Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.6, No.8, 2015

Determinants of Choice of Marketing Outlets for African Indigenous Vegetables among the Agro-Pastoral Maasai of Narok and Kajiado Counties of Kenya

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Abstract
The Maasai of Narok and Kajiado counties have started embracing agro-pastoralism as a livelihood diversification strategy. Among the crop enterprises they have incorporated are African Indigenous Vegetables (AIVs) in a bid to take advantage of their resilience to the changing environment. Literature on market outlet choices has been thin, especially in developing countries where significant frictions make this question most salient. It is prudent to note that none of past studies identified factors affecting vegetable market outlet choices in Narok and Kajiado despite the high potential of vegetable production and marketing. However, for AIVs to be beneficial, it requires efficient marketing. An AIVs marketing analysis study was conducted in Narok and Kajiado counties to established the factors influencing the choice of AIVs marketing outlets among the agro-pastoral Maasai. Data was collected from 200 respondents using structured questionnaires. Purposive sampling method was used to select the sub counties and locations while a list from the extension offices was obtained and systematic sampling technique was used to select the households for the data collection. A multinomial logistic regression model was used to establish the factors influencing the choice of marketing outlets of AIVs. The results of the logistic regression model revealed that the choice of marketing outlet of the sampled agro-pastoral Maasai is influenced by quantity of AIVs sold, distance to the agricultural market, sex of the household, education level, household size, levels of value addition, farming experience in agro-pastoralism, off-farm income and marketing costs. In view of the research findings, it is imperative to enhance AIVs marketing in the studied areas to contribute to improved livelihoods among the agro-pastoral Maasai communities.
Keywords: Agro-pastoralism, marketing outlets, choice of marketing outlets, livelihoods

1. Background and Problem Analysis

Pastoralism worldwide is facing increasing pressures such as the effects of climate change, increasing population, decreased pastureland and increasing sedentarisation (Fratkin *et al.*, 2005). As a result, pastoralists have increasingly settled, both in response to 'pushes' away from the pastoral economies, represented by the pressures on pastoralism, and to 'pulls' of urban or agricultural life (Fratkin *et al.*, 2005). Many pastoralists have therefore been forced to look beyond pastoralism for their continued survival (OXFAM, 2008) with an increasing number of them opting for agro-pastoralism as one of the ways of coping with the adverse conditions and improving their livelihood. As a result, an increase in concerted efforts by non-governmental organizations (NGOs) to promote more adaptable enterprises such as the production of resilient crops like AIVs among the settling pastoralists has been witnessed in most affected areas.

The role AIVs can play in the livelihoods of the agro-pastoral communities cannot be underscored. In many instances, underutilized species are among the few crops that cope with harsh environments similar to those that prevail in many agro-pastoral areas (Institute of biodiversity conservation, 2010). Moreover, most agro-pastoralists growing AIVs are resource poor (Nyoro *et al.*, 2006) and therefore not able to afford more sophisticated production methods, beside lack of commercial orientation and other marketing constraints. As such, development of good production and marketing chains of AIVs would stand to play a significant role in both subsistence production and income generation among such marginalized communities (Makhoha and Obwara, 2002). Besides, renewed interest in AIVs among urban and rural consumers has seen growing market opportunities for these species to be tapped.

The growing market opportunities for AIVs can benefit agro-pastoralists only when the markets function efficiently and fairly (IFAD, 2001) since efficiency and fairness of market functions facilitate stable incomes and sustainable livelihoods among grower communities. In a properly functioning market, marketing outlets have to guarantee that consumers can buy and that producers can sell their products at reasonable prices in the market place. Although such opportunities stand to generate additional income to smallholder farmers, they still remain under exploited among most of the agro-pastoralists.

Limited market access for AIVs produced by agro-pastoral Maasai remains a major constraint to their sustainable livelihoods. The infrastructural conditions in many of the areas resided by the agro-pastoral communities limit access to markets even though high value crops are produced. Other challenges facing the

agro-pastoral Maasai include reluctance to sell their produce, inadequate access to markets due to poor infrastructure, distance to the nearest market, lack of transport and/or insecurity and illiterate producers who are cheated by traders and traders' agents, thus selling when they absolutely must (Simpkin, 2004). Most of these challenges relate to market access and have been reported to negatively affect the financial sustainability of most smallholder farmers (Nyoro *et al*., 1999) including the agro-pastoral Maasai. In order to make the agro-pastoral Maasai more adept at using the markets to their advantage, these challenges need to be addressed so that the growing market opportunities for AIVs can be fully tapped.

This paper explores the determinants of choice of marketing outlets for AIVs among the agro-pastoral Maasai in a bid to equip them with adequate marketing information in making rational decisions. The subsequent sections reviewed literature on AIVs marketing followed by the theoretical framework that was used. The methodology, results and discussion, conclusion and recommendations follows respectively.

2. Literature Review

One of the major constraints in combating poverty is the lack of market participation by smallholder agricultural households (Best *et al*., 2005). A report by FAO (2003) noted that an efficient, integrated and responsive market that is marked with good performance is of crucial importance for optimal allocation of resources and stimulating households to increase output.

Goetz (1992) studied participation of Senegalese agricultural households in grain markets. He used probit model to analyze household's discrete decision either to participate in a market or not and did a second-stage regression model to analyze the extent of market participation. Goetz (1992) too shows empirical findings that explain many households failed to participate in coarse grain markets because of marketing costs. These costs drive a wedge between the selling and purchase price, and bring in the concept of goods being non-tradable.

A study by Delgado (1995) showed that increasing household participation in markets is a key factor to lifting rural households out of poverty in African countries. Further to this, Heltberg and Tarp (2002) showed that market participation is an important strategy for poverty alleviation and food security in developing countries. Barhanu *et al.* (2013) emphasized on facilitating market participation on households as well as developing chain competitiveness and efficiency to be valuable preconditions to improve livelihoods. They further noted the urgency of farm households adjusting to rapidly changing markets, which are characterized by quality and food safety, vertical integration, standards and product traceability as well as reliability of supply. Agricultural market participation is therefore the integration of subsistence farmers into the input and output markets of agricultural products with a view to increasing their income level hence reduce poverty (Holloway and Ehui, 2002).

Gani and Adeoti (2011) analyzed market participation and rural poverty among farmers in northern part of Taraba State, Nigeria, using a logit model. Their results revealed that with the exception of training and farming experience all other explanatory variables in the model (market information, training, distance, size of output in kilograms, extension visit, and co-operative membership, farming experience, family size, education, age and gender) had positive influences on market participation of farmers as expected. The explanatory variable for distance carried a negative sign in consonance with the a priori expectation. The decision by households to participate in market in the study area was significantly influenced by the following household socio-economic variables: market information, distance, size of output, extension visit, co-operative membership, family size, and education. Conversely, training and farming experience had no significant influence on farmers' market participation. The result showed a negative sign for the explanatory variable on farming experience, which is in dissonance with a priori expectation. It might be that more mouths were being fed. More so, this variable reflected insignificance. Other studies (Holloway *et al*. 2000; Makhura 2001; Renkow *et al*. 2002; Lapar *et al.* 2003; Bellemare and Barrett 2006) have a similar view that human capital, physical capital and financial capital have significance on market participation.

Literature on market outlet choices has been thin, especially in developing countries where significant frictions make this question most salient. It is prudent to note that none of past studies identified factors affecting vegetable market outlet choices in Narok and Kajiado. Narok and Kajiado have the potential of vegetable production and marketing. In these two counties, it is common to see household choices among vegetable market outlets. The basic question to ask is on the factors influencing the choice of vegetable marketing outlet in the study areas. Giuliani and Padulosi (2005) emphasized the importance of the identification of the factors faced by households in choosing marketing outlet on realizing the millennium development goals. This study was essential in providing vital information for effective research, planning and policy formulation. It further provided an empirical basis for identifying options to increase vegetable market outlet choices among agro-pastoralists. In doing so, the study attempted to contribute to filling the knowledge gap by assessing factors affecting vegetable marketing outlet choices in the study areas.

2.1 Theoretical Framework

We base this study on the theory of rational choice also known as choice theory or rational action theory, which is a framework often used in modeling social and economic behavior. This theory assumes that farmers are rational and will rank alternative marketing outlets in order of utility. The choice of the marketing outlet was based on farmers' socio-economic characteristics and relevant factors influencing the choice entrenched in each outlet. A farmer's marketing outlet choice was conceptualized using the random utility model (RUM). RUM is particularly appropriate for modeling discrete choice decisions such as between marketing outlets because it is an indirect utility function where an individual with specific characteristics associates an average utility level with each alternative marketing outlet in a choice set. The agro-pastoral Maasai were mapped into three marketing outlets: sales to farm gate, local open-air market and brokers. The agro-pastoral Maasai farmer **i** was able to choose from a set of alternatives (j = 1, 2, 3) which provided a certain level of utility $\mathbf{U}_{ij}$ from each alternative. This model was based on the principle that the farmer will choose the outlet that will maximize his/her utility. The farmer will make a comparison on marginal benefit and cost based on the utility that will be gained by selling to a particular marketing outlet. However, it is not possible to directly observe the utilities but the choice made by the farmer revealed which marketing outlet provides the greater utility (Greene, 2002; O'sullivan *et al.* 2006). Hence, the utility was decomposed into deterministic ($\mathbf{V}_{ij}$) and random ($\boldsymbol{\varepsilon}_{ij}$) part:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Since it was not possible to observe $\boldsymbol{\varepsilon}_{ij}$ and predict exactly the choice of marketing outlet, the probability of any particular outlet choice was used in which a farmer selected a marketing outlet **j** = 1 if:

$$U_{ik} > U_{ij} \qquad \forall j \neq k \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where $\mathbf{U}_{ik}$ represents a random utility associated with the market outlet j=k, $\mathbf{V}_{ij}$ represents an index function denoting the decision maker' average utility associated with this alternative and $\boldsymbol{\varepsilon}_{ij}$ represents the random error.

3. Methodology

This study was conducted in Narok and Kajiado counties. The population of study was the agro-pastoral Maasai households in Narok and Kajiado counties with the unit of analysis being the household. Isinya sub-county in Kajiado county and Narok North sub-county in Narok county were purposively selected because of the prevalence of agro-pastoralism. One ward per sub-county was selected because of homogeneity (in terms of topography, soils, amount of rainfall received, inhabitants, etc.) of the various wards. The wards included Isinya ward in Isinya sub-county and Narok Central ward in Narok North sub-county. After the selection of the wards, a systematic sampling technique was used to select the locations and a simple random sampling technique was used to select the households for the study. In this study, the sampling frame was obtained from the respective wards extension offices.

The desired sample size of 200 households was determined using a formula by Anderson *et al.* (2007). Data for this study was collected using structured questionnaires. The questionnaires were administered to 200 respondents (agro-pastoral Maasai of Narok and Kajiado counties) using trained enumerators. The main respondent provided most of the information, but was allowed to consult other household members where necessary.

The Statistical Package for the Social Sciences (SPSS version 17.0) was used for data entry while STATA (StataSE 12) was used for data cleaning and analysis to establishing the factors influencing the choice of AIVs marketing outlets among the agro-pastoral Maasai of Narok and Kajiado counties. A multinomial logistic regression model was used in establishing the factors influencing the choice of marketing outlets for AIVs grown by the agro-pastoralists.

The developed model explains the factors influencing the choice of marketing outlet. In the model, non-market participation has been set as the baseline group (basic variable). Conceptualized selected variables are postulated to influence the choice of marketing outlet among the agro-pastoral Maasai. These are physical capital (farm size, proportion of AIVs land and agricultural market distance), human capital (sex, age, education level, household size, extension visits, value addition and farming experience in agro-pastoralism) and financial capital (farm income, off-farm income, credit access and marketing costs). However, not all of the factors in the conceptual framework are included in the econometric model due to specification problems. The empirical model used to assess the significance of the independent variables is given as:

$$\ln\left(\frac{P_{ij}}{P_{ik}}\right) = \propto + \beta_1 Sex + \beta_2 Age + \beta_3 EDL + \beta_4 HHSize + \beta_5 YrsAgropast + \beta_6 QtyAIVs + \beta_7 ExtnVisit + \beta_8 AgriMktDist + \beta_9 MktCost + \beta_{10} LvalAdd + \beta_{11} OffrmInc + \beta_{12} Crdt + \varepsilon \ldots\ldots\ldots\ldots (9)$$

The variable reflecting sex of the household was measured by assigning zero to male and one to female. Sex of the household was expected to influence the choice of marketing outlet positively. This implied that female headed households were likely to participate more in the marketing of AIVs as it is regarded as a female enterprise. Education level was also expected to influence the choice of marketing outlet. The household head

that are educated are likely to make informed decisions on the outlet to sell their AIVS based on returns because they are expected to have the capacity to access and process marketing information better than uneducated household. Age of the household head was also expected to positively influence the choice of marketing outlet. Age was identified as a major household characteristic that significantly affects the proportion of quantity of produce for the market. A study by Tshiunza *et al.* (2001) found out that young aged household heads tend to produce and sell more than older and aged household heads hence young aged household head is expected to affect the choice of marketing outlet positively. Arega *et al.* (2007) also noted that market participation declines with age. The aged were expected to sell to marketing outlets which are near their homestead unlike those who are not aged who are able to carry their AIVs to alternative marketing outlets provided the utility gained from the other outlets is higher.

Households with more members were expected to provide the manpower or family labour in the marketing of AIVs thus positively influences the choice of the marketing outlets. Such households are able to transport AIVs to the market without having to hire transport services. Years of experience in agro-pastoralism were expected to either positively or negatively influence the choice of marketing outlet. Those with more experience in agro-pastoralism were assumed to be more exposed in crop farming and by inference aware of the existence of AIVs and thus likely to participate in the marketing of AIVs unlike those with less or no experience in agro-pastoralism. The quantity of AIVs sold to the market is directly related to marketing of AIVs. The households with more quantity of AIVS are likely to participate in the various marketing outlets unlike households with less quantity of AIVs.

Access to extension services through extension visits is closely linked to information availability such as access to farming advice and knowledge through extension offices, which is considered as the most crucial source of information among agro-pastoral Maasai. Those households who are frequently visited by the extension officers or visit extension offices are more informed and likely to make informed decisions on marketing of AIVs unlike the households who are not visited nor visit extension offices. This is because extension officers can help farmers to process and interpret market information so that they can make more informed marketing decisions and exploit opportunities offering better prices for their produce. Past studies revealed that extension agent visits had direct relationship with the choice of marketing outlet (Holloway and Ehui, 2002; Rehima, 2006). Thus access to extension service is expected to positively affect the choice of AIVs marketing outlet.

Distance to the agricultural market was measured in terms of kilometers. Households which are near an agriculture produce marketing outlet are likely to market their AIVs to that marketing outlet due to low transport cost. In addition to the agricultural market distance, the condition of both road and market infrastructures are alleged to have an influence on marketing efficiency. Where the infrastructure is unavailable or poor, farmers are discouraged from using it, thereby limiting marketing of AIVs. The poor state of the roads which are found in most of the rural areas worsens during the rainy seasons. This leads to spoilages and wastages of AIVs because of unavailability or limited means of transport to reach the markets at such time. Therefore, short agricultural market distance, availability of good road and market infrastructures are expected to exert a positive influence on the choice of marketing outlet. Another variable that is directly linked to agricultural market distance is the marketing cost. Where the agricultural market distance are short, good roads and market infrastructures are available, marketing cost are likely to be low and positively influence the choice of the marketing outlet for AIVs.

The levels of value addition has been captured by the dummy values where those AIVs which have been added value at the various levels take the value of one at each level and those which have not take the value of zero. It is assumed that AIVs, which have been added value, exerts a positive impact on marketing outlet. This positive relationship is because AIVs, which have been added value, are in an improved state and more appealing to customers. Off-farm income is expected to have either a positive or negative effect on the choice of marketing outlet. Households with off-farm income are likely not to be bothered on income from AIVs thus sell to any outlet regardless of returns. On the other hand, household with no off-farm income are assumed to be more concerned on the returns from AIVs sell and will sell to the marketing outlet with higher returns. The amount of credit accessed by the household can also influence positively or negatively the choice of marketing outlet. Household with an access to credit can be able to facilitate the marketing functions of AIVs easily or even abandon marketing of AIVs in favour of other enterprises.

4. Results and Discussion

This section provides the demographic and socio-economic characteristics of the sampled households, most preferred marketing outlets of AIVs among the agro-pastoral Maasai and the model empirical results.

4.1 Demographic and Socio-economic Characteristics

The differences in the socio-economic aspects between Narok and Kajiado counties are presented which assist in

providing a comparison of the socio-economic aspects of the two counties studied. The demographic and socio-economic characteristics are important because the household head coordinates the main household activities and the head's decisions are most likely to be influenced by such aspects.

The occupational options identified in the study areas show that there are more respondents engaged in mixed farming, followed by hired workers across the counties (Table 2). The results of a chi-square test show that occupation was statistically significant (P=0.01) indicating that more respondents (51%) in Kajiado compared to 40% in Narok engaged in mixed farming. The salaried employees were only 6% in Narok compared to 20% in Kajiado. Similarly, the respondents engaged in hired work were more (54%) in Narok compared to 29% in Kajiado. The variance of the occupational options between the two counties could have been due to urbanization in Kajiado.

Table 1: Socio-economic and farm characteristics of the households

Characteristics	Mean			t-ratio	Significant (2-tailed)
	Narok	Kajiado	Overall		
Age	39.96	44.91	42.50	2.657	0.009**
Household size (above 18 years)	2.42	3.65	3.05	3.837	0.000***
Household size (Total)	7.28	7.25	7.26	-0.51	0.959
Farm size (Ha)	6.42	3.54	4.95	-3.318	0.002**
Years in agro-pastoralism	4.94	12.91	8.98	6.325	0.000***
Market distance (KM)	13.09	9.73	11.45	3.140	0.002**

*****Significance at 1%; ** Significance at 5% and * Significance at 10%**

The age of the household can be an important feature in marketing of vegetables because carrying vegetables and spending time at the market is a tedious job and requires younger members of the household who are more active and energetic besides the fact that aged members of the households lack the energy to aggressively search for more lucrative market. The mean age of the respondents as shown in Table 1 was about 40 years for Narok and 45 years for Kajiado giving an overall mean age of about 43 years. The result of a two-tailed t-test performed on the data show that age of the agro-pastoral Maasai marketing AIVs in the two study sites was statistically significant (P=0.05) indicating that the respondents in Kajiado were more elderly.

The mean household size over 18 years was about 2 members for Narok and 4 members for Kajiado (Table 1). The overall mean of the household size over 18 years for the two counties was about 3 members. The results of two-tailed t-test show that household size over 18 years was statistically significant (P=0.01) indicating that respondents in Kajiado had more household members over 18 years than Narok. However, the total household size for Narok, Kajiado and on overall was about 7 members (Table 1). The results of two-tailed t-test show that the total household size was statistically insignificant meaning there is no difference in total household size in the two counties.

The mean farm size was about 6 hectares for Narok and 4 hectares for Kajiado (Table 1). The overall mean of the farm size was about 5 hectares. The results of a two-tailed t-test performed on the data show that farm size was statistically significant (P=0.05) indicating that Narok had larger farm sizes than Kajiado which can be attributed to the fact that land in Narok county has not been subjected to extensive sub division and most of it is still owned by the community.

In terms of experience in agro-pastoralism, the mean number of years of agro-pastoralism was about 5 years for Narok county and 13 years for Kajiado county with the overall mean experience in agro-pastoralism standing at about 9 years (Table 1). The result of two-tailed t-test show that the years of experience in agro-pastoralism was statistically significant (P=0.01) indicating that Kajiado respondents were more experienced in agro-pastoralism than Narok respondents. This could probably be due to the proximity of Kajiado to Nairobi compared to Narok to Nairobi and the diminishing land sizes in Kajiado prompting the move to agro-pastoralism. The diminishing land sizes in Kajiado can also be explained by settlement of urban dwellers from Nairobi city.

The mean distance from the farmer's household to the nearest market was about 13 kilometers for Narok and 10 kilometers for Kajiado (Table 1). The overall mean distance was about 12 kilometers. The result of two-tailed t-test show that farm distance was statistically significant (P=0.05) indicating that Narok respondents are located much far from the nearest agricultural market compared to those in Kajiado. This could have been as a result of urbanization in Kajiado which has led to the establishment of agricultural markets within the small and upcoming urban centers.

Table 2: Categorical characteristics of the households marketing AIVs

Characteristics	Category	Percentage			Chi-Square	Significance
		Narok	Kajiado	Overall		
Occupation	Mixed farming	40.00	51.43	45.85	32.558[a]	0.000***
	Salaried employee	6.00	20.00	13.17		
	Hired worker	54.00	28.57	40.98		
Sex	Male	58.00	28.57	43.29	7.939[a]	0.005**
	Female	42.00	71.43	56.71		
Group membership	Yes	67.00	61.90	64.45	7.343[a]	0.007**
	No	33.00	38.10	35.50		
Road type	Tarmac	22.20	12.10	16.80	209.055[a]	0.000***
	Murram	44.60	70.80	61.80		
	No road	33.20	17.10	21.40		

*****Significance at 1%; ** Significance at 5% and * Significance at 10%**

The sex of the household head is one of the important factors that could influence AIVs marketing. Averaged across the counties, the results indicate that there were more female headed households in the studied sites. However, the result of a chi-square test on sex of the household head (Table 2) show that there was a statistical significant difference (P=0.05) on the gender of the household head between the two counties. While Narok county had about 58% of the household heads being male and 42% female, Kajiado on the other hand, had only about 29% of the household being male headed and the majority of the households (71%) having female heads.

Group membership enhances information sharing amongst the members. Those who belong to farmer groups cited that they received financial support, market information and moral support from other group members. A chi-square test analysis on group membership showed a statistical significant difference (P=0.05) among the two counties (Table 2) in favour of Narok county. While Narok had about 67% of respondents belonging to a group and 33% not in any group, about 62%, of respondents in Kajiado belonged to groups and the remaining 38% not belonging to any group. On overall, about 64% of the respondents were members of groups while 35% were not in groups.

Good physical infrastructure such as good roads is a prerequisite to market access. A chi-square analysis on road type show that the road type in the two counties was statistically significant (P=0.01) indicating that there are more kilometers of tarmac road in Narok (22%) than in Kajiado (12%). On the other hand the kilometers of murram road are more in Kajiado (71%) than in Narok (45%). The results also indicate that there are more kilometers with no road in Narok (33%) compared to Kajiado (17%).

The marital status of households is usually used to determine the stability of households in African families. The marital status of the respondents in the two counties was divided into five main groups namely married, single, widowed, separated and divorced (Table 3). About 86% of the respondents in Narok county and 85% in Kajiado county were married giving an overall mean of about 85% of all the respondents as married. This shows that AIV marketing is well accepted in the family set up as most of the AIVs marketers are married. Among the respondents, only 0.5% in Narok county and 1% in Kajiado county were divorced while single households represented about 1% in Narok, 3% in Kajiado counties and 2% on overall.

Table 3: Marital status of the households marketing AIVs

Category	Percentages		
	Narok	Kajiado	Overall
Married	86.0	84.8	85.4
Single	1.0	2.9	1.95
Widow	10	9.5	9.75
Separated	2.5	1.9	2.25
Divorced	0.5	1.0	0.75

4.2 Most Preferred Marketing Outlets of AIVs among the Agro-Pastoralist

The most preferred marketing outlets were determined using descriptive statistics. In order to provide an adept understanding of preference, this section also provides results for the AIVs marketers and non marketers. The results in Table 4 show that about 59% of the respondents in the study sites market AIVs on overall. Only 54% of the respondents from Narok market AIVs compared to 63% in Kajiado indicating that there are more marketers of AIVs in Kajiado than in Narok. and they face lower transportation costs.

Table 4: Households marketing AIVs

Category	Percentages		
	Narok	Kajiado	Overall
Yes	54.0	62.9	59.0
No	46.0	37.1	41.0

This can be attributed to the proximity of Kajiado to urban centers such as Nairobi which is a big market for AIVs. The finding of this study are in agreement with those of Dorward *et al.* (2003) and Berhanu *et al.* (2013) who also observed that farmers who are located closer to towns are more likely to market their produce compared to those who are located far away because such farmers are more familiar with the markets

The descriptive results in Table 5 show the most preferred marketing outlets. In Narok, the local open air market is the most preferred marketing outlet and was used by 78% of the respondents, followed by farm gate at 17% with the least preferred being the brokers marketing outlet at 5%. In Kajiado county, the farm gate outlet is the most preferred marketing outlet and was used by 63%, followed by open-air market at 35% with the least preferred still being the brokers marketing outlet at 2%.

Table 5: Most preferred Marketing Outlets in Narok and Kajiado Counties

Outlet	Percentages		
	Narok	Kajiado	Overall
Farm gate	16.8	63.4	40.8
Local Open-air Market	77.9	34.9	54.8
Brokers	5.3	1.7	4.4

4.2.1 Reasons for Agro-Pastoral Maasai Choice of Marketing Outlets in Narok and Kajiado counties

Results in Table 6 show that 54% of the respondents in Narok county prefer marketing their AIVs mostly to local open-air market due to immediate payment. Those preferring marketing at the local open-air market due to higher prices account for 21% and more buyers at 10%. In addition, the results also show that 29% of agro-pastoralists in Narok preferred marketing AIVs using farm gate outlet due to proximity to buyers, 26% due to low transport cost.

In Kajiado county, 43% of the agro-pastoralists prefer selling their AIVs at farm gate due to immediate payment while those preferring the farm gate marketing outlet due to proximity to buyers and low transport costs are about 22%. Results of the pooled data indicate that 46% of the agro-pastoral Maasai prefer marketing their AIVs mostly to the local open-air market due to immediate payment. Those preferring the farm gate marketing outlet due to proximity to buyers are about 26% while 18% are for low transport costs. Similarly, those preferring marketing to the brokers due to higher prices are about 18%. Omiti *et al*. (2004) found out that about 50% of the vegetables produced by farmers in Kakamega were sold at the farm gate due to high marketing cost such as transport, access payments and other local authority charges. Dastagiri *et al*. (2013) emphasized that preference of marketing outlets depends on the situation and convenience.

Table 6: Reasons for preference of a particular marketing outlet by the Agro-pastoralist

Reasons of preference	Percentages								
	Marketing Outlets								
	Narok county			Kajiado county			Overall		
	Farm Gate	Local Open-air Market	Broker	Farm Gate	Local Open-air Market	Broker	Farm Gate	Local Open-air Market	Broker
Immediate payment	36.7	54.1	31.6	42.6	38.6	36.5	39.7	46.4	34.1
Higher prices	13.2	21.0	20.7	6.1	12.3	15.8	10.8	16.7	18.3
Proximity to buyer	29.3	9.4	28.4	21.8	18.8	16.9	25.6	14.1	22.7
Low transport costs	15.5	5.2	10.6	22.4	13.6	21.6	17.8	9.4	16.1
More buyers	5.3	10.3	8.7	7.1	16.7	9.2	6.2	13.5	9.0

Reasons for the agro-pastoral Maasai not marketing their AIVs are shown in Table 7. The results show that households in Narok county do not market AIVs due to lack of knowledge (33%), AIVs being considered a female enterprise (21%), little quantity of AIVs produced (14%), perception that AIVs are not meant for sell (11%), AIVs just grow wild (7%), being far from the market (6%), lack of interest (4%), lack of market (2%)

and AIVs not having any value (2%). In Kajiado county, the reasons cited for not marketing AIVs are little quantity being produced (28%), lack of knowledge (21%), just grow wild (18%), AIVs not meant for sale (13%), considered a female enterprise (13%) and far from market (8%).

Table 7: Reasons for not marketing AIVs by the Agro-pastoralist

	Percentages		
Reason(s)	Narok county	Kajiado county	Overall
Not meant for sale	10.9	12.8	11.8
Grow wild	6.5	18.2	12.5
Little quantity produced	14.4	28.2	23.3
Lack of knowledge	33.0	20.5	26.5
No market	2.2	0	1.2
Does not have value	2.2	0	1.2
Far from market	6.0	7.7	3.5
Female enterprise	20.5	12.6	14.7
Have no interest	4.4	0	5.4

From the above results, it may be deduced that the major problem evolves around lack of knowledge among the agro-pastoral Maasai with the cited problems in Table 7 being aggravated by lack of marketing information. Schipper (2002) cited other contraints often not mentioned by farmers as lack of awareness of economic value of AIVs.

4.3 Model Empirical Results

The multinomial logistic results are presented in Table 8. The table shows the estimated coefficients (β values), significance values of independent variables in the model and the multinomial logit marginal effects for factors influencing the choice of marketing outlets. According to Gujarati (1992), the coefficient values measure the expected change in the logit for a unit change in each independent variable, all other independent variables being equal. The sign of the coefficient shows the direction of influence of the variable on the logit. It follows that a positive value indicates an increase in the likelihood that a household will change to the alternative option from the baseline group. On the other hand, a negative value shows how less likely a household will consider the alternative (Gujarati, 1992; Pundo and Fraser, 2006). Therefore, in this study, a positive value implies an increase in the likelihood of changing from not selling AIVs to selling to either or all of the alternative marketing outlets and a negative value will imply a decrease in the likelihood.

The significance values (also known as p-values) show whether a change in the independent variable significantly influences the logit at a given level and the marginal effects are the probabilities of observing a particular outcome which indicates the extent of the effect on the dependent variable caused by the predictor variables. The value of the marginal effects is obtained by differentiating the coefficients at their mean. A marginal effects value greater than one implies greater probability of variable influence on the logit and a value less than one indicates that the variable is less likely to influence the logit.

Table 8: Multinomial logit estimates and marginal effects for factors influencing the choice of marketing outlets

Explanatory variables	**Farm gate**		**Local open market**		**Brokers**	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Sex (Sex)	0.0626	-0.0682	0.6126	0.1402*	-0.4400	-0.4424
Age (Age)	-0.0047	-0.0030	0.0151	0.0043	0.7233	-0.2313
Education level (EDL)	-0.4612*	-0.1308**	0.2257	0.1160**	0.5579**	0.0869*
Household size (HHsize)	-0.0501	0.0407	-0.3883**	0.0874*	0.2594	0.9355
Years in agro-pastoralism (YrsAgropast)	-0.0418	-0.0719*	0.0210	0.0607*	0.1701	0.0105
Quantity of AIVs sold (QtyAIVs)	6.6936***	-0.1776**	2.8958	-0.1882	-0.1894	0.9400
Extension visits (ExtnVisits)	-0.0596	-0.0018	-0.0844*	-0.0125	-0.2907	0.0676
Agricultural market distance (AgrMktDist)	0.0231	-0.0045	0.0718	0.0143	-0.5018***	0.1761**
Marketing cost (MktCost)	0.0113***	0.1410**	0.0108***	-0.1111**	0.3224**	0.0677*
Level of Value addition (LvalAdd)	0.5692***	-0.1654**	0.4435**	0.0318	0.9047	0.4661
Off farm Income (OffInc)	0.0633	0.1073**	-0.7031***	-0.1788**	-.2832	-0.3243
Credit (Crdt)	-0.0886	-0.0643	0.3385	0.0927	-0.5384	-0.9997

*** Significant at 1% level; ** significant at 5% level; and * significant at 10 % level. Number of Obs = 200; LR chi2 (15) = 176.43; Prob > chi2 = 0.0000; Pseudo R2 = 0.6735; and Log likelihood = -147.98;

As shown in Table 8, some predictor variables significantly influence the choice of marketing outlets. A total of 12 independent variables were used in the model. Education level, quantity of AIVs sold, marketing cost, level of value addition and off-farm income were statistically significant (P=0.05) and years in agro-pastoralism (P=0.1) at the farm gate. The local open air marketing outlet revealed a statistical significance

(P=0.05) for education level, marketing cost and off-farm income and P=0.1 for sex, household size and years in agro-pastoralism. The variables that were found to be statistically significant at the brokers marketing outlet were agricultural marketing distance (P=0.05), educational level (P=0.1) and marketing cost (P=0.1). The signs of the estimated coefficients that were consistent with the *priori* expectation at the farm gate outlet were household size, years in agro-pastoralism, quantity of AIVs sold, marketing costs, levels of value addition, off-farm income and amount of credit accessed. Sex, age, education level, household size, years in agro-pastoralism, quantity of AIVs, agricultural market distance, level of value addition, off-farm income and amount of credit accessed were found to have consistent signs of the estimated coefficients with the *priori* expectation at the local open air market. At the broker' outlet, education level, household size, years in agro-pastoralism, quantity of AIVs, extension visits, agricultural market distance, marketing costs, level of value addition, off-farm income and amount of credit accessed were also found to have consistent signs of the estimated coefficients with the *priori* expectations. The variables that were found to have inconsistent signs of the estimated coefficients with the *priori* expectations were five at the farm gate (sex, age, education level, extension visits and agricultural market distance); two at the local open air market (extension visits and marketing cost) and two at the brokers' outlet (sex and age). The intervening factors (market environment) are where marketing of AIVs was conducted. Favorable marketing environment implied a positive effect on the choice of AIVs marketing outlet and vice versa.

At the farm gate, an increase in one KES in the marketing cost (P=0.05) and off-firm income (P=0.05) increases the likelihood of marketing at the farm gate by 14.10% and 10.73% respectively whereas an increase in additional year in education (P=0.05), one year of experience in agro-pastoralism (P=0.10), one kilogram of AIVs (P=0.05) and one level of value addition (P=0.05) decreases the likelihood by 13.08%, 7.19%, 17.76% and 16.54% respectively.

Gender change of the household head from male to female (P=0.10), an increase in one additional year in education (P=0.05), one year of experience in agro-pastoralism (P=0.10) and household size by one member (P=0.10) showed a positive effect at the local open air market by 14.02%, 11.60%, 6.07% and 8.74% respectively. On the other hand, a negative effect was caused by an increase in one KES in marketing cost (P=0.05) and off-firm income (P=0.05) by 11.11% and 17.88% respectively. An increase in one year in education (P=0.10), one kilometer to the nearest produce market (P=0.05) and one KES in the marketing cost (P=0.10) caused a positive effect on the likelihood of marketing AIVS at the brokers marketing outlet by 8.69%, 17.61% and 6.77% respectively

According to the results obtained and AIVs being regarded as female enterprise, marketing of AIVs at the local market offer an additional income to cater for the daily needs particularly to the female headed households. Bebe *et al.* (2012) noted that majority of the female are resource constrained given that they do not own critical resources such as land and livestock hence venture in AIVs marketing to obtain additional income. Nekesa and Meso (1997) and Maundu *et al.* (1999) also confirm that most AIVs traders in the local markets are females. This can further be justified by the fact that female also buy household goods alongside selling AIVs at the local open air market. Oduro *et al.* (2004) also contend that female headed households and households with more female members positively affect market participation. This finding is also in agreement with Eze *et al.* (2010) who revealed a higher women participation in rice marketing in Enugu state of Ethiopia.

The positive relationship between education level and selling at the local open air market and to brokers can be explained by the fact that these outlets have a higher marketing margin for the commonly grown AIVs and since education level comes with knowledge; farmers are able to make informed decision based on the marketing margin. The negative relationship at the farm gate marketing outlet can also be explained by the fact that farmers are getting enlightened, hence seek more lucrative marketing outlets. Shiferaw *et al.* (2009) noted the importance of education level in determining the ability to interpret marketing information on the choice of marketing outlet by farmers. These results concur with the findings of Sharma *et al.* (2009) which revealed that education level enhances the capability of farmers in making informed decisions with regard to the choice of marketing outlets to sell their farm produce. In addition Kosgey *et al.* (2004) and Kariuki *et al.* (2007) also found educated farmers to be more receptive to changes.

An increase in the household size by one member increases the likelihood of selling the AIVs at the local open air market because large households are able to produce AIVs and provide the manpower in carrying them to the markets. Besides, they sell more AIVs to obtain more income since their demand for basic needs is also higher. These findings are in agreement with Gani and Adeoti (2011), who contend that local farmers keep large family for agricultural purposes. However, Heltberg and Tarp (2002), Lapar *et al.* (2003), Randela (2005), Edmeades (2006) and Berhanu and Moti (2010) found a negative relationship between household size and market participation. This could have been so because household size increases domestic consumption requirements and may render households more risk averse. Further to this, families with more household members tend to consume more, which in turn decreases market participation.

Households with more experience in agro-pastoralism are assumed to be more exposed and venture into

commercial activities like AIVs marketing in lucrative markets like the open air markets, as experience comes with knowledge. The households with less or no experience in agro-pastoralism are assumed not likely to participate in the marketing of AIVs because they might be resistant to change and/or not aware of AIVs marketing and differences in profitability in the different marketing outlets. In addition, households with no experience in agro-pastoralism might be firmly entrenched in their traditions of pastoralism as noted by Bekure and Leeuw (1991); Little (2001); Dorward *et al.* (2003) and Mochabo *et al.* (2006). The negative relationship at the farm gate and the positive relationship at the local open air market with an increase in the number of years under agro-pastoralism can also be explained by the differences in marketing margin of the key marketing outlets. Staal *et al.* (2006) and Berhanu *et al.* (2013) also found a positive relationship of experience in dairy farming and the choice of a more profitable milk marketing outlet. This is also in agreement with Chelang'a *et al.* (2013) who also contend that experience comes with knowledge.

Quantity of AIVs sold was found to insignificantly influence the choice of marketing outlet at the local open air market and brokers' marketing outlets. The insignificant influence of quantity of AIVs sold on the choice of marketing outlet can be explained by low quantities of AIVs marketed. According to the marginal effects, an increase in one kilogram of AIVs reduces the likelihood of selling AIVs at the farm gate due to the large quantities of AIVs, which cannot be absorbed by the farm gate marketing outlet. Thus as the quantity of AIVs increases; the agro-pastoral Maasai tend to move away from the farm gate to other marketing outlets which are able to absorb the large quantities. Singh and Rai, (1998); Tsourgiannis *et al.* (2002) and Woldemichael (2008) also found the quantity of milk produced by farmers to be significant in determining the choice of milk marketing outlet.

The influence of agricultural market distance on the choice of marketing outlet was insignificant at the farm gate and local open air market. An increase in distance by one kilometer to the nearest agricultural produce market increases the likelihood of selling to the brokers outlet because as distance increases, the cost of transporting the AIVs to the alternative marketing outlet increases and thus the agro-pastoral Maasai decide to sell to brokers because the brokers cater for these cost. However, these costs are always reflected in the farmers' final price as they are deducted from the producer share. This further explains why brokers are least preferred in the study areas. Okoye *et al.* (2010), Salasya and Burger (2010) and Ohajianya and Ugochukwa (2011) also found an increase in distance to the market to increase on-farm sales and reduce sales to distant markets. Gebregziabher (2010) indicated that households located far from the market, incurred high transportation and other related costs which discouraged them from marketing in distance markets. Lapar *et al.* (2003), Bellamare and Bareth (2006), Gani and Adeoti (2011) also have the view that marketing cost often increases with long distance and poor infrastructure.

Marketing cost was found to significantly influence the likelihood of selling at the farm gate (P=0.05), local open air market (P=0.05) and brokers' (P=0.1) marketing outlets. The identified marketing costs for AIVs were mainly information, negotiation and transportation costs. The farm gate marketing outlet and selling to brokers outlets were found to have the least marketing cost thus explaining why they were positively favoured by an increase in marketing cost. The local open air market was negatively influenced by an increase in marketing cost mainly due to increase in transport costs. A study conducted by Holloway *et al.* (2000) in Ethiopia on livestock marketing found out that farmers with low transaction cost participated in markets and sold more because they were likely to recover their production and marketing costs. Holloway *et al.* (2000); Makhura (2001); Renkow *et al.* (2002); Lapar *et al.* (2003) and Balint and Wobst (2005) also found high marketing costs as a hindrance to marketing farm produce. Further to this, Dastagiri *et al.* (2013) revealed that farmers could incur low marketing cost through direct marketing.

The level of value addition significantly influences the choice of marketing outlet at the farm gate (P=0.05) but had no effect on the choice of marketing outlet at local open air market or selling to brokers. A possible explanation for this relationship is that an increase in the level of value addition improves the quality of AIVs and therefore the farmers would opt to market AIVs at the marketing outlets, which are more rewarding than at the farm gate thus protecting the agro-pastoral Maasai from exploitation by middlemen. Lack of processing strategies has been found to prevent commercialization of AIVs (Mnzava, 1997; Schippers, 2002; Mwangi and Mumbi, 2006). Shiundu and Oniang'o (2007) revealed that farmers could be protected from exploitation by middlemen through value adding processes. The identified levels of value addition in the study areas were cleaning (to remove soil and foreign matter), sorting (to remove rejects and non-marketable produce), grading (to separate AIVs of similar sizes and quality before packing), bunching (tying AIVs into bunches) and holding the vegetables in clean water to prevent them from drying.

Off-farm income was insignificant at the brokers marketing outlet. The results indicate that off-farm income influences the choice of marketing outlet at the farm gate and local open air market (P=0.05). This could be due to lack of time to go to the local open air market as they engage in off-farm activities to generate the additional KES. Jagwe (2011) also found that an increase in off-farm income decreases the likelihood of selling farm produce at the market. These results concur with those of Salasya and Burger (2010), which noted that

households with off-farm income might not be motivated in seeking higher prices for their produce at the market. Although it can be a common notion that households with off-farm income are able to facilitate marketing cost; it can also be an axiom that such households lack the motivation in marketing AIVs, which agrees with the findings of Salasya and Burger (2010).

The model empirical results also indicate insignificant influence of age, extension visits and credit on the choice of marketing outlets at the farm gate, local open air market and brokers' marketing outlets. The variables which positively influence the choice of marketing outlets provide an indication that the likelihood of selling AIVs to such marketing outlets increases with an increase in any one of the variables and vice versa. It is imperative to note that there is only enough evidence to support the influence of the significant variables, but that does not make the insignificant variables irrelevant.

5.0 Conclusion

The main objective of this study was to contribute to improved livelihoods among the agro-pastoral Maasai communities through efficient marketing of AIVs in Narok and Kajiado counties. This paper specifically focused on the factors that influence the choice of marketing outlets. Based on the outcome of the multinomial logistic regression model, the main factors that influence choice of marketing outlet by the agro-pastoral Maasai are quantity of AIVs sold, agricultural market distance, sex, education level, household size, levels of value addition, farming experience in agro-pastoralism, off-farm income and marketing costs.

5.1 Recommendations

The findings of this study point to the need for improvement of the education level of the agro-pastoral Maasai for efficient marketing of AIVs as well as increasing the quantity of AIVs sold at the most profitable marketing outlets. In addition, there is need to enhance value addition activities to improve the quality of AIVs in order to fetch higher prices. Long distance to the agricultural produce markets and poor infrastructure was noted to be a hindrance in marketing of AIVs and this study recommend the improvement of the infrastructure to enhance AIVs marketing. In addition, the County governments of Narok and Kajiado needs to consider support policies and regulation that are necessary to stimulate growth among the agro-pastoral Maasai of Narok and Kajiado counties.

5.2 Suggestions for Further Research

This study only focused on commonly grown AIVs and included selected marketing outlets despite the fact that there are many species of vegetables grouped as AIVs and several other marketing outlets. Further studies can be conducted on the other AIVs and marketing outlets not covered in this research. Similarly, the study also focused on physical, human and financial factors on the influence of the choice of AIVs marketing outlets. Further research on the influence of other factors such as economic and political factors and their influence on the choice of marketing outlets would also be beneficial.

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