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Transforming Smallholder Agriculture in Africa:  
The Role of Policy and Governance



# **Factors influencing smallholder farmers' participation in domestic high value markets for African Indigenous Vegetables in rural Kenya**

**Dorcas Anyango Jalang'o, David Jakinda Otieno and Willis-Oluoch Kosura**

*Invited paper presented at the 5th International Conference of the African Association of  
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# **Factors influencing smallholder farmers' participation in domestic high value markets for African Indigenous Vegetables in rural Kenya**

**A paper submitted for oral presentation at the 5<sup>th</sup> International Conference of the African Association of Agricultural Economists (AAAE), 26<sup>th</sup> - 29<sup>th</sup> September 2016, Addis Ababa, Ethiopia**

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## **Abstract**

Participation in high value markets holds potential for raising smallholder farmers' income and reducing poverty in the rural areas. Despite a growing literature on farmers' participation in supermarkets, there is no documented analysis of smallholder African Indigenous Vegetables (AIVs) farmers' involvement in other emerging high value domestic markets such as hospitals, schools and hotels. In order to address this critical knowledge gap, this study examined the factors that influence smallholder AIV farmers' participation in such markets in rural Kenya. Results showed that the traditional marketing system is still dominated by less than 13% of farmers selling their vegetables in high value markets. The results of the logit model show that the years of formal education, household income, price, quantity of output and access to credit had significant positive influence on smallholder farmers' participation in high value markets particularly hotels, hospitals and schools. These findings necessitate urgent policy interventions targeting investments on; access to quality farm information and skills, non-restricted credit especially from group-based informal member schemes, production methods and inputs and timely price information.

**Key words:** AIVs, smallholder farmers, high value markets, Kenya.

## 1. Introduction

AIVs are important for food and medicinal purposes. Consumption of AIVs is increasing significantly due to growing recognition of higher nutritional value (13 times more iron and 57 times more vitamins than exotic vegetables). They are also easily accessible and provide millions of consumers with healthy nutrients such as vitamins, minerals, anti-oxidants and even anti-cancer factors needed to maintain health (Abukutsa, 2006). About 60% of rural households depend on AIVs for food and income (Muhanji et al., 2011). The most popular AIVs produced and marketed in Kenya are Amaranthas, Nightshade, Spider plant, Cowpea and *Crotalaria* referred to in the various local languages as *Terere*, *Managu*, *Sergeti*, *Kunde* and *Mitoo*, respectively (Irungu et al., 2007; Maundu et al., 1999). Due to increased awareness of healthy food habits, demand for AIVs has considerably increased in both formal and informal markets (Ngugi et al., 2007). However, the supply has not kept pace with the rising demand.

The need to improve vegetable supply is more urgent considering the emergence of relatively high value markets for fresh produce in Africa. High value markets offer higher prices on comparable terms to traditional markets in the domestic arena; the most common one being supermarkets. Slightly over a decade ago, Neven and Reardon (2004), observed that supermarkets were growing at an annual rate of 18% and had gained a 20% share of urban food market. Generally, supermarkets create a reliable, fast growing, year-round market for producers and could become major contributors to the successes in African agriculture (Gabre-Madhin and Hagglade, 2003). In addition, other high value markets like hotels, schools and hospitals have also sprang up both in the rural and urban areas creating a market for suppliers of fresh produce. However, a majority of smallholders have not taken up the initiative to supply their vegetables to these high value markets. According to USAID (2013), the traditional domestic marketing system comprising mainly informal open air markets continue to dominate in all fresh produce value chains. For instance, Hagglade (2012) noted that in the domestic market, 55% of fresh fruits and vegetables produced by smallholder farmers' are sold to open air markets, while 33% to kiosks and groceries; only 4% find their way to supermarkets and other high value markets.

Previous studies on AIVs in Kenya have mainly focused on: changes in consumption patterns of AIVs among households, nutritional value of AIVs compared to exotic vegetables, AIVs seed enterprise and support system (Abukutsa, 2006; Onim and Mwaniki, 2008; AVRDC, 2010). Others have delved in the analysis of priority species of AIVs produced and marketed in (Irungu et al., 2007; Maundu et al., 1999); the contribution of AIVs to household welfare (Mwaura et al., 2013); processing and preservation methods (Ayua and Omwara, 2013; Habwe and Walingo, 2008); supermarket revolution and implications on farmers' income and welfare (Neven and Reardon, 2004; Neven et al., 2006; Rao and Qaim, 2011; Rao et al., 2012) and; the importance of group membership in accessing high value markets for AIVs and substantial difference in profits realized (Ngugi et al., 2007). However, none of these studies has explicitly analyzed the factors that influence smallholder farmers' participation in other high value

markets besides supermarkets, particularly in Kenya's domestic arena. This is the knowledge gap that the present study sought to address.

## 2. Methodology

### 2.1 Study Site and Sampling Method

The study was carried out in Siaya County in Western Kenya in April 2015. The area is characterized by high production of AIVs due to its proximity to Lake Victoria and River Yala. The area also experiences a modified equatorial climate with two rainfall seasons; annual rainfall of between 1170mm and 1450mm with relatively high temperatures ranging from 15-30°C. According to FAO (2007) AIVs thrive best in an environment with mean temperatures of not less than 15°C and not exceeding 31°C. Thus, the climatic condition in Siaya County is conducive for the production of a diversity of AIVs. However, the marketing structure of these AIVs is not well documented and there is need to examine how the AIVs value chain can be streamlined to contribute to livelihood improvement. A multistage sampling technique (Allen et al., 2002) was used to select a sample of 150 vegetable farmers. This sampling method has the rare advantage of considerably minimizing sampling errors. In the first stage, three Sub-counties; Ugenya, Bondo and Gem were purposively chosen based on evidence of intensive production and marketing of the AIVs, existence of ongoing projects to enhance the vegetable value chain and sale of vegetables by most farmers. In the second stage, smaller administrative units (divisions), where AIVs producers are concentrated were selected and farmers who sell their produce in various markets, both informal and formal were identified. Lastly, individual farmers were randomly selected and data was collected through face-to-face interviews using semi-structured questionnaires.

### 2.2 Data Analysis

The decision of whether a smallholder farmer participates in any one of the high value markets is influenced by socio-economic, institutional and farm-level factors. The probability of choice of a market channel is a random variable  $Y$  (binary choice) that takes the value of 1 when participation is observed and 0 otherwise. The logit and probit models can both be used when the choice from outcomes are two (McFadden, 1977). However, logit is preferred to probit model because it provides a closed mathematical form for underlying choice probabilities thus simplifying computation of situations (Greene, 2002). The probability that farmer  $i$  participates in high value markets can be modeled as follows.

$$Pr(Y_{ij} = Participation) = \exp(\beta X_i) / 1 + \exp(\beta X_i) \dots\dots\dots (1)$$

The subscripts  $i$  and  $j$  denote farmer and farmer participation in high value markets (1= participation, 0=otherwise), respectively. Equation (1) is the reduced form of the binary logit model. The logit model can therefore be specified as:

$$\ln(P_i/1-P_i) = Z_i = \beta_0 + \beta_1 X_{i1} \dots\dots \beta_n X_{in} + \varepsilon \dots\dots\dots (2)$$

Where:

$Z_i$  = Logit or log of odds

$P_i$  = Participation in market by the  $i$ th farmer (1)

$1-P_i$  = Non-participation by the  $i$ th farmer (0)

$\beta_0$  = a constant term

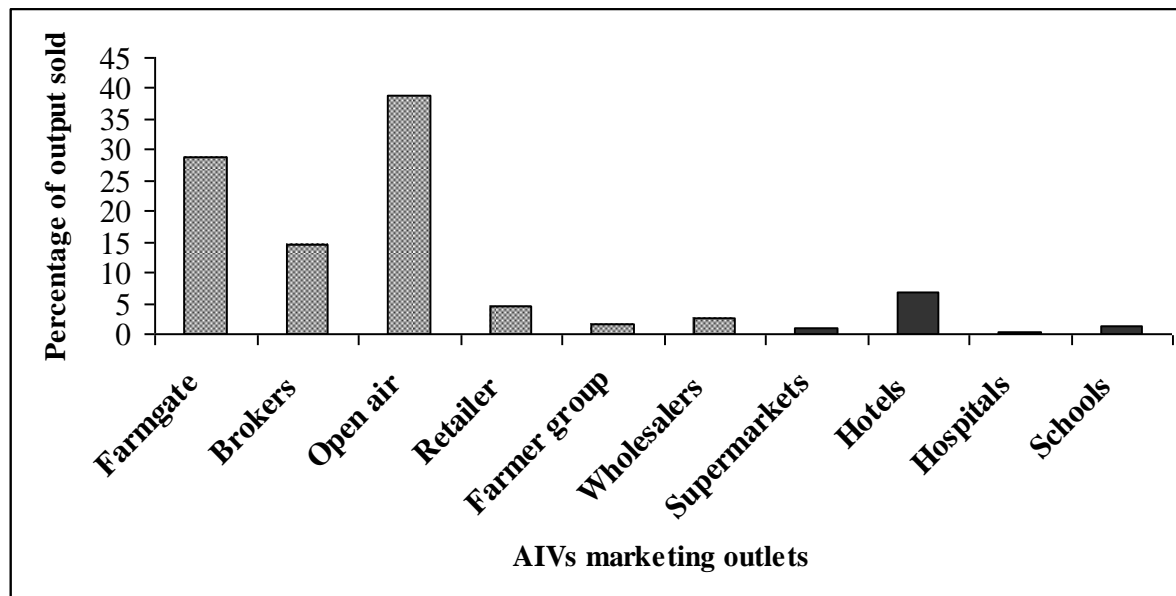
$\beta_1, \dots, \beta_n$  = estimated regression coefficients for the independent variables

$X_i, \dots, X_n$  = vector of explanatory variables for the  $i$ th farmer.

$\varepsilon$  = Error term

### 3. Results and Discussion

The study revealed that there are various marketing outlets used by smallholder farmers of AIVs as summarized in Figure 1. The preference of the marketing outlet is primarily based on the percentage of the vegetable output sold to that specific outlet.



**Figure 1: Percentage of vegetable output in sold in various marketing outlets**

The traditional marketing system is dominated with almost two fifths of farmers selling their AIVs to open-air markets. This is because of the timely and regular payment from the buyers. Moreover, it offers better prices for the vegetables compared with other traditional marketing outlets. The farm-gate accounts for almost one third of the total output sold. The farmers find the farm-gate convenient as it saves them time and transaction costs; this is because the buyers mostly collect the vegetables for themselves. There is also the aspect of familiarity/trust between the buyers and farmers as the buyers frequent the farms from time to time.

Participation in the emerging high value markets (schools, hospitals, hotels) is less than 13%. As shown in Table 1, most farmers noted that supermarkets and hotels are stricter on quality requirements than hospitals and schools. Ideally, the quality checks are on a visual basis. Some of the quality checks the vegetables go through include; no spots/holes, cleanliness of the vegetables (no dust/mud), fresh and flourishing leaves, dark green color and dry leaves (wet ones easily deteriorate). Supermarkets are keen on consistent supply of AIVs as compared to the other high value outlets. This is because they stock the vegetables three times a week irrespective of the season. The other outlets can regulate the quantities ordered during dry season. Since supermarkets offer a wide variety of fresh produce for their customers, they prefer purchasing from suppliers who sell a variety of products as it saves them time of looking for a different supplier for each produce they need.

**. Table 1: Reasons why farmers do not supply to high value outlets**

Reason	% of farmers			
	Supermarkets	Hotels	Hospitals	Schools
Strict on quality	97.3	91.2	58.8	42.3
Consistency in supply	75.8	41.6	52.7	29.3
Variety of produce	90.6	46.7	22.9	51.7
Require large quantities	98.7	96.3	96.6	95.9
Delay in payment	95.9	31.4	94.6	91.2
Contractual agreement	94.6	28.5	34.5	44.2
Long distance	85.3	32.1	45.9	21.8

For this reason, it was noted that within the study site, one of the supermarket stores (*Tuskys*) had contracted a fresh produce farm (*Shirganesh*) for all of its fresh produce supplies.

Over 90% of the farmers reported that all the high value outlets require large volumes of vegetable supply which most of them cannot supply on a regular basis. The payment systems vary across different high value markets. Supermarkets have a complex procurement system thus suppliers can be paid after 2 to 3 months of delivery. Another bottleneck in supplying supermarkets is their insistence on contractual agreements, which do not allow farmers the flexibility to benefit from temporary price premiums in alternative channels. On the other hand, schools and hospitals have shorter procurement processes but since most of them are public institutions, suppliers experience delays in payment for up to 3 or more months. Hotels are flexible with payment, and thus can pay within a week or a fortnight.

In order to provide a more nuanced perspective on the key factors influencing smallholder farmers' participation in the various high value markets, a binomial logit model was estimated. Participation in any of the alternative high value markets was considered as the dependent variable. The main determinants are presented in Table 2.

Years of schooling (*YEARSCHL*) was found to be statistically significant and positively influenced participation in high value market. The marginal effects show that an additional year in school increases probability of participating in high value markets by up to 8%. This could be because farmers who are educated are more equipped with knowledge on favorable market opportunities. They are therefore more likely to accept new ideas and innovations, hence are willing to supply their produce to high value markets. Household income (*HH\_INCOME*) was found to be positive and significant in influencing high value market participation by close to 22 %. This could be because farmers with higher income devote more of their resources to AIVs production in order to gain higher returns.

An increase in the volume produced (*OUTPUT*) increases participation 5%. This can also be explained by the fact that high value markets require consistency in supply and quantity hence farmers produce more to keep up with the standards. This is consistent with the observations of Gani and Adeoti (2011) that volume of output is motivated by the need to meet subsistence needs and generate surplus for sales and eventually earn more income. As expected, output value (*PRICE*) increases probability of selling in high value markets by slightly more than



10%. This is in concurrence with Ngugi et al. (2007) who also found that the price of vegetables supplied in high value markets was relatively higher and those farmers who supplied their vegetables made 30% more profit compared to farmers who sold in local markets.

**Table 2: Factors influencing smallholder farmers' participation in high value markets**

Variable	Co-efficient	Std. Error	p-value	Marginal effects
GEND	-0.912	0.020	0.301	-0.016
AGE	0.371	0.014	0.687	0.005
YEARSCHL	5.348**	0.045	0.017	0.074
HH_INCOME	3.487***	0.152	0.000	0.218
FARMSIZ	0.946	0.014	0.679	0.030
OUTPUT	0.115**	0.010	0.005	0.045
MARKTDIST	-1.067**	0.056	0.019	-0.057
PRICE	0.395***	0.002	0.000	0.110
EXTSERVICE	1.543	0.008	0.328	0.004
MRKTINFO	0.189	0.003	0.892	0.000
GRPMEMBERSHIP	0.005	0.000	0.910	0.000
CRDTACCESS	0.465*	0.005	0.093	0.003

*Log likelihood = -31.93; Pseudo-R<sup>2</sup> = 0.6527; LR Chi-square = 105.79; Probability > Chi square = 0.000; N = 150*

*Note: statistical significance levels: \*\*\*1%; \*\*5%; \*10%.*

Access to credit (*CRDTACCESS*) was found to be statistically significant at 10% level and positively related to high value market participation. This is because access to credit enables farmers to purchase agricultural inputs which increase production hence marketable surplus. Randela et al. (2008) agrees that access to credit has a significant impact on producers' likelihood to participate in high value markets because availability of credit reduces transaction costs both in input and output markets. Distance from the market was found to be negatively related to high value market participation. A unit increase in distance reduces the probability of participating in high value markets by about 6%. This is because longer distances entail higher transport costs. Alemu et al. (2011) concurs that the further the distance from other markets, the more the involvement of vegetable growers in open markets in the nearest centers.

#### 4. Conclusions and Policy Implications

The findings of this study suggest that like in any other fresh produce market, access to high niche AIVs markets for smallholder farmers is a great challenge. This is attributed to the stringent quality requirements that cannot be easily fulfilled by many resource-constrained smallholder farmers. The local county government should collaborate with development partners to identify possibilities for enhancing market access. In order to improve the volume and quality of vegetable output, there is need to improve farmers' access to production technologies. Though its impact on market participation is indirect, it is the only way that smallholders can compete and sustain themselves in these high value markets.

Measures that facilitate farmers to receive timely price information are plausible in order to enable farmers to maximize profits throughout the year. Credit was a crucial factor that influenced market participation hence its importance in agricultural marketing. The availability of credit especially during planting could encourage farmers to produce surplus and participate more in high value markets. This constraint can be addressed by encouraging farmers to adopt table banking concept, which relies on peer review and group membership rather than the traditional bank loans system that is dependent on the often stringent collateral requirements. This study is limited in the scope of policy application since it assessed smallholder farmers' participation in any of the alternative high value markets. More replicable and channel specific insights would be obtained through further studies that isolate the determinants of potential participation in each of the selected emerging high value markets; hospitals, hotels and schools.

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