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Impact of Farmers' Involvement in Agricultural Value Chain on Livelihoods, A Case of Maize Seed Multiplication Programme in Baringo South Sub-County, Kenya

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ABSTRACT

Agricultural value chains must establish mutually beneficial and sustainable relationships with farmers and farmer groups to ensure commodity supply and farmers' livelihoods are more resilient. Small-scale farmers, comprising most of the world's farming population are important actors in the agricultural value chains. A study was done to determine whether farmer involvement in the maize seed multiplication programme impacted their livelihoods in Baringo South, Kenya. The study focused on whether farmers' ability to repay the credit, whether they make savings from maize seed multiplication programme, the sustainability of such savings and how the savings translate to consistency in meeting family basic needs. Results indicated that, sustainability of farmer savings from the maize seed programme was statistically significant in relation to farmers' livelihoods; where, with a unit increase in sustainability of savings, the odds of a farmer inability to consistently provide for all his family basic needs decreased by 1.767. Only 61.8% of farmers reported to be making some income savings in the maize seed multiplication programme while 22.1% reported being unable to make any savings. Therefore, to enable farmers realize better productivity from maize seed multiplication programme and adequately sustain their family livelihoods, the study recommends; building farmer capacity on financial management and providing environment conducive for farmers so as to minimize losses and safeguard their hard-earned income.

INTRODUCTION

Farmers in Africa and particularly the sub-Saharan continually face emergent risks related to climate change with notable effects on major production and income instability among farming communities. Farmer experiences are worsened by the fact that most African farmers own small uneconomical land sizes and rely more on rain-fed agriculture which in most cases is unsustainable thus increasing farmers' susceptibility to the effects of climate change and other natural occurrences. According to Precision Agriculture for Development [PAD] (2018), smallholder typically harvest only 30% to 50% of what their land could produce implying that, the opportunity to successfully and sustainably increase production and reduce poverty is huge. Yield gaps exist due to sub-optimal farming either as a result of misapplication of inputs, use of low-quality seeds or limited access to appropriate inputs. Devaux et al., (2018) further noted that, smallholder farmers often lack necessary production assets and up to date information on market trends. These factors confine farmer's capacity to invest and expand in the agricultural value chains. Frezer (2020) noted that small-holder farmers, among other vulnerable groups within value chains have inadequate power to negotiate market terms resulting to less opportunities to draw value for their farming ventures.

Besides food, small-scale farmers also have other basic livelihood needs to meet every day of the year. In recent decades, the global agricultural landscape has witnessed notable changes as a result of technological advancements, ever-changing consumer preferences and policy interventions. These changes have introduced new complexities and opportunities within the agricultural value chains, affecting small-scale farmers the most. According to Oxford (2019), sub-Saharan Africa countries (apart from South Africa) will need to up their effort in the use of fertilizers and improved seeds by eight and six times respectively in order to unlock their full agricultural potential. According to World Economic Forum [WEF], 2018), a third of the world's food produced by farmers (approximated as 1.3 billion tons) is often lost along the food systems chain. Reducing losses in agricultural produce has potential to increase farmer incomes and lighten the undesirable effects on the environment. According to Suwadu and Hathie (2020), small scale farmers must contend with limitations such as weakness and uncertainty related to input and product markets, massive post-harvest losses, climatic uncertainty, high cost of doing business and weak agricultural research and extension programs.

For decades, national government and international development programmes have sought to advance the livelihoods of small-scale farmers

with varied results at best (Woodhill, Hasnain & Griffith, 2020). An inclusive value chain based on promoting small scale rural farmers on a profitable basis to make farming more resilient to climatic shocks and foster sustainability is important now than ever before (Michelson, 2020). This calls for governments' support in providing the basics, like an enabling economic and policy environment, adequate rural infrastructure and agricultural research and development (Kufuor, 2021). Islamic Development Bank (IsDB) report of 2019 indicates that, for Sustainable Development Goals (SDGs) to be realized by 2030, economic growth has to be accompanied by measures that enhance food security and resilience in agri-food systems to be able to withstand effects of climate change (IsDB, 2019). Past studies allude that agricultural value chains through contract farming increases smallholder farmers' incomes (Bellemare & Bloem, 2018). But a common finding in these value chains is that participation requires certain investments and skills (Chengappa, 2018). As stated by Dunn (2014), the challenge frequently is not on only how to include small farmers, but also to assure farmers are involved in ways that lead to household livelihood improvement, productivity increases and overall poverty alleviation.

Davis (2023) observed that, engaging farmers on contractual farming planning is an important agricultural marketing scheme that can assure definite market for smallholder farmers leading to improved livelihoods. However, the disparity of influence between farmers and the companies that organize and manage contract farming schemes may put small farmers at disadvantaged position (Davis, 2023). IFPRI (2019) report also recognizes the existence of pertinent concerns regarding smallholder-friendly value chains. Such concerns include the role of the value chains to sustainably better livelihoods of small-holder farmers, scalability of the positive impacts of agricultural value chains and how to find lasting solutions to the technical, institutional and policy related constraints that limit the potential of value chains. Carletto, Coral and Guelfi (2017) noted that commercialization of small-scale subsistence farming remains an essential part of economic growth and a much-needed component in strengthening rural livelihoods. Inclusivity in an agricultural value chain therefore means it considers every actor in the chain and seek out to make their involvement not only workable but economically and socially transformative. The participation of smallholder farmers in agricultural value chains through contract farming and other arrangements are to a larger extent promoted as a way of upgrading agricultural production. In bid to improve their livelihoods, farmers hope for good prices but in the end, they have very little influence on the arrangements thus making the market unfavorable to the smallholder farmers. The need to promote collaboration and cooperation among the actors in an effort to address information gaps at all levels in the value chain is very important. There is limited systematic research into the impacts of farmer involvement as a crucial factor for inclusive agricultural value chain on the livelihoods of the maize seed multiplication programme farmers in Baringo South Sub-County.

1. Methodology

1.1 Geographical description of the study area

Baringo County is located in the Rift Valley Region of the Republic of Kenya and is located between longitudes 35 30' and 36 30' East and between latitudes 0 10' South and 1 40'. Baringo County coverage area is 11,075 square kilometers with approximately 221 square kilometer of land being covered by surface water of Lakes Baringo, Bogoria and Kamnarok. The Equator crosses the county at the southern part. Seven Sub-counties form Baringo County namely; Baringo South, Mogotio, Eldama Ravine, Baringo Central, Baringo North, Tiaty West and Tiaty East. Approximately 80% of the County is arid and semi-arid with the larger part of the county population mostly living in the highlands and towns. The rainfall experienced in Baringo County ranges from 1,000mm to 1,500mm received in the highland areas annually to 600mm per year in the lowland areas. Because of their diverse altitudes, the seven sub-counties receive different levels of rainfall with Koibatek sub-county receiving the highest amount of rainfall. Sub-counties in the lowland areas namely; Mogotio, Tiaty East, Tiaty west, Baringo South and Baringo North comparatively receive limited rains. Temperatures in the county vary from a minimum of 10°C to a maximum of 35°C.

Agriculture (both crop farming and livestock keeping) is the mainstay of Baringo county economy, approximately accounting to 58 % of Gross Domestic Product (GDP). Baringo South sub-county (the study area) falls in the lowland area, it is mainly semi-arid area with complex soils. The bigger portion of the sub-county has for long been a pastoralist area with residents mainly rearing livestock as their major economic mainstay. This is basically because the area gets inadequate rainfall given its semi-arid climate meaning that, the region is not conducive for crop farming without irrigation. Perkerra irrigation scheme in Baringo South was one of the most admirable programmes in the dry area in the 1990s as it was best known for cotton growing. Cotton farmers in the area were disappointed when the local ginnery failed to pay their arrears valued at Kenya Shillings 2.7 million and as a result, farmers abandoned cotton and ventured into maize seed farming which they began in the year 1996. Whereas the female maize crop is

the main source of income once harvested and delivered to the contracting seed company, farmers are allowed to sell the male crop locally or utilize it as household food.

1.2 Research design

The study used mixed-method research approach, combining quantitative and qualitative methods of data collection. The study used survey to assess the impact of farmer involvement in maize seed multiplication programme in Baringo South Sub-County in Kenya on their livelihood by use of structured questionnaire administered to a representative sample of participants. The descriptive design provided a comprehensive and detailed description of the socio-economic aspects of farmers in the maize seed multiplication programme in Baringo South primary so as to create a snapshot of the current status of this demographic group, shedding light on their gender, age distribution, education levels, size of farming land among other important components of farmer background information. Quantitative data was collected and subsequently analyzed to draw meaningful conclusions. Multinomial logistic regression was used to analyze and predict the impact of independent variables on dependent variables by use of odds ratios.

1.3 Target population

Currently, the seed maize contractual engagement in Baringo South Sub-County is coordinated between Kenya Seed Company (KSC) and 27 local entities (referred to as Registered Growers) distributed within the sub-county. One registered grower is in charge of number of farmers spread in different irrigation blocks depending on their locality. After the production and processing of the seed maize, payments are done to the farmers through the registered grower. National Irrigation Authority (NIA) coordinates the use of water in the scheme and maintains the irrigation infrastructure as well. According to the National Irrigation Authority, the contracted farmer groups/growers have approximately 4286 farmers participating in seed maize farming and directly benefit a population of at least 23,000 people in Baringo and neighboring counties. Maize varieties grown by farmers in the programme are those suitable for both low and medium altitudes.

1.4 Sample size and sampling procedures

Multi-stage sampling method was used in selection of the representative sample. In the first step, purposive sampling technique was used to select Baringo South sub county because of it being a prime maize seed production area in Baringo County. Secondly, the study used simple random sampling in selection of the six out of the twenty-seven maize seed grower groups where the study was undertaken. Thirdly, the required sample of farmers to be interviewed were drawn from each of the six selected farmer grower groups apportioned proportionately to the number of farmers in the group. The last step of sampling involved systematic sampling that was used to select study respondents from each of the six selected grower groups by listing the participants alphabetically and picking the nth position to attain the required proportion of respondents per group. The confidence level adopted for this study was 95% and a margin of error of 0.05. According to Kothari, (2004), the formula for calculating sample size is given as:

$$n = \frac{N}{1\text{-}N(e^2)}$$

Where*; N* is population size, e being margin of error and *n* is required sample size. In determining the ideal size of the sample for a population of 4286 maize seed farmers in Baringo South, at 95% confidence level and a 0.5 margin of error, the required sample for this studywas calculated as follows;

$$n = \frac{4286}{1+4286(0.05^2)}$$

Therefore; *n*=365.855. The studysample size was 366 farmers.

1.5 Data collection instruments and procedures

Quantitative data collection was done from April to May 2023 by use of individual respondent questionnaires. Structured questionnaires were administered to the sampled maize seed farmers with the help of six research assistants. Questionnaire technique for data collection was ideal since it gives the researcher room to reach a bigger number of sampled respondents within a shorter time and also its suitability in collection of basic background information. In total, 366 questionnaires were administered to respondents out of which 348 were completed giving 95.08% response rate. Qualitative data was obtained by engaging some key informants in the maize seed multiplication programme.

1.6 Data analysis

Both descriptive and inferential statistical techniques were used for data analysis. Descriptive analysis was done to produce frequencies, percentages, mean, and standard deviation to provide statistics that describe the basic features of the variables of the study. Statistical Package for Social Scientists (SPSS) version 25 which was the main data analysis software utilized. Regression analysis by use of estimated coefficients (β values), standard error, significance values and odd ratio of independent variables were used to assess the association between independent and dependent variables of the study.

RESULTS

1.7 Characteristics of the study population

1.7.1 Gender representation of farmers in maize seed multiplication in Baringo South

The study assessed the representation of women and men in Baringo South maize seed multiplication programme. Understanding and addressing gender disparities by promoting inclusivity, is important in development of efficient strategies for enhancement of agricultural sustainability and promotion of more resilient and adaptive farming communities. Results depict that most representing 72 % of the respondents were male in comparison to 28 % female.

1.7.2 Age distribution of farmers in maize seed multiplication programme in Baringo South

Table 1 presents the age distribution of the farmers in maize seed multiplication programme in Baringo South sub-county.

Table 1: Age distribution of farmers in maize seed multiplication programme in Baringo South

Age bracket(years)	Frequency	Percentage
20-29	104	29.9
30-39	121	34.8
40-49	87	25.0
50-59	25	7.2
Above 60	11	3.2
Total	348	100.0

1.7.3 Education levels for farmers in maize seed multiplication programme in Baringo South

The educational background of farmers plays a fundamental role in shaping their understanding of agricultural best practices, innovative technologies, and sustainable resource management. Respondents were also asked to indicate the highest-level education attained as presented in Table 2. Study results depict that majority of Baringo South farmers attained basic level of education with a majority having attained 35.6 % and 32.8 % secondary and primary levels respectively. Also, to note is a remarkable 23 % of farmers with tertiary education (middle level colleges and universities).

Table 2: Education levels for farmers in maize seed multiplication programme in Baringo South

Education level	Frequency	Percentage
No primary education	30	8.6
Primary	114	32.8
Secondary	124	35.6
Tertiary	80	23.0
Total	348	100.0

1.7.4 Land sizes for farmers in maize seed multiplication programme in Baringo South

The land sizes held by farmers have far reaching implications for agricultural productivity, rural livelihoods and sustainable development. Understanding landholding patterns is key for assessing the potential for land use efficiency and the challenges farmers encounter in managing their agricultural ventures. Study results indicate that, farmers in Baringo South practiced farming on varied sizes of land with majority doing it on between 2 to 4-acre pieces at 45 %, and those doing on 1 to 2 acres at 43 %. A minimal percentage of 3 % practiced farming on land less than an acre while 9 % practiced on 5 acres and above.

1.8 Impact of farmers' involvement in maize seed multiplication programme on livelihoods in Baringo South

The study focused on assessing whether farmers do farm records including production and financial records, their ability to repay credit, whether they make savings from maize seed multiplication programme, the sustainability of such savings and how the same translates to consistency in meeting all family basic needs.

1.8.1 Record keeping on crop production among farmers in maize seed multiplication programme in Baringo South.

Preparation and use of farm records is important in enabling farmers to assess the value of their money, time, and other resources incurred in agricultural intervention. When done well, farm records enable proper decision-making in agricultural ventures just like in any other business related-field. Despite 97% of farmers reporting that they do production records in their maize farming, the study noted that this was not comprehensive as farmers did not take into consideration important aspects in their production such as irrigation water, labour, and security among other production factors. Additionally, 60% of the interviewed farmers reported that they were not able to adequately track their expenditures and income from the start of the crop season until the product is was delivered to the seed company because of the complexity of doing calculations.

1.8.2 Farmer savings from the maize seed multiplication programme in Baringo South

Practicing a saving culture prepares farmers for unforeseen circumstances because savings serve as a safety buffer for the household. Additionally, savings enables households to accumulate wealth that they can utilize to undertake other promising livelihood opportunities and improve their living standards.

Table 3: Farmer's ability to make savings from maize seed multiplication programme in Baringo South farmers.

	Frequency	Percent
No	77	22.1
Yes	215	61.8
very rarely	56	16.1
Total	348	100.0

From Table 13, despite an above-average percentage representing 61.8% of farmers who reported to be making some income savings in the maize seed multiplication programme, there exists a whole 22.1% that are unable to make any savings. This result is further reinforced by the fact that 14.1% of the interviewed farmers reported to have children who dropped out of school due to various reasons among them being lack of school fees and school supplies recorded at 7.8 %.

1.8.3 Credit repayment ability among farmers in maize seed multiplication programme in Baringo South

The study also assessed farmer's ability to repay credit as a key element for stable income at the household level. Although 70.3% of the farmers interviewed reported that they were able to repay their credit facilities without much struggle, a notable number representing 29.7% indicated that they had challenges in fully repaying the loans on time. Several reasons were given for the inability to repay credit including crop failure, high cost of production, high interest rates and the effect of pests and diseases which ultimately affect farmer incomes and ability to adequately sustain their household livelihoods.

1.8.4 Maize seed farmer household ability to consistently meet household needs in Baringo South

The study further sought to establish farmer livelihood capacity by assessing their perception on the ability to meet their family's basic needs consistently. The farmer's inability to consistently meet the cost of their household basic needs as indicated by the 21% who reported being unable and those partly able with assistance at 35% is worth noting. Multinomial logistic regression was also done to establish whether farmer participation in the maize multiplication programme in Baringo South had any impact on farmer livelihoods. The dependent variable in this case being farmers' ability to consistently provide all family basic needs such as quality education for their children, quality food and nutrition among other basic needs. The independent variables considered were the sustainability of savings that farmers make from maize seed programme, losses incurred and their perception on timeliness in payment for their produce. The dependent variable on the other hand had three categories namely; farmers not able to consistently meet the cost of their household basic needs, those that partly managed with assistance and third category being those fully able. Table 4 presents regression coefficients of the independent variables on the dependent variable. Of the three categories of dependent variable (not able, partly able with assistance and fully able), the category of farmers who reported as fully able is the reference category for this study.

3.2.4.1 Impact of losses incurred and maize seed farmers ability to consistently meet household needs

In comparing the farmers who reported being unable to meet family needs and those fully able (first set of coefficients in Table 4, losses incurred by farmers was statistically significant at (b=0.723, standard error=0.300, p<.005). The odds ratio of 0.485 for this variable implies that for every unit increase in losses incurred by farmers due to crop failure, the odds of a farmer being unable to consistently provide for all his family basic increased by 0.485 compared with those fully able (the reference category).

Table 4: Multinomial regression results of farmer participation in maize seed multiplication program on household livelihood in Baringo South.

Farmer ability to consistently provide for all family basic needs		B	Std. Error	Wald	df	Sig.	Exp (B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Not able	Intercept	.496	1.391	.127	1	.721			
	Losses due to crop failure	.723	.300	5.829	1	.016	.485	.270	.873
	Sustainability of savings made	-.570	.129	19.445	1	.000	1.767	1.372	2.277
	Payment of farmers' produce	.336	.441	.580	1	.446	.715	.301	1.696
Partly able with some assistance	Intercept	4.406	1.296	11.561	1	.001			
	Losses due to crop failure	1.129	.260	18.898	1	.000	.323	.194	.538
	Sustainability of savings	-.391	.110	12.627	1	.000	1.479	1.192	1.836
	Payment of farmers' produce	1.221	.448	7.408	1	.007	.295	.122	.711

a. The reference category is: Fully able.

In the second set of coefficients (comparison of farmers partly able with assistance and those fully able to meet family needs), the losses due to crop failure were significant (b=1.129, standard error=0.260, p<.005). The odds ratio of 0.323 implies that, for a unit increase in losses incurred by farmers' due to crop failure, the odds of a farmer being able to provide his/her family's basic needs (only with assistance) increases by 0.323 compared to those fully able to provide.

3.2.4.2 Sustainability of savings made from maize seed farming and farmers ability to meet household needs in Baringo South consistently.

In comparison of the farmers who reported being unable to meet family needs and those fully able (first set of coefficients in Table 4), the sustainability of savings that farmers make from the maize seed programme was also statistically significant at (b= - 0.570, standard error=0.129, p<0.005). The odds ratio of 1.767 reveals that, for a unit increase in farmers reporting sustainable savings from the maize seed programme, the odds of a farmer not being able to consistently provide for all his family basic needs decreases by 1.767. Still in Table 4, second set of coefficients (comparison of farmers partly able and those fully able to meet family needs), sustainability of savings made by farmers was also significant at (b= - 0.391, standard error=0.110, p<.005). Its odds ratio of 1.479 implies that for a unit increase in farmers making sustainable savings from the maize seed programme, the odds of a farmer being partly able to provide for his/her family basic needs only with assistance decreases by 1.479.

DISCUSSION

1.9 Characteristics of the study population

The more than quarter of women participating as represented by the 28% is a pointer to the resilience of women in bracing against the odds that limit their equitable participation in male-dominated socio-economic interventions like the maize-seed multiplication programme in Baringo South. Observations from the study could be related to cultural factors that majorly ground women to household chores and other less challenging farming interventions compared to men who have the ability and flexibility to take part in diversified farming and other income generating interventions. According to Suwadu and Hathie (2020), women are underprivileged and face greater challenges in decision-making and in control of productive assets like land among others. According to Latif (2023), women farmers in rural areas have unique challenges in accessing appropriate agricultural information. In most scenarios, less women are targeted by extension agents as it is assumed that they do not have the power to make decisions within their own households hence the knowledge and skills shared with them will not be put to good use. Thorton, et al, (2019) also observed that, efforts women in Africa put in agriculture is still largely concentrated on production of food to sustain their households and less on commercialized agriculture representing 20% to 30% less agricultural output for women compared with men.

The dominance of an energetic and still productive population aged between 20 to 49 years representing 89.7% cumulatively participating in maize seed programme is worth to note. This observation can be attributed to the many youths with no formal employment and opt to engage in agricultural activities as a way of sustaining their livelihoods. Study finding is closely related to a study by Umar and Peter (2020) which revealed that, half of the farmers practicing maize farming in Doma Local Government Area of Nigeria were aged between 21-40 years. Investment in technology and promotion of innovative approaches can entice and sustain young rural men and women in agriculture. According to Ministry of Agriculture, Livestock and Fisheries Development (2018), youth have the ability to both contribute and benefit from agricultural value chain. Nevertheless, lack of resources makes it hard for them to wholly achieve their potential and optimize the opportunities available, especially in the agricultural value chain that is dominated by older farmers. Cruickshank, Grandelis, Barwitzki and Bammann (2022) emphasized that, youths are in a better position to revitalize the agriculture sector, gain knowledge and skills desired to undertake innovations, adopt new technologies and champion the digital change in their communities.

On farmer education levels, higher education attainment among farmers acts as a catalyst for positive change in agriculture as it empowers them with knowledge, skills and a forward-thinking approach in various ways. Through education, farmers understand the importance of diversifying their crops and income sources, a strategy that helps spread risk associated with environmental conditions and market demands. Educated farmers are also better equipped to access and interpret agricultural information from various sources, including research institutions, extension services and online resources. Findings on farmer education agrees with an observation by Otara et al , (2023) who noted that, uptake of minimum tillage technology among dry land farmers in Embu County was positively impacted by farmer's participation in off farm activity, implying that farmers who were involved in other activities over and above farming are likely to get additional earnings that they could utilize in meeting the cost of farm labour and requisite farm inputs. Gido et al.,

(2015) alluded that, high level of education attained by household head had significant positive relationship with demand for extension services.

1.10 Impact of farmers' involvement in maize seed multiplication programme on livelihoods in Baringo South

1.10.1 Record keeping on crop production among farmers in maize seed multiplication programme in Baringo South

Farmer limited capacity in farm record keeping is a pointer to limited numeracy and literacy level among maize seed farmers as indicated by the 8.6% and 32.8% with no formal schooling and those with only primary level education respectively. As reported by Manteaw, Akpotosu, Folitse and Mahama (2021), some of the challenges that are deterrence to efficient record keeping from the farmers point of view were inadequate formal training for farmers in record keeping and limited time to do records. with limited ability to assess the cost they incur against the earnings; a farmer may not be able to confidently evaluate his or her farm's productivity. According to International Finance Corporation [IFC], (2013), many smallholders have inadequate formal education, which hinders their ability to keep relevant written records or undertake improved agricultural practices that require some level of technical know-how. Majority of the less educated farmers only have an imprecise hint of the basic parameters like the size of the farm, yield and costs in their farms. Farmers' ability to correctly appraise the paybacks as a result of any new or improved agricultural practices in their farms is therefore reduced.

1.10.2 Farmer savings from the maize seed multiplication programme in Baringo South

Farmers limited capacity to make savings could imply that some of the farmers participating in the maize multiplication programme may not be breaking even in their production. This could further imply that the economic value of the earnings that farmers make from the venture is not sufficient to sustainably meet family needs and still remain for savings. Other studies hold contrary views, that despite the inclusion of small-scale farmers in agriculture related value chains having been profiled as a promising strategy for enhancing their livelihoods, their participation does not always translate into improved economic well-being for these farmers. Finding from this study on farmer savings ability is in tandem with a report by Ragasa, Lambrecht and Kufoalor (2017) that indicated that contractual engagements in agricultural value chains in Ghana contribute more to adoption of technologies and general productivity growth, but does not always translate to profits to farmers, suggesting limited potential for contract farming in agricultural value chains to increase incomes and reduce poverty.

1.10.3 Maize seed farmer household ability to consistently meet household needs in Baringo South

The farmer inability to consistently meet the cost of their household basic needs implies that, smallholder farmers' participation in agricultural value chains is not always a guaranteed pathway to improved livelihoods because of the multiple challenges farmers encounter in their farming ventures. Study results agrees with an observation by World Food Programme, (2023) that noted that, some of the smallholder farmers are unable to produce enough to even last them through the shortest of seasons. While some of the farmers may generate a small surplus and savings by extension, they often struggle to make a profit which is consistent with the earlier finding recorded on maize seed farmer ability to make savings where 22.1% reported being unable with another 16.1% indicating that they rarely made any saving. According to Oxfam (2018), the average income that small-scale farmers get is not adequate to assure one of a good living standard and it is even worse for female farmers who in most cases produce more and earn less.

1.10.4 Impact of losses incurred and maize seed farmers ability to consistently meet household needs

Extreme weather conditions for a number of past planting seasons have resulted in destruction of an entire crop for some of the farmers leaving them without reliable source of income, this pushes better-off farmers into poverty and the already poor households into destitution and can take them years to recover. This is consistent with findings by Kalele, Ogara, Oludhe and Onono (2021) who observed that, food scarcity, increase in food prices and decrease in availability of water are some of the farmer livelihoods components critically affected by climate change events. During the study, some farmers also reported that their yields and income were below the expected potentials because they had been experiencing challenges with diseases such as grey leaf spot, rust and smut. Such diseases escalated the cost of seed production and contributed to high probability of seed being rejected by the company for being of unacceptable quality. In rare occasions of intensified rains especially during crop harvest, farmers reported increase in post-harvest losses and exorbitant transportation costs for maize seed to drying yards further reducing farmers' income. Addressing these challenges requires targeted policies and interventions that empower smallholders, strengthen their resilience and enhance their capacity to engage effectively in value chains and realize the potential for improved livelihoods through their participation.

1.10.5 Sustainability of savings made from maize seed farming and farmers ability to consistently meet household needs in Baringo South.

Results on sustainability of maize seed farmer savings imply that, with an assured environment conducive for farming and by extension profitability in the maize seed multiplication programme, farmers will be able to adequately meet the cost of production and consistently provide their family needs through savings made. These results agree with observation by Manley and van der Velden (2022) who noted that, farmers need to earn income, more positive cash flows and a stronger balance sheet in order to achieve better livelihoods and to make the investments required to upgrade their operations or to capture even better opportunities outside of farming. Adeyanju et al., (2023) also reported that, farmer participation in agribusiness programmes positively impacted food security by 11% with the positive change being ascribed to the technical backing and regular mentorship received by farmers in addition to the effort put in skills development for young farmers. Ndlovu, Thamaga-Chitga and Ojo (2022) also added that, as the participation of households in value chain increased by one unit, the household food insecurity decreased by 2.195. Some studies hold contrary views with regard to the impact of agricultural value chains on farmer livelihoods. Gamel and Zubeiru (2023) argue that, while some formal agricultural value chains can increase farmer income through better prices and better productivity, they do not always result in food security which calls for income diversification by farmers. Guarin et al., (2022) noted that, with the new emerging trends in the growth of socially and more inclusive business approaches, small-scale farmers are often perceived as mere suppliers just working to accomplish the commitments of a contract. In such cases, these farmers are overstretched in the delivery of the required products and often have to contend with a wide range of unfulfilled household basic needs and exposure to risks that often result in increased indebtedness for the farmers.

CONCLUSIONS

Based on the study findings, the following conclusions were drawn;

- An environment conducive to maize seed multiplication programme is key to ensure farmers are able to adequately meet the cost of production and consistently sustain their livelihoods.
- The study also deduces that, for the savings made by farmers to sustainably support the household in the long term, a lot requires to be done by supporting farmers to diversity their farming ventures. This is because despite being able to make some savings, 27.5% of farmers reported that their savings were insufficient for long-term household needs like education investment for their children.
- The study also noted that the 29.7% of farmers who reported limited capacity in timely settling credit facilities incurred in their maize seed farming which could be a clear pointer that some of the farmers taking part in the programme are struggling financially to sustain production costs and hardly break-even which then limits their capacity to repay credit. This can ultimately put a farmer in cyclic state of debt which then affects their ability to adequately sustain their household livelihoods.
- During unfavourable weather conditions, farmers incur high cost of daily casual labour in grain drying process, grain spoilage, loss through theft incidents and general loss of countless man hours that could have been invested in other economic activities at household level. The study affirms that, reducing losses would play a huge part in enhancing production and safeguarding farmers' hard-earned income.
- Capacity gap exists among farmers with regard to effectiveness in record keeping (especially tracking of financial expenditures).

RECOMMENDATIONS

Based on study findings and conclusions drawn, this study recommends the following;

- To ensure farmers realize savings from the seed maize programme, the County government of Baringo needs to up their game in ensuring infrastructure (especially the rural road network) is conducive for farmers to ferry their produce to drying yards at ease to reduce the exorbitant transport and labour costs associated with the poor road network.
- Efforts to improve water resource availability and management for small-scale farmers in ASAL areas should be part of a comprehensive approach as farmers currently spend so much money on generator fuel to sustain irrigation. This limits the income that farmers earn from the programme. Promoting efficient water management practices, such as drip irrigation can help farmers make the most of limited water resources.

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