

KAPP

Kenya Agricultural Productivity Programme
P. O. Box 8073-00200, NAIROBI



SIAYA DISTRICT

**Enhancing sorghum production,
processing and marketing for
improved small-holder incomes
and livelihoods in Kenya**

FINAL SURVEY REPORT

CEREAL (SORGHUM) VALUE
CHAIN

SORGHUM : KAPAP CGS/FP 2011



Bondo University Research Team

The Research team comprises of the following:

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As important, we would like to state that the opinions expressed in this report are purely those of the authors based on observations and findings during the study. Suffice to say that the authors take full responsibility for any errors of commission or omission that may be found in the report.

Lastly, special thanks go to the KAPAP secretariat for funding this project and also to the PI for the team Dr. Eric Cheruiyot for good coordination.



EXECUTIVE SUMMARY

This report presents the findings of a study carried out in Siaya District during the months of June and July 2011. It is important to note that Bondo University College, at the request of Plan International, conducted this study. The exercise was undertaken in one division in Siaya district namely, Karemo. The study covered duration of seven days over each trip including a two day period of training and reconnaissance survey. The activities carried out during the trips included interviews, focus group discussions, observations and data/information collection from various sources including key informants, district technical staff, farmers/farmer groups and traders. Both primary and secondary data and information were captured during the field work. Members of the review team comprised of Bondo University College Researchers and Extension workers.

1.0 INTRODUCTION

The purpose of the exercise was to collect the current situational data from respondents including mainly small-scale farmers, Government/NGO staff, and registered / unregistered farmer groups

The respondents were from the 3 locations in Siaya District, Siaya County namely: South Alego, East Alego and South East Alego and were sparsely spread in the four zones/sub locations in each location giving a representative sample of each location and the division.

1.1 PROBLEM STATEMENT

Despite the numerous benefits that sorghum possesses and research efforts made in the past, its adoption, production and utilization as a staple and commercial crop in Kenya remains low. This is largely due to low productivity, lack of diversified products, inadequate product promotion, poor marketing linkages and unfavourable policy environment. Sorghum production at the farm level is limited by low yielding varieties, lack appropriate varieties targeted for specific uses, poor agronomic management practices, diseases and pests and un-developed seed supply systems.

To alleviate poverty, create employment and reduce malnutrition in the semi-arid and marginal areas of the country, it is will be essential for Kenya to harness the industrial potential of sorghum. Currently, at the farm level, sorghum is largely consumed as whole grain or used to make porridge 'uji, local brews whereas at commercially currently sorghum is being used to make a few limited products.

Poor and asymmetric access to market information and uneven market power by the brokers and merchants leads to poor negotiation capacity by the farmers, thereby depressing sorghum farm gate prices. This project intends to improve sorghum productivity, processing and create stronger market linkages.

It is envisaged that the project will empower the small-holder farmers particularly women and the youth to grow sorghum not only for food security but also for establishing sorghum based agribusiness enterprises.

1.2 PROJECT GOAL

Overall goal: To enhance sustainable sorghum production, processing and marketing for improved incomes and livelihoods in Kenya

1.3 PROJECT OBJECTIVES

1. To improve small-holder sorghum production in Kenya
2. To enhance and promote sorghum processing
3. To increase marketing opportunities for sorghum products
4. To avail and share information targeting different categories of stakeholders in the sorghum value chain

1.4 SPECIFIC OBJECTIVES OF THE BASELINE SURVEY

The specific objectives of the baseline included the following;

1. To identify and describe the functions of market players and intermediaries in SORGHUM, value chains (including provision of links to markets, consolidating production, provision of transportation, inputs, technical assistance, finance or other services to the farmers they source from) and the challenges they face
2. To investigate the socio-economic factors that influence intermediation in the areas of production, transportation, storage and marketing of Sorghum in Siaya.
3. To identify the challenges facing the farmers and their groups in Sorghum production and make appropriate recommendations on seed multiplication in this particular value-chain analysis.

1.5 SORGHUM VALUE CHAIN

The VCA comprises of the following segments:

SORGHUM Input Suppliers

In the Sorghum sub-sector, input suppliers were involved in stocking and in some cases distribution of Sorghum inputs from dealers/ agents and sale of the inputs to farmers and farmer groups directly. Notably however was the lack of Sorghum seeds. Maize seed was readily available but Sorghum seeds were hard to come by, and where available, only limited varieties found.

SORGHUM Producers

There were both individual farmers and farmer groups involved in the SORGHUM production sub-sector.

SORGHUM Wholesalers

In the SORGHUM sun-sector, wholesalers were mostly operating from the market centres and stationary points from where they buy and sell the produce in bulk. The number of wholesalers in the entire SORGHUM sub-sector was relatively few in comparison to their retailer compatriots.

SORGHUM Retailers

These were distinguished in the SORGHUM value chain as market actors dealing in smaller volumes of produce in terms of quantities bought or sold. They were also identified as the market leaders on the basis of their numerical presence and transactional turnover in the SORGHUM market sub-sector. Most of the retailers were involved in trading of Sorghum in terms of size and quality for sales purposes.

SORGHUM Mobile traders

This category of market actors in the chain are sometimes referred to as transporters due to their movement bound nature of trade in which they purchase and sell Sorghum between and among different chain actors e.g. they trade between the farm gate and wholesale traders and between wholesaler and retailers. In some cases they own their own transport and yet in other



situations they hire the means of transport to facilitate Sorghum produce movement. The study found that there were few mobile traders operating in the district.

SORGHUM Consumers

In the sorghum sub-sector like in the other horticultural produce sectors, consumers are categorized into household, public and private institutional types. Individual household form the bulk of Sorghum consumers in the market. Institutional consumers include hotels, restaurants, hospitals and brewery and bakery companies. Although latter categories of consumers are relatively few in number, they are considered as the future potential market leaders in this segment of the market on the basis of their volume of trade.

2.0 RESEARCH METHODOLOGY

The study started with a desktop review of trends in production, marketed volume, commodity market price and gross margins for Sorghum in the Siaya District as well as relevant literature and publications on value chain analysis. The desktop review was followed by consultative meetings with Siaya KAPP office and related Ministries. A two day participatory training for the enumerators was conducted involving the use of the study tool and pilot testing of the instrument. This was followed by field administration of the study instrument to the various actors in the value chain. Using this procedure, data was obtained giving a detailed value chain analysis for SORGHUM.

2.1 Approach and Methodology

The methodology involved the use of various experimental designs employed and how the researchers conducted the investigations. The concept of methodology validity based the main drive for the choice of techniques that were made and will be illustrated in this particular section.

Important questions were to be answered whilst looking at the research methodology that was used while carrying out this value chain analysis. Questions like:

Was the study valid?

Was the study in line with the project objectives?

Was desirable and useable information acquired?

Can the methodology be relied upon for similar projects in the future?

Were the research tools properly utilized while the project was being conducted?

What modifications could be made to aid in attaining efficiency in the methodology?

These few key questions among others are to guide this report section.

Different methodological types were employed for both data collection and analysis. The following methods were used in data collection:

The major tool used for this purpose was the questionnaire. Other assisting instruments included informant interviews and focus group discussions. All this constituted participatory techniques. The major areas that were captured in the research are shown in the table below:

Table 1: Main parameters captured in the study

Parameters	Examples
Socio-economic profile	Farm size, age structure, educational level, family size, income category and civil status
Types of inputs	Planting materials, Fertilizers, agrochemicals and

	farm implements
Operational expenses	Purchase of farm inputs, transport, storage and land preparation
Chain segment specific constraints	Input supply constraints, production constraints, marketing constraints and consumption constraints
Access to and management of Microfinance institutions	Availability, application for credit facility, purposes for the credit facility
Agronomic activities	Land clearing, planting, watering, pruning, pests and disease control, post harvest loss management.

Data collection methods evaluation

The following were the methods used for the data collection purposes:

i). Key Informant interviews

These were held and the following respondents were involved; District Agricultural Officer; District Crops Officer; District Agribusiness Development Officer and Monitoring & Evaluation Officer KAPP as well as the Coordinator KAPP Siaya. Others included the Divisional Agricultural Officer Karemo division and his staff. Discussions centred on information and data related to production trends (in hecterage and tonnage); marketed volume; market and market prices.

ii) Focused group discussions

Three focus group discussions were held concurrently in Bar Olengo, Kogelo and Bar Malango all in Karemo division. The participants in the discussions were selected with the help of the divisional technical team and the group consisted of farmer groups; individual farmers; youth and women group representatives; other Self Help Group (SHG) and Community Based Organizations (CBO) representatives associated with agricultural production and marketing in the study area.

Field observations

These involved making pertinent observations in relation to institutional arrangements between the value chain actors and the service providers including public institutions, development partners and other NGOs and relevant organizations operating in the agricultural sector in the study area. Additional data and information relevant to value chain analysis were also collected from various sources in the study area.

3.0 STUDY FINDINGS

1. Socio-economic data for Karemo Division

The divisor has the following socio economic characteristics:

a). SOUTH ALEGO LOCATION

- ❖ Population – 25363 persons.
- ❖ Area of South Alego – 112.1Km²
- ❖ Sub locations within the location include; Barding, Pap Oriang, Randago, Bar Osimbo, Bar Olengo, Mur Malanga and Nyajuok.
- ❖ Villages – 55
- ❖ Clans – 9
- ❖ Poverty levels – well off – 12%, middle rich – 48% and poor – 40%
- ❖ Population density is 226 persons per square Kilometers.
- ❖ This is due to inconsistent household income source which has exposed either parents or their children to take farm hired labour as household source of income.
- ❖ Rural-urban migration is about 51% particularly the energetic tough men migrate to urban centers for various types of jobs as coping mechanism for survival. The middle and old aged are at home doing farming activities hence less labour force.
- ❖ Number of households – 2784.
- ❖ Average number of persons per household is 4.
- ❖ Farm size per household is approximately 2 Ha.
- ❖ Land tenure is both communally – 52% and individually – 48% owned, the family taking upper hand.

- ❖ Rainfall – the area experiences bimodal rainfall with long rains from March to June and short rains from September to November with mean annual rainfall of approximately 925mm.
- ❖ Agro-ecological zone AEZ LM₃ – suitable for crop enterprises; cassava, sisal, maize, sorghum, groundnuts, sweet potatoes, banana, beans and livestock enterprise; dairy cow, zebu cows, local poultry, fish farming, bee keeping, dairy goats and pig keeping.
- ❖ Soil type – sandy clay loams to red loamy with underlying murram suitable for crop production but requires manipulation through the use of organic and inorganic manures.
- ❖ Altitude – 1300 – 1500 M.A.S.L
- ❖ Major crops – maize, sorghum, beans, cassava, simsim, groundnuts, s/potatoes, sisal, kales, tomatoes, onions, bananas, mangoes.
- ❖ Livestock enterprises are dairy cow, zebu cow, local poultry, fish farming, bee keeping, goats and pigs.

b) East Alego Loaction

- ❖ East Alego covers an area of 29.1 Km² with 3 sub-locations namely; Ulafu, Olwa and Umala. There are 24 villages with only 11 clans.
- ❖ *Population density*
 - Number of households is 1964.
 - Average number of persons per household is 4.
 - Average farm size per household is approximately 2 Hectares.
 - Land tenure is both communally and individually owned.
 - Number of farm families is 2156
- ❖ ***Administration***
 - This is formal with chiefs, assistant chiefs, village elders and at some level clan elders.
- ❖ ***Rainfall***

The area experiences bimodal rainfall with rains from March-June and short rains from September to November with mean annual rainfall of approximately 925mm (Ministry of water – Siaya)

Agro ecological zones – AEZ Lm

This soil is suitable for crop enterprises – e.g. cassava, maize, sorghum, groundnuts, sweet potatoes, grain amaranth bulb onions and kales.

Livestock enterprises – dairy cattle, local zebus, poultry, fish farming and bee keeping.

❖ *Soil types*

Sandy loams to clay loams, aggregate of murram suitable for crop production but requires incorporation of organic and inorganic manures.

❖ *Altitude – 1300 to 1500M.A.S.L*

❖ *Major crops*

Sorghum, beans, maize, simsim, cassava, grain amaranth, sweet potatoes, kales, tomatoes, mangoes, avocados, onions, and bananas.

❖ *Livestock include*

Dairy cows, local poultry, fish farming, zebu cow, bee keeping, goats and dairy goat.

c) South East Alego Location

❖ Location has a population of 21,023 which comprises of 9786 males and 11237 females.

❖ The area is approximately 53.4 Km²

❖ The sub-locations which make the location are;

❖ Bar Agulu – Zone I – 12.6Km²

❖ Mur Ngiya – Zone II – 6.8Km²

❖ Masumbi - Zone III – 17.8Km²

❖ Nyangoma – Zone IV - 16.2Km²

- ❖ There are 42 villages with 47 clans
- ❖ Poverty level – well off – 14%
- ❖ Middle rich – 42%
- ❖ Poor – 44%
- ❖ Population density is 394
- ❖ *Social organization.*
 - The average household size is 6 people. Generally the community has extended families and with the prevalence of HIV/AIDS, extended families are on the increase.
 - The education levels of the community are as follows on average;
 - Primary level – 40%
 - Secondary level – 35%
 - Tertiary level – 20%
 - Illiterate – 10%
 - Extension Officers ration is 1:2000
 - Number of households – 2784
 - Average number of persons per household is 6
 - Farm size per household is 2 acres.
 - Land tenure is both communal (52%) and individually owned (48%) with the former taking upper hand.
 - Average number of persons

Administration structures

- ❖ *Rainfall*

The area experiences bimodal rainfall with long rains from March – June and short rains from September – November with mean annual rainfall of approximately 925mm (Source – Ministry of water)

- ❖ *Agro-ecological zone: AEZ – LM₃* suitable for crop enterprises such as Cassava, Sisal, maize, sorghum, groundnuts, sweet potato, banana and beans.

Livestock enterprises as dairy cow, zebus, local poultry, fish farming, bee keeping, dairy goat & pig.

Soil types- predominantly sandy, clay and loams to red loamy with underlying murrum suitable for crop production but requires manipulation through the use of organic or inorganic fertilizers.

Altitude ranges between 1300 – 1500m above the sea level.

- ❖ *Major crops:*Maize, sorghum, beans, cassava, simsim, groundnuts, sweet potatoes, sisal, kales, tomatoes, onions, bananas, grafted mangoes, avocados.
- ❖ *Major livestock:* Dairy cow, local zebus, local poultry, fish farming, bee keeping, dairy goat, pigs.
- ❖ *Agro forestry:* Common forest/fruit trees and fodder trees in the area are Makhemia, eucalyptus, gravellia, lantana camara, albicine camara, various local trees and shrubs; mango, pawpaw, avocados & euphorbia trees.
- ❖ *Land:* The tenure status of the farm and security of the hold as both titular ownership inherited from ancestry linkage tree for the community dwellers in the location also lease terms on seasonal basis for the urban dwellers who practices agriculture and livestock production.

Land tenure issue can only be positively influence the farmers ability and or willingness to adopt the location activities because both agriculture and livestock production are practiced with entire four zones by greater population of the location.

Community natural resource management/ assessment

Land: the prime community natural resource is land as major factor of production. Land is communally owned with a few farmers (20%) individually owned. This tenure system originates from inheritance of land from parents and grandparents.

The land is used for crop farming, livestock farming, quarrying, brick making.

Land has been inadequately managed as a unit of production since some parts of land/ farms are not answered to actively and optimally produce crops; despite all these, the current land price per acre is 200,000/= especially around Nyangoma Kogelo.

PROCESSES IN SORGHUM PRODUCTION

The core processes in sorghum production were listed as below:

1. Land clearing
2. Acquisition of inputs
3. Land preparation
4. Ploughing planting
5. Weeding
6. Top dressing
7. Harvesting
8. Drying
9. storage
10. Selling
11. Post harvesting
12. Harrowing

II. FINDINGS SORGHUM PRODUCTION

a) PRODUCTION CONSTRAINTS FOR KAREMO DIVISION

1. Uneven distribution of labour.
2. Retrogressive cultural practices.
3. Bad roads.
4. Lack of knowledge on marketing structures.
5. Insecurity.
6. Soil erosion on farms.
7. Lack of clean drinking water for both domestic and livestock use.
8. Unreliable rainfall.
9. Livestock pests and diseases menace.
10. Low production in livestock enterprises.
11. Lack of knowledge and skills on tree agronomy.

12. Inadequate personnel both on agriculture and livestock enterprises.

13. High malnutrition amongst adults and children.

14. Inadequate livestock feeds.

From the findings it was revealed that many people seemed to have been dealing with this particular commodity. At least in 58% of the households we would find some Sorghum even if in small acreages. Only 87 cases of the noted 150 were reported to be dealing with the SORGHUM commodity as shown in the frequency (table 1)below:

Table 1: Frequency table showing respondent cases found to be dealing with the commodity SORGHUM

	Frequency	Percent
No	63	42
Yes	87	58
Total	150	100.0

Findings show as shown in (figure 1) that for farmers the majority are in the age bracket of 35-60yrs, represented by 84%. The youth under 35 years seem not to be involved in SORGHUM production, represented by 6% which was largely attributed to the fact that SORGHUM was not promising in terms of returns due to lack of market for the commodity.

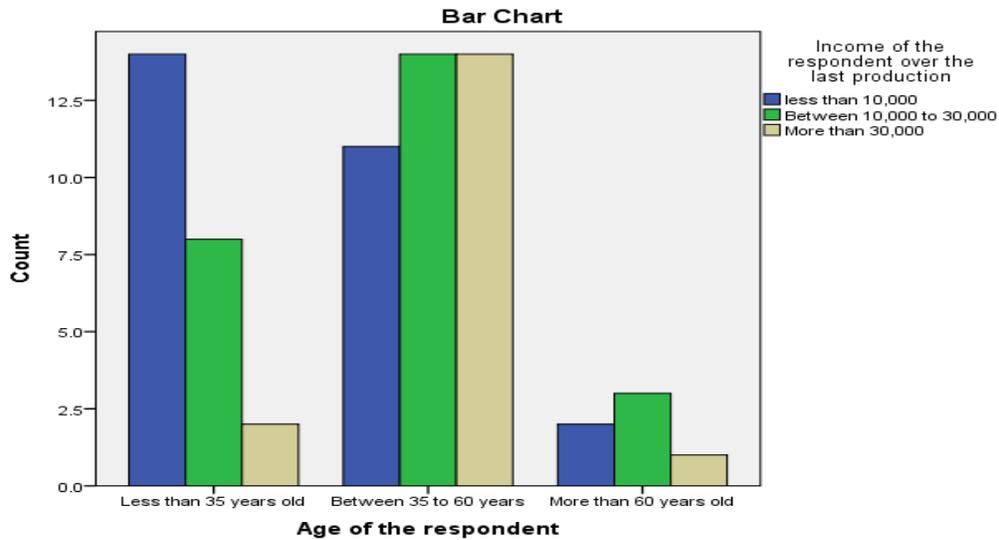


Figure 4: A comparison of income earned from sorghum production by age

Figure 1: Age of respondents

b) Gender

In terms of gender, results revealed that the majority of farmers in SORGHUM growing are women, represented by about 56%, although a significant proportion of men are also involved, represented by about 44%. In the trade segment also, more women are involved in the trade of SORGHUM, represented by 55% for women as compared to 45% for men.

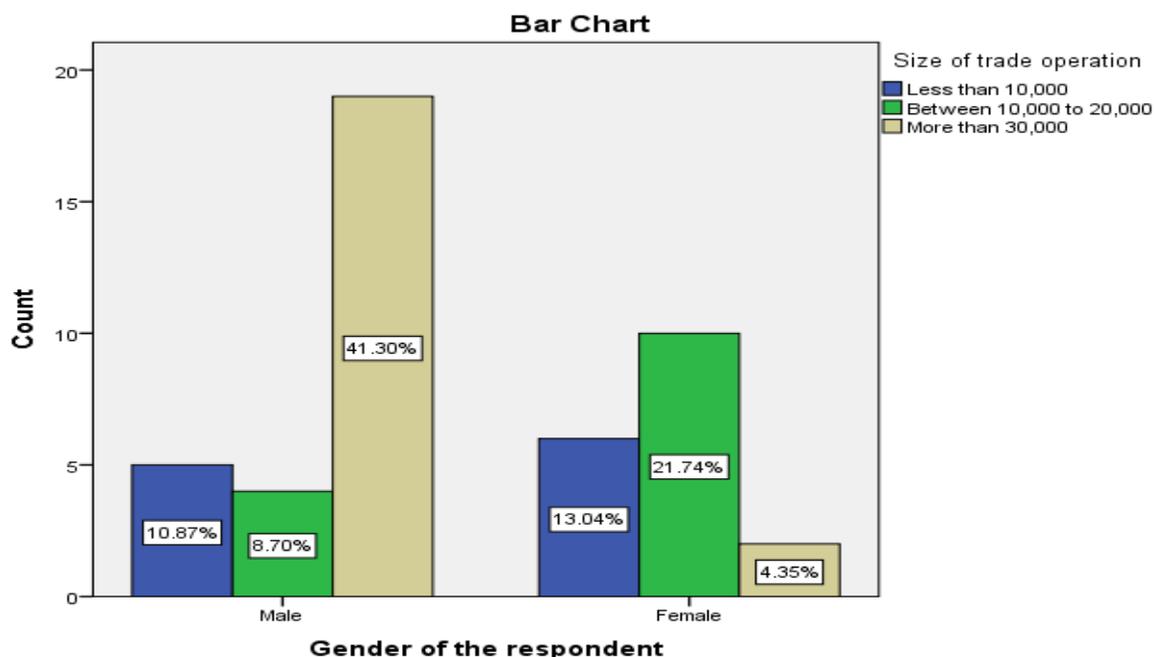


Figure 2: A comparison of size of trade operation by gender

Figure 2: Gender of respondents

Looking at the educational background of those dealing with SORGHUM, most of the producers had attained only upto primary education coming to about 61%, followed by those who had secondary education at about 38% and the least being those with post-secondary education at approximately 1%.

c) Income

In the production segment most of the actors receive an income of less than KES 10,000 with this coming to about 70%, while the income range of KES 10-30,000 followed with about 24% and last was more than KES 30,000 at around 6%.

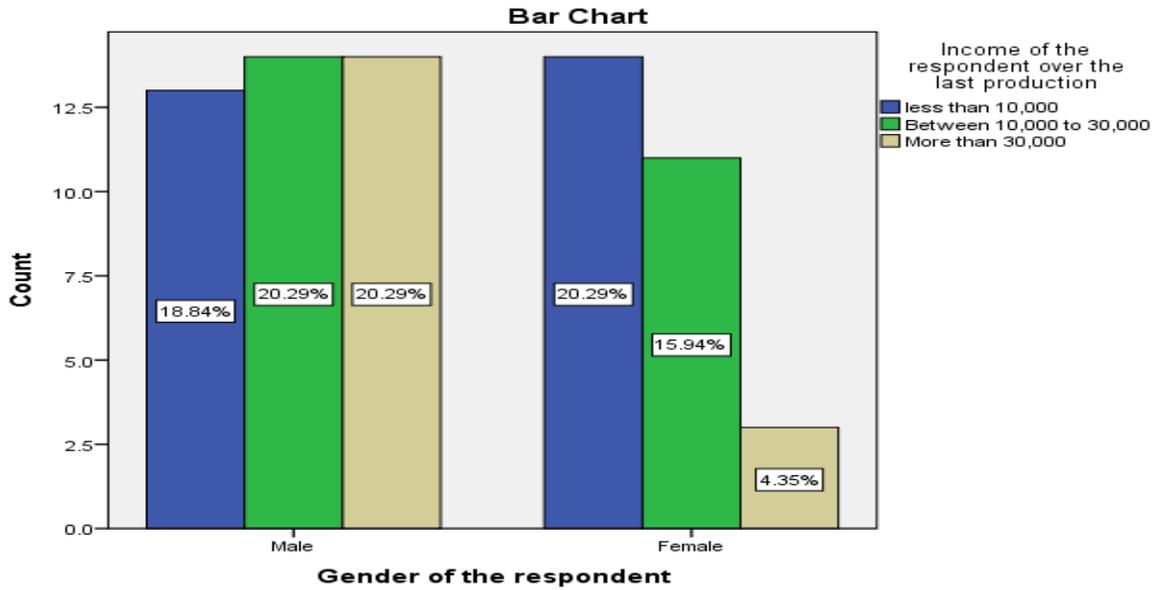


Figure 1: A comparison of income earned by gender

The disparity in incomes from investment can further be attributed to the fact that fewer female farmers take loan compared to their male counterparts as depicted by the pie charts below. According to the pie charts only 11.11% of women had access to credit compared to 72.22% of men who had access to loans.

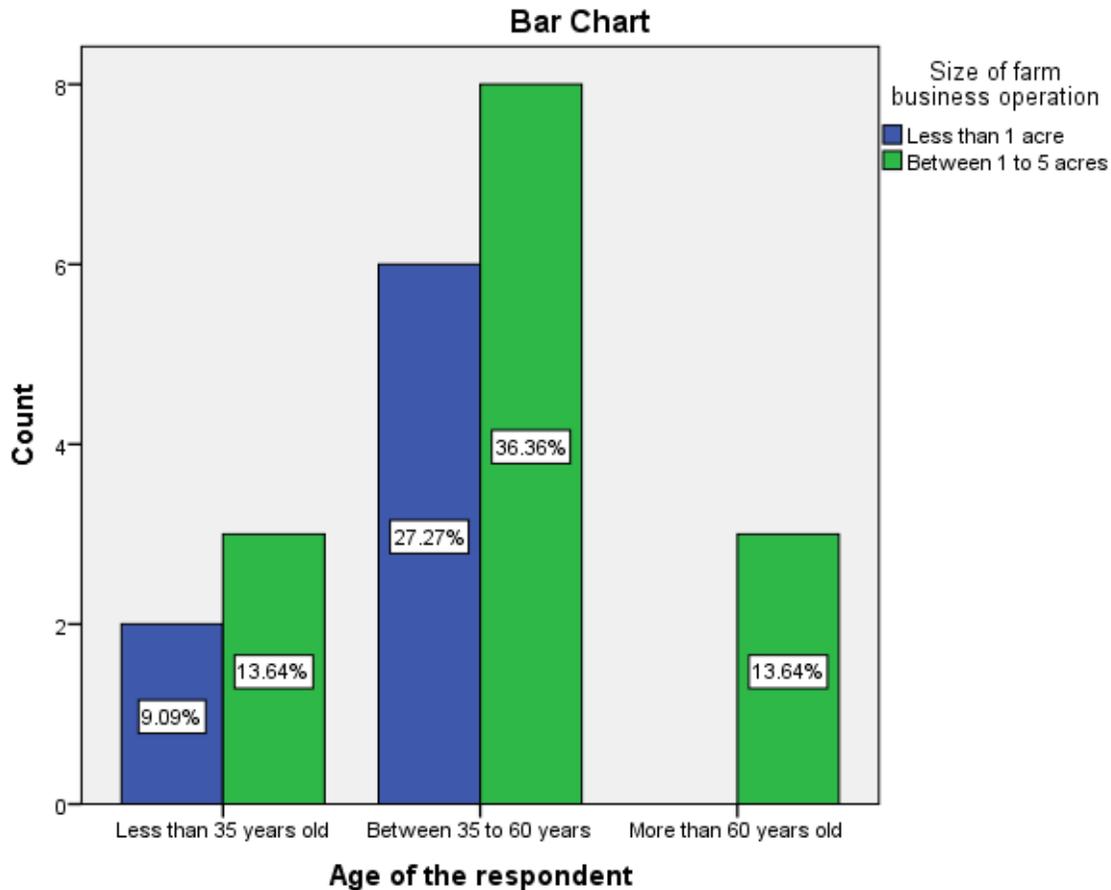
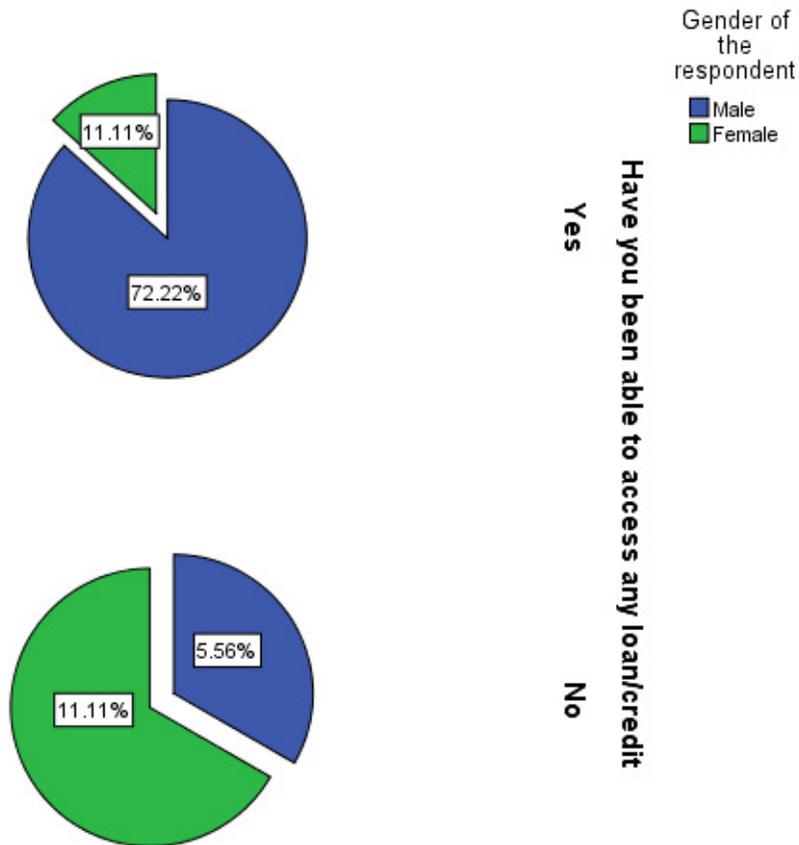


Figure 5: A comparison of size of farm under sorghum production by gender

The low income from sorghum production among those aged above 60 years is also evidenced by the fact that this age group does not have access to credit facilities as shown below. When asked whether or not they have access to credit facilities, only those aged less than 35 years and between 35 years to 60 years responded while those aged above 60 year did not respond.



d) Input suppliers

The main inputs used for SORGHUM production were: improved seeds, agrochemicals and fertilizers. The main actors in the SORGHUM input supply segment of the value chain were farm input stockists. Instances of farm input supply shortage due to inefficient distribution networks were reported.

e) Marketing system

In the SORGHUM production the farmers sell the produce directly to traders or the middlemen individually at the farm gate. However there were cases where SORGHUM was sold directly to the local markets by farmers. It was noted that at the market place, the retailer was the most active actor/ market leader in the SORGHUM value chain and the majority of whom were women.

f) Sorghum input supply

Discussions with farmers' stockists and agricultural officers established that inputs for SORGHUM production were improved seeds, fertilizers SSP, DAP, CAN, and Urea as well as agrochemicals. These SORGHUM farm inputs were sourced locally by stockists from seed merchants namely Kenya Seed Company and Western Seed Company while fertilizers were obtained from NCPB and Mayer Ltd and agrochemicals were sourced from Bayer East Africa.

g) Sorghum transportation

The most commonly used means of transportation for SORGHUM farm inputs by farmers were motorbike pick up, wheelbarrow and bicycle at an average cost of KES 150 – 1000 over a distance of 10 km. In the distribution of SORGHUM farm inputs, transport costs were noted as a major component of the internal costs which together with transit losses and high taxes/levies contribute to the high input cost as the supply nears the farm gate.

Table 2: Constraint analysis for the SORGHUM input supply segment in Siaya District

CONSTRAINTS	CAUSES	EFFECTS	POSSIBLE INTERVENTIONS	OPPORTUNITIES
High cost of inputs	<ul style="list-style-type: none"> Poor access road High cost of transport Bad weather conditions 	High sales prices Decline in demand of farm inputs Reduction in profits	Rehabilitation of rural access/feeder roads and bridges	Lower transport cost, lower input prices leading to increased demand for farm inputs
Unavailability of inputs from distributors/ manufacturers	<ul style="list-style-type: none"> High demand by input suppliers (e.g. Stockist and middlemen) Unawareness of cropping calendar by the /distributors 	Untimely supply of inputs to the producers Decline in profit	Create awareness among supplier/ distributors /manufacturers on seasonal cropping calendars	Increased availability of required farm inputs and timely supply and delivery of farm inputs by manufacturers and distributors
Access to credit	<ul style="list-style-type: none"> Lack of awareness of credit sources Limited financial 	Slow business growth and expansion	Capacity building on credit access and management	Well stocked input supply retail shops to meet farmers' demand for farm

	institutions <ul style="list-style-type: none"> • High interest rate • Lack of collateral 			input s
Lack of knowledge on farm inputs application and management	<ul style="list-style-type: none"> • Lack of training on farm inputs application and management 	Inadequate advice to customer on farm input application and management	Provision of training on farm inputs application and management for inputs suppliers	Increased confidence building among farmers and effective application and management of farm inputs.
Supply of fake inputs by distributors	<ul style="list-style-type: none"> • Unscrupulous business practices • Lack of knowledge of 	Loss of market Poor sales Low profit margin	Training and capacity of inputs suppliers on genuine farm inputs identification	Increased sales of quality farm inputs

Table 3: SORGHUM production segment actors in Siaya District

ACTORS	CHARACTERISTICS	ROLE	LIMITATION	OPPORTUNITIES
Farm Input Suppliers	<ul style="list-style-type: none"> • Are small scale Agro-Vet businesses based in Urban/Market centers 	<ul style="list-style-type: none"> • Stocking, Distribution, Sale 	<ul style="list-style-type: none"> • High transport, adulterated farm inputs, availability of inputs, price instability, poor repayment of input credit by farmers 	<ul style="list-style-type: none"> • Increased demand for farm input,
Producer	<ul style="list-style-type: none"> • Are mostly small scale farmers with farm size varying from 0.03 to 15 acres 	<ul style="list-style-type: none"> • Production 	<ul style="list-style-type: none"> • High cost of inputs, Low quality farm inputs, lack of market, poor information flow, pest and disease infestation 	<ul style="list-style-type: none"> • Good market prices, good weather conditions

h) sorghum production constraints

Discussion with SORGHUM farmers established that there were various constraints that affect SORGHUM production in the district. Their causes, effects and possible interventions were analyzed and presented in the table 11 below:

Table 4: SORGHUM production constraint analysis

CONSTRAINTS	CAUSES	EFFECTS	POSSIBLE INTERVENTIONS	OPPORTUNITIES
High cost of inputs	High cost of transports Poor access roads Levies (Municipal, County council)	High production cost Lower returns	Construction and Rehabilitation of rural access/feeder roads and bridges/drift identified Lobbying for favourable farm input levies	Reduction in transport and farm input costs leading to increased use of farm inputs hence improved production levels
Lack of grading sheds storage facilities	Lack of funds Lack of awareness on importance of storage facilities Weak existing producer groups	Post harvest losses Low commodity price Poor product differentiation Low returns	Facilitate the construction of grading sheds and storage facilities in the district	Improved product differentiation and reduced postharvest losses leading to better output price at the farm gate
Lack of small scale irrigation system	Lack of funds for investment techniques	Unsustainable production Unstable income Underutilization of land and water resources	Support of small scale irrigation developments	Sustainable production cycles leading to effective commodity supply to the market and stable returns
Lack of access to credit facilities	High interest rate charged by commercial banks Lack of collateral Farmer delinquency	Slow expansion of production Profitability/Low returns	Create a revolving fund for lending purpose Capacity building on credit facility access and management	Improved access to credit, increased utilization of farm inputs
Lack of affordable packaged inputs for	Conflict of interest between buyers and sellers	Low production Low returns	Facilitate repackaging of farm inputs into to affordable sizes for small scale farmers by Input	Increased demand for affordable farm inputs leading to increased production levels

small scale farmers and sale of adulterated inputs	Lack of policy on affordable packing of farm inputs for small scale farmers		suppliers without comprising quality Lobby for appropriate farm input packaging policy	
Pests and diseases menace	Inadequate extension services Poor crop husbandry Use of infected seeds	Low production levels Low prices Loss of market demand	Training and capacity building on pest and diseases and management for farmers	Improved yield and better returns

Recommendations for SORGHUM production constraints

The district exhibited high potential for commercialization of SORGHUM production in lieu of the relatively high gross margins registered by the commodity alongside other crops. Field observations and production sector constraint analysis (Table 11) showed that producers encountered some serious difficulties in the SORGHUM sub-sector. In order to adequately address these concerns and scale up SORGHUM production in the district, the following recommendations below were proposed as possible solutions.

- **Effective control and management of pests and diseases menace**

On the basis of discussion with farmers in the project area, prevalence of SORGHUM pest and diseases was as an important constraint in Siaya district. The causes of this constraint were inadequate knowledge and skills on SORGHUM disease and pest management as well as use of low quality SORGHUM planting materials. The eventual effects of the constraint alluded to above included low levels of SORGHUM production and poor quality of SORGHUM produce leading to low prices. To bring the SORGHUM pest and disease menace under control, it was recommended that more research and capacity building be done on pests and disease management. Notable was the infestation by Striga and birds.

- **Fair Price of farm inputs**



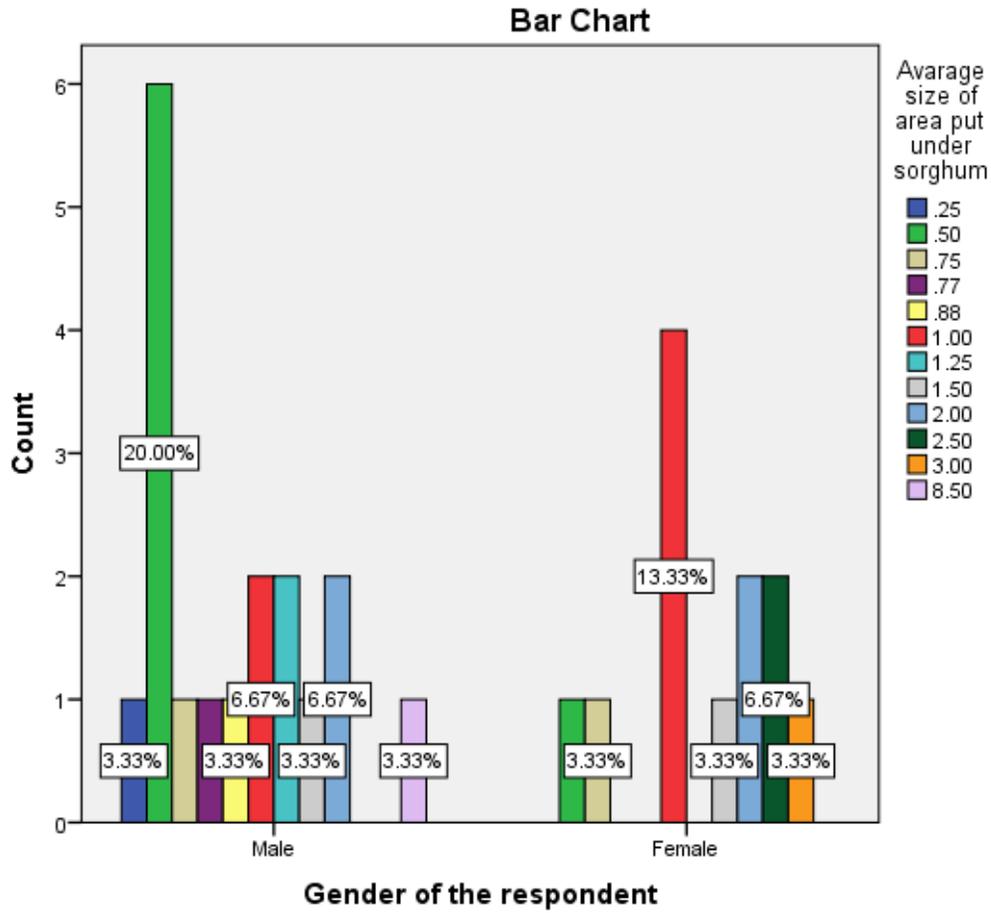
Field investigations, discussions with farmers and analysis of collected data, showed that high cost of inputs was a major constraint in the SORGHUM production in the project area. The causes of the constraint were exorbitant prices occasioned by high transport costs incurred by stockists. In order to ameliorate the impact of the constraint, it was recommended that KAPAP project implements the seed multiplication project alongside other initiatives to avail Sorghum seeds to the small-scale farmers

- **Provision of Quality farm Inputs**

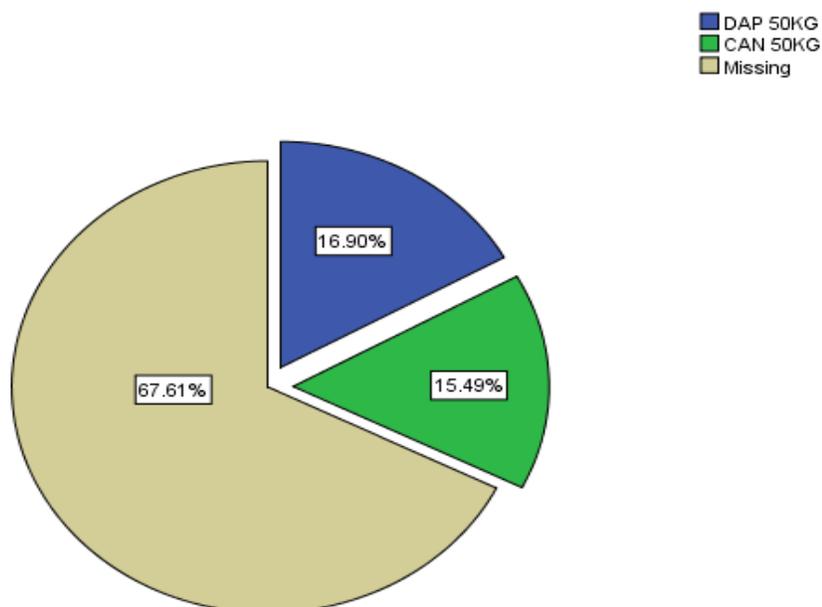
Farmers in the district mentioned inferior quality and adulteration of farm inputs in the SORGHUM sub-sector as a common occurrence. Lack of knowledge among farmers about SORGHUM farm input quality and dishonesty among input suppliers and distributors was noted as the primary causes of this constraint. The resultant effects were low production and poor produce quality. In view of this, there is need to work closely with farm input manufacturers and importers, PCPB, KEPHIS and KEBS to carry out training and capacity building on SORGHUM farm input quality assurance.

- **Provision of technical knowledge and improved crop husbandry**

SORGHUM producers identified lack of technical knowledge about farm input application and poor crop husbandry as an impediment to quality SORGHUM crop production. They mostly attributed this to inadequate advisory services by relevant service providers in the SORGHUM production sub-sector. The end result of which was low SORGHUM output level and poor produce quality. To increase SORGHUM production levels and quality produce, there is justification to work together with agencies such as MoA, AGMAK, farm input manufacturers and importers to provide training and capacity building on technical knowledge and application of SORGHUM farm inputs and management to farmers and farmer groups. From the bar chart below we realize that the area under sorghum production is still low implying that most farmers don't give it priority. It is therefore important to sensitize the farmers on the benefits of sorghum so as to increase its production.

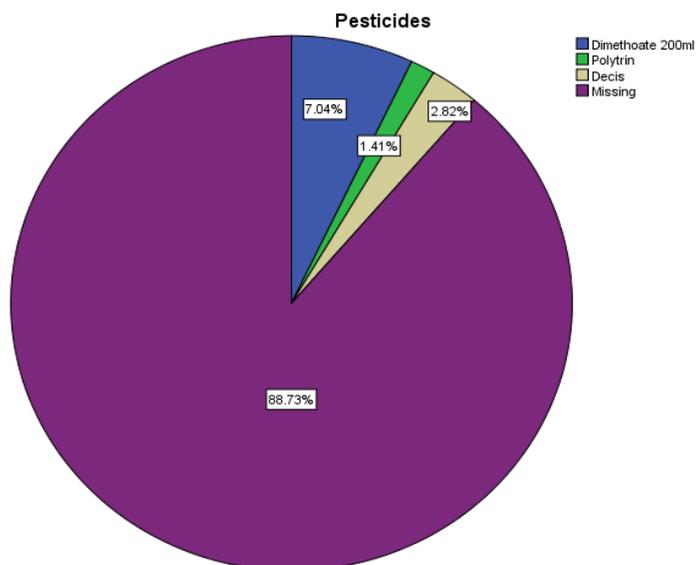


Fertilizers



The following tables shows the main inputs supplied to the farmers and the percentage usage is also computed in the third column.

Commodity	Input	Percentage Usage	Source	Buying price(Ksh.)	Selling price (Ksh.)
Fertilizers	DAP (50KG)	52.16	Kisumu	4,000	4500
	CAN (50KG)	47.84	Kisumu	2,500	3,000
Fungicides	Ridomil	49.56	Kisumu	1,700	1,900
	Dithane	37.17	Kisumu	800	900
	Antracol	12.39	Kisumu	800	1200
Pesticides	Dimethoate	62.84	Kisumu	250	300
	Polytrin	12.38	Kisumu		
	Decis	24.78	Kisumu	1200	1300



- Provision of knowledge and technical skills on post-harvest management**

Discussions with farmers and analysis of the information gathered in the field during the study indicated that lack of knowledge and technical skills on SORGHUM post-harvest management was a major concern among SORGHUM producers in the district. This was caused by lack of awareness of the SORGHUM postharvest handling technology and inappropriate equipments leading to loss of opportunity in SORGHUM value addition and premium price attainment. Due to the need to tackle this challenge, it was recommended that development agencies including MoA, KIRDI, KARI, and Agro-based Public Universities should provide training and capacity building on technical skills and knowledge on SORGHUM post-harvest management.

- Support for small scale irrigation equipments**

Lack of small scale SORGHUM irrigation equipments/implements was identified as one of the major constraints to SORGHUM production by small scale farmers in the district. It was attributed to high cost of investment in SORGHUM irrigation and lack of technical skills. The subsequent effect was reliance on rain fed SORGHUM cultivation ultimately resulting into low production. To ensure stable and reliable production all year round, Plan International in collaboration with the pertinent agro-development agencies, for

example, NIB, MoA, KARI and Agro-based Public Universities should work together to support acquisition and establishment of small scale SORGHUM irrigation equipments/implements.

- **Support access to credit facilities**

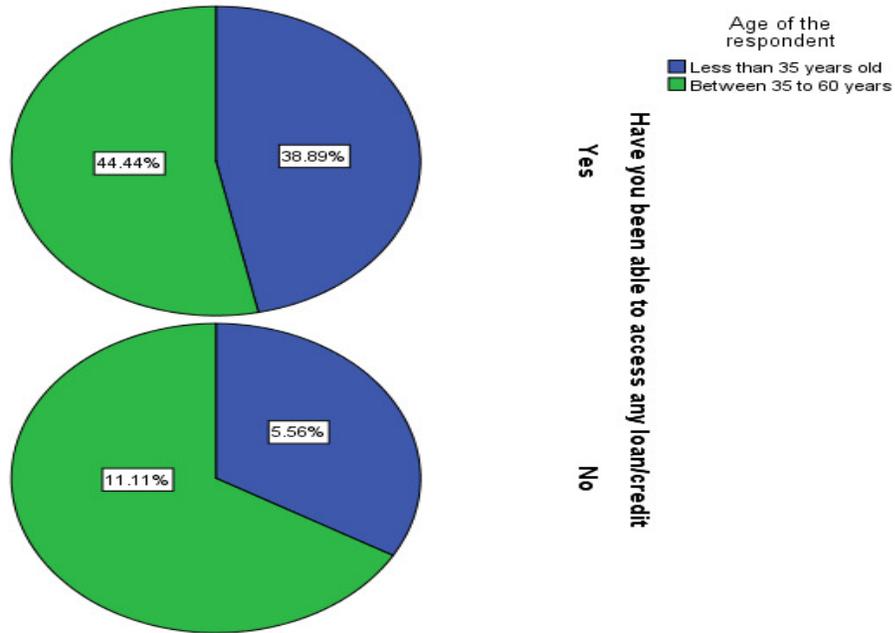
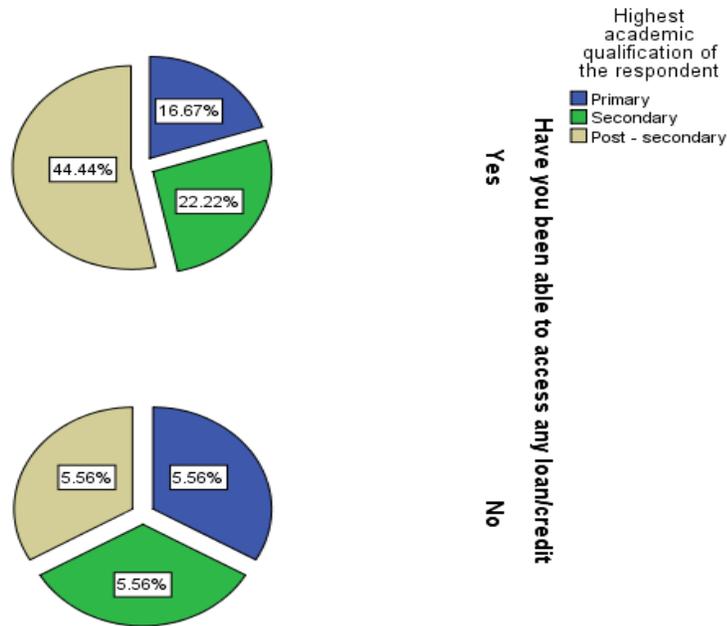


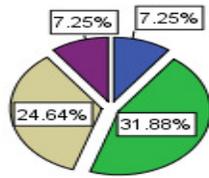
Figure 6: Access to credit by gender

For many SORGHUM producers the issue of accessibility to credit was fundamental in acquiring farm inputs for production. While financial institutions were available in the project area, for example commercial banks, Microfinance institutions, and cooperatives, there was a general inaccessibility of the credit facility by SORGHUM producers in the district. This was attributed to lack of security for acquisition of credit for SORGHUM production. Hence, leading to limited farm enterprise operation and low-level of farm input adoption in the SORGHUM production segment of the value chain. In view of the for-going challenge, there is need to work in collaboration with local financial institutions such as Equity Bank, Faulu Kenya, *Njaa Marafuku Kenya*, and other micro-financial agencies to provide training and capacity building on credit access and management in the SORGHUM production sub-sector.

We also find that access to credit facilities is influenced by the level of education of the individual farmer as shown below. It is therefore important to encourage those who have post-secondary education to engage in sorghum farming.



From the pie chart below we see that most of the farmers who belong to savings and credit societies have a post-secondary education. It is therefore necessary to sensitize the rest of the famers on the benefits of being a member of savings and credit societies.



Highest academic qualification of the respondent

- None
- Primary
- Secondary
- Post - secondary

Do you belong to any saving and credit

Yes

No

SORGHUM Marketing System and Pricing

The farmers sell the produce to middlemen individually at the farm gate. They also sell directly to the local markets. These are organized SORGHUM CIG groups who indicated they were officially registered and had officials but were weak in operation.

Markets and Infrastructure

The main wholesale and retail markets in Siaya district are Siaya town and Ng'iya. It was also noted that the markets had specific and different market days of meeting mostly twice in a week and operated as open-air markets as shown in the figure 19. From the observation, the situations in these markets were disorganized.



Figure 1: Open air market in Siaya district

Transportation of SORGHUM

Mode and means of transport is an important consideration in the SORGHUM marketing segment in the value chain. In the project area it was observed that the most commonly used means of transport by traders were bicycles, handcarts, pickup and motorcycle.

SORGHUM Storage

Like most horticultural produce, the SORGHUM commodity is susceptible to post harvest losses and therefore requires good storage facilities at the market level. It was observed that Wholesale traders normally buy and sell in bulk and package them in sacks for a period for some time before selling to retail. However, at the retail trader level, re packaging is done in two kilogram tins (gorogoros) and sacks for sale to consumers/households. In terms of storage it was observed that the traders store the produce in sacks sometimes without applying insecticides. This type of storage has resulted in heavy losses due to pest attacks including Greater Grain borer and weevils.