REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES

SWEDEN

AGRICULTURAL SECTOR DEVELOPMENT SUPPORT PROGRAMME (ASDSP)

Volume 1
HOUSEHOLD BASELINE SURVEY REPORT

HOMABAY COUNTY

KALRO
Kenya Agricultural & Livestock Research Organization

TRANSFORMING KENYA'S AGRICULTURAL SECTOR
ASDSP
AGRICULTURAL SECTOR DEVELOPMENT SUPPORT PROGRAMME

University of Nairobi

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FOREWORD

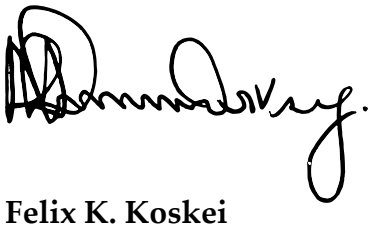
Agricultural sector growth and development is crucial to Kenya's overall economic and social development. In particular, agriculture significantly contributes to the national economy; ensures the country is food secure; generates incomes and provides employment both directly and indirectly for the population. Sustained agricultural growth is therefore critical to uplifting the standards of living of our people. The country however faces a number of challenges which need to be overcome for this growth to occur. These challenges include high levels of poverty, food insecurity and the negative effects of climate change.

Kenya's development blue print, Vision 2030 recognizes the agricultural sector as one of the vehicles that will aid the achievements of the targets contained therein. Consequently, Agricultural Sector Development Strategy (ASDS) was put in place as a basis for formulating specific policies, work plans, projects and programmes that address food and nutrition security and farm productivity while conserving the natural resource base in the country. The overall goal of the strategy is to revolutionize agriculture from subsistence to an economic and commercial enterprise capable of providing Kenyans with employment opportunities and increased incomes. The government of Kenya in collaboration with other development partners and specifically with initial support from the government of Sweden has brought the realization of this goal a step closer through the Agricultural Sector Development Support Programme (ASDSP) at both the national and county governments' levels.

In order to assess the status and impacts of this collaborative initiative, it was necessary to establish the existing realistic data on households, agribusiness and policy environment. Further, the two countries and stakeholders have committed to sharing information and data from time to time to chart the way forward in addressing the challenges that the sector faces in food security, productivity and natural resource management. This survey was therefore timely and critical for this nation as the basis for planning and setting priorities of intervention in the sector.

The survey has made pertinent observations in the counties that require urgent attention by both levels of governance and stakeholders. Of particular concern are the low levels of productivity and food security among households in most counties. Another area of interest realized was that the status of agribusiness though vibrant requires support in access to financial services if they are to compete favorably at international levels. As regards the policies and regulations governing the sector, they are in place and sufficient but there is lack of capacity both at national and county levels for their execution.

I wish to encourage all stakeholders to not only study the reports but also utilize the data and information for evaluating their activities and improving their implementation profiles to achieve realistic goals. As a ministry, we are committed to use the findings to inform the process of linking policy generated with future programmes that will lead to realization of food and nutritive secure, wealthy households.



Felix K. Koskei

CABINET SECRETARY

MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES

PREFACE

The Agricultural Sector Development Support Programme (ASDSP) was formulated by the government in 2011 in collaboration with development partners and other stakeholders to support the implementation of the strategies identified in the Agriculture Sector Development Strategy, ASDS (2010 – 2020) and the Comprehensive African Agricultural Development Programme (CAADP) Kenya Compact. The programme focuses on three key strategic areas; development of a transparent system for improved agricultural sector coordination and harmonization and creation of an enabling policy and institutional environment for the realization of the ASDS. Secondly, strengthening of the environmental resilience and social inclusion of Value Chains (VC) and finally promotion of viable and equitable commercialization of the agricultural sector through Value Chain Development (VCD).

The baseline survey was a first step in the implementation of the programme with the sole purpose of generating real time data and information that will be used by programme implementers and other stakeholders to set benchmarks assess their performance and make adjustments to their implementation plans. The surveys had three main objectives;

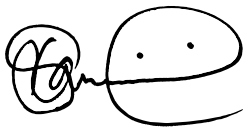
First, to assess the socio-economic status of the communities especially the food security levels as this has an impact on cognitive human development which has an overall effect on the country's economic growth. Other factors considered were their social inclusion, gender disparity and their resilience in adapting to environmental challenges. Results indicate that we still have a lot to do in order to increase productivity through increasing the community's ability to access inputs and services.

Secondly, the objective of the agribusiness survey was to assess how actors along the value chains interact with one another and to determine how best to address their challenges. The survey reveals that the country has a vibrant agribusiness sector that can further be improved with the right agro trade policies and with both financial and technical support.

Lastly, to assess the current levels of policy formulation and institutional frameworks and to determine the gaps that may be hindering the advancement of agriculture. As can be seen from the results, we have formulated a number of policies to guide the sector. The capacity of our various institutions however, needs to be strengthened by adopting improved performance enhancing systems to deliver services more efficiently and effectively to our people.

We believe that this information will assist the national and county governments to improve on strategies geared towards food security and commercialization of agriculture in Kenya. We wish to acknowledge and appreciate the support of the Swedish government in the development of agriculture in the country and in particular for their commitment to the development of the sector through the ASDSP. The effective

participation of MOALF staff, Kenya Agricultural and Livestock Research Organization (KALRO), the University of Nairobi (UoN), Kenya Institute of Public Policy Research and Analysis (KIPPRA) and the various collaborators is appreciated.



Sicily Kariuki (Mrs), MBS

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STATE DEPARTMENT OF AGRICULTURE

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Prof. Fred Sigor, PhD

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ACKNOWLEDGEMENT

The ASDSP is implemented at national and county level in the 47 counties through the established National Programme Secretariat (NPS) and the County Coordinating Units (CCU).

The purpose of the nationwide baseline surveys was thus to gather data and information to be used in establishing the pre-program levels of the result indicators contained in the Agricultural Sector Development Support Programme (ASDSP) log- frame. The surveys, which were intensive and costly were conducted between September and October 2013 covering the 47 counties in the country.

The specific objectives of the surveys were to; provide benchmarks and indicators for future evaluation of the program, provide useful data for planning and monitoring the progress made during implementation and mobilize various actors to participate in the programme interventions through the formation of partnerships at the critical stages identified by the survey data. Further, the study intended to avail data to be shared with other stakeholders to guide them in planning their activities.

Based on the functional lines, the survey was divided into three separate but complimentary segments that required different methods of data collection. The segments were household survey, focusing on resources, climate change and food security, agribusiness survey focusing on value chains, marketing and financial investments and lastly policy, institutional setting and coordination.

I take this opportunity to extend special recognition and appreciation to the following, whose contribution led to the success of this exercise

Mr. Felix K.Koskei, Cabinet Secretary, MoALF, for his leadership and support that enabled the completion of the study.

Sicily K. Kariuki (Mrs), MBS, Principal Secretary, State Department of Agriculture;

Prof. Micheni Japhet Ntiba, CBS, Principal Secretary State Department of Fisheries; and

Prof. Fred Sigor, Principal Secretary, State Department of Livestock for their guidance and support throughout the survey period.

The Hon Governors of the 47 counties for their leadership and support at the county levels.

The Embassy of Sweden under the leadership of Anders Ronquist for providing resources, support and guidance to the ASDSP.

The following for their technical and logistical engagement;

Dr. Eliud Kireger, Director General KALRO, Dr. Ephraim Mukisira (former Director, KARI) and Dr. Joseph Mureithi for overall guidance and management of Household and Agribusiness surveys.

Dr. Lawrence Mose, Dr. Festus Mureithi and Dr.Wellington Mulinge for coordinating the Household and Agribusiness surveys.

Prof. Chris Ackello-Ogutu, University of Nairobi for the technical guidance in the household and agribusiness surveys.

The Central Planning and Project Unit (CPPU), MoALF under the coordination of Mr Wellington Lubira and KIPPRA under the guidance of Dr. John M. Omiti for carrying out the policy and institutional survey.

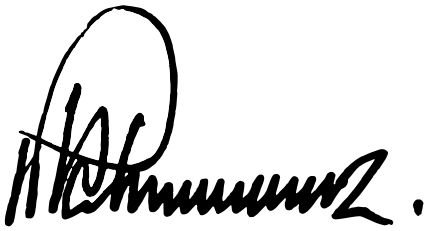
The National Programme Steering Committee under the chairmanship of Ms Anne Onyango, MBS and Mr Julius Kiptarus, OGW, for guidance and oversight role.

The NIRAS Natura under the leadership of Mikael Segerros for supporting the whole process from the development of the baseline tools to its execution and analysis.

The National programme Secretariat (NPS), under the coordination of Rosemary Magambo ASDSP M&E specialist for the day today administration of the baseline survey process.

The technical coordinating teams and the county staff, for their diligence and hard work that has seen the completion of the survey.

And to all those who contributed in one way or another towards this exercise, I thank you most sincerely for ensuring this report is produced.



Phoebe A. Odhiambo (Mrs), HSC

National Programme Coordinator

AGRICULTURAL SECTOR DEVELOPMENT SUPPORT PROGRAMME

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ABBREVIATIONS AND ACRONYMS

AI	Artificial Insemination
APVC	Agricultural Prioritized Value Chains
ASDS	Agricultural Sector Development Strategy, 2010-2020
ASDSP	Agricultural Sector Development Support Programme
CAADP	Comprehensive African Agricultural Development Programme
CC	Climate Change
CIDP	County Integrated Development Profile
CRA	Commission for Revenue Allocation
FAO	Food and Agriculture Organisation of the United Nations
FBO	Faith Based Organization
FGD	Focus Group Discussion
FHH	Female Headed Household
FHM	Female Headed Managed
GIS	Geographical Information System
GoK	Government of Kenya
GPS	Geographic Positioning System
HH	Household Head
KALRO	Kenya Agricultural and Livestock Research Organization
KARI	Kenya Agricultural Research Institute
Kcal	Kilo calories
KCC	Kenya Cooperative Creameries
KDB	Kenya Dairy Board
KENAF	Kenya National Association of Farmers
KENFAP	Kenya Federation of Agricultural Producers
KES	Kenya Shillings
Kg	Kilogramme
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KPHC	Kenya Population and Housing Census
KRA	Kenya Revenue Authority
LMIS	Livestock Information Management Systems
M&E	Monitoring and Evaluation
MDGs	Millenium Development Goals
MHH	Male Headed Household
MOA	Ministry of Agriculture
MOALF	Ministry of Agriculture, Livestock and Fisheries

MOLD	Ministry of Livestock Development
NGOs	Non-Governmental Organizations
NPS	National Programme secretariat
NRM	Natural Resource Management
PCP	Per Capita Production
PPS	Proportionate to Population Size
RATIN	Regional Agricultural Trade Intelligence Network
SACCO	Savings and Credit Co-operative Organization
SE	Standard Error
SIDA	Sweden through Swedish international Development Agency
SIMULESA	Sustainable Intensification of Maize-Legume Cropping Systems for food security in Eastern and Southern Africa
SPSS	Statistical Package for Social Sciences
TC	Tissue Culture
WFP	World Food Programme
YHH	Youth Headed Household

DEFINITION OF TERMS

Baseline survey: Refers to the analysis of the current situation to identify the starting point for a project or programme. It is a collection of primary and secondary data which describes the situation at a particular time. It is conducted within the framework of a proposed development intervention; in this case the ASDSP programme

County: Refers to one of the 47 devolved administrative/political units in Kenya.

Dietary Diversity Index: Refers to a figure obtained by assessing the average number of food categories (out of a total of 12 broad food categories) a household consumed in the past one week prior to the survey. Households that consumed from a maximum of two food groups/ categories were considered as having low food diversity while those who consumed from a minimum of three food groups/categories were considered as having high food diversity.

Farm income: Refers to income that a household derives from sources within its farm(s) Examples include income from crops and livestock; income from use of farm machinery eg hiring out of tractors and income from use of posho mill etc;

Female-Headed Household: This is a household whose main decision maker on agricultural production, marketing and consumption is a female person aged 36 years and above.

Food Security: According to FAO (1996) refers to "all people, at all times, having physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". A food-secure household was defined as one whose calorie supply per Adult Equivalent is greater than or equal to the minimum daily calorie requirement of 2,260 kcal for an adult.

Gender: Categorizes people in terms of their roles and responsibilities as provided by the social and customary considerations of a given society. Gender does not refer to sex of an individual. For this study, four gender categories were used: Adult males (men aged 36 years and above); Adult females (women aged 36 years and above.), Male youth (men aged 18-35 years of age), female youth (women aged 18-35 years of age).

Household: This is a collection of persons who depend on a common store. The persons may not necessarily be members of the same family. They often make common production, marketing and consumption decisions.

Land Parcel 1: Refers to the parcel of farm land where the homestead is located.

Land Parcels 2 & 3: These were any other two parcels of land owned by the household that were not contiguous with the homestead. On average, most households had more than one parcel of land. For this study, the maximum number of land parcels were limited to three.

Livestock Off-take: Value of livestock that a household sells or liquidates in one year in order to maintain the herd / flock size and / or meet financial obligations.

Logical Framework : This is a management tool used for designing, monitoring and evaluating development projects/programmes

Male-Headed Household: This is a household whose main decision maker on agricultural production, marketing and consumption is a male person aged 36 years and above.

Non-farm Income: Refers to income derived from other sources apart from farming activities by household members. Examples include salaried employment, business, etc.

***Nyirinyiri* :** This is meat that is dried /fried and preserved by deep frying in fat to enhance its

shelf-life. It is commonly found in the dry regions of the country.

Off-farm Income: Refers to income derived from farming activities undertaken outside the household farm setting. The activities could be farming or non-farming in nature. Examples include farm wage labour, marketing of produce that is not of the household..

Primary occupation: The main activity from which the heads of household derive their livelihood and income.

Productivity: This is production per unit of resource. The term is applied to crop / livestock production per unit of land or animal (yield) within a specified time period (day, season or year) in this study.

Seasons one and two: This is a specific reference made for purposes of this study with respect to the time the data was collected (September and October 2013).

Season one: Refers to the cropping season that spanned from August 2012 to February 2013.

Season two: Refers to the cropping season that spanned from March 2013 to August / September 2013.

Social protection: Refers to affirmative action taken by Government, Development Partners or other agencies to assist the vulnerable such as the elderly, incapacitated and those with terminal diseases, food insecure ,poor to cushion them from livelihood challenges they face.

Technology: This refers to a process or technique that enhances crop or livestock productivity. Examples include use of improved seed, fertilizer etc

Value addition: Refers to any activity or process that enhances the value of a product through a number of ways; by increasing its shelf-life or improving accessibility / ease of sale of product, etc with or without transforming the original product.

Vulnerability: Is a state of inadequacy. A household member is vulnerable when he/she lacks adequate resources to meet their basic human wants: food, shelter, clothing etc.

Youth-Headed Household: This is a household whose main decision maker on agricultural production, marketing and consumption is a male or female person aged between 18 and 35 years irrespective of sex or marital status.

EXECUTIVE SUMMARY

This report presents the results of the household survey carried out in Homabay County to establish the pre-Programme status (or levels) for result indicators in the Agricultural Sector Development Support Programme (ASDSP) log-frame. The Programme, initiated 2012, is a sector-wide Programme implemented by the GoK in collaboration with Development Partners and other stakeholders in the agricultural sector. It is aligned to the Agricultural Sector Development Strategy (ASDS) and the Comprehensive African Agricultural Development Programme (CAADP) Kenya Compact. The ASDSP furthermore contributes to the realization of Kenya's wider development goals as expressed in the Millennium Development Goals (MDGs), Vision 2030 and Kenya's Constitution (2010).

The main purpose of ASDSP is to increase equitable income, employment and improved food security of male and female target groups as a result of improved production and productivity in the rural smallholder farm and off-farm sectors. The programme has defined its results indicators in the program log-frame which require baseline levels as part of the programme implementation strategy. A nationwide survey to establish the status of baseline levels was conducted between September and early October 2013 covering the 47 counties in the country. The survey was carried out by the Ministry of Agriculture Livestock and Fisheries (MoALF) through the ASDSP in collaboration with Kenya Agricultural Research Institute (KARI) and the University of Nairobi (UoN). A sample size of 325 households was selected whereby male-, female- and youth-headed households were 68%, 16% and 15%, respectively. The sample was determined using the proportionate to population size (PPS) technique and other parameters. Data collected was analyzed using the Statistical Package for Social Sciences (SPSS).

Results of the study show that at least 63% of the households were engaged in crop and/or livestock farming while approximately 7% were in formal salaried employment. About 70.7% of all the household heads had attained upper primary and secondary school of education. Those who had attained certificate/vocational level of education and above were 15.1%.

A typical household in the county had an average of seven members. The average farm size was 3.7 acres. About 30% of households hold title deeds, 65% owned land but did not have titles, 3% leased land, 2% used communal and 1% were squatters. On average, about 43% of the land in a household was allocated to subsistence crop production while about 33% was the homestead area.

The mean value total household income for Homabay County was KES 209, 500 while the mean value of wealth was KES 735,000. The overall mean on-farm income was KES 98,496 per year, while the overall mean off-farm income was KES 92,954 per year.

The main annual food crops grown were maize, beans, sorghum and finger millet. The perennial crops grown were sugarcane, mangoes and bananas. The overall mean maize production was 1,055 kg/acre while the overall mean bean production was 169 kg/acre. Households experienced constraints especially in acquiring seed, planting fertilizer and organic manure.

Milk was produced by local cattle, cross breed cattle and dairy goats. The overall mean milk production from cross breed cattle was 4.7 litres/cow/day while the overall mean milk production from dairy goats was 2.1 litres/doe/day. The overall egg production from local poultry was 13 eggs/hen/laying cycle. The major constraints to acquisition of various inputs for livestock production was high price of the inputs, distance to input markets, adulteration of inputs and lack of access of inputs in right packaging.

Most households indicated that they used some farm machinery/equipment in their agricultural activities. Of these, 57% indicated that they used ploughs. 36% of those who had used machinery indicated that they owned them while 52% indicated that they hired.

Value addition in cereals and pulses involved mainly grading, dehulling and making flour. In pulses, grading and dehulling were the most common value addition practices. Extracting oil from oil crops and ripening in fruits were other value addition practices. Value addition of medicinal plants involved drying and extraction while fibre crops were graded. Fodder crops were graded and chopped. Value addition of chicken involved dressing and differentiation of parts.

Twenty two percent of the households had contractual arrangements for marketing of their crop produce. Only 8% of the households had contractual arrangements for marketing of their livestock and livestock products.

The services accessed were infrastructure, financial, agricultural and climate. 46% of households mainly access agricultural-related services.

Overall, 84% of households were food insecure. The county did not meet the threshold of food security and reported four months of food insufficiency in a year.

At least 88% of sampled households practiced natural resource management on their farms. The major natural management practices known and practiced were intercropping, crop rotation and minimum tillage.

There was great gender disparity depending on the indicator under consideration.

The following recommendations are suggested so as to improve the livelihoods of the communities in Homabay County. First, explore other avenues of increasing on-farm and off farm income. Second, reduce the area under homestead and utilize it for crop or livestock production. Third, address all the constraints limiting crop and livestock production so as to increase their productivity. Finally, take into account the gender disparity and other opportunities during activities geared towards improving the livelihoods of the communities in Homabay County.

1.0 INTRODUCTION

1.1 County Profile

1.1.1 Location and size

Homabay County covers 3,183 km^2. It is located in South Western Kenya along Lake Victoria where it borders Kisumu and Siaya Counties to the North, Kisii and Nyamira Counties to the East, Migori County to the South and Lake Victoria and the Republic of Uganda to the West. (Homabay County Development Profile, 2013).

1.1.2 Administrative and political units

The County has 6 sub counties, 8 parliamentary constituencies and 40 wards, six sub-counties, 19 divisions, 116 locations and 226 sub-locations (Table 1.1).

Table 1.1: Administrative and political units, Homabay County

Sub-Counties	Constituency	Area (km^2)	No. of divisions	No. of locations	No. of sub-locations
Rachuonyo South	Kabondo Kasipul Kasipul	509.5	2	23	39
Rachuonyo North	Karachuonyo	441.2	2	23	58
Homabay	Rangwe/ Homabay Town	458.5	4	21	28
Ndhiwa	Ndhiwa	711.4	6	29	50
Mbita	Mbita	420.8	3	11	27
Suba	Suba	641.8	2	9	24
		3,183.2	**19**	**116**	**226**

Source: Homabay County Development Profile (2013)

1.1.3 Demographic characteristics

According to the Kenya Population and Housing Census conducted in 2009 (Gok, 2010), Homabay County had an estimated population of 963,794 persons (462,454 males and 501,340 females). This population was projected to be 1,038,858 consisting of 498,472 males and 540,386 females in 2012. It is also expected to rise to 1,119,769 and 1,177,181 by 2015 and 2017, respectively.

The labour force was projected to be 494,757 in 2012 representing 47.6% of the total population. This category is expected to grow to 526,929 and 549,563 by 2015 and 2017 respectively. According to the 2009 Kenya Population and Housing Census, the employed population in the county stood at about 393,374. That was about 79.5% of the labour force. Of this population, 74% are in agriculture, 11% are in wage employment, 6% are in rural self-employment and 9% are in urban self-employment. The county's labour force is projected to stand at 494,757 persons, comprising 48% of the total projected population by 2012. It is estimated that 73% of the county's population are either unemployed or under employed as at 2012. About 74% of the underemployed are involved in some form of subsistence agriculture or disguised unemployment (part time). The hard core unemployed, however, stand at about 20.5 per cent.

1.1.4 Land availability and use

The county covers two main agro-ecological zones; upper midland (UM) and lower midland (LM), which are further subdivided into seven specific zones. The zones are UM 1,3,4 and the LM 2,3,4 and 5 which are suitable for production of different agricultural commodities ranging from tea and coffee in the UM1 to livestock and millet in the LM5 (Jaetzold *et al.*, 2006). There are two rainy seasons from March to June (long rains season) and from August to November (short rains season) and the total annual rainfall received ranges from 700 to 800 mm. The rainfall received in the long rains season is 60% reliable and ranges from 250–1000 mm while 500–700 mm is received in the short rains season.

Agriculture is an important activity in this County. The average farm size is six acres, whereby small-scale farmers have four acres while large-scale farmers have 10 acres. On average, two acres are used for settlement and the balance is used for agricultural and rural development purposes. There is low incidence of landlessness estimated at three per cent as the cost of land remains low. The main crops produced in the county include maize, beans, sorghum, millet, kales, sweet potatoes and peas. The vast majority (80%) of the farmers grow maize and beans since these are considered the staple foods. The main cash crops produced in the county are sugar cane (Ndhiwa), sun flower (Suba), pineapples (Rangwe) and potatoes (Kasipul and Kabondo Kasipul). There exists huge potential for cotton in Mbita, Homabay town, Rangwe and Karachuonyo sub-counties. Large-scale farmers are found mainly in less densely populated areas where large stocks of livestock are kept. The main livestock kept in the county include zebu cattle, the red Maasai sheep, the small East African goat and indigenous chicken. Most of these livestock are bred for their sentimental value and are used only in emergencies to cover medical and transport costs, pay school fees, entertain guests and pay dowry. There exists very limited commercial development of livestock resources in the county save for promotion of dairy goats by Heifer International and Southern Nyanza Community Development Project. Fishing is the most important activity in the county with over 18,300 people and 3,600 families engaged in it. The main types of fish harvested include Nile perch, tilapia and clarias. The county has 151 landing beaches managed by 133 beach management units (BMUs). However, the county faces a challenge of declining stock of fish in Lake Victoria, drying up of water ways and worsening weather conditions.

Homabay County has two gazetted forests covering 29.6 km², namely Gwassi and Wire hills. There are eight non-gazetted forests covering about 128 km², namely Ngorome hills, Ruri hill, and Gembe hills, Mfangano, Homa Hills, Asego Hill and Kodera Forest

Homabay County has deposits of iron ore around the Homa Hills, Kendu Bay and Oyugis (Got Kanyango) and limestone around Homa Hills. Prospecting for Gold continues in areas of Ndhiwa bordering Nyatike. The county has two quarry zones in Sindo and Karachuonyo Kanyipir. Sand harvesting is also common along most rivers and a few beaches especially around Kochia and Sindo.

The county is home to Ruma National Park which hosts unique and rare species such as the roan antelope. . it also has historical monuments such as the Tom Mboya Mausoleum and natural features such as , the Mfangano Rock Art, Homa Hills Hot Spring and Simbi Nyaima. There are over 18 islands, peninsulas and bays some with unique fauna and flora and an array of physical features of aesthetic value around the lake Victoria coast line.. These present opportunities for sports and cultural tourism.

1.2 Role of agriculture in the County

The agriculture sector consists of the sub-sectors of agriculture, lands, fisheries development, livestock development, co-operative development and marketing, forestry and wildlife. The sector is the leading contributor to household income and food security in the county. Agriculture is the leading income contributor at the household level besides being the mainstay of household food security.

Agriculture employs 74% of the labour force, mostly in cottage industries and value-added agriculture and traditional subsistence agriculture as self employed businesses. . There exists huge potential for the agro-processing industry particular for processing nuts, roots and fruits such as pineapples, guavas, avocados and sunflowers. Sugar cane farming, irrigation and recent government investments in fish auction centres and expected fish processing are industries with potential in the county.

Table 1.2 shows that in terms of income generation from crops, the county received about KES 4.1 billion from the major crops, with maize and beans contributing about KES 2 billion and KES 0.9 billion, respectively. Maize and beans account for 74% of the estimated income from main crops while milk and beef generated KES 1.8 billion and KES 783 million, respectively.

Table 1.2: Crop production in Homabay County

Crop	Price/unit (KES/90kg)	Production (Tons)	Value (KES million)
Dry maize	2,341	80,538	2,095
Beans	4,693	18,180	948
Sorghum	2,298	29,321	749
Millet	2827	12,487	329
Total			**4,121**

Source: Economic Review of Agriculture, 2012

Table 1.3 shows quantities and the estimated value of output from livestock in the county

Table 1.3: Quantity and value of livestock and livestock products

Product	Unit	Quantity	Value (KES million)
Milk	L	30,670,000	1,840.2
Beef	kg	2,901,610	783.4
Egg	no	1,944,333	583.3
Poultry meat	kg	1,841,666	388.3
Honey	kg	32,018	16.0

Source: Homabay County Development Profile (2013)

Some of the challenges to agricultural production in the county are:

- Livestock diseases especially tick-borne diseases
- Low crop productivity and declining soil fertility
- Low access to input and their affordability
- Lengthy land adjudication processes
- Poor farming methods
- Environmental degradation due to poor disposal of solid waste materials and loss of land productivity
- High HIV and AIDs prevalence rate
- Poor road infrastructure
- Poor marketing systems
- Climate change resulting in reduced agricultural production
- Lack of storage coolant facilities and fishing processing plants

2.0 RATIONALE OF THE HOUSEHOLD BASELINE SURVEY

The Agricultural Sector Development Support Programme (ASDSP) is intended as a sector Programme, aligned with the Government of Kenya (GOK) commitments to the agricultural sector through the Agricultural Sector Development Strategy 2010–2020 (ASDS) and the Comprehensive African Agricultural Development Programme (CAADP) Kenya Compact. The ASDSP furthermore contributes to the realization of Kenya's wider development goals as expressed in the Millennium Development Goals (MDGs), Vision 2030 and Kenya's Constitution (2010).

The programme's overall goal is to transform Kenya's agricultural sector into an innovative, commercially orientated and modern industry that will contribute to poverty reduction, improved food security and equity. The main purpose of ASDSP is to increase equitable income, employment and improved food security of male and female target groups as a result of improved production and productivity in the rural smallholder farm and off-farm sectors'

The ASDSP supports Programme coordination within its primary outcome areas (environmentally resilient and socially inclusive value chain development and associated sector coordination) at national and county levels

ASDSP is open to contributions from interested development partners. The Current 5 year phase (2012-2016) is prepared by the Government of Kenya with the assistance of the Government of Sweden through Swedish International Development Agency, (SIDA)

The Agricultural Sector Development Support Programme, (ASDSP, 2013) has defined its results indicators in the programme log-frame but the baseline levels for these indicators are currently unavailable. A baseline survey was therefore necessary in order to establish the current status (or level) for each indicator. The baseline information for the indicators will be the guiding pillars to measure the programme's achievements and outputs. The information will also help in developing an appropriate tool for the monitoring and evaluation (M&E) of program interventions that target specific results (outputs, outcomes and impacts). Furthermore, the baseline survey will generate and develop an information base comprising the detailed relevant information of the general and targeted beneficiaries in the programme's working areas.

The specific objectives of the baseline study were:

- To collect data on and analyse the verifiable indicators from the programme log-frame
- To collect and analyze the relevant information of existing situation of programme's target beneficiaries including the poor and vulnerable groups, service providers, and/ or related stakeholders
- Enhance understanding on the characteristics and determinants of actors' activities, management practices, factors influencing their service delivery and inclusion of key stakeholders in their planning and programming.

3.0 METHODOLOGY

3.1 Approach

The survey was carried out by the Ministry of Agriculture Livestock and fisheries (MALF) through the ASDSP in collaboration with Kenya Agricultural Research Institute (KARI) and the University of Nairobi (UoN).

Both primary and secondary data collection methods were employed to gather data needed for the baseline survey. Secondary data sources comprising relevant program and sub-sector documents, County level databases and related literature were used. Primary data were collected from sampled beneficiaries in the county. The survey, which was conducted during September-October 2013, was structured and managed in a way that ensured high data quality. Specifically, the survey focused on collection of the following data:

- Household socio-economics characteristics
- Farm characteristics
- Level of production and productivity for major agricultural commodities
- Adoption and access to improved agricultural technologies
- Costs of major inputs used and prices received from selling major commodities
- Index of labour availability and wage rates paid for farm and off-farm work
- Access and use of machinery and various equipment in farm operations
- Pre-harvest and post-harvest food losses and main causes
- Quantities of major commodities consumed and marketed
- Level of primary target groups' engagement in agro-enterprises
- Extent of primary target groups' access to productive assets disaggregated by gender and vulnerability
- Extent of primary target groups' involvement in local farmer organizations
- Extent of access to social protection services
- Extent of involvement by different gender categories in decision making at the local level
- Average and disaggregated (male and female-headed) household on-farm income
- Average and disaggregated (male and female-headed) household off-farm income
- Level of food and nutrition security in both male and female-headed households
- Household asset ownership index by gender and vulnerable groups
- Level of farmers' membership in local farmer organizations, by gender and vulnerability
- Extent to which primary target groups' (by gender and vulnerability) are addressing their production and marketing needs through horizontal organizations
- Extent to which primary target groups' access financial (credit) and insurance services and prevalence of savings
- Prevailing climate-related risks, the extent of primary target groups' awareness of climate-related risks, level of response to climate-related risks

The approach used for collecting these data involved the following steps:

- Defining the sample, identification of the respondents and gauging their accessibility
- Reflecting on the research design and collection of secondary data

- Preparation of research instruments and recruitment/training of survey supervisors who were to be responsible for data collection and entry
- Obtaining permission for data collection from the relevant authorities. This was done through the county committees
- Pre-testing and revisions of instruments
- Sampling, geo-referencing sampled households, recruitment/training of Geographical Information System (GIS) mappers and identification of sampled households
- Recruitment/training of enumerators and collection of primary data
- Data entry and analysis
- Report preparation
- Validation of information in the report at county level

3.2 Sampling procedure

The Homabay County baseline survey was part of a larger national survey covering all the 47 counties with an overall sample of 12,651 agricultural households. Using a Proportionate to Population Size (PPS) sampling method, a sample size of 325 households was selected out of 2,179 agricultural households in the county. Figure 3.1 shows the areas of Homabay County selected for the household baseline survey and the locations of the randomly sampled households which were geo-referenced. The survey was confined to the prominent production systems (agro-ecological zones) and the county sample size was randomly distributed to those areas based on the population density of each production system.

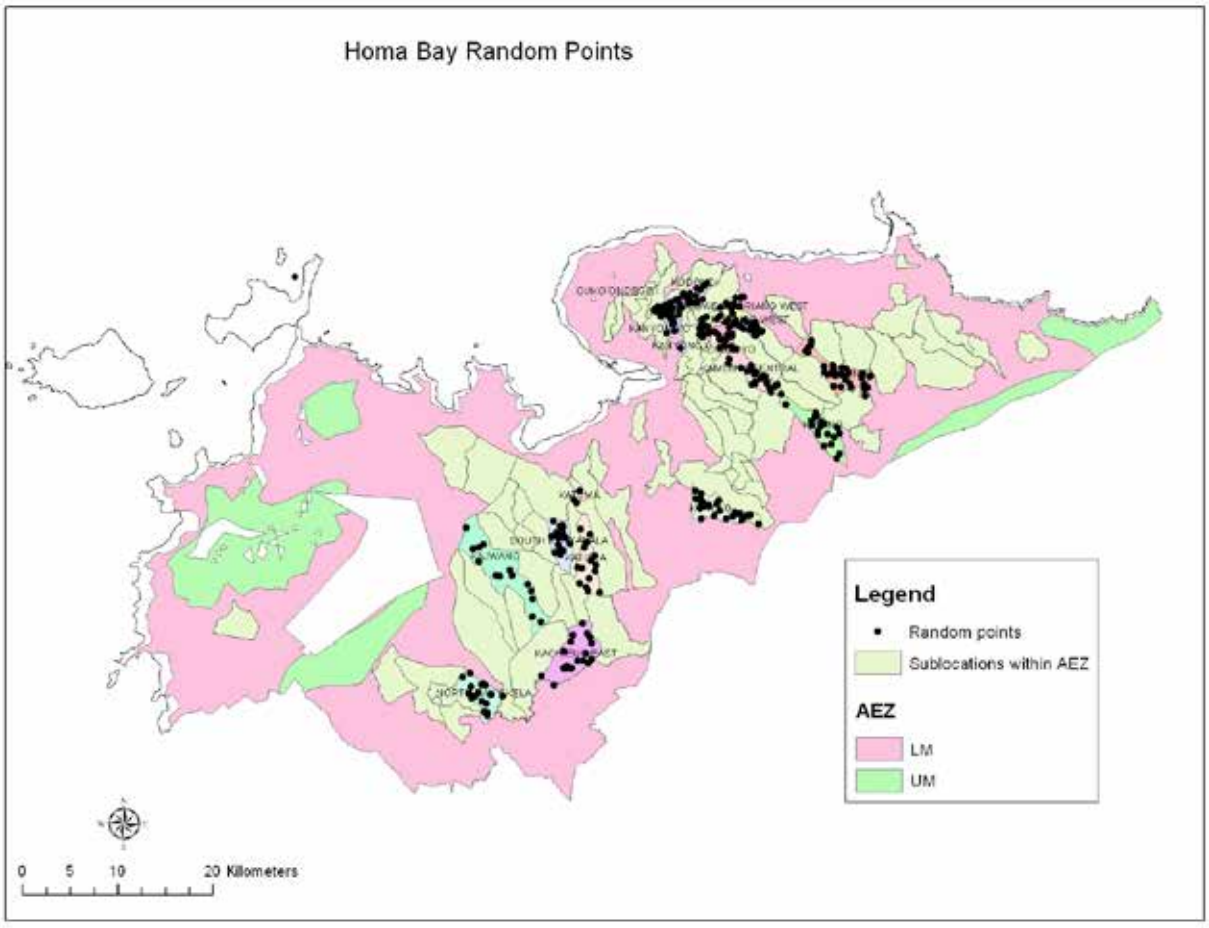

Figure 3.1: Map of Homabay County showing the sampled household locations

3.3 Data collection and Analysis

Prior to data collection, local county supervisors were sensitized on the objectives, scope and expected logistics for the planned survey. Enumerators and data entry clerks were recruited and trained on the survey instrument (questionnaire).

All households were geo-referenced by the GIS mappers who had earlier been recruited and trained. The mapping of households was done prior to the actual data collection. Thereafter, data were collected by enumerators using a structured questionnaire during late September to early October 2013. Data entry was done at KARI Kisii using Microsoft Excel software and later exported to the Statistical Package for Social Sciences (SPSS) which was used for data analysis. During data analysis, results were summarized using descriptive statistics (frequencies, means, measures of dispersion) and other relevant statistics. In this report, area is expressed in acres, where 1 acre = 0.4047 hectares. With regard to gender, adult male or female is a person more than 35 years old, while youth is a male or female 18 to 35 years old.

4.0 SURVEY RESULTS

This chapter presents the results of the various analyses done from the sample survey data. The results presented focus mainly on the current status or levels of the various indicators in the ASDSP log-frame.

4.1 Household socioeconomics and farm characteristics

4.1.1 Household size and gender

Most of the households were male headed (68%) while female and youth headed households were 16% and 15% respectively. A typical household in the county had an average of seven members. Disaggregated by gender, household mean size of male headed households was seven while those of the female headed and youth headed households was six each. The proportion of sex of household members did not differ with 50% males and 50% females. The mean age of household head was 55 years for male headed households, 53 years for female headed households and 31 years for youth headed households.

4.1.2 Level of education

The education level of the head of household to some extent usually influences agricultural decisions such as adoption of new technologies, investment levels including ability to take risks in making decisions. Table 4.1 shows the education levels of the household heads. About 70.7% of all the household heads had attained upper primary and secondary school of education. Those who had attained certificate/vocational level of education and above were 15.1%.

Table 4.1: Level of education attained by household head

Level of education	Proportion (%) of household heads			
	Adult male (n=222)	Adult female (n=53)	Youth (n=50)	Total (n=325)
No education	4.9	4.3	0.3	9.5
Lower primary	3.4	0.9	0.3	4.6
Upper primary	27.7	9.2	8.3	45.2
Secondary	19.4	0.9	5.2	25.5
Certificate/vocational/craft	8.3	0.9	0.9	10.2
Diploma/higher national diploma	3.7	0.0	0.0	3.7
Tertiary	0.9	0.0	0.3	1.2
Total	**68.3**	**16.3**	**15.4**	**100**

NOTE: Data are expressed as proportion of total sample (n= 325)

4.1.3 Primary occupation of household heads

About 60% of male headed, 81% female headed and 60% of youth headed households were involved in farming. At least 63% of the households were engaged in crop and/or livestock farming while approximately 7% were in formal salaried employment (Table 4.2).

Table 4.2: Primary occupation of household head

Occupation	Proportion (%) of household heads engaging in the occupation			
	Adult male (n=213)	Adult female (n=52)	Youth (n=47)	Overall (n=312)
Crop and /or livestock farming	59.6	80.8	59.6	63.1
Formal salaried employment	9.4	1.9	4.3	7.4
Self-employed business – trade/ services)	9.4	5.8	25.5	11.2
Farm labourer on other farm	1.4	1.9	2.1	1.6
Old/Retired /Pensioner	8.5	0.0	0.0	5.8
Livestock and livestock product trading	0.0	0.0	4.3	0.6
Other occupation	11.7	9.6	4.3	10.3
Total	**100**	**100**	**100**	**100**

4. 1.4 Household members with chronic illness, incapacitated or under social protection

Out of the sample households, 19% of the households reported having members with chronic illness, incapacitated or under social protection. Disaggregated by gender, 20.3% male headed, 11.3% female headed and 22% youth headed households reported having members with chronic illness condition in their households.

4. 1.5 Land ownership and access

The average farm size was 3.7 acres (n=325), disaggregated by gender, 4.1, 2.7 and 3.1 acres for adult male, adult female and youth headed households, respectively. On average most households owned and/or accessed three parcels of land. The joint access to land by household head and spouse was the most common among the respondents. The average distance of land parcels from where the homestead was located ranged from 0 (at the homestead) to 0.7 km (for other parcels of land owned). For the parcel of land where the homestead was located, 90% of the land was owned by the household head and/or spouse (Table 4.3). A similar trend was observed for other parcels.

Table 4.3: Ownership of different parcels of land accessed by the households

Parcel of land no./head	Owner of parcel (%)				
	Household head and / or spouse	Rented in	Communal	Relative non-household member	Joint household member and relative
Land parcel 1 (n=313)	90.1	0.3	1.9	1.6	6.1
Male (n=213)	93.4	0.5	0.9	1.4	3.8
Female (n=53)	86.8	0.0	5.7	1.9	5.7
Youth (n=47)	78.7	0.0	2.1	2.1	17.0
Land parcel 2 (n=225)	88.4	1.8	2.7	1.3	5.8
Male (n=159)	91.2	1.9	1.3	1.9	3.8
Female (n=31)	90.3	0.0	6.5	0.0	3.2
Youth (n=35)	74.3	2.9	5.7	0.0	17.1
Land parcel 3 (n=158)	82.9	5.1	1.9	0.6	9.5
Male (n=113)	87.6	4.4	0.9	0.9	6.2
Female (n=20)	75.0	5.0	10.0	0.0	10.0
Youth(n=25)	68.0	8.0	0.0	0.0	24.0

The access/use of land parcel where the homestead was located (parcel 1) was 47% by household head (HHH), 33.3% by HHH and spouse, 12.7% by the spouse and 7% by household member and relative (Table 4.4). In a majority of the cases, the land was accessed by the household head jointly with the spouse.

Table 4.4: Access to different parcels of land by household members

Parcel no.	Degree of access (%) to different parcels of land by various heads						
	Head of household (HH)	Spouse of HH	HH and spouse	Household member and relative	Male relative	Female relative	Non-relative (male)
Land parcel 1	47.0	12.7	33.3	7.0	-	-	-
Land parcel 2	46.4	16.4	28.6	7.7	0.5	-	0.5
Land parcel 3	48.4	16.3	23.5	9.8	2.0	-	-

4.1.6 Land Tenure

About 94% of households owned land (30% with title and 65% owned but no title). Disaggregated by gender, 95.0% of male headed households owned land, 95.3% of female headed households and 89.1% of youth headed households owned land. Of these, about 30% of households held title deeds, 65% owned land but did not have titles, 3% leased land, 2% used communal and 1% were squatters. Those who did not have formal titles were 60.0% of male headed households, 81.3% of female headed households and 69.1% of youth headed households (Table 4.5).

Table 4.5: Proportion (%) of land tenure system, by gender

Tenure system	Proportion by gender of household head			Overall (n=325)
	Adult male (n=222)	Adult female (n=53)	Youth (n=50)	
With title deed/allotment letter	35.0	14.0	20.0	29.5
Owned but no formal title	60.0	81.3	69.1	64.8
Leased/Rented in	2.4	1.9	5.5	2.8
Communal	1.6	1.9	2.7	1.8
Squatters	0.6	0.9	2.7	1.0

For the land parcel where the homestead was located, the most common land tenure was ownership without formal documents with 61%, 79% and 69% for male adult, female adult and youth headed households, respectively. This indicated that more than half the households could not borrow or undertake investments using their land as collateral. The land where the homestead was located was rarely/leased/rented (Table 4.6).

Table 4.6: Land tenure system of different parcels of land owned by the household

Parcel of land no./ Head	Proportion (%) of households under system				
	Formal title or allotment letter	Owns but has no formal document	Lease/ Rented in	Has communal rights to use land	Has land considered as own but not allocated (squatters)
Land parcel 1 (n=318)	31.0	67.0	1.0	1.0	2.0
Male (n=217)	35.9	61.3	0.9	0.9	0.9
Female (n=53)	17.0	79.2	1.9	0.0	1.9
Youth (n=48)	20.8	68.8	2.1	4.2	4.2
Land parcel 2 (n=231)	29.0	66.0	2.0	2.0	1.0
Male (n=163)	33.7	62.0	1.8	1.8	6.0
Female (n=32)	12.5	84.4	0.0	3.1	0.0
Youth (n=36)	19.4	69.4	5.6	2.8	2.8
Land parcel 3 (n=159)	29.0	62.0	7.0	3.0	0
Male (n=111)	0.0	35.1	55.9	6.3	2.7
Female (n=22)	0.0	9.1	81.8	4.5	4.5
Youth (n=26)	0.0	19.2	69.2	11.5	0.0

4.1.7 Allocation of land for different uses

Most of the land in the county was allocated to subsistence crop production (43%) and homestead (33%). Adult males allocated 43.3% to subsistence crop production while adult females and youth allocated 43.2% and 38.9% of land, respectively On average, unused land constituted 5.3% of the land owned, with male, female, and youth headed households at least 6.7%, 1.5% and 0.8% respectively. The proportion of land under woodlot was less than 1%. (Table 4.7).

Table 4.7: Allocation of land to different uses by different household types

Land use type	Proportion (%) of land allocated, by gender of household head			
	Adult male	Adult female	Youth	Overall
Homestead	33.4	32.6	33.5	33.3
Subsistence crop production (i.e. for household consumption)	43.3	43.2	38.9	42.8
Commercial crop production (i.e. for marketing)	7.9	10.3	12.9	8.8
Improved pastures/forages production	0.9	0.6	3.6	1.2
Natural pastures	6.7	10.7	10.2	7.7
Woodlot	1.0	1.2	0.0	0.9
Unusable land (swampy, rocky, hilly)	6.7	1.5	0.8	5.3

4.2 Production and use of inputs in crops, livestock and fisheries

4.2.1 Use of labour in crop and livestock production

Figure 4.1 shows the labour contribution in crop and livestock production, disaggregated by gender. The youth provided the least of family labour in crop production, while the adult females provided the most. The pattern of family labour use in livestock production was slightly different. The youth contributed the highest share of labour. Hired labour for livestock production was dominated by youth.

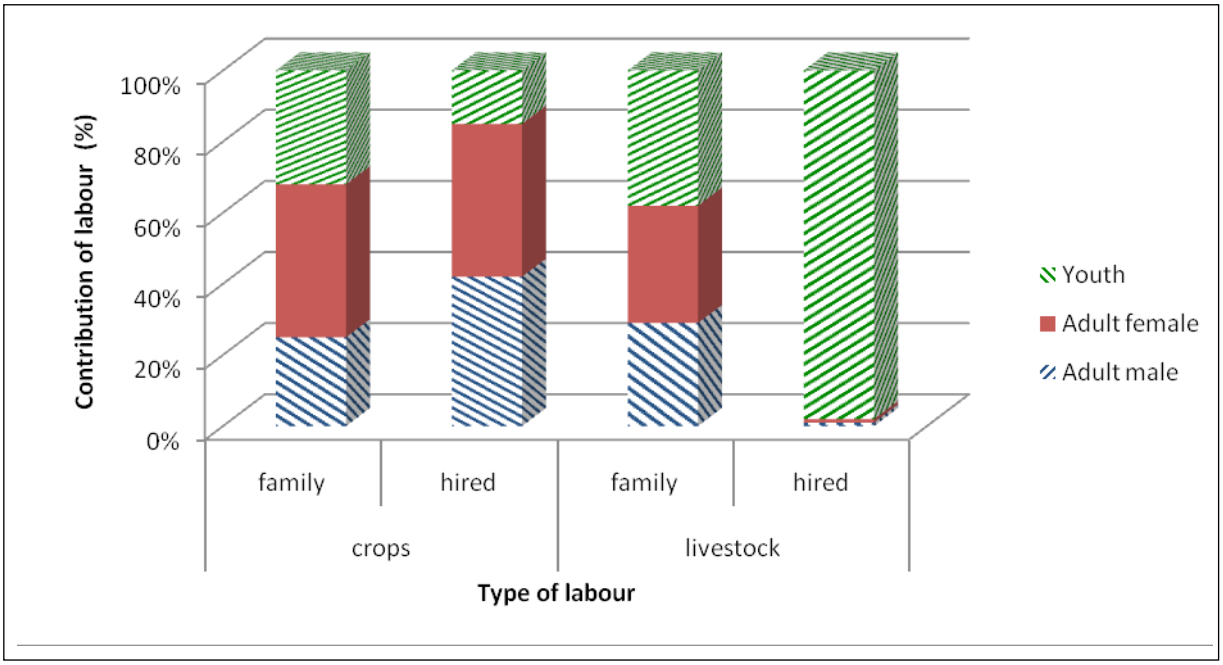

Figure 4.1: Contribution (%) of labour in crop and livestock production, by gender

4.2.2 Use of agricultural inputs, rates, costs and challenges

4.2.2.1 Use of inputs for different annual crops during Season one

Figure 4.2 presents level of household use of crop varieties in Season one. There was no difference among male headed and female headed households in the type of seed used for the priority crops grown in season one. At least 60% of respondents who grew grains used local seed in both seasons while only 20% of those who grew tubers used improved seed. 40% cent of respondents used improved varieties of vegetables such as kales.

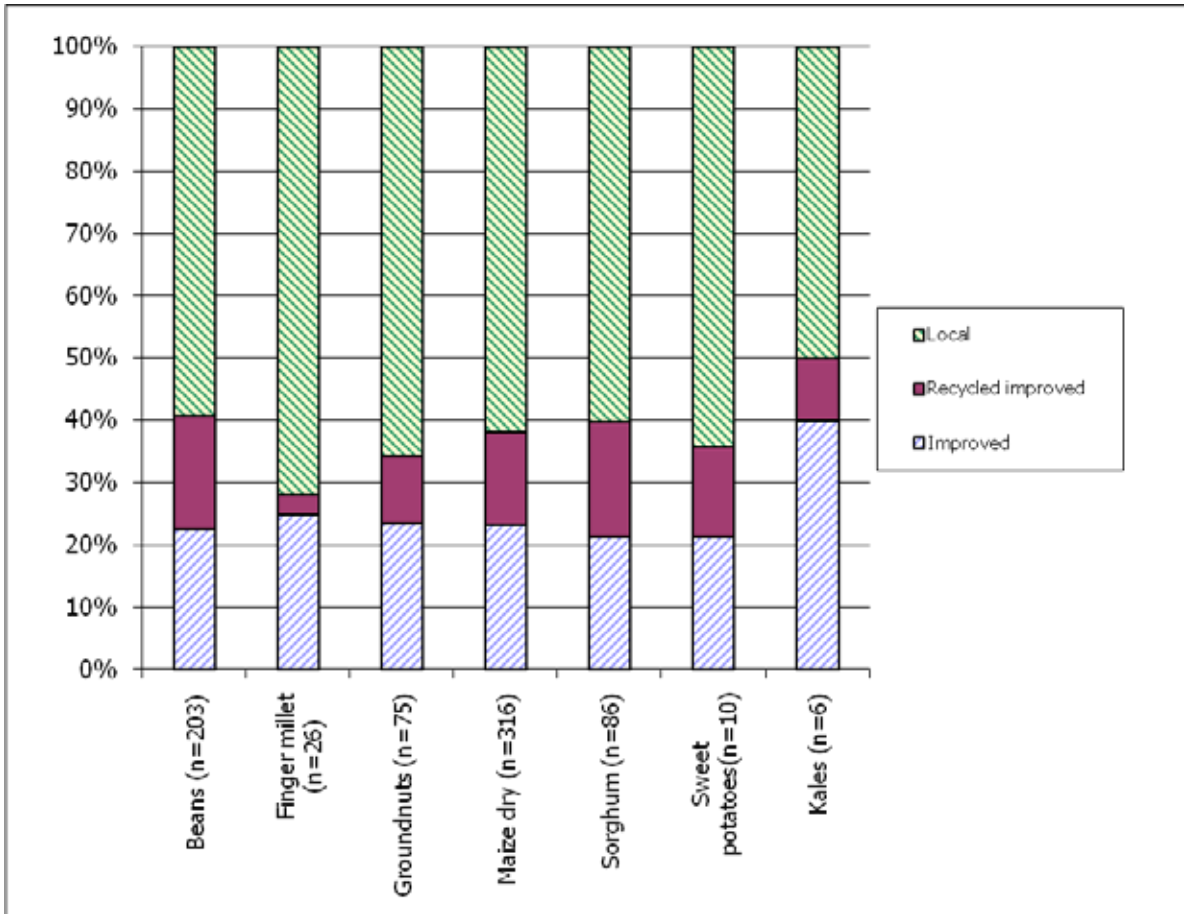

Figure 4.2: Proportion (%) of households using different seed types dur ing Season one

Table 4.8 presents households, disaggregated by gender, who used various types of agricultural inputs in farming activities. Use of planting materials was at least 84%. However, with the exception of basal fertilizer and organic manure which had adoption rates over 15%, the other management practices had low adoption rates (less than 10%).

Table 4.8: Household use, of various inputs in annual crops during Season one

Input used	Gender of household head (HH)						Overall (n =325)
	Adult male		Adult female		Youth		
	% within Male HH (n=222)	% of total HH	% within Female HH (n=52)	% of total HH	% within Youth HH (n=50)	% of total HH	
Improved Seed/ planting material	85.6	58.5	86.5	13.8	74.0	11.4	83.7
Herbicides	0.5	0.3	0.0	0.0	0.0	0.0	0.3
Basal fertilizer	18.9	12.9	23.1	3.7	6.0	0.9	17.5
Top dress fertilizer	7.7	5.2	1.9	0.3	4.0	0.6	6.2
Organic manure	19.8	13.5	5.8	0.9	18.0	2.8	17.2
Foliar feed	0.0	0.0	0.0	0.0	4.0	0.9	0.6
Field pesticides	0.5	0.3	0.0	0.0	0.6	0.6	0.9
Storage pesticides	3.2	2.2	5.8	0.9	6.0	0.9	4.0

4.2.2.2 Decision-making in production of annual crops during Season 1

Decision-making depended on the type of crop. Among the crops listed in Table 4.9, males dominated in making decision for market oriented crops such as green grams, beans, kales, and maize. However, females appeared prominent in groundnuts and sweet potatoes which are also market oriented.

Table 4.9: Decision-making in production of annual crops during season 1

Crop	Level of decision-making (%) by gender				
	Sample size (n)	Adult male	Adult female	Youth male	Youth female
Maize, dry	747	47.5	43.6	5.8	3.1
Beans (common)	531	47.6	42.7	6.4	3.2
Finger millet	77	49.4	46.8	3.9	0.0
Sorghum	114	47.9	46.2	3.8	2.1
Groundnuts	218	46.3	46.8	2.8	4.1
Green grams	21	52.4	47.6	0.0	0.0
Sweet potatoes	28	35.7	42.9	10.7	10.7
Kales	18	47.9	46.2	3.8	2.1

4.2.2.3 Use of inputs in different annual crops during Season two

Figure 4.4 presents the levels of use of crop varieties by households in Season two. Over 60% of households growing beans, finger millet, groundnuts, maize and sorghum used local varieties. Less than 25% of respondents used improved maize seed while about 45% grew improved varieties of kales.

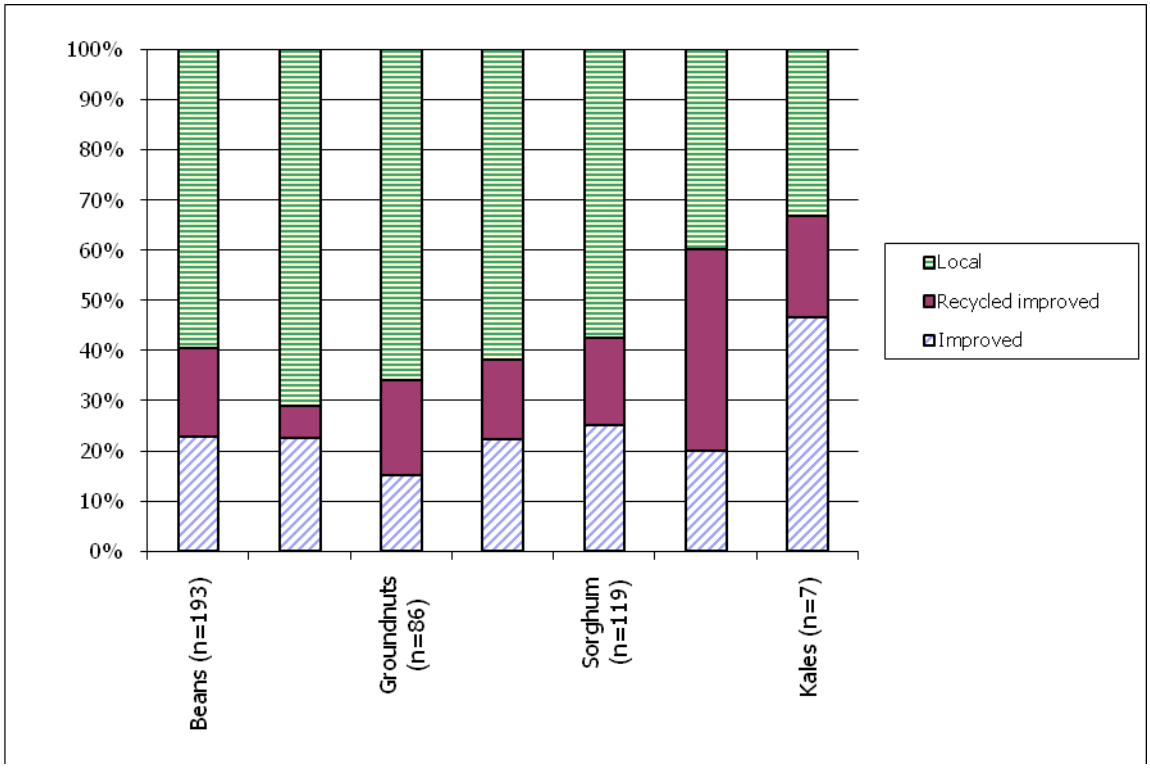

Figure 4.4: Household use of different seed types during Season 2

Table 4.10 shows that more males than females used planting material, top dress fertilizer and organic manure in season two. Apart from planting material, adoption rates were low in all inputs among gender categories. Adoption was higher among females headed households than males headed and youth headed households for herbicides and storage pesticides. None of the households reported using irrigation water in production of crops during the second season.

Table 4.10: Household use various inputs in annual crops during Season 2

Input used	Gender of household head (HH)						Overall (n=325)
	Adult male		Adult female		Youth		
	% within adult male HH (n=222)	% of total HH	% within adult female HH (n=53)	% of total HH	% within youth HH (n=50)	% of total HH	
Improved Seed/ planting material	81.5	55.7	16.9	13.5	80.0	12.3	81.5
Herbicides	0.5	0.3	1.9	0.3	0.0	0.0	0.6
Basal fertilizer	18.0	12.3	18.9	3.1	2.0	0.3	15.7
Top dress fertilizer	7.2	4.9	0.0	0.0	2.0	0.3	5.2
Organic manure	18.9	12.9	11.3	1.8	20.0	3.1	17.8
Foliar feed	0.5	0.3	0.0	0.0	0.0	0.0	0.3
Field pesticides	1.4	0.6	0.0	0.0	2.0	0.3	.09
Storage pesticides	1.4	0.9	3.8	0.6	4.0	0.6	2.2

Table 4.11 shows levels of input use for selected annual crops. Use of organic manure in growing crops was common while use of top dress fertilizer was minimal. Planting fertilizer was more common in maize compared to other crops.

Table 4.11: Levels of input use at farm level for annual crops,

Input/Crop	Season	Quantity used (kg/household) by household head			
		Adult male	Adult female	Youth	Overall
Seed					
Dry Maize	Season 1	48.1	19.5	31.4	42.8
	Season 2	54.9	13.3	15.1	42.0
Common beans	Season 1	20.5	28.0	62.3	26.1
	Season 2	37.1	9.6	8.2	28.8
Sorghum	Season 1	113.8	0.0	105.0	113.0
	Season 2	47.2	32.4	43.6	44.8
Planting fertilizer					
Dry Maize	Season 1	163.8	10.8	2.8	121.8
	Season 2	136.7	141.8	20.3	130.9
Common beans	Season 1	9.9	50.0	0.0	12.3
	Season 2	30.8	50.0	0.0	32.1
Sorghum	Season 1	20.8	16.0	0.0	20.1
	Season 2	21.3	140.0	0.0	193.6
Topdressing fertilizer					
Dry Maize	Season 1	28.5	1.0	6.0	24.7
	Season 2	130.0	3.0	10.0	116.3
Common beans	Season 1	1.0	0.0	0.0	1.0
	Season 2	50.0	0.0	0.0	50.0
Sorghum	Season 1	1.0	0.0	0.0	1.0
	Season 2	6.7	0.0	0.0	6.7
Organic manure					
Dry Maize	Season 1	48.1	19.5	31.4	42.8
	Season 2	1,481	2,328.6	2,013.3	1,648.0
Common beans	Season 1	20.5	28.0	62.3	26.1
	Season 2	1,228.6	1200	0.0	1,227.1
Sorghum	Season 1	113.8	0.0	105.0	113.0
	Season 2	754.4	0.0	107.0	718.4

Use of planting fertilizer was restricted to cassava and sugarcane by male households only (Table 4.12). None of the households reported using top dressing fertilizer on their perennial crops. However, organic manure was applied in growing coffee, cassava, sugarcane and mangoes. The youth headed households applied manure on sugarcane and mango crops only while adult female headed households applied organic manure in cassava and bananas crops only.

Table 4.12: Level of input use for perennial crops at farm level,

Input/Crop	Quantity of input used by household head			
	Adult male	Adult female	Youth	Overall
Planting Fertilizer (kg)				
Cassava	2.0	-	-	2.0
Sugarcane	12.0	-	-	12.0
Organic Manure (kg)				
Coffee	80.0	-	-	80.0
Cassava	1,533.3	800.0	-	1,350.0
Bananas	330.0	800.0	-	424.0
Sugarcane	2,480.0	-	2,000.0	2,400.0
Mangoes	20.0	-	69.0	44.5

4.2.2.4 Level of decision-making in production of annual crops during Season two

The main decision makers in production of annual crops in season two were adult males followed by adult females. Males dominated in decision making for most of the crops with adult females making most decisions on kales and sweet potatoes. The women appear therefore to make decision on crops that were important for meeting the subsistence needs of the households while market oriented crops seems like the domain of men. (Table 4.13)

Table 4.13: Decision-making levels in annual crop production during Season 2

Crop	Sample size (n)	Proportion (%) of decision-making by household head			
		Adult male	Adult female	Youth male	Youth female
Maize , dry	750	51.6	41.6	4.9	1.9
Beans (common)	518	52.7	40.7	4.6	1.9
Groundnuts	241	49.4	44.0	3.3	3.3
Sorghum	319	51.7	43.6	3.4	1.3
Finger millet	73	52.1	43.8	4.1	0.0
Kales	21	9.0	33.3	33.3	14.3
Green grams	21	47.6	38.1	14.3	0.0
Sweet potatoes	17	47.1	52.9	0.0	0.0

4.2.2.5 Use of inputs for different perennial crops

Table 4.14 presents the proportion of households using various types of agricultural inputs in farming activities for perennial crops. Among the farmers who grew perennial crops, only 3.7% applied organic manure to their crops, while none used top dressing fertilizers. Irrigation water was not used in perennial crop production, while herbicides, foliar sprays and field pesticides were hardly used(Table 4.14).

Table 4.14: Use of inputs in perennial crop production

Input used	Gender of the household head						
	Adult male		Adult female		Youth		
	% within Male HH (n=222)	% of total	% within female HH (n=53)	% of total	% within youth HH (n=50)	% of total	Overall (n=325)
Improved Seed/planting material	27.9	19.1	26.4	4.3	28.0	4.3	27.7
Herbicide	0.5	0.3	0.0	0.0	0.0	0.0	0.3
Planting fertilizer	1.1	0.9	0.0	0.0	0.0	0.0	0.9
Organic manure	3.8	3.1	3.3	0.6	4.0	0.6	3.7
Foliar spray	0.5	0.3	0.0	0.0	0.0	0.0	0.3
Pre-harvest pesticides	0.4	0.3	0.0	0.0	0.0	0.0	0.3

4.2.2.6 Main decision-maker in production of perennial crops

With the exception of tissue culture cassava and multi-purpose trees (Table 4.15), most of the decisions relating to perennial crops were made by adult male.

Table 4.15: Decision-making in perennial crop production,

Crop grown	Sample size (n)	Proportion (%) of decision-making by household head			
		Adult male	Adult female	Youth male	Youth female
Bananas	32	68.8	18.8	6.3	6.3
Sugarcane	124	75.8	14.5	8.1	1.6
Mangoes	6	66.7	33.3	-	-
Coffee	2	100.0	0.0	-	-
Avocado, grafted	2	100.0	-	-	-
Cassava, tc	2	-	100.0	-	-
Multi-purpose trees, tc	2	-	100.0	-	-

4.2.2.7 Constraints to input use in crop production

Table 4.16 shows that households experienced constraints especially in acquiring seed (77%), planting fertilizer (19%) and organic manure (11%). Proportionally, youth headed households reported the most number of constraints.

Table 4.16: Households encountering major constraints in input use

Input	Proportion (%) of household heads using input			Overall (n=325)
	Adult male	Adult female	Youth	
Improved seeds	79.3	69.8	74.0	76.9
Basal fertilizer	19.4	15.1	20.0	18.8
Top dress fertilizer	7.7	9.4	10.0	8.3
Herbicide	4.9	5.7	6.0	5.2
Organic manure	11.3	5.7	18.0	11.4
Irrigation water	1.4	0.0	6.0	1.8
Foliar feed	1.4	0.0	10.0	2.5
Field pesticides	5.0	0.0	8.0	4.6
Storage pesticides	3.2	0.0	8.0	3.4

4.2.2.8 Constraints on using inputs in crop production

The main constraints encountered across all inputs were high prices and lack of access to inputs at the right times. Other constraints were lack of desired brands, ineffectiveness of inputs and distance to input market (Figure 4.5).

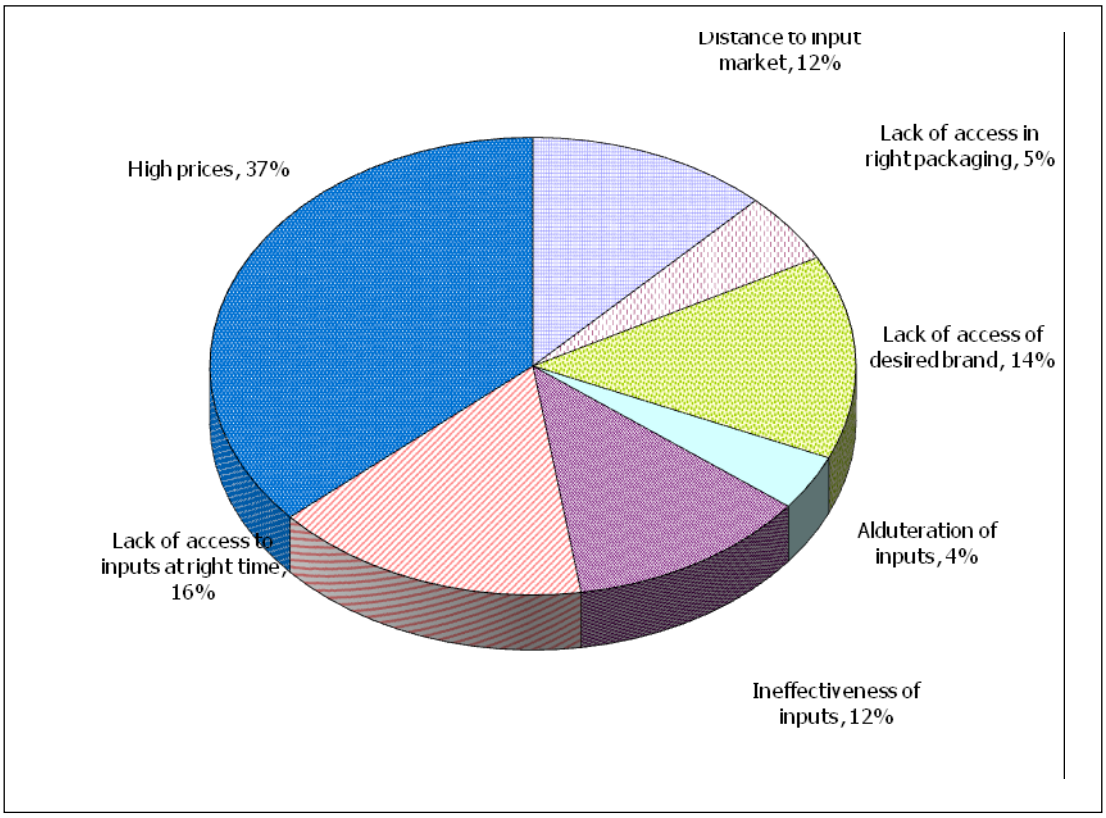

Figure 4.5: Main constraints in the use of inputs for major crop production

4.2.3: Use of purchased inputs in livestock production

The use of inputs in livestock production was low on average. (Table 4.17). The most commonly used inputs were acaricides (38%), dewormers (37%) and vaccines (33%). Less than 1% of respondents used Artificial Insemination (AI) in upgrading livestock and concentrates in feeding livestock. Proportionately, more male adult headed households used livestock inputs than either female adult headed or youth headed households. However, more youth headed households used fodder, vaccines and other veterinary drugs compared to male headed and female headed households.

Table 4.17: Proportion of households (by gender) using various inputs in livestock production

Input used	Use of inputs by gender of household head						
	Adult male		Adult female		Youth		
	% within male HH (n=222)	% of	% within female HH (n=53)	% of total	% within youth HH (n=50)	% of total	Total (n =325)
Artificial insemination (semen)	0.9	0.6	0.0	0.0	0.0	0.0	0.6
Concentrates/animal feeds	1.4	0.9	0.0	0.0	0.0	0.0	0.9
Acaricides (dipping/spraying)	41.0	28.0	32.1	5.2	28.0	4.3	37.5
Mineral supplements (salts)	9.0	6.2	1.9	1.2	8.0	1.2	7.7
De-wormers	37.8	25.8	32.1	5.2	36.0	5.5	36.6
Vaccines	32.9	22.5	32.1	5.2	34.0	5.2	32.9
Fodder/hay/silage/crop Residue	2.7	1.8	5.7	0.9	4.0	0.6	3.4
Other veterinary drugs	19.8	13.5	24.5	4.0	24.0	3.7	21.4
Water	5.0	3.4	0.0	0.0	4.0	4.0	4.0

4.2.3: Decision-making in livestock production, by gender

Table 4.18 shows that apart from chicken, adult males made most of the production decisions on all types of livestock. Most decisions in regard to chicken were made by adult females.

Table 4.18: Decision-making on livestock production for different species

		Level (%) of decision-making by household head		
Livestock species	Sample size (n)	Adult male	Adult female	Youth
Cattle	172	72.7	18.6	8.7
Goats	60	70.0	25.0	5.0
Sheep	53	58.5	28.3	13.2
Chicken	171	33.9	53.8	12.3
Other poultry	4	50.0	25.0	25.0

4.2.5: Constraints to using inputs in livestock

The major constraint to acquisition of various inputs for livestock production was high price of the inputs (47%), followed by distance to input market (Table 4.19). other constraints were adulteration of inputs (6%) and lack of access of inputs in right packaging (5%).

Table 4.19: Major constraints on using inputs for livestock

Constraint to livestock production	Proportion (%) of household head experiencing constraint(n=325			
	Adult male	Adult female	Youth	Overall
High prices/Affordability	30.2	9.1	7.5	46.8
Unavailability of inputs	3.9	0.3	0.3	4.4
Distance to input market	6.6	3.0	2.2	11.9
Lack of access of inputs in right packaging/dosage	3.3	0.8	1.1	5.3
Lack of access to inputs at the right time (lateness)	3.6	0.8	0.3	0.7
Ineffectiveness of inputs	0.3	0.8	0.3	4.7
Adulteration of inputs	5.0	0.6	0.8	6.4
Lack of access of the desired brand/ type of input	0.8	0.6	0.3	1.7

4.2.6 Use of machinery in farming activities

4.2.6.1 Type of machinery/equipment used

Most households indicated that they used some farm machinery/equipment in their agricultural activities. Of these, 47 respondents indicated that they owned tractors while 80 hired tractors for their farm activities. animal draught power was owned by 23 respondents and hired by 31. Other machinery and equipment used were few. They included carts, generators, and chaff cutters as shown in Table 4.20.

Table 4.20: Type and source of machinery/equipment

	Ownership of machine/equipment (by number of responses; n=289)			
Type of machinery	**No. owned by HH**	**No. owned communally**	**No. hired**	**overall no.**
Tractor	47	15	80	142
Plough	19	12	27	58
Harrow	7	1	9	17
Pump	1	0	0	1
Planter	0	0	1	1
Draught power animals Oxen donkeys	23	9	31	63
Tractor trailer	1	0	0	1
Ox/donkey cart	2	0	1	3
Generator	1	0	0	1
Posho mill	1	0	0	1
Chaff cutter	1	0	0	1

4.2.6.2 Types of activities mechanized

The main farm activities in which machinery was used were ploughing (53%) followed by harrowing (35%). Other mechanized activities were planting, carrying/transportation and milking (Figure 4.6). The charges for ploughing were KES 2,270 per acre while those for harrowing were KES 1,500 per acre.

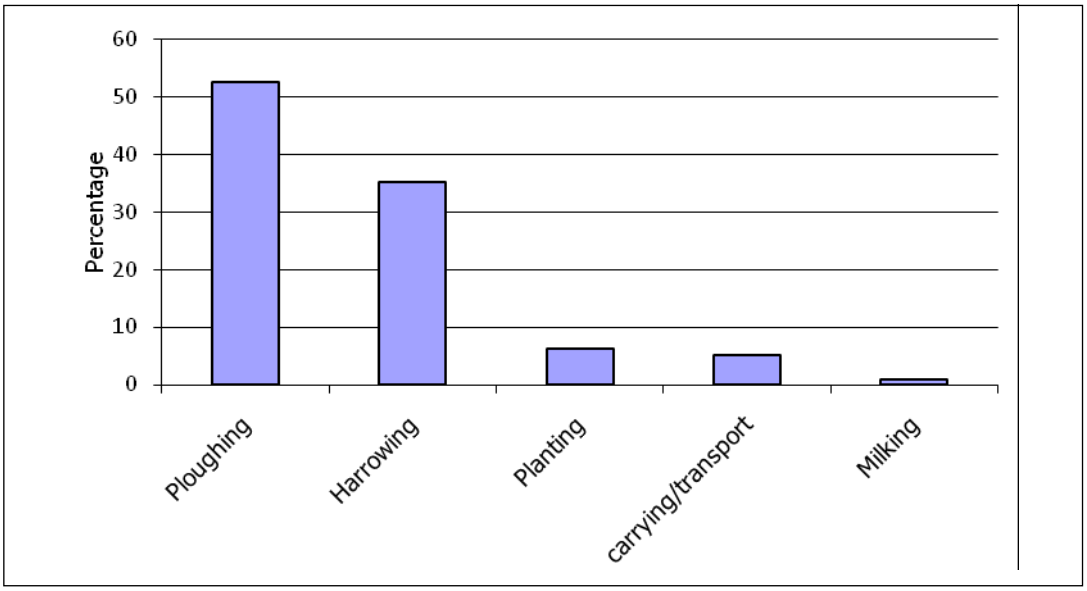

Figure 4.6: Activities mechanized

Figure 4.7 shows that the main source of machinery or equipment for use on the farm was hired (52%). Those who used their own machinery were 36% of the households. Some machinery was owned communally.

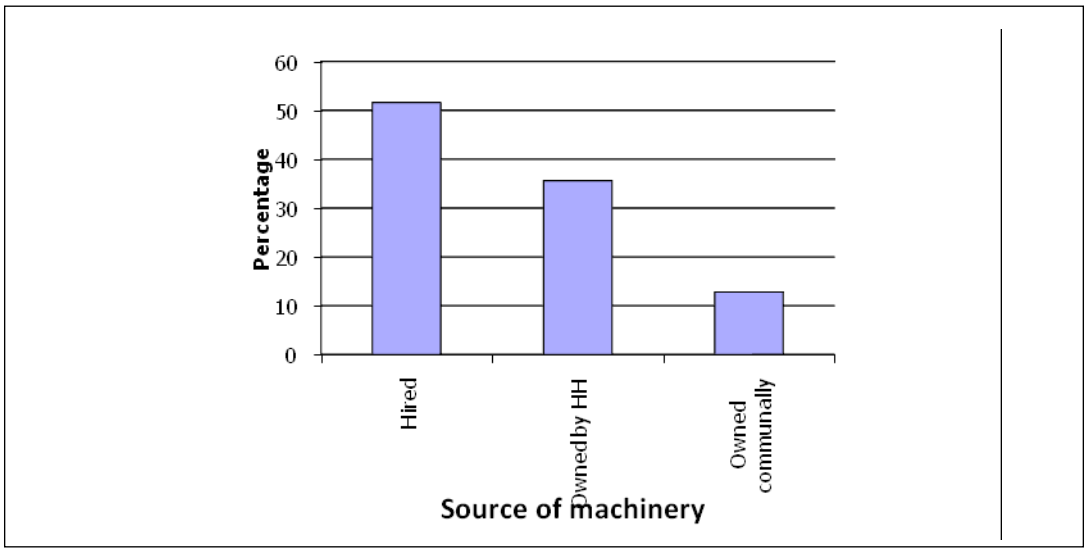

Figure 4.7: Main sources of machinery

4.2.7: Input distribution networks and levels of satisfaction

4.2.7.1 Access to the nearest agricultural related services and infrastructure

The results in Figure 4.8 indicate that male head households had better access to agricultural services, climate information, finance and infrastructure compared to female headed and youth headed households.

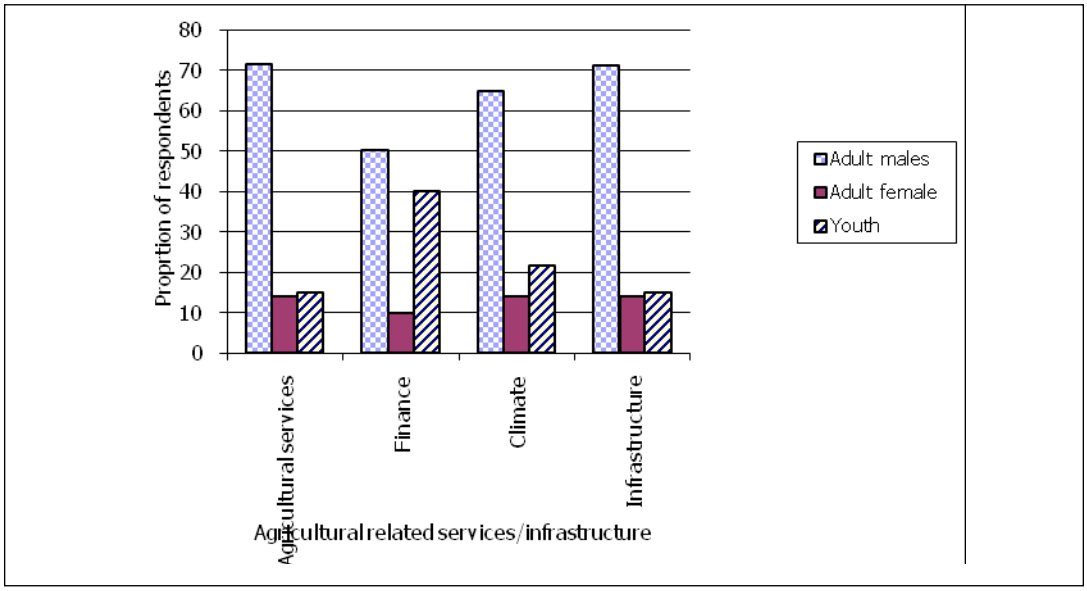

Figure 4.8: Proportion (%) of households accessing different services

Table 4.21 indicates households' access to agriculture-related services and infrastructure. Among the households that accessed the different services, at least 53% accessed from the public sector, while 47% accessed the services and/or infrastructure from private sector institutions. Climate related services were mainly accessed from the private sector (Table 4.21).

Table 4.21: Access to agriculture-related services and infrastructure

Agriculture related services/infrastructure	Degree of access (%) by household head				Overall
	Institution type	Adult male	Adult female	Youth	
Agricultural services	Public	48.6	35.0	66.7	49.7
	Private	51.4	65.0	33.3	50.3
Infrastructure	Public	58.3	45.8	61.5	57.1
	Private	41.7	54.2	38.5	42.9
Climate information	Public	10.2	10.0	25.0	12.7
	Private	89.8	90.0	75.0	87.3
Finance	Public	38.2	33.3	25.0	33.3
	Private	61.8	66.7	75.0	66.7
Overall	Public	53.4	41.7	58.3	52.6
	Private	46.6	58.3	41.7	47.4

4.2.7.2 Access to agricultural related information services and infrastructure

Table 4.22 shows the access to agricultural related information services and infrastructure. Adult males had more access to extension, veterinary, climate and input markets while Adult females had more access to research, AI, credit and output markets. The youth has the least access to all services.

Table 4.22: Access to services, by gender of household head

Services provided	Proportion (%) of household heads accessing services		
	Adult male	Adult female	Youth
Extension	55.6	33.3	11.1
Research	42.9	50.0	7.1
Veterinary	66.7	22.6	10.7
Dipping	47.1	41.2	11.8
Climate information	68.6	23.5	7.9
Credit	40.0	50.0	10.0
Input market	47.8	39.1	13.1
Output market	37.4	48.5	14.1

4.2.8: Satisfaction with agriculture-related services and infrastructure

Measuring satisfaction on a Likert scale of 1 to 3, the results in Table 4.23 show that a large proportion of the households in the county were satisfied with the key services offered. Very few respondents accessed A.I. and those who did were satisfied with the services.

Table 4.23: Proportion of households satisfied with agriculture-related services

Services	Proportion (%) of household heads satisfied with service		
	Dissatisfied	Neutral	Satisfied
Extension	22.9	5.7	71.4
Research	38.5	7.7	53.9
Veterinary	6.2	22.2	71.6
Livestock dipping	5.9	11.8	82.4
Climate information	2.0	62.0	36.0
Agricultural credit	30.0	20.0	50.0
Input market	13.5	15.3	71.2
Output market	10.9	21.7	67.3

Only 4.6% of households accessed agricultural credit (Figure 4.9). Disaggregated by gender, 2.8% adult males, 0.6% adult females and 1.2% youth accessed credit. About 25% of households accessed market information. Disaggregated by gender, 16% male headed households, 5% female headed households and 4% youth headed household accessed market information services.

Only 13% of the household heads accessed agricultural insurance. Disaggregated by gender, 10% male headed households, 2% female headed households and 1% youth headed households accessed agricultural insurance.

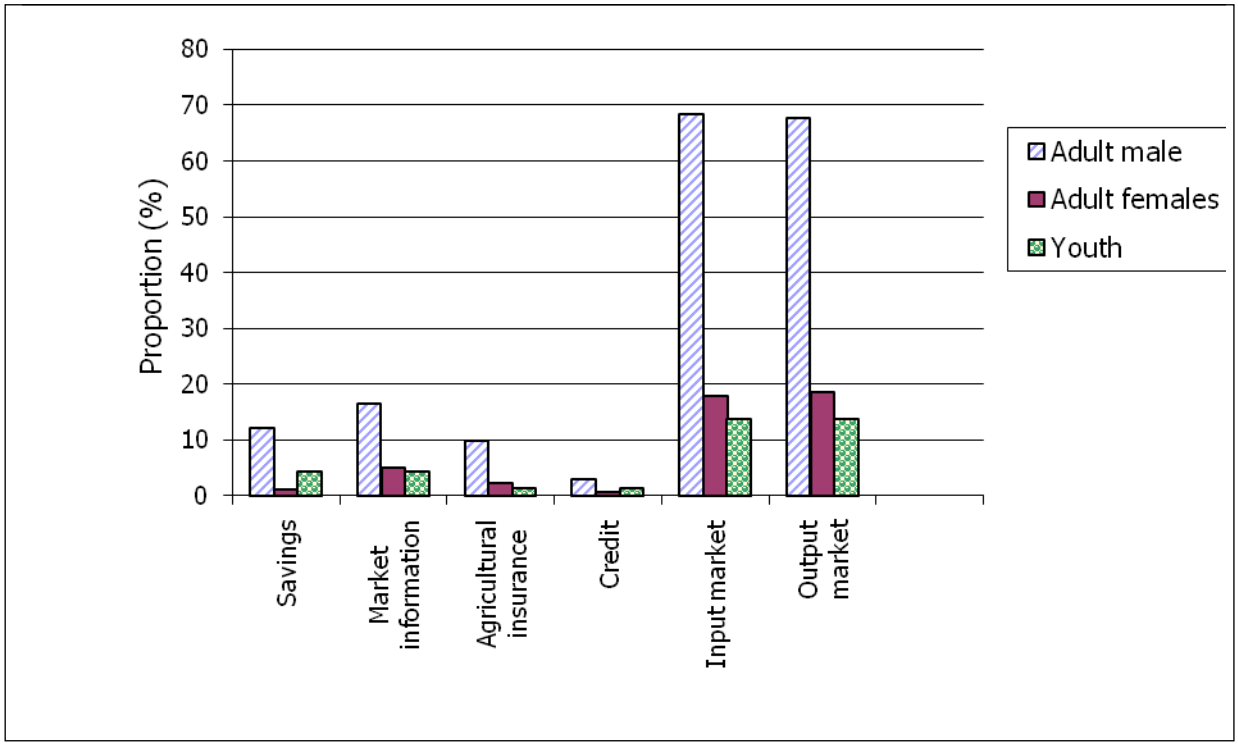

Figure 4.9: Access to financial services by household head, by gender

4.2.9 Access to agricultural technologies

Table 4.24 indicates the proportion of households accessing agricultural technologies. Crop technologies were the most accessed (Table 4.24).

Table 4.24: Proportion of households accessing agricultural technologies

Type of technology accessed	Gender			
	Adult male HH (n=222)	Adult female HH (n=53)	Youth (n=50)	Overall (n HH=325)
Crop	26.1	20.8	24.0	33.2
Livestock	8.1	3.8	16.0	9.4
Natural resource management	4.5	1.9	4.0	4.2
Overall agricultural technologies	31.5	20.8	32.0	42.5

4.3 Crop output and productivity

4.3.1 Annual crops

4.3.1.1 Productivity in season 1 for each crop (August 2012- February 2013)

Table 4.25 shows that the main annual food crops grown were maize, beans, finger millet, groundnuts and sorghum.

Table 4.25: Main crop grown in Season 1

Crop	Area in acres (SE)	% of farmers growing priority crop			Productivity (kg/acre)			
		Adult male (n=222)	Adult female (n=53)	Youth (n=50)	Adult male	Adult female	Youth	Overall
Maize, dry	1.6 (0.1)	95.5	96.2	94.0	869.7	1,968.6	660.2	1,023.0
Beans (common)	1.3 (0.1)	59.5	58.5	54.0	196.5	84.5	110.6	166.1
Finger millet	1.5 (0.12)	10.0	3.8	2.0	196.6	51.0	180.0	184.3
Groundnuts	0.9 (0.1)	23.9	20.8	10.0	527.9	106.8	462.0	462.1
Sorghum	1.0 (0.1)	27.9	13.2	20.0	540			540

4.3.1.2 Productivity in Season 2 for each crop (March-August/September 2013)

Table 4.26 shows that maize and beans were grown by the majority of farmers in season two. , The acreage under maize decreased slightly but the yield increased. A similar trend occurred with beans where there was decrease in acreage in season two but yield increased. Sorghum yield increases in season two without an increase in area under the crop.

Table 4.26: Main crop in Season 2

Crops	Area in acres (SE)	% of farmers growing priority crop			Productivity (kg/acre)			
		Adult Male (n=222)	Adult Female (n=53)	Youth (n=50)	Adult Male	Adult Female	Youth	Overall (n=325)
Maize, dry	1.5 (0.1)	91.4	90.6		1,421.4	289.6	345.0	1,086.9
Beans (common)	1.2 (0.07)	53.6	49.1	50.0	191.8	127.0	121.3	171.6
Finger millet	1.7 (0.2)	10.4	43.4	2.0	178.5	45.0	6.0	166.2
Groundnuts	1.3 (0.4)	24.8	24.5	18.0	680.5	145.3	287.8	530.4
Sorghum	1.0 (0.1)	37.4	26.4	24.0		420.7	261.2	-

4.3.2 Productivity of perennial crops

The county had few perennial crops grown, of which sugarcane, mangoes and bananas were the main ones. (Table 4.27). 32% percent and 67% of male and female headed households respectively had allocated land for growing perennial crops. Other crops grown by less than 5% of farmers were coffee, avocadoes and multi-purpose trees. Most of the land was allocated to sugarcane.

Table 4.27: Main perennial crop enterprises

Crop	Mean area in acres (SE)	% of farmers growing priority crop			Productivity (kg/acre)			
		Adult male (n=222)	Adult female (n=53)	Youth (n=50)	Adult male	Adult female	Youth	Overall
Avocado grafted	0.5	0.5	0.0	0.0	1,100.0	-	-	1,100.0
Bananas	0.4 (0.12)	6.3	3.8	2.0	201.4	28.5	32.0	167.1
Coffee	0.3	0.5	0.0	0.0	96.0	-	-	96.0
Mangoes	0.1 (0.00)	0.9	0.0	2.0	3,200.0	-	1,600.0	2,400.0
Sugarcane	2.5 (0.97)	18.0	13.2	30.0	17,125.2	9,200.0	8,442.3	13,835.7

Legend: blank cells mean data not available (no responses)

4.4 Marketing of outputs

4.4.1 Marketing of annual and perennial crops

Most of the crops grown were used for both domestic consumption and as a source of income for the households. Domestic consumption includes produce used as food for the household, livestock feed, and given away as gifts. Table 4.28 shows the percentage of produce marketed by households per cropping season. Maize and beans indicated a sale of 100% of the produce as marketing of subsistence produce is a continous process that overlaps between seasons. The study shows that a portion of most crop harvest is sold to meet other household needs irrespective of whether the quantities available meet the household requirements for a particular commodity.

Table 4.28: proportion of Marketed crop produce by households.

Proportion (%) of marketed crop produce per season by gender				
Crops	Adult male	Adult female	Youth	Overall
Maize	68.6	100*	100*	100*
Beans	80.5	100*	100*	100*
Finger millet	77.1	-	-	77.9
Banana	19.0	21.0	0.00	20.7
Sugarcane	86.7	100*	100*	92.4

*High percentage of produce sales are due to cummulations from previous harvests and local purchases for resale

4.5 Productivity of different types of livestock

4.5.1. Dairy productivity

Table 4.29 presents the productivity of dairy animals in the county. Milk was produced by local cattle, cross breed cattle and dairy goats. During the dry season, the highest milk yield from local cattle was 1.9 litres milk/cow/day from female headed households. Male headed households obtained an average of 4.7 litres milk per cow per day from cross breed dairy cattle. Dairy goats produced 1.8 litres milk per doe per day.

Table 4.29: Daily milk production of different dairy animals during dry season

Type of livestock	Adult male HH		Adult female HH		Youth HH		Overall	
	No. of animals	litres/ animal/ day	No. of animals	litres/ animal/ day	No. of animals	litres/ animal/day	No. of animals	litres/ animal/day
Local cattle	2	1.5	2	1.9	1	1.5	2	1.6
Cross breed cattle	2	4.7	-	-	-	-	2	4.4
Exotic/dairy goats	1	1.8	-	-	-	-	1	1.8

Table 4.30 presents productivity of dairy animals in the county in the wet season. Milk was produced by local cattle, cross breed cattle and dairy goats. During the wet season, the highest milk yield from local cattle (1.9 kg milk/cow/day) was in female headed households. Male headed households obtained an average of 5.0 kg milk per cow per day from cross breed dairy cattle. Dairy goats produced 2.3 kg milk per doe per day.

Table 4.30: Daily milk production of different dairy animals during wet season

Type of livestock	Adult male HH		Adult female HH		Youth HH		Overall	
	No. of animals	litres/ animal/ day	No. of animals	litres/ animal/ day	No. of animals	litres/ animal/ day	No. of animals	litres/ animal/day
Local cattle	2	1.7	2	1.9	1	1.8	2	1.8
Cross breed cattle	2	5.0	-	-	-	-	2	5.0
Exotic/dairy goats	1	2.3	-	-	-	-	1	2.3

4.5.2 Meat production

Table 4.31 presents meat productivity of different meat animals in the county. Meat was produced from local cattle and indigenous chicken. The highest number of animals slaughtered in the last 12 months by male headed households was 11 local/indigenous chickens with an average weight of 2.0 kg per bird. Female HH slaughtered 16 local chicken while the youth slaughtered 11.

Table 4.31: Meat production of different meat animals

Type of livestock	Adult male HH		Adult female HH		Youth HH		Overall	
	No. slaughtered on farm in the last 12 months	weight per animal (kg)	No. slaughtered on farm in the last 12 months	weight per animal (kg)	No. slaughtered on farm in the last 12 months	weight per animal (kg)	No. slaughtered on farm in the last 12 months	weight per animal (kg)
Local cattle	1	160.0	-	-	2	150.0	1	157.0
Local/ indigenous chicken	11	2.0	16	2.0	11	2.0	11	2.0

4.5.3 Egg production

Table 4.32 presents the egg production of different types of poultry by gender of the household head. Most households reared local/indigenous chicken. The highest egg production within male headed households was 90 eggs per hen per laying cycle from exotic layer chicken. Local/ indigenous chickens produced approximately 13 eggs per hen per cycle, while improved indigenous chicken produced approximately 27 eggs per hen per year per laying cycle within male headed households.

Table 4.32: Egg production of different types of poultry

Gender household head		Local/ indigenous chicken	Improved indigenous chicken	Exotic Layers chicken	Ducks
Adult male	No. of layers	5	1	2	1
	No. of eggs per hen per laying cycle	13	27	90	15
	No of laying cycles per year	3	5	3	2
	No of eggs consumed (last year)	138	52	20	30
	No of eggs sold (last year)	16	-	-	-
	Price per egg (KES)	12.50	-	-	-
Adult female	No. of layers	5	-	-	15
	No. of eggs per hen per laying cycle	11	-	-	15
	No of laying cycles per year	3	-	-	2
	No of eggs consumed (last year)	48	-	-	20
	No of eggs sold (last year)	190	-	-	-
	Price per egg (KES)	5.50	-	-	-
Youth	No. of layers	4	1	10	-
	No. of eggs per hen per laying cycle	12	20	90	-
	No of laying cycles per year	3	3	3	3
	No of eggs consumed (last year)	-	-	-	-
	No of eggs sold (last year)	-	-	-	-
	Price per egg (KES)	-	-	-	-

4.5.4 Manure production

The average amount of manure produced in the last 12 months per household was 0.8 tons. Disaggregated by gender, the average amount of manure produced by male headed households was approximately 865 kg. The female headed households produced 670 kg of manure per household during the last 12 months while the youth headed households produced an average of 815 kg.

4.5.5 Apiculture production

Honey was produced using improved bee hives. The average production of honey from improved hives was 24 kg in the last 12 months. Honey production was dominated by male-headed households.

4.5.6 Decision-making on use of proceeds from sale of livestock products

Decision making on milk sales was done by the head of the household and/or spouse of the household head. Decision making on eggs was mainly by the spouse of the household head. It would therefore be appropriate to deduce that women have greater responsibility than men with regard to marketing of eggs (Table 4.33).

Table 4.33: Decision makers on use of proceeds from sale of milk and eggs

Decision maker	Adult male HH		Adult female HH		Youth HH	
	Milk	Eggs	Milk	Eggs	Milk	Eggs
Head of household	62.5	16.7	69.2	100.0	61.5	-
Spouse of household head	33.3	83.3	30.8	0.0	15.4	-
Joint HHH and spouse	4.2		0.0		7.7	
Female household relative	0.0		0.0		15.4	

Milk and eggs from both types of households were mostly sold to individual consumers (Table 4.34). More male households sold milk to institutions compared to female headed households.

Table 4.34: Sale of livestock products

Where sold	Proportion (%) of milk and egg sold by household head			
	Adult male		Adult female	
	Milk	Eggs	Milk	Eggs
Institutions-schools, hospitals, etc	20.4	-	6.7	50.0
Traders-brokers, hawkers	3.7	25.0	-	-
Individual consumers	75.9	50.0	93.3	50.0
Hotels	-	25.0	-	-

4.6 Contractual arrangements for marketing crops and livestock products

4.6.1 Marketing contractual arrangements for crops

Twenty two per cent of farmers indicted that they had established contract arrangements in marketing their crop produce. Table 4.35 shows that there were two major crops under contract arrangements; dry maize (29.6%) and sugarcane (26.8%). Other crops under contract arrangements were common beans, groundnuts, cotton, coffee and sorghum.

Table 4.35: Crop commodities marketed through contractual arrangements by gender of household head

Crop/Crop product	Proportion (%) of households heads with contractual arrangements			
	Adult male (n=46)	Adult female (n=12)	Youth (n=13)	Total (n=71)
Maize	30.4	33.3	23.1	29.6
Sugarcane	21.7	25.0	46.2	26.8
Common beans	8.7	16.7	7.7	10.0
Groundnuts	6.5	8.3	15.4	8.5
Sorghum	8.7	0.0	0.0	5.6
Cotton	2.2	8.3	0.0	2.8
Coffee	2.2	0.0	0.0	1.4

Out of 71 farmers selling crops, 32.4% of the farmers selling crops had contractual arrangements with individuals while 20% sold to traders (Figure 4.10). Twenty percent had contractual arrangements with traders that included brokers and hawkers. Only about 18% sold their crop produce to processors while 7% sold their produce through co-operatives.

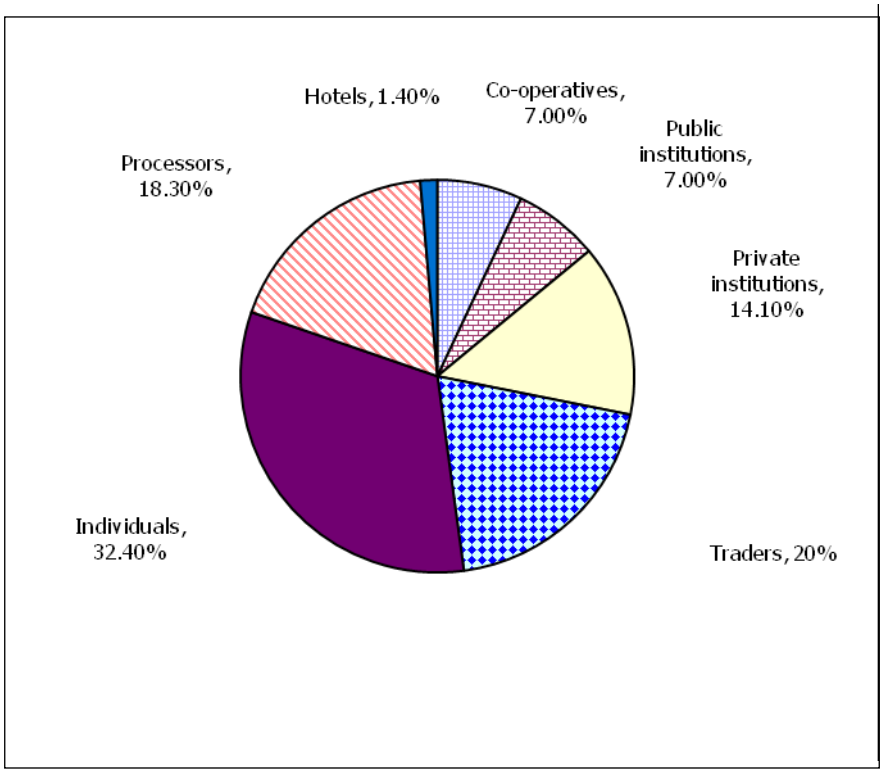

Figure 4.10: Actors involved in crop sale contractual arrangements

4.6.2 Contractual arrangement for marketing of livestock and livestock products

Only eight per cent of farmers had contractual arrangements in selling livestock. Table 4.36 shows that livestock products under contractual arrangements were milk (60%), live animals (27%). Eggs, manure and hides/skins had low numbers of respondents even though they had contractual arrangements. The main contractual arrangements were with individual consumers, traders and brokers.

Table 4.36: Proportion of households having contractual arrangements for sale of livestock products

Livestock product	Proportion (%) of household heads having contractual arrangement by gender of the household head			Overall (n=30)
	Adult male (n=11)	Adult female (n=6)	Youth (n=6)	
Milk (n=18)	66.7	66.7	33.3	60.0
Eggs (n=2)	11.1	0.0	0.0	6.7
Manure (n=1)	5.6	0.0	0.0	3.3
Live animals (n=8)	11.1	33.3	66.7	26.7
Hides and skins/ wool (n=1)	5.6	0.0	0.0	3.3

4.7 Value addition of crops and livestock products

4.7.1 Value addition for different broad crop categories

Value addition in cereals and pulses involved mainly grading, dehulling and making flour. In pulses, grading and dehulling were the most common value addition practices. Extracting oil from oil crops and ripening of fruits were other value addition practices. Value addition of medicinal plants involved drying and extraction while fibre crops were graded. Fodder crops were graded and chopped. Other value addition measures are illustrated in Table 4.38.

Table 4.38: Value addition by type of household

Crop categories	Type of value addition	Percentage of household heads adding value
Cereals (n= 426)	Grading and/or packaging Making flour Dehulling	31.0 44.6 18.5
Pulses (n= 118)	Grading and /or Packaging Dehulling Milling	44.1 50.0
Roots and tubers (n=65)	Grading/or packaging Chips Milling Baking/cake	24.6 6.2 46.2 23.1
Vegetables (n=58)	Grading and/or packaging Juice Drying Paste/sauce	46.6 19.0 20.7 6.9
Fruits (n=66)	Grading/packaging Ripening Drying Juice	15.2 46.9 7.6 18.2
Oil crops (n= 8)	Grading and /or packaging Dehulling Oil Chips	25.0 12.5 37.5 12.5
Nuts (n=112)	Grading and /packaging Dehulling Oil Roasting	24.7 32.3 10.8 25.8

Value addition to fodders was mainly chopping (40%) while making timber (29%) and firewood (29%) was most common in trees.

4.7.2 Value addition in livestock and fish products

Value addition in milk mainly involved boiling (45%) and fermenting (33%). Value addition of fish involved salting only while in honey, only packaging was done (Table 4.39). Eggs were graded, or boiled or set aside as fertilized to add value. Value addition of chicken involved de-feathering and differentiation of parts (each 47%) while packaging involved 7%. One respondent in each case adding value to fish and honey used salting and packaging only.

Table 4.39: Value addition by categories of livestock and fish products

Livestock/fish product	Type of value addition	Percentage of households adding valuecheck by gender of the HHs
Milk (n=169)	Fermenting	32.5
	Yoghurt	4.1
	Cooling	7.1
	Flavouring	2.4
	Boiling	45.0
	Ghee	7.7
Beef (n=7)	Smoking	28.6
	Differentiation of parts	28.6
	Drying	14.3
	Salting	14.3
Goat meat (n=7)	Smoking	14.3
	Preserving under fat	14.3
	Drying	42.9
	Salting	28.6
Mutton (n=10)	Refrigeration	10.0
	Differentiation of parts	20.0
	Drying	20.0
	Salting	20.0
	Smoking	30.0
Chicken (n=58)	Dressing	46.6
	Differentiation into parts	46.6
	Packaging	6.9
Eggs (n=61)	Boiling	41.0
	Packaging	4.9
	Graded as fertilized eggs	47.5
	Grading	6.6
Hides and skins (n=8)	Salting	37.5
	Drying	62.5

4.8 Employment and sources of household income

4.8.1 Income sources

The main sources of household income included on-farm (crop and livestock sales, woodlot) and off-farm (salaried employment, businesses, remittances among others). Figure 4.11 shows the income sources available to households. It is clear that in most households, income sources are not diversified (Figure 4.11).

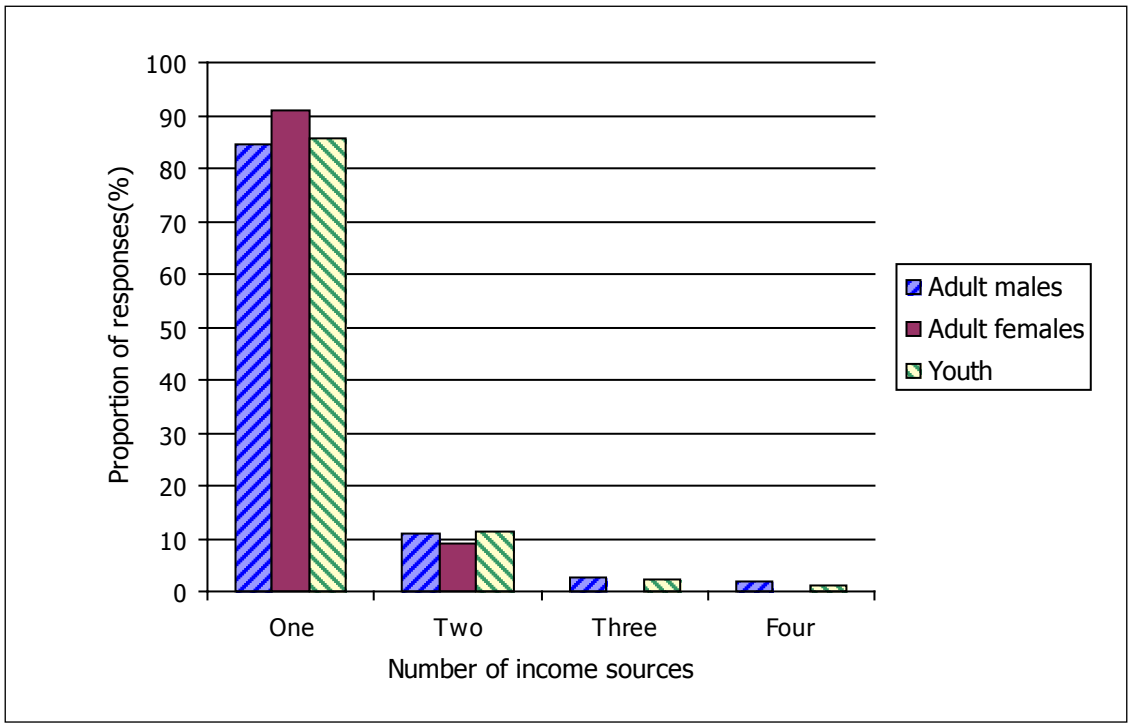

Figure 4.11: Income sources available to households

4.8.2 On farm income source

Most of the income was derived from crop and livestock activities. Adult males received more total on-farm income compared to either adult females or youth. On-farm income earned the households an average of KES 98,496 per year with crop sources contributing the largest portion (Table 4.40). On money value basis at household level, crop income represented 40% of all on-farm income compared to livestock contribution of 21%. Woodlot activities earned male headed households of KES 19,050 per year compared to earnings by female headed and youth households of KES 7,600 and KES 3,733 per year, respectively.

Table 4.40: Average annual household income from on-farm activities, by gender

Income source	Adult male HH (n=222)		Adult female HH (n=53)		Youth HH (n=50)		weighted Average (n=325)	
	%	KES	%	KES	%	KES	%	KES
Crop activities	36	40,167	44	30,434	59	45,132	40	39,434
Livestock activities	19	21,793	29	20,195	21	15,614	21	20,777
Woodlot activities	17	19,050	11	7,600	5	3,733	15	14,589
Renting out pasture	3	3,000	5	3,633	-	-	4	3,475
Other*	25	27,957	11	7,300	15	11,480	21	20,221
Total	**100**	**111,967**	**100**	**69,162**	**100**	**75,959**	**100**	**98,496**

*Other , (sale of value added products, vending of fruits, nurseries etc.)

4.8.3 Income from off-farm activities

Table 4.41 presents the average annual household income from off-farm and non-farm activities. The most common source of income in all categories of households was business.

Table 4.41: Average annual household income from off-farm activities

Income source	Adult Male HH		Adult Female HH		Youth HH		Weighted average	
	%	KES/yr	%	KES/yr	%	KES/yr	%	KES/yr
Salaried employment	11.7	181,000	9.4	141,000	10.0	87,000	11	163,000
Salaried employment (spouse)	3.2	154,000	1.9	60,000	4.0	384,000	3.1	191,000
Pension Income	8.1	86,000	1.9	96,000	0.0	-	5.8	86,000
Social protection	0.9	45,000	1.9	24,000	0.0	-	0.9	38,000
Farm labour wages	12.6	27,000	15.1	6,000	12.0	11,000	12.9	21,000
Non-farm labour wages	9.9	56,000	5.7	17,000	14.0	55,000	9.8	52,000
NET Income from business	27.5	63,000	32.1	63,000	42.0	44,000	30.5	59,000
Amount from children	6.3	78,000	13.2	23,000	6.0	11,000	7.4	54,000
Remittances from relatives	11.7	23,000	18.9	18,000	6.0	7,000	12.0	21,000
Renting out land	5.0	9,000	5.7	9,000	0.0	-	4.3	9,000
Renting out oxen	8.6	19,000	5.7	25,000	8.0	12,000	8.0	19,000
Renting out equipment	5.4	11,000	3.8	51,000	4.0	16,000	4.9	17,000
Weighted average		**100,712**		**71,073**		**81,756**		**92,954**

On average, the annual income received by each household (based on total sample size) was KES 60,834 with salaried employment and income from business constituting the highest proportion of the income (Table 4.42)

Table 4.42: Average off-farm household income (based on the sample size)

Off-farm income category	Average amount (KES) earned per household by Gender			
	Adult male (n=222)	Adult female (n=53)	Youth (n=50)	Weghted average (n=325)
Salaried employment	21,293	13,300	8,760	18,002
Salaried employment (spouse)	4,874	1,132	15,360	5,877
Pension income	6,962	1,811	0	1,214
Social protection	405	452	0	495
Farm labour wages	3,410	917	1,500	2,398
Non-farm labour wages	5,530	943	7,768	5,127
Net income from business	17,421	20,204	18,472	18,037
Amount from children	4,932	3,011	668	3,963
Remittances from relatives	2,792	3,374	420	2,556
Renting out land	455	509	0	738
Renting out oxen	1,604	1,442	1,000	1,484
Renting out equipment	602	1,932	640	843
Average off-farm income	70,280	49,027	54,588	60,734

4.9 Poverty and vulnerability

4.9.1 Indicators of income and wealth

One of the main aims of ASDSP is to alleviate poverty levels across the country and close the gender disparities in income (Gok, 2012). The total household income and gross wealth are indicators of the wellbeing of household members and ability of the household to meet its needs such as food, medical, school fees, agricultural inputs, etc. They also provide an indication of how food insecure, poor or vulnerable a household could be. Table 4.43 shows the average values of some key indicators of income and wealth by gender in Homabay County. Total household income considers on-farm income (from agricultural related activities within the farm), non-farm income (agricultural related activities done outside the farm) and off farm income (from non agricultural related activities).

In addition to income, wealth considers the value of stocks, in this case livestock, household assets and savings which the household can fall back on in case of shocks or catastrophe. Livestock value was derived by multiplying all the numbers of all livestock of different species, ages and sex with their respective price in case the farmer were to sell them at the time of the survey and summed the value of all the categories. The value of household assets was obtained by multiplying the number of assets owned by the household and the value they considered they would ask for in case they were to sell the item at the time of the survey. The household assets included housing structures (living houses, stores, sheds), household goods (furniture, radio, television), transport (vehicle, bicycles, motorbikes), agricultural equipment (threshers, chaff-cutters, ploughs), other household infrastructure (See Annex 4 for distribution of assets owned).

The mean value total household income for Homabay County was KES 209, 500 while the mean value of wealth was KES 735,000 (Table 4.43). The annual per capita income and per capita gross wealth were KES 30,000 and KES 105,000 respectively. The mean daily per capita income for male headed household was KES 92 while for female headed and youth headed households was KES 65 and KES 78 respectively. This shows disparity of per capita income by adult male and adult female heads of the households at KES 27. Land is also an important indicator of wealth but it was not valued in this particular study.

Table 4.43: **Mean values of various indicators of income and wealth, by gender of household head**

Indicator	Indocator value			Mean value (n=325)
	Adult male HH (n= 222)	Adult female HH (n=53)	Youth HH (n=50)	
1. Household size (No)	7	6	6	7
2. Land size (acres)	4.1	2.7	3.1	3.7
3. Per capita land size (Line 2÷Line 1)	0.58	0.45	0.52	0.53
4. Value of all livestock owned (KES)	86,669	64,360	78,932	81,882
5. Value of household assets (KES)	486,861	578,987	111,087	443,675
6. Total on-farm income (KES)	111,968	69,163	75,959	98,495
7.Total off farm income (KES)	100,712	71,073	81,756	92,954
8. Bank savings from agricultural related activities (KES)	20,000	0	9,465	14,733
9. Livestock off-take (4% of value of livestock) KES	3,467	2,574	3,157	3,275
10.Total household income (Line 6, 7,8 and 9) KES	236,147	142,810	170,337	209,457
11.Annual per capita income (Line 10÷Line 1) KES	33,735	23,802	28,390	29,922
12.Daily per capita income (Line 11÷365 days) KES	92.4	65.2	77.8	81.9
13.Gross household wealth (Sum of lines 4,5,and 10) KES	809,677	786,157	360,356	735,014
14. Annual per capita gross wealth per (Line 13÷Line 1) KES	115,668	131,026	60,059	105,002

4.9.2 Wealth and other socio-economic indicators by vulnerability

The sample households were categorized into vulnerable and non-vulnerable ones using the level of total income as a proxy indicator of vulnerability. After estimating the total income and ordering the households from the highest to the lowest income earners, proportions of poor households gathered from the Commission of Revenue Authority's fact data (CRA, 2013) on counties were used to establish the border line between the vulnerable and non-vulnerable. For Homabay County, the poverty rate was 44% implying that the same proportion of the households, counted from the one with the lowest income, are treated as vulnerable. This approach gave 83.8% vulnerable and 16.2% non-vulnerable sample households.

Several indicators or parameters provided a clear distinction between vulnerable and non-vulnerable households in terms of socio-economic wealth and capacity to cope with shocks and poverty. Table 4.44 indicate that non-vulnerable households accessed more productive resources that make them better off when adapting or coping with shocks.

Table 4.44: Wealth and other socio-economic indicators by vulnerability

Wealth/socioeconomic Parameter	Vulnerability		Overall (n=235)
	Vulnerable (n=197)	Non-vulnerable (n=38)	
Household size (No)	7	7	7
Land size (acres)	3.3	4.3	3.7
Value of livestock owned (KES)	72,206	94,183	81,882
Total on-farm income (KES)	13,145	64,130	43,436
Off-farm non-farm income (KES)	15,035	149,129	92,954
Value of household assets (KES)	259,003	677,766	443,675
Proportion of HH with agricultural savings (%)	13.3	20.9	17.5
Climate shocks (% experiencing)	86.8	86.7	86.8
Social protection (% receiving)	19.8	16.8	18.5
% of people employed on-farm	12.1	14.0	12.9
% of people employed off-farm	8.8	11.2	9.8

4.10 Food and nutrition security

Food security is defined as a state whereby, at individual, household, national, regional and global levels, "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996). The critical issues in the food security definition focus on availability, access, and utilization of food among the people. Food security thus involves dimensions that encompass food production, distribution and marketing, preparation, processing and storage as well as issues to do with population and health, education, employment and income. It also requires involvement not just of the households but also the national governments and the international community. Household food security refers both to the availability and to stability of food, together with purchasing power of the household. This section entails analysis of food and nutrition security situation among the households in Homabay County specifically with a view of determining the level of food insecurity, nutritional status and nutrient intakes among both the rural and urban populations in the county.

4.10.1. Food production, availability and seasonality

As shown in the above definition, food production is one of the indicators of food security. In addition to production, there are other factors that influence food and nutrition security: Post-harvest losses; household size (which for the county was estimated at six members per household); food availability (number of meals per day); and seasonality in food supply.

On average, individual members took three meals on a normal day during peak food availability (Table 4.45).

Table 4.45: Average number of meals for household members in different seasons

Period	Adult male	Adult female	Youth	Children (Below 18)
Peak food availability (P)	2.86	2.87	2.91	2.99
Low food availability (L)	2.23	2.18	2.27	2.49

4.10.2 Food availability

Results in Table 4.46 show that the overall proportion of households who did not have enough food to meet their household need throughout the year was 82%. Among the male, female and youth headed households at least 82%, 81% and 84% of households did not have enough to meet the household needs in the year of study.

Table 4.46: Extent to which households met family food needs in last 12 months

Condition	% Response			
	Male headed (n=222)	Female headed (n=53)	Youth headed (n=50)	Overall (n=325)
Having enough food	18.0	18.9	16.0	17.8
Not having enough food	82.0	81.1	84.0	82.2

4.10.3 Seasonality in food supply

Seasonality in food production has an influence on food security. Figure 4.12 gives the proportion of farmers who indicated the non-availability of enough food at household level over 12 months. The results show that there are two peaks of food scarcity periods in the county. These occur from July to August and December to March.

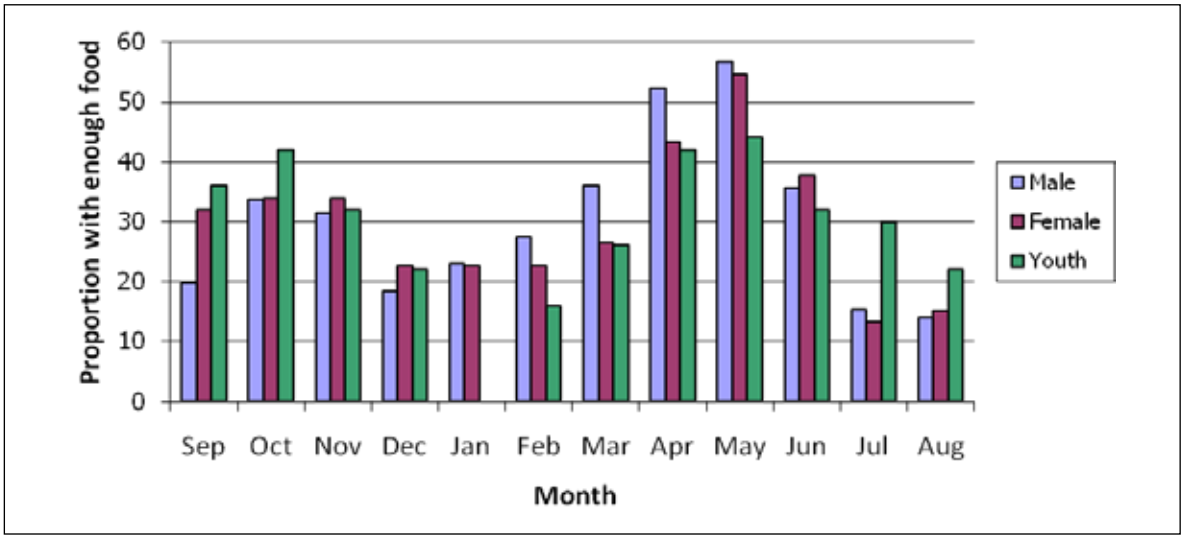

Figure 4.12: Proportion (%) of households that were food insecure over 12 months of study period

The peaks and lows in food availability are indicators of food and nutritional security among households. One week's recall memory was used to evaluate the food availability. Table 4.47 shows that within a period of one week, 63% of respondents considered the survey period as low food availability season while 32% considered it normal. About 59%, 77% and 64% of male, female and youth headed households respectively considered the period as low in food availability. On average 6% of the respondents considered the survey period as a period of peak food availability.

Table 4.47: Peak and low season food availability in the county

Season	% Availability response by household head			
	Adult male (n=222)	Adult female (n=53)	Youth (n=50)	Overall (n=325)
Peak food availability	6.0	3.8	6.0	5.7
Low food availability	58.8	76.9	64.0	62.6
Normal food availability	35.2	19.2	30.0	31.8

4.10.3 Food and nutrition security index

The problem of malnutrition is attributed to poor diversification of food sources eaten in households and can lead to malnutrition, and stunted growth among others. Food quantities consumed at the household level were computed using a structured questionnaire for data collected from primary source. The foods consumed were converted to calories using the available food consumption tables. Resulting calorie values were divided by the number of Adult Equivalent (AE) in the household, in order to obtain numbers that were comparable across households of different size. A food secure household is defined as one whose calorie supply per AE is greater than or equal to the minimum daily calorie requirement for adult of 2,260 kcal. Households with lower calorie intakes are considered to be food insecure.

(i) Dietary diversity of the respondents

A one-week recall period was used as a reference period to measure household dietary diversity (a proxy for quality of diet) as shown in Table 4.48. The following set of 12 food groups were used to calculate the household dietary diversity:

- Cereals
- Root and tubers
- Vegetables
- Fruits
- Meat, poultry, offal
- Eggs
- Fish and seafood
- Pulses, legumes and nuts
- Milk and milk products
- Oil/fats
- Sugar/honey
- Miscellaneous foods

The mean distribution of the dietary diversity scores among male, female and youth headed households was 1.314, 1.551 and 1.553 respectively out of a maximum of 12 (Table 4.48). The male headed and youth headed respondents had marginally higher scores than female headed ones.

Table 4.48: Mean of dietary diversity score/index

Household category	Dietary Diversity Score level	Mean score	SE
Adult female HH (n= 53)	Low food diversity (max 2 food groups) n=53	1.31	0.11
	High food diversity (min 3 food groups) n=0	-	-
Adult male HH (n=222)	Low food diversity (max 2 food groups) n=212	1.44	0.05
	High food diversity (min 3 food groups) n=10	3.94	0.46
Youth HH (n=50)	Low food diversity (max 2 food groups) n=45	1.32	0.09
	High food diversity (min 3 food groups) n=5	3.66	0.19
County average	Low food diversity (max 2 food groups) n=310	1.39	0.04
	High food diversity (min 3 food groups) n=15	3.85	0.31
Average adult female (n=53)		1.314	0.107
Average adult male (n=222)		1.551	0.636
Average youth (n=50)		1.553	0.1338

The percentage response for low diversity group was higher than high diversity ones for all gender categories (Table 4.49). The implication is that most of the rural farmers in the County consumed less than three food groups within the study year.

Table 4.49: Distribution of respondents by dietary diversity score/index

	% response	
Gender category	Low food diversity (2 food groups)	High food diversity (over 3 food groups)
Adult female (n=53)	100.0	0.0
Adult male (n=222)	95.5	4.5
Youth (n=50)	90.0	10.0
Average (n=325)	95.4	4.6

(ii) Household food security status

The apparent disparity between the rate of food production and demand for food in Kenya has led to a food deficit and hence posing a threat to national food security. The number of man-equivalent units was estimated for the total population and according to the socio-demographic variables in the County. The average calorie per man unit per day was 1,808, 1,881 and 5,751 for male, female and youth headed households respectively with an overall mean of 2,435 (Table 4.50).

Table 4.50: Mean calorie intake per man-equivalent, 2013

Gender category	Food security category	Calorie intake per man-equivalent	
		Mean	SE
Adult female HH	Food secure (n=9)	5,534.8	678.0
	Food insecure (n=42)	1,098.6	124.9
Adult male HH	Food secure (n=28)	6,782.7	1,441.2
	Food insecure (n=186)	1,059.4	52.7
Youth HH	Food secure (n=13)	5,779.7	1,129.9
	Food insecure (n=35)	1,110.2	118.2
Adult female HH (n=51)		1,881.4	284.1
Adult male HH (n=214)		1,808.3	232.4
Youth HH (n=49)		5,751.6	3,403.2
Food secure (n=50)		6,297.3	861.4
Food insecure (n=263)		1,072.4	44.9
Overall sampled households calorie intake		2,435.5	558

Compared with the standard level of 2,260 kcal, the households in the county are food insecure. About 82% female headed households were food insecure compared to 87% male headed and 73% youth headed households. On average 84% of households are food insecure and 16% are food secure (Table 4.51).

Table 4.51: Distribution of food secure and insecure households

Proportion	Adult female HH (n=53)	Adult male HH (n=222)	Youth HH (n=50)	Overall (n=325)
Food insecure	82.4	86.9	73.0	84.0
Food secure	17.6	13.1	27.0	16.0

4.11 Collective action:

4.11.1 Membership of households in agricultural groups

Respondents were asked whether any of their household members belonged to any agricultural activities related groups or associations. 50% of the respondents indicated that they had household members who belonged to some groups and 89% of these indicated that the groups they belonged to were registered. In terms of the gender, of the household members who belonged to groups, 47% were adult male , 43% were adult female and 10% were youth (Figure 4.13).

Figure 4.13: Membership to groups by household members

4.11.2 Types and categories of groups

Figure 4.14 shows the types of groups and the type of activities they dealt in. Out of the possible types of farmer groups or associations, members of households belonged to producer groups (45%) followed by co-operative societies (22%.) labour and producucer cum marketing were below 15%.

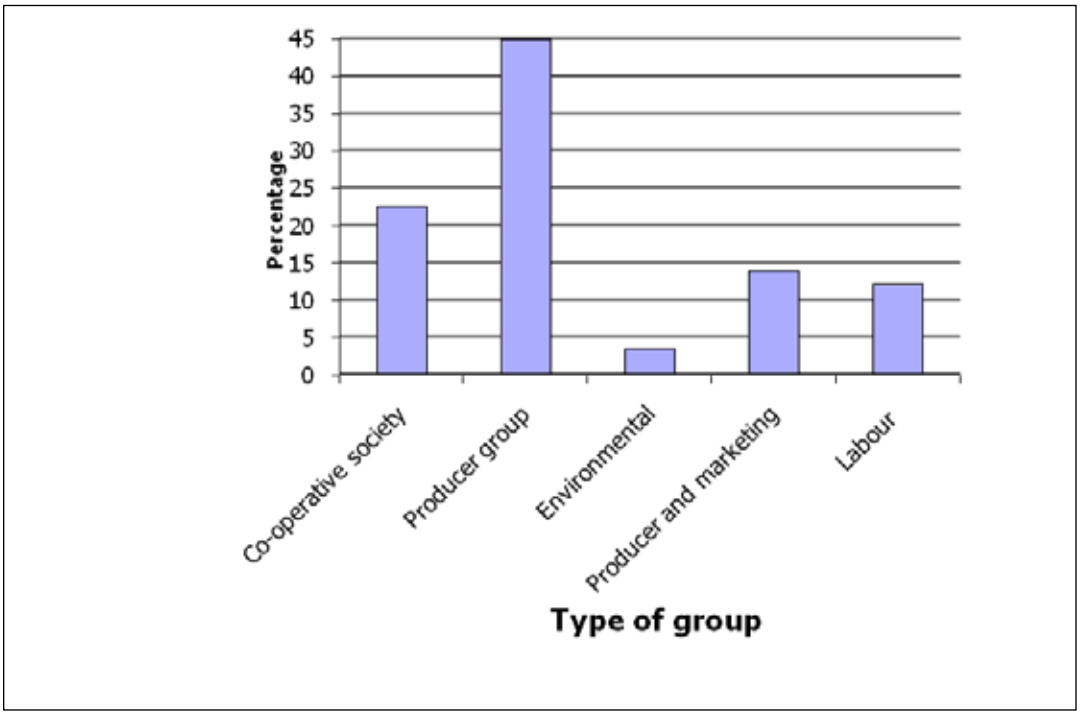

Figure 4.14: Types of agricultural group membership

About 48% were mixed groups of approximately equal men and women.. Others comprised 38% women groups, 7% youth and 7% men groups (Figure 4.15).

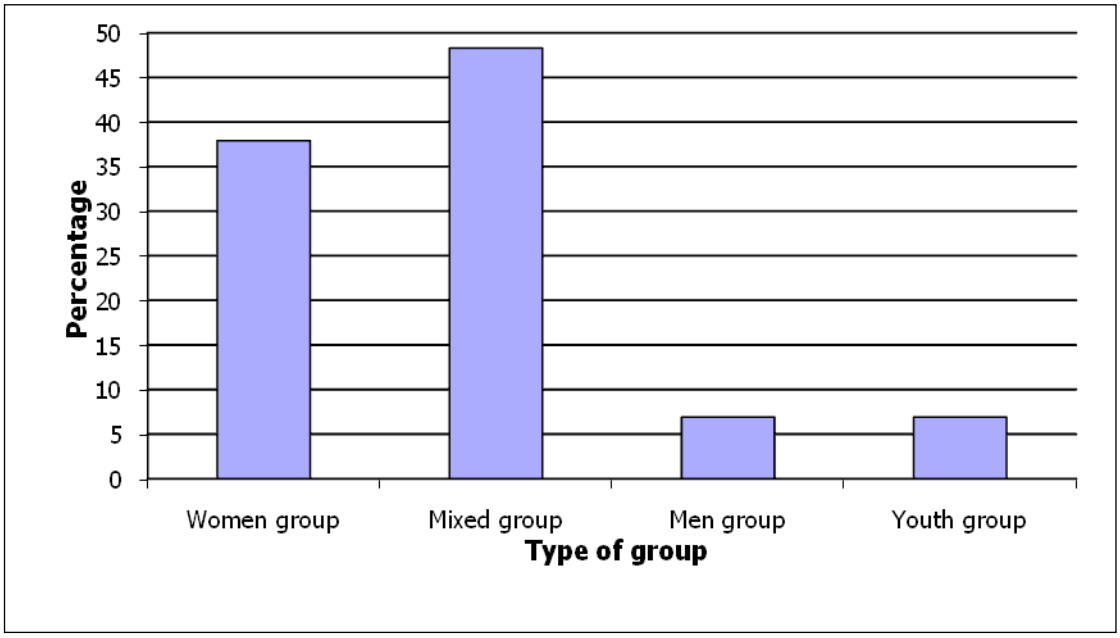

Figure 4.15: Categories of the groups

4.11.3: Main commodities and activities of the groups

Commodities that group members dealt with were crop related activities (84%) and livestock related (12%) (Figure 4.16). nurseries were at less than 10%.

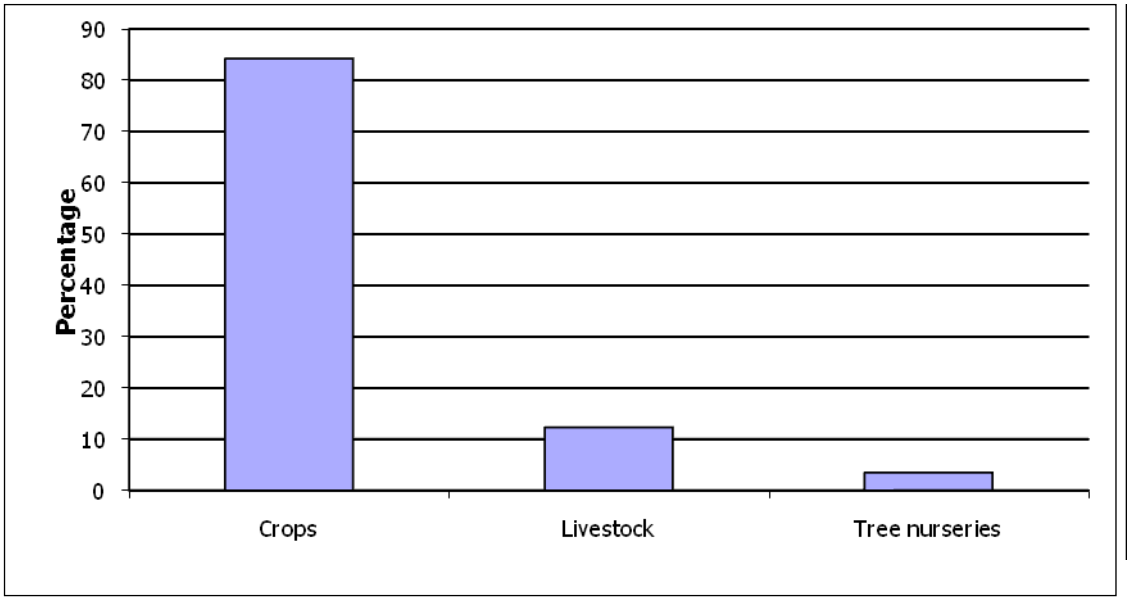

Figure 4.16: Main commodities groups deal in

The main activities of the groups were savings and credit (25%) and produce marketing (21%). Other activities were input access (17%), seed production (17%), tree planting (5%), communal labour (4%) and environmental groups (2%).

4.12 Access and satisfaction with various services

4.12.1 Access and satisfaction with support services and infrastructure

Two most accessed support services were infrastructure and agriculture services (Figure 4.17). About 22% and less than 5% accessed climate and finance services respectively.

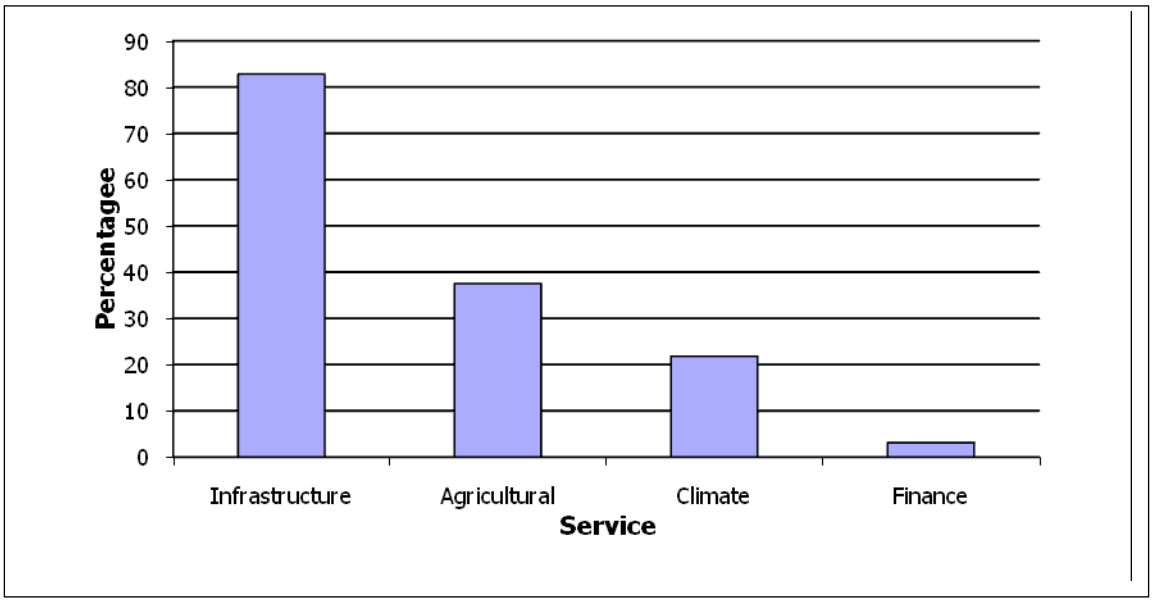

Figure 4.17: Access to various support services

4.12.2 Access, use and satisfaction with credit

Those who obtained agricultural credit in the last 12 months were only 5%, disaggregated as 3%, 1% and 1% of male, female and youth headed households from a sample size of 325 reporting. The mean amount borrowed was KES 31,255 and KES 15,650 for male and female headed households respectively. Table 4.52 shows that the level of satisfaction was higher among male headed compared to female headed households.

Table 4.52: Levels of satisfaction with credit services

Gender	Dissatisfied	Neutral	Satisfied
Adult male	16.7	25.0	58.3
Adult female	0.0	75.0	25.0
Youth	-	-	-
Total	**12.5**	**37.5**	**50.0**

4.12.3 Access and satisfaction with market information

Those who obtained market information in the last 12 months were 26%. The information was accessed by 16%, 5% and 4% of male, female and youth headed households respectively. About 62% of those accessing market information were satisfied (Table 4.53).

Table 4.53: Levels of satisfaction (%) with market information services

Gender	Dissatisfied	Neutral	Satisfied
Male	8.0	32.2	52.9
Female	1.1	12.6	9.2
Youth	-	-	-
All	**9.2**	**44.8**	**62.1**

4.12.3 Access, use and satisfaction with formal savings services

About 17% of respondents had access to formal savings services. Disaggregated by gender, access was 12%, 1% and 4% for male, female and youth headed households respectively (Figure 4.18).

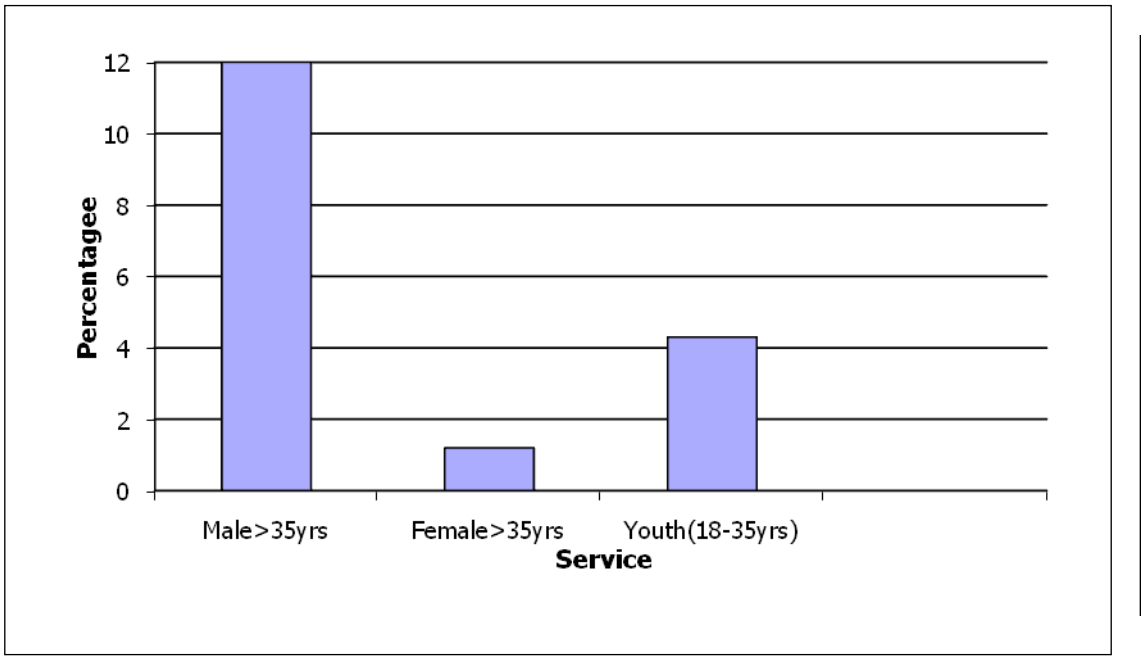

Figure 4.18: Proportion of household members who accessed savings services

4.12.4 Access, use and satisfaction with insurance services

Only 0.3% of male headed households accessed insurance services.

4.13 Climate change challenges, adaptation and coping strategies

4.13.1 Sources of climate related information

In Homabay County, the main sources of climate related information (Figure 4.19) with over 80% responses were the radio and traditional indigenous knowledge in all households. Information from television and partners was about 10% and 9% respectively. Government extension, internet, FBOs, private extension, NGOs and meteorological department were at less than 10%..

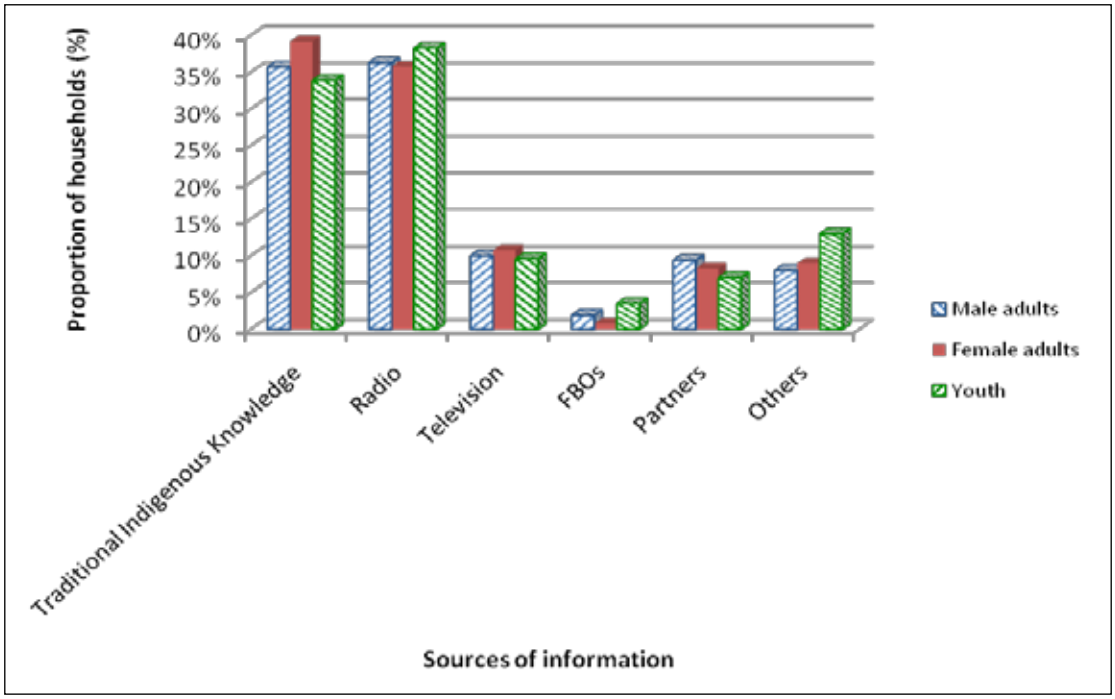

Figure 4.19: Sources of climate-related information

4.13.2 Respondents noticing long-term environmental changes

About 91% of households had noticed long term environmental changes. Disaggregated by gender, 92% adult males, 89% adult females and 90% youth noticed long term environmental changes. The main changes noticed were reduction in water volumes (51%), drying up of wells (43%) and soil degradation (39%). Proportionally, more youth headed households identified soil degradation, landslides and incidences of new diseases and pests, compared to adult males and females. More adult females identified reduction in water volumes and disappearance of plants and animals compared to households headed by the other gender categories (Table 4.54).

Table 4.54: Awareness of households about long-term environmental changes (%)

Environmental changes	Level (%) of awareness among household heads			
	Adult male (*n*=222)	Adult female (*n*=53)	Youth (*n*=50)	Overall (n=325)
		Per cent		
Soil degradation	43.1	38.3	46.7	39.1
Reduction in water volumes	58.3	59.6	44.4	51.4
Land slides	2.0	2.1	2.2	1.8
Drying of wells and rivers	50.5	38.3	40.0	42.8
Deforestation	19.6	19.1	17.8	17.5
Disappearance of some plants and animals	3.9	10.6	6.7	5.0
Emergence of new plants/animals	6.4	10.6	8.9	6.8
Incidences of new diseases and pests	14.2	21.3	28.9	16.0

4.13.3 Types of adaptation strategies to climate change

The main adaptation strategies to climate change were changing crop type (41%), tree planting (33%), increased soil and water conservation (27%) and water harvesting (24%). Adult male headed households mainly practiced changing crop type and tree planting while female headed households practiced changing the crop type (28%) and staggered cropping (23%). The youth practiced changing crop type (40%) and water harvesting (34%) strategies (Table 4.55).

Table 4.55: Strategies for adaptation to climate change

Adaptation strategy	Proportion (%) of households using the strategies			
	Adult male HH (*n*=222)	Adult female HH (*n*=53)	Youth HH (*n*=50)	Overall (n=325)
Increased soil and water conservation	27.5	20.8	28.0	26.5
Increased irrigation	5.4	0.0	4.0	4.3
Tree planting	36.5	20.8	28.0	32.6
Water harvesting	24.8	13.2	34.0	24.3
Changing crop type	44.1	28.3	40.0	40.9
Changing livestock type	6.8	0.0	8.0	5.8
Feed conservation and diversification	4.1	1.9	2.0	3.4
Diversification of enterprises	3.6	5.7	10.0	4.9
Staggered cropping	17.6	22.6	18.0	18.5
Value addition	18.5	13.2	10.0	16.3
Communal seed banks	0.9	0.0	0.0	0.6
Food storage structures	5.9	3.8	4.0	5.2
Buying insurance	0.9	0.0	0.0	0.6
Leasing land	3.2	1.9	0.0	2.5
Seeking employment	12.6	13.2	16.0	13.2

4.13.4 Training on climate change strategies

Table 4.56 shows proportion of respondents trained in climate change adaptation. Adult males were mostly trained in changing crop type (19%) and tree planting (15%).Adult females were mainly trained in changing crop type (17%) and staggered cropping (13%). Similarly, youth were trained in mainly changing crop type.

Table 4.56: Household members trained in adaptation to climate change

Adaptation strategies training	Proportion (%) of household heads trained			Overall (*n*=325)
	Adult male (*n*=222)	Adult female (*n*=53)	Youth (*n*=50)	
Increased soil, Water conservation	13.5	11.3	10.0	12.6
Increased irrigation	6.8	1.9	2.0	5.2
Tree planting	14.9	11.3	10.0	13.5
Water harvesting	9.5	1.9	10.0	8.3
Change crop type	18.5	17.0	14.0	17.5
Change Livestock type	4.1	0.0	8.0	4.0
Feed conservation/diversification	4.1	1.9	2.0	3.4
Diversification of enterprises	1.4	1.9	4.0	1.8

Adaptation strategies training	Proportion (%) of household heads trained			Overall (*n*=325)
	Adult male (*n*=222)	Adult female (*n*=53)	Youth (*n*=50)	
Staggered cropping	7.7	13.2	8.0	8.6
Value Addition	5.9	5.7	4.0	5.5
Communal Seed Banks	1.4	0.0	0.0	0.9
Food storage facilities	2.3	0.0	0.0	1.5
Buy insurance	0.5	0.0	0.0	0.3
Lease land	1.4	1.9	0.0	1.2
Seek employment	9.0	1.9	10.0	8.0

4.13.5 Types of climate shocks experienced

At least 87% of households experienced climate shocks in their agricultural production activities. Disaggregated by gender, 88% male, 91% female and 96% youth headed households experienced climate shocks in their agricultural activities. The main shocks experienced were droughts (65%), poor rain distribution (63%) crop pest and diseases (58%) and livestock pests and diseases 50%). The least experienced shocks were frosts, landslides and human pests and diseases (Figure 4.20).

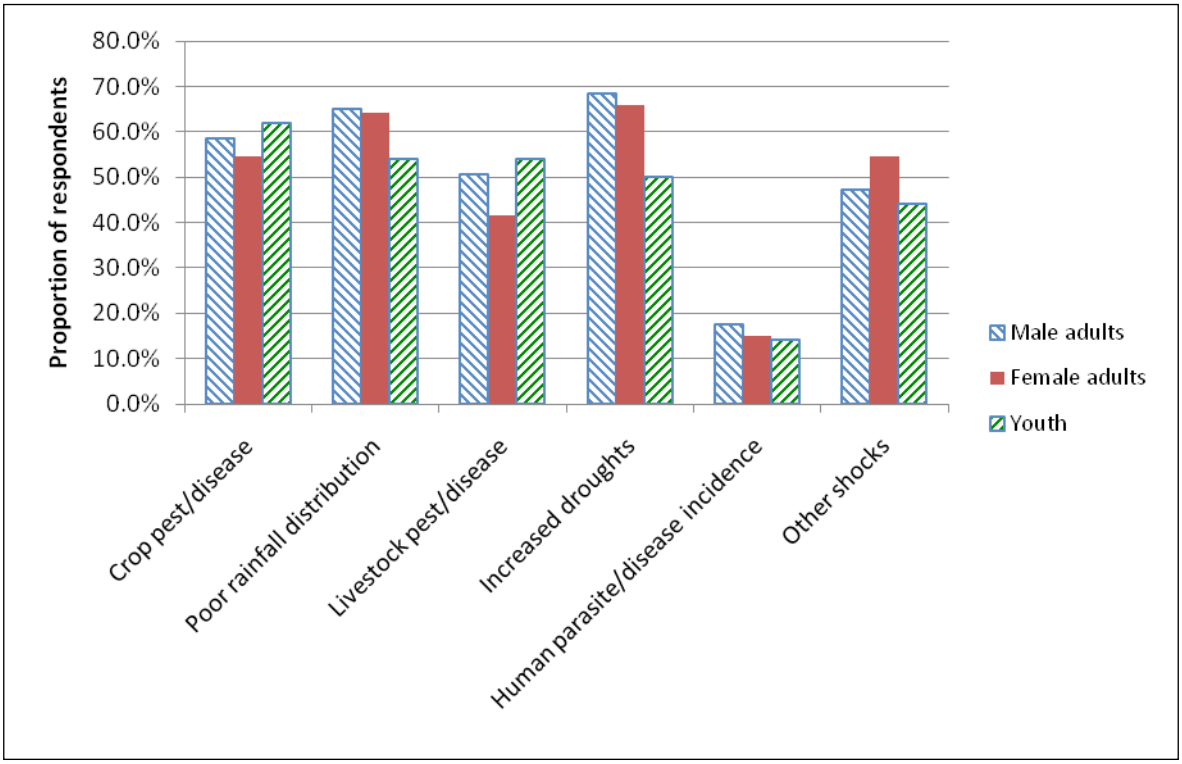

Figure 4.20: Climate shocks experienced

4.13.6 Coping strategies to climate change

At least 86% of the respondents had at least one coping strategy to climate shocks. Disaggregated by gender, 87% male, 85% female and 80% youth headed households had at least one coping strategy. Table 4.57 shows that the main coping strategies were increased use/ frequency of pesticides in crop and livestock diseases control (38%) and destocking to reduce risk (12%).

Table 4.57: Coping strategies to climate change

Coping strategies used	Household coping strategy by gender			
	Adult male	Adult female	Youth	Overall (n=
Destocking to reduce risk	3.6	4.6	3.6	11.7
Increased use/frequency of pesticides in crop and livestock pest and disease control	12.4	9.8	14.3	37.8
Rely on traditional support systems	2.7	0.6	2.9	7.4
Food rationing	3.0	0.0	2.1	7.4
Purchased food	2.2	1.7	1.4	6.2
Temporary migration to other areas	2.5	3.4	2.9	8.3
Used previously stored food	1.7	1.1	1.4	4.9
Sold/slaughtered livestock to access food	1.2	0.6	2.1	3.7
Used existing savings	0.9	1.1	1.4	3.1

4.13.6.1 Household members who respond to climate shocks

Seventy nine per cent of households responded to climate events that significally affected household income (climate shocks). Disaggregated by gender, 80% adult male, 77% adult female and 76% youth responded to climate shocks (Table 4.58). The main responses were to droughts, poor rain distribution and crop pests and diseases.

Table 4.58: Response to climate-related shocks

Climate shock	Gender of person who responds to climate shocks (%)			
	Adult male (n=222)	Adult female (n=53)	Youth (n=97)	Overall (n=325)
Crop pests and diseases	58.6	54.7	62.0	58.5
Livestock pest and disease	50.5	41.5	54.0	49.5
Floods	32.0	37.7	26.0	32.0
Droughts	68.5	66.0	50.0	65.2
Poor rain distribution	64.9	64.2	54.0	63.1
Human parasite and disease	17.6	15.1	14.0	16.6
Landslide	0.9	9.4	4.0	2.8
Hailstorms	27.5	35.8	28.0	28.9
Frost	1.4	5.7	0.0	1.8

4.13.6.2 Capacity of households to cope with climate change

The overall capacity to respond to climate shocks was 23%, 12% and 65% in high, neutral and low capacity categories. The capacity to respond was notably low in poor distribution of rain (10%), floods (21%) and droughts (25%). In floods and droughts shocks, adult females had the least capacity to cope. However, adult females had the highest capacity to cope in crop pests and disease and human parasites disease shocks (Table 4.59).

Table 4.59: Capacity of households to respond to climate shocks

Major climate shock experienced	Capacity to respond	Proportion (%) of respondents by gender of household head			
		Adult male	Adult female	Youth	Overall
Crop Pests and Diseases	High	27.6	31.0	30.0	28.6
	Neutral	6.5	10.3	20.0	9.3
	Low	65.8	56.8	50.0	62.1
Livestock Pests and Diseases	High	34.0	31.8	36.0	34.0
	Neutral	13.6	18.2	12.0	14.0
	Low	52.4	50.0	52.0	52.0
Floods	High	25.1	15.0	23.1	21.4
	Neutral	10.8	5.0	7.7	9.2
	Low	66.1	80.0	69.2	69.4
Droughts	High	52.0	29.9	30.4	25.3
	Neutral	13.6	8.6	8.7	12.1
	Low	61.4	68.6	60.9	62.6
Poor Distribution of Rain	High	16.1	12.5	8.3	14.5
	Neutral	14.6	9.4	25.0	15.0
	Low	69.3	78.1	66.6	70.5
Human Parasite Diseases	High	27.8	50.0	42.9	33.3
	Neutral	2.8	12.5	14.3	5.9
	Low	69.4	37.5	42.9	60.8

4.14 Natural resource management practices

The study examined respondent's knowledge and practice in natural resource management. The practices were minimum tillage, crop rotation, intercropping, mulching, cover-cropping, terracing and planting pits.

4.14.1 Proportion using and types of agroforestry practices used

About 91% knew about natural resource management, disaggregated by gender, 93% adult male, 85% adult female and 92% youth headed households. About 40% of the respondents practiced agroforestry in their farms. Disaggregated by gender, 44% adult male, 25% adult female and 42% youth headed households practiced agroforestry. Respondents had more than one agroforestry practice in their farms (Table 4.60). The main practice was wind breaks (49%) and shade trees (39%).

A higher proportion of male headed households practiced windbreaks compared to either female headed or youth headed households. Proportionally, more youth headed households grew shade trees on their farms compared to other gender categories. Growing trees with pasture and livestock was practiced by only male headed household.

Table 4.60: Proportion (%) of households practicing agroforestry technologies

Agro forestry practice	Gender of the household head			Overall (n=325)
	Adult male	Adult female	Youth	
Improved fallows	2.5	0.4	0.4	3.3
Alley cropping	5.0	1.2	1.7	7.9
Shade trees	29.0	3.7	6.6	39.4
Wind breaks	37.3	5.0	6.6	49.0
Silvo-pastoral (trees with livestock/pasture)	0.4	0.0	0.0	0.4

4.14.2 Main natural resource management practises known and used

At least 88% of sampled households practiced natural resource management (NRM) on their farms, disaggregated as 90% adult male, 81% adult female and 88% youth headed households. The natural resource management practices were minimum tillage, crop rotation, intercropping, mulching, cover cropping and terracing. However, respondents practiced less than they knew in all natural resource management practices. Intercropping was the most known and practiced NRM method by all gender categories. Followed by crop rotation and mulching. In the case of the youth headed household, intercropping was practiced by at least 70% of the respondents and crop rotation was practiced by 64%. Less than 50% practicing any other method (Table 4.61)..

Table 4.61: Knowledge and practices of natural resource management

NRM practice	Adult male HH (n=222)		Adult female HH (n=53)		Youth HH (n=50)		Overall (n=325)	
	Know	Practice	Know	Practice	Know	Practice	Know	Practice
Minimum tillage	52.7	37.8	54.7	37.7	56.0	48.0	53.5	39.4
Crop rotation	81.5	60.8	77.4	43.4	82.0	64.0	80.9	58.5
Intercropping	86.0	19.4	81.1	73.6	82.0	70.0	84.6	77.8
Mulching	68.9	36.9	50.9	26.4	60.0	32.0	64.6	34.5
Cover cropping	61.7	40.5	54.7	39.6	68.0	46.0	61.5	41.4
Terracing	50.9	18.5	30.2	9.4	50.0	14.0	47.4	16.3
Planting pits	41.0	17.1	39.6	18.9	52.0	28.0	42.5	19.1

5.0 CONCLUSION AND RECOMMENDATIONS

Results of the study show that most of the households were male headed (68%) while female and youth headed households were 16% and 15% respectively.

At least 63% of the households were engaged in crop and/or livestock farming while approximately 7% were in formal salaried employment. About 70.7% of all the household heads had attained upper primary and secondary school of education. A typical household in the county had an average of seven members. The average farm size was 3.7 acres.

About 30% of households hold title deeds. On average, about 43% of the land in a household was allocated to subsistence crop production while about 33% was the homestead area. Perhaps, the area under homestead may be utilized for crop or livestock production.

The mean value total household income for Homabay County was KES 209, 500 while the mean value of wealth was KES 735,000. The overall mean on-farm income was KES 98,496 per year, while the overall mean off-farm income was KES 92,954 per year. Perhaps, other avenues of increasing on-farm and off farm income need to be explored.

The main annual food crops grown were maize, beans, sorghum and finger millet. The perennial crops grown were sugarcane, mangoes and bananas. The overall mean maize production was 1055 kg/acre while the overall mean bean production was 169 kg/acre. Households experienced constraints especially in acquiring seed, planting fertilizer and organic manure. These constraints should be addressed so as to increase crop productivity.

Milk was produced by local cattle, cross breed cattle and dairy goats. The overall mean milk production from cross breed cattle was 4.7 litres/cow/day while the overall mean milk production from dairy goats was 2.1 litres/doe/day. The overall egg production from local poultry was 13 eggs/hen/laying cycle. The major constraints to acquisition of various inputs for livestock production was high price of the inputs, distance to input markets, adulteration of inputs and lack of access of inputs in right packaging. There is need to address these constraints so as to increase livestock productivity.

Most households indicated that they used some farm machinery/equipment in their agricultural activities. Of these, 57% indicated that they used ploughs. Thirty six percent of those who had used machinery indicated that they owned them while 52% indicated that they hired. There is need, as has been shown by the studt to support the provision of basic socio-economic services to the resource poor and vulnerable producers to uplift their productive capacity to a level where they engage in commercial production

Value addition in cereals and pulses involved mainly grading, dehulling and making flour. In pulses, grading and dehulling were the most common value addition practices. Value addition of chicken involved defeathering and differentiation of parts.

The services accessed were infrastructure, financial, agricultural and climate. Forty-six per cent of households mainly access agricultural-related services.

Markets are a strong incentive for small scale farmers to increase their farm out puts. There is therefore need to improve access to market information and other services, and to provide technical capacity for pre- and post-production management of outputs. The development of functional and accessible marketing systems are essential to viable value chain development. There is need to establish modalities to improve farm gate marketing by encouraging collaboration with companies, cooperatives, and individual initiatives. Enhancing the capability

of community action through support to establishment and functioning of community groups will further increase outputs from small scale farmers and vulnerable groups.

Overall, 84% of households were food insecure. Generally, the county did not meet the threshold of food security and reported four months of food insufficiency in a year. It is recommended that Social protection and security services be made more accessible to vulnerable groups.

At least 88% of sampled households practiced natural resource management on their farms. The major natural management practices known and practiced were intercropping, crop rotation and minimum tillage.

Although communities were aware of natural resource management technologies and had experienced climate related shocks, there is need to enhance the awareness, knowledge and appreciation of NRM and climate change (CC) causes/risks among communities and particulary the vulnerable groups. Use of climate smart technologies focusing on inputs and /or land management/ husbandry practices should be enhanced,

There was great gender disparity depending on the indicator under consideration. There is need to take into account the gender disparity and other opportunities during activities geared towards improving the livelihoods of the communities in Homabay County.

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7.0 LIST OF ANNEXES

Annex 1: County Baseline indicators

Outcome	Indicators	Baseline data needed	Level of indicator
	On-farm income increase by 5% p.a. in both male and female-headed households by 2017	-Current total mean on-farm income (Disaggregated by gender; male, female, youth headed)	Overall mean value = KES 98,496 per year Mean male headed household annual on-farm income = KES 111,968 Mean female headed household annual on-farm income = KES 69,163 and Youth KES 75,959 **Vulnerability** Overall =KES 43,436 Vulnerable =KES 13,145 Non –vulnerable =KES 64,130
	Off-farm income increase by 6% p.a. in both male and female-headed households by 2017	-Current total mean off-farm income (Disaggregated by gender; male, female, youth headed)	Overall mean value=KES 92,954 per year Mean male headed household annual off-farm income = KES 100,712 Mean female headed household annual off-farm income = KES 71,073 Mean Youth headed household annual off-farm = KES 81,756 **Vulnerability** Overall =KES 92,954 Vulnerable =KES 15,035 Non –vulnerable =KES 149,129
	Food and nutrition security level increase by 10% in both male and female-headed households by 2017	- Current level of food and nutrition security for male and female headed households: -Need to establish food and nutrition security	Food insecurity Overall households food insecure= 84% of households: Male headed food insecure households = 87% Female headed insecure households 82% :Youth headed insecure households=73%

Outcome	Indicators	Baseline data needed	Level of indicator
	Productivity for major food commodities increase by 10% by 2017	- Current productivity (yields kg/acre) of maize –the year. (Overall, and disaggregated gender male and female headed)	Overall mean for the year=1055 kg/ acre, Male headed household (MHH) for year=1145.5 kg/acre
			Female headed (FHH) for year=1129.1 kg/acre
			Youth headed (YHH) for year=502.6 kg/acre:
		- Current productivity (yields kg/acre) of beans per year. (General, and disaggregated by gender male and female headed)	Overall=168.9kg/acre. Male headed=194.2 kg/acre
			Female headed (FHH)=105.8 kg/acre
			Youth headed (YHH) = 116 kg/acre.
			Groundnuts -Overall mean for the year=496.3 kg/ acre, -Male headed household (MHH) for year=604.2 kg/acre Female headed (FHH)=126.1 kg/acre Youth headed (YHH) = 374.9kg/acre.
		- Current productivity (yields, kg/acre) of coffee crops (General, and disaggregated by gender male and female headed)	Sugarcane Overall mean=13,835.7 kg/acre Male headed household (MHH)=17,125.2 kg/acre; Female headed (FHH)= 9,200 kg/ acre; Youth headed (YHH)= 8,442.3 kg/acre
			Banana Overall mean=167.1 kg/acre, MHH=201.4 kg/acre, FHH=28.5 kg/acre YHH=32.0 kg/acre
			Mangoes Overall mean=2,400.0 kg/acre, MHH=3,200.0 kg/acre FHH= nil, YHH=1,600.0 kg/acre
		- Current productivity (yields) of major livestock species (General, and disaggregate by gender male and female headed)	Milk (litres/day): Crossbred (litres/cow/day) Overall mean =4.7 MHH=4.9; FHH=nil; YHH=nil. Dairy goats: (litres/doe/day) Overall=2.1; MHH=2.1; FHH=Nil; YHH=Nil.
			Local poultry (eggs/hen/laying cycle) Overall =13; MHH=13; FHH=11; YHH=12.

Outcome	Indicators	Baseline data needed	Level of indicator
To increase equitable incomes, employment and food security of both male and female target groups as a result of improved production and productivity in the smallholder farm and off-farm sectors	Household asset index for women, youth and vulnerable groups increased	- Current household asset wealth overall, by Gender (women, youth and vulnerable groups) - Need to establish asset ownership wealth by gender (women, youth and vulnerable groups)	Overall Mean household asset value= KES 443,675, MHH = KES 486,861, FHH = KES 578,987, YHH=KES 111,087 **Vulnerability** Overall =KES 443,675 Vulnerable =KES 259,003 Non –vulnerable =KES 677,766
	Household gross wealth by gender and vulnerable groups increased by 10% by 2017		Overall gross wealth =KES 735,014 MHH=KES 809,677 FHH=KES 786,157 YHH=KES 360,356
Environmental resilience and social inclusion in value chains strengthened	% increase HH who notice long-term changes in the environment	- Current % of HH reporting noticing changes in environment: Overall, by gender.	Overall mean reporting=91% MHH=92%, FHH=89% YHH=90%
	% increase of HH experiencing climate shocks in their agricultural activities	Current % households experiencing climate shocks: Overall and by gender	Overall mean reporting=87% MHH=88% FHH=91% YHH=96% **Vulnerability** Overall =86.8% Vulnerable =86.8% Non –vulnerable =86.7%
		Current% of households accessing climate related information	Overall mean=96% MHH=96% FHH=96% YHH=92%
	C2 (a) % increase in households responding to climate-related risks has improved, by gender and vulnerability	- Current % of households responding to climate shocks and :Overall and by gender and vulnerability (Perception therefore proportions by gender)	Overall mean = 79% MHH= 80%, FHH=77% YHH=76% =HH Capacity to respond: Overall: High=23, Neutral= 12, Low=65 =MHH: High=30.4, Neutral 10.3, Low =64.1 =FHH: High=28.4, Neutral = 10.7, Low =61.8, =YHH: High=28.6, Neutral = 14.6, Low =56.9

Outcome	Indicators	Baseline data needed	Level of indicator
Value chain development. Viable and equitable commercialization of the agricultural sector promoted	C3 (a) Proportion of output marketed by major agricultural commodities increased by 10% by 2017		Maize Overall 100% MHH=68.6% FHH=100% YHH=100% Beans Overall 100% MHH=80.5% FHH=100% YHH=100% Finger millet: Overall 77.9% MHH=77.1% Banana: Overall 20.8% MHH=19.0% FHH=21.1% Sugarcane Overall 92.4% MHH=86.7% FHH=100% YHH=100% Milk: Overall 16% MHH=14% FHH=17% YHH=24% Eggs-local chicken: Overall= MHH=10.4% FHH=115.2% YHH=-%
	On farm employment increase by 5% p.a. by 2017, disaggregated by gender and vulnerability	- Current % of people employed on farm and disaggregated by gender and vulnerability	Overall proportion=63% MHH=60% FHH=81% and YHH=60% **Vulnerability** Overall =12.9% Vulnerable =12.1% Non –vulnerable =14%
	Off farm employment increase by 6% p.a by 2017, disaggregated by gender and vulnerability	- Current % of people employed off farm disaggregated by gender and vulnerability	Overall proportion=37%, MHH=40%, FHH=11% and YHH=40% **Vulnerability** Overall =9.8% Vulnerable =8.8% Non –vulnerable =11.2%

Outcome	Indicators	Baseline data needed	Level of indicator
Component 1.3: Linkages between key sectors stakeholders (Programmes, researchers, educational institutions, extensionists and Vc actors) improved	1.3.1.2. % increase in proportion of Producers accessing public and or private agricultural services and infrastructure (by type)	- Current % of farmers accessing public agric services and infrastructure by type - Current % of farmers accessing private agric services and infrastructure by type	46% of households mainly access agricultural-related services (public and private).By gender, 47% MHH, 38% FHH and 48% YHH. 53% of all households mainly accessing from public institutions and 47% from private institutions. 53% of MHH mainly accessing public institutions and 47% MHH accessing private institution 42% of FHH mainly accessing public institutions and 58% FHH accessing private institution 58% of YHH mainly accessing public institutions and 42% YHH accessing private institution
	2.2.1 % change in productive asset (Land, Labour and capital) access , disaggregated by gender and vulnerability	- Current % access to productive assets (Land, Labour, capital) by gender and vulnerability	=100% of household access to land=HHH-47.3% ,HH+Spouce-15%, HH+relative-8.2% =Access to labour =26% of households accessed market information services, 16% of MHH, 5% FHH and 4% YHH. =5% of households accessed credit,3% of MHH, 1%FHH and 1% YHH. =17% of households accessed saving services, 12% MHH, 1.2% FHH and 4.3% YHH. =0.3% of households accessed agricultural insurance, 0.3% MHH, 0% FHH and 0% YHH. 43% of households accessing agricultural technologies, 32% MHH, 21% FHH and 32% YHH. 2% of households accessed social protection, 1% MHH, 9% FHH and 0% YHH **Vulnerability** 17.5% of households accessed saving services, vulnerable=13.3% Non vulnerable=20.9% 18.5% of households accessed social protection, vulnerable=19.8% Non vulnerable=16.8%

Annex 2. Types and percent of respondents owning different household assets

Item No.	Item	Percent of respondents (N=325)	Item No.	Item	Percent of respondents (N=325)
1	Radios	82.5	**26**	Harvesting Crates	1.8
2	Telephone Mobile	85.5	**27**	Car	0.0
3	Zero grazing Units	0.3	**28**	Chaff Cutter	0.0
4	Television sets	20.6	**29**	Animal Traction Plough	15.4
5	Bicycles	29.8	**30**	Ploughs for tractor	0.3
6	Water Tanks	15.7	**31**	Piggery Houses	0.3
7	Wheel Barrow	26.2	**32**	Borehole	2.5
8	Stores	16.0	**33**	Pestle and Mortar	2.5
9	Spray Pump	7.4	**34**	Silage Pit	0
10	Solar Panels	12.6	**35**	Power Saw	0
11	Battery Car	10.8	**36**	Well	2.8
12	Water Trough	16.0	**37**	Fences	9.2
13	Gas Cooker	2.8	**38**	Posho Mill	1.2
14	Motorcycle	5.5	**39**	Maize Sheller	0
15	Hand Cart	2.2	**40**	Dam	0.3
16	Water Pump	1.5	**41**	Generator	2.2
17	Weighing Machine	0.3	**42**	Boom Sprayer	0
18	Donkey Cart	3.1	**43**	Green House	0
19	Beehives	0.9	**44**	Desk Top Computer Laptop	0
20	Sewing Knitting Machine	4.6	**45**	Hay Baler	0
21	Poultry houses	5.5	**46**	Cane crusher	0.6
22	Jaggery unit	1.8	**47**	Commercial buildings	0.3
23	Furniture	56.6	**48**	Milking equipment shed	2.2
24	Cattle dip	0.6	**48**	Gas cooker	2.8
25	Trailer	0.3			

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