

**AN ANALYSIS OF MARKETING OF AFRICAN INDIGENOUS VEGETABLES
AMONG AGRO-PASTORAL MAASAI OF NAROK AND KAJIADO COUNTIES**

**BY
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the Award of Master of Science Degree in Agricultural Economics of Egerton University**

Egerton University

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DECLARATION AND APPROVAL

Declaration

This thesis is my original work and has not been submitted for an award of any degree in any other University.

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DEDICATION

This thesis is dedicated to my daughter, Baby Aisha Juma and my wife, Amina Juma for their moral support and kind understanding when my studies demanded that I stay far away from them.

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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 in abid to take advantage of their resilience to the changing environment. However, for African Indigenous Vegetables to be beneficial, it requires efficient marketing. A marketing analysis of African Indigenous Vegetables was conducted in Narok and Kajiado counties to determine the most preferred marketing outlets, the characteristics of the different actors in the marketing and the marketing margins of key marketing outlets of the African Indigenous Vegetables. The study also established the factors influencing the choice of African Indigenous Vegetables 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 used to select the households for the data collection. Descriptive statistics were used to determine the most preferred marketing outlets as well as the characteristics of the different actors in the marketing of African Indigenous Vegetables. Market margin analysis was used to determine the marketing margins of key marketing outlets while a multinomial logistic regression model was used to establish the factors influencing the choice of marketing outlets of African Indigenous Vegetables. The descriptive results indicated that the most preferred marketing outlet in the studied areas is the local open-air market (55%) and the identified marketing actors have no specialization in terms of training in their marketing roles. Females were found to be predominant in marketing OF African Indigenous Vegetables. The marketing margin of African Indigenous Vegetables varied between the key marketing outlets due to price and marketing cost variation. The results for marketing margin also show that the local open air market is the most profitable marketing outlet for the commonly grown African Indigenous Vegetables. 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 African Indigenous Vegetables 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 African Indigenous Vegetables marketing in the studied areas to contribute to improved livelihoods among the agro-pastoral Maasai communities.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIVs	African Indigenous Vegetables
AERC	African Economic Research Consortium
ALVs	African Leafy Vegetables
ANOVA	Analysis of Variance
CMAAE	Collaborative Masters in Agriculture and Applied Economics
CMC	Conventional Marketing Channel
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GMMp	Producers Gross Marketing Margins
ICRAF	World Agro forestry Centre
KES	Kenya Shillings
MAPS	Medicinal and Aromatic Plants
MPM	Marketing Performance and Management
NGO	Non-Government Organization
NMM	Net Marketing Margin
P - Values	Significant values
RUM	Random Utility Model
SCP	Structure – Conduct – Performance
SLEPT	Social, Legal, Economic, Political and Technological
SPSS	Statistical Package for the Social Sciences
TGM	Total Gross Marketing Margin
TMM	Total Marketing Margin
VMS	Vertical Marketing Systems
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Agriculture is the mainstay of the Kenyan economy currently representing 24 per cent of Gross Domestic Product (GDP) (Ministry of State for Planning, National Development and Vision 2030, 2006). The Kenyan agricultural sector is made up of four major sub-sectors namely; industrial crops, food crops, horticulture, and livestock and fisheries. The horticulture sub-sector is a significant contributor to the economy accounting for 36 percent of agriculture's GDP. The sub-sector contributes to food security with regard to increasing economic access to food for majority of smallholder farmers (HCDA, 2011). Moreover, the sub-sector which comprises of five commodity areas; flowers, fruits, nuts, medicinal and aromatic plants and vegetables (HCDA, 2011) is vital in the transformation of Kenya into a rapidly industrializing middle-income nation as envisaged in vision 2030.

Among the five horticultural commodity areas, the vegetable sub-sector has been documented to hold the future of the Kenyan horticulture industry due to the ever-increasing demand resulting from rapid population growth and urbanization. Furthermore, 90% of vegetables produced in the country are consumed locally (HCDA, 2011). The vegetables grown and consumed in Kenya are categorized as either exotic or indigenous/traditional. Different species of African Indigenous Vegetables (AIVs) including nightshade (*Solanum scabrum*, *S. nigrum* and *S. villosum*), spider plant (*Cleome gynandra*), vegetable amaranth (*Amaranthus hybridus*), slender leaf (*Crotalaria brevidens*), jute mallow (*Corchorus olitorius*), vegetable cowpea (*Vigna unguiculata*), pumpkin leaves (*Curcubita moschata*) and African kale (*Brassica carinata*) among many others grow in different agro-ecological zones within the country (Eyzaguirre and Chweya, 1989; Maundu *et al.*, 1999; Abukutsa-Onyango *et al.*, 2006). These vegetables among other crops have in the past significantly contributed to the nutritional and economic wellbeing of agricultural communities. AIVs have a potential of positively impacting on the income and nutritional wellbeing of agro-pastoral households. They are a rich source of vitamins and mineral salts (Okigbo 1977; Ngetich 2010). ALVs are known to be rich in micronutrients such as vitamins and minerals. A number of studies have been done on some of these vegetables and compared to exotic leafy vegetables such as cabbage, they were found to be higher in vitamin content (especially vitamins A and C), fibre and minerals. Some are known to

be rich in lysine, an essential amino acid that is lacking in diets based on cereal and fibres, while others are medicinal (Imungi and Porters, 1983, Imungi, 2002). The green, leafy ALVs contain polyphenols which have beneficial physiological effects on humans as antioxidants. They are also known to be anticarcinogenic and anti-arteriosclerotic (Imungi, 2002). A study carried out in Nairobi showed that consumption of ALVs is associated with the treatment of various diseases including therapy for patients with HIV/AIDS, diabetes, high blood pressure and other common ailments (Kimiye, *et al.*, 2006). Muhanji *et al.*, (2011), observed that people suffering from diseases such as high blood pressure, HIV/AIDS, cancer and hypertension have been advised to consume AIVs because of their medicinal value.

Contrary to the feeding habits of agricultural communities, pastoralists have in the past relied on livestock and livestock products as their main source of livelihood. Currently, this is not the case due to the fact that pastoralism worldwide is facing increasing pressures such as the effects of climate change, increasing population, decreased pastureland and increasing sedentarisation. 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 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.

Despite the importance of vegetable marketing, evidence shows that vegetable marketing is given little attention or credence in the developing countries as well as facing constraints related to access to production resources and markets (Minot, 1986). Smallholder farmers face difficulties in accessing markets and as a result, markets do not serve their interests. In most of the less developed rural areas, smallholder farmers find it difficult to participate in commercial markets due to factors such as high transaction cost, dearth of market information, use of grades and standards, lack of value addition and agro-processing, inability to conclude contractual agreements and poor organizational support, legal environment and poor physical infrastructure. These challenges have led to inefficient use of markets, resulting in commercialization bottlenecks. Furthermore, smallholder farmers lack vertical linkages in the marketing channels, which result in their exclusion from the use of formal markets (Delgado, 1999; Fenwick and Lyne, 1999; Makhura *et al.*, 2001; Wynne and Lyne, 2004). Smallholder farmers also have weak financial and social capital and limited access to legal recourse making it difficult to change these negative market factors individually (Fenwick and Lyne, 1999). As a result, they are trapped and continue to operate within the given market constraints hence not receiving rewarding incomes from their agricultural activities.

These challenges usually results in a 'low level equilibrium trap' as shown in Figure 1. In the figure, constraints, investment disincentives and the stagnant rural economy reinforce each other, leading to a reduction in market participation (Dorward and Kydd, 2005). The factors illustrated in Figure 1, give a summary of the factors influencing marketing decisions amongst smallholder farmers. It is important to note that these are not the only factors influencing smallholder farmers' decisions, but they form part of an array of other factors such as economic, social and political factors. Transaction costs are observable and non-observable costs associated with enforcing and transferring property rights from one person to another (Eggertson, 1990).

These include the costs of searching for trading partners with whom to exchange with, the costs of screening partners, bargaining, monitoring, enforcement and eventually transferring the product to its destination (Jaffee and Morton, 1995; Hobbs, 1997). Delgado (1999) identified high transaction costs as the embodiment of market access barriers among resource poor smallholders. These high transaction costs result from individual produce transportation and selling, difficulties in getting trading partners and poor bargaining power (Delgado, 1999). In other words, with high transaction costs, markets fail in their role of allocating scarce resources to alternative ends.

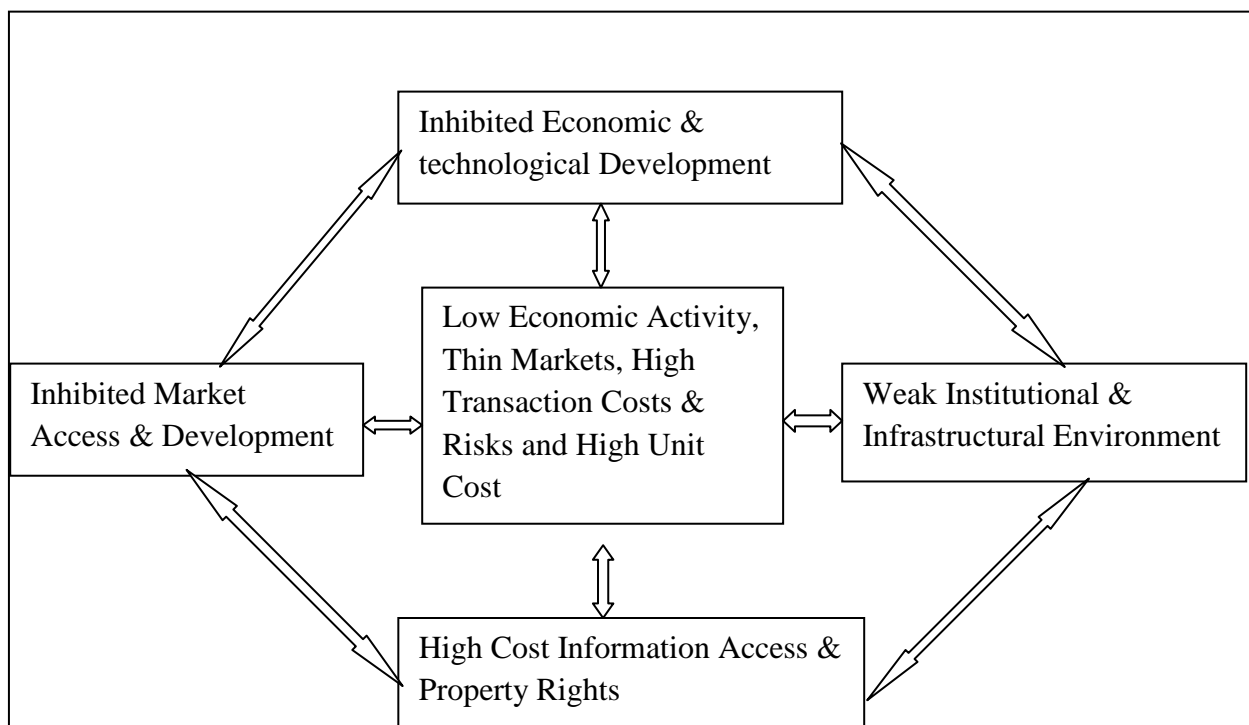


Figure 1: Low level equilibrium trap in smallholder farming

Source: Dorward and Kydd, (2005).

Market information is vital to market participation behaviour of any community. Market information allows farmers to take informed marketing decisions that are related to supplying necessary goods, searching for potential buyers, negotiating, enforcing contracts and monitoring. Necessary information includes that on consumer preferences, quantity demanded, prices, produce quality, market requirements and opportunities (Ruijs, 2002); of equal importance is the source of market information since it determines accuracy of the information. According to Montshwe (2006), small scale farmers have difficulties in accessing market information, exposing them to a marketing disadvantage. Agro-pastoralists normally rely on informal

networks (traders, friends and relatives) for market information due to weak public information systems (FAO, 2004). However, such individuals may not have up to date and reliable market information, making the usefulness of the information doubtful. Additionally, farmers relying on informal networks for market information are at risk of getting biased information due to opportunistic behaviour of the more informed group. Mangisoni (2006) explained that farmers usually accept low prices for their crops when the broker informs them that their produce is of poor quality, which makes them accept these low prices mainly because they are unable to negotiate from a well-informed position.

Consumers demand high quality for the goods they buy. In addition, they will not buy food products unless there is a guarantee that they are safe to eat (Kherallah and Kirsten, 2001). Consumers therefore make purchasing decisions depending on packaging, consistency as well as uniformity of goods. Most crops have no clearly defined grades and standards and, therefore, cannot meet the consumers' demands (Reardon and Barrett, 2000). Produce from most smallholder farmers does not meet certain market grades and standards because smallholder farmers lack the knowledge and resources to ascertain such requirements. In addition, institutions for determining market standards and grades tend to be poorly developed in agro-pastoral environments. Due to uncertainty on the reliability and quality of their goods, agro-pastoralists usually cannot get contracts to supply formal intermediaries such as shops and processors (Benfica *et al.*, 2002). This indicates that only well-organized farmers can benefit from trade liberalization by adopting strict quality control measures and obtaining the necessary certification for their farm produce.

According to Robbins (2005), prices of primary agricultural produce have fallen steeply, but retail prices for the same packaged, cut and processed products in industrial countries, have increased. This implies that value adding activities can earn farmers additional income. Value adding can be in the form of grading, sorting, cutting, packaging in standard weights and processing of produce (Mather, 2005). Lack of value adding and agro-processing is part of missing marketing link amongst smallholder farmers. Agricultural produce from smallholder farmers are usually poorly packaged. With few exceptions, most smallholder farmers cannot add value to their produce because they do not know its importance and lack processing technology (Louw *et al.*, 2007).

Legal institutions influence the activities performed on the market and the costs of exchange. Minot and Goletti (1997) affirm that the formal institutional development of a society has a considerable influence on transaction costs. Thus, if trade laws are transparent then agreements can be legally enforced, leading to information accessibility and lower costs. In other words, effective legal institutions may improve the organization of the marketing outlets and decrease marketing costs. In many developing countries, laws are not always executed and enforced correctly and market rules are often not transparent to the producers and traders (Ruijs, 2002). In addition, formal contract enforcement mechanisms are weak (Fafchamps, 1996). The situation is worse for the agro-pastoralists because they lack lobbies in the legal environment. As a result, rural trade prospers where trust has been developed based on repeated transactions or informal relationships (Randela, 2005). The unfavourable legal environment creates a significant barrier to entry into formal food trade and limits participation by smallholders in the modern marketing system.

Physical infrastructure includes communication links, electricity, storage facilities, transportation facilities and roads. Good physical infrastructure such as good roads, transportation and communication links are prerequisites to market access, particularly to those potential market participants who reside in rural areas because of the relatively longer distances between them and the markets (Machethe, 2004). In Kajiado and Narok, the agro-pastoralists are mostly found in areas remote from market places where there is a serious lack of the aforementioned facilities. Kherallah and Minot (2001) noted that the lack of physical infrastructure results to high transaction costs. Sometimes transaction costs are too high for farmers and traders to get any meaningful benefits from potential trading activities, discouraging farmers from participating in marketing activities. Machethe (2004) pointed out the importance of developing and maintaining the physical infrastructure after recognizing high transaction costs as one of the major factors constraining the growth of smallholder agriculture in African countries.

Agricultural commodities must move from the farms where they are produced to the retail outlets where they are sold. Road infrastructure and transport availability have an influence on smallholder market participation, especially if they are located a long distance from the consumption centres (Gabre-Madhin, 2001). According to Bachmann and Earles (2000), one of the most important constraints facing agricultural markets throughout Sub-Saharan Africa is

transport infrastructure and the need to reduce transport costs. The majority of villages in rural areas are served by an inadequate and poorly maintained road network (Montshwe, 2006). The poor conditions of roads, which are often impassable during the rainy season, have an adverse effect on the transportation of the produce. As transport generally marks the passage from one stage of the post-harvest system to the next, poorly developed roads make it difficult to move produce from one stage to another. Under bad roads, travelling time becomes longer, implying that it will be difficult to sell fresh produce within the required time limit (Dijkstra *et al.*, 2001). Under this situation, agro-pastoralists find it difficult to produce for the market.

The absence of mechanical transport poses serious problems for marketing of agricultural produce. Transportation of produce to the markets in time becomes difficulty where there is no reliable private form of transport, since public vehicles tend to be few in the rural areas (Bachmann and Earles, 2000). Inability to transport produce in time may result in produce spoilage and losses. In addition, unavailability of reliable private transport may increase transport costs, which in turn increases transaction costs for growers (Zaibet and Dunn, 1998). These high costs reduce the incentive to move away from the farm gate sales. Makhura (2001) pointed out that those farmers with transportation vehicles are able to move around in search of more rewarding markets. In addition, such farmers stand a better chance of getting market information from different markets. Thus, farmers who own their own vehicles are more likely to meet many buyers and reach several markets. Most farmers without their own transport usually pack their goods (especially vegetables) in sacks, which are then transported to the market places using public transport (Jayne *et al.*, 2002) which leads to bruises and damage and drastically reducing the quality of the agricultural produce being transported. Additionally, brokers buy produce transported this way and the brokers play an essential role in determining the prices at which the produce is sold. Faced with all these problems, agro-pastoralists may opt to sell their products to middlemen at the farm gate or around the villages.

The ability to deliver a quality product to the market and ultimately to the consumer, commands buyer attention and gives the grower a competitive edge (Bachmann and Earles, 2000). As such, proper post-harvest handling and storage contribute in ensuring quality maintenance for perishable agricultural produce. Moreover, agricultural commodities have to be harvested at a specific point in time, but are consumed year-round, thus necessitating proper storage facilities (Sasseville, 1988). Thus, if crops are to be available for consumption

throughout the year, proper storage facilities have to be implemented by both farmers and traders. Amongst farmers, storage may have some added advantages because it increases market flexibility. Households with proper storage facilities do not need to market their produce immediately after harvest when prices tend to be low. They can store their produce and sell when prices are higher. Most smallholder farmers do not have access to adequate storage infrastructure and end up selling their produce soon after harvest (Wilson *et al.*, 1995). Many smallholder farmers often rely on open-air storage (Gabre-Madhin, 2001). In studies carried out in Malawi and Benin, Gabre-Madhin (2001) revealed that storage practices are relatively limited in both countries. Smallholder farmers are usually served by poor market infrastructure. In some instances, market infrastructure is unavailable and farmers sell from the back of their trucks (Makhura *et al.*, 2001). These conditions are not conducive for fresh produce, contributing to perishability and loss of produce. Additionally, produce sold under poor market conditions may not be attractive to consumers, putting farmers at risk of losing customers. Fresh produce tends to have a limited shelf life, therefore, cannot be stored for longer periods (Dijkstra *et al.*, 2001). This implies that such produce needs to be processed or sold while still fresh. When selling them, it is important to be cautious of market place conditions to keep them fresh. Market infrastructure such as sheds and stalls in spot markets is crucial in maintaining freshness of agricultural produce (Wilson *et al.*, 1995).

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.

1.2 Statement of the Problem

The livelihood of many Maasai is threatened as a result of climate change that is rendering pastoralism an unviable agricultural enterprise. To overcome this, one strategy by some members of the community has been to take up alternative livelihoods options that are adaptable to the changing climatic conditions. Among these has been the incorporation of AIVs into their pastoral livelihoods in order to take advantage of their resilience to the changing environment. In as much as this has been the case, maximum benefits from these enterprises are

yet to be realized. Lack of adequate information on markets and marketing for the AIVs has emerged as one of the major challenges to realization of maximum benefits from the AIVs grown. The problem has been aggravated by the perishable nature of most of these vegetables, which calls for efficient marketing.

1.3 Objective of the Study

1.3.1 General Objective.

To contribute to improved livelihoods among the agro-pastoral Maasai communities through efficient marketing of AIVs.

1.3.2 Specific Objectives

The specific objectives of the study are:

- i) To determine the most preferred marketing outlets of AIVs among the agro-pastoral Maasai of Narok and Kajiado counties.
- ii) To determine the characteristics of the different actors in the marketing of AIVs grown by the agro-pastoral Maasai of Narok and Kajiado counties.
- iii) To determine the marketing margins of key marketing outlets of AIVs grown by the agro-pastoral Maasai of Narok and Kajiado counties.
- iv) To establish the factors influencing the choice of AIVs marketing outlets among the agro-pastoral Maasai of Narok and Kajiado counties.

1.4 Research Question

The proposed research was guided by the following questions:

- (i) Which are the most preferred marketing outlets of AIVs grown by the agro-pastoral Maasai of Narok and Kajiado counties?
- (ii) What are the characteristics of the different market actors in the marketing of AIVs grown by the agro-pastoral Maasai of Narok and Kajiado counties?
- (iii) What are the marketing margins of key marketing outlets of AIVs grown by the agro-pastoral Maasai of Narok and Kajiado counties?
- (iv) What are the factors influencing the choice of AIVs marketing outlet among the agro-pastoral Maasai of Narok and Kajiado counties?

1.5 Justification and Significance of the Study

Marketing plays a critical role in meeting the overall goals of food security, poverty alleviation and sustainable agriculture particularly among smallholder farmers. In any system, a commercializing environment is essential in providing incentives for increased production and thus, for improved welfare of the people. Among the agro-pastoral Maasai, efficient and fair marketing of AIVs would be important in ensuring that maximum benefits such as income and rural employment are derived. This enhances the transition from subsistence farming to commercial farming. An analysis of marketing of AIVs among the agro-pastoral Maasai therefore provides valuable information, which will assist the agro-pastoralists in making an informed choice of the marketing outlet to sell their AIVs leading to better income. Besides, information that has been generated by this study will positively contribute towards the development of AIVs value chain strategies in Kenya.

1.6 Scope and Limitation of the Study

This research was restricted to analysis and documentation of performance of markets for AIVs grown by the agro-pastoral Maasai of Narok and Kajiado counties of Kenya. Although there are many species of vegetables grouped as AIVs, this study only focused on commonly grown AIVs (Night shade, Vegetable amaranth, cowpeas and Spider plant) and included selected marketing outlets (farm gate, local open air market and brokers) despite the fact that there were several other marketing outlets. To achieve its objectives, the research utilized both primary and secondary data. Availability of secondary data and access to records was a limitation for this study, while reliance on memory recall, for those respondents who do not keep records could also have affected precision of data collected. The limitation of access to records and memory recall was overcome by probing and gathering the most recent data from the respondents.

1.7 Operational Definition of Terms

African Indigenous Vegetable - African Indigenous Vegetable (AIVs) is defined as plants that are native or introduced whose leaves have been used for long time as vegetables hence becoming part of the culture and tradition of a community (Maundu *et al.*, 2009).

Agro-Pastoralism –This relates to a practice of agriculture that includes both the growing of crops and the raising of livestock.

Commercialization - Is the process or cycle of introducing a new product or production method into the market.

Diversification –This is a portfolio strategy designed to reduce exposure to risk by combining a variety of investments.

External intervening factors – These are factors which are beyond the control of the marketer and they include social, legal, economic, political and technological factors (SLEPT)

Formal Market - Formal markets are specialized form of market such as supermarkets, wholesale markets, free markets and retail shops.

Household - Individuals who comprise a family unit and who live together under the same roof; individuals who dwell in the same place and comprise a family, sometimes encompassing domestic help.

Household Head – The person who makes decisions and provides the daily needs of the family.

Internal intervening factors – These are factors that are generally under control of the marketer and they include product, price, promotion and place/distribution commonly referred to as 4Ps

Livelihood - A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Chambers and Conway, 1991).

Market Efficiency - Refers to the degree to which commodity prices accurately reflect current information in the market place. Market integration was utilized to infer on the levels of market efficiency.

Marketing Margin - It refers to the difference between the consumer prices and what the farmer gets at different levels in the marketing system.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature on agro-pastoralism and its importance in improving livelihoods of the agro-pastoral communities. The chapter also explores the vegetable marketing system and is followed by a discussion of marketing outlets and channels. The structure and organization of vegetable marketing and the actors is also discussed as well as the effectiveness of different marketing outlets and marketing efficiency. The factors influencing the choice of vegetable marketing outlets have also been reviewed and a discussion on the theoretical and conceptual framework provided.

2.2 The Nature, Importance and Constraints of Agro-Pastoral Farming in Sub-Saharan Africa

In Africa, agro-pastoral farming system is located in the arid and semi-arid zones extending from Mauritania to the northern parts of Mali, Niger, Chad, Sudan, Ethiopia, Eritrea, Kenya and Uganda. This system is also found in the arid zones of Namibia, Botswana, South Africa, and Southern Angola. In the Africa region alone, 25 million pastoralists and 240 million agro-pastoralists depend on livestock as their primary source of income. Most of them live in arid and semi-arid zones impacted by climate variation, particularly low rainfall and drought (IIED and SOS Sahel, 2010).

ILRI (2006) observed that pastoralism serves as the bedrock of livelihoods and culture in the arid and semi-arid lands (ASALs), which constitute most of the land mass in East Africa. However, pastoralism is currently faced with a lot of pressures, which are threatening the pastoral livelihoods and subjecting many to increasing poverty and food insecurity. These pressures include the effects of climate change, increasing population, decreased pastureland and increasing sedentarisation. Many pastoralists are therefore being forced to look beyond pastoralism for their continued survival (OXFAM, 2008). An increasing number of the pastoralists are engaging in agro-pastoralism as one of the means of coping with adverse conditions and improving food security.

Bonfiglioli (1993) found that there are advantages and challenges associated with agro-pastoralism. Agro-pastoralism offers a refuge and a survival choice during times of drought by

ensuring that pastoralists have food reserves to see them through periods of drought. It also widens the sources of income and contributes to risk reduction. The challenges with agro-pastoralism as noted by Bonfiglioli (1993) include the fact that crop cultivation among pastoralists introduces in each system new constraints and a new way of life. Nkurumwa *et al.* (2010) noted that the adoption of agro-pastoralism by the Maasai involves not just changes in economic activities, but also adjustments in related non-material social and cultural aspects of their lives. This is supported by the Ogburn's Theory of Cultural Lag (Richard and June, 1997), which states that non-material aspects of culture are more difficult to change than material aspects, and may therefore present greater challenges in the adoption of agro-pastoralism by the Maasai. However, a study by Nkurumwa *et al.* (2010) on livelihood diversification and enhanced food security through agro-pastoralism in Narok, found out that the Maasai in Narok North district had a positive attitude towards crop cultivation and thus, although they still value livestock, they preferred agro-pastoralism to pure pastoralism.

2.3 Agricultural Marketing

Agricultural marketing is one of the important branches of marketing that deals with the exchange of agricultural goods. Kohls and Uhl (1998) defined agricultural marketing as the performance of all business activities involved in the flow of food products and services from the point of initial agricultural production until they are in the hands of consumers. Marketing in vegetables is particularly important as up to 90-98 per cent of the output of most vegetables is sold, except for root and tuber crops for which a significant proportion is saved for seed (Singh and Sikka, 1992) and vegetables produced in home gardens.

2.3.1 Vegetable Marketing System

Kohls and Uhl (1998) contend that the vegetable marketing system has been influenced by a number of production, product and market characteristics. These characteristics comprise of perishability, large price and quantity variations, seasonality, alternative product forms, and bulkiness of product and geographic specialization of production. From the review of literature, it can be concluded that marketing systems for vegetables are complex and tend to vary across vegetable species, location, end use (fresh or processed), and destination (local, town, big city, or export market) but can generally be grouped into three systems.

Tracey (1991) described the first system as a system that engages a central wholesale market. This system seems to evolve as an efficient vegetable marketing system. Food reaches the consumer by a complex network, involving production, assembly, sorting, reassembly, distribution and retail stages. Seidler (2001) emphasised the social institution or mechanism that forms the linkage between the producer (farmer) and the retailer as the assembly and wholesale trading system which enables farmers to sell in small quantities and purchasing by traders and wholesalers to be made in bulk. The wholesalers play a critical role as without them the retailer would need to purchase directly from farmers, involving many minor transactions. Cadilhon *et al.* (2003) noted the number of transactions is reduced and the marketing process simplified with the presence of both rural assembly and wholesale markets. Tracey (1991) further explained that the retailer does not need to be concerned with any of the sorting, reassembly or distribution functions and concentrates solely on selling to consumers. Wholesaling facilitates the economic function of buying and selling (usually termed as "price formation") by allowing the forces of supply and demand to converge to establish a single price for a commodity. Tracey (1991) also noted the assembler or wholesaler may also perform storage and warehousing function, as well as allowing economies of scale to be obtained in the transportation of produce from farm to market. The people involved in wholesaling can act simply as merchants, buying and selling produce, be brokers dealing with orders rather than goods, be commission agents acting for the producers (and without title to the produce) or be export/import agents, only dealing in foreign trade.

The second system is the absence of any central wholesale market and trade takes place in traditional sites in towns without any one person or group controlling the trading. In this marketing system, several price levels for a commodity prevail at any given time and prevailing prices do not truly reflect consumer preferences. Several inter-agent transactions at the same marketing level can be observed (Librero and Rola, 2000). This marketing system still dominates in most developing economies.

In the third type of vegetable marketing system, farmers take their produce to nearby markets and sell to retailers or directly to consumers. This system is common with smallholder farmers, especially those who live on the periphery of big cities. In this system, the producers' share of the consumers' price can be high, but marketing costs can also be high (Cadilhon *et al.*, 2003).

2.4 Vegetable Marketing Outlets and Channels

Consumer demands for fresh vegetables are increasing as nutritional and health claims gain credibility. An understanding of the marketing outlets and channels by the producers is imperative. This section highlights the categorization of market outlets and channels with their associated advantages and disadvantages. It further reviews the structure and organization and the actors in vegetable marketing.

2.4.1 Vegetable Marketing Outlets

Deciding which market outlet to use for selling farm produce is important for farmers because it assists them in matching their resources, goals, market potential, and location with the best suitable marketing outlet (Holland *et al.*, 1999b). Vegetable marketing outlets can be categorized as wholesale (local open-air market, cooperatives, wholesalers, brokers, distributors, retailers, contracts, etc.) or direct marketing (farm gate, customers picking-their own, roadside stands, etc.). Diversifying in market outlets, just like diversifying in production, helps reduce risks by providing income stability to the farmers (Holland *et al.*, 1999b). A farmer may want to pursue both wholesale and direct market outlet, as well as more than one wholesale or direct marketing outlet.

Seidler (2001) noted that wholesale markets are an essential component of any agricultural marketing system, especially for horticultural crops. The functioning and viability of wholesale markets especially the growth of vertically integrated distribution arrangements has greatly developed in food retailing. The author also notes that wholesale markets are needed to provide farmers with effective and profitable marketing outlets for their produce particularly in most of developing countries where the farm structure and the marketing system remain fragmented and co-operatives and farmer groupings are largely underdeveloped. In addition to facilitating farmers' access to the marketing outlets, wholesale markets, if adequately located, sized and managed, are basic instruments for promoting competition and improving public health and food quality control, which lowers and stabilizes consumer prices and reduces post-harvest losses.

The direct marketing of farm foods from producer to consumer, without the assistance of packers, processors, wholesalers, or retailers, can be an important outlet for small farms. By maintaining high quality and a continuous supply, farmers can receive higher prices by capturing

some of the “middle charges.” Consumers give higher quality and lower prices as major reasons for buying direct. Direct farm marketing (farmers selling their farm products directly to consumers) has the obvious advantage in that a farmer can increase the value of the farm produce by eliminating broker fees, packaging or taking over common “middle-men” services (Russel, 1995). However, Russel (1995) also noted that direct marketing requires lots of time and energy in developing relationships with the buyers.

2.4.2 Vegetable Marketing Channels

Kohls and Uhl (1985) defined marketing channels as alternative routes of product flow from producers to consumers. According to Kohls and Uhl (1985), marketing channels start at the farmer’s gate and ends at the consumer's front door. Some of the products are processed on their way to end-user while other products reach them without undergoing any form of changes. In their definition, marketing channel is considered as alternative route, but in this study marketing channel is one, which is the mainstream route for the product flows from the producers to the consumers.

Various types of marketing channels exist for agricultural products. First, conventional marketing channel (CMC) comprises an independent producer, wholesaler, and retailers. Each is a separate business seeking to maximize its own profits. Overall profits for the system remain low. No channel member has complete or substantial control over other members. Kotler (1988) introduced the concept of vertical marketing systems (VMS), which comprises the producers, wholesalers and retailers acting as a unified system. VMS arose as a result of strong channel members’ attempts to control channel behaviour and eliminate the conflict that result when independent channel members pursue their own objectives. Singh (2005) identified four different types of marketing channels in Madhya Pradesh of India. They were producers to retailers to consumers, producers to wholesalers to retailers to consumers, producers to local level collectors to retailers to consumers and producers to local level collectors to wholesalers to retailers to consumers. Thapa and Poudel (2003) on the other hand reported that farmers in Nepal take their produce to the local market centres and sell either to retailers or direct to consumers at the local level.

2.4.3 Structure, Conduct and Organization of Vegetable Marketing

Market structure is defined as those characteristics of the organization of the market that seem to exercise strategic influence on the nature of competition and pricing within the market (Bain, 1968). Market structure consists of the relatively stable features of the market that influence the rivalry among the buyers and sellers operating in a market. The characteristics usually stressed are the number and size of firms in relation to the size of the market, the presence or absence of barriers to entry facing new firms, physical or subjective and product differentiation.

The structure and conduct of market participants will have a direct implication for the nature of production price relationships between different marketing levels. Market conduct refers to the practices or strategies of traders in maximizing their profits. Among these practices are the use of regular partners, long-term relations with clients, and suppliers, the use of intermediaries, and trade within personalized networks (Wolday, 1994). According to Abbot and Makeham (1981) conduct refers to the market behaviour of all firms. Meijer (1994) indicated that, “conduct is a pattern of behaviour which enterprises follow in adopting or adjusting to the market in which they sell or buy”, in other words the strategies of the actors operating in the market.

Most of the actors operating in vegetable markets are smallholder farmers and lack collective action. They usually sell their produce as individuals. This weakens their bargaining positions and often exposes them to price exploitation by traders. Kherallah and Minot (2001) noted that smallholder farmers also do not benefit from economies of scale. A study by Key and Runsten (1999) found that farmers tend not to be organized in the markets as they usually sell their few agricultural produce surpluses individually and directly to the consumers without linking them with other marketing actors.

Lunndy *et al.* (2004) describe the numerous links that connect all actors and transactions involved in the movement of agricultural products from the farmer to consumer as the marketing chain. Functions conducted in a marketing chain have three things in common; they use up scarce resources, they can be performed better through specialization, and they can be shifted among channel members (FAO, 2005a).

2.4.4 Vegetable Marketing Actors

The actors in vegetable marketing chain include producers, brokers, wholesalers, retailers and consumers. Producers form the first link in the vegetable market chain; the producer harvests the vegetables and supplies to the second agent. A broker is normally described as an independent sales force that performs the essential functions required to facilitate sales between buyers and sellers. Brokers buy the vegetables and sell them to other vendors, in the chain who may then sell them to other middlemen or to the final consumer. This option turns the marketing function over to someone else, allowing the farmer to focus on production. However, this can also be disadvantageous to the farmer because someone else controls the marketing of the farmers' produce. Brokers normally provide their services to a number of different farmers and use their discretion as to where they market the farm produce. The broker's responsibilities may be more complex than the definition implies. The broker's job is to please both the producer and the buyer. A commission fee for their services often compensates brokers. Generally, the broker does not receive any money unless a sale is completed.

Wholesalers sell to retailers, other wholesalers and users, but normally do not sell directly to the final consumer. Wholesalers are often segmented into agent wholesalers and merchant wholesalers. Agent wholesalers act as sales representatives on behalf of their clients. They work on behalf of individual producers to identify alternative buyers and new sales locations and finalize orders with retail outlets. Most agent wholesalers represent specialized products and provide their service for a fee or commission. Merchant wholesalers use their knowledge of the product and industry to buy and sell products for their own gain. These agents will purchase a product from a producer or supplier and resell it for profit. Unlike the agent wholesaler, merchant wholesalers do not act on behalf of a producer client.

A retailer purchases farm produce to sell to the end user or final consumer. The retailer does not purchase for personal consumption, but buys to resell, usually in small quantities per sales transaction. Most retailers buy products from distributors or through wholesalers. However, a farmer can also arrange to sell directly to the retailer. The consumer provides the last link in the vegetable marketing chain. However, the respective functions of the marketing actors often overlap. Through the analysis of the current market situation and future market perspectives of AIVs in Narok and Kajiado counties and its market environment, this research sought to contribute to the development of a sustainable marketing strategy for AIVs.

2.5 The Effectiveness of Marketing Outlets

Examining how well marketing outlets respond to consumers assesses the effectiveness of a marketing outlet. Consumers demand for services in relation to their preferences. 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 as well as balance supply and demand in each market segment at any time (Luu, 2002). In this study, the effectiveness of AIVs marketing outlets was assessed in relation to the different services offered in the market in order to maximize profit. In broad categorization, these functions included: assembling, distribution (exchange functions); storage, transport (physical functions); grading, financing (facilitating functions) among others. All these functions are aimed at creating farmers' convenience in terms of time, form and place. Farmers usually prefer to deal with a marketing outlet that provides a higher level of spatial, time and/or form convenience and profits.

2.6 Marketing Efficiency

Efficiency in marketing is the most used measure of market performance. Improved marketing efficiency is a common goal of farmers, marketing organizations, consumers and society. It is a commonplace notation that higher efficiency means better performance whereas declining efficiency denotes poor performance. Most of the changes proposed in marketing are justified on the grounds of improved efficiency (Kohls and Uhl, 1985). Evaluating marketing efficiency forms the core of improving marketing of agricultural produce.

2.6.1 Methods of Evaluating Marketing Efficiency

Evaluation of the efficiency with which the vegetables marketing system operates forms the crux of analysis of the marketing problem (Kohls and Uhl, 1985). At the same time, the analysis of the market structure, behaviour and quantitative evaluation of the efficiency of the marketing system requires concept, theories, methods, data and workable frame (Branson and Norvell, 1983). Marketing efficiency is essentially the degree of market performance. It entails the effectiveness with which a marketing service would be performed and the effect on the costs and the method of performing the service on production, marketing and consumption. These are the most important because the satisfaction of the producer at the highest possible profit must go

hand in hand with maintenance of a high volume of farm output (Ramakumar, 2001). Abbot and Makeham (1981) indicated that factors accounting for efficiency could be evaluated by examining the characteristics of markets such as structure, conduct and performance. These elements measure the extent of deviation from the perfectly competitive norm. The larger the deviation, the more imperfectly competitive is the market.

Performance of the market is a reflection of the impact of the structure and conduct on product price, costs and the volume and quality of output (Cramer and Jensen, 1982). If the market structure in an industry resembles monopoly rather than pure competition, then one expects poor market performance. Market performance is how successfully the firm's aims are accomplished, which shows the assessment of how well the process of marketing is carried out. There are such practical indicators of how well a certain marketing system is operating (Abbott and Makeham, 1981). As a method for analysis, the Structure-Conduct-Performance (SCP) paradigm postulates that a relationship exists between the three levels distinguished. One can imagine a causal relationship starting from the structure, which determine the conduct, which together determine the performance (technological progressiveness, growth orientation of marketing firms, efficiency of resource use, and product improvement and maximum market services at the least possible cost) of marketing systems in developing countries (Meijer, 1994).

Market performance can be evaluated by analysis of costs and margins of marketing agents in different outlets. A commonly used measure of system performance is the marketing margin or price spread. Margin or spread can be a useful descriptive statistics as it is used to show how the consumer's food price is divided among participants at different levels of the marketing system (Purcel, 1979; Gizachew, 2005b). The two approaches to measure marketing performance are: the analysis of marketing efficiency and margin. A large number of studies have analyzed the marketing margins for different types of commodities to examine the performance of agricultural products marketing (Wohlengenant and Mullen, 1987; Schroeter and Azzam, 1991; Holt, 1993; Sexton *et al.*, 2005). These authors argued that even though variations in the margin over time might be attributable to marginal marketing costs under perfect competition, additional factors such as seasonality, technological changes, and sales volume might also explain the variations in the margin.

Marketing costs are the embodiment of barriers to access to market participation by resource poor smallholders. It refers to those costs, which are incurred to perform various

marketing activities in the transportation of goods from producer to consumers. Marketing costs include handling cost, packing and unpacking cost, costs of searching for a partner with whom to exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading partners to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Holloway *et al.*, 2000).

In a commodity sub-system approach, the analysis is based on the identification of the marketing outlet. When there are several participants in the marketing chain, the margin is calculated by finding the price variations at different segments and by comparing them with the final price to the consumer. The consumer price is then taken as the base or the common denominator for all marketing margins. Comparing the total gross marketing margin is always related to the final price or the price paid by the end consumer and then expressed as a percentage (Mendoza, 1995).

Marketing margin is most commonly used to refer to the difference between producer and consumer prices of an equivalent quantity and quality of a commodity. However, it may also describe price differences between other points in the marketing chain, for example between producer and wholesale and wholesale and retail prices (Scarborough and Kydd, 1992). The size of marketing margins is largely dependent upon a combination of the quality and quantity of marketing services, and the efficiency with which they are undertaken and priced. The quality and quantity of marketing services depends on supply and demand of marketing services and/or the degree of competition in the market place. The costs of service provision depend on both exogenous and endogenous factors and the efficiency is determined by the extent of competition between marketing enterprises at each stage. Large gross margins may not express high profit; since size of marketing margins largely depends upon a combination of the quality and quantity of marketing services, and the efficiency with which they are undertaken and priced. The quality and quantity of marketing services depends on supply and demand of marketing services and/or the degree of competition in the market place. Therefore, in using market margin analysis to assess the economic performance of markets, it is always preferable to deconstruct them into their cost and return elements (Scarborough and Kydd, 1992). However, the challenges of data availability on costs usually create a problem.

Mendoza (1995) warns that precise marketing costs are frequently difficult to determine in many agricultural marketing chains because these costs are often both in terms of cash costs and assigned costs. According to Mendoza (1995), “marketing margins” should be understood as the gross marketing margins and advises marketing researchers to emphasize on gross marketing margins in reporting their findings due to the difficulties associated in determining the precise marketing costs. In similar manner, gross marketing margin will be considered instead of net marketing margin in this study, since estimation of the implicit costs incurred during marketing may be difficult. Several calculations can be done for the different marketing margins (i.e. total gross marketing margin (TGMM), producers gross marketing margins (GMMp) and the net marketing margin (NMM)].

$$TGMM = \frac{\text{Consumer's Price} - \text{Farmer's Price}}{\text{Consumer's Price}} \times 100 \dots \dots \dots (1)$$

$$GMMp = \frac{\text{Consumer's Price} - \text{Marketing Gross Margins}}{\text{Consumer's Price}} \times 100 \text{ OR } 1 - TGMM \dots (2)$$

$$PS = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r} \dots \dots \dots (3)$$

$$NMM = \frac{\text{Gross Margin} - \text{Marketing Cost}}{\text{Consumer Price}} \dots \dots \dots (4)$$

Where **TGMM** is the total gross marketing margin; **GMMp** is the producers’ participation or producers’ gross margin (which is the proportion of the price paid by the end consumer that belongs to the farmer as a producer), **PS** is the Producer’s share, **P_x** is the producer’s price, **P_r** is the retail price, and **MM** is the Marketing margin.

The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit (Wolday, 1994) whereas in an efficient marketing system, such costs should be recovered plus a reasonable return to investment (Pomeroy and Trinidad, 1995). Studies have found out that estimating marketing margin quite accurately through price surveys at all levels in the distribution channel during one week under normal conditions is normally recommended for perishable products.

2.7 Factors Influencing the Choice of Vegetable Marketing Outlet

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.

The factors drawn from literature on the determinants of market participation include human capital (age, education, gender, extension training, labour and population density), physical capital (number of livestock producing stock, farmland and distance to the agricultural produce markets) and financial capital (crop income, non-farm income, credit). 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 marketing 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. 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.

2.8 Theoretical and Conceptual Framework

This study was based on the theory of rational choice also known as choice theory or rational action theory, which is a framework often used in modelling social and economic behaviour. Rationality was interpreted as "wanting more rather than less of a good".

The conceptual framework attempted to connect aspects of analysis for the factors that influence the choice of marketing outlet.

2.8.1 Theoretical Framework

This study used the rational choice theory by William Glasser, M.D., which 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) by Thurstone. RUM is particularly appropriate for modelling 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 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). Hence, the utility was decomposed into deterministic (V_{ij}) and random (ϵ_{ij}) part:

$$U_{ij} = V_{ij} + \epsilon_{ij} \dots \dots \dots (5)$$

Since it was not possible to observe ϵ_{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:

$$U_{ik} > U_{ij} \quad \forall j \neq k \dots \dots \dots (6)$$

Where U_{ik} represents a random utility associated with the market outlet $j=k$, V_{ij} represents an index function denoting the decision maker' average utility associated with this alternative and ϵ_{ij} represents the random error.

2.8.2 Conceptual Framework

This study has been conceptualized in a diagrammatic form as shown in Figure 2 below. In this framework, it was assumed that the farmers were faced with three options of marketing outlet (farm gate, local open-air market and brokers). The factors that were expected to influence the choice of AIVs marketing outlet were human capital (age, education, household size, sex, extension visits, value addition and farming experience), physical capital (farm size, proportion of AIVs land and distance to agricultural markets) and financial capital (farm income, non-farm income and credit access). The choice of marketing outlet was expected to have an effect on the agro-pastoralists income from AIVs sales. The improved income led to improved welfare, which then feeds back to improving the human capital, and financial capital, which helps in sustaining the choice of market outlet. The intervening factors included the market environment in which the agro-pastoralists were conducting their marketing of AIVs. This marketing environment was expected to have either positive or negative effects on the choice of AIV marketing outlet.

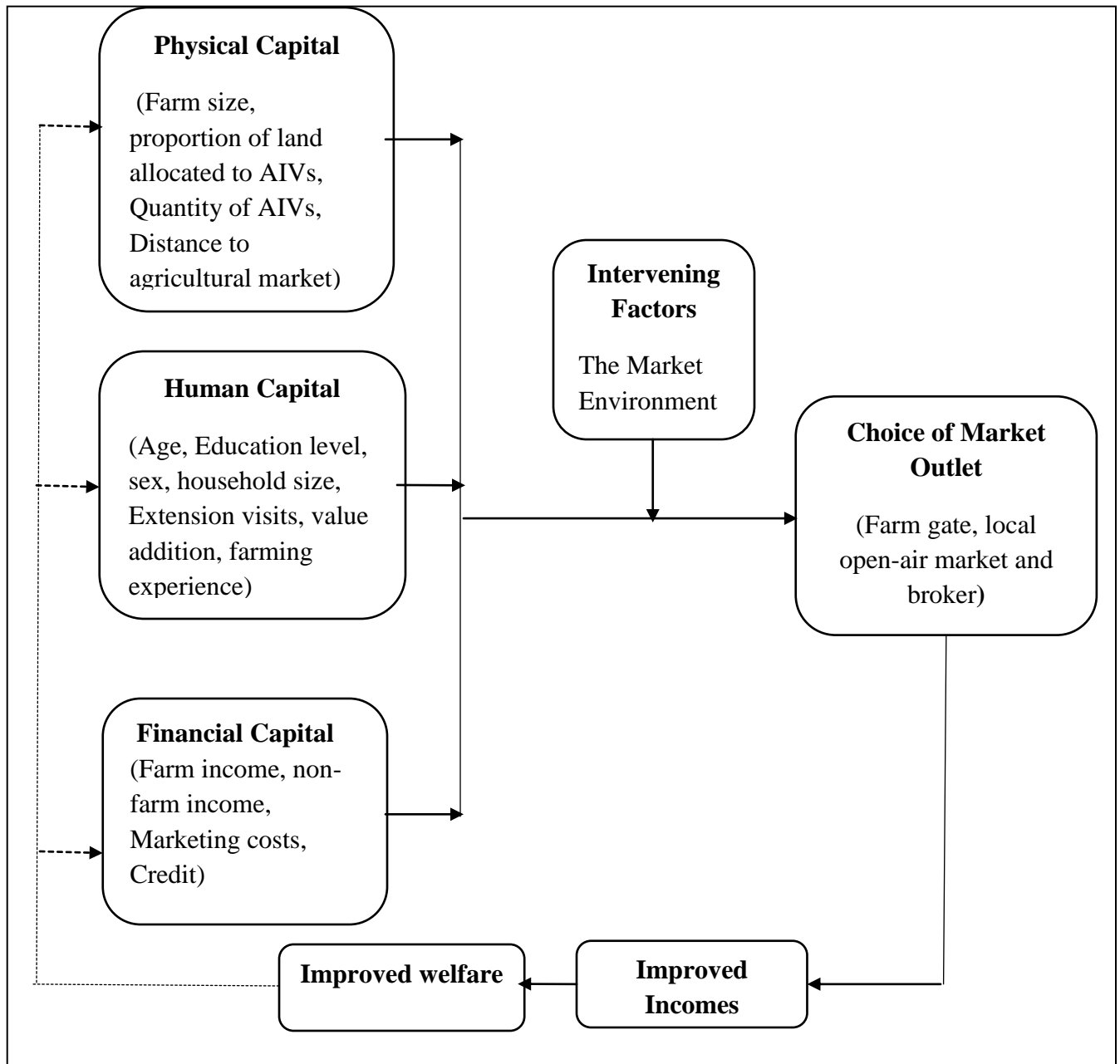


Figure 2: Factors influencing the choice of marketing outlet

Source: Author's conceptualization 2013.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the research methods that were used in collecting and analyzing data from the agro-pastoral Maasai in Narok and Kajiado counties. It starts by explaining the sampling technique and the sample size from which data was collected. The chapter goes on to describe the data collection methods. The section on data collection methods explains the tools that were used for collecting data and the variables that were measured. The analytical framework follows, outlining descriptive statistics and the model for data processing, giving reasons why the model was chosen for the analysis.

3.2 Study Area

This study was conducted in Narok (Narok North sub county, Narok Central ward, Nkareta location) and Kajiado (Isinya sub county, Isinya ward, Engigirr location) counties. Narok county lies within latitude $0^{\circ} 50'$ and $2^{\circ} 05'$ South and within longitudes $35^{\circ} 58'$ and $36^{\circ} 05'$ East. It borders Tanzania to the South, Nakuru and Bomet counties to the North, Kisii county to the West, and Kajiado to the East. It has a population of about 850,920 persons with a poverty rate of 38.3% (GoK, 2009). About 70% of the people in Narok have primary education while only 7% have attained secondary education (GoK, 2009).

Kajiado county lies within latitude $1^{\circ} 53'$ south and within longitudes $36^{\circ} 47'$ East. It borders Tanzania to the South, Narok county to the West, Kiambu and Nakuru counties to the North, and Nairobi, Makueni and Machakos counties to the East. It has a population of about 687,312 persons with poverty rate of 31.6% (GoK, 2009). About 62% of the people in Kajiado have primary education while 12% have attained secondary education (GoK, 2009).

The topography of Narok and Kajiado counties can be categorized into highlands and lowlands. The highlands have altitude ranging from about 3,000 meters while the lowlands range between 1,000 to 1,400 meters above sea level. The highlands have fertile volcanic soils suitable for intensive agriculture. Large-scale farmers inhabit the highlands, which receive reliable rainfall ranging from 1200mm-1800mm. The lowlands are high potential areas for livestock rearing. Nomadic pastoralists and small scale subsistence cultivators inhabit the lowland areas

which are mostly characterized by poor quality soils and unreliable rains (Munyasi *et al.*, 2012). The study areas were chosen for the study because of prevalence of agro-pastoralism.

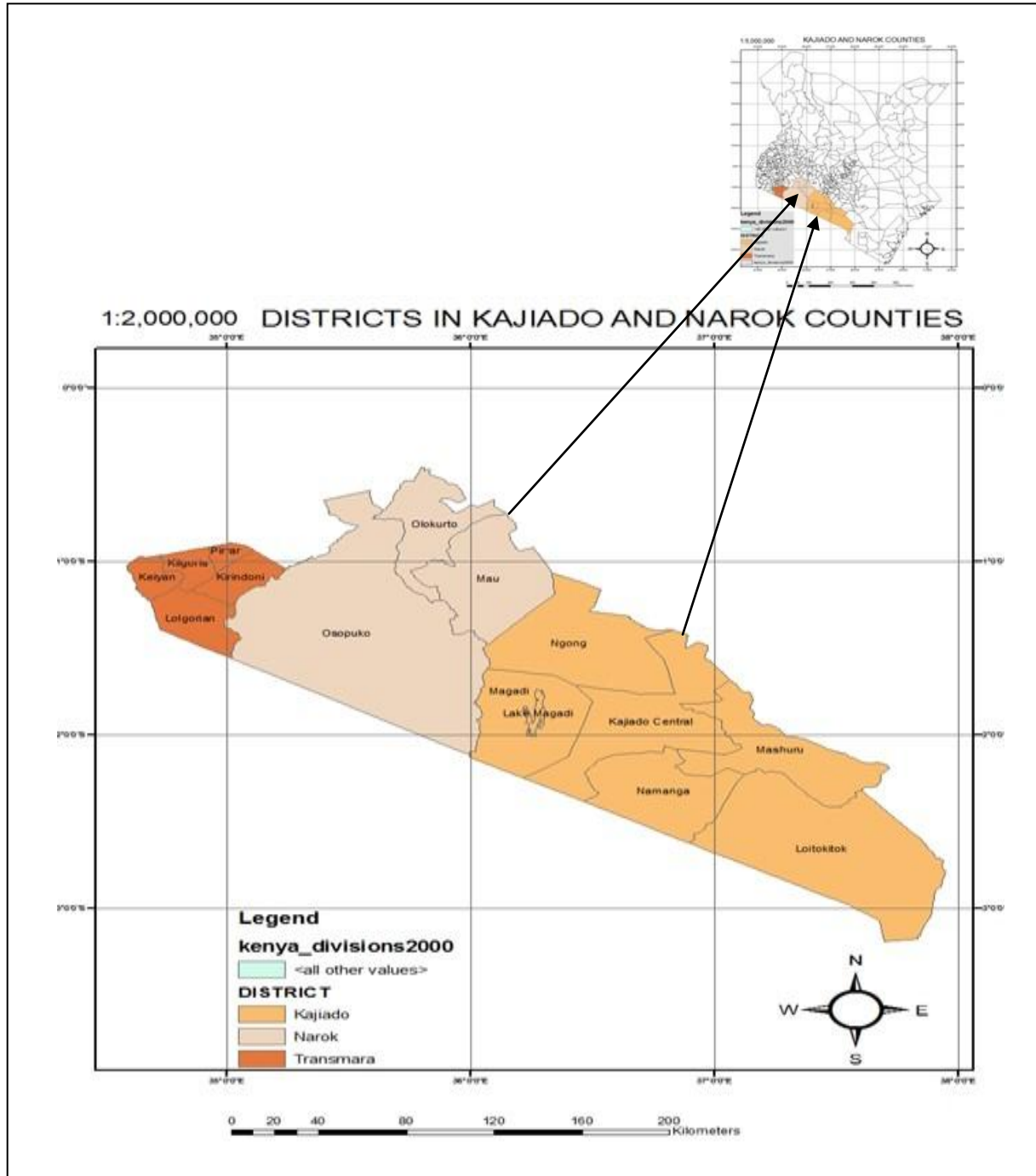


Figure 3: **Map of Narok and Kajiado Counties**

Source: **World Resource Institute, (2000).**

3.3 Research Design and Sampling Procedure

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.

3.4 Sample Size

The desired sample size was determined using a formula by Anderson *et al.* (2007). Using this formula and since the population proportion with the characteristic of interest was not known, this study used 50% for this parameter.

$$n = \frac{pqZ^2}{e^2} \dots \dots \dots (7)$$

Where **n** is the sample size, **p** is population proportion with the characteristic of interest (50%), **q** is **1-p**, **Z** is 1.96 at 95% confidence level (0.05 significance level) and **e** is the acceptable error of 0.069. This resulted to a sample size of 200 that was distributed equally in the two counties.

$$n = \frac{pq Z^2}{e^2} = \frac{0.5 \times 0.5 \times 1.96^2}{0.069 \times 0.069} = 200 \dots \dots \dots (8)$$

3.5 Data Collection

Data for this study was collected using structured questionnaires. The questionnaire captured data on household profile (sex, age, marital status, educational level, farming experience, household size, occupation of the household head, income of household per month, average monthly remittance and the farming objectives), farm enterprises (livestock ownership, land ownership, land use, years of agro-pastoral farming, and crops produced in the last season of January to December 2012), access to credit, group membership, roads infrastructure and transport, marketing of AIVs (marketing outlets, distance to the market, how marketing is done, who market and sets the prices of AIVs, how AIVs' price are set and decided, contract

arrangements, modes of payment, market availability, marketing actors and their roles, marketing problems, marketing costs and marketing information), AIVs value addition and decision making in the household. 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.

3.6 Data Analysis

The Statistical Package for Social Sciences (SPSS version 17.0) was used for data entry and analysis in order to determine the most preferred marketing outlets and marketing margins of key marketing outlets of AIVs while STATA (StataSE 12) was used for data cleaning and analysis to determine the characteristics of the different actors in the marketing of AIVs and establishing the factors influencing the choice of AIVs marketing outlets among the agro-pastoral Maasai of Narok and Kajiado counties. Descriptive statistics were used in determining the most preferred marketing outlets and the characteristics of the different actors in the marketing of AIVs. The main descriptive indicators that were employed were frequencies and mean values because they are useful in analyzing household characteristics as well as analyzing the relationship between variables. Market margin analysis was used in determining the marketing margins of key marketing outlets while a multinomial logistic regression model was used in establishing the factors influencing the choice of marketing outlets for AIVs grown by the agro-pastoralists.

3.6.1 Determination of the Most preferred Marketing Outlets of AIVs

The mean was the main descriptive statistic that was used in determining the most preferred marketing outlets of AIVs in the study areas.

3.6.2 Characteristics of the Different Actors in the Marketing of AIVs

The objective was to determine the characteristics of the different actors in the marketing of AIVs through which AIVs move from producers to consumers and understand transactions' modalities. To characterize the different actors in the marketing of AIVs, descriptive statistics technique using the mean was also used. In this technique, the marketing actors were

characterized in terms of their marketing roles and gender predominance in the marketing of AIVs.

3.6.3 Marketing Margins of Key Marketing Outlets of AIVs

Market margin analysis was used to analyze the data to determine the marketing margins of key marketing outlets of AIVs grown by the agro-pastoral Maasai. The marketing margin refers to the difference between prices at different levels in the marketing system. The total marketing margin is the difference between what the consumers pays and what the producer/farmer receives for AIVs; in other words it is the difference between retail price and farm price. A wide margin means high prices to consumers and low prices to producers. The producers' share, which is a commonly employed ratio, was calculated mathematically as, the ratio of producers' price (ex-vessel) to consumers' price (retail).

$$PS = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r} \dots \dots \dots (9)$$

Where: **PS** = Producers' share, **P_x** = Producers' price of AIVs, **P_r** = Retail price of AIVs and **MM** = Marketing Margin.

According to the equation calculating **PS**, i.e. equation (9), a higher marketing margin diminishes producers' share and vice versa. It also provides an indication of welfare distribution among production and marketing agents. Calculating the total marketing margin was done using the following formula:

$$TGMM = \frac{\text{Consumer Price} - \text{Farmers' Price}}{\text{Consumers' Price}} \times 100 \dots \dots \dots (10)$$

Where **TGMM** represents the Total Gross Marketing Margin

The Marketing Margin (MM) and the Net Marketing Margin (NMM) was calculated using equation (11) and equation (12), respectively. The NMM is the percentage over the final price earned by the intermediary as net income once marketing costs are deducted.

$$MM = P_r - P_x \dots \dots \dots (11)$$

$$NMM = \frac{\text{Gross Margin} - \text{Marketing Cost}}{\text{Consumer Price}} \dots \dots \dots (12)$$

The NMM shows the allocative efficiency of markets. Higher NMM or profit of the marketing intermediaries reflects reduced downward and unfair income distribution, which depresses market participation of smallholders. An efficient marketing system is where the net margin is near to normal or reasonable profit.

3.6.4 Factors Influencing the Choice of AIVs Marketing Outlet

The multinomial logistic regression model was used to establish the factors that influence the choice of marketing outlet. Hill *et al.* (2001) noted that multinomial logistic regression could be used to predict a dependent variable, based on continuous and/or categorical independent variables, where the dependent variable takes more than two forms. Furthermore, it is used to determine the percent of variance in the dependent variable explained by the independent variables and to rank the relative importance of independent variables. Gujarati (1992) explained that logistic regression does not assume linear relationship between the dependent variable and independent variables, but requires that the independent variables be linearly related to the logit of the dependent variable. Pundo and Fraser (2006) further explained that the model allows for the interpretation of the logit weights for the variables in the same way as in linear regression. The multinomial logistic regression model was chosen because it allows one to analyze data where participants are faced with more than two choices. The agro-pastoral Maasai were mapped into three marketing outlets: sales to farm gate, local open-air market and to brokers. The decision to market AIVs through a particular marketing outlet was based on the option, which maximizes their utility, subject to certain constraints.

O’sullivan *et al.* (2006) pointed out that it is difficult to measure utility directly; therefore, it is assumed that households make marketing choices depending on the option that maximizes their utility. Thus, decisions to market at the farm gate markets, local open-air markets, and brokers or even not to sell signify the direction, which maximizes utility. With the given assumption, multinomial regression was used to relate the decisions to sell at the farm gate, local open-air market and broker or even not to sell and the factors that influence these choices. A typical logistic regression model, which was used, is of the form:

$$P_{ij} = \beta_0 + \beta_i X_i + \varepsilon_i \dots \dots \dots (13)$$

Where P_{ij} represent the probability of choice of any given outlet by the agro-pastoral Maasai, X_i are factors affecting choice of a market outlet, β are parameters to be estimated, j represents the alternative choices of a market outlet and ϵ is randomized error. P_{ij} takes the values (1, 2, 3) each representing choice of marketing outlet (Farm gate =1, Local open-air market =2, and brokers =3).

In the model, marketing outlet choice, with three possibilities (farm gate markets, local open-air market and broker) was set with the not selling as the basic variable (baseline group). The probability of choosing outlet j was given by:

$$Prob(Y_i = j) = \frac{\epsilon_{zj}}{\sum_{k=0}^j \epsilon_{zk}} \dots \dots \dots (14)$$

Where Z_j represents choice of marketing outlet and Z_k represent an alternative choice of the marketing outlet that could be chosen. In this model, the estimates were used to determine the probability of choice of a marketing outlet given X_i factors that affect the choice j . Given the alternative choices of marketing outlets; the log odds ratio was computed as:

$$\ln\left(\frac{P_{ij}}{P_{ik}}\right) = \alpha + \sum X_i(\beta_j - \beta_k) + \epsilon \dots \dots \dots (15)$$

Where P_{ij} and P_{ik} are the probabilities that a farmer will choose a given outlet and alternative outlet, respectively, $\ln\left(\frac{P_{ij}}{P_{ik}}\right)$ represents the natural log of probability of choice j relative to probability of choice k , α represents a constant, β represent a matrix of parameters that reflect the impact of changes in X on probability of choosing a given outlet and ϵ is the error term that is independent and normally distributed with a mean zero.

Greene (2002) noted misleading association of β_j with the j^{th} outcome and recommended interpretation of the coefficients of multinomial regression using the marginal effects, which are the probabilities of observing a particular outcome. The marginal effects were computed as per equation 15 by differentiating the coefficients at their mean.

$$\delta_{ji} = \frac{\delta P_j}{\delta X_i} = P_j \left[\beta_j - \sum_{j=0}^3 P_j \beta_j \right] = P_j [\beta_j - \beta], \quad j = 0,1,2,3 \dots \dots \dots (16)$$

Where δ_{ji} gives the probability of individual i using outlet j and every sub-vector of β enter every marginal effect both through probabilities and through weighted average.

Multinomial logistic regression model is useful in analyzing data where the researcher is interested in finding the likelihood of a certain event occurring. According to Gujarati (1992) the multinomial logistic regression model is used to predict the probability (\mathbf{p}) of occurrence, not necessarily getting a numerical value for a dependent variable. The procedure for formulating a multinomial logistic regression model was explained by Dougherty (1992) as the same as for a binary logistic regression. However, the dependent variable in the binary logistic regression has two categories whereas the dependent variable in the multinomial logistic regression has more than two categories. This shows that the multinomial logistic regression model is an extension of binary logistic regression. The relationship between dependent and independent variables can be explained by several methods such as linear regression models, probit analysis, log-linear regression and discriminant analysis as elaborated by Mohammed and Ortmann (2005).

A study by Montshwe (2006) revealed that linear regression model, also known as Ordinary Least Squares regression (OLS) as the most widely used modelling method for data analysis. However, Gujarati (1992) has pointed out that the OLS is useful in analyzing data with a quantitative (numerical) dependent variable but has a tendency of creating problems if the dependent variable is qualitative (categorical). OLS is also associated with the problem of violating the fact that the probability has to lie between 0 and 1, if there are no restrictions on the values of the independent variables. In addition, OLS has been found not practical because it assumes that the rate of change of probability per unit change in the value of the explanatory variable is constant. The log-linear regression requires that all independent variables be categorical whereas discriminant analysis requires them all to be numerical. In addition, Klecka (1980) noted that discriminant analysis assumes multivariate normality, and this limits its usage because the assumption may be violated.

The multinomial logistic regression model was chosen because it has more advantages, especially when dealing with qualitative dependent variables. According to Gujarati (1992), the multinomial logistic regression guarantees that probabilities estimated from the logit model will always lie within the logical bounds of 0 and 1 and does not increase by a constant amount but approaches 0 at a slower rate as the value of an explanatory variable gets smaller. Further to this, Dougherty (1992) also found that logistic regression model can also be used when there is a mixture of numerical and categorical independent variables. In this study, the logistic model was preferred because of its comparative mathematical simplicity and fewer assumptions in theory.

Moreover, logistic regression analysis is more statistically robust in practice, and is easier to use and understand than other methods.

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). Selected variables conceptualized in chapter 2 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:

$$\ln\left(\frac{P_{ij}}{P_{ik}}\right) = \alpha + \beta_1 Sex + \beta_2 Age + \beta_3 EDL + \beta_4 HHSize + \beta_5 YrsAgropast + \beta_6 QtyAIVs + \beta_7 ExtnVisit + \beta_8 AgriMktDist + \beta_9 MktCost + \beta_{10} LvalAdd + \beta_{11} OfffrmInc + \beta_{12} Crdt + \varepsilon \dots \dots \dots (17)$$

The variable reflecting sex of the household was measured by assigning zero for male and one for 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's 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 influencing 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 kilometres. 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 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 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 are able to facilitate the marketing functions of AIVs easily or even abandon marketing of AIV in favour of other enterprises.

Table 1: Description of variables for the multinomial logit model

Variable	Description	Unit of measurement	Expected sign on choice of marketing outlet
Dependent variable			
Choice of market outlet	Which market outlet do you mostly sell your AIVs	1= Farm gate; 2 = Local open-air market 3= Broker	
Intervening variable			
Market Environment	What are the intervening factors	0=Internal (4Ps), 1=External (SLEPT)	±
Independent variables			
Sex	Sex of the household	0= Female, 1= Male	+
Age	Age of the household	Years	+
EDL	Education level	Years in school	+
HHSize	Household size	Number	+
YrsAgropast	Years in agro-pastoral farming	Years	±
QtyAIVs	Quantity of AIVs sold	Kilograms	±
ExtnVisits	Number of visits to the nearest extension service provider	Number of visits	+
AgriMktDist	Distance from the nearest agriculture produce market	Kilometres	+
MktCost	Marketing cost	KES	+
LvalAdd	Levels of value addition	Number of value addition techniques?	±
OffrmInc	Off farm income	KES	±
Crdt	Amount of loan	KES	±

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter provides the results as well as their discussion. The chapter begins with brief explanations of the demographic and socio-economic characteristics of the sampled households, which is then followed by a discussion of the most preferred marketing outlets for AIVs. It goes on to discuss the characteristics of the different actors in the marketing of AIVs. A discussion on the marketing margins of key marketing outlets and the factors influencing the choice of the marketing outlet is also provided.

4.1.1 Demographic and Socio-economic Characteristics

This section provides an analysis of the demographic and socio-economic characteristics of the 200 households sampled. 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 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 2 was about 40 years for Narok and 45 years for Kajiado giving an overall mean age of about 43 years. The mean age for male and female was about 43 years and 42 years, respectively. 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 2). 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 2). 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.

Table 2: 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 mean farm size was about 6 hectares for Narok and 4 hectares for Kajiado (Table 2). 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 2). 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 kilometres for Narok and 10 kilometres for Kajiado (Table 2). The overall mean distance was about 12 kilometres. 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 centres.

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 3). 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.

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 3) 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 3) 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.

Table 3: 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%**

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 kilometres of tarmac road in Narok (22%) than in Kajiado (12%). On the other hand the kilometres of murram road are more in Kajiado (71%) than in Narok (45%). The results also indicate that there are more kilometres 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 4). 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 4: 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-Pastoral Maasai of Narok and Kajiado counties.

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 5 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. This can be attributed to the proximity of Kajiado to urban centres such as Nairobi which is a big market for AIVs.

Table 5: Households marketing AIVs

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

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 and they face lower transportation costs.

The descriptive results in Table 6 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 6: 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 7 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 7: Reasons for preference of a particular marketing outlet by the Agro-pastoral Maasai

Reasons of preference	Percentages									
	Marketing Outlets									
	Narok county			Kajiado county			Overall			
	Farm Gate	Local	Open-air Broker	Farm Gate	Local	Open-air Broker	Farm Gate	Local	Open-air 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 8. 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%).

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 8 being aggravated by lack of marketing information. Schipper (2002) cited other constraints often not mentioned by farmers as lack of awareness of economic value of AIVs.

Table 8: Reasons for not marketing AIVs by the Agro-pastoral Maasai of Narok and Kajiado

Reason(s)	Percentages		
	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

4.3 Characteristics of the Different Actors in the Marketing of AIVs

Along the AIVs marketing chain, there are a number of marketing actors who handle AIVs at different stages in the process of marketing. They together form the link through which AIVs are moved from the production point until they reach the ultimate consumers. These actors include producers, brokers, retailers, wholesalers, transporters and consumers among others. Results in Table 9 show the characteristics of different AIVs marketing actors in Narok and Kajiado counties. The producers are about 62% in Narok and 65% in Kajiado. Amongst the producers, about 17% in Narok and 22% in Kajiado transport their AIVs to the market. From the pooled data, the producers are about 64% of the respondents and amongst them about 19% transport their AIVs to the market. The producers transporting AIVs mostly market at the local open-air market.

The brokers who purchase AIVs were about 53% in Narok and 33% in Kajiado. However, most of the brokers purchase the AIVs at the farm gate. The retailers performed the function of bulk breaking and sold in small quantities to the consumers. The percentage of retailers was about 56% in Narok, 30% in Kajiado and 43% on overall. The wholesalers bulking AIVs in Narok were about 54% while in Kajiado, they were 18%. This finding show that

wholesalers are more pronounced in Narok than in Kajiado counties which could be due to the fact that the agro-pastoral Maasai in Kajiado sell direct to retailers and consumers.

Results in Table 9 also show that the transporters were about 55% in Narok and 50% in Kajiado, giving an average of 53% on overall. The commonly used mode of transport is the motor bikes also known as '*boda bodas*'. The '*boda bodas*' are commonly used because they are fast, cheap and can be used on roads that are not passable by motor vehicles. Besides, it is the readily available means of transport in the study areas. Some of the transporters were involved in sorting. The transporters involved in sorting (to remove rejects and non-marketable produce) were about 13% in Narok, 28% in Kajiado and 20% on overall. The results also indicate that some of the transporters purchase AIVs from producers. Such transporters were about 23% in Narok, 7% in Kajiado and 15% on overall. This shows that some of the transporters are not only involved in transporting the vegetables but also in sorting and purchasing of AIVs.

Sharing of market information is very low in both counties (Table 9). The producers sharing marketing information with other marketing actors in Narok were about 4%. The brokers, retailers and transporters sharing marketing information in Narok were about 11%, 1% and 9%, respectively while in Kajiado brokers, retailers, wholesalers and transporters sharing marketing information with other marketing actors were about 3%, 5%, 6% and 8%, respectively. Flow of marketing information is very vital in reducing information asymmetry between and amongst the marketing players. The results of the characteristics of the different actors in the marketing of AIVs grown by the agro-pastoral Maasai of Narok and Kajiado counties are in agreement with the findings of Amare and Dawiti (2013) in a study on marketing channels of red pepper at Jabitehinan district in North-western Ethiopia, which found the marketing actors, composed mainly of farmers (producers), wholesalers, assemblers, processors and consumers. They also revealed that wholesalers and the processors frequently transport their pepper to the market. Similarly, Ada-Okungbowa *et al.*, (2013) also found that wholesalers were involved in purchasing, transportation, packaging and storage of palm oil to the retailer or directly to the consumers in a study on profitability of palm oil marketing in Ethiopie East Local Government Area of Delta State, Nigeria.

Table 9: Characteristics of different AIVs marketing actors in Narok and Kajiado Counties

	Narok					Kajiado					Overall				
	Producers	Brokers	Retailers	Wholesalers	Transporters	Producers	Brokers	Retailers	Wholesalers	Transporters	Producers	Brokers	Retailers	Wholesalers	Transporters
Producing	62.0	0.0	0.0	0.0	0.0	65.3	0.0	0.0	0.0	0.0	63.7	0.0	0.0	0.0	0.0
Transporting	17.0	5.0	13.0	11.0	55.0	21.6	29.5	18.1	30.8	49.9	19.3	17.3	15.6	20.9	52.5
Bulking	6.0	5.0	4.0	54.0	0.0	6.4	5.7	0.0	17.9	0.0	6.2	5.4	2.0	36.0	0.0
Sorting	5.0	6.0	14.0	15.0	13.0	4.8	27.6	26.7	11.9	27.6	4.9	16.8	20.4	13.5	20.3
Break Bulking	2.0	2.0	56.0	0.0	0.0	0.9	0.0	29.5	2.0	3.0	1.5	1.0	42.8	1.0	1.5
Packaging	2.0	9.0	3.0	5.0	0.0	1.0	0.9	14.3	7.0	1.7	1.5	5.0	8.7	6.0	0.9
Purchasing	1.0	53.0	6.0	0.0	23.0	0.0	32.5	6.6	11.0	6.8	0.5	42.8	6.3	5.5	14.8
Offer credit	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	1.5	0.0	0.0	1.5
Share marketing Information	4.0	11.0	1.0	0.0	9.0	0.0	2.8	4.8	6.4	8.0	2.0	6.9	2.0	3.2	8.5

4.3.1 Gender Predominance in Marketing of AIVs

Results on gender predominance in marketing of AIVs show that females constitute higher proportion of the actors in marketing of AIVs in both counties except for wholesalers and processors in Narok (Table 10). Table 10 also shows that females retailing AIVs account for about 94% in Narok, 97% in Kajiado and 95% on overall. This trend was also observed in the local open air markets where AIVs were traded. Male brokers' participation was observed to be higher in Narok at about 27% compared to 17% in Kajiado whereas; female brokers' participation was about 73% in Narok and 83% in Kajiado. The results in Table 11 also show a high female participation in the production of AIVs at about 83% in Narok and 94% in Kajiado. Consumption of AIVs by females is also high at about 97% in Narok and 98% in Kajiado. This could be due to the fact that AIVs are highly regarded as female enterprises thus their predominance. In addition, most of the males are occupied in herding and females in farming. This finding of female predominance in AIVs marketing is in agreement with Nekesa and Meso (1997) and Maundu *et al.* (1999).

Table 10: Gender predominance in marketing of AIVs

	Percentages					
	Narok		Kajiado		Overall	
	Male	Female	Male	Female	Male	Female
Producers	16.67	83.33	6.25	93.75	11.02	88.98
Brokers	26.83	73.17	16.67	83.33	23.73	76.27
Retailers	5.88	94.12	3.51	96.49	4.05	95.95
Wholesalers	50.00	50.00	41.67	58.33	42.31	57.69
Processors	50.00	50.00	27.27	72.73	30.77	69.23
Consumers	2.86	97.14	1.64	98.36	2.08	97.92

4.4 Marketing Margins of Key Marketing Outlets of AIVs grown by the Agro-Pastoral Maasai of Narok and Kajiado counties.

The study sought to find out marketing margins of the key marketing outlets of AIVs grown by the agro-pastoral Maasai. One notable thing was that in as much as many of the agro-pastoral households in Narok did not grow AIVs, they harvested these vegetables especially

night shade and vegetable amaranth from the wild and large farms and sold the same to the market, hotels and even middlemen from urban centres like Nairobi. The results on marketing margins are shown in Table 11.

Table 11: Marketing margin of key marketing outlets of AIVs grown by the agro-pastoral Maasai

Marketing outlet	Type of vegetables				Mean Market Outlet	F – value	P- value
	Night shade	Vegetable amaranth	Cowpeas	Spider plant			
	Marketing Margin (KES)						
Farm gate	2.330	2.250	2.440	2.177	2.300		
Local open air market	5.740	3.010	4.950	3.950	4.412	8.327	0.019
Brokers	3.650	2.226	3.720	2.999	3.147		
Mean Vegetable type	3.907	2.500	3.703	3.039			
F – value			3.234				
P- value			1.103				

Vegetable type*Marketing outlet, P<0.0001

The marketing margins of key marketing outlets were significant (P=0.10) indicating that the variations of marketing margins varied across the marketing outlets (Table 11). The local open air market emerged the most profitable marketing outlet in the study sites, followed by brokers with least profitability recorded for the farm gate marketing outlet. The subsequent ANOVA test results for the marketing margins of the different type of AIVS were statistically insignificant. The results also show a significant interaction between the vegetable type and marketing outlet (P<0.0001). This imply that the marketing margins were only significant at the marketing outlets visa vis the vegetable type. The significance in the marketing margin could be due to the variation in prices paid to farmers selling the different AIVs through the various outlets and the marketing costs especially information and transport costs which vary along the different marketing outlets. These findings are in agreement with those of Mohammad *et al.* (2006) who found that selling vegetables at the local markets has a high marketing margin due to good selling price, low transport cost and using family labour in the marketing of vegetables in Northern part of Bangladesh. Hazoor *et al.* (2010) also contend that local markets had a high marketing margin for citrus in a case study of Sargodha region of Pakistan.

4.5 Factors Influencing the Choice of AIVs Marketing Outlets among the Agro-Pastoral Maasai of Narok and Kajiado counties

This section focuses on the factors influencing the choice of AIVs marketing outlets among the Agro-Pastoral Maasai of Narok and Kajiado counties. The main objective of this section is to present the empirical results of the model that was given in Chapter 3, in accordance with the research objective that sought to determine the factors influencing the choice of AIVs marketing outlets.

4.5.1 Model Empirical Results

This section presents the results of the multinomial logistic regression model and discusses the results of the significant variables that influence the choice of marketing outlet of AIVs in Narok and Kajiado counties. The multinomial logistic results are presented in Table 12. 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.

As shown in Table 12, 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. Favourable 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 kilometre 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 (Table 11). 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 kilometre 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.

Table 12: Multinomial logit estimates and marginal effects for factors influencing the choice of marketing outlets

Explanatory variables	Farm gate		Local open market		Brokers	
	Coefficient s	Marginal effects	Coefficient s	Marginal effects	Coefficient s	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;

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.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

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. The study specifically focused on the most preferred marketing outlets, the characteristics of the marketing actors and marketing margin of key marketing outlets of AIVs. It further looked at the factors that influence the choice of marketing outlets. Based on the results obtained in the study, the most preferred marketing outlet on overall was the local open air market followed by farm gate and brokers in descending order. The study revealed that the choice of the most preferred marketing outlet depends on situations and convenience and the major problem in AIVs marketing evolves around lack of marketing information among the agro-pastoral Maasai. The results show that the marketing actors composed mainly of farmers (producers), brokers, retailers, wholesalers and transporters. The results also indicate female predominance in AIVs marketing and that AIVs are highly regarded as female enterprises. According to the findings of the study, the local open air market is the most profitable marketing outlet for the commonly grown AIVs. 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.

5.2 Recommendations

Based on the findings, this study recommends capacity building of the actors in the marketing of AIVs with special preference to women. The marketing outlets with high marketing margin need to be promoted. The study also recommends 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. Finally, 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. These recommendations will go towards contribution to the improvement of the livelihood of the agro-pastoral Maasai in the studied areas.

5.3 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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APPENDICES

Appendix 1: Questionnaire
QUESTIONNAIRE FOR SMALLHOLDER AGRO-PASTORALISTS ON
PRODUCTION, UTILIZATION AND MARKETING OF AIVS

Questionnaire Number.

You are one among several smallholder farmers in this area who have been selected for this study. The study aims to evaluate the production, utilization and marketing of African Indigenous Vegetables (AIVs). The study findings may be useful in promoting the production and utilization of AIVs among agro-pastoralists, which may result in improved food security and livelihoods. The information you give will be very useful towards this end. Your identity however will be strictly confidential.

Date..... Enumerator (EN) Name.....

PART A: GENERAL INFORMATION

A1 Geographic Location

County Sub County.....
 Ward Location
 Village (VIL).....

A2 Profile of the Head

Respondent	Sex (HH)	Age (Years) (HH)	Marital Status(HH)	Educ. Level (HH)	Farming Experience(HH)
Relationship to HH	SEX	AGE	MRTS	EDL (YRS)	FEXP (YEARS)

Codes:

Relationship 1. Head 2. Wife 3. Child 4. Others (specify).....

Sex: 1 = Male 2 = Female

Marital status: 1 = Married 2 = Single 3 = Divorced 4 = Separated 5 =
Widowed

A3 Household size – Adults (over 18 years)..... Children

A4 What is the occupation of the household head?.....

1. Mixed farming 2. Salaried Employee 3. Hired worker 7. Others (specify).....

A5 What is the amount of income of the household per month?

A6. Does the family receive any remittances? 1= Yes [] 2 = No []

A7. If yes, what is the average amount per month? _____

A8. What are your farming objectives?

1= Making Profits [] 2 = Support the family [] 3 = Reduce risk of hunger []

4 = As a way of life [] 5 = Have no other option (could abandon farming) []

6 = Others (*Specify*)

PART B: FARM ENTERPRISES

B1 Livestock Ownership

Type of Livestock	Number of animals

Code: Cattle – 1, Goats-2, Sheep- 3, Others- 4

B2 Land Ownership

	Size in Acres	Rental Price (KES.) Per acre
1. Own		
2. Rented		
3. Leased		
4. Others (specify)		

B3 Land Use

1. Land use (specify)	Size in Acres	Years in Same use	Rank : 1 for major
2. Homestead			
3. Forest			
4. Crops			
5. Livestock			
6. Others (specify)			

B4 For how long has the household practiced agro-pastoral farming system?..... (years)

B5 Answer the following questions for all crops produced in the last season (**Jan- Dec 2012**).

Crop	Acreage

Crop codes	8 = maize(Dry)	
1= beans	9 = sorghum	16= groundnuts
2= bananas	10= finger millet	17=Oranges
3=Watermelon	11=Tomatoes	18=passion fruit
4= Soya beans	12= Local vegetables	19=potatoes
5= Green peas	13= onions	20=cabbages
6= pigeon peas	14= sweet potatoes	19=Other(specify)_____
7= cowpea leaves	15= kales	

PART C: PRODUCTION AND UTILIZATION OF AIVS

C1 Of the crops grown, does the household grow AIVs [] 1 = Yes 2 = No

C2 If No to C1 above what are the reasons for not growing AIVs (tick) 1.= Not food

2. =They grow wild 3.= Others (List)

C3 If No to C1 above, would the household be willing to integrated AIVs into its farming system?[] Yes = 1, No = 2

C4 If No to C3 above what are the reasons (List).....

C5 If Yes to C1 above, For African Indigenous vegetables grown give the types and acreage (Give the Maasai Names and interpret to Kiswahili or English)

Type of AIV	Acreage

C6 List the type of costs and the amount of expenses you incurred in producing AIVs during the last season

Type of cost	Cost in KES/ acre
1.Labor	
2.Seed	
3.Fertilizer	
4.Pesticide	
5.Others	

C7 How does the household utilize AIVs? []

Type of AIV	Way of Utilization	Percentage of AIV produced

Code 1= Food, 2=Selling, 3 = Both, 4= Others (List)

PART D.CREDIT

D.1 Did any member of the household apply for credit in the last season?

1. Yes 2. No

D.2 Was the credit availed? 1.Yes 2. No

D.2.1: If yes, how much?.....

D.3 If yes, what was the purpose of the credit?1. Crops production 2. Livestock

Production 3. Others, specify.....

D.4 If No, what was the reason for not being given credit?

1. Had outstanding loan 2. Did not need

3. No security 4. Others, specify.....

D.5 Which is the main source of credit?

1. Commercial Bank 2. NGO 3.Sacco

4. Relative 5. Group 6.Others, Specify

PART E. GROUP MEMBERSHIP

E.1 Do you belong to any group in your area?

1. Yes 2. No

E.2 If yes, fill the details in the table

Group type	No. of female members	No. of male members	Year started	Group activities	Meetings per month	Savings per month

Group types code: 1=Self Help group 2= Welfare group 3=Cooperative Society 4= Farmers group

5= Climate change CIG 6= Others (Specify)

Group activities code: 1=Farming 2=Business 3=HIV/AIDS 4=Advocacy 5= Other (specify)

E.3. What benefits do you derive from membership in the groups?

1. Information on credit 2. Welfare 3. Advice on farming 4.Others (specify)

PART F. ROADS INFRASTRUCTURE AND TRANSPORT

F.1. Distance from homestead to:

	Distance (KM)	Road type
1. The nearest farm inputs stockist	<input type="checkbox"/>
2. The nearest Extension service provider	<input type="checkbox"/>
3. The nearest crop production service provider	<input type="checkbox"/>
5. The nearest agriculture produces market	<input type="checkbox"/>

Code Road type: 1= tarmac 2 = murrum 3 = no road

F.1.1: Do you visit any service provider

F.1.1.1: If yes, how many times

F.1.1.2: If no, why.....

F.1.2: Have you been visited by any extension service provider

F.1.2.1: If yes, how many times

F.1.2.2: If no, why.....

F.2. If you take your produce to the market, what kind of transport do you use?

1=Public 2=Private 3=Farmer carries produce on his head

F.3. If public, what type of transport mode do you use, what is the travel time and how much do you pay?

Mode of Transport	Travel time	Fare
Truck		
Min bus		
Ox cart		
Bus		
Bicycle		
Other (specify)		

F.4. Why do you use that particular mode?

1=Cheap 2=No alternative 3=To carry more 4=Faster 5=Other (specify).....

PART G. MARKETING

H.1. Do you sell AIVs 1. Yes [] 2.No []

H.2 If no gives reasons.....

If yes ANSWER G.3 -

G.3. Which market outlets do you mostly sell your AIVs []

Code: Farm gate = 1 Local open-air market = 2 Supermarket =3 Others = 4

Type of AIV	Farm gate				Local Open-air Market				Supermarket				Broker			
	Low Season		High Season		Low Season		High Season		Low Season		High Season		Low Season		High Season	
	Cost	Price/Kg	Cost	Price/Kg	Cost	Price/Kg	Cost	Price/Kg	Cost	Price/Kg	Cost	Price/Kg	Cost	Price/Kg	Cost	Price/Kg

G.4. How far is the nearest market where you sell your AIVs from your home?km

G.5 How far are the other markets where you **do not sell** your AIVs from your home?

Type of Market Outlet	Distance from home in Km	Time taken (hours)	Fare (KES)

G.6. How is marketing done? [] 1 = Individual, 2 = Group marketing,

INDIVIDUAL	Reason	GROUP MARKETING	Reason
	You don't sell at the same time		It lowers costs
	You don't sell at the same market		Increases bargaining power
	You have a conflict		Share market information
	They will degrade your produce Other (Such as:)		Other (Such as:)

G.7. Who markets the AIVs? 1= HHD Head, 2=Spouse, 3=Children, 4.All HHD members, 5= Others (Specify).....

G.8. Who sets the AIV prices? 1= HHD Head, 2=Spouse, 3 = Children, 4. All HHD members, 5= Others (Specify).....

G.9. How is price set during the sales?

I set the price	We negotiate	It is market driven	It is dictated by buyers	Other (Specify)

G.10. How do you decide the sale price of your AIVs? Mark with an X as appropriate

	Very important	Important	Not important
It depends on the price of other local farmers			
It depends on the market we sell to			

It depends on the production costs			
It depends on the concentration of the market			
It depends on the transaction costs ¹			

G.11. Do you have contract arrangements with the buyers? 1 = Yes [], 2 = No []

G.12. If yes, what type of contracts? 1 = Signed contract 2 = Informal/word of mouth 3 = other (specify)

G.13. Complete the table below for payments and how long it takes to receive the payment

List the market outlet	How are you paid?			Time taken for the payment
	Cash	Cheque	Other (specify)	

G.14. Do you always find a market for all the AIVs you produce? 1. Yes [] 2.No []

G.15. If No, what happens to the unsold AIVs? Mark with an X.

Lose to spoilage	Eat (family and friends)	Sell at low prices	Store and sell later	Process it

G.16. Who are the actors in AIVs market chain (tick as appropriate)

Producers (farmers) [] Brokers [] Retailers []

Wholesalers [] Consumers [] Processors [] Others (specify).....

G.17. Kindly indicate appropriate the roles and characteristics of the various actors in the AIVs market

Actor	Role (indicate the code)	Gender Predominance
Producers (farmers)		
Brokers Producers (farmers)		
Retailers		
Wholesalers		
Processors		
Consumers		
Others (specify)		

ROLES DODE: 1=Production; 2=Transportation, 3= Bulking, 4=Sorting, 5=Break bulking, 6=Packaging, 7=Storage; 8=Purchasing, 9=Offer credit, 10= Provide marketing/market information

G.18. Do you experience problems in marketing your AIVs? Yes (1) [] No (2) []

G.19.If yes, what problems do you encounter?

Constraint	Rank of constraint (1=Mild, 2=Severe, 3=Very severe)	Coping mechanism
1=Poor roads		
2= high transport costs		
3=low prices		
4=low demand		
5= Poor storage facilities		
6=Lack of markets		
7=high rate of spoilage of AIVs		
8=High processing costs		
9=Lack of market information		
10=High local taxes (road taxes and market dues)		
11=Unorganized farmers		
12=Thieves		
13=Others (specify)_____		

G.20. What are marketing costs do you incur when you take your produce to the market?

Items	Cost (KES).	Remark
Sales tax		
Transport cost		
Loading and unloading		
Packing		
Others		

G.21. Did you know the nearby market price before you sold your AIVs?

1. Yes [] 2. No []

G.22. How did you get information on supply, demand & price of AIVs in other markets?

	Use code	Code for Source of information
Supply		1. Other AIV traders 4. Personal observation
Demand		2. Radio 5. Broker 7. TV
Price		3. Telephone 6. Newspaper 8. Other

PART H. AIV VALUE ADDITION

H.1. Do you add value to your AIVs Yes [] No [] **Code Yes 1, No 2**

H.2. What major activities do you do before marketing AIVs?

1=Cleaning, such as removing soil and foreign matter []

2=Sorting, to remove rejects and non-marketable produce []

3=Grading, to separate produce into similar sizes and qualities before packaging []

4= Packaging [] 5= Other (specify).....

H.3. What motivated you to choose the form of value addition?

If no to 1 above

H.4. Give reasons for not adding value.....

PART I. DECISION MAKING IN THE HOUSEHOLD

I.1 Who takes decisions in allocating land for African Indigenous vegetable production?

1= HHD Head, 2=Spouse, 3=Children, 4=All HHD members,

5= Others (Specify).....

I.2 Who takes decisions in AIV value addition? 1= HHD Head, 2=Spouse, 3=Children, 4=All HHD members, 5= Others (Specify).....

I.3 Who takes decisions in using proceeds from AIVs sales? 1= HHD Head, 2=Spouse, 3=Children, 4=All HHD members, 5= Others (Specify).....

Appendix 1I: Research Permit

Appendix 1II: Publication