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MARKET ANALYSIS FOR ALOE PRODUCTS IN SAMBURU COUNTY, KENYA

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ABSTRACT

This research article analyses the socio-economic characteristics of the local communities living in Samburu County on commercialization of Aloes and their products. This study sought identify and provide information gaps on the harvesting, processing, utilization and marketing Aloe species and their products in Samburu County. The objective of this study was to assess the current status on the harvesting, processing, utilization and marketing of Aloe species in Samburu County for enhanced biodiversity and improved livelihood. Primary data was collected using two sets of semi-structured questionnaires that were administered to 44 randomly selected households involved in harvesting, processing and marketing of Aloe products. The data was analyzed for qualitative and quantitative statistics. The findings show that majority of respondents were engaged in Aloe products harvesting and marketing.



The average age of respondents was 36 years. It was noted that respondents encountered challenges in the harvesting process such as long distances to collection and markets, insecurity due to bandits and wild animals, inadequate skills/technologies of proper harvesting and processing and high operating costs. High poverty levels coupled with lack of alternative sources of livelihood compelled the local communities to and in the exploitation of Aloe species and their products. The harvesters, processors and dealers were three main players in aloe products marketing chain in Samburu. Aloe Sap was the main primary products collected from Aloe species. The harvesters deliver their sap at a price of Ksh. 250 per 5litre (Ksh. 50 per litre) to primary processors who in turn process it to produce the Aloe bitter gum. The Aloe bitter gum is sold to large-scale dealers at a cost of Ksh. 200 per kilogram. It is recommended that the major players should be trained in propagation, harvesting and processing of Aloe products, encourage the local domestication and commercialization of aloe species, provided with technical support to women and youth groups to enhance their processing and entrepreneurial skills for improved production and marketing of basic aloe products.

Key Words: *Aloe Sap Processing, Aloe Bitter gum, Livelihood, Value Chain*

INTRODUCTION

Market strategies in developing countries are predicated on improving agricultural production, market access, market prices and integration of smallholder producers in formal market exchange. Research at both conceptual and empirical levels has shown that there exists a huge potential benefits in a market-driven production system (Barrett, 2008). Development partners make use of the market value chain concept to design community market-driven development plans and strategies. There is a growing interest in marketing and value chain analysis (Fasse *et al.*, 2009). Kaplinsky and Morris (2002) define a market value chain as the product or service conception, production, transformation and delivery to final consumers a that, until is eventually disposed after use. In Kaplinsky and Morris' approach, (2002), market value chain analysis sought to characterize how chain activities are performed and value is created and shared among chain participants. This paper sought to analyze Aloe products market chain for Samburu County, Kenya.

In this regards, the ASALs have enormous economic potential arising from non-wood forest products such as dyes, medicines, gums, resins, perfume, honey and fruits among others (Muga, 2009). At international level, the natural products offer new sources of livelihood to the population of the ASALs. Information on Aloe species population trends in East Africa is scanty since no specific studies have been undertaken in this area given that they occur in remote and isolated areas. However, the population of Aloe species continue to decline as a result of fragmentation of habitats as a result of increasing human population. The population of five commercial Aloe species continue to decline due to unsustainable exploitation practices. In Kenya, this trend has been slowed down by recent efforts to involve stakeholders in decision making and the legalization on sustainable extraction of aloes from the wild (Wabuyele & Kyalo, 2008).

Approximately 60 species of aloe naturally occur in Kenya out of which 26 are endemic. Five species namely *Aloe turkanensis*, *A. scabrifolia*, *A. secundiflora*, *A. calidophia* and *A. riva* are exploited commercially (Newton, 1987). Many local communities traditionally use the sap and leaves in treatment of various ailments such as malaria, fungal and bacterial diseases. Other uses include, rangelands rehabilitation, bee forage, wild animal feed, dry season livestock fodder,



live fence and ornamental (Mukonyi, 2003). Despite their commercial importance, all aloes except *Aloe vera* are listed on Appendix I & II of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). All Aloe species in East African are listed on Appendix II, for which trade is regulated through use of permits and certificates and in accordance with Article IV of the CITES Convention. The international trade in Aloe species and their products is subject to CITES guidelines and procedures (Teshome & Bekabil, 2014).

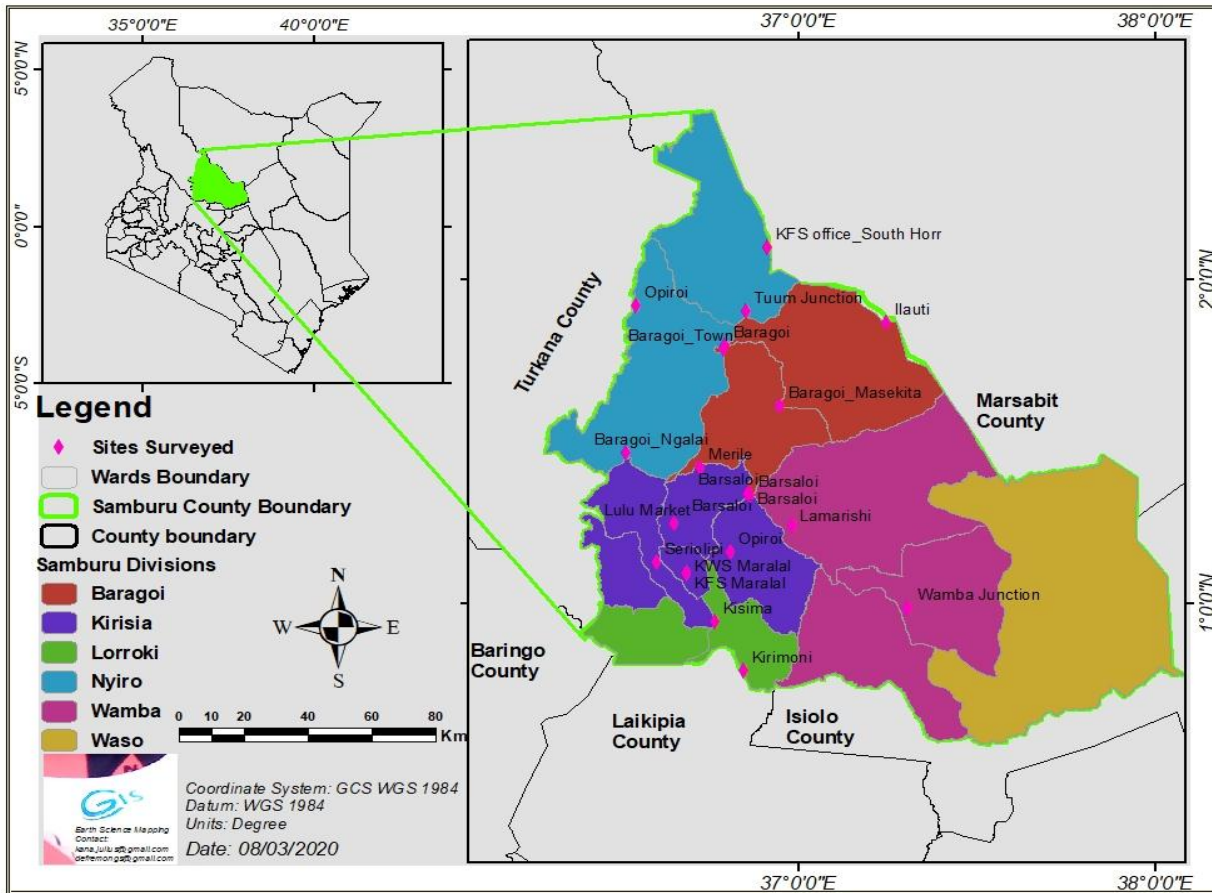
Harvesting from the wild is permissible where resource assessment has been undertaken and pre-determined quota is allowed to enhance sustainability (Mukonyi, Owuor, Chikamai & Wabuye, 2001). The Government through Vision 2030 is committed to providing an enabling environment for citizens to create wealth using local resources to achieve developed status by 2030 (Mwenda & Kibutu, 2012). *Aloe turkansensis*, *A. secundiflora*, and *A. scabriflora* are commonly exploited. *Aloe secundiflora* species is the most widespread and widely harvested and exploited for its relatively large quantities of sap (Bjora, Wabuye, Grace, Nordal & Newton, 2015). Aloe is exploited for its curative and medicinal properties. This exploitation is evident in Maralal, Baragoi and Nachola in Samburu. Commercially, Aloes are exploited for the Aloe sap and the gel which is harvested and processed for use in pharmaceutical, cosmetic and nutraceutical industries i.e. in manufacture of drugs, cosmetics and health drinks e.g. “Life Aloe vera plus”. Aloe Vera, which is exotic to Kenya, is the main source of Aloe gel (Mbuvi, Ongugo, Maua & Koech, 2007). Other common uses include preparation of traditional brew and marking farm boundaries. The potential for sustainable utilization of Aloe is enormous but remains largely unexploited due to absence of information on the resource abundance and distribution, inefficient extraction methods, limited processing technology, unclear markets coupled with low returns to producers (Mukonyi, Owuor, Chikamai & Wabuye, 2001). Therefore, the objectives of this study were to assess the harvesting, processing, utilization and marketing of Aloe species and their products and identify factors limiting the Aloe resources in Samburu County, Kenya.

RESEARCH METHODS

Study Sites

The study was conducted in Samburu County, Kenya. The county has an area of 21,022.1 sq. Km. According to the 2019 Population and Housing Census, the population of Samburu County is 310,327 with 156,774 male and 153,546 female (KNBS 2019). The main livelihood options for the population are pastoralism, 37% are agro-pastoralists, and 6.5% pursue formal employment among other livelihood options. In the pastoral livelihood zone, 50% of the population is fully nomadic while about 28% is semi-nomadic (GoK, Samburu CIDP, 2013).





Both primary and secondary datasets were collected. Desktop review was undertaken to gather secondary data while primary data was collected using two separate semi-structured questionnaires that were administered to key informants. A total of forty-four (44) respondents involved in harvesting, processing and marketing of Aloe products were randomly sampled and interviewed. Those sampled were involved in harvesting, processing and marketing of Aloe products. The data collected include personal information, household income, farming activities, utilization of wood and non-timber forest products, training in agro-forestry, aloe markets, marketing and value addition of Aloe products. The data was analyzed using SPSS computer package and Microsoft excel for descriptive statistics such as frequencies, average, etc. The result was summarized into graphs, tables, and pie charts.



RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of the Respondents

The respondent's socio-economic characteristics captured include education level, landownership method, economic activity, means of transport, respondents' age, household size, annual income, number of livestock and livestock market price (Table 2). The survey revealed that the most of the respondents had no formal education (95%) as compared to (5%) of respondents with formal education. It demonstrates that majority of the households involved in harvesting and marketing Aloe products in Samburu County were illiterate. The respondents involved in aloe harvesting and marketing had registered an average age of 37 years with and seven members per household. It was also established that the households earned an average annual income of Ksh 86,665 which is an average of 3 dollars per day.

The survey further established that land ownership in Samburu County is principally communal (95%) as compared to a few respondents with private land ownership (5%). Most of the land in the county is owned as Group Ranches. The main economic activity of the local community was livestock herding (73%) with only 27% engaging in Aloe products harvesting and marketing. Various tools and equipment were used in the Aloe sap tapping and they include pangas (64%), buckets (25%) and jembes (11%) mostly used for the aloe. This implies that harvesting of Aloe sap is still rudimentary at the household level. The livestock kept were goats, cattle and sheep with an average number of 11, 12 and 4 respectively that fetched Ksh 2,230, Ksh 1,180 and Ksh 7,125 respectively on the local markets. Transportation of people and goods was mainly foot (70%), vehicles (23%) and donkey (7%). The poor infrastructures dictated the mode of transport in use.



Table 2. Socio-Economic Characteristics of the Respondents

Socio-economic Factor	Category	% Response
Level of Education (%)	No Formal	95
	Primary Level	5
Land Ownership (%)	Communal	95
	Private	5
Economic Activity (%)	Livestock	73
	Aloe harvesting	27
Means of Transport (%)	Foot	70
	Vehicle	23
	Donkey	7
Farm Tools and Equipment (%)	Panga	64
	Buckets	25
	Jembe	11
Household characteristics	Average Age (Years)	36.72
	Household Size (Number)	6.21
	Annual Income (Ksh)	86,665
Number of Livestock	Goats	11
	Cattle	12
	Sheep	4
Livestock Sales (Ksh)	Goat	2,230
	Sheep	1,180
	Cattle	7,195

Note: n = 44

Utilization of Non-Wood Products: Aloe Products

It was established that majority of the households (95%) in the region utilized non-wood and timber products that were available in the region.



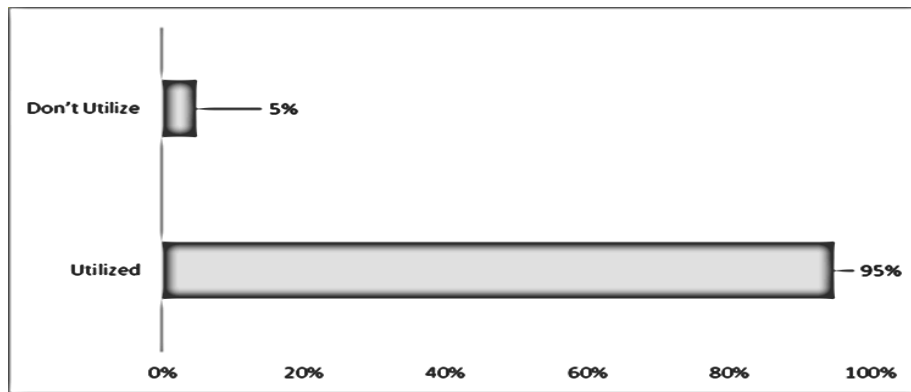


Figure 1. Utilization of Non-Wood Products

Aloes species and their products provide a secure a source of livelihood i.e. commercial and subsistence. A number of Aloe species were identified in the study area but those with commercial value included *A. secundiflora*, *A. scabrifolia*, *A. turkanensis*, *A. megalocantha* and *A. rivae* in Barasaloi, Masikta area, Baragoi, Samburu County.

Factors influencing Sap Harvesting

It was established that Aloe harvesting is influenced by seasons and large quantities was harvested during the rainy season (April-July) though of low quality as compared to the sap collected during the dry season (October –December). An average of 10 litres of sap was delivered by each household per day/week. Majority of the respondents also revealed that Aloe harvesting was influenced by prevailing markets conditions which is mostly available during the rainy season.

The survey also demonstrated that Aloe harvesting mainly carried out by women and children hence the need for men to be encouraged to participate this economic activity to improve their living standards. It was also established that an average of 1,670 litres of Aloe sap was harvested per household per annum. It was established that majority of the respondents (86%), reported that the local market price of Aloe sap per litre in Samburu County was Kshs. 50. The harvesters were paid in form of food stuffs. The tools and equipment used to harvest the sap were majorly pangas, tubes, basins and jerry cans averaging Kshs. 200 each (Figure2).



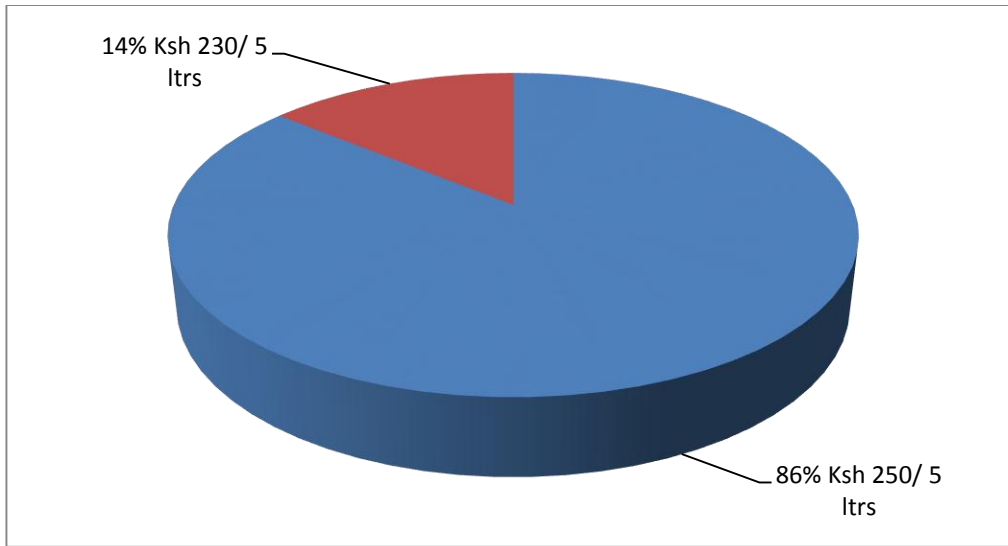


Figure 2. Market Price of Aloe sap

Harvesting process

Harvesting involved cutting of the leaves and collecting the sap in either polythene paper/tube or basin or sufuria. Sap tapping took about 30minutes. The Aloe sap was sourced from communal land (81%), and settlements (19%) (Figure 3). Harvesting of Aloe sap from communal land forced the respondents to walk long distances in search of it due to its scarcity.

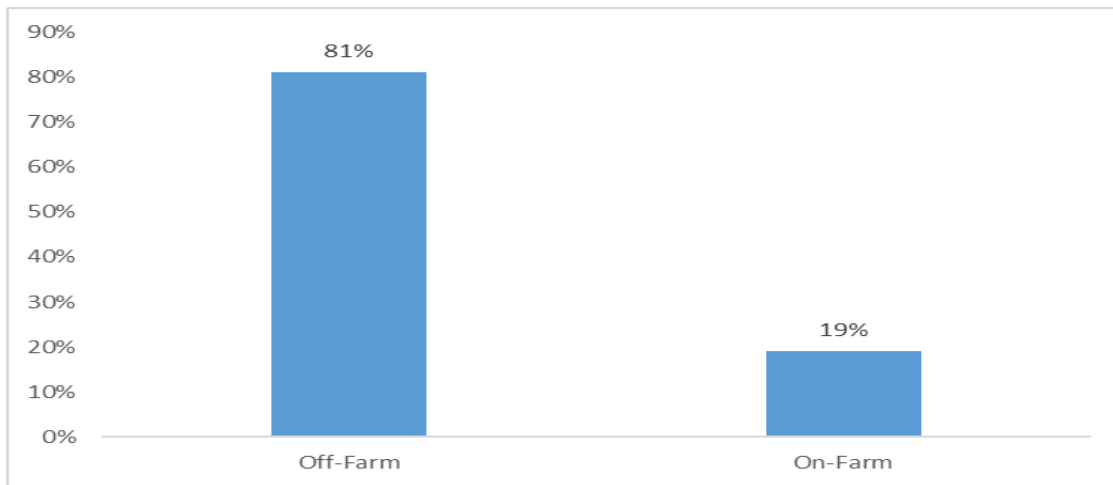


Figure 3. Sourcing of Aloe Sap



Transportation of Aloe Sap to processing centre

Walking on foot (82%) was the major mode of transporting in the area thus Aloe sap harvesters from tapping sites to selling points (figure4) whereas others used donkey (18%), Since sap was sold during market days, the collectors walk long distances with the sap for either a day or two and spend a night at the collection centre/selling point awaiting the market day to sell.

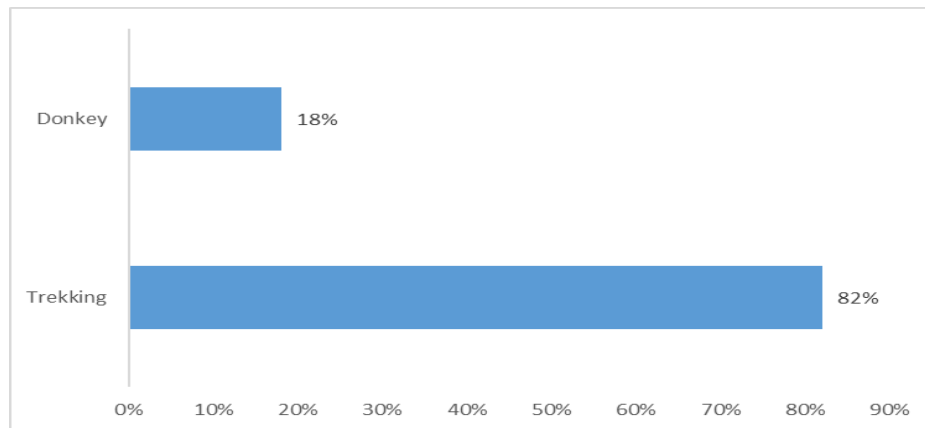


Figure 4. Mode of Transporting Aloe Sap to processing Centers

Processing of Aloe bitter gum

Aloe sap processing technology was still rudimentary considered cheap but quite wasteful. The processing was mainly conducted in the rural trading centers where Aloe populations existed and where Aloe harvesting activities were active. It was also established that availability of this boiling camps drove aloe harvesting, in the wake of the unpredictability that characterize the aloe market. Source of sap harvesting and processing points are sometime far apart. Herders use donkeys, motorcycle and vehicles to ferry the bitter gum from collection sites to the wholesalers.





Figure 5. Transportation of Aloe Sap to the Market

The participants in this process were mainly the local buying agents who buy the aloe sap from local collectors at Ksh 50 per litre and assemble it in a 200 litre drum where boiling for a period between 7 hours to 8 hours takes place although the duration depends on sap quality. The best quality with lower water content takes a shorter period to be processed. The product of boiling is a shiny blackish crystalline viscous Aloe gum (Figure 7) which is poured in a sack while still hot where it cools, stored in waterproof place ready for market.

The main Aloe sap processing tools and equipment include basins, boiling containers, sieves, spades and gunny bags. It was established that processing 250 litres of un-adulterated aloe sap produced 110 kg to 100 kg while adulterated Aloe sap produced 70kg to 90kg. The processing was being done twice a week averagely producing six (6) bags. An average of 20 ninety kilogram bags of bitter gum were produced during the rainy season (April- July) whereas 15 ninety kilogram bags was produced during the short rains (October –December) and 12 ninety kilogram bags ninety kilogram bags was produced during the (August & September) dry season (Figure 6).



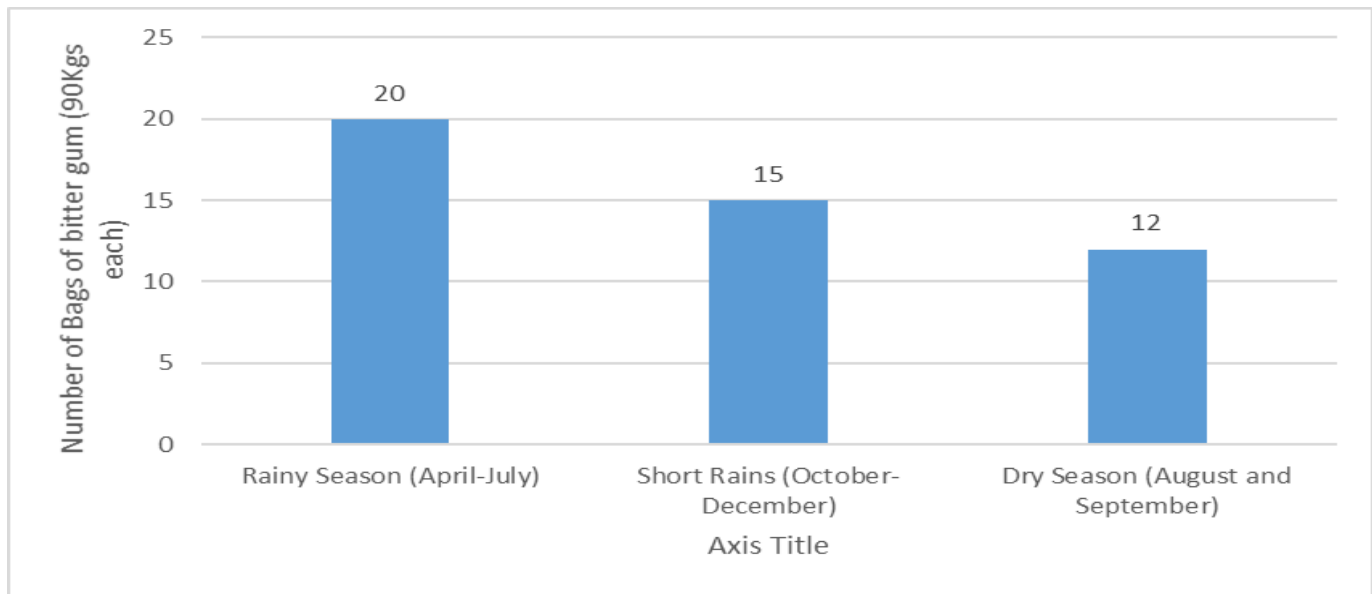


Figure 6. Processing of Aloe Bitter Gum per Season

It can be indicated that in order to produce the gum the agent is required to have firewood for Ksh 2,000 to boil 250 litres, laborer for Ksh 1,000, steel Drum (for boiling) at Ksh 2,500 two (2) plastic drum (for storage) at Ksh 2, 500, 30 Plastic 20 litre containers at 200 each and transport at Ksh 500-700 per (90kg) bag totaling to Kshs. 14,700 to process 250 litres of aloe sap to produce one bag (90kg) of aloe bitter gum (Table 3).

Table 3: 250 Litres Aloe Sap Processing Costs

Activity / Material	Cost (Ksh)
Fuel (Firewood)	2,000
Labour	1,000
Steel Drum for boiling	2,500
Storage Drums	2,500
20 Litre Containers	6,000
Transport Costs	700
Total	14,700

The respondents indicated that they had lack appropriate technologies to undertake effective value addition on aloe sap. According to Mbuvi, Ongugo, Maua and Koech (2007) who reported that there lacked technologies to add value to most of the non-wood products harvested from the ASAL areas in Kenya. This was attributed to factors such as illiteracy; lack of training and skilled personnel for up-scaling the traditional technologies, lack of adequate equipment, lack of ready markets for products especially for the processors, and lack of transport.



Marketing of Aloe products

Marketing of Aloe gum is not well structured in Samburu County. It appears the dealers who buy from middlemen know the market, operate in secrecy. This affect pricing and equitable benefit sharing therefore conservation is compromised. Mukonyi, Owuor, Chikamai and Wabuye (2001) similarly cited unclear marketing channels and low returns to producers as one of the challenges facing exploitation of this resource. The key market players are mainly women groups, retailers and consumers and the products were mainly disposed within the local market. There was no or minimal quality control and certification of Aloe products. The price for these products varied quite significant influenced by supply and demand. The individuals involved in the marketing individually undertook the promotion of their Aloe products though some had started forming networks and using good public relation skills to enhance sells.

a). Marketing of Aloe sap

There exists no marketing system for the Aloe products since the market is not well established. The collected aloe sap is sold locally to buying agents who process it into butter gum. Price of the sap is determined by the quality of the sap, adulterated sap fetched lower price (Ksh 30) as compared to high quality sap that fetched Ksh 50. It was established that respondents undertook on value addition of the tapped sap by the collectors. Market awareness by the respondents limited and the aloe sap was sold through local market such as Lulu, Barsaloi and Swari to local buying agents. It was established that prices of aloe sap had increased over the two years from Ksh 170 to Ksh 250.

Due to incidences of aloe sap adulteration, the processors have developed a simple way of determining the quality of the sap. This involves pouring a few drops of aloe sap on the ground and observing its behaviour. Evidence of percolation of sap indicates presence of water while absence of percolation indicates that the sap is pure. No incidences of addition of value to improve competitiveness of either sap or bitter were encountered among the harvesters and the processors. Moreover, no organized groups were dealing with marketing of Aloe products in the study areas.

b). Marketing of the Aloe Bitter gum

Information obtained from local community members and one wholesaler indicated that about 5-6 tones are transported to Nairobi and Mombasa per year. Aloe bitter gum market is not well established in the area. The produced Aloe bitter gum was being sold to external buying agents who transported it to Nairobi. The wholesale markets for Aloe bitters gum were located in Baragoi and Maralal. The local buying and processing agents sold their Aloe bitter gum at Ksh 200 per kilogramme. Buying agents are those who are relatively well to do and have linkages with wholesalers in Baragoi and Maralal. They own small kiosks where foodstuffs and other household goods are stocked. They usually exchange the Aloe bitter gum with supplies from wholesalers, who double up as the dealers. Assembling of Aloe sap to economically viable quantities was the main concern. Besides boiling the sap, the buying and processing agents are also concerned with developing trading links with the wholesalers. The Aloe buying and processing agents use their own transport to ferry bitter gum to wholesalers or use ad hoc means of transportation through simply taking advantage of any transporter conveniently going to points of sale or collection.



There were three main players in the aloe market and marketing chain in Samburu County. The three the harvesters, processors and wholesalers play specific roles along the marketing chain. The harvesters deliver Aloe sap to primary processors who boil the sap to produce Aloe bitter gum, which is then delivered to the wholesalers (Figure 6)

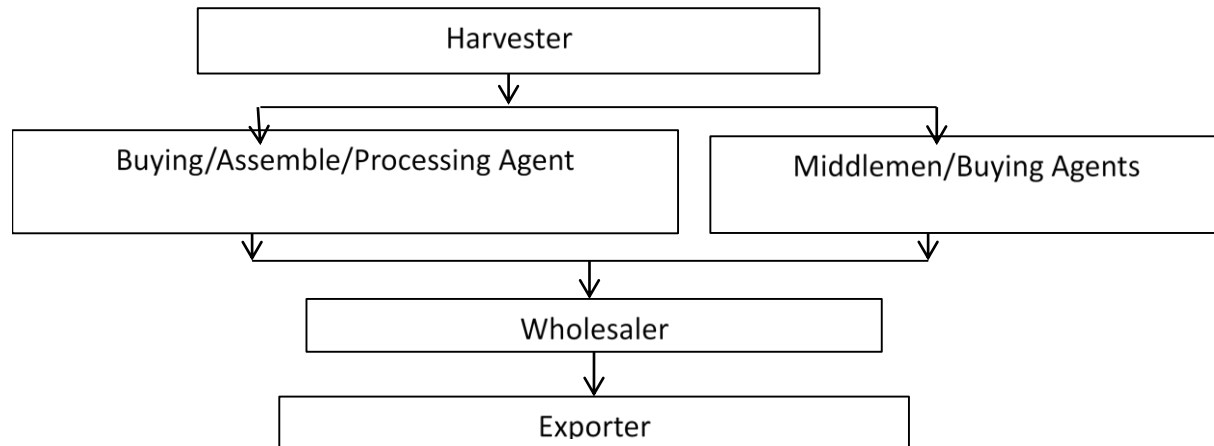


Figure 7. Aloe Product Value Chain Process

Challenges in Harvesting and Marketing of Aloe Products

The various challenges facing the of harvesting and marketing Aloe products in Samburu County include lack of market (59%), lack of training (17%), lack of transport (21%) and insecurity (3%) (Figure 7). Mukonyi, Owuor, Chikamai and Wabuye (2001) reported that the potential for sustainable Aloe utilization is enormous but remains largely unexploited due to absence of information on the resource abundance and distribution, inefficient extraction methods, limited technological knowhow in processing the products, unclear marketing channels and low returns to producers.



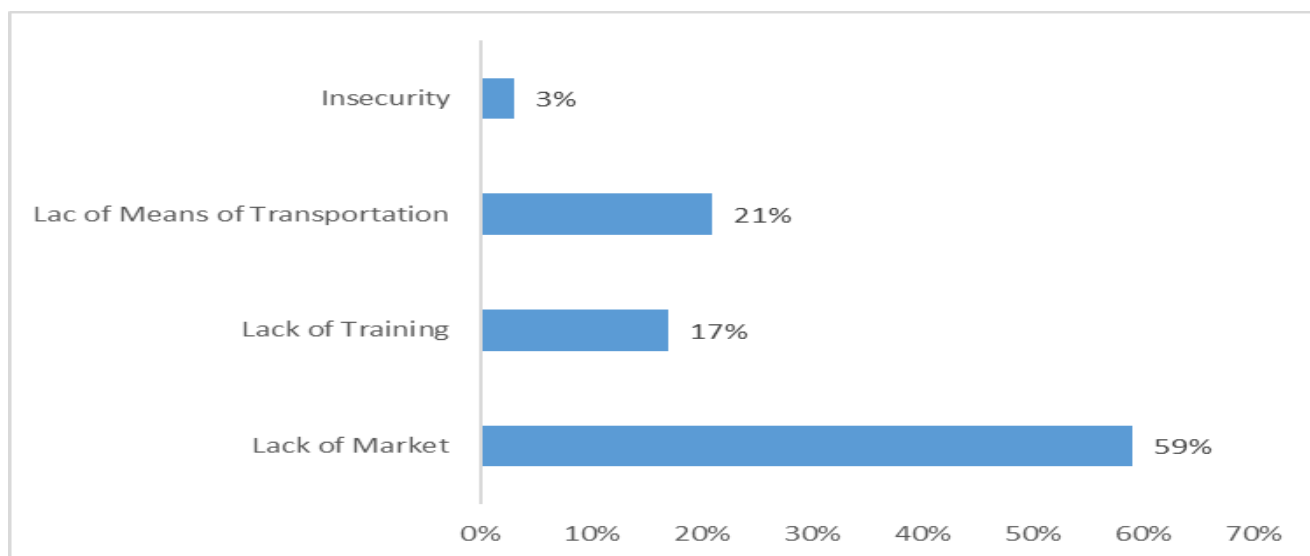
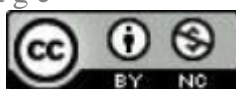


Figure 8. Challenges in Harvesting and Marketing of Aloe Products

The rudimentary technology used for processing aloe is associated with exposure to the bad odors, overexposure to heat, standing for long hours and difficulties encountered in packing the hot and viscous liquid. The processors complained of high operating costs. There is need to improve the work environment through provision appropriate technology and power supply. Consideration should be made for protective gear such as gloves and nose masks for the technicians. The marketing of Aloe bitter gum should be regulated to stabilize the prices. The other challenges include lack of proper tools and equipment, walking long distance in search of Aloe sap, Harsh environmental conditions during sourcing and harvesting of Aloe sap, inadequate water, insecurity arising from banditry and cattle rustling and wild animal attacks, poor prices for the Aloe sap, bad smell that contribute to stomach ache, inadequate market; exploitation by middlemen, adulteration of the aloe sap by the collectors, destruction of the aloe bitter gum during boiling (over boiling), and decline in the quantity of sap harvested as aloe matures.

CONCLUSION AND RECOMMENDATIONS

The unstable markets that characterize commercial aloe related activities have impacted on the pricing of aloe products. No formal and definite pricing mechanisms have been put in place. Prices for both Aloe sap and bitter gum are not constant and vary from time to time. The current players lack information on pricing of Aloe products making the business to operate in a closed and mysterious nature. There is need to improve propagation and harvesting methods and processing of Aloe products with a focus to value addition; provide technical assistance to the existing groups in Samburu i.e. community based aloe processing units, and train women and youth in processing and business skills to enable the local enterprises to gradually increase production and marketing of basic aloe products such as soaps, lotions, etc. provide better harvesting tools and equipment for easy of harvesting and organize collectors into cooperatives or producer groups



to improve on supply. Larger groups of collectors allow for efficient value-addition activities such as sorting, grading and cleaning.

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CONFLICT OF INTEREST

No potential Conflict of Interest was recorded by the author.

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