REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE,
LIVESTOCK AND FISHERIES

SWEDEN

## AGRICULTURAL SECTOR DEVELOPMENT SUPPORT PROGRAMME (ASDSP)

# Volume 1
# HOUSEHOLD BASELINE SURVEY REPORT

## BOMET COUNTY

KALRO
Kenya Agricultural & Livestock Research Organization

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

University of Nairobi

2014

REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES

SWEDEN

# AGRICULTURAL SECTOR DEVELOPMENT SUPPORT PROGRAMME (ASDSP)

# Volume 1
# HOUSEHOLD BASELINE SURVEY REPORT
## BOMET COUNTY

KALRO
Kenya Agricultural & Livestock Research Organization

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

University of Nairobi

2014

Agricultural Sector Development Support Programme (ASDSP)
Ministry of Agriculture, Livestock and Fisheries
Hill Plaza, 6th Floor, P.O. Box 30028-00100 Nairobi
Tel/Fax: +254-20-2714867
Email: pc@asdsp.co.ke
www.asdsp.co.ke

# FOREWORD

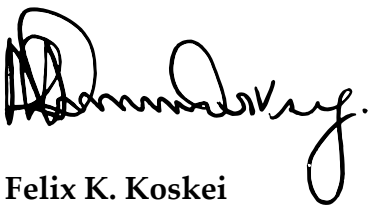
Agricultural sector growth and development is crucial to Kenya's overall economic and social development. In particular, agriculture significantly contributes to the national economy; ensures the country is food secure; generates incomes and provides employment both directly and indirectly for the population. 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;

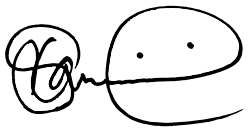
First, to assess the socio-economic status of the communities especially the food security levels as this has an impact on cognitive human development which has an overall effect on the country's economic growth. Other factors considered were their social inclusion, gender disparity and their resilience 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**
**PRINCIPAL SECRETARY**
**STATE DEPARTMENT OF AGRICULTURE**

**Prof. Micheni Japhet Ntiba, PhD, CBS**
**PRINCIPAL SECRETARY**
**STATE DEPARTMENT OF FISHERIES**

**Prof. Fred Sigor, PhD**
**PRINCIPAL SECRETARY**
**STATE DEPARTMENT OF LIVESTOCK**

# 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.

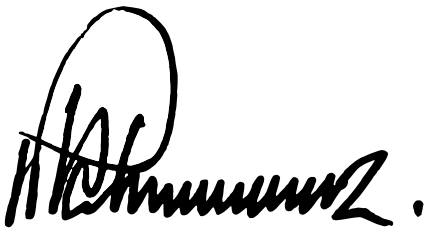
The National Programme Steering Committee under the chairmanship of Ms Anne Onyango, MBS and Mr Julius Kiptarus, OGW, for guidance and oversight role.

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**

# TECHNICAL TEAM

| Name | Role | Institution |
|---|---|---|
| Phoebe A. Odhiambo (Mrs) | Survey Coordinator | National Programme Coordinator ASDSP, MoALF |
| Rosemary Magambo | Deputy Survey Coordinator | Monitoring and Evaluation Specialist, ASDSP, MoALF |
| Mikael Segerros | Technical Assistance Services | Consultant, Niras Natura |
| Peter Shimon | Technical Assistance services | Consultant, Niras Natura |
| Japheth Kiara | Technical Assistance Services | Consultant, Niras Natura |
| Dr. Lawrence Mose | Survey Team Leader | Assistant Director, Planning, Monitoring and Evaluation, KARI |
| Dr. Festus Mureithi | Deputy Survey Team Leader | Assistant Director, Socio-Economics and Applied Statistics, KARI |
| Prof. Chris Ackello-Ogutu | Lead Technical Advisor | Professor Department of Agricultural Economics, University of Nairobi |
| Elias Thuranira | Data Analyst | Senior Research Officer, KARI |
| Alex Mwaniki | Data Analyst | Senior Economist, Statistician, MoALF, |
| Josephine Mogere | Editorial Advisor | Head Mass Media, AIRC, MoALF, Nairobi |
| Joseph Nginyi | Survey Supervisor | KARI |
| Charles Bett | Report Drafters | KARI |
| Dr. Rahab Muinga | Report Editor | KARI |
| Dr.Stella Makhoha | Editorial Review | Senior Principal Research Officer KARI |
| John Ayere | ICT Support | ICT Officer, ASDSP |
| Jane Njeru | Design | Head Printing and Ppublications, AIRC Nairobi |

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AI | Artificial Insemination |
| APVC | Agricultural Product 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 |
| CIMS | 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 | Swedish international Development Agency |
| SIMCESA | 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 baseline survey carried out in Bomet 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 the Kenya 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 276 households of which adult male, adult female and youth headed households made up 70%, 9% and 21% respectively was determined. 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) software.

The average household members were six (six in adult-male, five in adult-female and five in youth headed households). The average land size per household was 3.5 acres with the male headed households owning 4.1 acres, and 2.4 and 2.2 acres for the female and youth headed households respectively. The households accessed more than one parcel of land. About 40% of the land had titles. Land parcel one which is where the household was located, was mainly owned jointly by the household head and spouse (88%, 65% and 79% for male, female and youth headed households respectively). The trend was similar for the other parcels. The mean household age was 53, 51 and 21 years for male, female and youth headed households respectively. About 41% of the household members had attained upper primary education (29%, 3% and 9% in male, female and youth headed households respectively). Seventy per cent of the household heads were engaged in crop and/or livestock farming. About 8% of all sampled households reported to have had someone in formal salaried employment. Households earned an average of KES 93,697 per year from off farm activities. The level of annual saving was KES 12,500 mainly by adult male (18%).

Most of the farmers grew maize, beans, cabbages and sweet potato in both seasons on less than one acre except for maize (1.1 acres). Maize and beans were the main annual crops grown and yielded about 1090 and 725 kg per acre respectively in Season 2. Tea and banana were the most important perennial crops yielding on average 4534 and 6831 Kg per acre respectively. The livestock numbers were low (2-3 cows per household) and the daily milk production per crossbred cow was 6.6 and 7.9 litres in the dry and wet seasons, respectively.

A total of 159 households used farm machinery in their agricultural activities. Of these, 41% indicated that they used tractors, while 28% used ploughs. The main value addition was in cereals (73%), vegetables (27%) and trees (24%). The main product that was processed in livestock was milk reported by 90% of the households. Value addition was mainly done by men who fermented (82%), boiled (67%), cooled (73%) or flavoured (100%) the milk.

The farm produce was used for home consumption or sale in the informal market. While almost all the bananas and tea were sold only half the maize was sold by male and female households. The youth headed households sold almost all the maize produced. About 40% of the farmers used tractors while 28% used ploughs. Most of the machinery were owned communally (53%) or hired (35%).

The main support services accessed were infrastructure (74%), agricultural services (73%) and climate related services (15%). The main source of climate related information was radio (about 30%) and indigenous traditional knowledge (about 30%). Most (60%) of the respondents were satisfied with the services. Finance institutions offering credit to farmers were available and in the last 12 months prior to the survey, the credit accessed was on average KES 41,308 mainly by women (KES 60,000). The major constraints to agricultural production were high input prices, long distance to markets among others.

About 30% of the households were food insecure. The mean daily calorie per adult equivalent was 3,774, 4,594, 3,807 and kcal for male, female and youth headed households respectively with an overall mean of 3914 kcal which was above the recommended daily allowance of 2260 kcal. The households in the county were therefore nutritionally secure.

At least 25% of the households had noticed long term environmental changes, of which 66.8% had noticed drying of wells, deforestation (17.6%) and soil degradation (14.7%). The mitigation measures used against climate change were: tree planting (41%), water conservation (33%), and some changed the crops grown (34%).

There were gender disparities in the county. For instance land size for male headed households was 4.1 acres while it was 2.4 and 2.2 for female and youth headed households. The value of livestock was KES 143,875.40, 78,551.10 and 88,565.80 for male, female and youth headed households respectively. The FHHs interviewed had no bank savings while the male and youth headed households had KES 15,000 and 10,000 respectively. The total on- farm income was KES 327,370, 266,855 and 236,792 for male, female and youth headed households respectively. The male headed households used more farm inputs than the female and youth headed households.

The major constraints to input use in crop and livestock production were high prices and long distance to the market. Productivity of annual and perennial crops in both season 1 and 2 was low which could be attributed to low usage of production inputs, low access of agricultural services and low mechanization of farm activities. There was low use of input and rudimentary value addition methods. The awareness level for NRM/climate change issues was high but use of NRM/climate change technologies/strategies was not adequate. The coping strategies to climate change was quite low. Gender disparity was quite evident.

To increase and sustain agricultural productivity the extension arm of the county government in partnership with the private sector should develop programmes that ensure availability of farm inputs and farmers are sensitized on their use, enhance service provision to farmers and promote value addition. Intervention to improve the capacity to respond to climate change shocks is necessary. To mitigate poor rain distribution and drought shocks, investments can be made in water conservation, irrigation and drought tolerant crops. Gender parity through development of programmes that address the needs of the various gender categories should be undertaken. There should be diversification of food production including high value and nutritious foods both for home consumption and sale. The food deficit months need to be targeted in order to reduce the food gap.

# 1.0 BACKGROUND

## 1.1 County profile

### 1.1.1 Location and size

Bomet county borders Kericho county to the North and North East, Narok county to the South East, South, and South West, Nyamira county to the North West and Nakuru county to the East. The county occupies an area of 2,037.4 $Km^2$ where 1,716.6 $Km^2$ of this land is arable land suitable for farming.

### 1.1.2 Administrative and political units

Bomet county is divided into five sub-counties, 10 divisions, 66 locations and 178 sub-locations (Table 1.1). The sub-counties are Bomet Central, Bomet East, Chepalungu, Sotik and Konoin, each of which is a constituency.

**Table 1.1: Administrative and political units, Bomet County**

| Sub-county/ Constituency | Division | Area in $km^2$ | No. of Locations | No. of sub-locations |
|---|---|---|---|---|
| Bomet Central | Bomet Central | 266 | 10 | 27 |
| Bomet East | Longisa | 311.3 | 8 | 22 |
| Chepalungu | Sigor | 286.8 | 6 | 15 |
| | Siongiroi | 249.0 | 7 | 22 |
| Sotik | Ndanai | 81.5 | 2 | 8 |
| | Sotik | 150.8 | 6 | 15 |
| | Mutarakwa | 82.7 | 3 | 9 |
| | Abosi | 83.9 | 2 | 6 |
| | Kapletundo | 80.3 | 6 | 13 |
| Konoin | Kimulot | 262.4 | 5 | 11 |
| | Konoin | 94.3 | 6 | 12 |
| | Cheptalal | 88.4 | 5 | 12 |
| Total | | 2037.4 | 66 | 172 |

Source: Bomet County Development Profile (2013)

### 1.1.3 Demographic characteristics

The population of Bomet county was estimated to be 782,531 in 2012 and is projected to reach 846,012 in 2015. This population is expected to grow by 2.3% to 891,168 by 2017. Population density of the county was 384 per $km^2$ and is expected to grow to 415 $km^2$ and 437 $km^2$ in 2015 and 2017 respectively. In terms of population density as per the Kenya Population and Housing Census (KPHC) 2009 report, Bomet Central constituency had the highest density of 494 people per $Km^2$ followed by Bomet East, Sotik Konoin, and Chepalungu constituencies whose densities are 393, 349,312 and 303 respectively. The population density in Bomet Central constituency was high due to the attractive economic opportunities which include the rich agricultural land, commercial activities, and the largest urban centre (Bomet town), which is also the administrative centre in the county.

A total of 390,196 people in the county comprise the labour force. This represents 50.2% of the total county 2012 population projection. This indicates that the county is well endowed with abundant labour which ought to be tapped for its development.

### 1.1.4 Land availability and use

The total land area in Bomet County is 2037.4 Km². A total of 1,716.6 Km² of this land is arable land suitable for farming. There are also gazetted forests such as Tinet in Konoin sub-county and Chepalungu in Chepalungu sub-county that occupy 483.1 Km². About 230.1 Km² is non-arable land while the area coverage for the market centres is 2 km². Approximately 86% of the households have acquired titles for their pieces of land and this has enabled many of them to participate actively in economic activities. The people displaced from the forest in Konoin sub-county are among the households without title deeds. The incidence of landlessness in the county is 2%. This came about as a result of the displacement during the Mau escarpment conservation exercise that saw the displacement of people from the forest.

Bomet County has two gazetted and un-gazetted forests with the gazetted forest covering an area of approximately 481.1 Km². There are two types of forests in Bomet, that is indigenous and plantations. The major forests include Mau forest, Chepalungu forest and private forests. The county has 13 established Community Forest Associations (CFA). The main forest products include timber, honey, fire wood, building materials, herbal medicine, pottery clay, grass and pine gum. These products are generated from Mau forest, Chepalungu forest and private forests. The beneficiaries to these forest products are the locals who live along the forests and also the farmers who practice agro forestry. The forests are also the source of major rivers that provide water for domestic use and small scale irrigation of crops to generate income.

## 1.2 Role of agriculture in the county

Due to favourable rainfall, agriculture is the major occupation and source of income that drives the county's economy. It is the main source of household food and provides raw materials to agro-based industries. Rainfall is highest in the low highland zone with a recorded annual rainfall of 1400mm and the lowest is 1000 mm. The upper midland zone which lies west of the rift experiences uniform rainfall while in the upper midland zone on the southern part of the county, rainfall is low. The temperatures in the county range from 16 to 24 °C. The coldest months are between February and April, while the hot season is between December to January.

The average agricultural land area is estimated at 1.5 ha per household. Since the land size per household is small, most of it is used for agricultural and livestock production while the remaining land is utilized for construction of homesteads. Majority of the farmers in the county practice mixed farming with tea, maize and dairy farming taking the lead. Although the tea area is lowest, it has the highest income earnings followed by milk and maize. Table 1.2 presents crop production in Bomet County.

**Table 1.2: Crop production in Bomet County**

| Crops | Production (MT) | Value (KES) Millions |
|---|---|---|
| Dry maize | 1,159.0 | 2,713.11 |
| Beans | 160.5 | 753.44 |
| Sorghum | 5.3 | 12.27 |
| Millet | 8.5 | 24.09 |
| Sweet potato | 7.9 | 43.67 |
| Potatoes | 109,840.0 | 2,862.60 |
| Cabbages | 34,000.0 | 349.00 |
| Kales | 14,838.0 | 11.53 |
| Tea | 109,532.0 | 37,493.72 |
| Total | | 44,263.43 |

Source: Economic Review of Agriculture, 2012

Livestock production contributes between 30-45% of the total household income depending on the sub-county. The main cattle breeds reared are Friesian and Ayrshire. The main fishing activities in Bomet County are aquaculture development, fisheries resource protection and utilization, market survey and quality control of fisheries. The major rivers that can support fisheries activities include: Mara River, Irate, Kipsonoi, Kiptiget, Nyongores and Amalo hence there is a lot of potential for fisheries development in the county. The major types of fish produced in the county include Tilapia Clarias, Barbus Labeo and Trout species. The leading fish produced in the county is tilapia and the quantity produced annually is about 53,140.6 Kg. Table 1.3 shows the quantities and estimated value of outputs from livestock in the county.

**Table 1.3: Quantity and value of livestock and livestock products**

| Product | Quantity | Value (KES) |
|---|---|---|
| Cattle (number) | 369,412 | |
| Indigenous chicken (number) | 644,435 | |
| Sheep (number) | 99,924 | |
| Goats number) | 102,907 | |
| Pigs (number) | 1106 | |
| Honey (kg) | 48,905 | 39,124,000 |
| Donkeys (number) | 20,367 | |
| Beef (MT) | 2,419,883 | 846,959,050 |
| Milk (L) | 91,963,207 | 2,758,896,210 |
| Eggs (trays) | 765,469 | 229,640,700 |
| Mutton production (MT) | 59.79 | 23,916,000 |
| Nile tilapia fish (kg) | 53,141 | 10,195,057 |

Source: Bomet County Development Profile, 2013

Some of the major challenges to agricultural production in the county include:

- Poor crop husbandry,
- Use of uncertified seeds and low usage of fertilizer resulting from high costs attributed to poor infrastructure and distribution network.
- Use of traditional breeds
- Water shortage during dry periods and periodic water logging whenever there is excessive rain has also been affecting production especially in the lower parts of the county
- Land degradation
- Lack of planting materials has affected productivity of pyrethrum and coffee, the two main cash crops in the lower areas of Bomet sub-county
- Diseases are prevalent in potato and maize zones
- Inadequate extension services due to a high farmer to staff ratio. In addition, extension personnel lack access to emerging knowledge on modern farming practices
- Poor market access partly due to poor infrastructure, low productivity and poor access to accurate and timely market information

# 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.

The 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 the Swedish International Development Agency (SIDA).

The Agricultural Sector Development Support Program (ASDSP) has defined its results indicators in the program log frame (Annex 1), but the baseline levels for these indicators are currently unavailable. A baseline survey was therefore necessary to establish the current status (or level) for each indicator. The baseline information for the indicators will be the guiding pillars to measure the program's achievements and outputs. The information will also help in developing an appropriate tool for 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 program's working areas. The specific objectives of the baseline study were:

- Collect data and analyse the verifiable indicators from the program log frame
- Collect and analyse the relevant information of the existing situation of the program's target beneficiaries including the poor and vulnerable groups, service providers and related stakeholders
- Enhance understanding of 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 (MoALF) 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 used for the baseline survey. Secondary data sources such as relevant program and sub-sector documents, county databases and related literature were used. Primary data were collected from sampled beneficiaries in the county. The survey was conducted in September-October 2013 and was structured and managed in a way that ensured high data quality. Specifically, the survey focused on collecting 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 FHHs
- 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 to collect the data involved the following steps:

- Defining the sample, identifying respondents and gauging their accessibility
- Reflecting on the research design and collecting secondary data
- Preparing research instruments (questionnaires) and recruiting and training 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 ASDSP Office
- Pre-testing and revising instruments
- Sampling, geo-referencing sampled households, recruiting and training of Geographical Information System (GIS) mappers and identifying sampled households
- Recruiting and training enumerators, and collecting primary data
- Data entry and analysis
- Preparing report
- Validating information in the report at the county

## 3.2 Sampling procedure

The Bomet County household baseline survey was part of a larger national survey covering all the 47 counties, the overall sample consisted of 12,651 agricultural households. Using a proportionate to population size (PPS) sampling method, a sample of 276 households was selected for the county out of its 174,914 agricultural households. The survey was confined to the prominent production systems (agro-ecological zones); the county's sample size was randomly distributed to these areas based on the population density of each production system. Figure 3.1 shows the areas selected for the household baseline survey and the geo-referenced locations of the randomly sampled households.

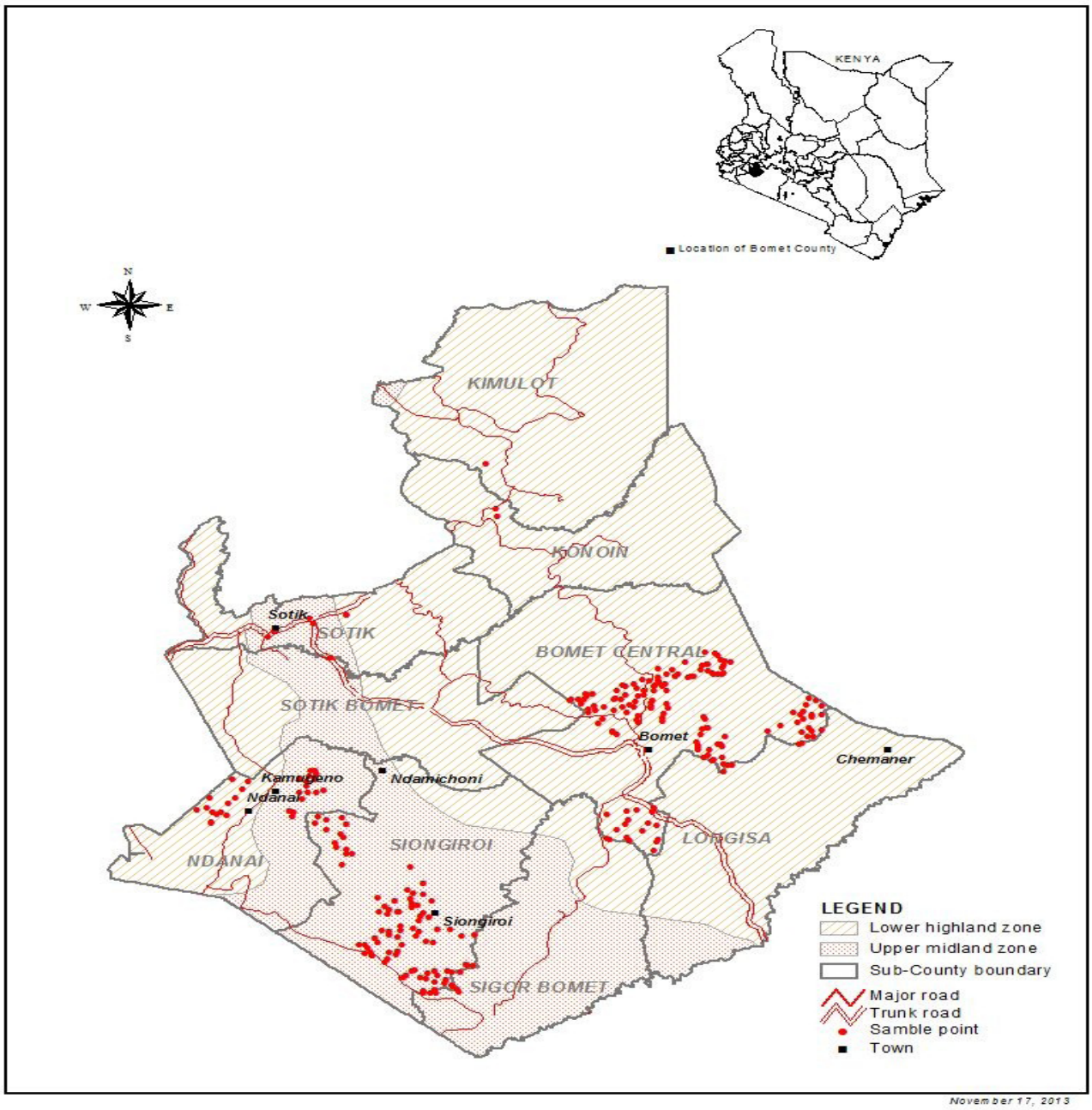



**Figure 3.1: Location of the sampled households in Bomet county**

## 3.3 Data collection

Prior to collecting data 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 questionnaire.

The GIS mappers were recruited and trained. All households were geo-referenced before data collection. Enumerators collected data using a structured questionnaire during late September to early October 2013. Data entry was done at KARI-Njoro using Microsoft Excel and later exported to the Statistical Package for Social Sciences (SPSS) for data analysis. The data analysis results were summarized using descriptive statistics-frequencies, means, measures of dispersion and graphs.

# 4.0 SURVEY RESULTS

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

## 4.1 Household socioeconomic and farm characteristics

### 4.1.1 Household size and gender

Most of the households were male headed (70%) while female headed and youth headed households constituted 9% and 21% respectively. A typical household in the county had an average of six members. Disaggregated by gender, household mean size for MHHs was six, and five for female-headed and YHHs. The mean age of household head was 53 years for male headed, 51 years for female headed and 21 years for YHHs.

### 4.1.2 Level of education

Table 4.1 shows the education levels of the household heads. About 71% 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 only 9.6%.

**Table 4.1: Distribution of levels of education attained by household head**

| | Proportion (%) of household heads (n=276) | | | |
|---|---|---|---|---|
| **Level of education** | **Male headed** | **Female headed** | **Youth headed** | **Overall** |
| No education | 10.3 | 2.6 | 1.5 | 14.4 |
| Lower primary | 3.7 | 0.4 | 0.0 | 4.1 |
| Upper primary | 28.8 | 3.3 | 9.2 | 41.3 |
| Secondary | 21.8 | 1.8 | 7.0 | 30.6 |
| Certificate/Vocational/Craft | 3.0 | 0.0 | 1.1 | 4.1 |
| Diploma/Higher National Diploma | 1.5 | 0.4 | 1.5 | 3.3 |
| Tertiary | 1.1 | 0.0 | 1.1 | 2.2 |
| **Total** | **70.1** | **8.5** | **21.4** | **100.0** |

*Note: Data was expressed as a proportion of the total sample size*

### 4.1.3 Primary occupation of household heads

At least 70% of households engaged in crop or livestock farming while 8% were in formal salaried employment in the civil service (Table 4.2).

**Table 4.2: Primary occupation of household head**

| Type of occupation | Proportion (%) of household heads (by gender) engaging in type of occupation | | | |
|---|---|---|---|---|
| | Male adult (n=182) | Female adult (n=23) | Youth (n=57) | Overall (N=262) |
| Livestock and livestock product trading | 5.5 | 0.0 | 1.8 | 4.2 |
| Formal salaried employment | 8.8 | 0.0 | 8.8 | 8.0 |
| Old/Retired /Pensioner | 1.6 | 0.0 | 0.0 | 1.1 |
| Crop and/or livestock farming | 67.6 | 82.6 | 73.7 | 70.2 |
| Self-employed business- trade/services | 6.6 | 0.0 | 14.0 | 7.6 |
| Other occupations | 9.9 | 17.4 | 1.8 | 8.8 |

### 4.1.4 Household members with chronic illness, incapacitated or under social protection

Of the sampled households, only 3% reported having members with chronic illness, incapacitated or were under social protection. Disaggregated by gender, 5% of male-headed and 4% of female-headed reported having members with either of the conditions and none amongst the YHHs.

### 4.1.5 Land ownership and access

The average farm size was 4 acres (n=276); disaggregated by gender, MHHs owned 4.1 acres, female headed owned 2.4 acres and youth headed owned 2.2 acres. On average most households owned and/or accessed two parcels of land across all the gender categories. For the parcel where the homestead was located, 88% of the land was owned by adult male household head (Table 4.3) A similar trend was observed for the other parcels of land except for the third land parcel where in majority of cases it was owned by youth headed households.

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

| Parcel of land no. | Household head and/or spouse | Rented | Communal | Relative non-house-hold member | Joint house-hold member and relative |
|---|---|---|---|---|---|
| Land Parcel 1 (n=270) | 131 | 0 | 7 | 16 | 3 |
| Male headed (n=188) | 88.3 | 0.0 | 5.8 | 3.9 | 1.9 |
| Female headed (n=1) | 65.0 | 0.0 | 0.0 | 35.0 | 0.0 |
| Youth headed (n=9) | 79.4 | 0.0 | 2.9 | 14.7 | 2.9 |
| Land Parcel 2 (n=43) | 49 | 5 | 1 | 6 | 2 |
| Male headed (n=33) | 77.8 | 8.9 | 2.2 | 6.7 | 4.4 |
| Female headed (n=1 | 75.0 | 0.0 | 0.0 | 25.0 | 0.0 |
| Youth headed (n=9) | 80.0 | 10.0 | 0.0 | 10.0 | 0.0 |
| Land Parcel 3 (n=11) | 20 | 3 | 0 | 0 | 1 |
| Male headed (n=9) | 81.3 | 12.5 | 0.0 | 0.0 | 6.3 |
| Female headed (n=1) | 66.7 | 33.3 | 0.0 | 0.0 | 0.0 |
| Youth headed (n=1) | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |

*Land parcel 1 refers to tthe land where the household is located*

Access to different parcels of land owned by the household members is presented in Table 4.4.4. The access/use of land parcel where the homestead was located (Parcel 1) was accessed mostly by the household head (44%) or jointly with the spouse (39%). A similar trend was observed for the other two parcels of land. The access by the spouse of the household head alone was only 10% for the parcel of land where the homestead was located and for Land

Parcel 2. In a majority of the cases, the land was accessed by the household head or jointly by the household head and spouse.

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

| | Degree of access (%) to different parcels of land by various heads | | | | | |
|---|---|---|---|---|---|---|
| Parcel of land no. | Head of household (HH) | Spouse of HH | HH and spouse | Household member and relative | Male relative | Female relative |
| Land Parcel 1 | 43.8 | 10.0 | 38.8 | 3.8 | 2.5 | 0.6 |
| Land Parcel 2 | 31.7 | 10.0 | 45.0 | 5.0 | 6.7 | 0.0 |
| Land Parcel 3 | 47.8 | 4.3 | 34.8 | 0.0 | 8.7 | 0.0 |

### 4.1.6 Land Tenure

At least 40% of households had title deeds to their land, 51% owned land but did not have title deeds or any formal document and 3% leased land while 3% had user rights or used communal land. Disaggregated by gender, majority of MHHs (47%) and FHHs (68%) owned land with no formal documents while 62% of the youth owned land with no formal documents (Table 4.5).

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

| | Gender of household head | | | |
|---|---|---|---|---|
| Type of tenure | Adult male (n=228) | Adult female (n=25) | Youth (n=66) | Overall (n=319) |
| With title deed/allotment | 43.0 | 32.0 | 31.9 | 39.9 |
| Owns but no formal title | 46.5 | 68.0 | 62.1 | 51.4 |
| Lease or rented | 2.6 | 0.0 | 4.5 | 2.8 |
| Communal | 3.5 | 0.0 | 0.0 | 2.5 |
| Has user rights | 4.4 | 0.0 | 1.5 | 3.4 |

For the land parcel where the homestead was located, the most common land tenure was ownership with no formal documents (52% for MHHs, 67% for FHHs and 68% of the youth headed households). This indicates that less than 50% households may not have any incentives to borrow or undertake major investments because they may not be the sole owners of the land where the homestead is located. A similar trend – characterized by having more households without titles than those with- was observed for the other parcels of lands (Table 4.6). The data suggests that households could increase land access though leases or renting.

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

| | Proportion (%) of households under system | | |
|---|---|---|---|
| Parcel of land No./ head | **Formal title or allotment letter** | **Owns but has no formal documents** | **Lease/Rented** |
| Land parcel 1 | 35 | 50 | 1 |
| *Male headed* (*n*=429) | 43.2 | 51.9 | .5 |
| *Female headed* (*n*=127) | 33.3 | 66.7 | 0.0 |
| *Youth headed* (*n*=149) | 28.1 | 68.4 | 1.8 |
| Land Parcel 2 | 6 | 4 | 2 |
| *Male headed* (*n*=151) | 41.2 | 23.5 | 11.8 |
| *Female headed* (*n*=44) | 0.0 | 100.0 | 0.0 |
| *Youth headed* (*n*=61) | 50.0 | 25.0 | 25.0 |
| Land Parcel 3 | 3 | 1 | 1 |
| *Male headed* (*n*=55) | 44.4 | 22.2 | 11.1 |
| *Female headed?* | | | |
| *Youth headed* (*n*=22) | 100.0 | 0.0 | 0.0 |

### 4.1.7 Allocation of land to different uses

About 23% of the land in the county was allocated to subsistence crop production. This was disaggregated by gender as 22%, 30%, and 27% of the land having been allocated by the male headed, female headed and youth headed households respectively. The homestead was allocated 16% of the land (Table 4.7).

**Table 4.7: Land allocated to different uses by different household types**

| **Land-use type** | **Proportion (%) of land allocated by gender of HH** | | | |
|---|---|---|---|---|
| | **Adult male** | **Adult female** | **Youth** | **Overall** |
| Homestead | 15.9 | 17.5 | 14.6 | 15.8 |
| Subsistence crops | 21.6 | 29.4 | 27.2 | 22.7 |
| Commercial crops | 24.2 | 18.1 | 26.4 | 24.1 |
| Improved pastures/forages | 7.5 | 8.8 | 13.2 | 8.3 |
| Natural pastures | 27.9 | 25.1 | 17.4 | 26.4 |
| Woodlot | 2.6 | 1.2 | 0.0 | 2.2 |
| Unusable land | 0.3 | 0.0 | 1.2 | 0.4 |

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

### 4.2.1 Use of labour in crop and livestock production

The labour contribution in crop and livestock production, disaggregated by gender, is shown in Figure 4.1. The adult females provided the largest share of family labour in both crop and livestock production, while males and the youth provided the least. Hired labour for livestock production was solely dominated by the youth with zero contribution from adult male and females. The youth contributed the least amount of family labour in livestock production.

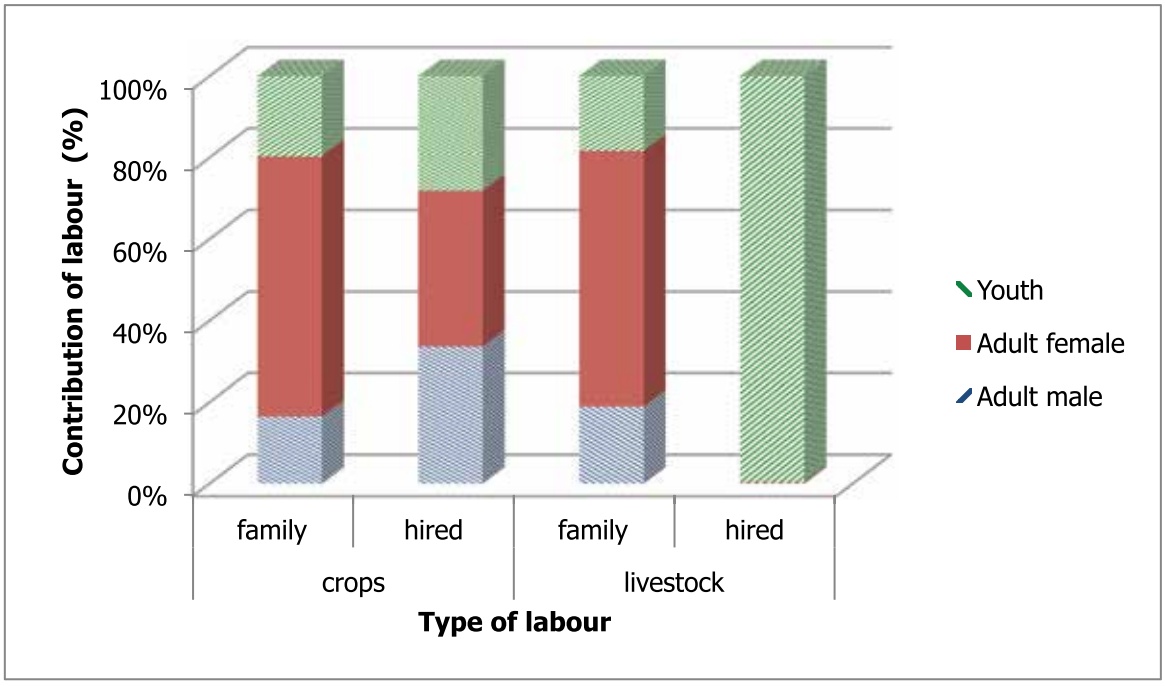



**Figure 4.1: Contribution (%) of labour in crop and livestock production, by gender**

### 4.2.2 Use of agricultural inputs, rates, costs and challenges

#### 4.2.2.1 Use of inputs for different annual crops during season 1

Figure 4.2 presents level of household use of crop varieties in Season 1. Farmers used improved seed for maize, tomatoes and cabbages while for crops such as sorghum, beans and sweet potatoes they used local or improved seed most of the time. Farmers used improved seed for commercial crops while they used local varieties for traditional food crops. There was no difference among male headed and FHHs in the type of seed used for the priority crops grown in Season 1. The respondents who grew maize and vegetables (spinach, tomatoes and cabbage) used improved seed while about 60% of the respondents who grew beans and potatoes used local seed in season 1.

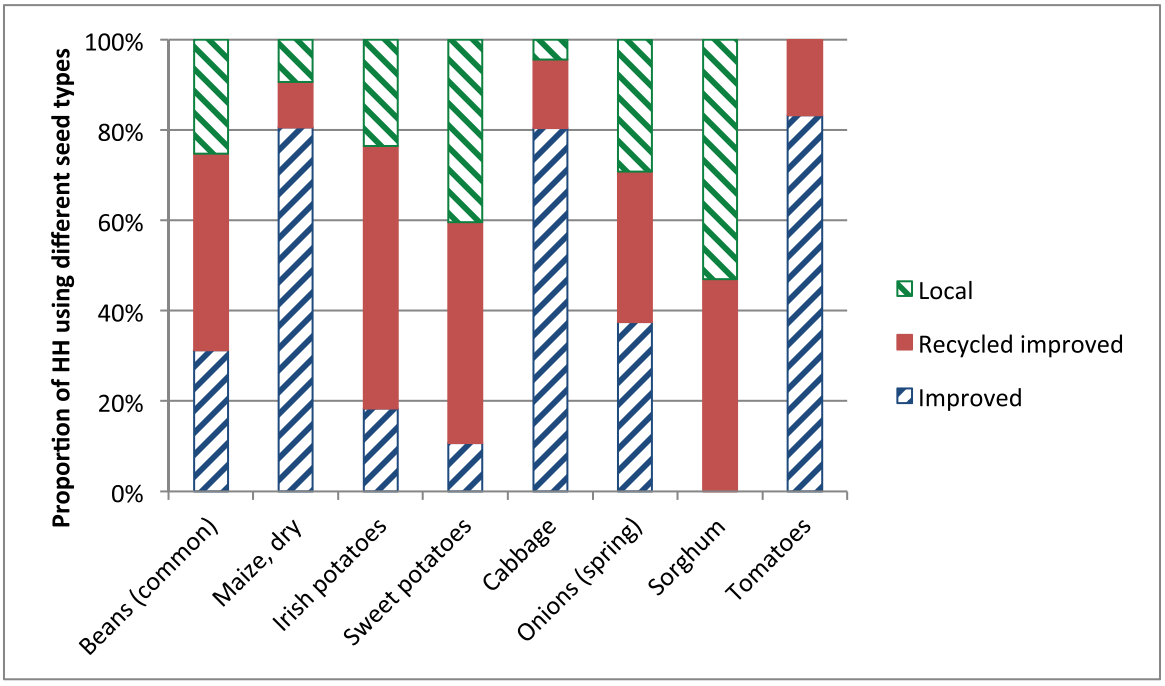



**Figure 4.2: Proportion (%) of households using different seed types during Season 1**

Table 4.8 presents households, disaggregated by gender, who used various types of agricultural inputs in farming activities in Bomet County. With the exception of basal fertilizer, foliar feed and herbicides which had high adoption rates, 67%, 45% and 43% respectively, the other management practices had relatively lower adoption rates (less than 20%). Only 20% of the households used field pesticides while 13% used organic manure and only a paltry 4% and 1% used storage pesticides and irrigation water. Proportionately, more males than females and youth adopted the various management practices.

**Table 4.8: Households use disaggregated by gender, of various inputs in annual crops during Season 1**

| Input used | Gender of household head | | | | | | Overall |
|---|---|---|---|---|---|---|---|
| | Male Adult | | Female Adult | | Youth | | (n = 276) |
| | % within Male HH (n=193) | % of total HH | % within Female HH (n=24) | % of total HH | % within Youth HH (n=59) | % of Overall HH | |
| Herbicides | 41.5 | 29.0 | 45.8 | 4.0 | 47.5 | 10.1 | 43.1 |
| Basal fertilizer | 68.4 | 47.8 | 66.7 | 5.8 | 64.4 | 13.8 | 67.4 |
| Top dress fertilizer | 10.4 | 7.2 | 8.3 | .7 | 5.1 | 1.1 | 9.1 |
| Organic manure | 14.0 | 9.8 | 12.5 | 1.1 | 8.5 | 1.8 | 12.7 |
| Foliar feed | 47.2 | 33.0 | 58.3 | 5.1 | 33.9 | 7.2 | 45.3 |
| Irrigation water | 0.5 | .4 | 8.3 | .7 | 0.0 | 0.0 | 1.1 |
| Field pesticides | 20.2 | 14.1 | 25.0 | 2.2 | 15.3 | 3.3 | 19.6 |
| Storage pesticides | 4.7 | 3.3 | 8.3 | .7 | 0.0 | 0.0 | 4.0 |

### Decision-making in production of annual crops by gender

Decision making depends on the type of crop. Among the 8 crops listed in Table 4.9, males above 35 years dominated in making decisions for all the crops followed by females above 35 years. Males dominated in making decisions on Irish potato (9% and 64%) and over 62% for sorghum, sweet potatoes, maize and beans.

**Table 4.9: Decision making in annual crops production by gender**

| Crops grown | Sample (n) | Level of decision-making (%) according to gender | | | |
|---|---|---|---|---|---|
| | | Adult male | Adult female | Youth male | Youth female |
| Beans (common) | 212 | 70.3 | 18.4 | 8.0 | 3.3 |
| Maize, dry | 128 | 75.0 | 18.0 | 5.5 | 1.6 |
| Irish potato | 95 | 64.2 | 17.9 | 12.6 | 5.3 |
| Sweet potato | 46 | 71.7 | 15.2 | 10.9 | 2.2 |
| Cabbage | 45 | 57.8 | 24.4 | 13.3 | 4.4 |
| Onion (spring) | 24 | 54.2 | 29.2 | 8.3 | 8.3 |
| Sorghum | 16 | 62.5 | 31.3 | 6.3 | 0.0 |
| Irish potato -tissue culture | 11 | 90.9 | 9.1 | 0.0 | 0.0 |

#### 4.2.2.3 Use of inputs in different annual crops during season 2

Figure 4.3 presents the levels of use of crop varieties by households in Season 2. There were differences in the type of seed used for the priority crops grown in Season 2. At least 60% of respondents who grew maize, cabbage and tissue culture (TC) potato used improved seeds. Those who grew beans, Irish potato and sorghum recycled improved seed. Significant proportion of farmers who grew sweet potato, bean and onion used local seed in Season 2 (Figure.4.3).

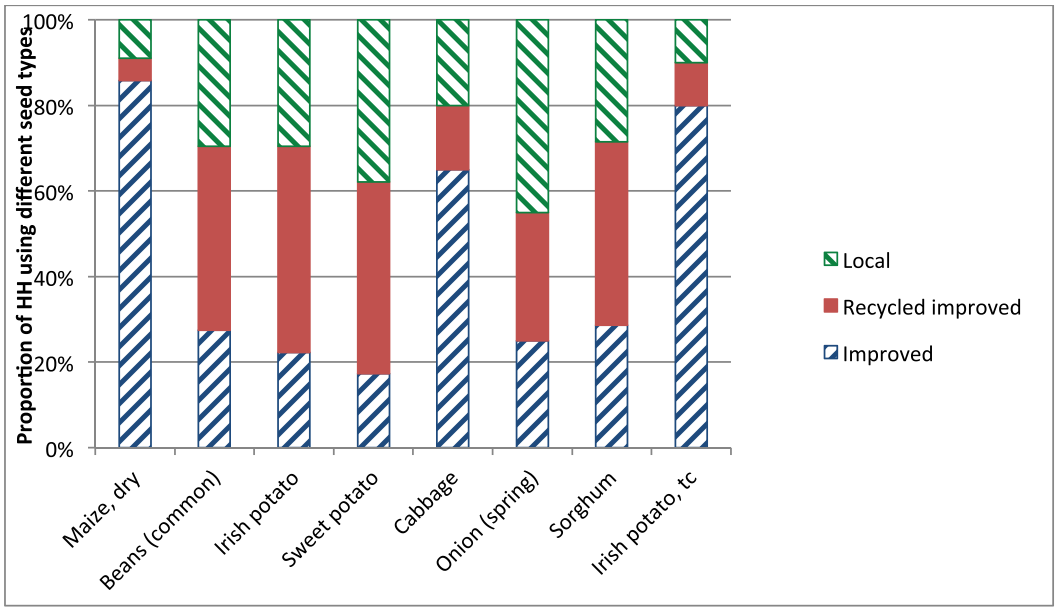



**Figure 4.3: Household use of different seed types during season 2**

The results in Table 4.10 show that more males than females used management practices in Season 2, a mirror of input use in the first season. With the exception of basal fertilizer, herbicides and foliar feed which had high adoption rates (over 30%), the other management practices had relatively lower adoption (less than 10%).

**Table 4.10. Household use of various inputs in annual crops during Season 2**

| | Gender of the household head | | | | | | |
|---|---|---|---|---|---|---|---|
| | Adult male | | Adult female | | Youth | | |
| Input used | % within Male Adult HH (n=193) | % of total | % within Female Adult HH (n=24) | % of total | % within Youth HH (n=59) | % of total | Overall (n=276) |
| Herbicides | 35.2 | 24.6 | 33.3 | 2.9 | 35.6 | 7.6 | 35.1 |
| Basal fertilizer | 54.9 | 38.4 | 70.8 | 6.2 | 47.5 | 10.1 | 54.7 |
| Top dress fertilizer | 3.1 | 2.2 | 4.2 | 0.4 | 1.7 | 0.4 | 2.9 |
| Organic manure | 9.3 | 6.5 | 8.3 | 0.7 | 8.5 | 1.8 | 9.1 |
| Foliar feed | 32.6 | 22.8 | 37.5 | 3.3 | 25.4 | 5.4 | 31.5 |
| Irrigation water | 0.0 | 0.0 | 4.2 | .4 | 0.0 | 0.0 | 0.4 |
| Field pesticides | 9.8 | 6.9 | 12.5 | 1.1 | 6.8 | 1.4 | 9.4 |
| Storage pesticides | 4.1 | 2.9 | 4.2 | 0.4 | 0.0 | 0.0 | 3.3 |

Table 4.11 show levels of input use for selected annual crops. There were variations in input use between seasons and among crops. Use of organic manure was widespread among crops and between seasons reflecting the mixed cropping pattern.

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

| Input | Crop | Season | Quantity used (kg) by gender of household head | | | |
|---|---|---|---|---|---|---|
| | | | Male headed | Female headed | Youth headed | Overall |
| Improved Planting material | Common beans | Season 1 | 73.252 | 30.545 | 26.075 | 60.158 |
| | | Season 2 | 22.929 | 19.611 | 18.160 | 21.665 |
| | Irish potato | Season 1 | 197.279 | 12.000 | 274.647 | 204.280 |
| | | Season 2 | 336.963 | 10.000 | 466.667 | 350.667 |
| | Maize, dry | Season 1 | 51.652 | 11.000 | 8.820 | 38.216 |
| | | Season 2 | 35.232 | 5.696 | 15.815 | 28.387 |
| Herbicide | Common beans | Season 1 | 8.433 | 1.514 | 0.958 | 6.174 |
| | | Season 2 | 44.365 | 116.630 | 4.386 | 41.684 |
| | Irish potato | Season 1 | | | 27.750 | 27.750 |
| | | Season 2 | | | 55.000 | 55.000 |
| | Maize, dry | Season 1 | 14.891 | 0.500 | 0.688 | 11.500 |
| | | Season 2 | 115.333 | 1.000 | 58.000 | 89.889 |
| Planting fertilizer | Common Beans | Season 1 | 622.393 | 53.250 | 42.167 | 457.066 |
| | | Season 2 | 131.108 | 43.571 | 74.111 | 109.546 |
| | Irish potato | Season 1 | 43.000 | 28.625 | 77.375 | 49.480 |
| | | Season 2 | 70.192 | 55.167 | 142.292 | 90.195 |
| | Maize, dry | Season 1 | 85.467 | 28.500 | 35.000 | 66.782 |
| | | Season 2 | 93.139 | 250.455 | 45.971 | 103.573 |
| Top dress fertilizer | Beans (common) | Season 1 | 16.857 | | 1.500 | 14.938 |
| | | Season 2 | 50.000 | | | 50.000 |
| | Irish potato | Season 1 | 48.750 | | | 48.750 |
| | | Season 2 | 37.500 | | | 37.500 |
| | Maize, dry | Season 1 | 21.667 | 62.500 | 50.000 | 40.000 |
| | | Season 2 | 72.500 | 75.000 | 50.000 | 68.500 |
| Organic manure | Beans (common) | Season 1 | 376.591 | 900.000 | 290.000 | 394.167 |
| | | Season 2 | 488.000 | 0.500 | 122.750 | 293.150 |
| | Irish potatoes | Season 1 | 45.000 | | 220.000 | 103.333 |
| | | Season 2 | 450.000 | | 20.000 | 163.333 |
| | Maize, dry | Season 1 | 471.250 | 1600.000 | 330.667 | 559.625 |
| | | Season 2 | 90.000 | | 450.125 | 270.063 |
| Foliar feed | Beans (common) | Season 1 | .859 | 1.333 | 1.063 | .951 |
| | | Season 2 | 3.377 | 8.071 | 1.125 | 3.616 |
| | Irish potato | Season 1 | 1.098 | 1.000 | 1.500 | 1.184 |
| | | Season 2 | 1.143 | 0.750 | 1.600 | 1.214 |
| | Maize, dry | Season 1 | 1.222 | 1.000 | 1.383 | 1.269 |
| | | Season 2 | 51.389 | | 1.400 | 33.536 |
| Field pesticide | Beans (common) | Season 1 | 0.676 | 0.567 | 0.531 | .639 |
| | | Season 2 | 0.911 | 1.000 | 0.825 | .903 |
| | Irish potato | Season 1 | 1.488 | 1.000 | 0.813 | 1.365 |
| | | Season 2 | 1.000 | | | 1.000 |

| Input | Crop | Season | Quantity used (kg) by gender of household head | | | |
|---|---|---|---|---|---|---|
| | | | Male headed | Female headed | Youth headed | Overall |
| | Maize, dry | Season 1 | 0.900 | | 1.000 | .925 |
| | | Season 2 | 13.250 | 1.000 | | 10.800 |
| Storage pesticide | Beans (common) | Season 1 | 0.563 | 0.100 | | .408 |
| | | Season 2 | 1.000 | | | 1.000 |
| | Irish potato | Season 1 | 50.125 | | | 50.125 |
| | | Season 2 | 1.600 | | | 1.600 |

These were variations in input use among perennial crops.

The youth were used a wider range of inputs than the adult male and adult female (Table 4.12).

**Table 4.12: Level of input use for perennial crops at farm level by gender**

| *Input*/Crop | Quantity (kg) of input used by gender of household head | | | Overall |
|---|---|---|---|---|
| | Adult male | Adult female | Youth | |
| *Planting fertilizer* | | | | |
| Tea | 62.7 | 85.0 | 200.0 | 76.3 |
| Bananas | | | 50.0 | 50.0 |
| Sugarcane | | | 25.3 | 25.3 |
| Herbicides | | | | |
| Tea | 1.5 | 0.8 | 1.0 | 1.4 |
| *Top dressing fertilizer* | | | | |
| Bananas | | | 50.0 | 50.0 |
| Sugarcane, chewing | | | 50.0 | 50.0 |
| Tea | 194.5 | 50.7 | 150.5 | 177.2 |
| *Organic manure* | | | | |
| Bananas | 106.7 | | 103.0 | 104.4 |
| Sugarcane | | | 275.0 | 275.0 |
| Napier /elephant grass | 200.0 | | | 200.0 |
| *Foliar feed* | | | | |
| Apple | | | 13,320.0 | 13,320.0 |
| Tea | 2.0 | 2.0 | 2.0 | 2.0 |

*Legend: Blank spaces mean non-use of respective inputs*

#### 4.2.2.4 Level of decision-making in production of annual crops during season 2

Adult males dominated in decision making for all the crops listed in Table 4.13 but a significant proportion of adult females made significant contribution in decision making for sorghum (36%) and cabbages (40%) while youth females rarely made any decisions on crops grown.

**Table 4.13: Decision-making levels of different gender in annual crop production during season 2**

| Crops grown | | Proportion (%) of decision-making by house-hold head | | | |
|---|---|---|---|---|---|
| | Sample (n) | Adult male | Adult female | Youth male | Youth female |
| Maize, dry | 154 | 80.6 | 13.6 | 4.5 | 1.3 |
| Beans (common) | 148 | 70.9 | 21.6 | 6.8 | 0.7 |
| Irish potatoes | 54 | 74 | 16.7 | 7.4 | 1.9 |
| Sweet potatoes | 29 | 62.1 | 20.7 | 10.3 | 6.9 |
| Cabbage | 20 | 55.0 | 40.0 | 5.0 | 0.0 |
| Onions (spring) | 20 | 80.0 | 20.0 | 0.0 | 0.0 |
| Sorghum | 14 | 50.0 | 35.8 | 7.1 | 7.1 |
| Irish potatoes | 10 | 80.0 | 20.0 | 0.0 | 0.0 |

### 4.2.2.5 Use of inputs for different perennial crops

Table 4.14 presents proportions of households who used various inputs in perennial crop production. Results reveal that farmers at the county rarely used inputs except during planting (22% Improved seed/planting material). At least 17% of the farmers who grew perennial crops used topdressing fertilizer.

**Table 4.14: Proportion of households using various inputs in perennial crop production**

| Input used | Gender of household head | | | | | | |
|---|---|---|---|---|---|---|---|
| | Adult male | | Adult female | | Youth | | |
| | % within male HH (n=193) | % of total | % within female HH (n=24) | % of total | % within youth HH (n=59) | % of total | Overall (n=276) |
| Improved Seed/planting material | 22.8 | 15.9 | 25.0 | 2.2 | 18.6 | 4.0 | 22.1 |
| Herbicides | 11.9 | 8.3 | 16.7 | 1.4 | 1.7 | 0.4 | 10.1 |
| Basal fertilizer | 12.4 | 8.7 | 25.0 | 2.2 | 5.1 | 1.1 | 12.0 |
| Top dress fertilizer | 19.7 | 13.8 | 16.7 | 1.4 | 6.8 | 1.4 | 16.7 |
| Organic Manure | 3.6 | 2.5 | 4.2 | 0.4 | 8.5 | 1.8 | 4.7 |
| Foliar feed | 1.0 | 0.7 | 4.2 | 0.4 | 3.4 | 0.7 | 1.8 |
| Field pesticides | 0.5 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 |

### 4.2.2.6 Main decision-maker in production of perennial crops

Decision making in production of perennial crops seemed to be a preserve of men except for sugar cane and Napier grass where decision making was dominated by youth males between the ages of 18-34 years and adult females over 35 years (Table 4.15). Decisions on tea, bananas and sugar cane (for chewing) was dominated by males above 35 years. While tea, bananas, and sugar cane can be sold and payment received immediately, Napier grass was rarely sold and sugar cane delivered to the factory was paid for later. Men therefore seemed to prefer the former rather the latter.

**Table 4.15: Decision-making in perennial crop production by gender**

| | | Proportion (%) of decision-making by HH | | | |
|---|---|---|---|---|---|
| **Crop grown** | **Sample (n)** | **Adult male** | **Adult female** | **Youth male** | **Youth female** |
| Tea | 52 | 82.7 | 9.6 | 3.8 | 3.8 |
| Bananas | 13 | 38.5 | 23.1 | 30.8 | 7.7 |
| Sugarcane | 4 | 25.0 | 0.0 | 50.0 | 25.0 |
| Sugarcane, chewing | 3 | 66.7 | 0.0 | 33.3 | 0.0 |
| Napier grass /elephant grass | 2 | 0.0 | 50.0 | 50.0 | 0.0 |
| Coffee | 1 | 100.0 | 0.0 | 0.0 | 0.0 |
| Mangoes | 1 | 100.0 | 0.0 | 0.0 | 0.0 |
| Pawpaw | 1 | 100.0 | 0.0 | 0.0 | 0.0 |
| Trees (multi-purpose) | 1 | 100.0 | 0.0 | 0.0 | 0.0 |
| Sesbania | 1 | 100.0 | 0.0 | 0.0 | 0.0 |

## Constraints to input use in crop production

Table 4.16 shows the percentage of households using different inputs. The male adults dominated the use of all the inputs. There was no female adult using organic manure and irrigation water.

**Table 4.16: Households who encountered major constraints in input use**

| | Proportion(%) of household heads using inputs | | | |
|---|---|---|---|---|
| **Input** | **Male Adults** | **Female adults** | **Youth** | **Overall n=276** |
| Improved Planting material | 77.7 | 62.5 | 61.0 | 72.8 |
| Herbicide | 34.7 | 25.0 | 33.9 | 33.7 |
| Planting fertilizer | 47.2 | 33.3 | 37.3 | 43.8 |
| Top dressing | 19.7 | 8.3 | 16.9 | 18.1 |
| Organic manure | 7.8 | 0.0 | 3.4 | 6.2 |
| Foliar feed | 25.9 | 16.7 | 22.0 | 24.3 |
| Irrigation water | 2.6 | 0.0 | 1.7 | 2.2 |
| Pre-harvest pesticide | 15.5 | 12.5 | 8.5 | 13.8 |
| Post-harvest pesticide | 6.2 | 8.3 | 3.4 | 5.8 |

The major constraints encountered for all inputs were high prices, distance to market and improper packaging of inputs. Distance to input market, ineffectiveness of inputs, adulteration and lack of timely access were the other important challenges for input use (Figure 4.4).

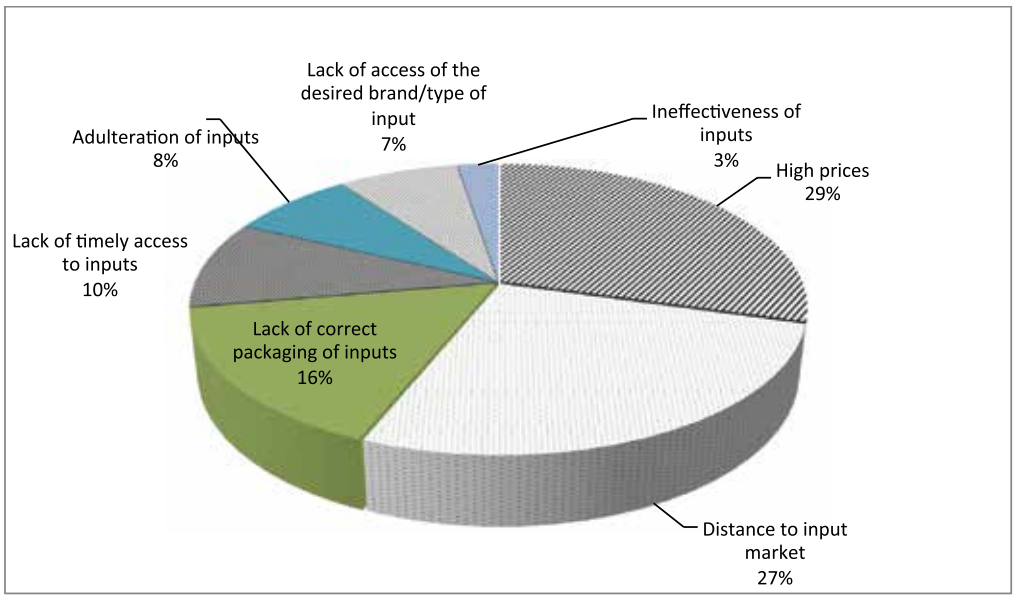



**Figure 4.4: Main constraints to use of major inputs for crop production**

### 4.2.2.8 Use of purchased inputs in livestock production

The use of most major inputs in livestock production (Table 4.17) was high with 84% of the households reporting use of de-wormers, acaricides (81 %), mineral supplements (77%) and vaccines (64%). The MHHs reported higher use of inputs than all the other gender categories.

**Table 4.17: Households using various inputs in livestock production**

| Input used | Use of input by gender of household head | | | | | | Overall (N =276) |
|---|---|---|---|---|---|---|---|
| | Male Adult | | Female Adult | | Youth | | |
| | % within Male Adult HH (n=193) | % of total HH | % within Female Adult HH (n=24) | % of total HH | % within Youth HH (n=59) | % of total HH | |
| Dewormers | 88.6 | 62.0 | 75.0 | 6.5 | 74.6 | 15.9 | 84.4 |
| Acaricides(dipping/spraying) | 83.4 | 58.3 | 75.0 | 6.5 | 76.3 | 16.3 | 81.2 |
| Mineral supplements | 77.7 | 54.3 | 66.7 | 5.8 | 78.0 | 16.7 | 76.8 |
| Vaccines | 65.8 | 46.0 | 50.0 | 4.3 | 64.4 | 13.8 | 64.1 |
| Concentrates/animal feeds | 32.6 | 22.8 | 37.5 | 3.3 | 32.2 | 6.9 | 33.0 |
| Water | 31.1 | 21.7 | 25.0 | 2.2 | 20.3 | 4.3 | 28.3 |
| Fodder/hay/silage/crop residue | 22.3 | 15.6 | 12.5 | 1.1 | 16.9 | 3.6 | 20.3 |
| Other veterinary drugs | 20.7 | 14.5 | 12.5 | 1.1 | 22.0 | 4.7 | 20.3 |
| Artificial insemination (semen) | 14.0 | 9.8 | 4.2 | .4 | 6.8 | 1.4 | 11.6 |

### 4.2.3 Decision-making in livestock production, by gender

Adult males made most of the production decisions on most types of livestock except chicken; sheep (60%), goats (71%) and cattle (75%), while adult female dominated in making production decisions only on chicken production (Table 4.18).

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

| Livestock species | Level (%) of decision making | | |
|---|---|---|---|
| | Adult male | Adult female | Youth |
| Cattle | 75.4 | 16.2 | 8.4 |
| Goats | 71.4 | 20.0 | 8.6 |
| Sheep | 60.0 | 36.0 | 4.0 |
| Chicken | 34.6 | 54.6 | 10.7 |

### 4.2.4 Constraints to using inputs in livestock

The major constraint to various inputs for livestock production was high price of the inputs (41% of the responses). Other constraints of less importance were ineffectiveness of the inputs, distance to markets, and unavailability and access of inputs (reported by less than 10% of the respondents) (Table 4.19).

**Table 4.19: Major constraints on using inputs for livestock production**

| Constraint to livestock production | Proportion (%) of household heads who experienced constraint | | | |
|---|---|---|---|---|
| | Male adults | Female adults | Youth | Overall |
| High input prices/affordability | 32.9 | 4.7 | 3.6 | 41.2 |
| Unavailability of inputs | 2.2 | 0.2 | 0.0 | 2.5 |
| Distance to input market | 5.8 | 0.2 | 2.5 | 8.5 |
| Lack of access of inputs in right packaging/dosage | 2.7 | 0.4 | 0.2 | 3.4 |
| Lack of access to inputs at the right time (lateness) | 3.6 | 0.2 | 0.2 | 4.0 |
| Ineffectiveness of inputs e.g. AI services | 3.1 | 0.0 | 0.2 | 3.4 |
| Adulteration of inputs | 0.4 | 0.4 | 0.0 | 0.9 |
| Lack of access of the desired brand/type of input | 4.3 | 0.2 | 1.3 | 5.8 |

### 4.2.5 Use of machinery in farming activities

#### 4.2.5.1 Type of machinery/equipment used

A few households indicated they used some farm machinery in their agricultural activities. Of these, 41% indicated that they used tractors, while 28% used ploughs. Other machinery and equipment were used by a few farmers as shown in Table 4.20: Type and source of machinery/equipment. Of those who used tractors 17 owned them while 10 were owned communally and 54 were hired.

**Table 4.20: Type and source of machinery/equipment**

| Type of machinery | Ownership of machine/equipment (by number of responses) | | | |
|---|---|---|---|---|
| | Owned by HH | Owned communally | Hired | Overall |
| Tractor | 17 | 10 | 54 | 81 |
| Plough | 13 | 0 | 18 | 31 |
| Harrow | 8 | 1 | 1 | 10 |
| Pump | 3 | 0 | 0 | 3 |
| Planter | 1 | 0 | 1 | 2 |
| Draught power animals Oxen donkeys | 10 | 5 | 9 | 24 |
| Tractor trailer | 0 | 1 | 1 | 2 |
| Ox/donkey cart | 4 | 0 | 1 | 5 |
| Generator | 1 | 0 | 0 | 1 |

#### 4.2.5.2 Types of activities mechanized

The main farm activity mechanized was ploughing (Figure 4.5).

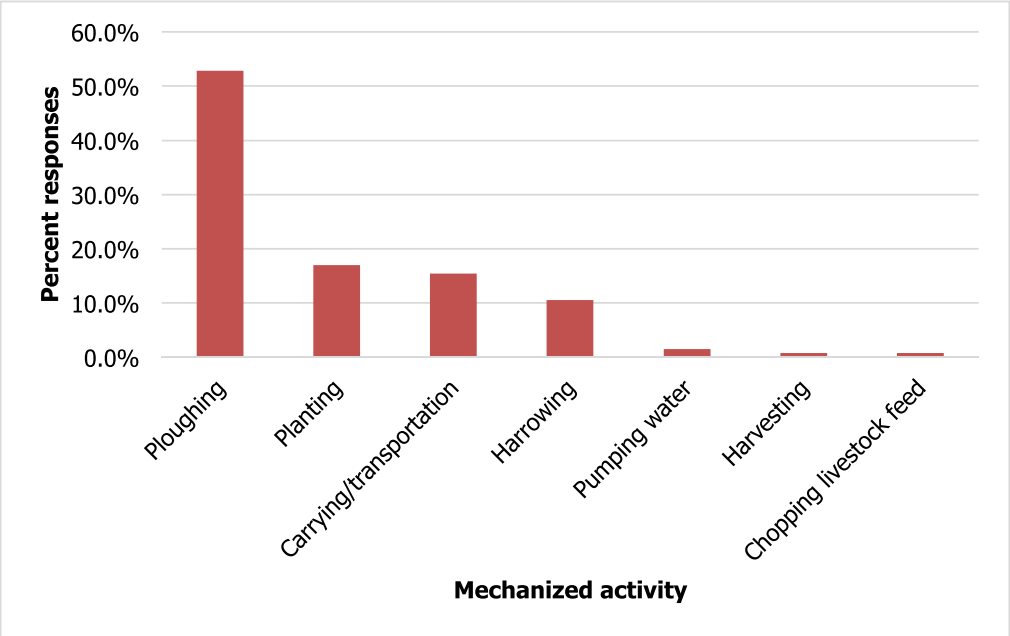



**Figure 4.5: Activities mechanized**

Most machinery or equipment used on farms were owned communally (53%). Only 11% of households used their own machinery. Some machinery were hired (Figure 4.6).

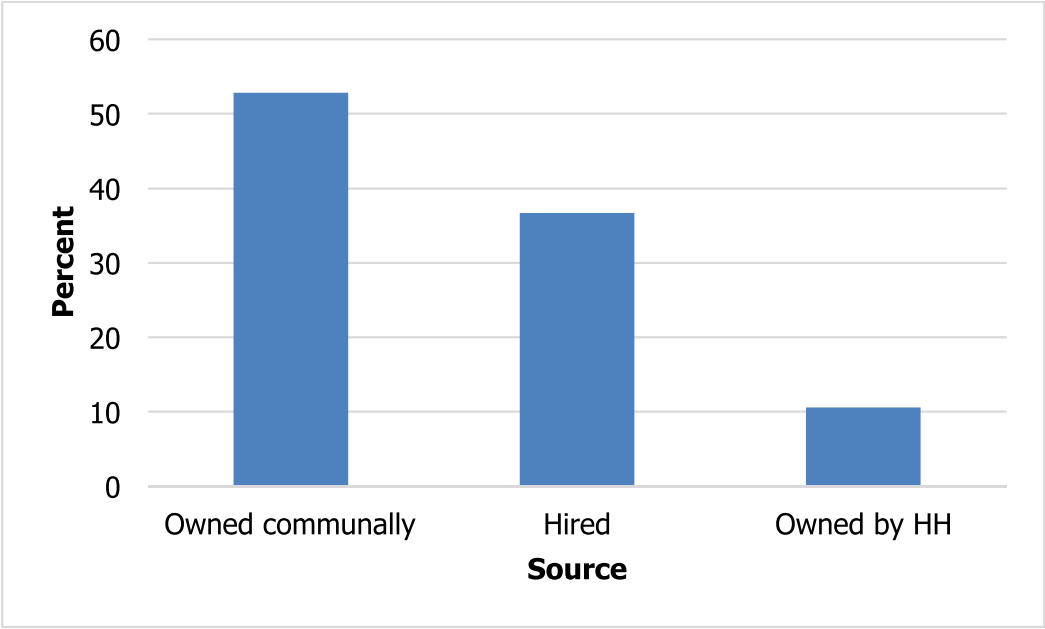



**Figure 4.6: Main sources of machinery**

### 4.2.6 Input distribution networks and levels of satisfaction

#### 4.2.6.1 Access to the nearest agricultural-related services and infrastructure

The results in Figure 4.7 indicate that at least 60% of the households interviewed had access to infrastructure (including input and output market, all weather roads and piped water), climate related services (at least 65%), while less than 20% accessed agricultural and financial related services. Youth headed households had higher access to infrastructure and agricultural services than the rest of the households. Financial services were the least accessed (4%) with the youth headed households accessing the least.

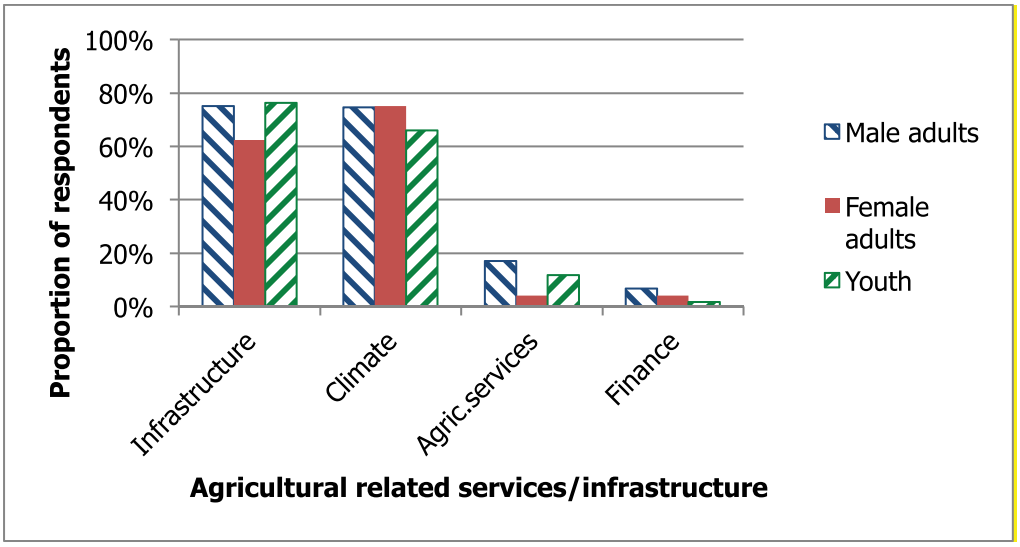



**Figure 4.7: Proportion (%) of households accessing different services**

Among the households that accessed the different services, at least 54% accessed from the public sector while 46% accessed the services and/or infrastructure from private sector institutions. Infrastructure and agricultural services were mainly from the public sector while finance and climate related services were accessed from private sector (Table 4.21).

**Table 4.21: Access to agriculture-related services and infrastructure**

| Agricultural related service /infrastructure | Institution type | Degree of access (%) by HH | | | Overall |
|---|---|---|---|---|---|
| | | Adult male | Adult female | Youth | |
| Infrastructure | Public | 46.4 | 77.3 | 61.4 | 52.5 |
| | Private | 53.6 | 22.7 | 38.6 | 47.5 |
| Finance | Public | 18.2 | – | – | 18.2 |
| | Private | 81.8 | – | – | 81.8 |
| Climate | Public | 20.7 | 0.0 | 33.3 | 22.2 |
| | Private | 79.3 | 100.0 | 66.7 | 77.8 |
| Agricultural Services | Public | 60.1 | 51.9 | 60.6 | 59.6 |
| | Private | 39.9 | 48.1 | 39.4 | 40.0 |
| Mean | Public | 50.6 | 66.7 | 60.3 | 54.2 |
| | Private | 49.4 | 33.3 | 39.7 | 45.8 |

#### 4.2.6.2 Access to agricultural-related information services and infrastructure

Table 4.22 shows that men had more access to services than women and the youth except for the output markets where 38.3% of the adult female accessed the services. Overall access for all services for men was more than 70% except the access to the input and output markets.

**Table 4.22: Households accessing services by gender of household head**

| | Proportion (%) of HH accessing services | | | |
|---|---|---|---|---|
| | Adult male >35yrs | Adult female >35 yrs. | Youth male 18-35 yrs. | Youth female 18-35 yrs. |
| Extension | 82.0 | 14.6 | 2.2 | 1.1 |
| Research | 74.3 | 20.0 | 2.9 | 2.9 |
| Veterinary | 74.3 | 19.1 | 5.1 | 1.5 |
| AI | 70.5 | 22.7 | 6.8 | 0.0 |
| Dipping | 70.9 | 13.7 | 14.5 | 0.9 |
| Climate | 91.7 | 8.3 | 0.0 | 0.0 |
| Credit | 92.9 | 7.1 | 0.0 | 0.0 |
| Input market | 50.0 | 22.6 | 27.4 | 0.0 |
| Output market | 36.7 | 38.3 | 23.3 | 1.7 |

### 4.2.7 Satisfaction with agriculture-related services and infrastructure

Satisfaction with agricultural services and infrastructure was measured using a Likert scale of 1 to 5. Table 4.23 shows that a large proportion (over 60%) of the households in the county were satisfied with the agricultural related services offered. More than 60% of the respondents were satisfied with all the services except research (32%).

**Table 4.23: Households satisfied with agriculture-related services**

| | Proportion (%) of HH satisfied with service | | | | |
|---|---|---|---|---|---|
| Services | Very dissatisfied | Dissatisfied | Neutral | Satisfied | Very Satisfied |
| Extension | 0.0 | 11.4 | 23.9 | 61.4 | 3.4 |
| Research | 0.0 | 23.5 | 35.3 | 32.4 | 8.8 |
| Veterinary | 1.7 | 8.3 | 22.5 | 63.3 | 4.2 |
| AI | 9.5 | 4.8 | 11.9 | 66.7 | 7.1 |
| Dipping | 1.0 | 7.9 | 16.8 | 72.3 | 2.0 |
| Climate | 0.0 | 0.0 | 0.0 | 80.0 | 20.0 |
| Credit | 9.1 | 9.1 | 9.1 | 63.6 | 9.1 |
| Input market | 8.8 | 1.8 | 35.1 | 47.4 | 7.0 |
| Output market | 3.5 | 3.5 | 24.6 | 59.6 | 8.8 |

Overall access to input market services was high among adult men with over 80% while access by female and youth was below 10%. The trend was similar for the market information and credit services (Figure 4.8).

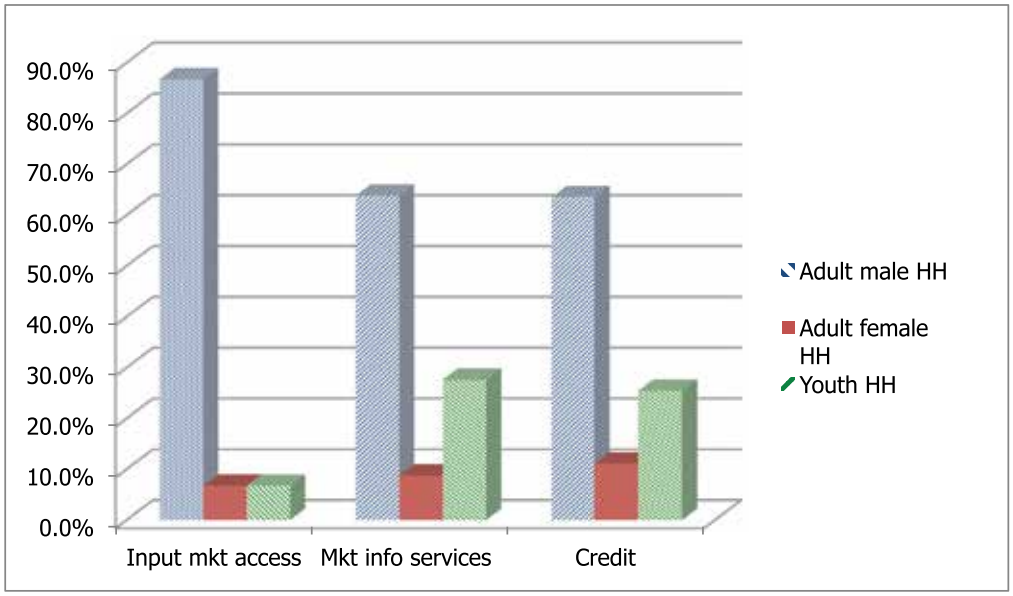



**Figure 4.8: Access to financial services by gender of household head**

### 4.2.8 Access to agricultural technologies

Overall female adults accessed agricultural technologies (63%) more than male adults and youth. Similarly they dominated in the access of livestock (50%) and crop (46%) technologies followed by male adults while access by the youth was the least (Table 4.24).

**Table 4.24: Households accessing agricultural technologies**

| Type of technologies accessed | Male adults (n=193) | Female adults (n=24) | Youth (n=59) | Overall (n=276) |
|---|---|---|---|---|
| Crop | 39.4 | 45.8 | 32.2 | 38.4 |
| Livestock | 24.4 | 50.0 | 20.3 | 25.7 |
| NRM | 6.2 | 8.3 | 1.7 | 5.4 |
| Overall agricultural technologies | 50.8 | 62.5 | 39.0 | 49.3 |

## 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 most farmers grew maize, beans, potatoes, cabbages and sweet potato in Season 1, but mostly on less than one acre except maize. Crop productivity was generally low, for example, maize and beans had yields below one ton per acre.

**Table 4.25: Main crop enterprises grown in Season 1**

| Crops | Area in acres (SE) | % of HH growing priority crop Productivity (kg / acre) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Male (n=193) | Female (n=24) | Youth (n=59) | Male adult | Female adult | Youth | Overall (n=276) |
| Beans (common) | 0.9(0.1) | 80.9 | 72.7 | 80.7 | 445.0 | 668.1 | 715.3 | 522.6 |
| Maize, dry | 1.2(0.3) | 46.8 | 59.1 | 49.1 | 1,044.8 | 451.2 | 824.1 | 938.6 |
| Potatoes | 0.7(0.1) | 35.6 | 27.3 | 43.9 | 1,719.1 | 1,040.0 | 2,200.0 | 1,820.6 |
| Cabbage | 0.4(0.1) | 16.5 | 22.7 | 19.3 | 2,752.1 | 3,580.1 | 2,254.5 | 2,720.3 |
| Sweet potatoes | 0.7(0.2) | 21.8 | 4.5 | 8.8 | 1,279.8 | 17,160.0 | 1,912.0 | 1,768.1 |

#### 4.3.1.2 Productivity in Season 2 (March–August/September 2013)

Table 4.26 shows that most households grew maize, beans, sweet potatoes and cabbages in season 2; 69% of adult male, 63% adult female- and 60% of YHHs grew maize. Most of these crops were grown on less than one acre except for maize (1.1 acres). The productivity of maize was higher in season 2 compared to season 1 while that for beans was lower than in Season 1.

**Table 4.26: Main crop enterprises in Season 2**

| Crops | Area in acres (SED) | % of farmers growing priority crop | | | Productivity (kg / acre) | | | |
|---|---|---|---|---|---|---|---|---|
| | | Male (n=193) | Female (n=24) | Youth (n=59) | Male Adult | Female Adult | Youth | Overall (n=276) |
| Maize, dry | 1.1(0.3) | 68.9 | 62.5 | 60.4 | 636.9 | 1,411.3 | 2,614.5 | 1,090.2 |
| Beans (common) | 0.7(0.1) | 64.6 | 58.3 | 64.6 | 594.7 | 1,473.5 | 800.9 | 725.1 |
| Potatoes | 0.9(0.1) | 21.1 | 12.5 | 35.4 | 2,544.8 | 1,620.0 | 1,965.5 | 2,348.2 |
| Sweet potatoes | 0.4(0.1) | 14.3 | 12.5 | 6.3 | 1,361.4 | 1,480.0 | 2,386.7 | 1,484.0 |
| Cabbage | 0.5(0.2) | 5.6 | 12.5 | 16.7 | 4,202.5 | 7,400.0 | 28,617.7 | 14,052.6 |

### 4.3.2 Productivity of perennial crops

Good climatic conditions in the county favour growing of many cash crops such as tea, bananas and sugarcane. In male- and FHH, tea was grown in one out of every four households compared with one out of five for sugarcane. More land was allocated to tea than other perennials.

Table 4.27 presents household land allocation and productivity levels (by number of households growing) for the major perennial crops in the county. Bananas had the highest productivity per acre across the genders, whereas tea had high productivity in adult MHHs.

**Table 4.27: Main perennial crops**

| Crops | Areas (SED) | % of farmers growing priority crop | | | Productivity (kg/acre) | | | |
|---|---|---|---|---|---|---|---|---|
| | | Male (n=193) | Female (n=24) | Youth (n=59) | Male Adult | Female Adult | Youth | Overall |
| Tea | 1.4 (0.35) | 75.0 | 100.0 | 23.5 | 5,185 | 4,465 | 2,383.3 | 4,533.9 |
| Bananas | 0.5 (0.22) | 10.7 | 0.0 | 41.2 | 82.8 | – | 13,580.0 | 6,831.4 |
| Sugarcane | 0.3 (0.1) | 1.8 | 0.0 | 17.6 | 10.0 | _ | 175.0 | 120.0 |
| Sugarcane (chewing) | 0.1 | 1.8 | 0.0 | 11.8 | _ | _ | 24.0 | 24.0 |
| Napier grass | 0.4(0.05) | 1.8 | 0.0 | 5.9 | 1,000.0 | _ | 62.5 | 531.3 |

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

## 4.4 Marketing of outputs

### 4.4.1 Production and 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 use as food for the household, livestock feed, (for instance maize, among others) and given away as gifts. The MHHs were more market oriented than the FHHs as shown in Table 4.28.

**Table 4.28: Proportion (%) of Crop produce (annual and perennial) marketed by household head**

| Crop | Male headed | Female headed | Youth headed | Overall |
|---|---|---|---|---|
| Banana | 104* | – | 90 | 98 |
| Sugarcane | 0 | – | 97 | 144* |
| Tea | 104* | – | 0 | 67 |
| Beans | 123* | 81 | 105* | 111* |
| Potato | 94 | 123* | 97 | 96 |
| Maize,dry | 45 | 237* | 101* | 57 |

**Legend**: blank cells mean data not available (no responses). *If the quantity sold is higher than quantity produced, households may have sold from previous harvests or bought from other farmers to sell.

## 4.5 Productivity of different types of livestock

### 4.5.1 Dairy productivity

Dairy productivityTable 4.29 and 4.30 present the productivity of dairy animals in the county in the dry and wet seasons respectively. Milk was produced by local, crossbred, exotic cattle and goats. The highest daily milk yield per cow for FHHs was about 9 litres achieved from the cross bred cattle during the wet season compared to the dry season (7 litres). The second highest milk production was achieved in MHHs from exotic cattle, 8 and 7 litres daily per cow during the wet and dry season respectively. Local cattle and goats also contributed to milk production.

**Table 4.29: Average milk production of different dairy animals during the dry season**

| Type of livestock | MHH | | FHH | | YHH | | Total | |
|---|---|---|---|---|---|---|---|---|
| | no. of animals | Yield | no. of animals | Yield | no. of animals | Yield | no. of animals | Yield |
| Local cattle | 2 | 4.9 | 2 | 5.2 | 2 | 4.4 | 2 | 4.8 |
| Crossbred cattle | 2 | 6.7 | 2 | 7.4 | 2 | 6.0 | 2 | 6.6 |
| Exotic cattle | 3 | 7.1 | – | 2.0 | 1 | 3.5 | 2 | 6.5 |
| Local goats | – | 1.0 | 1 | 0.5 | – | – | 1 | 0.8 |

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

The amount of milk produced in the wet season (Table 4.30) was on average of one kg higher compared to the dry season production (Table 4.29).

**Table 4.30: Average milk production of different dairy animals during the wet season**

| Type of livestock | Adult male | | Adult female | | Youth | | Overall | |
|---|---|---|---|---|---|---|---|---|
| | no. of animals | Yield | no. of animals | Yield | no. of animals | Yield | no. of animals | Yield |
| Local cattle | 2 | 5.6 | 2 | 5.8 | 2 | 4.7 | 2 | 5.5 |
| Crossbred cattle | 2 | 8.0 | 2 | 8.9 | 2 | 7.4 | 2 | 7.9 |
| Exotic cattle | 3 | 7.5 | – | 2.0 | 1 | 2.0 | 2 | 6.8 |
| Local goats | – | 1.0 | 1 | – | – | – | 1 | 1.0 |

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

### 4.5.2 Meat production

Table 4.31 presents meat productivity of different meat animals in the county. Meat was produced by exotic cattle and goats, local chicken, improved and indigenous chicken. The highest number of animals slaughtered in the last 12 months within the household was 4 chickens but in terms of weight it was cattle with an average weight of 170 kg and goats with an average weight of 30 kg. Although the numbers are low this may be explained by the fact that there were many local meat selling outlets, which discourages slaughter at home. The only time farmers would slaughter was during ceremonies mainly during the December festivities.

**Table 4.31: Meat production of different meat animals by household head**

| Type of livestock | Male headed household | | Overall | |
|---|---|---|---|---|
| | No. slaughtered in the farm in the last 12 months* | Average weight per animal (kg) | No. slaughtered in the farm in the last 12 months | Average weight per animal (kg) |
| Exotic cattle | 2 | – | 2 | 170 |
| Exotic/dairy goats | 1 | – | 1 | 30 |
| Local/indigenous chicken | 3 | – | 3 | 2 |
| Improved indigenous chicken | 4 | 0.8 | 4 | 3 |
| Broiler chicken | 4 | 0.9 | 4 | 3 |

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

### 4.5.3 Egg production

Table 4.32 presents the egg production of different types of poultry by gender of the household head. Eggs were produced by local indigenous and improved indigenous chicken, commercial layers and guinea fowls. The highest egg production within MHHs was from layers with 99 eggs per laying cycle with an average of 3 laying cycles per year. Local/indigenous chickens produced approximately 20 eggs per hen per laying cycle over laying cycles per year, while the improved indigenous chicken produced approximately 28 eggs per hen per year over laying cycles per year a significant variation from the layers. A similar trend was observed for female and youth headed households.

**Table 4.32: Egg production for different types of poultry**

| Gender household head | | Type of livestock | | | |
|---|---|---|---|---|---|
| | | Local/in-digenous chicken | Improved indigenous chicken | Layers chicken | Guinea fowls |
| Male adult | No. of layers | 4 | 5 | 9 | 3 |
| | No. of eggs per hen per laying cycle | 20 | 28 | 99 | 12 |
| | No of laying cycles per year | 3 | 4 | 3 | 6 |
| | No of eggs consumed (last year) | 170 | 47 | 105 | 150 |
| | No of eggs sold (last year) | 798 | 312 | 1656 | 360 |
| | Price per egg (KES) | 11 | 12 | 13 | 10 |
| Female adult | No. of layers | 7 | 4 | 2 | 5 |
| | No. of eggs per hen per laying cycle | 18 | 27 | 103 | |
| | No of laying cycles per year | 3 | 4 | 3 | |
| | No of eggs consumed (last year) | 450 | 15 | 148 | |
| | No of eggs sold (last year) | 266 | 68 | 590 | |
| | Price per egg (KES) | 11 | 15 | 13 | |
| Youth | No. of layers | 6 | 4 | 2 | |
| | No. of eggs per hen per laying cycle | 15 | 19 | 100 | |
| | No of laying cycles per year | 3 | 3 | 3 | |
| | No of eggs consumed (last year) | 375 | 35 | 20 | |
| | No of eggs sold (last year) | 645 | 320 | 100 | |
| | Price per egg (KES) | 11 | 11 | 10 | |
| Mean | No. of layers | 5 | 4 | 7 | 3 |
| | No. of eggs per hen per laying cycle | 19 | 27 | 100 | 12 |
| | No of laying cycles per year | 3 | 4 | 3 | 6 |
| | No of eggs consumed (last year) | 239 | 45 | 105 | 150 |
| | No of eggs sold (last year) | 738 | 300 | 1195 | 360 |
| | Price per egg (KES) | 11 | 12 | 12 | 10 |

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

### 4.5.4 Manure production

The total average amount of manure produced in the last 12 months per household was 12 tons. Disaggregated by gender, the average amount of manure produced by MHHs was approximately 17 tons. The FHHs produced 0.6 tons of manure per household during the last 12 months. The youth headed households produced at 0.6 tonnes per year. This finding is consistent with the earlier results where the head of the household owned most of the livestock and more land than the female and youth headed households. This therefore explains the low usage of manure by youth and female farmers.

### 4.5.5 Apiculture production

Only one MHH reported engaging in bee keeping for honey production using traditional bee hives with very low quantities produced (10 Kg) in the last 12 months

### 4.5.6 Hides and skins production

The average number of hides and skins produced in the last 12 months by male and youth headed households was 4 and 5 respectively, while female headed did not produce any hides. The average number of skins produced by male, female and youth headed households was 4, 3 and 2 respectively which was slightly at variance with hides produced. MHHs produced wool (500 Kg) in the last one year while the youth produced 12 Kg.

### 4.5.7 Decision-making on use of proceeds from sale of livestock products

Overall decision-making on sale of milk was done by the household head (59%) who was either male (57%) or female (50%) or youth (66%) (Table 4.33). The spouse of the household head was also important in making decisions on sale of milk with over 30% making decision on sale of milk across the three gender categories. The other less important decision makers were the youth, relatives, joint head of the household and spouse and relatives within the household. The implication here is that livestock technologies aimed at improving milk production should target the head of the household across the three gender categories.

Decision making on sale of eggs was made mainly by the spouse of the household head (65%). Among the category of the household head the youth (61%) made decisions in majority of the cases implying that the youth have embraced poultry farming unlike the adult males.

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

| | Proportion (%) of decision-making | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Decision maker** | **MHH** | | **FHH** | | **YHH** | | **Total** | |
| | **Milk** | **Eggs** | **Milk** | **Eggs** | **Milk** | **Eggs** | **Milk** | **Eggs** |
| Head of household (HH) | 57.6 | 20.0 | 50.0 | 42.9 | 65.6 | 60.9 | 58.5 | 28.5 |
| Spouse of household head | 32.5 | 73.0 | 33.3 | 57.1 | 31.3 | 30.4 | 32.3 | 64.6 |
| Joint HH and spouse | 9.3 | 7.0 | 0.0 | 0.0 | 3.1 | 8.7 | 7.7 | 6.9 |
| Male household relative | 0.7 | | 8.3 | | 0.0 | | 1.0 | |
| Female household relative | 0.0 | | 8.3 | | 0.0 | | 0.5 | |

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

## 4.6 Contractual arrangements for marketing crops and livestock products

### 4.6.1 Marketing contractual arrangements for crops

To determine contractual agreements, farmers were asked to indicate whether they sold their products with enforceable agreements. Results reveal that although contracts existed they covered only a few commodities and mainly cash crops. Fifty two percent of the respondents indicated that they sold their tea through formal agreements with buyers while 19% and 12% indicated that they had contractual agreements for bean and maize sales respectively. Sale agreements for the other commodities listed in Table 4.34 were almost non-existent with less than 4% of the respondents reporting existence of agreements.

**Table 4.34: Crop commodities marketed through contractual arrangements**

| Crop | Proportion (%) of households heads with contractual arrangements | | | |
|---|---|---|---|---|
| | MHH (n=193) | FHH (n=24) | YHH (n=59) | Overall (n=276 |
| Tea | 46.9 | 100.0 | 66.7 | 51.7 |
| Beans (common) | 20.4 | 0.0 | 16.7 | 19.0 |
| Maize, dry | 12.2 | 0.0 | 16.7 | 12.1 |
| Irish potato | 4.1 | 0.0 | 0.0 | 3.4 |
| Onion (bulb) | 4.1 | 0.0 | 0.0 | 3.4 |
| Apple | 2.0 | 0.0 | 0.0 | 1.7 |
| Bambara bean | 2.0 | 0.0 | 0.0 | 1.7 |
| Bananas | 2.0 | 0.0 | 0.0 | 1.7 |
| Irish potato | 2.0 | 0.0 | 0.0 | 1.7 |
| Sweet potato | 2.0 | 0.0 | 0.0 | 1.7 |
| Tomato | 2.0 | 0.0 | 0.0 | 1.7 |

Figure 4.9 shows the different institutions which farmers had contracts with when selling their crops. Sixteen percent of the contractual arrangements were formal with cooperatives while the rest were informal, 25% with traders, 1% with individual consumers and 15% with others.

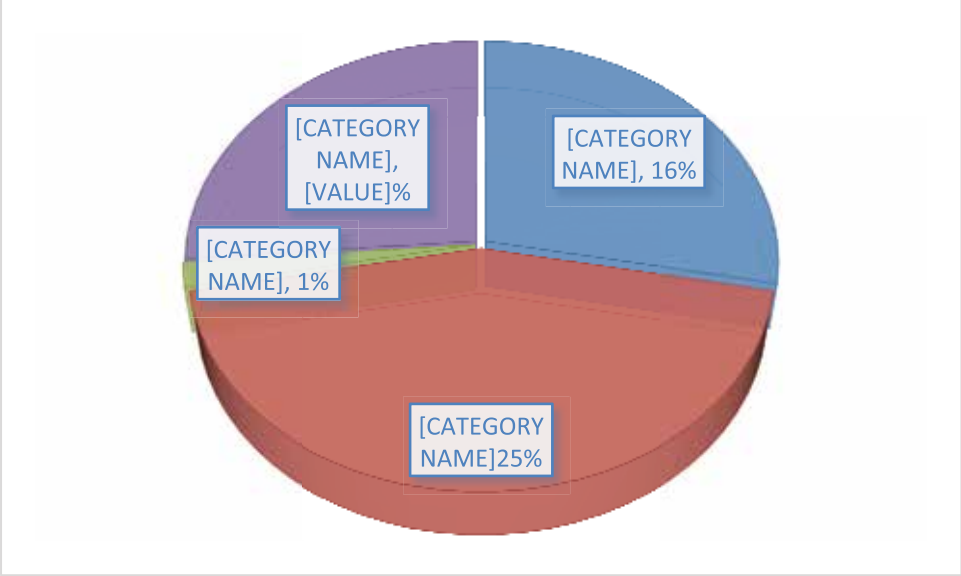



**Figure 4.9: Actors involved in crop sale contractual arrangements**

### 4.6.2 Contractual arrangement for marketing of livestock and livestock products

In the livestock subsector contractual agreements were dominated by milk sale sales with 73% of the respondents reporting sale agreements, 24% for egg sales while there was an insignificant contracts for sale of live animals (Table 4.35). Disaggregated by gender, at least 63%, 70% and 90% of FHH, MHH and YHH respectively had contractual marketing arrangements for their milk.

**Table 4.35: Households having contractual arrangements for sale of livestock products**

| Livestock product | Proportion (%) of HH having contractual arrangement | | Overall | |
|---|---|---|---|---|
| | MHH (n=37) | FHH (n=8) | YHH (n=10) | (n=55) |
| Milk (n=40) | 70.3 | 62.5 | 90.0 | 72.7 |
| Eggs (n=13) | 27.0 | 25.0 | 10.0 | 23.6 |
| Live animals (n=2) | 2.7 | 12.5 | 0.0 | 3.6 |

## 4.7 Value addition for crops and livestock products

### 4.7.1 Value addition for different broad crop categories

The proportion of households adding value were computed within the broad crop category .Different types of value addition were undertaken within each crop category. A high number of households (73%) reported adding value to cereals, vegetables (27%) and trees (24%) compared to the other crop categories. Grading/packing was the main value addition activity across all the crop categories (Table 4.36).

**Table 4.36: Value addition by type of household head**

| Crop category | Type of value addition | Percentage of household heads adding value | | | | | |
|---|---|---|---|---|---|---|---|
| | | MHH | | FHH | | Youth | |
| Cereals (n=201) | Grading/packaging | 70 | 69.3 | 9 | 8.9 | 22 | 21.8 |
| | Making flour | 34 | 72.3 | 5 | 10.6 | 8 | 17.0 |
| | De-hulling | 9 | 52.9 | 4 | 23.5 | 4 | 23.5 |
| | Chips | 26 | 78.8 | 2 | 6.1 | 5 | 15.2 |
| Pulses (n=3) | Grading/packaging | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 |
| | De-hulling | 1 | 50.0 | 1 | 50.0 | 0 | 0.0 |
| Oil crops (n=3) | Grading/packaging | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| | Oil | 0 | 0.0 | 2 | 100.0 | 0 | 0.0 |
| Roots and tubers (n=57) | Grading/packaging | 28 | 84.8 | 2 | 6.1 | 3 | 9.1 |
| | Making flour | 5 | 83.3 | 0 | 0.0 | 1 | 16.7 |
| | Chips | 5 | 71.4 | 1 | 14.3 | 1 | 14.3 |
| | Cake | 7 | 63.6 | 2 | 18.2 | 2 | 18.2 |
| Flowers (n=11) | Grading/packaging | 6 | 60.0 | 1 | 10.0 | 3 | 30.0 |
| | Drying | 0 | 0.0 | 1 | 100.0 | 0 | 0.0 |
| Vegetables (n=74) | Grading/packaging | 34 | 79.1 | 3 | 7.0 | 6 | 14.0 |
| | Making flour | 3 | 60.0 | 1 | 20.0 | 1 | 20.0 |
| | Drying | 16 | 80.0 | 1 | 5.0 | 3 | 15.0 |
| | Paste/Sauce | 5 | 83.3 | 0 | 0.0 | 1 | 16.7 |
| Fruits (n=22) | Grading/packaging | 7 | 77.8 | 1 | 11.1 | 1 | 11.1 |
| | Drying | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| | Ripening | 8 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| Fodder (n=39) | Grading/packaging | 1 | 100.0 | 0 | 0.0 | 0 | 0.0 |

| Crop category | Type of value addition | Percentage of household heads adding value | | | | | |
|---|---|---|---|---|---|---|---|
| | | MHH | | FHH | | Youth | |
| | Baling | 3 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| | Silage | 16 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| | Chopping | 17 | 89.5 | 1 | 5.3 | 1 | 5.3 |
| Trees (n=67) | Grading/packaging | 3 | 50.0 | 0 | 0.0 | 3 | 50.0 |
| | Timber | 17 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| | Firewood | 18 | 81.8 | 2 | 9.1 | 2 | 9.1 |
| | Charcoal | 4 | 100.0 | 0 | 0.0 | 0 | 0.0 |
| | Posts | 13 | 81.3 | 2 | 12.5 | 1 | 6.3 |

### 4.7.2 Value addition in livestock and fish products

Different types of value addition were undertaken within each livestock product category. Much of the value addition was done by male adults. A high number of households reported adding value to milk (90%) and eggs (45%) compared to all the other livestock product categories. Table 4.37 shows the proportions of value addition computed within each broad livestock product category.

**Table 4.37: Value addition by category of livestock products**

| Livestock/fish product | Type of value addition | Percent of age household heads adding value | | |
|---|---|---|---|---|
| | | MHH | FHH | YHH |
| Milk (n=248) | Fermenting | 81.6 | 4.8 | 13.6 |
| | Yogurt | 50.0 | 0.0 | 50.0 |
| | Cooling | 72.7 | 4.5 | 22.7 |
| | Flavouring | 100.0 | 0.0 | 0.0 |
| | Boiling | 67.0 | 8.5 | 24.5 |
| | Grading | 100.0 | 0.0 | 0.0 |
| Goat meat (n=4) | Smoking | 100.0 | 0.0 | 0.0 |
| | Differentiation of parts | 100.0 | 0.0 | 0.0 |
| | Salting | 100.0 | 0.0 | 0.0 |
| Chicken (n=27) | De-feathering | 68.4 | 10.5 | 21.1 |
| | Differentiation of parts | 75.0 | 25.0 | 0.0 |
| | Packaging | 80.0 | 0.0 | 20.0 |
| | Boiling | 100.0 | 0.0 | 0.0 |
| | Fertilized eggs | 100.0 | 0.0 | 0.0 |
| | Salting | 0.0 | 100.0 | 0.0 |
| Eggs (n=123) | Grading | 71.7 | 3.3 | 25.0 |
| | Packaging | 84.2 | 5.3 | 10.5 |
| | Boiling | 78.4 | 10.8 | 10.8 |
| | Fertilized eggs | 85.7 | 14.3 | 0.0 |

## 4.8 Employment and sources of household income

### 4.8.1 Farm income by type

#### 4.8.1.1 Farm income sources

Almost all the households had one income source, implying that households' income sources were not diversified. Only 28% of the households reported at least two sources of income of which 18%, 19% and 29% were the youth, male and FHHs respectively (Figure 4.10).

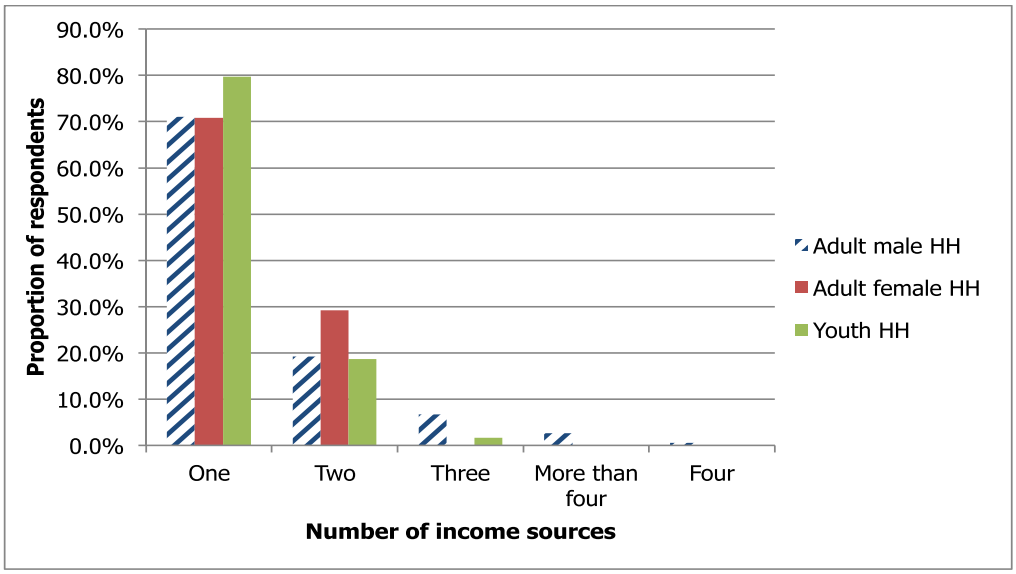



**Figure 4.10: Income sources available to households**

About 45% of male-headed and 46% of FHH earned income from crop-related on-farm activities while 39 and 33% of these respective households earned income from livestock activities respectively.

Households earned an average of KES 118398 per year with livestock sources contributing the largest portion of this income (Table 4.38). Crop income represented 24% of all on-farm income compared to livestock's contribution of 39%, and 17% from other sources. The YHHs on average earned more from on-farm activities (KES 74,584.40) compared to MHH (KES 75,981.70). Male adults earned KES 31,200 per year from rented pastures, followed by female adults with KES 10,250.

**Table 4.38: Average household income from on-farm activities, by gender**

| Income source | Head of household | | | | | | Average | |
|---|---|---|---|---|---|---|---|---|
| | MHH | | FHH | | YHH | | | |
| | % | KES | % | KES | % | KES | % | KES |
| Livestock activities | 38.5 | 134,108.50 | 33.3 | 72,878.40 | 22.6 | 101,579.70 | 39.0 | 118,398.50 |
| Crop activities | 45.5 | 83,322.90 | 46.2 | 60,527.00 | 36.0 | 57,052.70 | 24.4 | 74,190.90 |
| Other | 3.6 | 45,405.60 | 3.8 | 85,200.00 | 3.0 | 43,160.00 | 17.2 | 52,110.70 |
| Pasture | 2.3 | 31,200.00 | 1.5 | 10,250.00 | 0.6 | 6,000.00 | 8.6 | 26,038.50 |
| Wood lots | 3.8 | 22,000.00 | 2.3 | 38,000.00 | 1.2 | 26,000.00 | 8.2 | 24,800.00 |
| Fishing activities | 0.7 | 11,333.30 | 0.0 | 0.00 | 0.6 | 3,000.00 | 2.6 | 8,000.00 |
| Average | | 75,981.70 | | 337,541.20 | | 74,584.40 | | 94,223.50 |

### 4.8.2 Income from off-farm and non-farm activities

Of the sampled households, 18% male household heads earned an income from salaried employmen of KES 116,131.30 per year (Table 4.39). Over 30% of male household heads earned income from farm wages, where each of the male household heads earned an average of over KES 41,901.30 per year while income from business averaged KES 59,444.40 per year for about 15% of the total MHHs sampled. Overall, youth household heads earned more off-farm and non-farm income compared to male or female household heads.

**Table 4.39: Average annual household income from off-farm activities and non-farm activities**

| Income Source | Head of household | | | | | | Average |
|---|---|---|---|---|---|---|---|
| | MHH | | FHH | | YHH | | |
| | % | KES | % | KES | % | KES | KES |
| Salaried employment | 18.1 | 116,131.30 | 4.2 | 300,000.00 | 15.3 | 156,211.10 | 129,097.60 |
| Salaried employment (spouse) | 4.7 | 130,000.00 | 4.2 | 20,000.00 | 6.8 | 190,000.00 | 140,000.00 |
| Pension | 1.0 | 20,000.00 | 0.0 | 0.00 | 1.7 | 36,000.00 | 25,333.30 |
| Social protection | 1.6 | 50,000.00 | 0.0 | 0.00 | 0.0 | 0.00 | 50,000.00 |
| Farm labour wages | 33.2 | 41,901.30 | 20.8 | 42,750.00 | 22.0 | 28,545.50 | 40,061.30 |
| Non-Farm labour wages | 8.8 | 35,218.80 | 4.2 | 9,000.00 | 8.5 | 80,400.00 | 44,295.50 |
| Net income from business | 14.5 | 59,444.40 | 16.7 | 90,750.00 | 18.6 | 65,454.50 | 64,000.00 |
| Income from children | 5.2 | 29,500.0 | 8.3 | 8,500.00 | 0.0 | 0.00 | 26,000.00 |
| Remittances from relatives | 6.2 | 16,333.30 | 16.7 | 5,500.00 | 5.1 | 23,666.70 | 15,210.50 |
| Renting out land | 1.0 | 17,500.00 | 8.3 | 17,500.00 | 3.4 | 2,000.00 | 12,333.30 |
| Renting out Oxen | 6.7 | 7,045.50 | 0.0 | 0.00 | 6.8 | 5,500.00 | 6,714.30 |
| Renting out equipment | 2.6 | 8,800.00 | 4.2 | 16,800.00 | 0.0 | 0.00 | 10,133.30 |
| Average | | 94,563.50 | | 68,128.60 | | **100,794** | **93,696** |

On average, income received by each household (based on total sample size) was KES 54,656 with salaried employment and farm labour wages constituting the highest proportion of the income (Table 4.40).

**Table 4.40: Average off-farm household income**

| Off farm income category | Average amount (KES) earned per household by Gender | | | |
|---|---|---|---|---|
| | MHH | FHH | YHH | Overall |
| | (n=193) | (n=24) | (n=59) | (n=276) |
| Salaried employment | 19,254.90 | 12,500.00 | 23,828.80 | 19,645.30 |
| Salaried employment (spouse) | 5,388.60 | 833.30 | 12,881.40 | 6,594.20 |
| Pension | 207.30 | - | 610.20 | 275.40 |
| Social protection | 777.20 | - | - | 543.50 |
| Farm labour wages | 13,677.60 | 7,125.00 | 5,322.00 | 11,321.70 |
| Non-farm labour wages | 2,919.70 | 375.00 | 6,813.60 | 3,530.80 |
| Net income from business | 8,316.10 | 15,125.00 | 12,203.40 | 9,739.10 |
| Income from children | 1,528.50 | 708.30 | - | 1,130.40 |
| Remittances from relatives | 1,015.50 | 916.70 | 1,203.40 | 1,047.10 |
| Renting out land | 181.30 | 1,458.30 | 67.80 | 268.10 |
| Renting out oxen | 401.60 | - | 279.70 | 340.60 |
| Renting out equipment | 228.00 | 700.00 | - | 220.30 |
| Total | 53,896.30 | 39,741.70 | 63,210.20 | 54,656.40 |

## 4.9 Poverty and vulnerability

### 4.9.1 Levels of indicators of mean household gross and per capita wealth

One of the main aims of ASDSP is to alleviate poverty levels across the country and close gender disparities in income. The total household income and gross wealth are indicators of the wellbeing of household members and ability of the household to meet needs such as food, medical, school fees, agricultural inputs among others. Both household income and gross wealth also provide an indication of how food insecure, poor or vulnerable a household could be. Total household income consists of 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 also includes the value of stocks, in this case livestock, household assets and savings that the household can fall back to in case of shocks or catastrophes. Livestock wealth was computed by multiplying the number 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. 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. 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 like boreholes. About 40 different household assets were identified in the county (Annex 2). Land is also an important indicator of wealth but it was not valued in this particular study.

Table 4.41 shows the mean values of some key indicators of income and wealth by gender for the county. The mean value of total household income was KES 205,487 while the mean value of gross wealth was KES 584,937. The annual per capita income and per capita gross wealth were KES 34,248 and 97,490 respectively. The mean daily per capita income was KES 94. The mean per capita income for MHH was KES 87, while for the FHHs was KES 224. This shows a big disparity of per capita income by gender of head of household.

**Table 4.41: Mean values of various indicators of income and wealth by gender of household head**

| Indicator | Mean value | | | Mean value (*n*=276) |
|---|---|---|---|---|
| | Adult male (*n*= 193) | Adult female (*n*=24) | Youth (*n*=59) | |
| 1.Household size (no.) | 6 | 5 | 5 | 6 |
| 2. Land size (acres) | 4.1 | 2.4 | 2.2 | 3.5 |
| 3. Per capita land size (Line 2÷Line 1) | 0.7 | 0.5 | 0.4 | 0.6 |
| 4. Value of all livestock owned (KES) | 143,875.40 | 78,551.10 | 88,565.80 | 126,675.50 |
| 5. Value of household assets (KES) | 283,201.30 | 189,384.20 | 180,574.20 | 252,774.20 |
| 6. Total on-farm income (KES) | 75,981.70 | 337,541.20 | 74,584.40 | 94,223.50 |
| 7.Total non-farm and off farm income (KES) | 94,563.50 | 68,128.60 | 100,794.60 | 93,696.80 |
| 8. Bank savings from agric. Related activities (KES) | 15,000.00 | – | 10,000.00 | 12,500.00 |
| 9. Livestock off-take (4% of value of livestock) KES | 5,755.00 | 3,142.00 | 3,542.60 | 5,067.00 |
| 10.Total household income (Lines 6, 7, 8 and 9) KES | 191,300.00 | 408,812.00 | 188,922.00 | 205,487.00 |
| 11.Annual per capita income (Line 10÷Line 1) KES | 31,883.00 | 81,762.00 | 37,784.00 | 34,248.00 |
| 12.Daily per capita income (Line 11÷365 days) KES | 87.00 | 224.00 | 104.00 | 94.00 |
| 13.Gross household wealth (Sum of lines 4, 5, and 10) KES | 618,377.00 | 676,747.00 | 458,062.00 | 584,937.00 |
| 14. Annual per capita gross wealth (Line 13÷Line 1) KES | 103,063.00 | 135,349.00 | 91,612.00 | 97,490.00 |

### 4.9.2 Wealth and other socio-economic indicators by vulnerability

The sample households were categorized into vulnerable and non-vulnerable, 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 on counties were used to establish the borderline between the vulnerable and the non-vulnerable. For Bomet County the poverty rate was 53%, implying that the same proportion of the households, counted from the one with the lowest income, are treated as vulnerable. This approach gave 128 vulnerable and 148 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. Thus, with the exception of household size, which was not different for vulnerable and non-vulnerable households, all the variables in Table 4.42: indicate that the non-vulnerable households possess or access more productive resources that make them better off when adapting or coping with shocks.

**Table 4.42: Wealth and other socio-economic indicators by vulnerability**

| Wealth / socioeconomic parameter | Vulnerability | | Overall |
|---|---|---|---|
| | Vulnerable (*n* =128 ) | Non-vulnerable (*n* =148 ) | (*n* = 276) |
| Household size (no.) | 5.8 | 5.9 | 5.9 |
| Land size (acres) | 3.0 | 4.0 | 3.5 |
| Value of livestock owned (KES) | 95,539.00 | 151,973.90 | 126,675.50 |
| Total on-farm income (KES) | 33,095.00 | 235,427.50 | 303,538.60 |
| Off-farm non-farm income (KES) | 19,704.70 | 136,496.10 | 563,179.80 |
| Value of household assets (KES) | 169,060.60 | 324,528.70 | 252,774.20 |
| Proportion (%) of HH with agricultural savings | 17.2 | 30.4 | 24.3 |
| Climate shocks (% experiencing) | 85.2 | 13.1 | 88.5 |
| Social protection (% receiving) | 3.4 | - | 4.0 |
| % of people employed on-farm | 75.0 | 68.2 | 71.4 |
| % of people employed off-farm | 25.0 | 31.8 | 28.6 |
| Credit (% accessing) | 3.9 | 12.8 | 8.7 |

## 4.10 Food and nutrition security

Food security is defined as a state whereby, at the 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 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 stability of food, together with the purchasing power of the household. This section analyses food and nutrition security situation among households in Bomet county, specifically with a view to determining the level of food insecurity, nutritional status and nutrient intake among sample households.

### 4.10.1 Food production, availability and seasonality

As indicated in the above definition, food production is one of the indicators of food security. In addition to production, there are other factors that can influence food and nutrition security; including post-harvest losses; household size (which was estimated at 5.9 members per household); food availability (number of meals per day); and, seasonality in food supply.

On average, individual members of the households (all the different age groups and gender) ate three meals on a normal day during the peak food availability season. In the low food availability season, children got three meals while the rest took only two meals per day. The overall proportion of households that did not have enough food to meet their needs was 23%. At least 29% of MHH, 25% of FHH and 21% of YHHs did not have enough food to meet their needs in the year of study.

### 4.10.2 Seasonality in food supply

Seasonality in food production has an influence on food security. Figure 4.11 gives the proportion of farmers who indicated the non-availability of enough food at household level over months. The results show that January to April were the months with food scarcity in the county. Peaks of food unavailability are recorded in January and March. In food deficit months, a higher proportion of YHH and FHHs were food insecure compared to the MHHs, with about 60% of FHH and YHH being food insecure in January and March 2012.

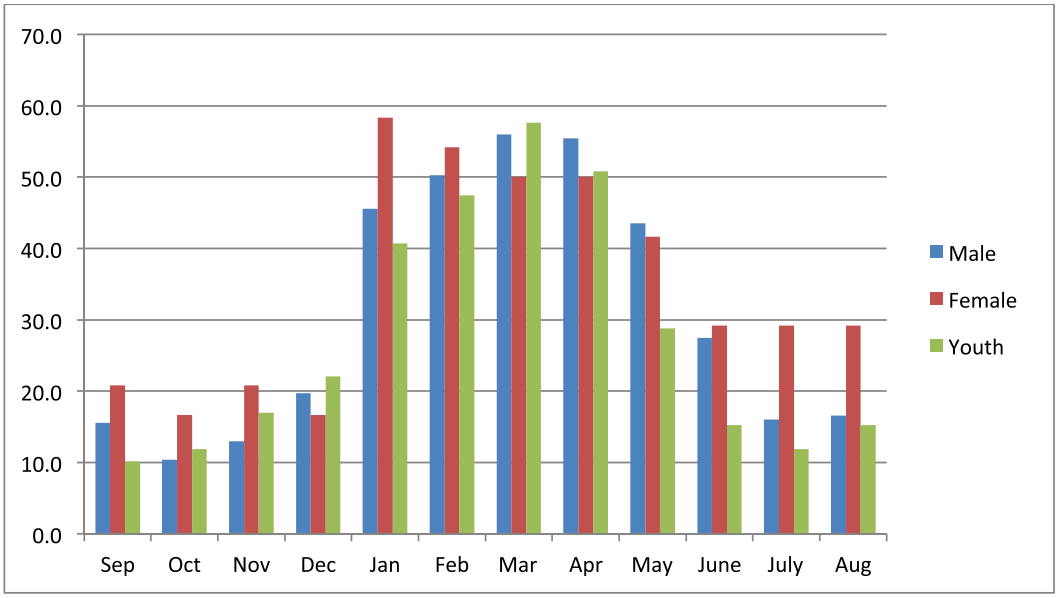



**Figure 4.11: Households that were food insecure over 12 months of the study period**

The peaks and lows in food availability are indicators of food and nutritional security. Evaluating the food availability was based on one week's recall (one week preceding the survey). Table 4.43 shows that within a period of one week, 52% of all types of households experienced normal food availability compared to 18% who experienced peak food availability. Low food availability was recorded by about 30% of households across gender. Almost all households, between 15% and 19% of the households regardless of gender of household head, experienced peak food availability in the country.

**Table 4.43: Peak and low season food availability in the county**

| Season | Response | | | |
|---|---|---|---|---|
| | Adult male (n=193) | Adult female (n=24) | Youth (n=59) | Overall (n=276) |
| Peak food availability | 18.7 | 16.7 | 15.3 | 17.8 |
| Low food availability | 29.9 | 33.3 | 28.8 | 30.0 |
| Normal food availability | 51.3 | 50.0 | 55.9 | 52.2 |

### 4.10.3 Food and nutrition security index

The problem of malnutrition is attributed to poor diversification of food sources among households. This can lead to poor health and stunted growth, among others. Food quantities consumed in the household were converted to calories using the available food consumption tables. The resultant calorie values were divided by the number of adult equivalents (AE) in the household to obtain numbers that are comparable across households of different sizes. A food-secure household is defined as one whose calorie supply per AE is greater than or equal to the minimum daily calorie requirement of 2,260 kcal for an adult. Households with lower calorie intakes were 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 Tables 4.43 and 4.44. 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 out of a maximum of 12 was not significantly different for the various gender categories, with 1.87 for male, 1.66 for female- and 1.98 for YHHs. The youth-headed respondents had a marginally higher score than adult MHH and adult FHH (Table 4.44).

**Table 4.44: Mean of dietary diversity score/index**

| Household category | Dietary diversity score level | Mean score | SE |
|---|---|---|---|
| Adult male (n=190) | low food diversity (Max 2 food groups) n= 175 | 1.73 | 0.06 |
| | high food diversity (min 3 food groups) n=15 | 3.44 | 0.13 |
| Adult female (n=22) | low food diversity (Max 2 food groups) n= 21 | 1.55 | 0.19 |
| | high food diversity (min 3 food groups) n=1 | 4.12 | 0.00 |
| Youth (n=58) | low food diversity (Max 2 food groups) n= 53 | 1.86 | 0.11 |
| | high food diversity (min 3 food groups) n=5 | 3.28 | 0.07 |
| Average MHH (n=190) | | 1.87 | 0.06 |
| Average adult female (n=22) | | 1.66 | 0.22 |
| Average YHH (n=58) | | 1.98 | 0.11 |

The percentage response for low-diversity groups was higher than for high-diversity groups for all gender categories (Table 4.45). The implication is that about 92% of the respondents consumed less than three food groups within one week. On average, 92% of the households had a low food diversity comprising a maximum of two food groups within the study year

**Table 4.45: Distribution of respondents by dietary diversity score/index**

| Gender category | %response | |
|---|---|---|
| | Low food diversity(#2 food groups) | High food diversity Medium (>3 food groups) |
| Male headed (n=193) | 92.2 | 7.8 |
| Female headed (n=24) | 95.8 | 4.2 |
| Youth headed (n=59) | 91.5 | 8.5 |
| Overall (n=276) | 92.4 | 7.6 |

### ii) Household nutrition security status

The apparent disparity between the food supply from domestic production and demand for food in Kenya has led to food deficiency, thus posing a threat to national food security. The number of adult equivalent units was estimated for the total population according to the socio-demographic variables in the county. Estimates for average calorie per adult equivalent unit per day were 3,774 kcal for adult MHH, 4,594 kcal for adult FHHs and 3,807 kcal for YHH, with an overall mean of 3,914 kcal (Table 4.46). Compared with the standard level of 2,260 kcal, the households in the country were on average, food secure.

**Table 4.46: Mean calorie intake per adult-equivalent, 2013**

| Gender category | Food security category | Calorie intake per adult-equivalent | |
|---|---|---|---|
| | | Mean | SE |
| MHH (n=151) | Food secure n=64 | 4680 | 261 |
| | Food insecure n=87 | 1707 | 77 |
| FHH(n=34) | Food secure n=21 | 6329 | 822 |
| | Food insecure n=13 | 1791 | 203 |
| YHH (n=20) | Food secure n=12 | 4998 | 892 |
| | Food insecure n=8 | 1766 | 335 |
| MHH (n=151) | | 3774 | 835 |
| FHH (n=34) | | 4594 | 638 |
| YHH (n=20) | | 3807 | 675 |
| Food secure n=97 | | 5081 | 277 |
| Food insecure n=108 | | 1721 | 70 |
| Mean calorie intake of the sampled households | | 3914 | 630 |

## 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 agriculture-related groups or associations. Thirteen percent of the respondents indicated they had household members who belonged to agricultural groups; 87% of these indicated the groups they belonged to were registered. In terms of the gender of the household members who belonged to groups, 64% were adult males, 24% were adult females while the youth were less than 10% (Figure 4.12).

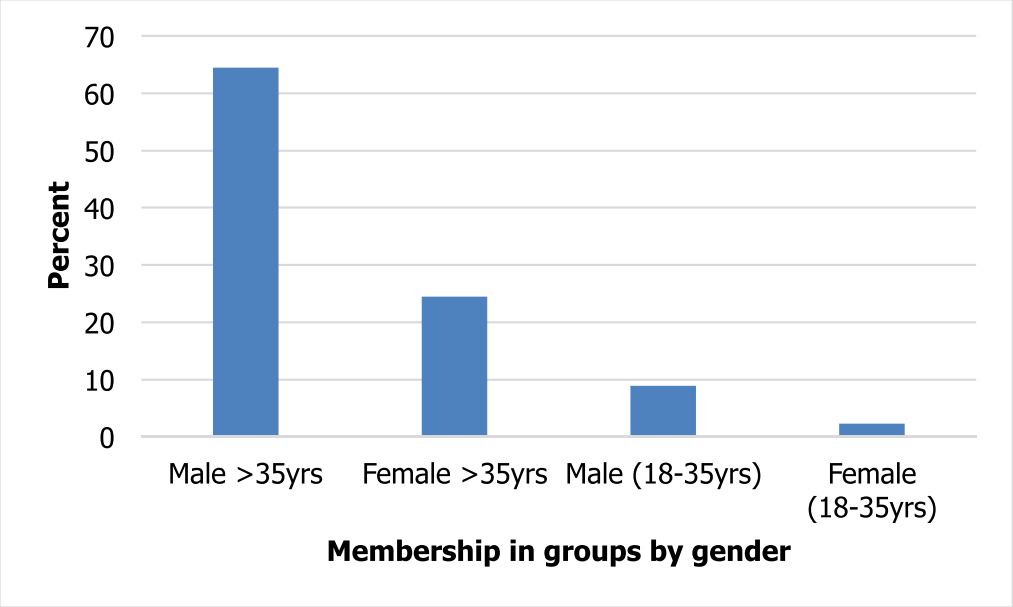



**Figure 4.12: Membership to groups by household members**

### 4.11.2 Types and categories of groups

Household members belonged to three main types of groups: 59% to cooperative groups, 18% to producer groups while 16% a mixture of producer and marketing groups (Figure 4.13).

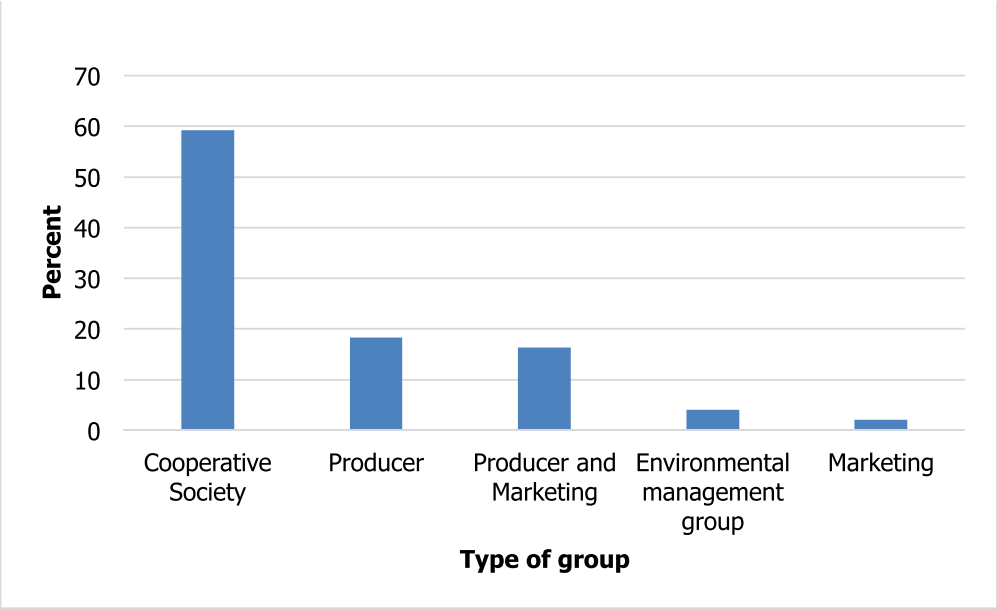



**Figure 4.13: Types of agricultural group membership**

The mixed group had the highest membership (61%), next was women groups (24%) while men groups were only 14% (Figure 4.14).

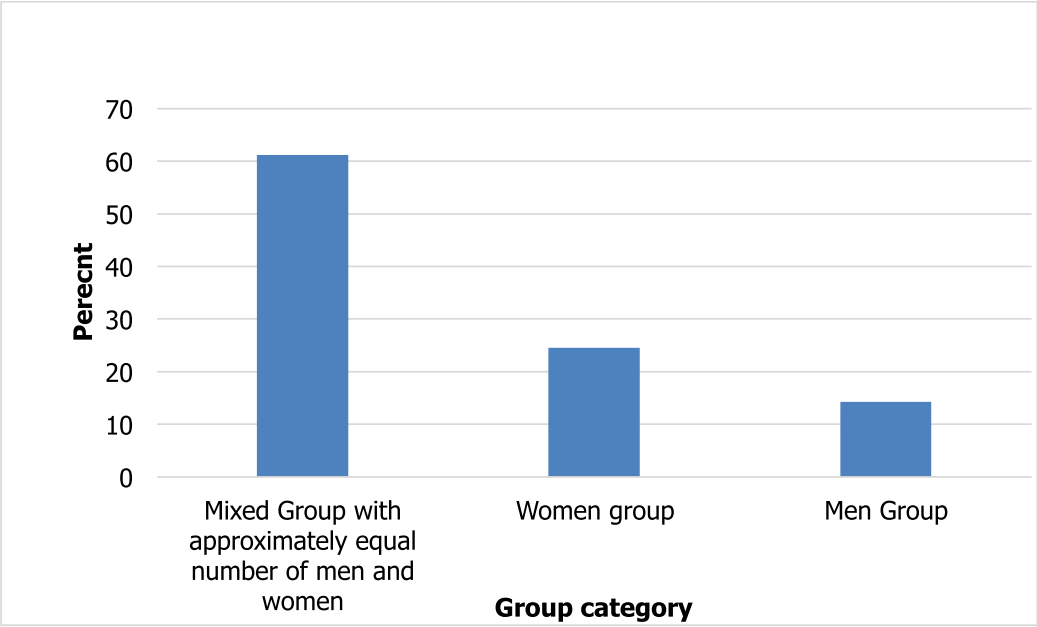



**Figure 4.14: Categories of groups**

### 4.11.3 Main commodities and activities of the groups

Fifty seven percent (57%) of these groups dealt in crop-related commodities while 29% dealt in livestock-related ones and 14% were engaged in tree nurseries (Figure 4.15).

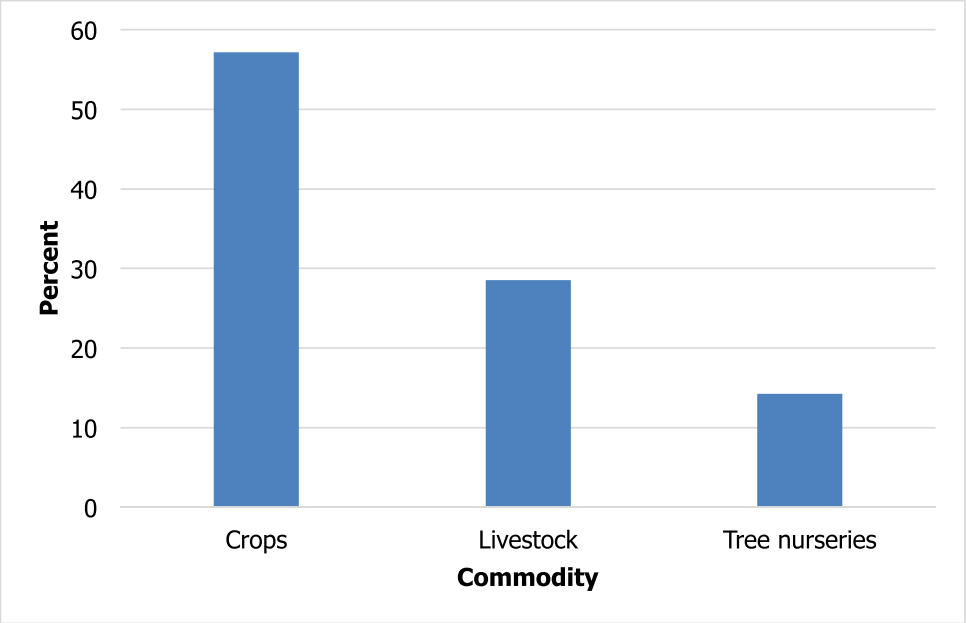



**Figure 4.15: Main commodities which groups dealt with**

## 4.12 Access and satisfaction with various services

### 4.12.1 Access and satisfaction with support services and infrastructure

According to respondents, the three support services most accessed were infrastructure at 74%, agricultural-related services at 73% and climate related information (15%). The infrastructure services include electricity, health centres, schools and all weather roads among others. Financial services (5%) were the least accessed (Figure 4.16).

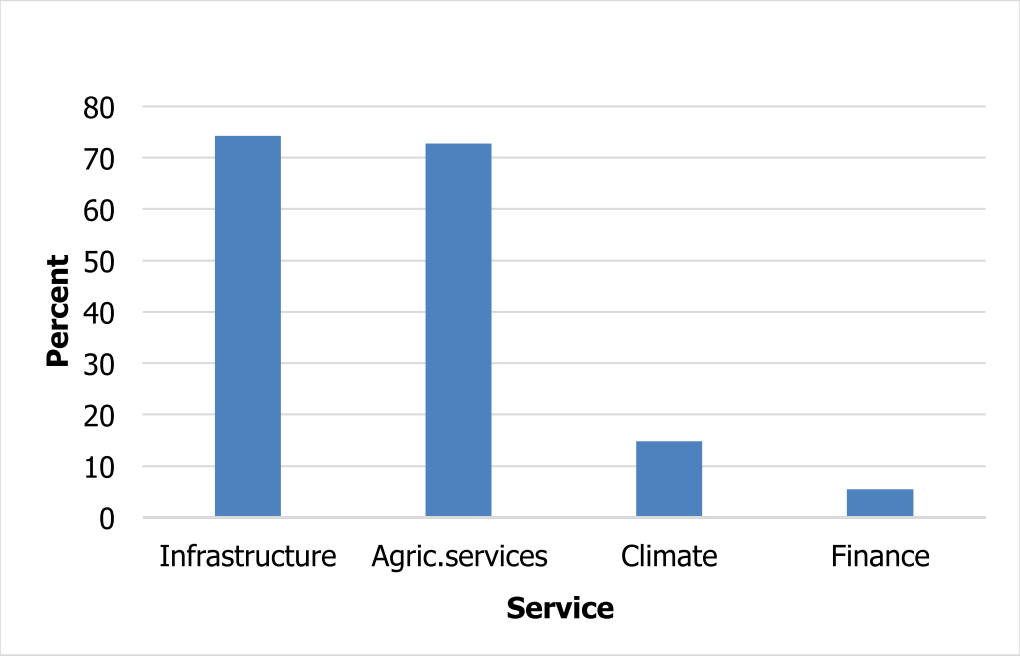



**Figure 4.16: Access to various support services**

### 4.12.2 Access, use and satisfaction with credit

From a sample size of 276, adult male, female and youth headed households obtained agricultural credit in the last 12 months of KES 44,950, 60,000 and 23,000 (a mean of KES 41,308) respectively. Although the amounts borrowed were low, Table 127:7 shows that the level of satisfaction was high among adult males (78%) than the youth.

**Table 4.47: Levels of satisfaction (%) with credit services**

| Gender | Dissatisfied | Neutral | Satisfied |
|---|---|---|---|
| Male adults | 0.0 | 75.0 | 77.8 |
| Female adults | 0.0 | 12.5 | 0.0 |
| Youth | 0.0 | 12.5 | 22.2 |

### 4.12.3 Access and satisfaction with market information

Thirty four percent of MHH, 4% of FHH and 9% of YHHs ($n$ = 276) accessed market information. MHH were more satisfied (41%) with the information compared to FHHfemales (10%) (Table 4.48).

**Table 4.48: Levels of satisfaction (%) with market information services**

| Gender | Neutral | Dissatisfied | Satisfied |
|---|---|---|---|
| Male | 34.9 | 8.0 | 41.2 |
| Female | 5.5 | 0.4 | 10.1 |
| All | 40.3 | 8.4 | 51.3 |

### 4.12.4 Access, use and satisfaction with formal savings services

Eighteen percent ($n$ = 276) of MHH and 2% of the FHH accessed saving services. The level of savings was only a mean of KES 12,500. Figure 4.17 gives a breakdown of those who had savings, by gender. Adult males saved more, next were the youth.

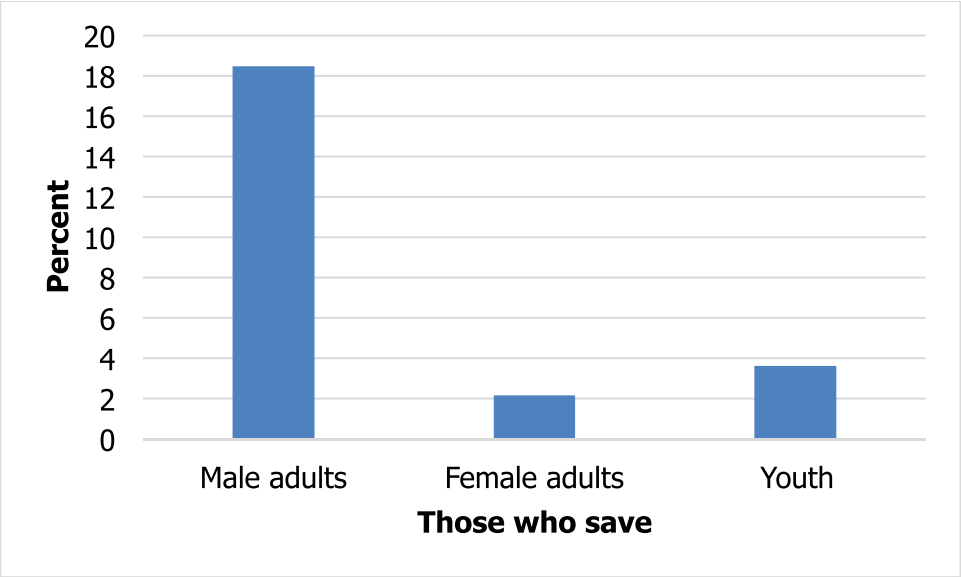



**Figure 4.17: Household members who accessed savings services**

### 4.12.5 Access, use and satisfaction with insurance services

Only about two percent ($n$ = 276) of MHHs accessed insurance services at the county.

## 4.13 Climate change challenges, adaptation and coping strategies

### 4.13.1 Sources of climate related information

In the county, main sources of climate related information were radio, traditional indigenous knowledge (ITK) and television (TV) (Figure 4.18). Other sources of information were public extension, community based organizations (CBOs) and partners. More FHHs had higher access of climate information from ITK and radio, while majority of YHHs and MHHs obtained information from television as compared to their female counterparts.

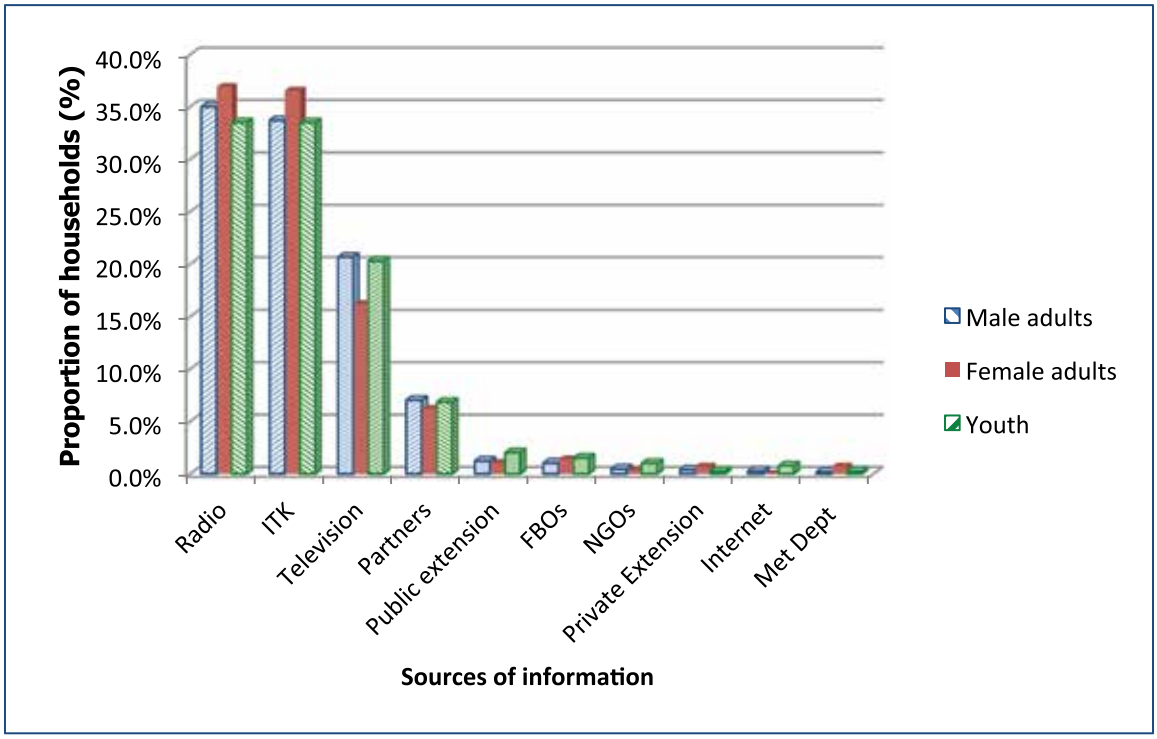



**Figure 4.18: Sources of climate related-information**

### 4.13.2 Respondents noticing long term environmental changes

At least 25% of the households had noticed long-term environmental changes and this did not vary with gender of household head. These long term changes include changes in average temperatures and rainfall. Other changes noticed include drying of wells and rivers (67%), reduction in water volumes (58%), incidences of new diseases and pests and soil degradation (Table 4.49). The FHH noticed more of reduction in water volumes and drying of rivers (65%) and wells which are correlated with rainfall. Most households (over 60%) had noticed reduction of water volumes.

**Table 4.49: Awareness of households about long-term environmental changes (%).**

| Environmental changes | Level (%) of awareness among household heads | | | |
|---|---|---|---|---|
| | Adult male (n=193) | Adult female (n=24) | Youth (n=59) | Overall (n=276) |
| Soil degradation | 16.8 | 10.0 | 8.9 | 14.7 |
| Reduction of water volumes | 57.2 | 65.0 | 60.0 | 58.4 |
| Land slides | 1.7 | 0.0 | 0.0 | 1.3 |
| Drying of wells and rivers | 64.2 | 65.0 | 77.8 | 66.8 |
| Deforestation | 17.3 | 15.0 | 20.0 | 17.6 |
| Disappearance of some plants and animals | 8.7 | 10.0 | 0.0 | 7.1 |
| Emergence of new plants/animals (not previously found in the area) | 1.7 | 0.0 | 2.2 | 1.7 |

| | | | | |
|---|---|---|---|---|
| Incidences of new diseases and pests | 30.1 | 30.0 | 24.4 | 29.0 |

### 4.13.3 Types of adaptation strategies to climate change

At least 15% of all households adapted to the perceived climate change. Disaggregated by gender, at least 16%, 19% and 9% of adult MHH, FHH and YHHs adapted to the perceived climate changes respectively.

The main adaptation strategies used were tree planting (41%), changing crop type (34%), water conservation (33%), water harvesting (24%) and changing livestock (20%). In livestock production, feed conservation and diversification (13%), changing livestock type (20%) and value addition (13%) were considered important. MHH and FHH headed households practised water harvesting more than YHHs (Table 4.50).

**Table 4.50: Strategies for adaptation to climate change**

| Adaptation Strategy | Proportion (%) of households using the strategies | | | |
|---|---|---|---|---|
| | Adult male HH | Adult female HH | Youth HH | Total |
| Tree planting | 44.6 | 41.7 | 28.8 | 40.9 |
| Change crop type | 37.8 | 33.3 | 23.7 | 34.4 |
| Water conservation | 34.7 | 58.3 | 16.9 | 33.0 |
| Water harvesting | 25.4 | 33.3 | 13.6 | 23.6 |
| Change of livestock | 20.2 | 25.0 | 15.3 | 19.6 |
| Feed conservation and diversification | 14.0 | 25.0 | 5.1 | 13.0 |
| Staggered cropping | 15.5 | 8.3 | 6.8 | 13.0 |
| Value addition | 15.0 | 8.3 | 6.8 | 12.7 |
| Enterprise diversification | 9.8 | 12.5 | 8.5 | 9.8 |
| Food storage facilities | 8.8 | 12.5 | 5.1 | 8.3 |
| Seek employment | 7.3 | 12.5 | 8.5 | 8.0 |
| Communal seed banks | 5.7 | 4.2 | 1.7 | 4.7 |
| Lease land | 3.1 | 4.2 | 0.0 | 2.5 |
| Irrigation | 2.1 | 4.2 | 1.7 | 2.2 |

### 4.13.4 Training on climate change strategies

At least 39% of all households were trained on climate change strategies. Disaggregated by gender, at least 44%, 33% and 27% of MHH, FHH and YHHs were trained on climate change strategies respectively.

Training on crop species and livestock breed suitability can be emphasized in technology adoption in the county. Apart from the training on agro forestry and tree planting (41%), changing crop types (34%) and soil and water conservation (33%) very few farmers had trained on the other strategies ( such as feed conservation, water harvesting) where those trained were less than 20% (Table 4.51).

**Table 4.51: Household members trained in adaptation to climate change**

| Adaptation strategies trained on | Proportion (%) of household heads trained | | | % Overall |
|---|---|---|---|---|
| | Adult male | Adult female | Youth | |
| Tree planting | 44.6 | 41.7 | 28.8 | 40.9 |
| Change crop type | 37.8 | 33.3 | 23.7 | 34.4 |
| Soil and water conservation | 34.7 | 58.3 | 16.9 | 33.0 |
| Water harvesting | 25.4 | 33.3 | 13.6 | 23.6 |
| Change livestock | 20.2 | 25.0 | 15.3 | 19.6 |
| Feed conservation and diversification | 14.0 | 25.0 | 5.1 | 13.0 |
| Staggered cropping | 15.5 | 8.3 | 6.8 | 13.0 |
| Value addition | 15.0 | 8.3 | 6.8 | 12.7 |
| Enterprise diversification | 9.8 | 12.5 | 8.5 | 9.8 |
| Storage | 8.8 | 12.5 | 5.1 | 8.3 |
| Seek employment | 7.3 | 12.5 | 8.5 | 8.0 |
| Communal seed banks | 5.7 | 4.2 | 1.7 | 4.7 |
| Lease land | 3.1 | 4.2 | 0.0 | 2.5 |
| Irrigation | 2.1 | 4.2 | 1.7 | 2.2 |
| Buy insurance | 1.0 | 0.0 | 0.0 | .7 |
| Total | 44 | 33 | 27 | 39 |

### 4.13.5 Types of climate shocks experienced

At least 70% of households experienced climate shocks in their agricultural production activities. Eighty percent of the YHH and at least 75% of the FHH and MHHs experienced at least one shock within the study year.

The most common shocks experienced were livestock pests and diseases, increased droughts and poor distribution of rainfall (Figure 4.19). Floods were not reported as common shock experienced in the study area.

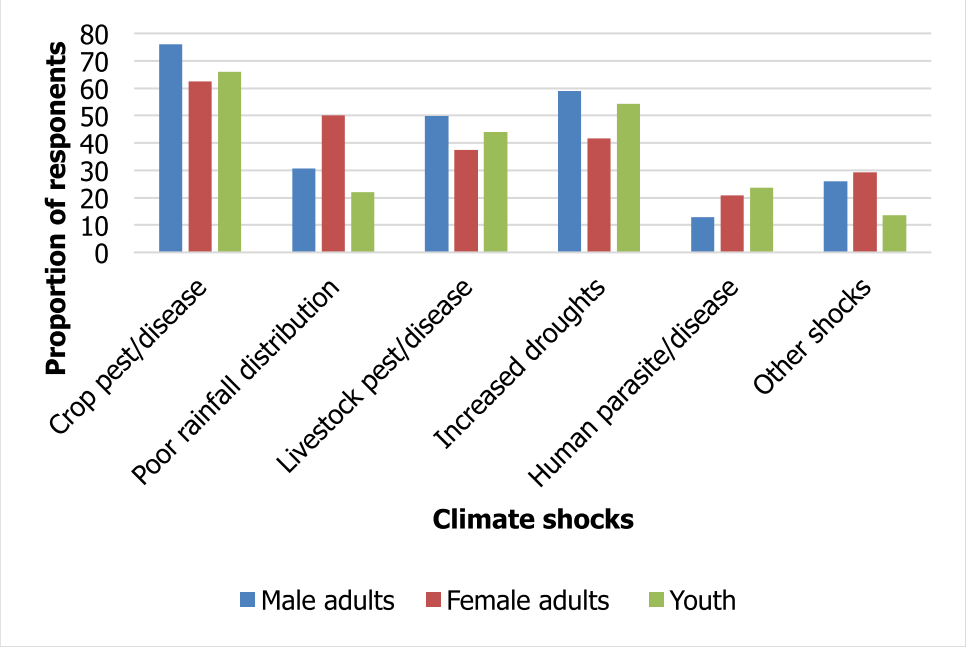



**Figure 4.19. Climate shocks experienced**

### 4.13.6 Coping strategies to climate change

Among those who experienced one of the climate shocks, 85% used at least one coping strategy (50% MHH, 16% FHH and 19% YHH). Table 4.5.2 shows selected strategies that were used by the respondents.

**Table 4.52: Coping strategies to climate change**

| Strategies used coping | Proportion (%) of householdheads using strategy | | |
|---|---|---|---|
| | Male adult | Female adult | Youth |
| Increase use/frequency of crop and livestock pest and disease control e.g. spraying | 9.8 | 15.2 | 26.6 |
| Purchased food | 9.6 | 8.7 | 4.7 |
| Destocking to reduce risk | 7.8 | 6.5 | 3.9 |
| Used existing savings | 5.7 | 6.5 | 6.3 |
| Split livestock herds | 5.5 | 0.0 | 3.1 |
| Increasing watering intervals to livestock | 5.1 | 8.7 | 2.3 |
| Reduced investments | 4.5 | 6.5 | 5.5 |
| Sold assets | 3.3 | 0.0 | 0.0 |
| Used previously stored food | 3.3 | 2.2 | 3.1 |
| Kill offseason young ones | 3.3 | 4.3 | 0.8 |
| Ate alternative foods | 3.3 | 2.2 | 0.0 |
| Sold/slaughter livestock to access food | 2.5 | 2.2 | 2.3 |
| Sought off-farm employment | 2.3 | 0.0 | 0.8 |
| Borrowed food | 2.0 | 0.0 | 0.8 |
| Food rationing | 1.8 | 2.2 | 3.1 |
| Rely on traditional support systems | 1.6 | 2.2 | 0.8 |
| Temporary migration to other areas | 1.4 | 2.2 | 0.8 |

#### 4.13.6.1 Household members who respond to climate shocks

Adult female and male household members were the ones who mainly responded to climate shocks with over 63% and 76% response respectively for crop pests and diseases and youth was about 66% response (Table 4.53). Responses for droughts and livestock pests and diseases recorded moderate responses.

**Table 4.53: Response to climate change shocks**

| Climate shock | Gender of person that responds to climate shocks (%) | | |
|---|---|---|---|
| | Male adult (n= 193) | Female adult (n= 24) | Youth (n=59) |
| Crop pests and diseases | 76.2 | 62.5 | 66.1 |
| Droughts | 59.1 | 41.7 | 54.2 |
| Livestock pests & diseases | 49.7 | 37.5 | 44.1 |
| Poor distribution of rainfall | 30.6 | 50.0 | 22.0 |
| Hailstorms | 20.2 | 8.3 | 6.8 |
| Human parasites & diseases | 13.0 | 20.8 | 23.7 |
| Floods | 6.7 | 20.8 | 10.2 |
| Frost | 6.7 | 4.2 | 0.0 |
| Land slides | 3.1 | 0.0 | 0.0 |

### 4.13.6.2 Capacity of household to cope with climate change

Households' capacity to respond to the shock was high in landslides (43%), floods (42%), poor distribution of rainfall (40%) and human parasites (35%). The other types of shock were reported to have a lower capacity to respond (Table 4.54).

**Table 4.54: Capacity of households to respond to climate shocks**

| Major climate shock experienced | Capacity to respond | Proportions (%) of respondents by gender of household head | | | Overall |
|---|---|---|---|---|---|
| | | MHH | FHH | YHH | |
| Crop pests & diseases | Very high | 31.4 | 28.6 | 34.2 | 31.7 |
| | High | 28.5 | 28.6 | 15.8 | 25.9 |
| | Neutral | 31.4 | 35.7 | 42.1 | 33.9 |
| | Low | 5.8 | 7.1 | 7.9 | 6.3 |
| | Very low | 2.9 | 0.0 | 0.0 | 2.1 |
| Livestock pests & diseases | Very high | 27.6 | 12.5 | 37.5 | 28.6 |
| | High | 34.5 | 37.5 | 25.0 | 32.8 |
| | Neutral | 34.5 | 25.0 | 37.5 | 34.5 |
| | Low | 3.4 | 25.0 | 0.0 | 4.2 |
| Floods | Very high | 33.3 | 20.0 | 83.3 | 42.3 |
| | High | 13.3 | 40.0 | 16.7 | 19.2 |
| | Neutral | 40.0 | 20.0 | 0.0 | 26.9 |
| | Low | 13.3 | 20.0 | 0.0 | 11.5 |
| Droughts | Very high | 24.3 | 50.0 | 39.3 | 28.5 |
| | High | 24.3 | 0.0 | 32.1 | 24.8 |
| | Neutral | 43.7 | 33.3 | 14.3 | 37.2 |
| | Low | 6.8 | 16.7 | 14.3 | 8.8 |
| | Very low | 1.0 | 0.0 | 0.0 | .7 |
| Poor distribution of rainfall | Very high | 22.0 | 33.3 | 15.4 | 22.2 |
| | High | 44.0 | 33.3 | 30.8 | 40.3 |
| | Neutral | 22.0 | 22.2 | 23.1 | 22.2 |
| | Low | 8.0 | 11.1 | 23.1 | 11.1 |
| | Very low | 4.0 | 0.0 | 7.7 | 4.2 |
| Human parasites & diseases | Very high | 31.8 | 25.0 | 42.9 | 35.0 |
| | High | 18.2 | 75.0 | 21.4 | 25.0 |
| | Neutral | 36.4 | 0.0 | 21.4 | 27.5 |
| | Low | 13.6 | 0.0 | 14.3 | 12.5 |
| Landslides | Very high | 42.9 | 0.0 | 0.0 | 42.9 |
| | Neutral | 28.6 | 0.0 | 0.0 | 28.6 |
| | Low | 28.6 | 0.0 | 0.0 | 28.6 |
| Hailstorms | Very high | 35.5 | 50.0 | 0.0 | 33.3 |
| | High | 9.7 | 0.0 | 33.3 | 11.1 |
| | Neutral | 38.7 | 50.0 | 33.3 | 38.9 |
| | Low | 9.7 | 0.0 | 33.3 | 11.1 |
| | Very low | 6.5 | 0.0 | 0.0 | 5.6 |

| Major climate shock experienced | Capacity to respond | Proportions (%) of respondents by gender of household head | | | Overall |
|---|---|---|---|---|---|
| | | MHH | FHH | YHH | |
| Frost | Very high | 27.3 | 100.0 | 0.0 | 33.3 |
| | Neutral | 45.5 | 0.0 | 0.0 | 41.7 |
| | Low | 9.1 | 0.0 | 0.0 | 8.3 |
| | Very low | 18.2 | 0.0 | 0.0 | 16.7 |

## 4.14 Natural resource management practices

The study examined respondent's knowledge and practice on natural resource management (NRM). The main practices included agroforestry, minimum tillage, crop rotation, intercropping, mulching, cover-cropping, terracing and planting in pits.

### 4.14.1 Proportion using and types of agro-forestry practices used

At least 40% of the households used windbreaks and shade trees on their farms while less than 15% used the other management practices listed in Table 4.55. Disaggregated by gender, 40% of MHHs, 37% of YHH and 32% of FHH used windbreaks along the boundaries of their farms.

**Table 4.55: Proportion (%) of households practicing agro forestry technologies**

| Agroforestry practice | MHH | FHH | YHH | Overall |
|---|---|---|---|---|
| Windbreaks (along boundaries) | 40.6 | 31.6 | 37.3 | 42.0 |
| Shade trees | 37.9 | 42.1 | 35.3 | 40.2 |
| Improved fallows | 13.8 | 5.3 | 19.6 | 15.2 |
| Alley cropping (trees within crops) | 3.6 | 15.8 | 5.9 | 5.1 |
| Silvo-pastural (trees with livestock/pasture) | 3.1 | 5.3 | 2.0 | 3.3 |
| Multi-storey cropping | 0.9 | 0.0 | 0.0 | 0.7 |

### 4.14.2 Main natural resource management practices known and used

The NRM practices were minimum tillage, crop rotation, intercropping, mulching, cover cropping and terracing. However, in a majority of the cases respondents practised less than what they knew in all NRM practices. Intercropping, crop rotation and minimum tillage were the most known and practised by all gender categories. More MHH had the highest knowledge of the management practices than FHH and YHH. The MHHs had highest knowledge on crop rotation (82%), followed by FHH (75%) and YHHs (73%). Generally knowledge and practice were at variance. (Table 4.56). Major NRM practices known and also practised were intercropping and crop rotation.

**Table 4.56: Knowledge and practices of natural resource management**

| Resource management practice | MHH (n=193) | | FHH (n=24) | | YHH (n=59) | | Overall (n=276) | |
|---|---|---|---|---|---|---|---|---|
| | Know | Practice | Know | Practice | Know | Practice | Know | Practice |
| Minimum tillage | 53.4 | 52.3 | 45.8 | 54.2 | 55.9 | 52.5 | 12.0 | 11.2 |
| Crop rotation | 82.4 | 77.2 | 75.0 | 75.0 | 72.9 | 67.8 | 15.6 | 14.5 |
| Intercropping | 54.4 | 52.8 | 54.2 | 54.2 | 52.5 | 45.8 | 11.2 | 9.8 |
| Mulching | 49.7 | 37.3 | 25.0 | 33.3 | 37.3 | 22.0 | 8.0 | 4.7 |
| Cover cropping | 40.9 | 33.2 | 20.8 | 25.0 | 35.6 | 25.4 | 7.6 | 5.4 |
| Terracing | 45.1 | 31.6 | 16.7 | 16.7 | 33.9 | 18.6 | 7.2 | 4.0 |
| Planting pits | 35.2 | 30.1 | 12.5 | 12.5 | 32.2 | 30.5 | 6.9 | 6.5 |

# 5.0 CONCLUSIONS AND RECOMMENDATIONS

The major constraints to input use in crop and livestock production were high prices and a long distance to the market. Productivity of annual and perennial crops in both Season 1 and 2 was low which could be attributed to low usage of production inputs, low access of agricultural services and low mechanization of farm activities. There was low use of input and rudimentary value addition methods. The awareness level for NRM/climate change issues was high but use of NRM/climate change technologies/strategies was not adequate. The coping strategies to climate change were low. Gender disparity in terms of farm input use, making decisions and household income was quite evident.

To increase and sustain agricultural productivity the extension arm of the county government in partnership with the private sector should:

- Develop and implement plans/programmes that ensure farm inputs are available and farmers are sensitized on their use.
- Enhance service provision to farmers, especially financial services to women, that can help them increase crop and livestock productivity, market information to help them market their produce, extension services to bring current technologies to farmers, among other services.
- Promote value addition by investing in infrastructure, capacity building and provision of relevant technologies.
- Diversify food production including high value and nutritious foods both for home consumption and sale
- Promote NRM to conserve the resource base and also adapt to and mitigate against climate change. This should be done through raising the level of awareness among farmers on NRM and climate change issues, enhancing the use of climate smart technology/NRM inputs, availing advisory services particularly for vulnerable groups, and promoting equitable engagement in local NRM/CC planning
- Improve access to social protection and security services by vulnerable groups through supporting the provision of basic socio-economic services to enable the resource poor and vulnerable producers to uplift their productive capacity to a level that will allow them to engage in commercial production
- Enhance community action capability through support for establishment and functioning of community groups

# 6.0 BIBLIOGRAPHY

Claro, R.M., Levy, R. B., Bandoni, D. H., Mondini, L.,. 2010. Per capita versus adult-equivalent estimates of calorie availability in household budget surveys. Cad. Saúde Pública, 27:2188-2195.

Devereux, S. 2003. Policy Options for Increasing the Contribution of Social Protection to Food Security. Institute of Development Studies University of Sussex.

FAO. 1996. Rome Declaration on World Food Security and World Food. Food and Agricultural Organization. Rome, Italy.

GoK (2010). 2009 Population and Housing Census Results. Nairobi: Kenya National Bureau of St, Ministry of Planning, National Development and Vision 2030.

GOK (2012). Agricultural Sector Development Strategy (2010 – 2020). Nairobi: Ministry of Agriculture

GOK, Ministry of Devolution and National Planning (2013) the County Development Plans.

Ministry of Agriculture (2012) Economic Review of Agriculture.

Onyiriuka, A.N., Fmcpaed; M., Umoru, D. D., Ibeawuchi, A. N.,. 2013. Weight status and eating habits of adolescent Nigerian urban secondary school girls. S Afr J CH 7:108-112

# 7.0 ANNEXES

## Annex 1: County Baseline indicators

| | Indicators | Baseline data needed (unless otherwise stated, data are relevant statistics for the sample used in the respective surveys) | Level of indicator |
|---|---|---|---|
| 1 | On-farm income increase by 5% p.a. in both male and FHHs by 2017 | -Current total mean on-farm income (Disaggregated by gender; male, female, youth headed) | • Overall mean value = KES 94,223<br>• Total Mean MHH annual on-farm income = KES 75,981<br>• Total Mean FHH annual on-farm income = KES 337,541<br>• Youth KES 74,584 |
| 2 | Off-farm income increase by 6% p.a. in both male and FHHs by 2017 | -Current total mean off-farm income (Disaggregated by gender; male, female, youth headed) | • Overall mean value=KES 93,696<br>• Mean MHH annual off-farm income = KES 94,563<br>• Mean FHH annual off-farm income = KES 68,128<br>• Mean YHH annual off-farm=100,794 |
| 4 | Food and nutrition security level increase by 10% in both male and FHHs by 2017 | - Current level of food and nutrition security for male and FHHs:<br>-Need to establish food and nutrition security | Food insecurity<br>• Overall households food insecure= 23% of households:<br>• Male headed food insecure households = 29%<br>• Female headed insecure households = 25% :<br>• Youth headed insecure households=21% |
| 5 | 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) | **Yields for season 1 and 2 average**:<br>• Overall mean for the year= 1,014 Kg/acre,<br>• MHH for year=841 Kg/acre |
| | | | • Female headed (FHH) for year=931 Kg/acre |
| | | | • Youth headed (YHH) for year=1715 Kg/acre: |
| | | - Current productivity (yields kg/ acre) of beans per year. (General, and disaggregated by gender male and female headed) | • Overall=624 kg/acre.<br>• Male headed=510 kg/acre |
| | | | • Female headed (FHH)=1021 kg/ acre |
| | | | • Youth headed (YHH) = 758 kg/ acre. |

| | Indicators | Baseline data needed (unless otherwise stated, data are relevant statistics for the sample used in the respective surveys) | Level of indicator |
|---|---|---|---|
| | | - Current productivity (yields, kg/ acre) of coffee crops (General, and disaggregated by gender male and female headed) | Sugarcane: (kg/acre)<br>• Over all mean=120<br>• (MHH)= 10;<br>• Female headed (FHH)= N/A;<br>• Youth headed (YHH)= 175 |
| | | | Tea: (kg/acre)<br>• Overall=4,534,<br>• MHH=5185,<br>• FHH=4,465,<br>• YHH=2,383 |
| | | | Banana: (kg/acre)<br>• overall=6,831,<br>• MHH=83<br>• FHH=N/A,<br>• YHH=13,580 |
| | | - Current productivity (yields) of major livestock species (General, and disaggregate by gender male and female headed) | Milk:<br>Crossbred (litres/cow/day)<br>• Overall=7.25;<br>• MHH=7.35;<br>• FHH=8.15;<br>• YHH=6.7.<br><br>Exotic cattle: (litres/cow/day)<br>• Overall=6.7;<br>• MHH=7.3;<br>• FHH=2;<br>• YHH=2.8. |
| | | | Local poultry (eggs/hen/laying cycle)<br>• Overall =19;<br>• MHH=20;<br>• FHH=18;<br>• YHH=15 |
| 6 | Household asset index for women, youth and vulnerable groups increased | - Current household asset wealth overall, by Gender (women, youth and vulnerable grou ps) - Need to establish asset ownership wealth by gender (women, youth and vulnerable groups) | • Overall Mean household asset value= KES 252,774,<br>• MHH = KES 283,201,<br>• FHH = KES 189,384,<br>• YHH=KES 180,574<br>Vulnerability<br>Overall = 252,774<br>vulnerable = KES 169,060<br>• non-vulnerable = KES 324,528 |
| 7 | % increase HH who notice long-term changes in the environment | - Current % of HH reporting noticing changes in environment: Overall, by gender. | • Overall mean reporting=25%<br>• MHH=25%,<br>• FHH=24% and<br>• YHH=24% |

| | Indicators | Baseline data needed (unless otherwise stated, data are relevant statistics for the sample used in the respective surveys) | Level of indicator |
|---|---|---|---|
| 8 | % increase of HH experiencing climate shocks in their agricultural activities | Current % households experiencing climate shocks: Overall and by gender | • Overall mean reporting=70%<br>• MHH=75%<br>• FHH=75%<br>• YHH=8o%<br>Vulnerability<br>Overall = 88.5<br>Vulnerable = 85.2<br>Non-vulnerable = 13.1 |
| 9 | 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 = 85%,<br>• MHH= 50%,<br>• FHH=16%<br>• YHH=19%<br>HH Capacity to respond:<br>Overall: High=39.7, Neutral=32.4, Low=9.4<br>MHH: High=37.3, Neutral =35.6, Low =9.4<br>FHH: High=44.4, Neutral = 19.1, Low =5.7,<br>YHH: High=35.6, Neutral = 1932.4, Low =7.2, |
| | | C3<br>(a) Proportion of output marketed by major agricultural commodities increased by 10% by 2017 | Maize: Overall 57%<br>• MHH=45%<br>• FHH=237%<br>• YHH=101%<br>Bean: Overall 111%<br>• MHH= 123%,<br>• FHH=81%,<br>• YHH=105%<br><br>Potato Overall =96%<br>• MHH=94%<br>• FHH=123%<br>• YHH=97%<br><br>Tea: Overall =67%<br>• MHH=104%<br>• FHH=%<br>• YHH=%<br>Sugarcane: Overall 144%<br>• MHH=%<br>• FHH=%<br>• YHH=97%<br>Banana: Overall=98%<br>• MHH=104%<br>• FHH=%<br>• YHH=90 % |

| | Indicators | Baseline data needed (unless otherwise stated, data are relevant statistics for the sample used in the respective surveys) | Level of indicator |
|---|---|---|---|
| 10 | 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=71%,<br>• MHH=68%,<br>• FHH=83% and<br>• YHH=74%<br>**Vulnerability:**<br>**Vulnerable=75%**<br>**Non-vulnerable=68.2%** |
| 9 | 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=29%,<br>• MHH=32%,<br>• FHH=17% and<br>• YHH=26%<br>**Vulnerability:**<br>**Vulnerable=25%**<br>• **Non-vulnerable=32%** |
| 10 | 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 agricultural services and infrastructure by type<br>- Current % of farmers accessing private agricultural services and infrastructure by type | • 46% of households mainly access agricultural-related services (public and private).By gender, 50% MHH, 50% FHH and 50% YHH.<br>• 54% of all households mainly accessing from public institutions and 46% from private institutions.<br>• 51% of MHH mainly accessing public institutions and 49% MHH accessing private institution<br>• 67% of FHH mainly accessing public institutions and 33% FHH accessing private institution<br>• 60% of YHH mainly accessing public institutions and 40% YHH accessing private institution |

| | Indicators | Baseline data needed (unless otherwise stated, data are relevant statistics for the sample used in the respective surveys) | Level of indicator |
|---|---|---|---|
| 11 | 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 | • 23% of households accessed market information services, 63% MHH,8% FHH and 25% YHH.<br>• 7% of households accessed credit, 60% of MHH, 8% FHH and 22% YHH.<br>• 0% of households accessed saving services, 0% MHH, 0% FHH and 0% YHH.<br>• 0% of households accessed agricultural insurance, 0% MHH, 0% FHH and 0% YHH.<br>• 49% of households accessing agricultural technologies, 51% MHH, 63% FHH and 39% YHH.<br>• 2% of households accessed social protection, 1% MHH, 9% FHH and 0% YHH<br><br>**Vulnerability:**<br>• 0verall =8.7% of households accessed credit, vulnerable 3.9% Non-vulnerable, 12.8%.<br>• 0verall =24.3% of households accessed saving , vulnerable 17.2% Non-vulnerable, 30.4%.<br>• 0verall =4.0% of households accessed social protection, vulnerable 3.4% Non-vulnerable, 0%. |

## Annex 2. Respondents owning different household assets (%)

| Item No. | Item | Percent response | Item No. | Item | Percent response |
|---|---|---|---|---|---|
| 1 | Radio | 89.9 | 21 | Donkey Cart | 3.6 |
| 2 | Telephone Mobile | 71.0 | 22 | Zero grazing Units | 2.9 |
| 3 | Stores | 69.2 | 23 | Water Pump | 2.2 |
| 4 | Spray Pump | 44.9 | 24 | Sewing Knitting Machine | 1.8 |
| 5 | Poultry Houses | 42.8 | 25 | Posho Mill | 1.4 |
| 6 | Water Tanks | 31.2 | 26 | Gas Cooker | 1.4 |
| 7 | TV | 22.8 | 27 | Chaff Cutter | 1.4 |
| 8 | Wheel Barrow | 19.2 | 28 | Harvesting Crates | 1.4 |
| 9 | Water Trough | 17.0 | 29 | Power Saw | 1.1 |
| 10 | Solar Panels | 14.5 | 30 | Generator | 1.1 |
| 11 | Well | 13.8 | 31 | Grinder | 0.7 |
| 12 | Animal Traction Plough | 12.0 | 32 | Planter | 0.7 |
| 13 | Borehole | 12.0 | 33 | Beehives | 0.7 |
| 14 | Bicycle | 11.2 | 34 | Silage Pit | 0.7 |
| 15 | Battery Car | 10.5 | 35 | Desk Top Computer Laptop | 0.7 |
| 16 | Motorcycle | 9.1 | 36 | Hand Cart | 0.4 |
| 17 | Dam | 8.7 | 37 | Harrow Tiller | 0.4 |
| 18 | Weighing Machine | 4.3 | 38 | Piggery Houses | 0.4 |
| 19 | Cattle Dip | 4.3 | 39 | Boat Rowing | 0.4 |
| 20 | Maize Sheller | 4.3 | 40 | Green House | 0.4 |

**Agricultural Sector Development Support Programme (ASDSP)**

Ministry of Agriculture, Livestock and Fisheries
Hill Plaza, 6th Floor, P.O. Box 30028-00100 Nairobi
Tel/Fax: +254-20-2714867
Email: pc@asdsp.co.ke
www.asdsp.co.ke