nakuru North and Bungoma but not in Nyando. Further analysis linking the sector in which a migrant works, and the migrant's destination indicates that most of the migrants involved in agriculture find opportunities within rather than outside the district. Even though the reasons for migration imply that agriculture on the family farms does not provide enough job opportunities, the high employment of migrants in the agricultural sector indicates that the sector in general is an important employer off the family farms. This suggests that the returns to on-farm agricultural activities are low and perhaps unsustainable but agriculture has important linkages outside the farm such as in agro-processing and hotel industries that are important for income-generation.

Business and the service sectors are the main attraction for migrants, indicating the need for increased public investment in these sectors to improve and expand the existing economic opportunities. Further, because of the important linkages that these sectors have with agriculture, this strategy may have a trickledown effect that will lead to development in agriculture.

Additional characteristics of migrants are shown in Table 41. The mean age indicates that the migrants are relatively young and that migration is more prevalent within the economically active population, with the males being slightly older than females across the regions. However, there are gender differences in migration, with a higher percentage of migrants in Nakuru North being female but male in the other two regions. Proportions of males and females do not differ by duration of migration in Nakuru North and Nyando, but there are more males in short-term migration compared to long-term migration in Bungoma region. Most of the migrants have either primary or secondary education but there is also a moderate representation of those with post-secondary education at the technical level. There are more long-term migrants sending remittances and the amounts they send are much higher compared to those by short-term migrants.

Table 40: Main Economic Activities by Type of Migrants

Economic activity/sector	Nakuru North Short-term	Nakuru North Long-term	Nyando Short-term	Nyando Long-term	Bungoma Short-term	Bungoma Long-term
None			1.6	0.7		
Agriculture	16.7	20.9	1.6	5.0	14.8	42.9
Construction	4.2	3.8	1.6	1.4	3.7	4.1
Services	22.9	25.6	19.7	25.2	20.4	19.0
Industry	2.1	1.9	4.9	18.0	3.7	7.5
Business	8.3	26.8	13.1	16.5	3.7	8.8
Unemployed[34]	25.0	10.2	1.6	2.9	3.7	4.8
Studies	8.3	2.3	37.7	12.9	42.6	11.6
Employed[35]	10.4	7.4	8.2	10.1	3.7	0.7
Housewife	2.1	0.2		5.0	1.9	
Visit			4.9	0.7		
Tailoring			3.3			
Married		0.6				
Fishing			1.6	1.4		
Charcoal burner					1.9	
Catholic nun		0.4				
Casual worker						0.7
Total	**100**	**100**	**100**	**100**	**100**	**100**

Table 41: Characteristics of Migrants

		Nakuru North Short-term	Nakuru North Long-term	Nyando Short-term	Nyando Long-term	Bungoma Short-term	Bungoma Long-term
Age in years	Male	29	35	25	32	25	34
	Female	24	32	18	27	21	29
Gender (% of males)		48	47	71	73	63	52
Level of education							
Pre-school					4	2	11
Primary school		29	35	39	54	33	46
Secondary school		38	42	45	31	46	31
Technical		21	16	11	9	17	9
University		13	8	5	3	2	3
Number sending remittances		0.03	0.54	0.07	0.28	0.06	0.22
Average amount of remittance (Ksh)		512	3,179	589	1,261	717	1,687

The utilization of remittances by households is as shown in Table 42. A higher proportion of remittance goes into current expenditures for food and medical care, but agriculture also receives an appreciable amount of remittances for input purchases. This is particularly more important in Bungoma, where 64% of remittance from short-term migrants is used in agriculture. This is consistent with the finding that on-farm production contributes 62.7% of total household income in Bungoma. These results emphasize the role that migration and remittances could play in enhancing agricultural development.

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[34] This refers to migrants who have moved out of their homes and are mostly likely living with friends and relatives as they search for jobs

[35] In this case, the migrants indicated that they were employed but did not specify the economic activity or sector they were engaged in

Table 42: Uses of Remittances

Use of remittance (%)	Nakuru North		Nyando		Bungoma	
	Short-term	Long-term	Short-term	Long-term	Short-term	Long-Term
Current expenditures (food, medical etc)	47	63	74	76	36	54
Agriculture (inputs, farm tools)	42	34	26	20	64	46
Purchase of livestock				2		
Education of the children	11	3		2		
Total	**100**	**100**	**100**	**100**	**100**	**100**

6.   Risk of Transition Impasse

This study hypothesized that risks of transition impasses could exist due to the lack of economic alternatives (opportunities) beyond the agricultural sector, and the inability of households to adapt to the changing dynamics in terms of integration and diversification. Study findings indicate that majority of the households in the surveyed regions are connected to markets but with very low levels of contractualization. Therefore, there is relatively low integration of households into modern value chains even in the winning region. However, there is a strong activity diversification, with nearly all households being involved in agricultural production as well as other off-farm activities. Although the largest share of global income is from agricultural production, ranging from 24% to 56%, other activities play a crucial role. For instance, non-agricultural wage employment accounts for 15-34% while self-employment contributes 9-33% of global income. This suggests that off-farm income diversification is an important strategy for some households. For example, Nakuru North and Nyando have significantly higher shares of off-farm income (53.9% and 52.6%, respectively) compared to on-farm income. In addition, the percentage of households with migrants ranges from 29% to 64% and between 20% and 64% of remittances are used for purchase of agricultural inputs.

In the overall, these results suggest that majority of these rural households do combine both farm and off-farm activities for their livelihoods. There is evidence of relatively strong activity diversification across the three regions.

The high share of on-farm income for Bungoma is consistent with other findings based on the Tegemeo rural household panel data (TAPRA) for high potential agricultural zones. For instance, over the period 1997-2007, shares of on-farm income remained high, ranging between 60% and 65% (Kimenju and Tschirley, 2008) for both the high potential maize zone and the Central Highlands. Unlike Bungoma, however, these TAPRA regions are characterized not only by high on-farm shares but also high total household incomes, well above the national average with most households being above the poverty line. This could be an indication of specialization that occurs with the agricultural transformation process. The combination of high on-farm shares and very low total household incomes for Bungoma is certainly an indication of limited opportunities for gainful employment off the farm and a locking into low productivity, low income agricultural activities.

Like most other low agricultural potential areas under the Tegemeo panel, Nyando region has relatively high off-farm shares and low total household incomes. This is an indication that most of the off-farm employment opportunities are low return survival type activities, which may not facilitate these households to move out of poverty. Unlike most of the Tegemeo high agricultural potential zones, Nakuru North has relatively lower on-farm shares. This could be due to the fact that compared to a typical rural set up, Nakuru region has the advantage of higher urbanization, proximity to towns and better road infrastructure which have enhanced participation in off-farm activities. Thus, although Nakuru district is endowed with agro-ecological conditions that are favorable for crop production, the importance of off-farm income is an indication of how rural households are adapting through diversified activity and income strategies which are reshaping the rural economies.

The varying shares of on-farm income in the three regions are to a large extent a reflection of the diversity in the local contexts in terms of agricultural potential and the associated production systems. Overall though, the situations for Nyando and Bungoma could be a depiction of an on-going marginalization process as a result of adaptation challenges ultimately creating some dead ends to the process of structural transformation. This is due to the lack of gainful employment opportunities off the farm and the reliance on low productivity agriculture with minimal returns. Prospects from migration into towns and other regions are also thwarted by an unresponsive employment sector in the wake of a growing population that increases the number of new entrants into the labor market that remains largely unmatched to the pool of existing employment opportunities.

PART III -

CONCLUSION AND POLICY RECOMMENDATIONS

The objective of RuralStruc Phase II was to provide a better understanding of the processes related to market integration, particularly with regard to the development of new integrated marketing chains, the diversification of economic activities, as well as the existence of potential employment alternatives outside agriculture. This was achieved through regional case studies, value chain reviews and households surveys.

The study was carried out in three regions with Nakuru North being classified as a winning region, Nyando as a losing region and Bungoma as an intermediate region. A description of these regions shows that the areas vary in terms of agro-climatic conditions, agricultural potential, access to markets and other services, provision of public infrastructure and creation and availability of employment opportunities.

To assess the processes of differentiation as a result of the restructuring of the agri-food systems and global integration, three distinct commodity value chains were selected for each of the regions. For the Nakuru North region, dairy was selected, while maize and sugarcane were selected for Bungoma and Nyando regions, respectively. The results of the study reveal clear changes in the structure of the value chains after liberalization especially with regards to increase in the number of players and elimination of government institutions in the chain. This new structure has resulted in more competition and generally better prices for farmers across the three commodities. There is, however, very low integration between producers and the market with majority of producers still selling through informal channels. There is also hardly any on-farm transformation of products, thus no gains in value addition.

The results of the household survey reveal clear differences between the winning region on the one hand and the losing and intermediate regions on the other, in terms of income levels and structure. While the average global income over the sample is about Ksh 40,000 per adult equivalent per year, the mean for Nakuru North is slightly over 3 times higher than those of Nyando and Bungoma. However, the gap between the intermediate and the losing regions is relatively weak, indicating that these two regions could have been indicative of a similar classification, the losing one. Although the a priori selection of Bungoma as an intermediate region limits the study in observing clear patterns from an intermediate region, it is also an indication of the negative realities of a region that would have been expected to be more economically viable.

Most households in the surveyed regions have a strong activity diversification, with nearly all households being involved in agricultural production as well as other off-farm activities. The largest share of global income is from agricultural production, ranging from 24% to 56%. Non-agricultural wage employment accounts for 15-34%, while self-employment contributes 9-33%, with the importance of these sources varying across regions and among households within the regions. Agricultural labor, hunting, fishing and gathering activities, private and public transfers, and rents have a much smaller contribution to income, and no income was generated from transformation of agricultural products.

In terms of farm income versus off-farm income, there is no statistically significant difference between their individual contributions to the household global income within the overall sample. Regionally, however, significant variations exist. Nakuru North and Nyando have significantly higher shares of off-farm income (53.9% and 52.6%, respectively) compared to on-farm income, indicating the important role that off-farm activities play in the income diversification strategies of households in these regions. For Bungoma, farm income has a significantly higher share than off-farm income (62.7% versus 35.9%) in the household global income.

Not only do we observe regional differences, but there exists significant heterogeneity across income quintiles. The share of agricultural production generally declines with income while those of self employment and non agricultural wages generally increase with income. The exceptionally low income levels and high shares of agricultural production for the lowest quintile reflect the difficulty

faced by such households in an endeavor to meet their basic needs. However, for high income households, the results reflect a deliberate strategy in search of more lucrative activities with higher returns. Such households, therefore, engage in self-employment, and non-agricultural wage labor, although the importance of these sources of income varies across the regions. Within agriculture, the contribution of various crop categories also varies across regions and income groups. As expected, the share of staples generally decreases with income and are slightly higher for Nyando than for Nakuru North and Bungoma.

Kenya's rural nominal poverty line in 2007 was estimated at Ksh 1,598/month (Suri et al, 2009). Based on this threshold, it is observed that households in the lowest income quintile in all the regions have average monthly global income levels below this threshold and are thus extremely poor, and locked up in poverty traps. In addition, households in the second and third quintiles in Nyando and Bungoma are also poor according to this definition. Given that agricultural production is the major contributor to these households' income, moving out of poverty by these households will require more emphasis on actions that can develop agriculture in these regions.

Other results indicate relatively higher levels of commercialization in Nakuru North compared to the other two regions, consistent with its a priori choice as a winning region. Across quintiles, we have a general increase in proportion of sales especially so for staples. Most of the sales are through traditional marketing methods with only a few using modern outlets, for example agro-processors. Also, most of the sales are done through informal arrangements with a few cases of formal contracts. Therefore, integration and contractualization processes that result from the restructuring of agricultural markets remain limited, and the households which engage in contracts tend to be those with the best factor or asset endowments, particularly with respect to size of farm and area of land per EAP under rain fed agriculture.

In addition, while the share of self-consumption in total crop production is small for most crop types, it is high for staples, particularly in Nyando and Bungoma and for the lower income quintile households. These findings support the view that poorer households produce crops that are consistent with their survival strategy of meeting their food security needs first.

Overall, households in the surveyed regions are connected to markets but with very low levels of contractualization. In addition, they are well diversified in terms of activities and income sources, showing participation in both on-farm and off-farm activities. Although, economic opportunities exist outside agriculture, there appears to be gainful employment in such activities only in the winning region. In other regions, low returns from the survival type activities that households engage in limit their ability to improve incomes. In addition, poorer households rely heavily on agricultural production to meet food security needs, and are less well positioned to take up opportunities outside agriculture.

Given the importance of agriculture in generating incomes for households in the surveyed areas, there is need for policies that will enhance the role of agriculture in driving the process of economic transition. These policies need to be clearly linked to the key economic drivers and mechanisms for change. The starting point for policy would be to focus on improvement in food security that would require substantial investment of resources in agriculture. This calls for concerted efforts to improve productivity of staples through the adoption of productivity-enhancing technologies, as well as investment in facilities/strategies that reduce storage losses and increase the profitability of agricultural activities through improvement of input and output markets. Additionally, it is critical to raise the productivity of orphan crops which could be important food items especially for low income households. This will drive the transition from subsistence agriculture to situations of food surpluses required to meet food security needs and also generate a marketable surplus for exchange. This would help alleviate poverty directly, particularly for households locked up in poverty traps, and also indirectly through lower food prices. Increasing domestic food production can also lead to higher

nutrient/caloric intake among the poor, which will in turn improve their health, work productivity, and generally, investment in human capital.

There is also need for policies that encourage and support enhanced participation of rural households in modern agricultural commodity marketing chains and commercialization, which would enable households to earn high incomes on the farm. These policies could support diversification into high value crops and enhancement of value addition activities. For instance, improvement of road infrastructure can open up inaccessible areas and play a role in enhancing market access and integration of households engaged in various agricultural enterprises. Additionally, public and private partnerships geared toward investment in agro-processing industries will promote transformation of agricultural products and value addition processes, and also reduce product losses in times of glut. This will increase farm incomes, which will in turn enhance purchasing power and rural demand that are critical in spurring growth of rural economies. Growth in rural demand will also stimulate the process of economic transition by enabling the creation of new opportunities for diversification and alternatives beyond the agricultural sector.

To enable gainful employment off the farm, there is need to transform small-scale activities or operations into larger productive rural non-farm enterprises that can benefit from economies of scale, and become an important source of rural employment growth. The non-farm sector has been regarded as a stepping stone for rural workers in helping them move from underemployment on the farms to informal employment in the rural economy and possibly later to formal employment. Development of off-farm activities, and especially in the service and business sectors, which are the main attraction for migrants, requires investments to improve the business climate and build capacity/skills in these sectors. Additionally, improving infrastructure and institutions such as those that provide credit can enable households to diversify more into the non-farm sector. It is also important that industrialization be given special attention since it has the potential to absorb the growing youthful population in the country. However, this still remains a big challenge given its slow pace and hence its inability to absorb labor from agriculture and additional yearly entrants into the labor market.

Additionally, policy efforts need to be directed at increasing investments in rural infrastructure. This can be done by developing local financing and planning mechanisms such as the constituency development funds that are used to prioritize and invest in infrastructure that reach the rural farm households and help enhance their production activities, as well as market access. Beneficial investments in roads, railways, cold storage and bulk transport, among others, will be critical in boosting the rural economy.

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LIST OF ACRONYMS

ACP	African Caribbean and Pacific
AgGDP	Agricultural Gross Domestic Product
AGOA	African Growth Opportunity Act
AoA	Agreement on Agriculture
ATC	Agreement on Textiles and Clothing
ATIA	African Trade Insurance Agency
AU	African Union
CBNP	Community Based Nutrition Program
CBS	Central Bureau of Statistics
CDF	Constituency Development Fund
COMESA	Common Market for East and Southern Africa
DAOs	District Agricultural Officers
DCs	District Commissioners
DFCS	Dairy Farmers Cooperative Societies
DMEOs	District Monitoring and Evaluation Officers
Dos	District Officers
DSOs	District Statistical Officers
EAC	East African Community
EAP	Economically Active Population
EPAs	Economic Partnership Agreements
EPZ	Export Promotion Zone

ERS	Economic Recovery Strategy
EU	European Union
FAO	Food and Agriculture Organization
FEWS-NET	Famine Early Warning Systems Network
GATS	General Agreement on Trade and Services
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GNP	Gross National Product
GoK	Government of Kenya
HIV/AIDS	Human Immuno Virus/ Acquired Immune-Deficiency Syndrome
ICSID	International Centre for Settlement of Investment Disputes
ICT	Information Communication Technology
IFAD	International Fund for Agricultural; Development
IGAD	Intergovernmental Authority for Development
ILFS	Integrated Labour Force Survey
ILRI	International Livestock Research Institute
KACE	Kenya Agricultural Commodity Exchange
KCC	Kenya Cooperative Creameries
KDB	Kenya Dairy Board
KESGA	Kenya Sugar Growers Association
KGMA	Kenya National Federation of Agricultural Producers

KIHS	Kenya Integrated Household Survey
KNTC	Kenya National Trading Corporation
KNTC	Kenya National Trading Corporation
KSB	Kenya Sugar Board
LATF	Local Authority Transfer Fund
LM	Lower Midland
MIGA	Multilateral Investment Guarantee Agency
Mn	Million
MOA	Ministry of Agriculture
MT	Metric Tonnes
NBS	National Bureau of Statistics
NCPB	National Cereals and Produce Board
NGO	Non-governmental Organization
NIB	National Irrigation Board
OECD	Organization of Economic Cooperation and Development
PMC	Primary Marketing Centers
SADC	Southern African Development Community
SAP	Structural Adjustment Program
SDF	Small Dairy Farmers
SDL	Sugar Development Levy
SPSS	Statistical Package for Social Sciences
TC	Tonnes of Cane Crashed

TCD	Tonnes of Cane Deliveries
TCH	Tonnes of Cane per Hectare
TRIPS	Agreement on Trade- Related Intellectual Property Rights
UN	United Nations
USAID	United States Agency for International Development
VAM	Vulnerability Assessment and Mapping
VAT	Value Added Tax
WDI	World Development Indicators
WDR=	World Development Report
WMS	Welfare Monitoring Survey
WTO	World Trade Organization

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ANNEXES

ANNEX 1: FURTHER CLASSIFICATION OF AREAS WITHIN THE SELECTED WINNING, INTERMEDIATE AND LOSING REGIONS

Nakuru North

Nakuru North, as a winning region, was divided further into two areas, with Bahati division being classified as winning and Mbogoini as intermediate. None of the divisions would qualify as a wholly losing area.

Bahati division consists of four locations namely Bahati, Solai, Dundori and Kabati. Bahati and Kabazi are classified as winning areas, while Dundori is classified as intermediate, and Solai as a losing area. Bahati and Kabazi have favourable climatic conditions for the main cash crops - tea and coffee – and maize grown in the division. These areas are also served well with a tarmac road from Nakuru town to Nyahururu town, making access to markets in these towns easy. The tea and tomato processing factories are also located in these locations, providing ready market for these crops and employment opportunities for the people. Although an NCPB depot is located in Subukia, the distance between it and these two locations is less than 10 km, suggesting that farmers can still easily access the depot. Dairy farming and stone mining supplement incomes in parts of Bahati.

Solai is a marginalized area and somewhat drier during dry seasons like October-January. It is due to this reason that only estate cultivated sisal does well in the area. However, with the emergence of synthetic fibers, sisal sector has been negatively affected. Small-scale farmers in the area also produce maize and potatoes. There is no tarmac road network in the area thus affecting market reach. The railway line going in the area through Rongai is under-utilized due to problems in the sisal sector. Maize farmers have to sell their maize at an NCPB depot in Rongai located over 70km away.

The conditions in Dundori are in between those in Bahati/Kabazi and Solai. Potatoes, cabbages and livestock are the main enterprises in the area. Roads are murrum and accessible, but during rainy seasons only trucks can pass through.

Mbogoini division was selected to represent an intermediate division. Its major trading center is Subukia town. Subukia location has one tarmac road passing through it from Nakuru town to Nyahururu. This provides easy access to the commodity markets. An NCPB depot for maize storage is located at Subukia town and farmers in this region sell their maize to NCPB. Tomatoes, carrots and cabbages are the main commodities in this area. Dairy farming also does well in the area. Much of Mbogoini, however, covers the deeper rural areas of the division and has poorer roads compared to Bahati division. Most of the area is plain land and just suitable for wheat production. It lacks industries and businesses and job opportunities are fewer compared to Bahati.

Bungoma District

As an intermediate region, Bungoma was further classified into three areas with Bungoma North as winning, Bungoma South as intermediate, and Bungoma West as losing. Bungoma North is divided into two divisions, Kimilili with 4 locations (Kamukuywa, Kibingei, Kimilili and Maeni) and Tongaren with 6 locations (Kabuyefwe, Kiminini, Mbakalo, Naitiri, Ndalu and Tongaren). Both divisions were categorized as 'winning' areas.

Kimilili location in Kimilili division was selected to represent the winning category for several reasons: proximity to main busy market centers - Kimilili, Webuye and Bungoma; access to farm inputs; access to public goods and services; roads network and ease of communication; diversity of agricultural enterprises; and good climatic conditions which promotes agriculture. Kibingei location was selected as intermediate area. The location has a lot of opportunities for horticultural products around the base of the hills. Soils are fertile, deep black cotton soils and less organic fertilizers are used. These productive parts of the location are also conducive for dairy farming. Roads, however, are poor and farmers depend on donkeys to transport farm produce. Most products are sold to the brokers who control prices. The main crops grown include maize, sugarcane, bananas, coffee and indigenous vegetables. The location has a coffee factory while dairy farmers can access the cooler located in Kimilili town. Farm inputs can be purchased from Kimilili town. Maeni location was categorized as losing. The location has continuously performed poorly following liberalization. There are no organized integrated commodity chains and most parts have poor ecological conditions. The location also lacks public goods and services, which if established can change its status to winning.

Bungoma South was selected as the intermediate area. It is divided into two divisions; Bumula (with 9 locations; Bumula, Kabula, Khasoko, Napara, Mukwa, Siboti, South Bukusu and West Bukusu) and Kanduyi (with 4 locations; Bukembe, Kibabii, Kimaeti, Musikoma and Township). Bukembe location was selected as the winning area. It has good road network, farmers can access markets and farm inputs, and agricultural production is higher compared to other locations. The location also houses Mabanga farmers training institute and is in close proximity to Bungoma town. Soils are fairly fertile in most parts of the location. Common crops are maize, sugarcane, beans, bananas and local vegetables. Livestock enterprises include dairy and poultry. The location also has Nzoia sugar factory. The intermediate area within Bungoma South is East Bukusu location. Public goods and services are not well established in the location. Sugarcane production dominates the area and it competes with food crops in terms of land, labour and other inputs. The location has large parcels of land, which can be utilized for commercial farming. Proper allocation of land (given the large farm sizes) among different enterprises can also improve economic performance in the area. Spillover effects of the Nzoia sugar factory can help in initiation of other non agricultural enterprises. Napara is the marginalized location within the intermediate region. Most parts of the location have infertile land, rocky terrain and poor road network. Most farmers grow tobacco as the main cash crop. Sugarcane is also grown in some parts of the location. Food crops in the location are maize, sorghum, millet, cassava, indigenous vegetables and sweet potatoes. Maize yields are remarkably low due to inaccessibility to farm inputs. Household income is generally low.

The losing area of Bungoma West is divided into 4 divisions, Nalondo (Central), Chwele, Sirisia and Malakisi. The sampled divisions are divided into several locations: Chwele division with 2 locations (Chwele and Mukuyuni); Sirisia division with 2 locations (Sirisia and Namwela).The winning location was sampled from Chwele division while the intermediate and losing locations were selected from Sirisia division. Mukuyuni is the winning area within a losing region. Crop yields, especially maize, are higher compared to other locations. The area has diversified into horticultural enterprises; tomatoes, beans and onions. Roads are good and farmers can access Chwele market easily. There are few contractual agreements between the farmers and buyers. Namwela location is the intermediate area within the losing region. The area has poor roads which if improved can open it up and move to a winning category. Most areas in Namwela Central and Menu sub-locations also have unfavourable climatic conditions. Maize, beans, horticulture and livestock productivity is lower compared to other locations. Farmers depend on donkeys to transport their farm products to market centers. Most households experience low income and commodity chains are not developed. Sirisia location is the losing area within a losing category. In Sirisia location, South Kulisiru sub-location is hilly and rocky with infertile soils, resulting into low yields. Trading in non-agricultural products is low and public goods are least developed. In North Kulisiru sub-location, improvement can be realized if farmers can access farm inputs. The sub-location is near trading center (Sirisia) where from farm products can be sold or transported to Bungoma and Chwele markets if roads are graded. High maize production cost and low yields in the location negatively affect farmers.

Nyando District

Nyando region was divided further into three areas also defined as winning, losing or intermediate. Upper Nyakach was selected as a winning area, while Nyando division represented an intermediate area and Miwani division a losing area.

Upper Nyakach division has high agricultural productivity occasioned by the high rainfall within the Nyabondo plateau and the fertile soils. This has made it easy for farmers to diversify their enterprises as the area does not suffer from perennial flooding. It is hilly and slightly rocky but suitable for maize and beans production. It is also the site of two (one still in construction phase) multi-billion shilling hydroelectric power generation projects in the area, which has provided the locals with employment opportunities. There are also two major towns in the area: Katito and Sondu, which provide markets for inputs and outputs for the households. In addition, Upper Nyakach acts as the link to the inter-regional trade with the agriculturally endowed Kisii and Kericho towns as well as other regions. The area is served by a tarmac road linking it to Kisii, Kisumu and the Lake Victoria beaches.

The intermediate area of Nyando division used to produce two major cash crops: rice and cotton. Rice is grown through irrigation along the River Nyando. The irrigation scheme operates by renting land to interested farmers. Production of rice has however declined over the years due to closure of the National Irrigation Board (NIB) unit in the area. Rice production currently operates below capacity. Cotton production was abandoned and most of the ginneries have closed down despite current efforts to revive the industry. Although some sugar cane is grown in parts of the division, the farmers are located far from the currently operating milling factories in Chemelil. Despite the limitations, farmers continue with its production. There is also some small-scale fishing in the villages located near the shores of Lake Victoria. Ahero town is the commercial and administrative hub of the division with the location of many small-scale businesses due to its location on the main highway linking the region to other major towns. The Kisumu-Kericho tarmac highway runs across the division (through Kakola and Onjiko locations), making communication and transport easily accessible[36]. Since a large proportion of the area is composed of Ahero town, and its proximity to Kisumu City, tap water and health facilities are present.

The selection of Miwani division as a losing region was due to the fact that, although it has fertile black-cotton soils and good climatic condition, the perennial problem of flooding severely affects meaningful agricultural activities. The area virtually relies on sugar cane production as the source of household livelihood and little food crop production. This dependence on one crop puts the farmers at a disadvantage because with the collapse of the Miwani Sugar Factory in the area and the nearby sugar cane factories in Kibos, and the problem-afflicted Muhoroni, which is under receivership, the household incomes have been negatively affected. Consequently, tracts of farmland are lying fallow thereby reducing not only land area under agricultural production, but also amount of cane deliveries to the far located factories. This has the potential of worsening the problem of poverty in the division.

There are also deep and wide gulleys in the division caused by soil erosion. The road network in the division is poor due to flooding, and is almost impassable during the rainy season. The flooding also affects the living conditions as the grass-thatched houses common in the area are frequently swept away. Public services and amenities are absent as the households must travel long distances to access health facilities in Ahero or Kisumu. Agricultural activities can however be promoted through proper drainage and improvement of the road network.

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[36] In fact, East Kano location within the division is well served by the tarmac road from Ahero to Kissi town through Sondu.

ANNEX 2: CONVERSION FACTORS FOR COMPUTING ADULT EQUIVALENTS

Age	Male ratio	Female ratio
0	0.33	0.33
1	0.46	0.46
2	0.54	0.54
3-4	0.62	0.62
5-6	0.74	0.70
7-9	0.84	0.72
10-11	0.88	0.78
12-13	0.96	0.84
14-15	1.06	0.86
16-17	1.14	0.86
18-29	1.04	0.80
30-59	1.00	0.82
60+	0.84	0.74

ANNEX 3: COMPUTATIONS OF INDICES

Index	Computation
Dependency ratio	# of individuals aged <15 or >64 divided by # of individuals aged 15-64
Education index = Edu	Index from 0 to 4 (0=none 1=preschool 2=primary or middle 3=secondary or high 4=university) - the definition of each level must refer to the local education system
Network index of the HH head	sum of memberships (included agricultural mutual aid groups]
Network index of the spouse of HH head	sum of memberships (included agricultural mutual aid groups)
Equipment index = EGh	EQh = sum of $EQih$ $(1-Pi)$ with $Pi=ni/n$ and where $EQih=1$ if the HH possesses agricultural equipment i (animal haulage, mechanical haulage, sprayer, micro-irrigation system, irrigation pump, silo, tractor), Pi = the probability of having agricultural equipment i, ni= number HH which have agricultural equipment i, n= total number of HH
Quality of housing index = Qh	Qh = sum of Qih $(1-Pi)$ with $Pi=ni/n$ and where $Qih=1$ if the quality of the housing i of the HH h is (cement or concrete floor, roof made of steel plates or tile, wall made of stones or wood) Pi is the probability of having housing quality i, ni= number HH which have housing quality i, n= total number of HH
Facility welfare index =Fh	Fh = sum of Fih $(1-Pi)$ with $Pi=ni/n$ and where $Fih=1$ if HH h has access to facility i (piped/running water, electricity in the house and private toilets in the house), Pi is the probability of having faility i, ni= number HH which have facility i, n= total number of HH
Durable goods index = Dh	Dh = sum of Dih $(1-Pi)$ with $Pi=ni/n$ and where $Dih=1$ if HH possesses durable good i (fridge, radio, TV, cell, bicycle, motorbike, vehicle), Pi is the probability of having good i, ni= number HH which have good i, n= total number of HH
Index of economical specialization	Main activity income / global income

ANNEX 4: SHARES OF EACH INCOME SOURCE PER ADULT EQUIVALENT IN THE THREE REGIONS

Source of Income	Mean	Median	Std. Deviation	Minimum	Maximum
Nakuru North					
Agricultural Production	24.4	19.2	22.2	-11.7	100.0
Livestock Production	20.6	14.5	22.8	-57.5	95.6
Hunting, Fishing and gathering activities	0.0	0.0	0.0	0.0	0.0
Transformation of agricultural products	0.0	0.0	0.0	0.0	0.0
Agricultural Labor (agricultural wages)	3.3	0.0	13.0	0.0	143.7
Non-agricultural labor (non-agricultural wages)	15.4	0.0	25.9	0.0	100.8
Self-employment	33.4	32.0	31.1	-71.8	122.9
Public transfers	0.0	0.0	0.3	0.0	4.6
Private transfers	1.7	0.0	5.9	0.0	58.2
Rents	1.1	0.0	2.9	0.0	23.2
Global income	100.0	100.0	0.0	100.0	100.0
Farm	*45.0*	*40.6*	*30.4*	*-22.9*	*162.5*
Off farm	*53.9*	*58.3*	*30.6*	*-66.6*	*122.9*
Nyando					
Agricultural Production	37.6	25.9	41.3	-129.0	234.3
Livestock Production	0.9	0.0	36.1	-286.1	131.9
Hunting, Fishing and gathering activities	3.0	0.0	12.7	0.0	109.4
Transformation of agricultural products	0.0	0.0	0.0	0.0	0.0
Agricultural labor (agricultural wages)	7.9	0.0	22.1	0.0	167.8
Non-agricultural labor (non-agricultural wages)	34.2	21.2	39.1	0.0	167.8
Self-employment	8.6	0.0	36.4	-290.3	152.2
Public transfers	0.0	0.0	0.1	0.0	2.0
Private transfers	1.9	0.0	7.7	0.0	86.9
Rents	5.8	0.2	17.4	0.0	164.5
Global income	100.0	100.0	0.0	100.0	100.0
Farm	*41.5*	*40.1*	*44.1*	*-160.1*	*366.1*
Off farm	*52.7*	*57.0*	*43.1*	*-290.3*	*156.0*
Bungoma					
Agricultural Production	55.6	49.4	45.8	-38.2	368.2
Livestock Production	5.4	1.6	27.1	-173.4	90.9
Hunting, Fishing and gathering activities	1.7	0.0	8.6	0.0	75.0
Transformation of agricultural products	0.0	0.0	0.0	0.0	0.0
Agricultural Labor (agricultural wages)	3.5	0.0	13.9	0.0	90.3
Non-agricultural labor (non-agricultural wages)	18.1	0.0	31.3	0.0	147.3
Self-employment	13.6	0.0	33.9	-292.5	221.9
Public transfers	0.0	0.0	0.6	0.0	6.9
Private transfers	0.7	0.0	3.5	0.0	43.3
Rents	1.3	0.0	3.8	0.0	31.0
Global income	100.0	100.0	0.0	100.0	100.0
Farm	*62.7*	*63.8*	*43.7*	*-121.9*	*392.5*
Off farm	*35.9*	*34.2*	*43.8*	*-292.5*	*221.9*

ANNEX 5: SELECTED HOUSEHOLD CHARACTERISTICS IN NAKURU NORTH BY INCOME QUINTILES

	Quintile 1 (lowest)			
	Median	**Deviation**	**Min**	**Max**
Global income	12,707	5,218	533	19,337
Agricultural Production	2,595	2,552	-1,479	13,349
Livestock Production	1,543	2,899	-1,689	9,969
Hunting, Fishing and gathering activities	0	0	0	0
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	1,998	0	11,538
Non-agricultural labor (non-agricultural wages)	0	3,181	0	13,913
Self-employment	2,256	4,399	-6,522	13,235
Public transfers	0	0	0	0
Private transfers	0	1,378	0	8,623
Rents	0	323	0	2,308
Demography				
Size of HH	6.66	2.60	1.56	12.94
Dependency ratio	0.25	0.96	0	6
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.87	0	4
Education index of most educated people of the HH	3	0.93	1	4
Social Capital				
Network Index	1	1.27	0	5

	Quintile 2			
	Median	**Deviation**	**Min**	**Max**
Global income	26,225	3,209	19,476	30,948
Agricultural Production	5,207	5,538	-2,434	24,053
Livestock Production	5,329	6,544	-6,286	24,441
Hunting, Fishing and gathering activities	0	0	0	0
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	3,060	0	14,656
Non-agricultural labor (non-agricultural wages)	0	7,618	0	26,549
Self-employment	4,800	8,312	-1,115	35,714
Public transfers	0	0	0	0
Private transfers	0	1,072	0	6,630
Rents	0	389	0	1,807
Demography				
Size of HH	5.48	1.96	0.84	11.46
Dependency ratio	0.4	0.77	0	3
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.75	1	4
Education index of most educated people of the HH	2	0.90	1	4
Social Capital				
Network Index	1	1.34	0	6

	Quintile 3			
	Median	**Deviation**	**Min**	**Max**
Global income	41,096	6,861	31,283	54,160
Agricultural Production	8,599	9,004	-2,579	32,592
Livestock Production	6,295	10,339	-2,802	38,948
Hunting, Fishing and gathering activities	0	0	0	0
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	3,203	0	16,216
Non-agricultural labor (non-agricultural wages)	0	11,472	0	35,644
Self-employment	10,000	12,170	-909	51,282
Public transfers	0	24	0	180
Private transfers	0	1,303	0	8,784
Rents	0	1,683	0	11,628
Demography				
Size of HH	5.07	2.24	0.74	11.46
Dependency ratio	0.33	0.73	0	3
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	1.02	0	4
Education index of most educated people of the HH	3	1.21	1	4
Social Capital				
Network Index	1	1.55	0	9

	Quintile 4			
	Median	**Deviation**	**Min**	**Max**
Global income	71,958	14,339	54,840	105,780
Agricultural Production	14,241	18,422	-6,172	83,690
Livestock Production	10,964	16,635	-1,458	77,272
Hunting, Fishing and gathering activities	0	0	0	0
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	3,546	0	25,000
Non-agricultural labor (non-agricultural wages)	0	20,131	0	75,000
Self-employment	25,738	21,087	-62,130	61,381
Public transfers	0	0	0	0
Private transfers	0	2,446	0	17,442
Rents	383	2,660	0	17,903
Demography				
Size of HH	6.11	2.44	0.74	12.82
Dependency ratio	0.44	0.83	0	3.5
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	1.24	0	4
Education index of most educated people of the HH	3	1.11	1	4
Social Capital				
Network Index	1	1.39	0	6

	Quintile 5 (highest)			
	Median	**Deviation**	**Min**	**Max**
Global income	181,983	164,936	106,110	803,760
Agricultural Production	16,378	40,464	-1,702	188,259
Livestock Production	18,775	32,143	-10,149	128,750
Hunting, Fishing and gathering activities	0	0	0	0
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	0	0	0
Non-agricultural labor (non-agricultural wages)	0	48,318	0	214,286
Self-employment	70,541	176,304	0	765,957
Public transfers	0	1,053	0	7,885
Private transfers	0	971	0	5,245
Rents	404	6,959	0	44,118
Demography				
Size of HH	4.76	1.63	1.58	9.18
Dependency ratio	0.14	0.69	0	3.5
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	1.40	1	4
Education index of most educated people of the HH	4	1.01	1	4
Social Capital				
Network Index	1	1.78	0	6

ANNEX 6: SELECTED HOUSEHOLD CHARACTERISTICS IN NYANDO BY INCOME QUINTILES

	Quintile 1 (lowest)			
	Median	**Deviation**	**Min**	**Max**
Global income	2,016	1,101	261	3,795
Agricultural Production	714	1,155	-537	7,165
Livestock Production	0	1,412	-6,619	2,752
Hunting, Fishing and gathering activities	0	277	0	1,496
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	509	0	2,602
Non-agricultural labor (non-agricultural wages)	0	1,154	0	4,438
Self-employment	0	640	-1,931	2,717
Public transfers	0	0	0	0
Private transfers	0	221	0	1,531
Rents	72	440	0	2,151
Demography				
Size of HH	5.58	2.57	0.74	12.24
Dependency ratio	1.25	1.29	0	8
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.54	1	3
Education index of most educated people of the HH	2	0.86	1	4
Social Capital				
Network Index	2	1.46	0	7

	Quintile 2			
	Median	**Deviation**	**Min**	**Max**
Global income	5,473	1,136	3,797	7,593
Agricultural Production	1,643	1,911	25	10,880
Livestock Production	0	1,901	-5,446	6,124
Hunting, Fishing and gathering activities	0	1,048	0	7,912
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	1,299	0	5,405
Non-agricultural labor (non-agricultural wages)	1,370	2,313	0	6,750
Self-employment	0	2,516	-13,483	10,714
Public transfers	0	0	0	0
Private transfers	0	365	0	2,439
Rents	0	432	0	2,453
Demography				
Size of HH	4.72	2.2	0.82	11.58
Dependency ratio	1.2	1.21	0	6
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.58	1	4
Education index of most educated people of the HH	2	0.85	1	4
Social Capital				
Network Index	2	1.42	0	7

	Quintile 3			
	Median	**Deviation**	**Min**	**Max**
Global income	10,415	2,243	7,728	14,720
Agricultural Production	1,945	3,831	-2,519	14,647
Livestock Production	48	3,239	-5,147	14,102
Hunting, Fishing and gathering activities	0	1,503	0	10,286
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	3,086	0	13,333
Non-agricultural labor (non-agricultural wages)	1,213	4,893	0	18,803
Self-employment	0	4,153	-20,000	11,111
Public transfers	0	0	0	0
Private transfers	0	307	0	1,471
Rents	0	966	0	4,808
Demography				
Size of HH	5.24	2.57	1.52	13.16
Dependency ratio	1	1.29	0	5
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.53	1	3
Education index of most educated people of the HH	2	1.02	1	4
Social Capital				
Network Index	2	1.21	0	5

	Quintile 4			
	Median	**Deviation**	**Min**	**Max**
Global income	21,504	4,298	15,654	30,866
Agricultural Production	3,314	6,738	0	22,383
Livestock Production	0	3,452	-7,349	12,579
Hunting, Fishing and gathering activities	0	2,145	0	13,427
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	2,716	0	13,228
Non-agricultural labor (non-agricultural wages)	8,286	7,528	0	30,000
Self-employment	0	5,929	-19,048	17,857
Public transfers	0	43	0	323
Private transfers	0	534	0	2,765
Rents	181	1,149	0	6,250
Demography				
Size of HH	5.36	2.73	0.8	12.68
Dependency ratio	1	0.94	0	3
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.93	1	4
Education index of most educated people of the HH	2	1.08	1	4
Social Capital				
Network Index	2	1.42	0	6

	Quintile 5 (highest)			
	Median	**Deviation**	**Min**	**Max**
Global income	56,950	64,735	32,881	412,546
Agricultural Production	13,069	50,791	-179	320,807
Livestock Production	0	5,592	-12,500	27,101
Hunting, Fishing and gathering activities	0	7,066	0	24,000
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	5,210	0	21,687
Non-agricultural labor (non-agricultural wages)	9,863	25,815	0	97,297
Self-employment	3,696	30,292	-38,698	133,007
Public transfers	0	82	0	620
Private transfers	0	114	0	725
Rents	103	1,738	0	8,242
Demography				
Size of HH	5.14	2.52	0.82	11.88
Dependency ratio	1	0.94	0	3.5
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	1.01	1	4
Education index of most educated people of the HH	2	1.07	1	4
Social Capital				
Network Index	2	1.52	0	7

ANNEX 7: SELECTED HOUSEHOLD CHARACTERISTICS IN BUNGOMA BY INCOME QUINTILES

	Quintile 1 (lowest)			
	Median	**Deviation**	**Min**	**Max**
Global income	2,547	1,415	187	4,885
Agricultural Production	2,088	2,318	-1,172	15,653
Livestock Production	0	903	-3,509	1,842
Hunting, Fishing and gathering activities	0	494	0	2,983
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	452	0	3,468
Non-agricultural labor (non-agricultural wages)	0	845	0	5,483
Self-employment	0	1,913	-12,435	6,799
Public transfers	0	25	0	195
Private transfers	0	145	0	1,000
Rents	0	109	0	625
Demography				
Size of HH	5.06	2.21	1.5	12.52
Dependency ratio	1	1.12	0	5
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.93	1	4
Education index of most educated people of the HH	2	0.90	1	4
Social Capital				
Network Index	1	0.88	0	3

	Quintile 2			
	Median	**Deviation**	**Min**	**Max**
Global income	7,870	1,695	4,906	10,904
Agricultural Production	3,967	3,152	-930	14,349
Livestock Production	245	2,132	-10,116	5,051
Hunting, Fishing and gathering activities	0	509	0	3,315
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	1,293	0	8,000
Non-agricultural labor (non-agricultural wages)	0	2,206	0	8,970
Self-employment	0	2,041	-4,528	8,061
Public transfers	0	0	0	0
Private transfers	0	101	0	575
Rents	0	368	0	1,899
Demography				
Size of HH	6.195	2.69	1.84	13.5
Dependency ratio	1	0.79	0	3
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.79	1	3
Education index of most educated people of the HH	2	0.89	1	4
Social Capital				
Network Index	1	0.93	0	4

	Quintile 3			
	Median	**Deviation**	**Min**	**Max**
Global income	14,586	2,503	10,964	19,295
Agricultural Production	5,766	5,681	-4,784	21,267
Livestock Production	264	3,188	-4,358	13,718
Hunting, Fishing and gathering activities	0	230	0	1,782
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	3,193	0	14,754
Non-agricultural labor (non-agricultural wages)	0	4,547	0	18,576
Self-employment	0	4,533	-9,863	13,830
Public transfers	0	0	0	0
Private transfers	0	340	0	1,575
Rents	0	630	0	3,644
Demography				
Size of HH	4.89	1.7	1.46	8.56
Dependency ratio	1.5	0.98	0	4.5
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.8	1	4
Education index of most educated people of the HH	2	0.93	1	4
Social Capital				
Network Index	1	1.1	0	5

	Quintile 4			
	Median	**Deviation**	**Min**	**Max**
Global income	24,635	3,547	19,404	32,115
Agricultural Production	10,223	8,715	-1,415	32,490
Livestock Production	547	3,270	-2,936	10,888
Hunting, Fishing and gathering activities	0	2,136	0	13,953
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	2,011	0	11,111
Non-agricultural labor (non-agricultural wages)	0	8,850	0	29,508
Self-employment	0	7,115	-1,690	24,096
Public transfers	0	283	0	2,190
Private transfers	0	358	0	1,870
Rents	0	709	0	3,949
Demography				
Size of HH	5.16	2.45	2.2	16.46
Dependency ratio	1	0.92	0	4.5
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	0.99	1	4
Education index of most educated people of the HH	2	1.02	1	4
Social Capital				
Network Index	1	0.76	0	3

	Quintile 5 (highest)			
	Median	**Deviation**	**Min**	**Max**
Global income	47,514	29,280	30,934	214,287
Agricultural Production	15,479	18,901	107	81,087
Livestock Production	2,835	10,431	-5,570	58,404
Hunting, Fishing and gathering activities	0	225	0	1,604
Transformation of agricultural products	0	0	0	0
Agricultural Labor (agricultural wages)	0	2,151	0	11,111
Non-agricultural labor (non-agricultural wages)	14,027	22,410	0	92,308
Self-employment	0	15,702	-17,021	94,054
Public transfers	0	0	0	0
Private transfers	0	384	0	1,572
Rents	0	2,509	-8,850	10,811
Demography				
Size of HH	5.15	2.11	1.58	10.6
Dependency ratio	1	0.79	0	4
% of HH whose head is male				
Human Capital				
Education index of head of the HH	1	1.23	1	4
Education index of most educated people of the HH	3	1.07	1	4
Social Capital				
Network Index	1	1.17	0	5

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