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Maize Value Chain Development for Poverty Reduction in Bungoma County, Kenya

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Abstract: **Food security exists when all people at all times have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. It entails food availability, accessibility, utilization and stability of production systems. Worldwide, food situation is such that 75% of the people lack adequate food while 47% in Kenya and 67% in Bungoma County lack sufficient food. Bungoma County has applied various agricultural extension approaches towards poverty reduction but to little avail. Consequently, the county has an average poverty index of 3.79 %, making it necessary to look for an alternative approach. The new approach should emphasize strategies that develop agricultural innovation systems, pluralism of service providers, demand-driven and innovative public-private partnerships that would enhance land productivity and increased incomes. The overall objective of this research was to establish if adopting value chain approach would enhance maize production, marketing and consumption thus enhancing poverty reduction in Bungoma County. Specifically, it established the level of poverty in the county. The study employed cross-sectional survey, descriptive and evaluation research designs. Purposive, stratified and simple random sampling strategies were used to give a study sample size of 348 from the maize value chain smallholders. Data collection instruments included archive analysis, questionnaires, focus group discussion guides, key informant interviews and observation check list. The questionnaires were pilot tested on 100 maize value chain actors in Kanduyi Sub County. Descriptive and inferential statistical analysis by Chi-Square analysis, linear regression and correlation, were used to analyse and interpret the results. The research revealed that maize value chain development was at 39% and that poverty level in the community was at 54%. The study recommended that the county should enhance development of partnerships amongst maize value chain stakeholders and development of the maize value chain for sustainable poverty reduction. Finally, the study provided additional knowledge on value chain and agribusiness development as well as groundwork knowledge for further research.**

Keywords: **Maize Value Chain, Poverty, Stakeholders, Partnerships.**

1. INTRODUCTION

World hunger situation is that 795 million people are not food secure, meaning that they are undernourished or are not able to acquire enough food to meet the daily minimum dietary energy requirements, over a period of one year [1] and [2]. Moreover, 75% of the hungry are found in the developing countries, especially, in the rural areas [3] which is a percentage that must be brought down if the MDGs and SDGs are to be achieved [4].

Studies have revealed that agribusiness and value chain approach have great potential for enhancing land productivity and increased incomes which can motivate increased food production and consumption. This is through increased inclusive growth, mitigation of prices and weather shocks, reduced post-harvest handling wastes, and increased business opportunities [5] and [6]. Nonetheless, value chain approach for agribusiness development demands continuous pursuit of new technologies and research so that collective and inclusive agricultural efficiency is enhanced by reducing wasted

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resources, saving time, and improving output [7]. All these translate into increased farm income, food availability, consumer purchasing power and improved food utilization and hence, an improved food security and standard of living [8].

Further, the release of farm manpower from farming into off-the-farm jobs through agribusiness has the basis for economic growth and development due to increased worker productivity, which in turn spurs creativity, more products and improved living [9]. In addition, value chain approach shifts focus from the activity of attracting customers to activities which are concerned with having customers, taking care of their needs and the achievement of profitability for the parties involved[7]. Moreover, while conventional agriculture focuses on intensive-type of farming where there is the application of high-input systems that offer an increased yield, agricultural value chain approach considers a set of activities, services, and products that lead to a product or service that reaches the final consumer thus promoting sustainable agriculture [10].

Although, agriculture remains the mainstay of Kenya's economic development, food security and poverty reduction are still major challenges for Kenyan Government as 47% of its rural population is not food secure [11] and [12]. Subsequently, Bungoma County like most of Kenyan counties depends on agriculture for its livelihood. It suffers from chronic and sometimes severe food insecurity (70%) and high level of well spread poverty which looms at 3.79% poverty index meaning that 53% of her population is poor [13] and [14]. It is the fourth poorest county in Kenya after Kakamega and Mandera (4.69), Turkana (4.13), and Nairobi (3.94) that have the given respective poverty indices.

Bungoma County highly depends on the maize crop for her food and livelihoods as the crop covers 95% of the land under food crop production, especially, in Tongaren, Kimilili, Mt. Elgon and Sirisia sub counties. It is one of the four counties which together produce 45% of the maize produced in Kenya. The other three counties are Narok, Uasin Gishu and Trans Nzoia [15]. Maize is the crop that determines not only the food security of the county and the Kenyan nation by extension, but also the earnings in the agricultural sector on which three quarters of the country's population is dependent for their livelihood [16] & [11].

Therefore, focusing on poverty reduction in Bungoma County is synonymous with focusing on maize and maize earnings. However, although maize production in the county has been on an upward trend over the last years increasing at an annual average rate of about 9.7% in the County, it is still not sufficient as per capita consumption is around 1.5 bags of 90kgs making the annual consumption requirement to be 3,737,690 bags, while production is at 2,962,830bags (98,761 Ha) [16]. Due to this deficit, the county has to rely on imports from neighbouring counties like Trans Nzoia, Uasin Gishu and countries like Uganda worsening the food accessibility and poverty reduction issues [16].

2. STUDY METHODOLOGY

2.1. Study Site and Population:

The study was undertaken in two Sub Counties; Sirisia and Tongaren, of Bungoma County in Kenya (Map of Bungoma County shown in Fig. 1) with the study population of 65,707 people that were composed of input suppliers, producers /farmers, transporters, processor, traders, maize value supporters and the chain enablers.

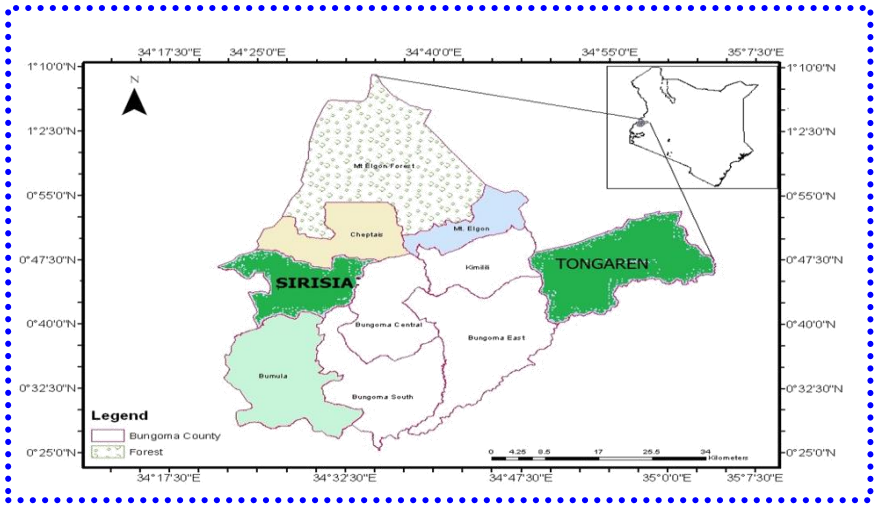

Fig.1. Map of Bungoma County: (Source: [16])

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2.2. Study Procedure:

The research methods used were secondary data collection whereby archival sources like GOK reports, journals, internet websites and books were reviewed. Primary data collection methods that included questionnaires focus group discussions (FGDs), key Informants, interviews and observations were also used to collect data from the field. They helped obtain information relevant to the research problem, specify the type of evidence needed to accurately describe and assess meaning related to an observable phenomenon. A study sample of 348 was obtained using this formula or equation; $\mathbf{n = N/1+Ne^2}$. Where n is the sample size required, N is the population size of the target value chain players in the study area and e is the level of precision (assumed to be about 0.05). Random sampling was used for large units while observation, purposive sampling and census sampling strategies were for small units.

3. RESULTS AND DISCUSSION ON DEMOGRAPHICS IN BUNGOMA COUNTY

3.1: Demographic Characteristics of the Respondents:

From the literature reviewed, it was revealed that gender, age, the level of education and occupation are the main demographic characteristics that were important to the research respondents. Therefore, researcher sought to establish the status of these characteristics by randomly and purposively sampling and interviewing respondents across the chain categories. Then the demographic characteristics were examined to see how they influenced the participation of the players in the maize value chain development.

3.1.1. Gender:

Gender percentage in each of the maize value chain category in Bungoma County was as shown in Fig. 2.

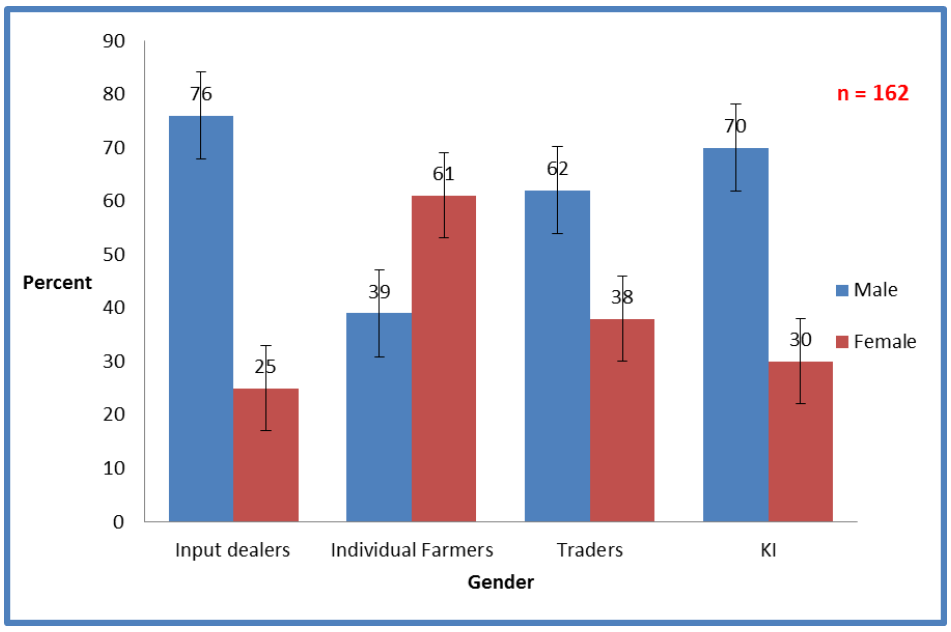

Fig.2. Gender of the maize players in Bungoma County (Source: Field Data, 2016)

Fig.2 indicates that 76% of the input dealers are mainly men against a minority of 25% women, only 39% of women actively engage in maize business and only 30% of the MVC supporters and enablers are women. Nevertheless, women are the majority at the production level (61%). This means that on average, female are only 39% of the players across the maize value chain. The non-overlapping error bars in Figure 3.1 also portray that the gender inequality amongst the maize value chain is very significant. This result was confirmed by the FGDs which revealed that most females are left out of the maize business activities except for maize production yet they are the majority of the area population. This finding affirms related literature by [16] and [17] who concur that in rural areas women are predominantly active in subsistence economy and personal requirements, whereas commercial cultivation of maize is dominated by men. Further, the finding also agrees with [18] and [19] that established that Bungoma County has a very large population that is dominantly female.

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This implies that for the maize value chain to effectively develop effort should be put into having more participation from women in the other categories of the maize value chain so that they may increase their incomes. From this revelations, it is alluded that since the county and country depend on maize and maize farming for food and livelihoods, then women must be empowered with resources, knowledge and skills in in order to effectively increase maize production and productivity.

3.1.2: Age:

The distribution of age, amongst the main value chain players in Bungoma County is as shown in Fig.3.

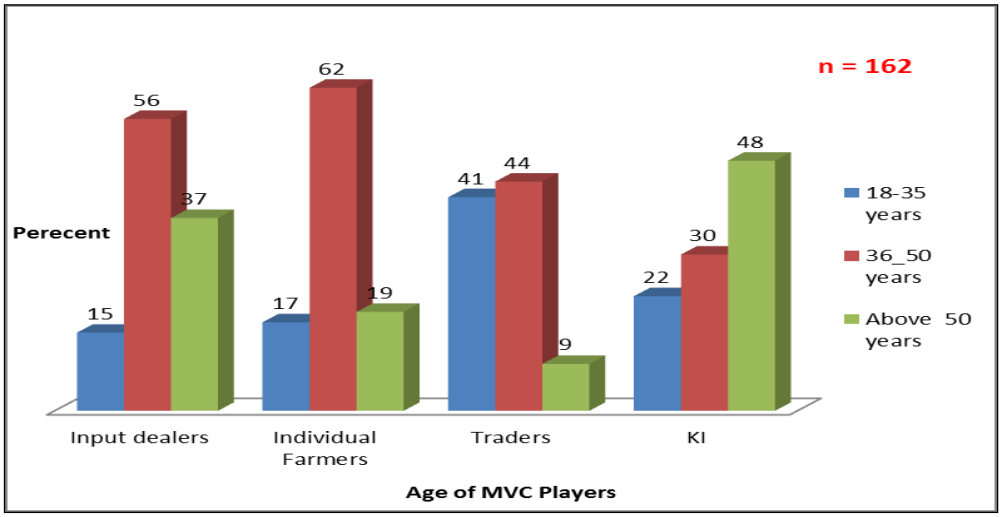

Fig.3. Age Distribution amongst the MVC Players (Source: Field Data, 2016)

In Fig.3 it is revealed that only 24% of the MVC players are youth (those between 18-35 years of age) across the various categories and that the youths in the MVC are mainly found in the maize traders' category of the chain. Figure 3.2 also shows that the majority of the MVC actors are of 36 -50 years of age, especially, in the inputs supply and production stages, while the KIs are mainly over 50 years old. The Chi-Square Test gave a value of $X^2 = 0.04$ meaning the age variation amongst the MVC players was significant at ($P < 0.05$). This means that rural businesses, especially, farming is left for those people who are mature and aging which was confirmed by the responses from the FGDs. This finding concurs with that of [20] whose study found that youth prefer white-collar jobs, and agriculture is considered as employment for poor, uneducated and old people.

3.1.3. Education Level:

The research sought to establish the level of education of the maize value chain players in Bungoma County and the findings are portrayed in Fig.4.

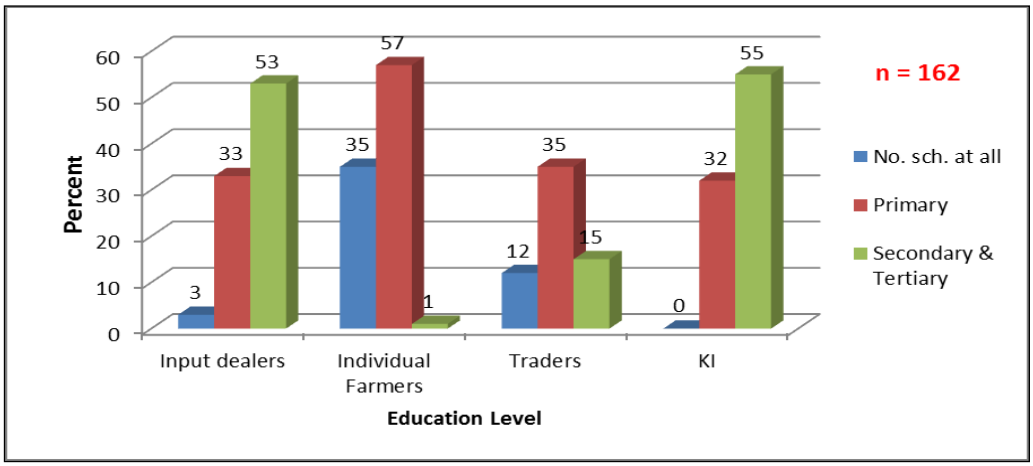

Fig.4. The Education Level of the MVC Players in Bungoma County (Source: Field Data, 2016)

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Fig.4 shows that on average, 12.5% of the MVC players have no formal schooling, 45% have at most primary level of education and 31% have at least secondary level of education. Thus, on average, 54% of the population, as it emerged from the FGDs and confirmed by KIIs, have gone up to primary education with the least educated being found at the farmers' level, which has the highest percentage of 57% having only up to primary education. The findings are also corroborated by [16] which indicate that 52% of the population in Bungoma County had at least primary education. They also agree with [14] and [18} which indicate that about 65% of the Kenyan population had at least completed primary education.

Nevertheless, according to [21], for an effective value chain development to be achieved, the actors as well as the chain supporters and enablers should be knowledgeable, informed and innovative in their areas of operation. This means that the maize value chain players in Bungoma County require training and capacity building on all aspects of the chain development.

4. RESULTS AND DISCUSSIONS ON POVERTY SITUATION

The respondents in the study were interviewed on various key issues related to poverty in endeavour to establish the poverty situation in the county. The issues quizzed about included local meaning of poverty, indicators and causes of poverty and source of livelihood in the community. The interviews were carried out per category of the respondents along the maize value chain; Agro-dealers, producers, traders, key informants (KIs,) and focus group discussions (FGDs).

4.1 What does poverty mean to the people of Bungoma County?

The study revealed that people of Bungoma define poverty as "Kumutambo" in the local language or "Umasikini" in Kiswahili, which means lacking of necessities of life like food, land, toilets, education and having no or poor housing. This general definition of poverty was more or less synonymous amongst the respondents.

4.2: Poverty Situation as seen by Farm Input Dealers

The 48 farm input dealers who were interviewed suggested that 51% (on average) of the people in the community are poor and that 87% of this people depend on maize crop for their livelihood. Fig.5 shows what the agro-dealers think as the main indicators of poverty in the community.

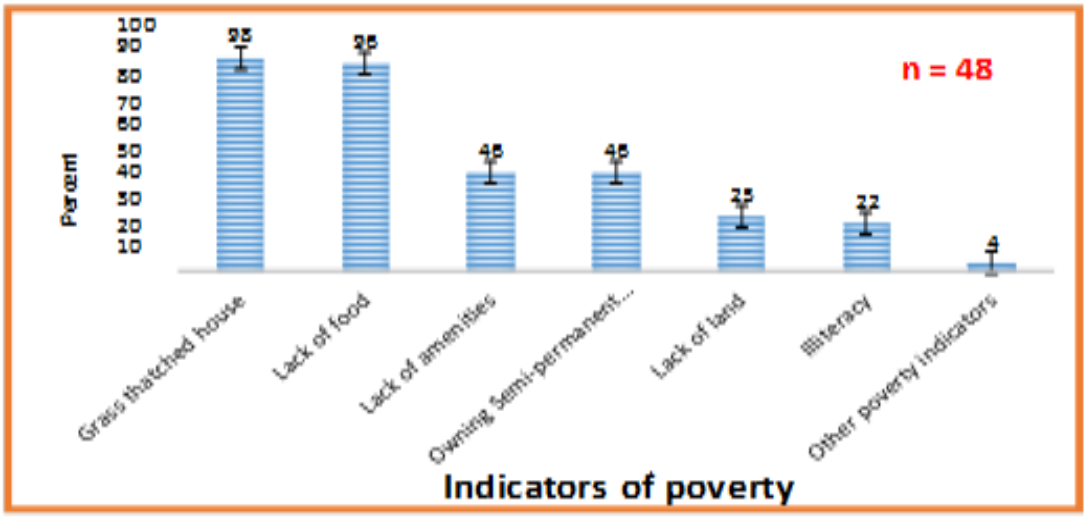

Fig.5. Indicators of Household Poverty in the Community (Source: Field Data, 2016)

Fig.5 shows that majority of the farm input dealers suggest that owning grass thatched houses and lack of food are major indicators of poverty in the region as indicated by 98% and 96% response respectively. However, it is noted that there is no significant difference between grass-thatched house and lack of food as major indicators of poverty in the community as indicated by the overlapping error bars and a one sample binomial test, $p = 0.061 > 0.05$. It was also evident that lack of amenities like water and toilets and owning semi-permanent houses are major indicators of poverty in the region as indicated by 46% and 46% response respectively. Finding on what are the causes of poverty in the study area as shown in Fig.6.

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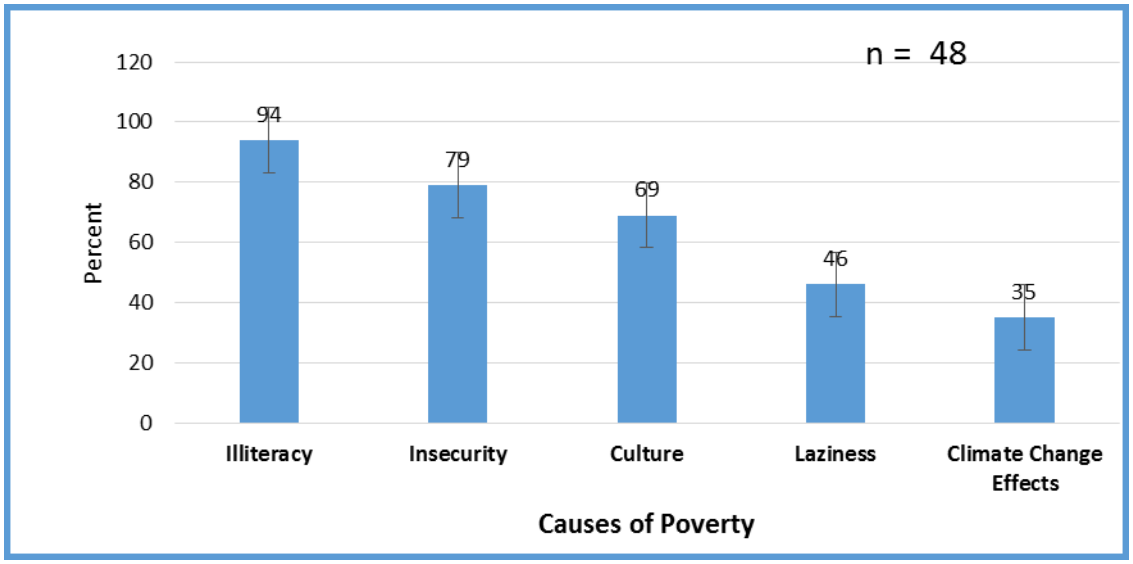

Fig.6. Causes of Poverty in the Community as per the Agro-Dealers (Source: Field Data, 2016)

Fig.6 indicates that majority of the farm input dealers think that illiteracy, insecurity and unfavorable community culture are the major causes of poverty in the region as indicated by 94%, 79% and 69% of the response. Illiteracy stands to be the main cause of poverty in the region as indicated by the Chi-Square test which showed a significant difference in the response on 'poverty' (with highest response, 94%) and 'insecurity' (second highest, 79%), (x_1^2= 9.873, p= 0.031 < 0.05). However, 96% of the farm input suppliers suggested that working together of the maize value chain players is important as it could help reduce poverty in the region by reducing insecurity and cost of operations in maize business through sharing of information and skills.

4.3. How much money does a farmer get from a maize crop?

Through the FGDs, the researcher worked out the processes, operations and costs involved in producing one acre of maize so as to establish the amount of income an average farmer gets from his/her farm. It was revealed that an average maize farmer in Bungoma County gets a net income of Kshs. 16,125 per acre at level 2 of farm management as portrayed in Table1.

TABLE 1. Gross Margin Analysis for One Acre of Maize

ITEM		UNIT	TOTAL
1. Output	1. Yield per acre	bags	18
	2. Price per bag of maize	Kshs.	2800
2. Gross output		**Kshs**	**50,400**
VARIABLE COSTS		Kshs	
4. Land preparation	Ploughing	Kshs	2,600
	Harrowing (Optional)	Kshs	2,500
5. Maize seeds 10Kg @	1800 10 kg pack	Kshs	1,800
	Planting: 2 DAP - 50kg bags @ 3000 per bag	Kshs	6,000
6.Fertilizers	Top Dressing: 1 CAN - 50kg bags@ 2400per bag	Kshs	2,400
7. Agro-chemicals	1. Type, rate and price: Thunder -100mls @ 800	Kshs	800
8. Post -Harvest	1. Hermetic gunny bags: Number & Price 10 @ 250	Kshs	2,500
Management	2. Drying Tarpaulins -	Kshs.	2,500
9. Transport of inputs			600
	Planting 10md @ Kshs. 260 per md	Kshs	2,600
	Weeding twice 10 md each @ 200 per md	Kshs	2,000
	Top dressing 3 md @ 200 per md	Kshs	600
10. Labor	Stooking 6md @ 200 Per md	Kshs	1,200
requirement	Dehusking @ Kshs. 50 Per bag	Kshs	1,800
	Shelling : @ Kshs. 50 Per bag	Kshs	900
11.Transport of maize to store @10/= / bag		Kshs	1,800
Sub-total		**Kshs**	**32,600**

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Miscellaneous costs @ 5% of sub-total	Kshs	1,675
Total variable cost (TVC)	**Kshs**	**34,275**
Gross margin per Acre (Gross output - Total variable cost)	**Kshs**	**16,125**
14% interest on WC (TVC)	Kshs	

(Source: Field Data, 2016)

Table1 shows that the cost of production per bag of maize is Kshs. 1904 while profit per bag was Kshs. 896 revealing that maize farm income is very low.

TABLE 2. Importance of Collaboration amongst MVC players

Benefits of Collaboration Amongst MVC Players	**Proportion (%) of the Input Suppliers who Agree with the given Benefit**	
	Reduces poverty	Does not reduce poverty
Facilitates sharing of information	100	0.0
Reduce cost of operations	100	0.0
Reduce insecurity	100	0.0
Time saving	86	14
AVERAGE	**96**	**4**

(Source: Field Data, 2016)

4.4. Poverty Situation as seen by Maize Traders/Transporters

34 traders and transporters were involved in the study and gave their views on what indicates poverty, what causes poverty and what is the level of poverty in the region. Their views on the indicators of poverty are as portrayed in Fig.7.

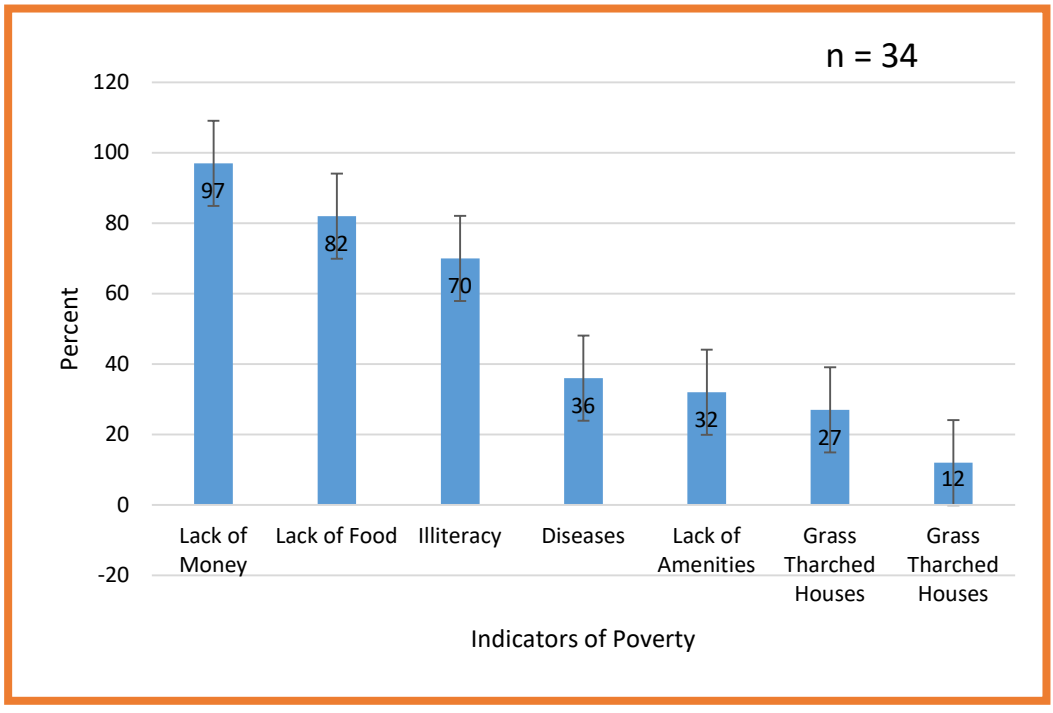

Fig.7. Indicators of household poverty in the community (Source: Field Data, 2016)

Most traders thought that lack of money, lack of food and high level of illiteracy among the people are the major indicators of poverty as indicated by 97%, 82% and 70% responses respectively as shown in Fig.7. According to traders in the region, lack of money stands to be the main indicator of poverty in the region as indicated by the Chi-Square test which showed a significant difference in the response on 'lack of money' (with highest response, 97.0%) and 'Lack of food' (second highest, 82.4%), (x_1^2= 7.98, p= 0.039 < 0.05). Causes of poverty according to the traders are as indicated in Fig.8.

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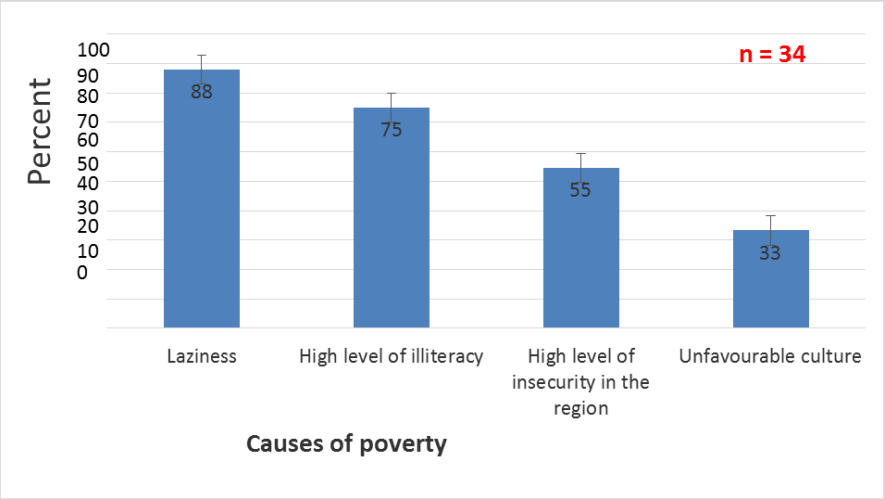

Fig. 8. Causes of poverty in the community (Source: Field Data, 2016)

According to the traders, laziness, high level of illiteracy and high level of insecurity in the region are the major causes to the high poverty in the community as indicated in Fig.8. A binomial test indicated that the causes of poverty in the community (as shown in Fig.8) differ significantly from each other at 5% significance level (p-values < 0.05). Fig.8 shows that 88% of the maize traders believe that laziness is the main cause of poverty in the region. Most traders also suggested that about 57% of the community is poor and that 84% of them depend on maize crop for their livelihood.

4.5 Poverty Situation as seen by Key Informants and FGDs:

The key informants defined poverty as "lack of basic needs to support daily life". They claimed that 54% (on average) of the people in the community are poor and that 79% of these people in the community depend on maize crop for their livelihood. Fig.9 indicates indicators of household poverty in the community as per KIs and FGDs

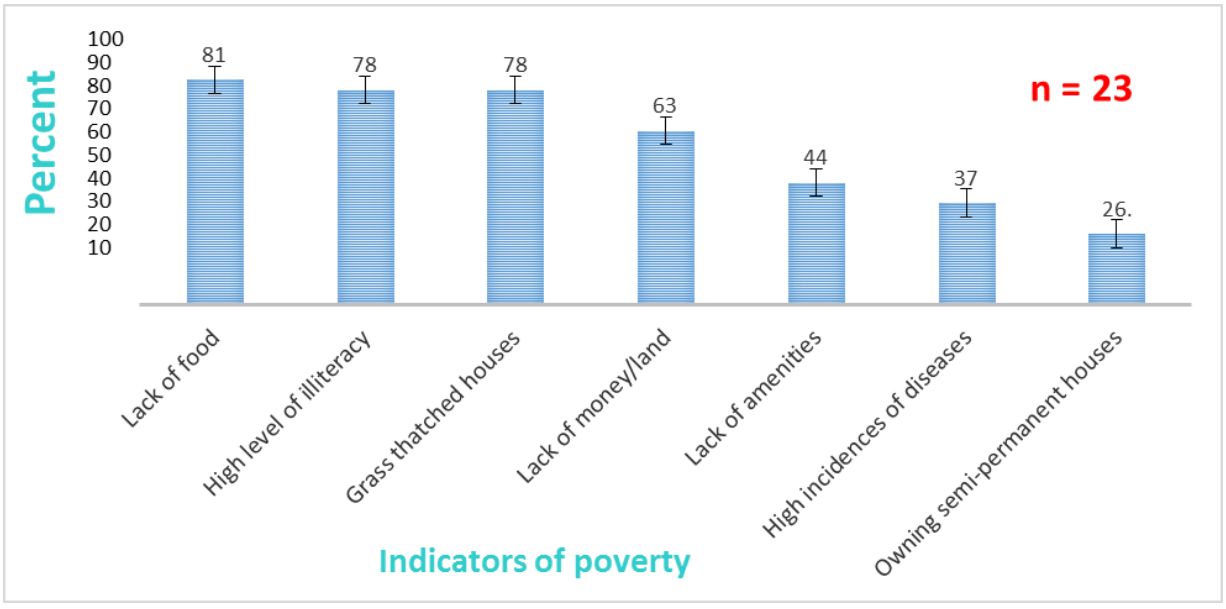

Fig.9. Indicators of household poverty in the community (Source: Field Data, 2016)

75% of the participants in the FGDs agreed that lack of food, high level of illiteracy, grass thatched houses and lack of money/land are the main indicators of poverty in the community as indicated by 81%, 78%, 78% and 63% as shown in Fig.9. This view was affirmed by 87% (20) if the KIs. Note that there is no significant difference at 5% sig. level among lack of food, High level of illiteracy and Grass-thatched houses as indicators of poverty in the community as indicated by the overlapping error bars as shown in Fig.9. This was also supported by the binomial test for each pair (p-values >0.05)

Findings on views of FGDs and KIs on the causes of poverty in the region are as portrayed in Fig.10.

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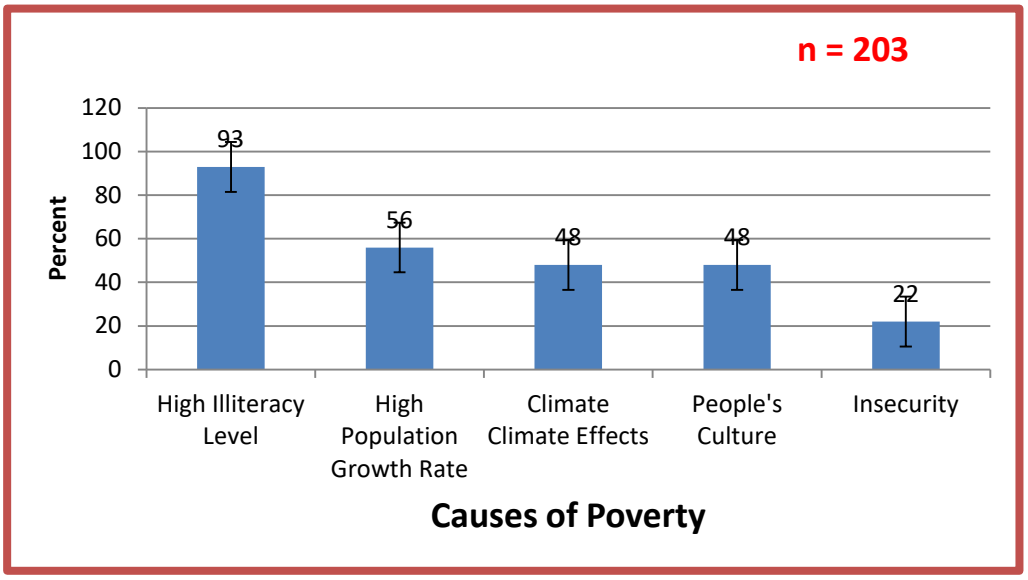

Fig.10. Causes of poverty as per FGDs and KIs (Source: Field Data, 2016)

78% of the key informants suggested that high level of illiteracy and high population growth rate among the people are the major causes of poverty in the region as indicated by 93% and 56% respective responses as shown in Fig.10. 66% of the participants in the FGDs agreed with view. 82% of the FGDs suggested that 57% (on average) of the people in the community were poor while 90% of the KIs thought that 51% of Bungoma Community is poor. This implies that poverty level in the county is at about 54%. These findings confirm the results of the study by [13] who found that the poverty level in Bungoma County was at 53% and that the main causes were high level of illiteracy and cultural practices. Moreover, the finding on population growth rate is much in line with related literature according to [16] and [18] that confirms that Bungoma County has one of the highest population growth rates in Kenya. They report a population growth rate of 3.1% that gave a population of 1, 5 52,973 (Male 758,404 Female 794,566) in 2013, a projection of 1,650,750 (Male 806,157, Female 844,593) in 2015 and 1,751,499 (Male 856,916 and Female 894,583) by 2017 the population. This is a clear indicator that for poverty to be eradicated, the people of Bungoma County need to be educated on improved ways of doing away with poverty. All the informants suggested that working together could help to eradicate poverty in the region as it facilitates sharing of information, educating each other and increases productivity.

4.6 Establishing the Poverty Level in the Region:

The study revealed that the majority of the people in the region are poor and the poverty level in the region is at about 54% as detailed in Fig.11.

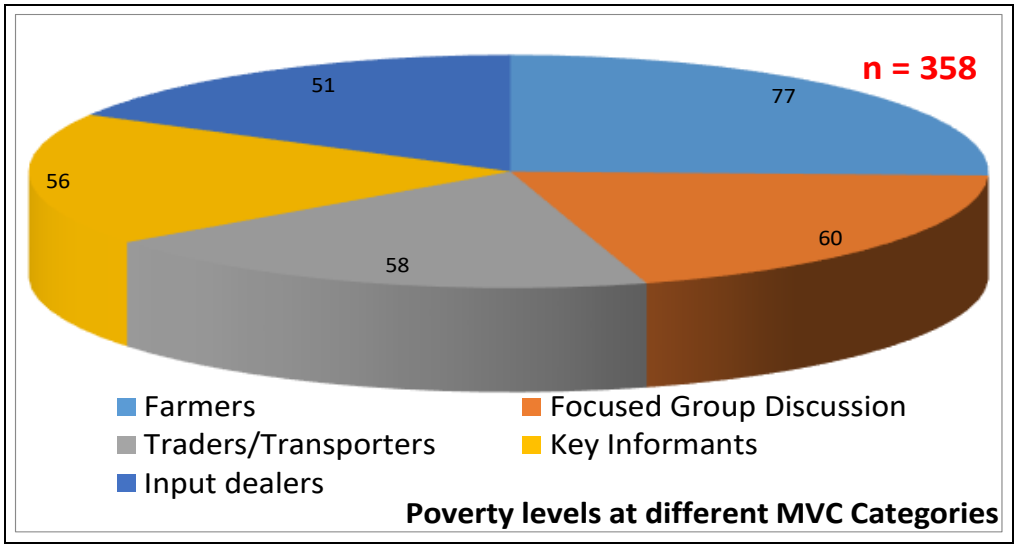

Fig.11. Poverty Level in Bungoma County (Source: Field Data, 2016)

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Figure 11 shows that out of all the categories of the maize value chain are the farmers who are most poor exhibiting a poverty level of 77%. However, the average poverty level for all the categories was revealed to be at about 54%. According to the Key Informants, lack of food was revealed to be the most significant indicator that defines the high level of poverty in the region as indicated in Fig.12.

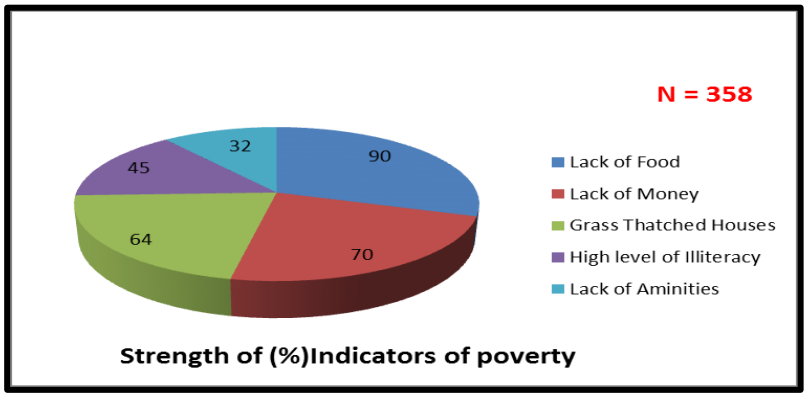

Fig.12. Ranking of Poverty Indicators in the Community (Source: Field Data, 2016)

Further analysis by the Pearson Chi-Square test indicated "lack of food") to significantly be the main indicator (with highest response, 90%) of poverty as compared to 'lack of money' (second highest, 70%), (x_1^2= 10.912, p = 0.001 < 0.05). The large proportion of the people in the community (86%) depending on maize for livelihood clearly indicates the need to increase maize production and productivity in order to reduce the high level of poverty in the region. These findings agree with the findings of [13] and [22].

4.7: Summary of findings on poverty situation:

People of Bungoma define poverty as "Kumutambo" in the local language or "Umasikini" in Kiswahili, which means lacking of necessities of life like food, land, toilets, education and having no or poor housing which agrees with [23] and [24]. On average, 88% of the respondents thought that 54% of the people in the community are poor and that 86% of this people depend on maize crop for their livelihood. It was also established that major causes of poverty in the community include illiteracy, insecurity, culture and laziness while main indicators of poverty include lack food, poor housing, illiteracy and lack of money.

5. CONCLUSIONS

Major causes of poverty in the community include illiteracy, insecurity, culture, high population growth rate and laziness while main indicators of poverty include poor housing, lack food, illiteracy and lack of money. High dependence on maize for food and livelihoods necessitates that maize production and productivity is increased in order to reduce the high level of poverty in the region. Further, there are numerous challenges that hinder efforts in the fight against reduction of poverty that must effectively be addressed. These include;

(i) Dependence on only maize as the key source of food, employment and income while maize like the rest of agriculture is vulnerable to erratic weather conditions like drought and hail stones thus worsening the poverty situation

(ii) Ineffective government policies and programmes that hamper maize value chain growth and increasing of in farm incomes

(iii) Poor overall (physical, market, communication, etc.) infrastructure that enhances poor returns from maize enterprise.

(iv) Illiteracy that leads to high percentage of unskilled labour involved in the maize value chain businesses

(v) Culture that causes people to be skeptical of diversification of foods causing food insecurity in the presence of plenty.

(vi) Gender discrimination that leaves out female gender in the mainstream of maize value chain development while they are the ones that do most of farm activities, food production and food preparation

6. RECOMMENDATION ON FOOD SECURITY SITUATION

1. Promote financial inclusion products and gender mainstreaming to encourage the resource poor chain actors to effectively participate in the maize value chain development.
2. Mobilize and sensitize smallholder farmers and other maize business actors on the need to form groups and associations that can build synergies towards increasing food availability and accessibility.
3. Small holder actors in the maize value chain to collectively lobby, source, exchange knowledge and share equitable benefits along the maize value chain.

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