

**INFLUENCE OF INFORMATION ACCESS ON ADOPTION OF IMPROVED
SWEETPOTATO VARIETIES IN MIGORI COUNTY, KENYA**

Tabitha Auma Ojuodhi

**A Thesis submitted in partial fulfillment of the requirements for the degree of
Master of Science in Agricultural Extension and Rural Development System of
Masinde Muliro University of Science and Technology**

November, 2019

DECLARATION

This thesis is my original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a degree or any other award.

Signature_____ Date _____

Tabitha Auma Ojuodhi

Reg. No. ERD/G/01/15

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a thesis entitled “**Influence of information access on adoption of improved sweetpotato varieties in Migori County, Kenya**”.

Signature_____ Date _____

Dr. Alice Chesambu Ndiema

Agribusiness Management and Extension Department

Masinde Muliro University of Science and Technology

Signature_____ Date _____

Dr. Joyce Nawire Maling’ a

Food Crops Research Institute

Kenya Agricultural and Livestock Research Organization

P.O BOX 450-30200

KITALE

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DEDICATION

To my parents, the late Loice Anyango Ojuodhi, the late Nickodemus Ojuodhi, and Alice Ruth Akinyi Opiyo, to my family members especially my husband, Vincent Ochieng.

ACKNOWLEDGMENT

I sincerely thank the Almighty God for the gift of life, grace and strength to undertake this study. My deepest appreciation goes to my supervisors; Dr. Alice Chesambu Ndiema and Dr. Joyce Nawire Maling'a for their invaluable guidance, insightful comments and inspiration in this study.

The study would not have been successfully carried out without the support of individuals and various Institutions, I therefore appreciate the contribution of lecturers and staff of the department of Agribusiness Management and Extension of Masinde Muliro University of Science and Technology for their immeasurable support in my studies.

My gratitude goes to my employer Kenya Agricultural and Livestock Research Organization (KALRO) for granting me study leave to pursue my studies, this gave me ample time to concentrate.

I thank Dr. Joyce Nawire Maling'a for funding my research work in the field through Alliance for Green innovation in Africa (AGRA).

I thank KALRO staff and my colleagues for their technical support and guidance, Mr. M. Akhwale, Mrs. A. Dok (now late), Dr .F.Wayua, Dr. M. Odendo, Ms. I. K. Ememwa, Mr. P. Oucho, Mr. S. Tindi, Mrs. E. Onyango, Mr. J. C. Mulindo and Mr. F. Emongor.

I sincerely appreciate Migori county Agricultural staff and Community Action for Rural Development (CARD) staff particularly George Otieno for their logistical support during data collection in their respective areas of jurisdiction and the farmers who graciously and patiently sacrificed their time answering numerous questions posed to them.

Ojuodhi T.A.

ABSTRACT

Sweetpotato (*Ipomea batatas*) (L) Lam is a root crop and the seventh most important food crop after wheat, rice, maize, potato, barley and cassava in Sub-Saharan Africa and in Kenya. It is rich in carbohydrate offering a cheap source of energy and vitamins for health and nutritional benefits especially orange fleshed varieties. Improved sweetpotato varieties were disseminated by different institutions and organization in Migori County from 2014 to avail clean planting vines for farming communities, but studies revealed that their adoption is still low. The general objective of this study was to evaluate the influence of information access on adoption of improved sweetpotato varieties in Migori County. Specific objectives were, to establish information access on production and marketing pathways, to determine socioeconomic factors influencing information access on improved sweetpotato varieties, and to evaluate drivers which influence adoption of improved sweetpotato varieties. The study was carried out in Migori County. The design of the study adopted was household survey on a sample size of 146 farmers and 12 key informants. Multistage sampling procedure was used to select 8 subcounties in Migori County. Purposive sampling procedure was used to identify 4 sub counties selected for the study, which were Suna East, Suna West, Kuria East and Kuria West which mainly produced sweetpotato. Farmers from the four sub counties were subjected to simple random sampling. Semi -structured questionnaires and interview schedule were used as instruments for data collection to sampled farmers and key informants. Data collected was analyzed using statistical package for social sciences version 20 to generate descriptive and inferential statistics. Logit model was used to establish the relationship between the study variables. The results showed that in demographic characteristic, males 61.5%, female 38.5%, males were more than females, with education levels at primary being 59.4%. Sweetpotato was produced at 20% on average land of 2acres. Information disseminated to farmers on production, preferred were high yields scored 87.0%, vitamin A content 82.0% and early maturity 78%. The significant variables which had influence on households to adopt improved sweetpotato varieties were large farm size above two acres ($P \leq 0.02$) practice of sweetpotato production ($P \leq 0.05$), sources of information from Kenya Agricultural and Livestock Research Organization, Ministry of Agriculture, farmers field days, ($P \leq 0.05$). In conclusion, sources information was associated with adoption of improved sweetpotato varieties. The study recommends that linkages be strengthened between Research institutions and Agricultural Extension in developing and disseminating integrated sweetpotato technologies to farmers to scale out adoption.

Key words: Improved sweetpotato varieties, information access and adoption.

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LIST OF ABBREVIATIONS AND ACRONYMS

AGRA:	Alliance for Green Revolution in Africa
ASARECA:	Association for strengthening Agricultural Research in Eastern and Central Africa
CARD:	Community Action for Rural Development
CIP:	International potato Centre
CIDP:	County Integrated Development Plan
FAO:	Food agricultural Organization of United Nations
G:	Grams
GAP:	Good Agronomic Practices
HHH:	Household heads
ISV:	Improved sweetpotato varieties
KALRO:	Kenya Agricultural and Livestock Organization
KARI:	Kenya Agricultural Research Institute
KG:	Kilo grams
KNBS:	Kenya National Bureau of Standards
L M:	Lower Midland
MMUST:	Masinde Muliro University of Science and Technology

MoALF:	Ministry of Agriculture Livestock and Fisheries
OFSP:	Orange fleshed sweetpotato
PPM:	Parts Per Million
SPSS:	Statistical Package for Social Sciences
SSA:	Sub Saharan Africa
UM:	Upper Midland

DEFINATION OF OPERATIONAL TERMS

A household member: A person who works away or is not dependent on the household for at least 6 months are excluded

Adoption: Is a process by which a particular farmer is exposed to, considers and finally accepts and practices a particular innovation.

An innovation: Is an idea, practice, or object (improved Sweetpotato) that is perceived to be new by an individual

County Integrated Development Plan: Is the key process in enhancing the efficiency and effectiveness of budget funds and the mechanism of addressing the county mandates under the constitution of Kenya (2010-2017) it is a core document in managing the county governments

Diffusion: Is the process by which an innovation is communicated through certain channels overtime among members of a given culture.

Drivers of technology adoption: Factors that positively promote technology adoption

Food security: Is a situation in which all people at all times have physical, social and economic access to sufficient food which meet their dietary needs and food preferences for active and healthy life.

Household: A household is a group of people who cook together drawing food from a common source hence share resources together.

Improved Sweetpotato varieties: Sweetpotato selected for their good performance in quality, yield, and tolerance to diseases.

Information access: Refers to information seeking habit to make it more effective for human uses.

CHAPTER ONE: GENERAL INTRODUCTION

INTRODUCTION

This chapter provides an over view of background information to the study, statement of the problem, research objectives, hypotheses, justification, scope and limitation of the study of

1.1 Background to the study

Sweetpotato (*Ipomoea batatas* (L.) Lam) is a starchy root crop, belonging to the family of *convolvulaceae*, its origin is believed to be Central America. Sweetpotato was introduced from India to East Africa later under British colonial influence by Speke and Grant expedition in the 1860's (Stathers *et al.*, 2018). New Guinea is considered to be the most important secondary centre of diversity of sweetpotato landraces (Roullier *et al.*, 2013). It is the seventh most important food crop in the world after wheat, rice, maize, potato, barley and cassava (FAOSTAT, 2013). Sweetpotato is a food security crop which can be harvested in piece meal as needed hence offering a flexible source of food and income to rural households. It is a drought tolerant crop having a wide ecological adaptation (Makini *et al.*, 2018) with a short maturity period of 3-6 months, and an excellent source of vitamin A, especially the orange fleshed sweetpotato (OFSP) varieties which can be made into several products when value added (Ndolo *et al.*, 2001). Sweetpotato is rich in carbohydrates offering a source of energy, the roots are healthy with high levels of vitamins C and E, several B vitamins, iron, zinc, potassium, and fiber (Stathers *et al.*, 2018). The fresh roots also have several uses which include boiling or roasting while its leaves are nutritious and widely eaten as a vegetable and fed to animals.

In Africa, sweetpotato is often referred to as the ‘poor person’s crop’ because it can be produced using minimum resources as it is typically grown on a small scale basis by women (Stathers *et al.*, 2018).

Agricultural information is an essential recipe for successful farming. Farmers need to be provided with right information at the right time and channel with the necessary components in place, good roads, education and good agricultural policies. Lack of agricultural information is a key factor that has greatly limited agricultural advancement in developing countries (Oladele, 2011). There is therefore need for agricultural information to interact with and influence agricultural activities in a variety of ways by making informed decisions regarding factors of production such as land, labor, livestock and capital management (Oladele, 2007). For improved sweetpotato varieties to be adopted, there has to be strong linkages between agricultural research and development partners and key actors institution in nutrition, health and education is crucial for intended objective to be impacted (FAO 2012)

1.2 Statement of the problem

Despite the efforts by Kenya Agricultural and Livestock Research Organization (KALRO) to develop improved sweetpotato varieties with three major different flesh colours; white, yellow, orange and sometimes purple (Karanja *et al.*, 2015), dissemination of these varieties by various organizations including the Ministry of Agriculture, Livestock and Fisheries (MoAL&F) Extension services and non-governmental organizations (NGOs), studies show that there is low uptake of these technologies by farmers (Gichangi *et al.*, 2013). Many farmers still grow traditional

varieties under poor agricultural practices. The reason for this low adoption is not clearly known, the study therefore sought to explore information access as a factor which influence adoption of improved sweetpotato varieties.

1.3 General objectives

The general objective of the study was to determine information access and its influence on adoption of improved Sweetpotato varieties in Migori County., Kenya.

1.3.1 Specific objectives

The study was guided by the following objectives,

- (i) To establish sources of information on production and marketing pathways of improved sweetpotato varieties in Migori County., Kenya
- (ii) To determine socio economic factors influencing information access on improved sweetpotato varieties in the study area.
- (iii) To evaluate the drivers which influence adoption of improved sweetpotato varieties in Migori County, Kenya.

1.4 Research hypotheses

The study sought to test the following null hypotheses.

H₀₁: There is no statistical significant difference between production and marketing of sweetpotato varieties and information access by farmers in Migori County Kenya

H₀₂: There is no statistical significant relationship between socio-economic factors influencing information access and adoption of improved sweetpotato varieties in Migori County, Kenya

H₀₃: There is no statistical significant relationship between drivers which influence adoption of improved sweetpotato varieties and information sources in Migori County, Kenya.

1.5 Justification of the study

Sweetpotato is an emerging crop of commercial value in Migori County where farmers are engaged in commercial production of traditional varieties. Traditional varieties grown in Suna West and Suna East included Oduoko Jadongo Epacho (late maturing) and Olombo Japielo (early maturing). Both of them being low yielding varieties. On the Kuria side, the traditional varieties found were Gachaga and Nyaitwo which were late maturing and low yielding. Kenya Agricultural and Livestock Research Organization recently developed and recommended improved sweetpotato varieties among them white, yellow, and orange-fleshed sweetpotato such as Vitaa, Kabode, Kenspot 1, Kenspot 2, Kenspot 3, Kenspot 4 and Kenspot 5 which were introduced in the area. (Karanja *et al.*, 2015) Sweetpotato is produced as a subsistence crop in most parts of Kenya like, Homa Bay, Migori, Kakamega, Bungoma just to mention a few in counties of former Nyanza and Western Provinces (FAOSTAT, 2014). Despite the introduced improved sweetpotato varieties, studies show that their adoption is still low. The potential of sweetpotato contribution to food security increased incomes and reduction of nutritional deficit is therefore considerable and is yet to be fully exploited in Kenya (Bovell *et al*, 2007). It is envisioned that increased knowledge on good agricultural practices and improved information access is likely to increase adoption of improved varieties and the associated technologies. Opportunity exists in sweetpotato production being a crop of income

generation to rural farmers if they grew high yielding improved sweetpotato varieties. New research areas were identified and reference materials for academia were availed.

1.6 Scope of the study

This study covered influence of information access on adoption of improved sweetpotato varieties in Migori County, Kenya. It was carried out in 2017-2018 and was narrowed down to cover 4 sub counties namely, Suna East, Suna West, Kuria East and Kuria West which were located in Migori County in the western region of Kenya. Factor identification was done on prior knowledge upon which the emphasis was on small scale farmers of sweetpotato growers. Key informants were also selected and these included representatives from Non -Governmental Organizations, Ministry of Agriculture, Fisheries and Livestock development, village elders and representatives from Research institution. (KALRO)

1.7 Limitations of the study

- i. Migori County is large with many crop enterprises, but the study focused on sweetpotato producers who were confined within four sub counties of Migori County as a representative site where sweetpotato is mainly grown. The researcher took time to book appointment from the village elders because off their busy schedules who would give direction of the villages to counter any setbacks.
- ii. Most farmers were illiterate and not able to understand Kiswahili or English, this caused communication barrier during the interviews. Local field guide were used

to explain the questionnaire in Luo or Kuria language in order to get the relevant response.

- iii. Transportation was a challenge, so the researcher used flexible means of transport like motorbikes to access inaccessible areas of the wards to avoid inaccessibility.

1.8 Assumptions

The assumptions of the study were:-

- i. Respondents provided independent and honest views when responding to questionnaires and interviews.
- ii. Information obtained from the study would be generalized for other regions in the country
- iii. The respondents would be available to respond to the questionnaires.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter discusses scholarly contributions previously made in relationship to guiding objectives of the study. In particular, it outlines sweetpotato production, importance of sweetpotato, socio-economic factors and factors which influence their adoption. It also views theory of adoption and diffusion of technology as well as conceptual framework and the relationship between sources of information and adoption which will help contextualize the study findings,

2.2 Sweetpotato production

Globally, China is the top producer of sweetpotato accounting for 70% of world production. It is widely cultivated in a number of developing countries, where it serves as a principal source of food and income for many of the world's poorest and most nutritionally insecure people (FAOSTAT, 2014). Asia and Africa are significant producers of sweetpotato. The top six sweetpotato producing nations include Nigeria, with a 2013 harvest estimated at 3.3 % of total world production; Uganda with 2.5 % of total world production and Indonesia and Vietnam with production of 1.3 % of world production respectively. United States is the sixth largest sweetpotato producing nation in the world (FAOSTAT, 2014). In Kenya sweetpotato is ranked third among root and tuber crops after potato and cassava (FAOSTAT, 2014). According to FAO statistics (2014), Kenya produces 62,000 tons per annum. Average yield of sweetpotato fresh roots in Kenya is only 7 tons per hectare compared to world average of 14.3 tons/ha by farmers and 30 tons/ha under experimental conditions.

In Kenya, the Lake Victoria Basin area accounts for over 60% of the national production followed by Central Kenya and the coastal region. In Migori County, eighty percent of the rural population draw their livelihood from agricultural activities. Sweetpotato gave the highest value at Kenya shillings 4.38 billion.

2.3 Importance of sweetpotato

There is a growing understanding by consumers, that sweetpotato is a healthy crop to consume rather than a poor man's crop and there is growing shift of sweetpotato from a subsistence crop to a commercial crop cited from Ministry of Agriculture Livestock and Fisheries reports, (MoALF, 2015, Stathers *et al.*, 2018). In some African countries such as Uganda, Rwanda and Burundi starchy crops are the staple food and 75 to 150 kilograms of sweetpotato are consumed per person per year. In countries with maize based food systems, such as Kenya, Angola, Mozambique and DR Congo sweetpotato is an additional food and only 5 to 50 kilogram of it are consumed per person per year. (Stathers *et al.*, 2018). Sweetpotato have characteristics and attributes which leads to various preferences by consumers and farmers. These are based on skin color, flesh color, root yield, marketability, and resistance to drought and disease pest. There are also numerous varieties of sweetpotato whose roots have an elongated slightly pointed shape to them, and come in a range of sizes, forms and colors. Depending on the variety the outer skin may be white, yellow, red, purple or brown, and the flesh white, yellow, orange or purple. Sweetpotato is vegetatively propagated and this makes vines available for cuttings. The cuttings can be obtained from farmers own or neighbors' field from the previous season's crop. This makes sale of vines not common and therefore farmers prefer farmer-to -farmer vine sharing. Fresh roots are also bulky and perishable hence

distribution and sale is carried out locally and in informal markets (Kimenye and McEwan, 2014). Some of the improved sweetpotato varieties released by formerly (Kenya Agricultural research Institute) KARI now (KALRO) are shown in Table 2.1 below.

Table 2. 1: Improved sweetpotato varieties by KALRO (formerly KARI)

Variety	Optimal altitude	Maturity in months	Root yield tons ha⁻¹-year	Root (flesh colour)
Kabode	1200-1800	4-5	16-25	Orange
Vitaa	1200-1800	4-5	15-22	Orange
Kenspot 1	1700-2300	6-7	15-25	Yellow
Kenspot 2	1700-1900	6-7	15-46	White
Kenspot 3	1900-2300	6-7	16-27	Orange
Kenspot 4	1700-2300	6-7	10-26	Orange
Kenspot 5	1700-2300	6-7	10-23	Orange

Source: Karanja *et al*, (2015)

There are a wide range of tastes and textures among the different sweetpotato varieties (Stathers *et al*, 2018) which are preferred by consumer tastes and preferences. Sweetpotato is a food security crop which can be harvested in piece meal as needed. It offers a flexible source of food and income to rural households who are vulnerable to crop failure and fluctuating cash income. It is also a drought tolerant crop with a wide ecological adaptation with a short maturity period of 3-6 months. Sweetpotato is a source of vitamin A, especially the orange-fleshed sweetpotato (OFSP) varieties (Ndolo *et al*, 2001). It is rich in carbohydrates offering a source of energy, roots are also healthy food

with most varieties having high levels of vitamins C and E, several B Vitamins, Iron, Zinc, Potassium, and Fiber. Its leaves are nutritious and widely eaten as a vegetable dish and livestock feed (Stathers *et al*, 2018). Nutritional value of sweetpotato, like most crops depends greatly on maturity stage, climatic and soil conditions (Stathers *et al.*, 2018). A study was conducted recently released varieties on their nutritional content of Zinc, Iron, beta carotene and protein. This emphasized the value of improved sweetpotato varieties to enhance its production and consumption for health nutritional and health benefits (Ndungu,*et al.*, 2014) shown Table 2.2

Table 2. 2: Nutritional parameters of raw sweetpotato.

Variety	Iron (ppm)	Zinc (ppm)	Vitamin A (ppm)	Protein (%)
Kenspot 1	18.79c	30.26d	12.59e	11.77d
Kenspot 2	16.66d	41.69b	5.60f	14.76b
Kenspot 3	22.06b	39.76c	20.34c	15.69a
Kenspot 4	25.36a	55.16a	30.89a	14.56b
Kenspot 5	21.81b	39.35c	26.88b	13.02c
SPK 004	14.41e	30.08d	16.65d	11.63d

Source: Ndungu, et al, (2014)

Generally sweetpotato varieties have much nutrient content which makes it an important crop nutritionally which exposed the importance of sweetpotato and be appreciated to change the mental and attitude of people that sweetpotato is” a poor man’s crop “ shown Table 2.3. Utilization of improved sweetpotato was beneficial if the much displayed nutrient content was handled in a manner that I availed these nutrients to the end user. A

food technologist tested some of the nutrients available after boiling sweetpotato roots. The nutrients tested were, Iron, Zinc, Vitamin A and protein and the retention levels. It was recommended that, boiling sweetpotato roots retained more nutrients as opposed to using pressure cooker for boiling which led to losses of these nutrients.(Ndungu *et al.*, 2014) Table 2.3 below.

Table 2. 3: Nutritional parameters of boiled sweetpotato.

Variety	Iron (ppm)	Zinc (ppm)	Vitamin A (ppm)	Protein (%)
Kenspot 1	15.11c	27.44d	9.39e	9.08c
Kenspot 2	14.03d	38.09b	4.42f	12.91a
Kenspot 3	19.30ab	38.25b	17.37c	12.76ab
Kenspot 4	20.09a	52.80a	26.93a	13.20a
Kenspot 5	19.26b	35.57c	24.17b	11.79b
SPK 004	13.30d	25.81e	13.45d	9.50c

Source: Ndungu *et al.*, (2014)

The value of improved sweetpotato varieties guided in the knowledge gap if they had been accessed by farmers in the study area concerning utilization and consumption of roots and leaves of sweetpotato (Masumba, 2004).

2.4 Information access on adoption

Studies show that access to information is vital for improving agricultural production especially in rural areas where agriculture is the main source of livelihood (Griggs *et al.*, 2013). Diffusion of innovation process is communicated through certain channels over

time among the members of a social system. The components of the process are, innovation, communication channel, time and social system (Roger *et al.* 2005). Adoption is a decision of a full use of an innovation as the best course of action available, to adopt an innovation (Roger *et al.* 2005). Adoption decisions were influenced by a number of socio-economic, demographic, ecological and institutional factors and were dependent on the technology (Kaguongo *et al.*, 2013). These factors guided the study objectives to establish the factors which influence information access on improved sweetpotato varieties for adoption. Adoption of innovation is a process by which a particular farmer is exposed to, considered and finally practiced a particular innovation. (Roger *et al.* 2005)

Studies show that access to information was vital in improving agricultural production in rural areas where agriculture was the main source of livelihood (Oladele, 2006). This information guided the study in sources of information access in accessing, planting materials and marketing of sweetpotato roots and vines. It also helped to bridge the existing gap on adoption of improved sweetpotato varieties.

2.5 Institutional Factors

Agricultural extension services play a major role in improving the livelihoods of farming communities through provision of expert assistance in dissemination of information technologies, translating it into scientific research into practice (Okunade, 2007). Extension workers used methods of information access as tools to achieve their objectives which appeal to the desire of farmers to change. These include mass media methods that attract attention and stimulate the interest and desire for further communication. It reaches many people at the same time in different locations. Individual

methods that are face to face are used for conviction and action. Group contact method are aimed at bringing specific information about practices by using method demonstration, field days among others (Okunade, 2007) These institutions come up with new technologies and developments which is purposed to reach the farmer through effective extension and mass media channel to enable them adopt new technologies and use them (Kobero, 2010).

Institutional variables are guiding factors on independent variables which help in analyzing relationship with dependent variables. Adoption of agricultural technologies by farmers is influenced by a number of factors, which include farm attributes, technology characteristics and institutional factors (Ndiema, 2010). These information guided in showing how farmers accessed information on improved sweetpotato varieties from various sources. Among the independent variables were, research institutions, state department of Agriculture, farmers field days and farmer to farmer. This guided on the kind of information farmers accessed like planting materials and other production technologies.

2.6 Socio economic factors

2.6.1 Education

Education level relates to years in formal schooling which creates a favorable mental attitude for acceptance of new practices that are information intensive (Feder and Slade, 1984). Education level of the farmer increases his ability to obtain, process and use information relevant to adoption of new technology (Mignon *et al*, 2011) .These factors

guided the study to evaluate the determinants on factors influencing information access on improved sweetpotato varieties.

2.6.2 Gender

Sweetpotato is largely grown by women, they predominate in the existing seed management practices and farmer to farmer dissemination of planting material. This is due to the fact that women are knowledgeable about names and characteristics of sweetpotato varieties. (Badstue and Adam, 2011). This finding guided the study on matters to do with responsibility of sweetpotato production among the household heads.

Sweetpotato root production is shifting from a subsistence crop for home consumption to commercialization. Men are now more involved in root production, seed management and marketing either jointly or on their own account (Benjamin and David, 2012). Gender-biased in access to agricultural information, extension services or credit have been observed, women are often involved in household chores giving them little time to receive extension services, unlike their male counter parts (Okwu and Umoru, 2019). There is little individual information on empirical studies on women sweetpotato farmers' access to and use of agricultural information, credit and extension services in Uganda. Insufficient information is an obstacle to reducing gender bias in access to social services hence hinders poverty reduction and economic development programs (Okwu and Umoru, 2019)

2.7 Accessibility and Usability of information

Information is facts or knowledge provided or learned as a result of research or study. Information is considered a vital resource, alongside land, labor, capital and skills.

People need information for their day- to-day activities and for the development (Mtega, 2012). According to (Reitz, 2010), information need is a gap in a person's knowledge that when experienced at the conscious level as a question, gives rise to a search for an answer. After identification of information needs, the information user embarks on a search for information. The behavioral expressions collectively known as information seeking behavior resembles problem-solving or decision-making processes where an individual identifies possible sources, differentiates and chooses a few sources. The individual locates or makes contact with them, and interacts with them in order to obtain the desired information (Choo *et al*,2013) Culture refers to beliefs customs, arts and social institutions, specific collections of values and norms shared among people and groups in an organization, control the way they interact with other people outside their area (Kanyingi, 2014). Indigenous knowledge is the basis for agriculture and natural resource management (Lwoga, 2010)

Access to agricultural knowledge is important in transforming livelihoods of those relying on it for a living to enhance food security. To enhance agricultural knowledge, agricultural extension agents, access to radio and television networks and print sources, are important (Mugwisi, *et al*, 2013).

2.8 Theory of adoption and diffusion of technology

For an innovation to be adopted several theories have been discussed, a farmer should be aware of an innovation before adopting it, (Jirgi, 2009). For farmers to adopt a new technology and continue utilizing them, information about these new ideas must reach them through effective extension and mass media channels as suggested by (Okwu,

(2011). Roger *et al.* 2005, categorized five groups depending on the speed of adoption of new ideas. These categories followed an S- shaped course of diffusion curve, beginning with very few innovators (brave people) 2.5%, early adopters (respected people) 13.5%, early majority (thoughtful people) 34%, late majority,(Skeptical people) 34% finally, the laggards (traditional people) 16 %.Studies revealed that physical capital commonly associated with adoption of technologies has been identified as farm size or cultivated land, livestock and farm implements owned (Feder *et al.*, 1985). These theories give the understanding why adoption of agricultural technologies depends on many factors within communities.

2.9 Conceptual framework

This study focused on information and knowledge on improved sweetpotato varieties from different sources and factors influencing their adoption.

2.9.1 Dependent variables

Adoption of improved sweetpotato technology was the dependent variable which was affected by the independent variable in this study. Dependent variables forms the basis of choice of the farm in adopting the improved sweetpotato technologies

2.9.2 Independent variables

Decision to adopt or reject the technologies or information may have been influenced by a combined effect of many factors such as farm, household and institutional and external factors such as (farm size, land ownership, age, gender, size of household head, marital status, level of formal education of the farmer, factors of extension and marketing)

.Independent variables were influenced by the intervening variables before they affected the dependent variables.

2.9.3 Intervening variables

Knowledge of sweetpotato practices and attitudes towards improved sweetpotato varieties and access to information sources formed intervening variables that influenced dependent variables .Knowledge and farmer practices affected the technologies and policies in farming systems in the communities.

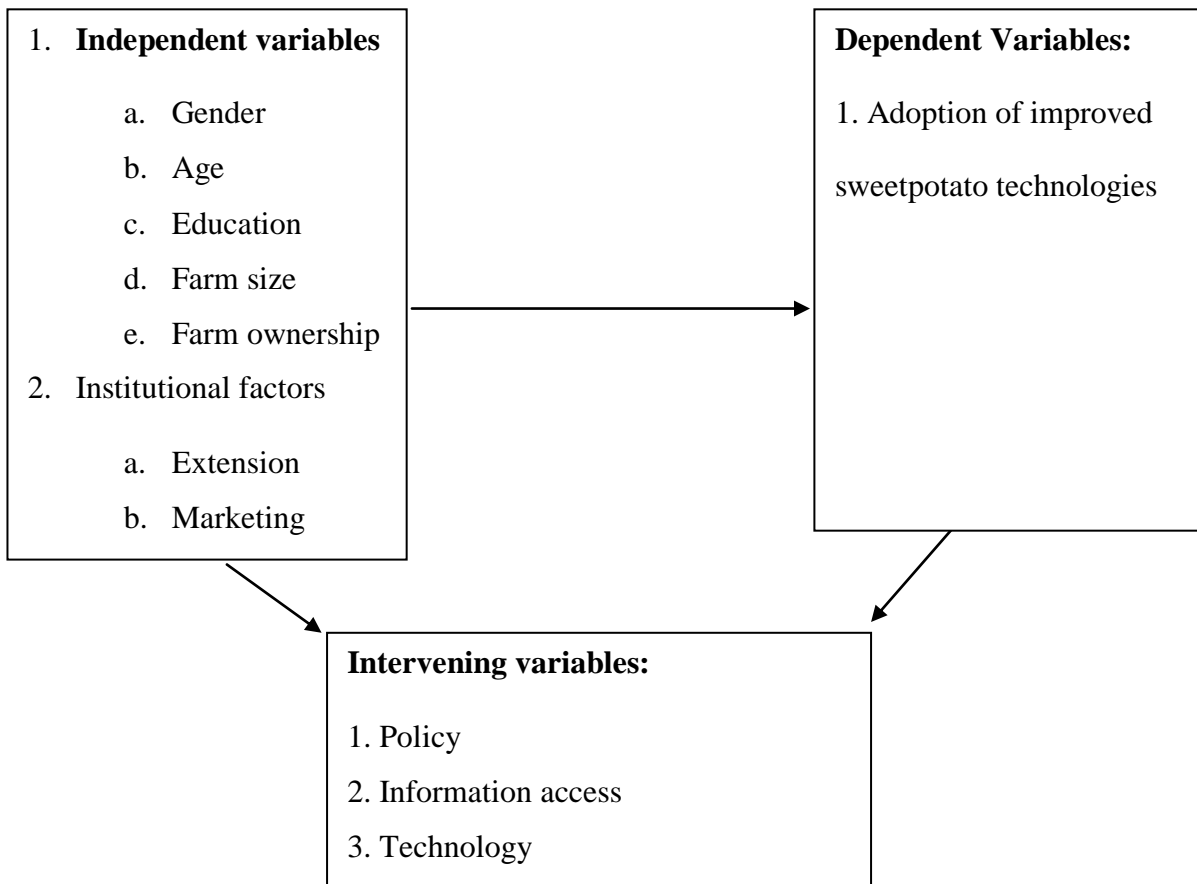


Figure 2. 1: Conceptual framework for factors affecting the adoption of improved sweetpotato technologies and access to information for improved sweetpotato in Migori County.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents, materials and methods which were used during the study. It describes the research design, of the study site, study population, over view of sampling strategy, instruments of data collection procedure, validity and reliability of the instrument ,data collection and methods of data analysis used to arrive at the findings. The last section of this chapter presents ethical considerations, measurements of variables data analysis and presentations.

3.2. Study site

The study was carried out in Migori County, situated in the South Western part of Kenya. It borders Homa Bay County to the North, Kisii and Narok counties to the East and the Republic of Tanzania to the South. It also borders Lake Victoria to the West. (Appendix 1) The county is located between latitude $0^{\circ} 24$, South and $0^{\circ} 40$ South and Longitude 34° East and $34^{\circ} 50$ East. The county has a population of 917,170 and covers an area of $2,596.5 \text{ km}^2$ and approximately 478km^2 of water surface (KNBS population census, 2009).

Migori is a multi-ethnic County with the dominant tribes being the Luo, Suba, Luhya, Kisii, Kuria and Somalis. There are 8 sub counties in the County namely Suna East and West, Nyatike Uriri, Rongo, Awendo, Kuria East and West. The study site selected were Suna East, Suna West, Kuria East and Kuria West. Migori County has an average population density of 355 persons per Km^2 with Kuria West Sub County recording the highest density population of 490 persons per km^2 and Nyatike Sub County having the

lowest of 213 persons per km². The harsh climatic conditions coupled with poor soils for agricultural activities account for the low population density in Nyatike Sub County. Majority of the rural poor are found in the marginal areas of Nyatike and Kuria East constituencies due to the harsh climatic conditions resulting into low agricultural production

The county has six agro-ecological zones ranging from Upper Midland (UM) 1-4 covering Rongo, Kehancha and Ntitaru in Kuria East and Kuria West respectively to Lower Midland (LM) 1 – 5 covering parts of Rongo, Awendo and Nyatike sub-counties. The county has an inland equatorial climate modified by the effects of altitude, relief and the influence of Lake Victoria. It has an altitude of between 1140 meters above sea level at the shores of Lake Victoria in Nyatike Sub County to 4625 meters above sea level in Uriiri Sub County. The main food crops, include maize, cassava, sweetpotato, and pineapples. Temperatures show mean minimum of 24°C and maximum of 31°C with humidity and a potential evaporation of 1,800, 2000 mm per annum (*weather forecast Migori County, Ecological conditions, google scholar; accessed on April 3rd 2017 11:30am*) Rainfall requirement for sweetpotato is 750-1000 mm of rainfall per year. Soil pH is 6.0, ([www. Farmlinkedkenya.com](http://www.Farmlinkedkenya.com) 16/11/2019 8:30pm)

The mean holding size of land in the county is 3 acres for the small scale farmers and 7 acres for the large scale farms. The small scale farms are mainly utilized for subsistence farming while the large scale farms are utilized for livestock and cash crop farming mainly tobacco and sugarcane. The large farms are mainly found in Rongo, Nyatike, Kuria and Awendo sub counties where the farmers have large sugar and tobacco plantations.

At least 50 % of the households do not have title deeds for their lands. This is because land ownership is still communal particularly in Kuria and Nyatike. In Migori constituency, land owners with title deeds are approximately 60 % largely because the constituency is more cosmopolitan. Land is still under adjudication hence very few people have title deeds. (CIDP, 2010-2017) Migori. There are very few cases of landlessness in the county. This is evident from the sparse population in many areas of the county. The few pockets of landless people are found in the government lands which they encroached especially in Nyatike constituency.

3.3 Research design

This study was conducted through household survey research design to examine effects of naturally occurring influence of independent variables on the dependent variable, (Mugenda, 2008). Data was from household head and key informants where by questions inform of semi- questionnaires and interviews were used. The survey was pegged on the relationships and conditions that existed. The design was selected because it constituted the blue print for the collection, measurement and analysis of data. The social situation had varying human characteristics and environmental conditions which constituted the data collected. It was a conceptual within which research was conducted

3.4 Study Population

The total population of Migori County according to the 2009 population census was 917,170 comprising of 444,357 males (48.6%) and 472,814 females (51.4%). Targeted population was 112, 316 households of Suna East, Suna West, East and Kuria West sub

counties (KNBS, 2009). The basic statistical data of the study area of Migori Count is shown Table 3.1:

Table 3. 1: Basic statistical of study area of Migori County

Sub county	Population	Area(Km 2)	Density (Km2)	Wards
Sun East	97,121	207.3	468.5	4
Suna West	94,127	252.8	332.8	4
Kuria East	93,229	235	396.7	5
Kuria West	162,857	332.5	489.8	7
Total	447,334	1057.6	1687.8	20

Source: KNBS, office, Migori (2011)

3.5 Sampling strategy

Purposive sampling procedure was used to select study site which was Migori County.

Multistage sampling was used to select 4sub counties and 9 wards, representative survey samples from eight sub counties, which were sweetpotato growers. These were Suna East (n=29) Suna west (n=27), Kuria East (n=24) and Kuria West (n=63), N= 143.

Purposive sampling was again used to obtain key informants from various institutions which included Ministry of Agriculture, Non-Governmental Organizations, farmer leaders and Research institution representatives. Random sampling was used on every fifth household head to obtain data. This ensured that each household in every location had an equal opportunity of being included in the sample.

Table 3. 2: Sampling strategy study site of Migori County

Study population	Sampling method	Sample size N=143	wards	Data collection instruments	Appendix
Suna East	Multistage	29	God Jope Kakrao	Questionnaire	
Suna West	Multistage	27	Wasweta II Ragana-Oruba		6
Kuria East	Multistage	24	Ntimaru west Nyabusi west		
Kuria West	Multistage	63	Bukira east Tagare Masaba		
MoA	Multistage	3		Interview guide	5
NGO	Purposive	3			
Farmer leader	Purposive	3			
Research Institution	purposive	3			

3.5.1 Sample size distribution

Proportionate stratified sampling was used to obtain sample size of the study. In order to arrive at the desired sample size (S), the study adopted Fisher's model, (Mugenda et al, 2003) and considered sample proportion of 0.05 appropriate at 95% confidence interval.

The sample size hence,

$$n = \frac{-2pq}{d^2} \quad \text{Equation (3.1)}$$

Where,

n = sample size of the target population was greater than 10,000

z = the standard normal deviate at the required confidence level (1.96)

p = the proportion in the target population estimated to have the characteristic being (0.5) measured

$$q = (1-P) = 0.5$$

d = the level of statistical significance of 5%

Table 3. 3: Summary of sampling strategy

$$\frac{1.96^2 (0.5) (0.5)^2}{(0.05)^2} \quad \text{Equation (3.2)}$$

$$= 384$$

$$\frac{n_t - n}{1 + n/N} \quad \text{Equation (3.3)}$$

n = 384 computed for population of less than 10,000 and

N = Actual target population.

$$\therefore n_t = 384$$

$$\frac{1+384}{2224} \quad \text{Equation (3.4)}$$

Table 3. 4: Sample size distribution in 4 sub counties of Migori

Sub county	Population of farmers growing sweetpotato*	Size
Suna East	415	29
Suna West	392	27
Kuria East	102	24
Kuria West	1315	63
Total	2224	143

Source: CARD (2017)

3.5.2 Sample size determination

A table for determination of sample size is given, and for survey research a major sample of 100 can be used and for a minor group, 20 number of cases can be used. According to the table of required size for randomly chosen sample (S) from a given population of (N) cases such that sample proportion (P) will be within plus or minus (+/-) 0.05 of the population proportion (Kathuri and Pals,1998). Population (N) = 2224 and (S) = 143 sample size. A total of 12 key informants from different sectors were interviewed these included ministry of Agriculture, farmer leader, Non-governmental organization and Research institute

3.6 Data collection Instruments

The instruments used in primary data collection were questionnaires which had questions of both close-ended and open-ended. Close-ended questions were useful in quantifying the data obtained while open ended were useful in obtaining views and opinions of respondents, these were important in strengthening the data collected. Primary data was collected with the help of research assistants who were trained to undertake administration of field survey by use of questionnaires to the respondents. The researcher administered interview schedule to key informants to obtain supplementary data which were not captured from the questionnaires and to improve on the rapport and willingness to give true and additional information.

3.6.1 Validity of research instruments

Validity was ensured since the items in the questionnaire have been modeled along instruments used in similar studies. These items were modified to suit the study

objectives. They were submitted to experts in research who included lecturers and Research officers, who modified and improved on the instruments before the questionnaire was pilot tested in the study area. Necessary corrections and modification were done in reference to the content and clarity of the instruments (Taherdoost, 2016).

3.6.2 Reliability of research instruments

The questionnaire is considered reliable for the study as it has been modeled upon instruments in research literature that had been pre-tested in previous studies and yielded desired results (Taherdoost, 2016) the instrument used in the primary data collection were questionnaires in Matungu sub County of Kakamega County using a random sample of 20 respondents. The site was chosen because it has a similar Agro -ecological zone, hence farmers' circumstances were similar to what was expected in Migori County. The number 20 for pretesting was picked because it is the smallest number that can yield meaningful results in data analysis in a survey research (Kathuri and Pals, 1993). The outcome of the data collected was then subjected to Cronbach's Alpha coefficient test to estimate reliability of the instrument. The results of data collected in pre-test indicated reliability of 0.7 which is in agreement with the minimum accepted reliability coefficient alpha 0.71.

3.7 Data collection

Data collected were both primary and secondary which were instrumental in the study in providing information. Primary data were collected from the sample population of farmers growing sweetpotato. The core of the information for the primary data consisted of detailed household unit and individual farmer's survey with the use of a standard

questionnaire. The interviews were collaborative and intended to generate data. This contributed to the understanding of the ways improved sweetpotato varieties impacted in the social economic lives of the people as regards information access. Interview guides were used to collect data from key informants. Interview guides consisted of open ended questions used to lead discussions with selected key informants to obtain supplementary data from MoA farmer leader, NGO and research institution. Some of the respondents were illiterate so they could not understand English. Local field staff were used to interpret the questionnaires which enabled the household heads to respond relevantly. The interviews were conducted in Luo, Kiswahili and Kuria. Key informants from the village and sub- county and county agricultural offices were also interviewed by the researcher. They were asked common, varieties of sweetpotato grown in the areas, the preferred varieties and their attributes, and channels of information access used by farmers in the areas, challenges faced by farmers concerning marketing and how they were being addressed. The purpose of the interview was to understand sources and channels of information access by the farmers and the improved varieties grown as well as market information. These interviews formed the basis of inquiry and initiated discussion. The Agricultural Extension assistant gave help whenever was necessary in identification of geographical locations and interpretation of the native language during interviews of the respondents.

Secondary data were obtained from reviewed literature that comprised professional journals, papers, text books from online search, County Integrated Development Plans of Migori (2010 to 2017) and other relevant institutions as well as reports.

3.8 Ethical considerations

Arrangements were made before proceeding to the study in Migori County, the researcher sought for authorization from the sub county Commissioner of Migori County. Formal permission was granted through, the Graduate Studies of Masinde Muliro University of Science and Technology. (Appendix 2, 3, 4) the researcher then proceeded to the study area and informed the Assistant chiefs of sub counties of the study area about the research study. The community leaders were informed of the dates prior to the interview schedules in their locations. Each respondent was informed of the purpose of the examination at the beginning of the interviews. They were assured that sensitive personal issues were not to be shared in any forum apart from learning purposes. The participants were treated with dignity and confidentiality. The researcher treated age, gender, culture, religion and social class of the participants with respect. Strict confidence was applied to all information given during interviews. Most of the data was from the farming activities. The participants were selected on voluntary basis.

3.9 Measurement of variables

The key variables in this study were independent variable, dependent variables and intervening variables .Personal factors (age ,gender, size of household, marital status and level of formal education) combines with institutional factors (extension services , marketing) were independent variables of the study. The improved sweetpotato varieties and their adoption were the dependent variables that were affected by the independent variables in the study. Policy, information access, technology and culture were identified as the intervening variables affecting adoption of improved sweetpotato varieties.

Summary schedule of measurement scales of the study variables in Table 3.3

Table 3. 5: Study variables

Objective	Independent Variables	Dependent variables	Analysis Method
Establish sources of information on production and marketing of sweetpotato	Knowledge practices on production and marketing of sweetpotato	Adoption of improved sweetpotato varieties	Descriptive: Percentages Frequencies, Inferential: Logit
To determine socioeconomic factors influencing improved sweetpotato	Age, gender, level of education ,farm size, marital status,	Extent of adoption of improved sweetpotato varieties	Descriptive: Percentages Frequencies, Inferential: Logit
To evaluate the drivers which influence adoption of sweetpotato varieties	Institutional factors- Extension services and marketing	Extent of influence of information	Descriptive: Percentages Frequencies, Inferential: Logit

3.9.1: Data analysis and Presentations

The researcher reviewed the data sheets for completeness and accuracy of data collected. The conceptual frame work was compared with the answers which in turn guided the researcher to conclusion regarding the investigated topic. The data was entered, cleaned, code, organized, summarized and reorganized according to various category of respondents of households. The study yielded a variety of data containing quantitative and qualitative details. Recorded data was then transcribed and analyzed using Statistical Package for Social Sciences (SPSS) version 20 to generate descriptive and inferential

statistics .The results were presented using tables, graphs, charts and figures and discussions.

Factors influencing the adoption of new agricultural technologies can be divided into: farm and farmers' associated attributes and attributes associated with the technology (Adesina *et al.* 1993; Misra *et al.* 1993). Various models are used to analyze the specific factors affecting the adoption of the technologies. Feder *et al.*, (1985) showed that many models used in adoption studies fail to meet statistical assumptions necessary to validate the conclusions based on the hypotheses tested and they advocated the use of qualitative response models. The two models of choice in adoption studies are the logit and probit. The probabilities in the two models are bound between 0 and 1. (Amemiya, 1981) says that the decision on which model to choose among the two is difficult given that they have statistical similarities. For this study, we used the Logit model.

The Logit model is specified as follows (Amemiya, 1981):

$$\ln [P_i / (1-P_i)] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + \varepsilon_i$$

Where:

$[P_i / (1-P_i)]$ = Odds of the outcome

P = Probability of the outcome

i = i -th observation in the sample

β_0 = Intercept term

$\beta_1, \beta_2, \dots, \beta_k$ = Coefficients associated with each explanatory variable

$X_1, X_2, \dots, X_k =$ Explanatory variables

The coefficients in the model reflect the effect of individual explanatory variables on its log of odds $\{\ln [P/ (1-P)]\}$.

The model will be estimated twice: first when analyzing factors affecting access to market information for improved sweetpotato and secondly, when looking at the factors affecting farmer adoption of improved sweetpotato technology. In both instances, the X_{ki} variables covered the farm, farmer and technology attributes. P took a value of 1 with access to information or adoption and 0 if otherwise in both cases. Table 3.6 shows summary of data analysis.

Table 3. 6: Summary of data analysis

Objective	Method	Output
To establish and document sources of information on improved sweetpotato varieties	Descriptive: Frequencies Percentages. Inferential: Logit	Figures of information sources Figures of improved sweetpotato varieties
To determine socioeconomic factors which influence information access	Descriptive: Frequencies Percentages: Inferential: Logit	Farmers who have adopted sweetpotato varieties
To evaluate drivers which influence information access	Descriptive: Frequencies Percentages	List of significant factors of Description of Farm and institutional factors

CHAPTER FOUR:

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter presents results and discussions from socio economic characteristics and how farm and household characteristics influenced farming decisions which were important in understanding decisions relating to choice and adoption of a technology. The variables examined were, access to information on sweetpotato production, how information was passed on, profiling of improved sweetpotato adoption, access to market information ,drivers which affected adoption and summary of the analysis and findings.

4.1 Socio-economic characteristics of sweetpotato farmers

The key socioeconomic characteristics of farm, household and contextual variable sampled across the four sub counties are summarized and presented in various tables.

4.1.1 Age of respondents

This was an important variable in the study since age influenced access to information on improved sweetpotato varieties. The majority of the respondents were middle aged between (36-45years) at 28.0%, followed by (46-55years) 26.5%, youth (18-35 years) followed closely at 22.4 %. They were mostly involved in motorcycle business in transportation of sweetpotato roots to the market. Kuria West had the highest percentage of middle aged respondents (36-40) 36.5% shown in Table4.1 below.

Table 4. 1: Age of respondents

Description		Frequencies (percentages in parenthesis) N= 143.					
		Suna East n=29	Suna West n=27	Kuria East N=24	Kuria West n=63	F	%
Age of household head	18-35	4 (13.8)	6 (22.2)	1 (4.2)	21 (33.3)	32	(22.4)
	36-45	5 (17.2)	7 (25.9)	5 (20.8)	23 (36.5)	40	(28.0)
	46-55	11 (37.9)	7 (25.9)	7 (29.2)	13 (20.6)	38	(26.6)
	56-60	3 (17.3)	3 (11.1)	4 (16.7)	1 (1.6)	11	(7.7)
	61-65	6 (20.7)	4 (14.8)	7 (29.2)	5 (7.9)	22	(15.4)

4.1.2 Gender of household heads

The data showed that the household heads were predominantly male at 61.5% except for Suna West where majority were female. Male households were the majority in the three sub counties at (61.5%) while women were (38.5%) across the four sub counties of Migori County as shown in Table 4.2.

Table 4. 2: Gender of household heads

Description		Frequencies (percentages in parenthesis) N= 143					
		Suna East	Suna West	Kuria East	Kuria West	F	%
Gender of household head	Male	15 (51.7)	13 (48.1)	18 (75.0)	42 (66.7)	88	(61.5)
	Female	14 (48.3)	14 (51.9)	6 (25.0)	21 (33.3)	55	(38.5)

4.1.3 Education level of respondents

An overwhelming majority (59.7%) of the respondents had primary school education. This enabled the respondents access information on improved sweetpotato varieties for adoption. Their level of information access increased with the level of learning shown in Table 4.3. Education level relates to years in formal schooling which creates a favorable mental attitude for acceptance of new practices that are information intensive (Feder and Slade, 1984). Education level of the farmer increases his ability to obtain, process and use information relevant to adoption of new technology (Mignon *et al*, 2011).

Table 4. 3: Education level of household heads

Description		Frequencies (percentages in parenthesis) N= 143.					
		Suna East	Suna West	Kuria East	Kuria West	F	%
Education of household head	None	1 (3.4)	4 (14.8)	2 (8.3)	3 (4.8)	10 (7.0)	
	Primary	15 (51.7)	14 (51.9)	13 (54.2)	43 (68.3)	85 (59.4)	
	Secondary	6 (20.7)	2 (7.4)	5 (20.8)	8 (12.7)	21 (14.7)	
	Tertiary	7 (24.1)	7 (25.9)	4 (16.7)	9 (14.3)	27 (18.9)	

4.1.4 Occupation of household head

Main occupation of respondents was important as this showed their source of livelihood. Results show that (95.8%) were not in any formal employment and relied on farming activities for their livelihoods. Others were casual workers, self-employed and formal employment each were (1.4%) shown in Table 4.4. Reports from (CIDP, 2010-2017),

Migori reveal that most of the land is fertile with favourable climatic conditions which favour agricultural activities as such, 80% of the population are involved in agricultural activities.

Table 4. 4: Occupation of household head

Occupation of respondents	Frequency	Percentage
Farming	137	95.8
Casual	2	1.4
Self employed	2	1.4
Formal employment	2	1.4
Total	143	100

4.1.5 Land ownership of respondents

Land is an important resource and its access is crucial for agricultural development. Land is one of the important resource where households derive their lively hoods, most of the land across the four sub counties, was inherited from parents (86.0%) in Table 4.5below. Most of the respondents had inherited land from ancestors which enabled the household engage in production of different crop enterprises with maize ranked as the most important crop followed by beans, sorghum then sweetpotato fourth. Reports from County Integrated Development Plan (CIDP, 2012-2017) of Migori indicate that, at least 50 per cent of the households do not have title deeds for their lands. This is because land ownership is still communal particularly in Kuria and Nyatike. There are very few cases of landlessness in the county. This is evident from the sparse population in many areas of the county. The few pockets of landless people are found in the government lands.

Table 4. 5: Distribution of land ownership in Migori County

Type of land ownership	Frequency	Percentage
Inherited	123	86.0
Bought	16	11.2
Squatter	1	0.7
Rented	3	2.1
Total	143	100

4.1.6 Distribution of farm sizes

Households had land sizes ranging from <2 to > 3 acres. The minimum land holdings were(< 2 acres 17.5%) ,2<3 acres of land were(20.3%) ,while > 3 acres,(62.2%) were the majority. Table 4.6 .This is in agreement with the (CIDP, 2010-2017) of Migori which shows that, the mean holding size of land in the county for small scale farmers are 3 acres, while for large scale farmers are 7 acres. The small scale farmers utilize land for subsistence while large scale farmers utilize land for growing cash crops like sugar can and tobacco. Large land sizes are mainly found in Kuria, Rongo, Nyatike and Awendo.

Table 4. 6: Distribution of land sizes in Migori County

Distribution of land sizes in acres	Frequency	Percentage
<2	25	17.5
2<3	29	20.3
>3	89	62.2
Total	143	100

4.1.7 Sweetpotato production

The respondents had less than two acres of land under improved sweetpotato which was (88.2%) and under 2 acres was 11.5 % shown in Table 4.7 below. This apparently showed that, the rest of the households grew local varieties of sweetpotato. Sweetpotato was not among their staple food as compared to maize, beans and sorghum which were more considerable. The main food crops in the sub-counties included maize, sorghum, beans, cassava, finger millet and sweetpotato. The main cash crops were tobacco, sugarcane, sweetpotato which were mainly grown in Kuria sub counties. Farmers had different crop enterprises produced on their farms which included maize, beans, sorghum, cassava, sweetpotato among others. (CIDP, 2010-2017, Migori)

Table 4. 7: Distribution of land under sweetpotato

Land size under sweetpotato	Frequency	Percentage
< 2	123	88.5
2	16	11.5
Total	139	100

4.2.1 Information accessed for improved sweetpotato production

Farmers were asked open- ended and some close- ended questions which addressed the following 3 objectives.

Objective 1: To establish sources of information on production and marketing pathways of improved sweetpotato varieties in Migori County, Kenya.

This objective was achieved by asking open- ended questions on the kind of information on production households accessed on improved sweetpotato varieties,

Production information accessed by households included, information on improved sweetpotato varieties, market information and persons responsible for production of improved sweetpotato varieties. About 38.3% of the households accessed production information and 61.5% had not accessed the information. The household accessed market information at 55.2 % while 48.8% did not access market information shown in Table 4.8 below. The level of information access by household was average. In reference to Pearson Chi- square test of independence, level of education and market information by farmers, the results showed that ($P \leq 0.05$) value was significant. This was attributed to the primary level of education which the majority had attained and this inferred that access and understanding of improved sweetpotato technology was still low. This was revealed by studies carried out that, education influences respondent's attitude and thoughts making them more open, rational and able to analyze the benefits of the new technology (Walter *et al*, 1992).

Table 4. 8: Production information by respondents

Access to production information on Improved Sweetpotato Varieties	Frequency	Percentage
Yes	55	38.5
No	88	61.5
Access to market information for improved sweetpotato varieties		
Yes	79	55.2
No	63	44.8
Households responsible for improved sweetpotato varieties production		
Male	23	16.9
Female	47	34.6
Both male and female	66	48.5

Majority of the farmers from the four sub counties in Migori County had been trained on Good Agricultural Practices (GAP) and value addition of improved sweetpotato varieties.

4.2.2 Establishing sources of information for improved sweetpotato production

The main source of information on improved sweetpotato production came from Kenya Agricultural and Livestock Research (KALRO) and public extension department of the Ministry of Agriculture (MoA). Less than 50% of the households in the County accessed information on improved sweetpotato production. In an interesting twist, the proportion of those who had access to improved sweetpotato marketing information was higher across all sub counties except in Kuria East. Very few farmers across the County

produced sweetpotato for sale. This is understood when it is considered that very few farmers produced the improved sweetpotato varieties at (20%) of land under crop enterprises. It can be inferred that much of the sweetpotato produced were the local varieties for home consumption.

Farmers who heard about the improved sweetpotato from different sources, KALRO represented the largest source of information given that the organization was central in managing the projects that were promoting improved sweetpotato varieties (Figure 4.1). Radio was the least 5% source of information on improved sweetpotato varieties. Farmers who had access to training on good agricultural practices and value addition of improved sweetpotato varieties were 38.5%. This represents the proportion of farmers who had access to information on improved sweetpotato production. Though there were no extreme preferences in information source, farmers preferred KALRO (29.9%), Ministry of Agriculture's extension division (31.9%) Field Days (19.6%) and Group trainings (18.6%) shown in Table 4.1. Studies done by (Awotide *et al.*, 2014) on access to information and adoption, is in agreement as was reported, that awareness or exposure to improved technologies through information either from extension agent, mass media or mobile phones has been identified as one of the vital determinants of technology adoption..

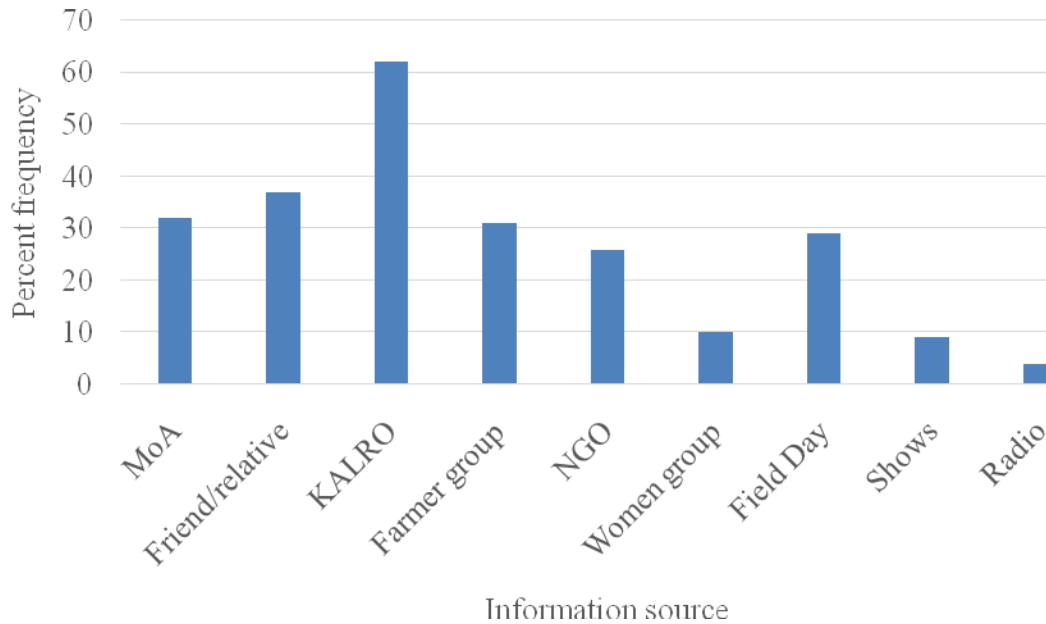


Figure 4. 1: Sources of information to farmers on production of improved sweetpotato varieties.

4.2.3 Information on improved sweetpotato varieties accessed by farmers

Farmers received information about varieties and their characteristics and associated agronomic practices including pest and disease management of sweetpotato production from multiple sources. They were given multiple advantages on improved sweetpotato varieties that attracted them to produce the crop. Among them were, high yields (87.0%) presence of vitamin A (82.0%) and early maturity (78.0%) were high selling points in the promotion of the improved sweetpotato shown in (Figure 4.2) below. This is in agreement with (Roger *et al.* 2005) who found out that information sources have been reported as stimulus to individuals in the adoption process.

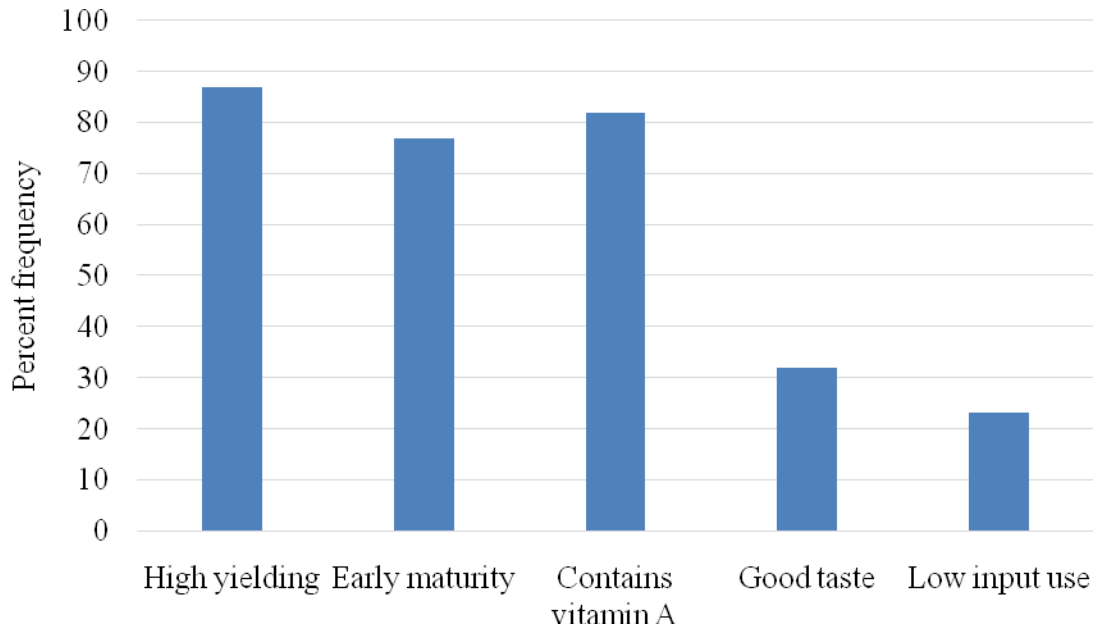


Figure 4. 2: Information passed to farmers about improved sweetpotato varieties,

4.2.4 Improved sweetpotato varieties grown by farmers

From information disseminated on improved sweetpotato varieties , 93% heard about improved sweetpotato varieties and some started producing them. Those who did not produce improved sweetpotato irrespective of the given advantages of high yields, early maturity , pro- Vitamin A content, cited, inaccessibility to planting materials which in part was attributed to lack of funds to purchase (4.9%) and lack of planting material and markets (0.7%) for the produce. The farmers who grew improved sweetpotato had a higher preference for Kenspot 1 (27%), Vitaa (23%) and Kabode (22 %) due to the mentioned varietal attributes, shown in (Figure 4.3). These studies in Migori County carried by (Gichangi *et al.*, 2014) revealed that out the farmers interviewed on growing of

improved sweetpotato varieties, confirmed that 40% preferred Kenspots 1, 2 and 3 varieties, this is in agreement with the results computed.

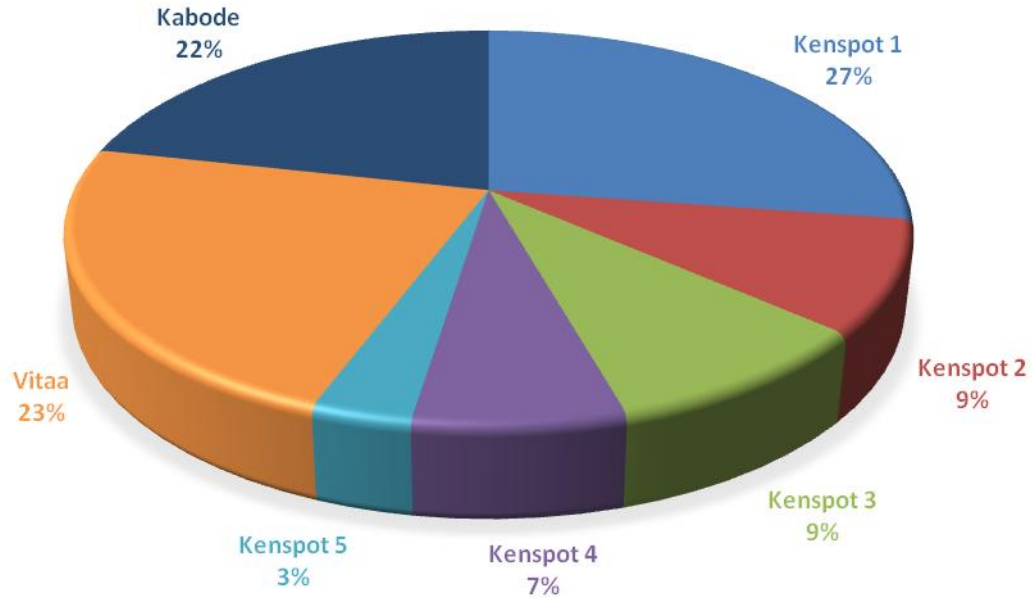


Figure 4. 3: Farmer percentages growing various improved sweetpotato varieties,

4.2.5: Sources of market information for improved sweetpotato varieties

The major source of market information for improved sweetpotato varieties was from other farmers 39% shown (Figure 4.4). Traders came out second (30%) as vital source of market information. However, it was noted that majority of the traders were farmers too. It follows therefore that farmer-to-farmer exchange of market information was prevalent and important. For analysis purposes, it was taken that any stakeholder who had been exposed to at least two sources of market information was taken to have had access to market information. It therefore follows that a slight majority of farmers (55.2%) had

access to market information for improved sweetpotato varieties shown in Table 4.7 below.

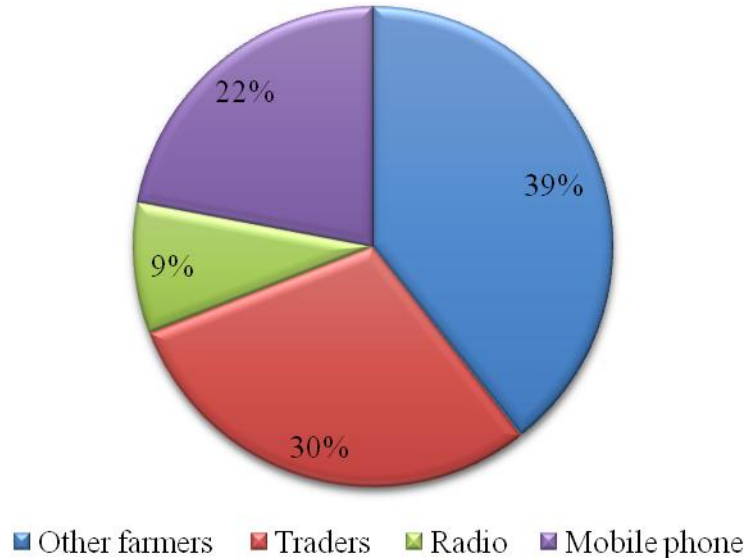


Figure 4. 4: Sources of market information for improved sweetpotato in Migori County.

4.2.6 Variation of market information source across sub counties

When the farmers were decomposed into sub counties, variations in sources for market information became distinct shown in Figure 4.5. Kuria West sub County had the largest market share in access to market information 49% from farmers, 42% from traders and 32% from mobile phones. In contrast, Kuria East had minimal use of the various market information sources, 16% from other farmers was its highest, reason being distant from source of information and poor infrastructure. Use of radio as a source of market information for improved sweetpotato varieties was minimal across the four sub Counties.

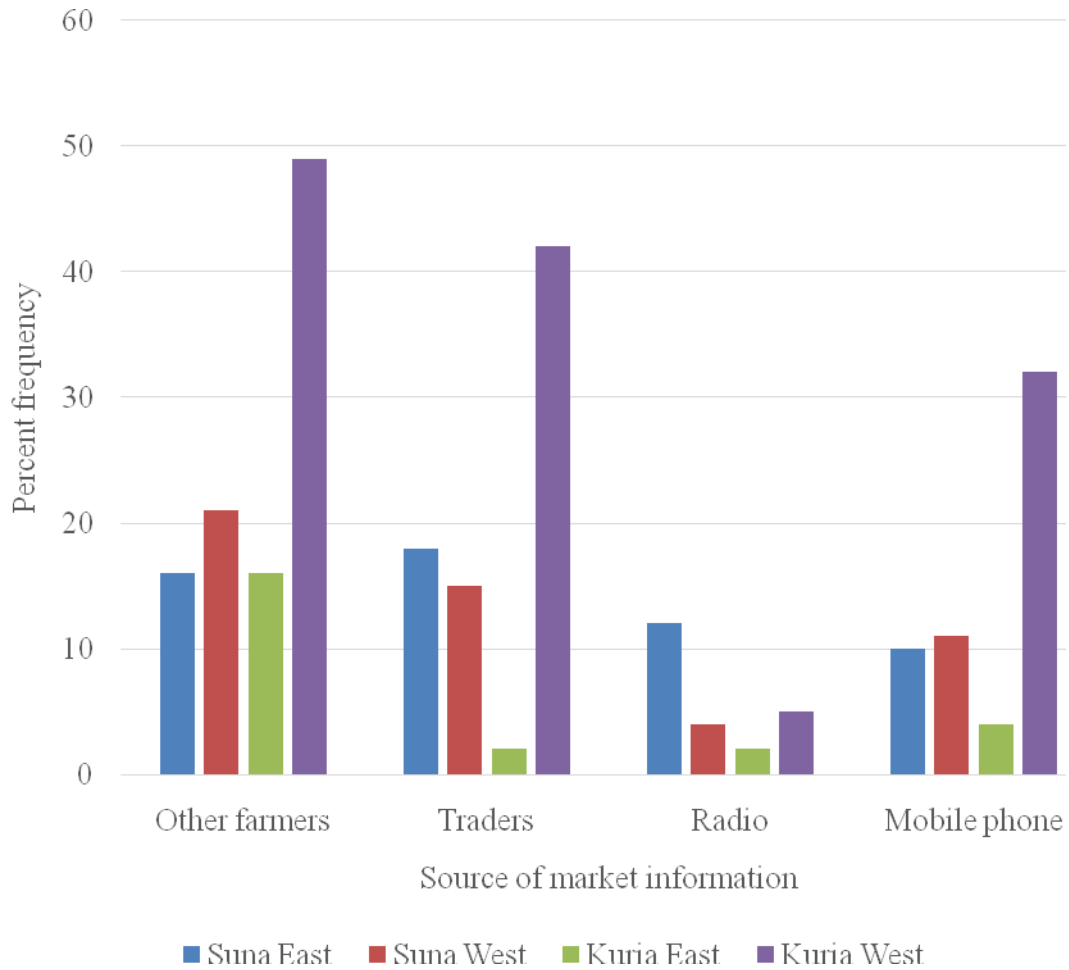


Figure 4. 5: Sources of market information across the sub counties of Migori County

In Kuria west sub County sweetpotato is considered as one of the income earner crops in Migori County. Kuria West has favourable climatic conditions for agricultural production. It also has advantage of ideal business environment due to its proximity to Kenya-Tanzania border business trade (CIDP 2010-2017) Migori. Figure 4.6 shows a sweetpotato field being harvested in Kuria West using oversize bags 110 Kilo gram bag instead of 50Kg recommended bag by policy standards, Kenya bureau of standards.



Plate 4. 1: Sweetpotato harvesting in oversized bags from a farm in Kuria west Sub County.

Source: (CIDP 2010-2017. Migori County)

4.2.7: Market information accessed and selling point

The Chi-Square Statistic was used to test the relationship between access to market information on improved sweetpotato for sale and the choice of selling point for the sweetpotato. The null hypothesis of the Chi-Square test is that, “no relationship existed between access to market information and improved sweetpotato marketing”, that means, the variables were independent. In the first instance, we related choice to sell of improved sweetpotato and access to market information. It was found that there was no association between access to market information by farmers and their decision to sell improved sweetpotato. Similarly, a Chi-Square test of independence between market information

access by farmers and the choice of point of sale of sweetpotato revealed no association. This implies that market information access had no influence in farmers' choice to sell their sweetpotato at any of the selling points. The kind of information accessed included demand for the improved sweetpotato varieties, prices and quality characteristics of roots. Majority of the farmers (90.4%) sold improved sweetpotato varieties that they produced. They mostly traded in roots (95.3%) while the rest dealt in vine marketing. The improved sweetpotato produce was sold in the village, to neighbours and the local market centre. The local market centre absorbed the largest share of the produce shown in Figure 4.6



Figure 4. 6: Points of sale for sweetpotato produce in Migori County

The price of improved sweetpotato root was consistently higher than that of the local varieties. It was determined mostly by the producers themselves (56.7%). Traders (28.7%) and middlemen (14.6%) too determined the price of sweetpotato produce. Sweetpotato roots was mainly sold locally. The local market was the highest at (78%) in

the village at (14%) and neighbours (8%). This inferred that there was no adequate information accessed on marketing so that farmers would sell their produce outside Migori County.

4. 3: Socio economic factors affecting access to information on improved sweetpotato varieties

Objective 2: To determine socio economic factors influencing information access on improved sweetpotato varieties in Migori County, Kenya.

4.3.1 Sources of production and marketing information on improved sweetpotato varieties

Information sources on production and marketing were affected by various variables. Analysis was done on variables which affected market information sources. Market information sources affected production of sweetpotato as farmers are more responsive to market availability than sources of production information for improved sweetpotato production. This is because, besides impacting on marketing, access to market information has been found to affect production too, in a feedback loop (Alemu *et al*, 2006). A binary Logit model was estimated in this case with the dependent variable being (1) if the farmer had access to market information for improved sweetpotato varieties and (0) if otherwise. The results of the analysis of the socioeconomic factors affecting farmer access to market information for improved sweetpotato varieties were presented in Table 4.9. The age of the farmer, the gender and the person responsible for improved sweetpotato production in the household were significant in explaining the probability of a farmer to have access to market information for improved sweetpotato varieties. This was in agreement with studies done on improved cassava varieties, it was determined that

age of the household, gender, education and off-farm income were variables that were positive and statistically significant in determining access to information on improved cassava varieties (Awotide, *et al*, 2014)

Table 4. 9: Binary Logit regression estimates of access to market information for improved sweetpotato varieties

Variable	Coefficient	SE	P-value	Ex(β)
Age	-0.27*	0.15	0.08	0.76
Gender	-0.70*	0.40	0.09	2.02
Produce sweetpotato	1.88*	0.41	0.04	2.40
Number of observations	143			

*, implies significant at 0.01.

4.3.2 Age

From the results, it follows that a farmer accessing market information declined with age. Younger household heads had a higher likelihood of accessing information on improved sweetpotato technologies. This category of farmers had the capacity to travel longer distances to attend training meetings and because of their younger age, they could use mobile phones to communicate with information service providers more easily than older household heads. Studies carried out indicate that, in technology adoption, older farmers are usually reluctant to change than younger farmers who are less risk averse (Jensen *et al* (2007) and Ramo *et al*, (2009) This is in agreement with the research finding that market information access declined with the age of the farmer, hence farmers who are old could not effectively adopt improved sweetpotato varieties.

4.3.3 Gender

Women household heads were more likely to access market information for improved sweetpotato marketing than men household heads. A larger segment of households involved in sweetpotato production were found to be female-headed. Similarly, those persons responsible for sweetpotato production in households were predominantly women. From the data on who is responsible for most activities in sweetpotato production male were 16.9%, women 34.6% and both male and female was 48.5%. This gender perspective is particularly interesting, because sweetpotato in Kenya has traditionally been a woman's crop. Sweetpotato root production is shifting from a subsistence crop for home consumption to more commercialize with men being involved in root production, seed management and marketing either jointly or on their own account (Benjamin and David, 2012) Yet with increasing levels of commercialization and technology adoption, traditional gender roles within households may potentially change (von Braun, 1995). It is expected that as households embrace improved sweetpotato production, the level of involvement by men is increasing. This is because adoption of improved sweetpotato production is undertaken with a commercial perspective.

4.3.4 Production of sweetpotato

The odds for those households not producing sweetpotato varieties to access market information were 0.42 times that of those households producing sweetpotato varieties on their farms. Farmers who produced the improved sweetpotato varieties and by extension for sale, were few, except for Kuria West. Sweetpotato were rated as "important" within households in the County. Suna East attached the lowest value on Sweetpotato while

Kuria West valued them highest, in comparison to Suna East. Production of improved sweetpotato varieties in Migori County was first done in 2014 in Suna West. One year later, the root crop was grown in the other three sub Counties. In Kuria West, farmers perceived that growing improved sweetpotato varieties had improved household food security. However, in Suna East, the perception was that improved sweetpotato varieties had negligible contribution to improving household food security.

4.4. Drivers influencing the adoption of improved sweetpotato varieties.

Objective 3: To evaluate the drivers which influenced adoption of improved sweetpotato varieties in Migori County, Kenya.

4.4.1 Farm size

The average farm size for small scale farmers was 3 acres while that of large scale farmers was 7 acres. Farm size was an important variable as this determined economic empowerment where a farmer could get access to credit due to availability of collaterals. Large farm size also gave the farmers added advantage of having leverage of crop diversity in being able to grow improved sweetpotato varieties as compared to those who had smaller farms of less than 3 acres. This was witnessed in Kuria West who had large acreage of more than 3 acres had higher production of improved sweetpotato varieties compared to Suna East which had less than 3 acres.

4.4.2: Sweetpotato training

Participation in sweetpotato training on good agricultural practices and value addition, management of pests and disease, increased farmers chances of adopting improved sweetpotato varieties. Farmers who had received training in improved sweetpotato

production technologies had advantage of adopting the improved sweetpotato technologies. Improved sweetpotato varieties were promoted as a rich source of vitamin A, the ingredient for boosting body immunity, early maturing and high yielding among other attributes. The prospect of making money out of improved sweetpotato production must have enticed farmers who attended the trainings to adopt. All these explain the reason why farmers who had access to information about improved sweetpotato varieties had higher chances of adopting more than those who did not. The source of information was an important aspect to. Farmers who got their information from either KALRO or MoA had advantage of adoption than those who got from either radio or other groups/organizations. KALRO and MoA were central in running the programmes that introduced and promoted improved sweetpotato varieties. They thus came with resources like planting materials for giving to farmers, this jumpstarted farmers in the adoption process.

4.4.3 Production information on planting materials for improved sweetpotato

Production information and source of improved sweetpotato information were significant variables in explaining the probability of farmer adoption of improved sweetpotato varieties. With production information sources, the odds ratio (18.98) compared three times more to access planting materials than that without access, adopting improved sweetpotato production. The odds for adoption were a lot lower for those households without access to production information on planting materials ($1/18.98 = 0.05$ times that of those with access to sweetpotato production information). According to studies conducted on adoption of improved cassava varieties, showed that, adoption increased as farmers gained access to credit related to agricultural production. (Awoitide *etal.*, 2014).

These are mainly farm and institutional factors. This was in agreement with studies carried out on improved cassava varieties. It revealed that awareness or exposure to improved agricultural technologies through information either from extension agents or mass media or mobile phones, has been identified as one of the determinants of technology adoption. (Mwangi.M and Kariuki .S. 2015)

4.4.4 Source of production information

Access to information on improved sweetpotato information were significant variables in explaining the probability of farmer adoption of improved sweetpotato varieties. These are mainly farm and institutional factors. Households had a higher likelihood of adopting improved sweetpotato production technologies if the information was from KALRO or ministry of agriculture's extension division as opposed to radios or group trainings

4.4.5 Market information access

Access to market information was on market prices, where to sell and consumer demand and supply for various sweetpotato varieties. With access to market information for improved sweetpotato varieties, the odds for those households without access to adopt improved sweetpotato technologies were 0.4 times higher than that of those households with access to market information for sweetpotato. In studies carried out on adoption of improved cassava, it was realised that, information is an essential component of Agricultural technology adoption. (Awotide *et al.*, 2014). All the discussions of objective three are shown in table 4.10 below.

Table 4. 10: Drivers' of farmers' adoption of improved sweetpotato varieties

Variable	Coefficient	SE	P-value	Ex(β)
Farm size	0.18**	0.08	0.02	1.19
Sweetpotato training	1.85**	0.77	0.02	6.34
Production information access	2.94**	1.25	0.02	18.98
Source of production information	-0.91***	0.34	0.01	0.40
Market information access	0.91*	0.50	0.07	2.49
Number of observations	143			

***, ** and *, implies, significant at 0.01%, 0.05% respectively,

CHAPTER FIVE: SUMMARY, CONCLUSIONS, RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of findings, conclusions, recommendations and Research gap for the study in tandem with the specific objectives

5.1 Summary.

A strong relationship was figured between access to information and production of improved sweetpotato. However access to information had no relationship with the variety of improved sweetpotato being produced. This may indicate that farmers did not put much attention to the varietal differences among the improved sweetpotato. It might have been in response to signals from the demand side of the chain. The consumer may only be interested in knowing whether the sweetpotato variety was the improved one or not. Kenspot 1 was the most widely produced variety most probably because it was the first to be introduced in the region and the observable attributes by the producers. These attributes included, early maturity, high dry matter content and high palatability.

There was no association between information access and decision to sell improved sweetpotato varieties. Similarly, no association was observed between access to market information and the choice of selling point for improved sweetpotato varieties. All these pointed to an undeveloped market for sweetpotato varieties in Migori County, where the role of information in influencing market decisions was absent. In developed market systems, market information access plays a pivotal role in determining the demand, supply and prices of goods.

In functional markets, information plays a significant role in determining where to sell, how much to sell, at what price to sell and even forecast future scenarios for strategic action. Therefore, determining factors that impact on farmer access to information is critical. Gender and age of household head were significant in affecting the likelihood of a farmer accessing information. Whether a farmer was a sweetpotato producer affected the probability of their access to information. Women farmers were found to have a higher likelihood of accessing market information for sweetpotato than men. This is understood when it is realized that sweetpotato is a woman's crop. In her efforts to ensure that she produces enough food for her family, the woman goes out in search of information on sweetpotato. In the process, she gets information on improved sweetpotato varieties. Younger household heads had a higher likelihood of accessing information on improved sweetpotato technologies. This category of farmers had the capacity to travel longer distances to attend training meetings and because of their younger age, they could use mobile phones to communicate with information service providers more easily than older household heads. For those farmers producing sweetpotato, the likelihood of going out to seek for more information to increase production was higher than those not producing. Their interest in sweetpotato pushed them to deliberately go out to seek for further information.

It was evident from the results that a larger farm size increased the chances of a household adopting improved sweetpotato technology. Having a larger farm size gave the households a leverage in crop diversity. Those with smaller pieces were limited in the number of crops they could plant. Given that sweetpotato was not ranked the "most important" it followed that farmers with smaller land sizes had a lower likelihood of

adopting improved sweetpotato production. Farmers who had received training in improved sweetpotato production technologies had advantage of adopting the improved sweetpotato technologies. Improved sweetpotato varieties were promoted as a rich source of vitamin A, the ingredient for boosting body immunity, early maturing and high yielding among other attributes. The prospect of making money out of improved sweetpotato production must have enticed farmers who attended the trainings to adopt. All these explain the reason why farmers who had access to information about improved sweetpotato varieties had a higher chance of adopting more than those who did not. The source of information was an important aspect . Farmers who got their information from either KALRO or MoA had advantage of adoption than those who got from either radio or other groups/organizations. KALRO and MoA were central in running the programmes that introduced and promoted improved sweetpotato varieties. They thus came with resources like planting materials for giving to farmers, this jumpstarted farmers in the adoption process.

5.2 Conclusion

This study sought to understand the adoption of improved sweetpotato varieties and the role of information access in the whole process in Migori County.

1. Sources of information identified were:
 - KALRO,
 - MoA
 - Farmer groups

- Farmers' field days

2 Socio economic factors which influenced information access were:

- Age
- Gender variable
- Production of improved sweetpotato

3 Drivers which influenced adoption of improved sweetpotato were:

- Farm size
- Training on good agronomic practices
- Access to planting materials
- Market information

5.3 Recommendation

- i. Information dissemination should be improved for farmers to access.
- ii. Farmers should be encouraged to form production and marketing groups to share information. The groups should networking with other stakeholders in the sweetpotato value chain.
- iii. Training on utilization on improved sweetpotato varieties will enhance consumption and hence adoption of sweetpotato technologies.

5.4 Areas of further research

- i. Farmers' participatory evaluation of more varieties to give farmers an opportunity to choose varieties with preferred attributes.
- ii. Dissemination and up scaling the farmer preferred sweetpotato varieties
- iii. Conduct a Market survey to find out the marketing potential within the county and the neighbouring areas for enhancing sweetpotato adoption.

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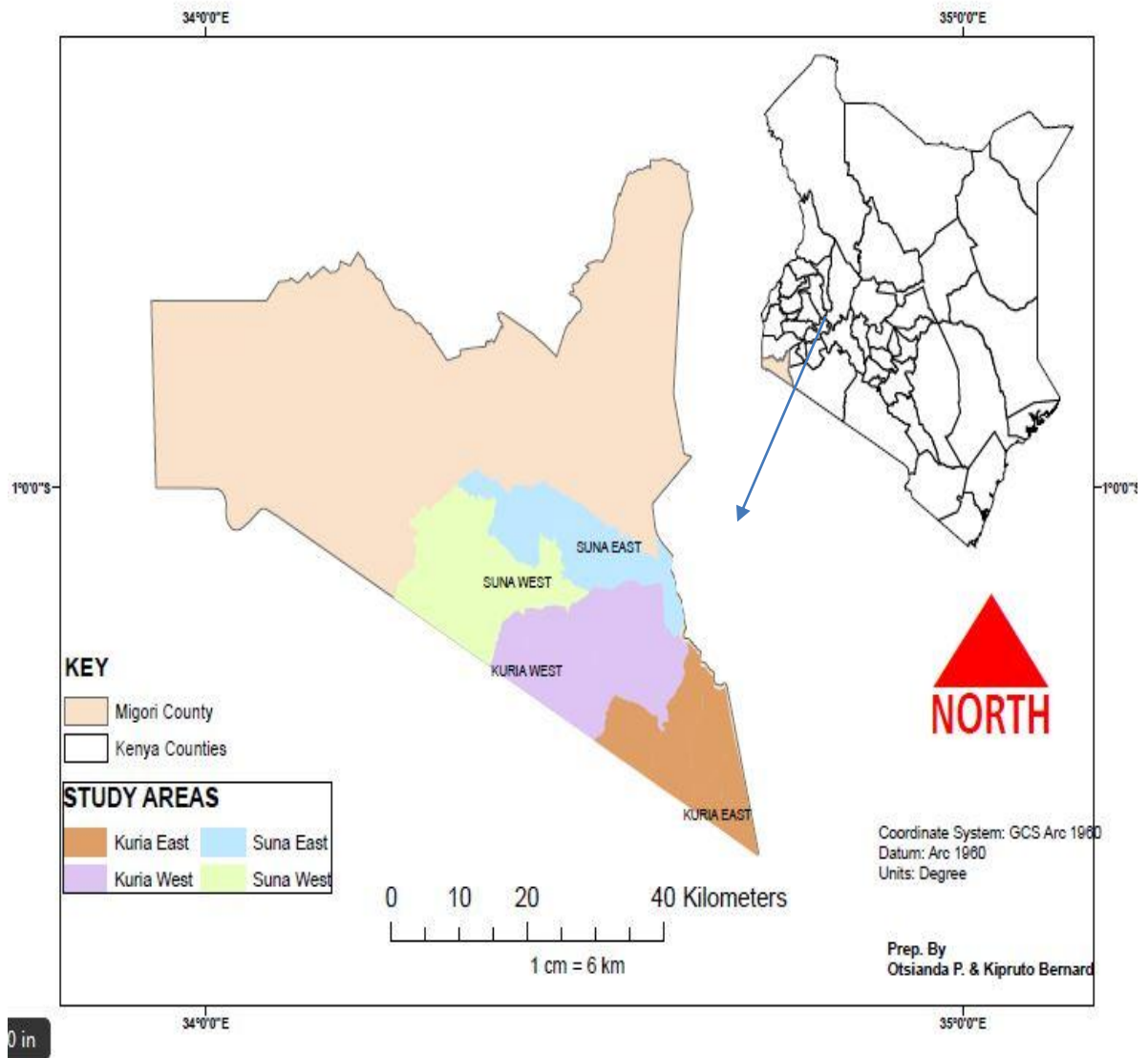
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APPENDICES

APPENDIX 1: MAP OF MIGORI COUNTY



Source: (KNBS, 2009)

APPENDIX 2: INTRODUCTORY LETTER

MMUST,

P.O BOX 190

Kakamega.

17th MAY 2017

Dear Sir/Madam

RE: REQUEST TO CONDUCT RESEARCH IN MIGORI COUNTY

I am a post graduate student at Masinde Muliro University of Science and Technology, Kakamega, studying Master of Science Degree in Agricultural Extension and Rural Development System I am conducting a research titled,“ Influenceof information access on adoption of improved sweetpotato varieties in Migori County”.

You are kindly requested to facilitate the research by allowing me to conduct the research in the County. The information provided will be treated in confidence and is needed purely for academic purposes.

Your cooperation will be highly appreciated

Yours Faithfully,

Tabitha A. Ojuodhi

APPENDIX 3: NACOSTI REF: PERMIT NO. 959540



REPUBLIC OF KENYA



NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 959540

Date of Issue: 11/September/2019

RESEARCH LICENSE



This is to Certify that Ms. TABITHA OJUODHI of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Migori on the topic: THE INFLUENCE OF INFORMATION ACCESS ON IMPROVED SWEET POTATO VARIETIES FOR ADOPTION IN MIGORI COUNTY OF KENYA for the period ending : 11/September/2020.

License No: NACOSTI/P/19/1031

959540

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY &
INNOVATION

Verification QR Code



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Scan the QR Code using QR scanner application.

APPENDIX 4: A LETTER OF CONSENT TO INDIVIDUAL FARMER

17th May 2017

Dear Farmer,

I am a post graduate student at Masinde Muliro University of Science and Technology, in Kakamega. I am conducting an academic Research on, influence of information access on adoption of improved sweetpotato varieties in Migori County.

I am requesting you to participate in the Research study by accepting to be interviewed. The information you provide shall be for academic purposes only and will be kept confidential.

Please cooperate to enable me complete this study.

Thank you.

Yours Faithfully,

Tabitha A. Ojuodhi.

APPENDIX 5: INTERVIEW GUIDE TO KEY INFORMANT

Survey on Influence of Information on Improved Sweetpotato Varieties for Adoption in
Migori County, Kenya

KEY INFORMANT INTERVIEW Date 17 May 2017

General Details

Date of Interview _____ Time Started _____ Time Ended

Time Started _____ Time Ended _____

Sub-County _____ [1=Suna East;=2 Suna West 3= Kuria East=4Kuria West]

Village _____

Name of Respondent _____ Gender

_____ [M/F]

What is your education level?

Organization

Position in Organization

Questions

1. What are the main types of sweetpotato grown by farmers in this area? From where do farmers get information about improved sweetpotato production?
2. Which are the main organizations / service providers that disseminate information on improved sweetpotato production, value addition and utilization in this area?
3. What challenges do farmers encounter in accessing information on improved sweetpotato from service providers?
4. How can the challenges be addressed?
5. As far as *farmers access to information* on improved sweetpotato varieties is concerned;
 - (a) What is working well? Explain.
 - (b) What is **NOT** working well. Explain.
6. As far as *service providers providing information* about improved sweetpotato varieties is concerned;
 - (a) What is working well? Explain.
 - (b) What is **NOT** working well. Explain.
7. Are there any good practices on farmers' access to information on sweetpotato that can be scaled up? Explain.

8. How are policy issues affecting sweetpotato producers in this area?

APPENDIX 6: QUESTIONNAIRE FOR INDIVIDUAL FARMERS

Instructions

Tick or fill the spaces provided appropriately

Title: Survey on influence of information access on improved sweetpotato varieties for adoption in Migori county Kenya

Date of interview _____ Questionnaire no. _____

Sub county [Suna East =1] [Suna West = 2] [Kuria West = 3] [Kuria East =4]

SECTION 1: GENERAL QUESTIONS

1. Household head Full name _____

Mobile No. _____

2. Gender of household head _____ (Tick one) 1=Male [] 2=Female []

3. Age of household head (Tick one) __ [1=18- 35 [] 2= 36-45[] 3= 46-55 [] 4= 56-60 [] =61 -65 []

4. Education level attained by household head [1= none [] 2=Primary [] 3=Secondary [] 4=Tertiary []

5. Marital status of household head__ [1=Married [] 2=Single [] 3=Widow / Widower []

6. Household's size? _____ (persons)

In this context, a household is a group of people who cook together and eat together and drawing food from a common source – share resources together.

Family members who work away or are not dependent on the household for at least 6 months are excluded. (For this purpose, household members are not necessarily the same as family members)

7. Main occupation of household head_____ (*tick only one*)

1. Farming	2. Casual labour (specify)____	3. Self-employment (specify)____	Employee (specify)____	5. Others (specify)____
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SECTION 2: FARM CHARACTERISTICS

Land size and ownership

8. What is your farm size under cropping in acres__ (acres?)

9. What is your land ownership? ____ [1=Inherited, 2=Bought; 3=Government settlement; 4=Rented; 5=Others (Specify) ____]

10. What are your **five main** crop enterprises? Please rank them and mention the main purpose of having them.

Crop enterprise	Acreage	Rating 1=Most important 2=Important 3=Moderate 4=Least important	Purpose of growing the crops 1=Sale 2=Home consumption 3=Both sale & home consumption 4=Others (specify)___
1=Maize			
2=Beans			
3=Sorghum			
4=Sweetpotato			
5= Cassava			
6=Finger millet			
7=Sugarcane			
8=Tobacco			
9=Vegetables			
10=Bananas			

SECTION 3: SWEETPOTATO PRODUCTION

Experience with sweetpotato information access

11. Have you ever heard about improved sweetpotato? ___ [1= Yes [] 2=No []

12. If yes, from whom did you hear about improved sweetpotato?

1. MoA extension agent	5. _____ NGO	9. Field days
2. Family/Neighbor/ Relations	(specify)_____	10. Shows
3. KALRO / KARI	6. Women group	11. Others
4. Farmer group	7. Radio	
	8. Poster/Pamphlet	

13. When did you hear about it? _____ (Year)

14. What were you told about improved sweetpotato?

1. High yielding	3. High in vitamins	5. Low input requirement
2. Early maturity	4. Good taste	6. Others (specify)_____

15. After hearing about improved sweetpotato do you grow them? _ [1= Yes [], 2=No []

16. If no please give your reasons;

1. Satisfied with the local variety I usually plant	5. No market
2. Was not convinced of its advantages	6. Culture not allowing my gender to grow
3. No access to planting material	7. Lack of money to buy planting material
4. Don't like the taste	

17. If yes which varieties do you grow?

[1=Kenspot 1 []; 2=Kenspot 2 []; 3=Kenspot 3 []; 4=Kenspot 4 [] 5=Kenspot 5 []; 6=Vitaa []; 7= Kabode []; 8=Others (Specify) []

18. When did you first start growing improved sweetpotato varieties? _____ (Year)

Use of inputs in sweetpotato production

19. What was the source of your planting material?

Variety	Source of planting material	Did you buy?	Cost
	1. Own production		
	2. Given by neighbor / friend/ relative	1=Yes	
	3. Received as a member of farmer group	2=No	
	4. NGO (specify)_____		
	5. KALRO / KARI		
	6. MoA Extension		
	7. Others (specify)____		

20. Who is responsible for the majority of sweetpotato production activities in your household?

[1=Male []; 2=Female []; 3= Both []

Production technologies

21. Have you ever been trained on sweetpotato production technologies? [1= Yes [],

2=No []

22. If yes, what kind of information did you get during training? 1= Sources of seed []

2= planting method []; 3= Disease management []; 4= Pest management []; 5=

Harvest [];

6= utilization []; 7= marketing [] 8= weed management []

23. Please specify who trained you? _____

24. What other sources of information on sweetpotato production technologies do you

usually access? _____

1. MoA	2. KALRO	3. Field days	4. Group training, by _____	5. Radio	6. Others (Specify) _____
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25. Which information source do you prefer, and why? __

Information source	Preferred information source (Tick below)	Why preferred
1. MoA		1.
		2.
2. KALRO		1.
		2.
3. Field days		1.
		2.
4. Group training (by who_____(specify))		1.
		2.
5. Radio		1.
		2.
6. Others (specify)_____		1.
		2.

Sweetpotato Variety Preference

26. Since you got information about improved sweetpotato which varieties have you continued to grow?

Variety of sweetpotato	Do you grow this variety in the 1= Long rains 2=Short rains 3=Both long and short rains	Rank varieties in order of preference

27. Which **three main** attributes do you prefer in choosing improved sweetpotato variety
(rank in order of importance the top three?)

Desired attribute	Which are the preferred attributes	Rank in order of importance the top three 1=Most important 5=Least important
1. Early Maturity		
2. Cooking ability		
3. Disease Resistance		
4. Storability before harvest		
5. Storability after harvest		
6. Yield Characteristics		
7. Taste (Sweetness)		
8. Texture (floury)		
9. Nutritional value		
10. Drought tolerance		
11. Root size		
12. Number of roots per plant		
13. Root flesh color		
14. Skin color		
15. Fibrousness		

Root production

28. Which part of the vine do you cut for planting? Why do you prefer that part?

Part of the vine cut for planting	(Tick one) preferred part of the vine for planting	Why do you prefer that part?
1=Upper part of the vine		1.
		2.
2=Center of the vine		1.
		2.
3= Near the base of the vine		1.
		2.

29. Which method do you prefer in planting sweetpotato, and why?

Method of planting sweetpotato	Tick preferred method of planting sweetpotato	Why do you prefer that method?
1=Mounds		1.
		2.
2=Ridges		1.
		2.
3=Flat		1.
		2.

30. How many times do you prefer weeding sweetpotato?

No. of times sweetpotato weeding is done in a season?	Tick number of weeding preferred	Please explain why?
1=Once		1.
		2.
2=Twice		1.
		2.

Production and sale of sweetpotato

31. From which sweetpotato did you get highest yield?

Yield (1=50kg bag, 2=90kg bag/ acre)*	(specify bag size)
1. Improved sweetpotato	
2. Local sweetpotato	

32. Do you sell sweetpotato? _ [1= Yes []]; 2= No []

33. If Yes, fill the Table below: *(If No, go to question 34)*

Part of sweetpotato	Do you sell this part of sweetpotato (1=Yes; 2=No)	Quantity 1=roots 50.00/ hip Vine Shs 1.00/cutting	Where sold 1. Village 2. Local market 3. Neighbor 4.Group (specify) 5.NGO (Specify)___	Who determines selling price 1. Farmer 2. Trader 3. Middlemen 4.Others (specify)
Roots				
Vines				

34. How do you rate the pricing of improved sweetpotato compared to local varieties?

—

1= Higher []; 2=Lower; [] 3= Same []

35. Mention **ways** in which you access market information on sweetpotato production?

(Tick all that apply)___

1. Farmers	2.	3. Radio	4. Mobile phone	5.	6.
	Traders			Newspapers	Others

36. Which is the best method above _____Please explain why_____

37. If not selling sweetpotato please give reasons_____

[1=Produced enough for home use []; 2=Lack of buyers []; 3=Low prices [];

4=others specify [].

38. What are your constraints in sweetpotato production? Please suggest how you prefer the constraints be addressed?

Constraints in sweetpotato production	Suggestion on addressing the constraints	Suggestion on information source 1. Group training 2. Radio 3. Field demonstration 4. Extension agent (MoA) 5. Extension agent (NGO, specify__) 6. KALRO
1. Low yielding		
2. Lack of labor		
3. Drought		
4. Lack of market		
5. Pests and diseases (specify)_____		
6. Lack of planting material		
7. Others (specify)		

Sweetpotato vine conservation

39. Do you conserve vines during the dry season? _ [1= Yes []; 2=No []

40. If yes, state **3 main ways** how do you conserve the vines?

Method of conservation	Choice	Source of information 1= IK 2=KALRO 3=Moa 4=NGO
Plant in wet areas (swamps)		
Small nursery under irrigation		
Small nursery in shade		
Leave some roots in the ground to sprout		
In banana plantation shade		

Utilization of sweetpotato

41. Has growing of sweetpotato improved your food security?__ 1=Yes []; 2= No []

42. If yes please explain 3 main ways how ?

1. _____

2. _____

3. _____

43. Have you been trained on value addition from sweetpotato? [1= Yes []; 2= No

44. If yes, what are the **three main** forms do you prefer in eating sweetpotato? ____

Utilization of improved sweetpotato	Choice	Source of information 1= IK 2=KALRO 3=MoA 4=NGO_____
Boiled/ steamed alone		
Boiled / steamed sweetpotato mixed with other foods		
Fried		
Roasted		
Make Porridge		
Juice		
Mandazi		

Household Income Sources

45. What are your **household's** main sources of income for the last one month?

Main income source (<i>for the four month</i>)	Amount received last four month i.e. (KS)*
1.Sale of sweetpotato	
2.Sale of maize	
3. Sale of livestock products	
4. Salary from formal employment (specify)____	
5. Self-employed (shop, carpenter, etc.)	
6. Casual labor (specify____)	

END

Stop Time _____