

## **Level of Knowledge on Quality Standards of High Value Markets in Kenya among Indigenous Vegetable Women Farmers in Kakamega County**

**Annah Indeche<sup>1\*</sup>, Albert Obeng Mensah<sup>2</sup>, Festus Annor-Frempong<sup>2</sup>**

<sup>1</sup>Faculty of Agriculture, Department of Horticulture, Jomo Kenyatta University of Agriculture and Technology, PO box 62000-00200, Nairobi, Kenya

<sup>2</sup>College of Agriculture and Natural Sciences, Department of Agricultural Economics and Extension, University of Cape Coast, Ghana

\* Corresponding author E-mail: [indecheannah@gmail.com](mailto:indecheannah@gmail.com)

### **Abstract**

African indigenous vegetable (AIV) farmers have limited information in the areas for training and readiness to access and produce vegetables to satisfy the growing demands by retailers in Kenya. This study assessed the level of knowledge among women AIV farmers in Kakamega County to satisfy quality standards for high value markets (HVMs). Descriptive survey design, multistage sampling technique and interview schedule were used to collect data from 276 farmers. The study revealed that farmers had low knowledge on quality standards especially the transaction attributes. The public extension was the main source of information. The study recommends among others that the Ministry of Agriculture train farmers on AIV production and marketing and develop trade policy to ensure that retailers purchase vegetables from certified local farmers.

**Keywords:** Knowledge, Women farmers, African indigenous vegetables, quality standards, high value markets

## 1. Background information

African Indigenous Vegetables (AIVs) as defined by Maundu, Achigan-Dako and Morimoto (2009) are vegetables that have their natural habitat in SSA and are a part of the food culture in the subcontinent. According to Mnzava and Chweya (1997), AIVs are highly nutritious as they contain high levels of minerals such as calcium, iron and phosphorous. In addition, some contain significant amounts of vitamins and proteins. Studies have shown that for these nutritional potential to be realised, factors such as stage of growth of the vegetable, storage, cooking and processing must be considered as nutrient losses can occur (Abukutsa-Onyango, 2007; Makokha&Ombwara, 2002; Muchoki, Imungi, Jasper & Lamuka, 2005).

According to Johns and Sthapit (2004), countries that retain indigenous vegetable diets are much less likely to be affected by cardiovascular diseases, diabetes and other adverse consequences of nutrition in transition. AIVs also have socio cultural value. Among the Luo of Nyanza Region, a commonly used phrase stressing the importance of AIVs is “*alot ma ochaematiekokuon*” –translated literally as “the despised potherb is what relishes the corn cake”; this saying promotes the value of leafy vegetables relative to other dishes. It is translated as: “a thing that is despised might become respected” (Ocholla-Ayayo, 1976 as cited in Owuor&Olaimer-Anyara, 2007). A leafy vegetable with a bitter taste was commonly associated with medicine while one with a sour taste was associated with food. By virtue of their significance, AIVs enhance human capabilities and widen human nutrition, cultural rituals, environmental adoption and socializing choices (Malla&Chhetri, 2009). There are obvious cultural differences in the way vegetables are prepared and consumed. In some regions, average daily consumption of vegetables is as high as 64g per person or about 5.4 % of the weight of all the foodstuffs consumed. According to Smith and Eyzaguirre (2005), Community women’s groups, women’s cooperative groups and other women’s social groups would be valuable assets in recipe development projects aimed at show-casing AIVs. Smith and Eyzaguirre (2005) noted that even though drying has been an African way of processing leafy vegetables to make them available during periods of shortages and is one solution to the problem of perishability, it does not satisfy the needs of a large population of consumers, particularly urban dwellers who prefer freshly harvested vegetables. Shitanda and Wanjala (2006) in investigating the effect of different drying methods on the quality of jute mallow (*Corchorusolitorius*) an AIV, found that freeze drying was the best drying method but acknowledged that freeze drying is an expensive method. Marketing of AIVs is such that the farm women harvest, pack and transfer the vegetables to the buying point nearest to their farms, usually by a roadside. Pre-bundled, fresh, succulent vegetables represent a market advantage due to quality of presentation (Nekesa&Meso, 1995). The demand for high value products in both developed and developing countries is rising rapidly. This is because as incomes increase, consumers adopt more diverse diets. These products are typically perishable, they are increasingly sold through specialized markets, and the product price is highly sensitive to variations in quality. Supermarkets have had a major effect on the marketing of AIVs in Kenya.

In Kenya, the production, processing and marketing of indigenous vegetables are done mainly by women, hence women are said to dominate in most of the AIV activities (Gotor&Irungu, 2010). In the Western Region of Kenya where Kakamega County is located, AIVs have been grown since time immemorial for subsistence purposes and are considered as a “women’s” crop (Gotor&Irungu, 2010; Oniango, Grum&Obel-Lawson, 2008) without much economic importance. On the contrary, in Central Kenya, AIVs are grown mainly for commercial purposes since they do not form an integral part of the people’s diet and have been found to improve household wellbeing (Gotor&Irungu, 2010; Mwaura, Muluvi&Mathenge, 2013; Ngugi, et al., 2006). The huge potential of AIVs transforming

farmers' livelihoods in Kakamega as it has done for the AIV farmers in Central Kenya has not been fully exploited. According to KNBS (2010), 57% of the people in Kakamega County live below the poverty line. Consumers are becoming more sensitive to sanitary and phytosanitary aspects of fresh produce (Ngigi et al., 2011). This is exerting pressure on existing high value markets for AIVs to impose stringent conditions on quality of the produce purchased from farmers. For example, the retail outlets demand specific standards for leaf size and appearance. Further, checks to ensure that the zero tolerance residue level of chemicals allowed in the vegetables is not exceeded are done. The retailers also demand consistency in supply and prefer to deal with groups rather than individual farmers so as to cut on transaction costs (Ngugi et al., 2006). The growing demands of the retailers have given rise to the need to train AIV farmers to produce vegetables to satisfy the demanded specifications and access the high value markets. The aim of this study therefore was to determine the level of knowledge on quality standards and market demands set by high value markets among women AIV farmers in Kakamega County, Kenya

## ***1.1 Theoretical framework***

### ***1.1.1 The Diffusion of innovations Theory (Rogers, 2003)***

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas. An innovation, simply put, is "an idea perceived as new by the individual." An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. The four main elements in the diffusion of new ideas are: (1) The innovation (2) Communication channels (3) Time (4) The social system (context). The characteristics which determine an innovation's rate of adoption are: (1) Relative advantage (2) Compatibility (3) Complexity (4) Trialability (5) Observability to those people within the social system.

Most individuals evaluate an innovation, not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation. One of the ways in which the time dimension is involved in diffusion is in the innovation-decision process. The innovation decision process is the mental process through which an individual (or other decision making unit) passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. An individual seeks information at various stages in the innovation-decision process in order to decrease uncertainty about an innovation's expected consequences. 5-Step Process: (1) Knowledge – person becomes aware of an innovation and has some idea of how it functions (2) Persuasion – person forms a favorable or unfavorable attitude toward the innovation (3) Decision – person engages in activities that lead to a choice to adopt or reject the innovation (4) Implementation – person puts an innovation into use (5) Confirmation – person evaluates the results of an innovation-decision already made (Rogers, 2003).

## ***1.2 Contribution of Women to Agricultural Production***

Literature on women's contribution to agricultural production state that rural women in particular are responsible for half of the world's food production and produce between 60 and 80 percent of the food in most developing countries (Mehra & Rojas, 2008; Oladejo, Olawuyi & Anjorin, 2011). This statement has however been critiqued. Raney et al., (2011) argue that the contribution of women to agricultural and food production is significant but it

is impossible to verify empirically the share produced by women. Undeniably though Raney et al., (2011) posit that women play a fundamental role in all the stages of the food cycle in all regions, but these roles differ by region and advises that taking account of the heterogeneity of women's contribution is essential if policies and interventions are to be effective.

Oladejo et al., (2011) posited that despite women's contribution to global food security, they are frequently underestimated and overlooked in development strategies. Raney et al., (2011) observed that agriculture sector is underperforming in many countries in part because women, who are often a crucial resource in agriculture and the rural economy, face constraints that reduce their productivity. Weak property rights constraint because they limit women's ability to participate in land and other markets, to obtain credit, and to undertake other investments on the land (Peterman, Behrman & Quisumbing., 2010).

According to FAO (2009), the trend towards the growing dominance of women in agricultural production and the concomitant decrease of men in the sector is inevitable. There are an increasing number of female-headed households around the world. A major cause of both these developments is male-out migration from rural areas to towns and cities or abroad and/or the abandonment of farming by men for more lucrative occupations.

In addition to the crucial roles women play in food production, women contribute to food security in other significant ways such as preservation of biodiversity. According to Karl (1996) and Bunning and Hill (1996), the preservation of biodiversity and plant genetic resources is now widely recognized as essential to food security. Women often have special knowledge of the value and diverse use of plants for nutrition, health and income. Consequently, they are frequently the preservers of traditional knowledge of indigenous plants.

### ***1.3 Concept of Knowledge***

According to the Webster new world dictionary, knowledge is the general awareness or possession of information, facts, ideas, truths or principles. It is clear awareness, acquaintance or familiarity (with something) and understanding. It is therefore all that has been perceived or grasped by the mind, learning and enlightening accumulated by mankind. There are two perspectives of knowledge; a state of knowing and a state of what is known (Ogunlade, 2002). Ogunlade goes on to link knowledge with learning and posits that farmers learn a lot from their own experience and their own experiments, from watching what other farmers do and from discussion with other actors in the Agricultural Knowledge Information System (AKIS). Botlhoko and Oladele (2013) noted that knowledge and information are basic ingredients for increased agricultural production and productivity.

### ***1.4 Factors Associated with Knowledge among Farmers***

Many empirical studies involving knowledge have identified factors associated with knowledge level of farmers. However, factors that have been found to influence level of knowledge among farmers vary with the study. Educational level and exposure to information through mass media were found to have a positive and significant relationship with knowledge (Ogunlade, 2002). Jha (2012) study to determine factors influencing level of knowledge about social forestry among farmers in India, shows that variables education, social participation, sources of information utilized, size of land holding, annual income, economic motivation and innovation proneness had positive and significant association with the variable knowledge level of the respondents. However, age, household size and credit behaviour were non-significant in this study.

In a study to assess knowledge level of dairy farmers in Nagpur district and the correlation between socio-economic variables with their training needs (Patil, Gawande, Nande&Gobade, 2009), findings show that age was not an important factor but the size of the farmer's herd, how much milk he sold and how much milk he produced were positive and significant factors. Social participation and annual income just like in the social forestry study were also found to be important factors influencing the level of knowledge of dairy farmers. Twei (2010), in a study to assess the awareness of regulations for milk quality control among dairy farmers in Kenya found that the farmers had low knowledge. Regulation in the dairy industry targets the small scale producers and milk traders with the aim of ensuring that they meet requirements for milk quality control.

## 2. Methodology

The study adopted the descriptive survey design method. The study was conducted in Kakamega County in the Western Region of Kenya which is 30km north of the equator. Kakamega covers an area of 3,244.9 km<sup>2</sup>. The county government in Kenya is such that each county is made up of subcounties. Kakamega County has 12 subcounties. Each subcounty comprises of several county assembly wards. County assembly wards are divided into sublocations and sublocations into villages which form the smallest unit of administrative office. Three subcounties representing the main crop zones in Kakamega were randomly selected namely Lurhambi (Maize/sugarcane transition zone), Ikolomani (Maize zone) and Malava (Sugarcane zone). Multi-stage sampling technique was used to select the sample for the study. A total of 276 women indigenous vegetable farmers participated in the study as respondents. An interview schedule was used as the main data collection instrument. The interview schedule was face validated by the researcher and content validated by extension experts.

## 3. Results and Discussion

Table 1: Frequency Distribution of African Indigenous Vegetables Grown in Kakamega County

| African Indigenous Vegetable                   | *Frequency | Percent    |
|--|------------|------------|
| Black Nightshade ( <i>Solanumnigrum</i> )      | 202        | 73.2       |
| Cowpeas ( <i>Vignaunguiculata</i> )            | 201        | 72.8       |
| Slenderleaf ( <i>Crotolariabrevidens</i> )     | 189        | 68.5       |
| Jute Mallow ( <i>Corchorusoliitorus</i> )      | 182        | 65.9       |
| Spider plant ( <i>Cleome gynandra</i> )        | 137        | 49.6       |
| Pumpkin leaves ( <i>Cucurbita spp.</i> )       | 132        | 47.8       |
| Pigweed ( <i>Amaranthus spp.</i> )             | 111        | 40.2       |
| Ethiopian Mustard ( <i>Brassica carinata</i> ) | 23         | 8.3        |
| African spinach ( <i>Basella Alba</i> )        | 20         | 7.3        |
| <b>Total</b>                                   | <b>276</b> | <b>100</b> |

\* Multiple responses

Source: Field data (2014)

The study revealed that nine (9) AIV species were commonly grown by the women in Kakamega County as shown in Table 1. The results show that over 50% of the women grew black nightshade (*Solanumnigrum*), cowpeas (*Vignaunguiculata*), slenderleaf (*Crotolariabrevidens*), jute mallow (*Corchorusoliitorus*) and spider plant (*Cleome gynandra*). These were also the most common African indigenous vegetables in the supermarkets. Discussion with the supermarket staff revealed that these vegetables were on high demand amongst customers especially black nightshade, spider plant and amaranth. All the nine (9)

were readily available in the open market. Similar results were obtained by Abukutsa-Onyango (2007) in a market survey seeking to prioritize the vegetables for research on agronomy, postharvest and value addition. This implies that the vegetables are still the preferred choices of most farmers in Kakamega.

Table 2: Awareness status of women farmers on quality standards and market demands (QSMDs) of High value markets (HVMs).

| Awareness status | Frequency | Percentage |
|------------------|-----------|------------|
| Aware            | 160       | 58.0       |
| Not aware        | 109       | 39.5       |
| No response      | 7         | 2.5        |
| Total            | 276       | 100        |

Source: Field data (2014)

Awareness is a passive stage in the adoption theory but very important because it creates the interest in a system to actively seek out new information, both explicit and tacit. The quest is informed by sources both outside and inside the community leading to an acquisition of knowledge (Rogers, 2003). As shown in Table 2, over half of the women farmers were aware that quality standards existed.

Table 3: Number of Women AIV Farmers with Knowledge on Quality Standards in Lurhambi, Malava and Ikolomani Subcounties

| Quality Standards and Market demands | Subcounty (total) |          |          | Total | $\chi^2$ | p-value |
|--------------------------------------|-------------------|----------|----------|-------|----------|---------|
|                                      | SB1 (97)          | SB2 (88) | SB3 (91) |       |          |         |
| <b>Product attributes</b>            |                   |          |          |       |          |         |
| Cleanliness of vegetables            | 79                | 86       | 60       | 225   | 30.02    | 0.00*   |
| Neat bundling of vegetables          | 67                | 50       | 54       | 171   | 3.33     | 0.19    |
| Very fresh at point of sale          | 42                | 62       | 47       | 151   | 14.2     | 0.00*   |
| Harvested at Young stage             | 43                | 34       | 47       | 124   | 5.01     | 0.29    |
| Specified length                     | 24                | 6        | 31       | 61    | 21.67    | 0.00*   |
| Specified weight                     | 18                | 0        | 23       | 41    | 24.22    | 0.00*   |
| <b>Process attributes</b>            |                   |          |          |       |          |         |
| Pest free                            | 53                | 84       | 57       | 194   | 40.61    | 0.00*   |
| Disease free                         | 28                | 80       | 54       | 162   | 73.28    | 0.00*   |
| Pesticide free                       | 34                | 2        | 38       | 74    | 40.72    | 0.00*   |
| Grown with unpolluted water          | 19                | 0        | 35       | 54    | 42.05    | 0.00*   |
| <b>Transaction attributes</b>        |                   |          |          |       |          |         |
| Supply high volumes                  | 24                | 23       | 46       | 93    | 17.30    | 0.00*   |
| Consistency in Supply                | 30                | 13       | 44       | 87    | 23.39    | 0.00*   |
| Negotiation for contract             | 19                | 5        | 24       | 48    | 13.84    | 0.01*   |
| Undergo probation                    | 18                | 0        | 29       | 47    | 32.40    | 0.00*   |
| Provide vegetable samples            | 16                | 3        | 25       | 44    | 19.37    | 0.00*   |

N= 276 \* Significant at  $p < 0.05$  SB1- Lurhambi , SB2-Malava, SB3- Ikolomani

Source: Field data, (2014)

Despite a majority of the women AIV farmers in Kakamega being aware that QSMDs existed, results of the study as shown in Table showed that only five (5) out of the 15

QSMDs of HVM were known by the majority of the respondents representing 33.3% of the total QSMDs known by the farmers. The QSMDs known by many of the farmers were; cleanliness of vegetables (82%), neatly bundling of vegetables (62%), pest free (70.3%), disease free (58.7%) and vegetables being very fresh at point of sale (54.7%).

In contrast, the less known QSMDs were; growing vegetables with unpolluted water (19.6%), negotiating for a contract with high value market (17.4%), Farmer agreeing to undergo probation if contracted (17.0%), provision of samples before supply (15.9%) and adhering to specific market weight (14.9%). Of these five (5) less known QSMDs, three (3) are transaction attributes (negotiating for contracts, undergoing probation and providing samples). This implies that most farmers lack knowledge on the requirements they need to fulfill to transact business with high value markets.

Since the farmers for this study were sampled from three different sub counties representing a major crop zone, the study sought to find out if differences existed in knowledge level of the farmers in the crop zones represented by the sub counties on each of the quality standards, Chi-square test was done. The test revealed that significant differences existed in knowledge on all the quality standards and market demands except on neat bundling of vegetables and harvesting at young stage at  $p < 0.05$  in the crop zones. Further, this study revealed that the women in the sugarcane zone know fewer quality standards than women in the sugarcane maize transition zone and maize zone. This implies that women in the sugarcane zone are less likely to access high value markets due to their low knowledge on quality standards demanded by the market.

Table 4: Level of Knowledge on Quality Standards among Women Farmers in Kakamega County

| No. of QSMDs Known (Level of Knowledge ) | Frequency | Percent | Mean | Std. Dev. |
|--|-----------|---------|------|-----------|
| 0-3 (Very Low)                           | 56        | 20.3    | 5.72 | 3.05      |
| 4-6 (Low)                                | 134       | 48.6    |      |           |
| 7-9 (Moderate)                           | 51        | 18.5    |      |           |
| 10-12 (High)                             | 26        | 9.4     |      |           |
| 13-15 (Very High)                        | 9         | 3.3     |      |           |
| Total                                    | 276       | 100.0   |      |           |

Source: Field data (2014)

Results of this study revealed that close to 50% of the women AIV farmers (48.6%) had “Low” level of knowledge as shown in Table 4. Observations made in the open markets at Amalemba in Lurhambi sub county, Imalinya in Ikolomani and Isanjiro in Malava sub county markets indicated that most traders were not meeting the QSMDs. For example, the roots of cowpeas (*Vigna unguiculata*), slenderleaf (*Crotalaria brevidens*) and jute mallow (*Cochorusolitorus*) were not trimmed and carried soil. The bundled vegetables were of varying weights and length, and stored in jute bags instead of aerated crates. A few of the farmers (5.8%) had “Very high” level of knowledge about QSMDs. Tuei (2010) found similar results with milk farmers in Kenya. The farmers had low knowledge of regulations that aim at ensuring that the farmers met requirements of milk quality control.

#### 4. Conclusion and recommendation

The level of knowledge among women indigenous vegetables farmers on quality standards and market demands is low. Ministry of Agriculture in Kakamega County should facilitate the women AIV farmers in their activities in terms of training them on QSMDs of

HVMS. Trainings should focus on low knowledge areas such as record keeping skills, negotiation skills and appropriate irrigation technologies. Interest areas such as organic farming of AIVs for niche markets could be introduced.

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