DISSEMINATION OF AGRICULTURAL INNOVATIONS: SOCIO - ECONOMIC ANALYSIS OF COMMUNICATION CHANNELS USED IN IMPROVED CHICKPEA (*Cicer arietinum L*) VARIETIES IN EMBU COUNTY, KENYA

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A research dissertation submitted to the Department of Horticulture in the Faculty of Agriculture in partial fulfillment of the requirement for the award of degree of masters in Research methods of Jomo Kenyatta University of Agriculture and Technology

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DECLARATION

This research dissertation is my original work and has not been presented for a degree in any other University or any other award.

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DEDICATION

To the glory of GOD, the Lord my shield and the lifter of my head, I dedicate this work to my loving mother Mrs Phylgona Oywer and my adorable children Lucky Odhiambo,Allan Otieno and Yvonne Akoth for everything you have been to me.

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ABSTRACT

Chickpea is the world's second most widely grown leguminous food crop after soybean. In Kenya however, chickpea is a new crop and not known by many. This could be due to insufficient agricultural information on the crop. Hence, it affects its adoption by farmers. It is therefore of great importance that chickpea information and knowledge be disseminated effectively to the end users. This study sought to evaluate the existing communication and dissemination methods of chickpea information and factors affecting them, determine gender involvement in chickpea information dissemination, and to evaluate the role of social network in disseminating and communicating chickpea knowledge among farmers. Household, socio-economic and institutional data was collected from farmers using household survey. A semi-structured questionnaire was administered to 120 farmers from Karaba, Gategi, Riakanau and Wachoro sublocations in Mwea ward. Of Embu County Farmers were sampled in a purposive random manner from the available growers and non-growers of chickpea. The study found that fellow farmer and ICRISAT staff was the most used communication channels. Gender and farmers social networks played a major role in chickpea information dissemination. Results from the binary logistic regression indicated that socio- economic factors such as means of transport and training before farming significantly influenced the farmer's choice of communication method (s) it was therefore recommended that improved chickpea awareness be increased by increasing field days, demonstrations and farmer group meetings. It was also recommended that, apart from the interpersonal communication methods, multiple communication methods such as ICTs be used also to disseminate chickpea information. This will increase the level of education in the study area.

ACRONYMS

AB	Ascochyta Blight
BGM	Botrytis Grey Mold
CVD	Cardiovascular Diseases
CGIAR	Consultative Group on International Agricultural Research
CYMMIT	International Maize and Wheat Improvement Centre
CBO	Community Based Organization
EAGC	Eastern Africa Grain
FW	Fusarium Wilt
GRT	Green Revolution Technology
HYVs	High yielding Varieties
ICT	Information Communication Technology
IPM	Integrated Pest Management
ICRISAT	International Crop Research Institute for Semi-Arid Tropics
KARLO	Kenya Agricultural Research and Livestock Organization
PMGs	Production Marketing Groups
RUFORUM	Regional Universities for capacity building in Agriculture
TCM	Traditional Communication Media
TL	Tropical Legume

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CHAPTER I

INTRODUCTION

1.1 Background

Agriculture is the backbone of most sub-Saharan (SSA) countries' economies and contributes highly to the Gross Domestic Product (GDP) (Adolwa *et al*., 2012). Agricultural production especially among rural farmers has been severely curtailed by a number of factors. Key among them being insufficient agricultural information dissemination to farmers. This has affected the productivity and livelihood of smallholder farmers in Africa. According to Salim *et al* (2003) over half the rural population in East Africa lives in extreme poverty.

Kenyan agricultural sector accounts for 26% of the Gross Domestic Product (GDP) and 60% of export earnings with 80% of the population depending directly or indirectly on agriculture (Adolwa *et al.*, 2012). Agricultural research and innovations dissemination enhance food security and improve livelihood of the poor. A well-developed agricultural innovation is perceived not useful when the adoption rate is poor Researchers should ensure therefore that their research products and outputs are disseminated to the end users and should not only focus on the research aspect of their work but also on communicating their innovations and findings to users. (Gathecha *etal.*, 2012).

Communication plays a vital role in the adoption of improved technologies. The delivered information enable farmers to improve on their agricultural production and marketing their produce (Ajayi and Gunn, 2009). Effective communication is an essential tool for the establishment and maintenance of good social and working relationships. It enables people to exercise control over their environment (Agwu *et al*., 2008).

Knowledge and information are vital for people to respond successfully to the opportunities and challenges of social, economic and technological changes even those that help to improve

agricultural productivity and rural livelihood knowledge. Information should therefore be effectively disseminated so that it becomes useful to people (Ajayi and Gunn, 2009)

Chickpea is a new crop in Kenya and not known by many. This could be due to insufficient information on the crop. Hence poor adoption by farmers. Therefore it is important that chickpea production information be disseminated effectively especially to smallholder farmers in the rural areas (Varshney *et al*., 2013).

ICRISAT initiated the chickpea improvement project with the following objectives: to develop high yielding , disease resistant varieties that can adopt to drought prone environment and to promote their adoptions (Gathecha et al.,, 2012). These collaborative effort between ICRISAT and various partners are to reduce rural poverty through a market driven strategy based on intensified cultivation of chickpea and other ICRISAT legumes, then link farmers to markets (Salim *et a*l., 2003).The initiative was aimed at identifying higher-yielding chickpea varieties than the local races and linking farmers directly to markets through a six step process:- Foundation seed produced by ICRISAT on research fields provided by Kenya Agricultural research and livestock organization (KARLO) and the University of Nairobi, the seeds are then handed over to farmers' organization called Producer Marketing Groups (PMGs), the PMGs then distribute seed to a few dozen farmers for multiplication, the farmers produce high quality seed and sell it back to the PMGs ,who again sell it to farmers then finally the farmers pool their produce and market it to traders (Salim *et al*., 2003). However little attention has been given to the knowledge base of chickpea information by farmers. A reconnaissance visit in the study area revealed that most chickpea information by the farmers are acquired via their social networks and informal channels such as the demonstrations and the field days. However, the most preferred communication methods and, factors affecting them in the study area is still not known.

1.2. Problem Statement

Chickpea is a low input crop, matures fast and produces high yields. Its cultivation is of importance to potential food security and livelihood of poor people in the developing world. Chickpea has capacity for symbiotic nitrogen fixation. In Kenya, however, chickpea adoption is a relatively low this could be due to insufficient information on the crop, which is caused by the wide communication gap between researchers and farmers It is therefore of great importance that chickpea production information be disseminated effectively especially to smallholder farmers in the rural areas (Varshney *et al*., 2013). ICRISAT gave seeds to farmers, conducted demonstrations, field visits among many activities to disseminate improved chickpea technologies to farmers in Embu County. However, the current chickpea knowledge base by chickpea farmers and how the information diffuses in a way that improves the livelihood of the people is not known. There is scarcity of studies focusing on methods of chickpea information dissemination and the factors affecting choice of chickpea communication channel. This study therefore seeks to understand the communication methods by chickpea farmers in Embu County and factors affecting the communication channel choice. It will also analyze the gender involvement and its effect on method use

The study will also determine social network in disseminating and communicating chickpea information

1.3 Study Objectives

1.3.1 General objective

To determine the methods of chickpea information dissemination and factors influencing them and to establish the local social network used by the farmers in accessing chickpea information.

1.3.2 Specific objectives

1. To determine the most prevalent method(s) of information dissemination farmers used to access chickpea knowledge and factors affecting them.

2. To determine the role of gender in chickpea information dissemination among farmers

3. To evaluate the role of social networks in disseminating and communicating chickpea knowledge to chickpea farmers

1.4 Study hypotheses

1. Socio-economic factors have no influence on the communication methods used to disseminate chickpea knowledge

2. Gender involvement has no effect on chickpea information dissemination among farmers

3. Social networks have no influence on chickpea information dissemination among farmers

1.5 Justification of the study

Chickpea (Cicer arietinum L.) is a hardy crop grown with residual moisture and on marginal soils that are unsuitable for other crops such as wheat, fixes atmospheric nitrogen in the soils and an excellent source of protein (Onyari *et al*., 2010, Kassie et at.,2009) its adoption will help increase productivity and improve livelihood of farmers.

Adoption of agricultural technologies is essential in improving the efficiency of technology generation; assessing the effectiveness of technology transfer; understanding the role of policy in the adoption of new technology; and demonstrating the impact of investing in knowledge generation (CIMMYT, 1993). Most dissemination of agricultural innovations studies in the country mainly focused on cash crops and other agricultural technologies such as soil conservation techniques and fertilizers with less emphasis on crops such as chickpea.

1.6 Definitions of terms

Communication is a process in which participants create and share information with one another in order to reach a mutual understanding (Rogers, 2003)

Communication channels are the means by which information is transmitted to or within the social system. These communicational channels are divided into two main types namely: mass media channels including radio, TV, newspapers, etc. and interpersonal channels including face-to-face linkages between two or more members of the social system. Time determines the rate of adoption or the relative speed with which it is adopted by the members of the social system(Arumapperuma, 2008).

Innovation- is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003)

A communication network consists of interconnected individuals who are linked by patterned flows of information (Rogers, 2003)

CHAPTER II

LITERATURE RIVIEW

2.1 Chickpea origin and economic importance

Chickpea *(Cicer arietinum L*)(2n=2x=16) is a major food legume in the world. Its domestication and that of wheat, pea and lentils dates back to 10,000-12,000years in the fertile crescent of Iran, Turkey and Israel/Jordan (Rao et al., 2009;Meena *et al*., 2012 and (Upadhyaya et al.,2001).

According to Varshney *et a*l, (2013) Chickpea seeds are a primary source of human dietary protein. The author further argues that chickpea is one of the founder crops of modern agriculture and it originated from Turkey and Syria. Chickpea is a cool season annual pulse crop that is grown in tropical, subtropical and temperate regions of the world; it needs a subtropical or tropical climate with well-drained fertile soils having pH of 5.5-8.6. Chickpea improves more intensive and productive use of land, particularly in areas where land is scarce and the crop can be grown as a second crop using residual moisture. It reduces malnutrition and improves human health especially for the poor who cannot afford livestock products, since it is an excellent source of protein (Kassie *et al*., 2009). Globally, chickpea is adapted to black soils in the cool semi-arid areas of the tropics, sub-tropics as well as the temperate areas, and constitutes 20% of the world's pulse production. Its production works well in rotation with cereals such as wheat and *teff, which* are widely grown in relatively well-drained black soils (Kassie *et al.,* 2009). Chickpea was first produced in the Middle East about 7,000 years ago. However, the most important chickpea producing countries are India, Turkey, Pakistan, Iran, Mexico, Australia, Ethiopia, Myanmar and Canada. Chickpea is currently grown on about 10.7 million hectares worldwide with average annual production of

8.2 million tonnes. About 95% of chickpea cultivation and consumption is in the developing countries (Kassie *et al*., 2009).

Chickpea is grown at the end of the main rainy season using residual soil moisture. This allows farmers to practice double cropping, which in turn increases productivity of scarce land resource and serves as an additional source of income (Kassie *et al*., 2009; Jukanti, *et al*., 2012;Varshney *et al.,* 2013).

Chickpea has more diversified uses than any other food legume. The green leaves are used as leafy vegetable and are superior to spinach and cabbage in mineral content. The green immature seed is used as a snack or vegetable. Selling green pods for green grains is highly profitable as these are sold at around US $ 1 to US$ 1.5 per kg and weigh 2-3 times higher than dry grains. The dry seed splits and flour are used in a variety of other preparations like *githeri*, stew, *mandaz*i, cake, *samosa,* doughnuts, buns, *chapati* and grits (Rao *et al.,* 2009).

Apart from a biotic and biotic stresses, insufficient communication is another major challenge limiting chickpea production globally. Drought is the most important constraint to yield in chickpea, accounting for about 50% yield reduction globally (Pooran et al., 2012). Heat stress has become another major constraint to chickpea production. Other constraints include root diseases such as Fusarium wilt (FW), dry root rot and collar rot, mostly found in areas where the chickpea-growing season is dry and warm, e.g., southern and eastern Asia. Ascochyta blight (AB), and botrytis grey mold (BGM) among others (Pooran *et al*., 2012). Pod borer (*Helicoverpa armigera* Hubner) is the most important pest of chickpea worldwide. It is a highly polyphagous pest and can feed on various plant parts, such as leaves, tender shoots, flower buds, and immature seeds. The extent of global losses to chickpea by this pest is estimated at over US$ 500 million. (Pooran *et al.,* 2012).

Chickpea is planted immediately after the harvest of cereals and grows under residual moisture thus giving farmers a second crop (where only one crop would traditionally be grown). Hence, it generates additional income, and nutrition to the farmers. Policy makers and peoples' representatives in Kenya are also in favor of drought tolerant chickpea, and have earmarked constituency development fund to promote this crop. The bulk of chickpea produced in Eastern Africa is consumed locally, adding to the nutrition of people; only Ethiopia exports a substantial amount of its chickpea produced (Rao et al.,2009).

Chickpea (Cicer arietinum L) is the second most widely grown food legume after soybean. Its domestication dates back to 10,000-12,000years in the fertile crescent of Iran, Turkey and Israel/Jordan (Li et al., 2015; Meena et al., 2012, (Varshney et al., 2013).

Chickpea is a cool season annual pulse crop that is grown in tropical, subtropical and temperate regions of the world. It needs a subtropical or tropical climate with well-drained fertile soils (Tuba and Abdurrahim, 2013). Chickpea fixes atmospheric nitrogen in soils and thus improves soil fertility and saves fertilizer costs in subsequent crops. It improves more intensive and productive use of land, particularly in areas where land is scarce. The crop is also grown as a second crop using residual moisture. It reduces malnutrition and improves human health especially for the poor (Kassie et al., 2009). Chickpea is an excellent source of protein, fiber, complex carbohydrates, vitamins, and minerals. The growing demand for chickpea the domestic and export markets provides a source of cash for smallholder producers, and it increases livestock productivity as the residue is in rich indigestible crude protein content compared to other cereals (Kassie et al.,2009). There are two types of globally produced chickpea;desi and kabuli . Chickpea is grown at the end of the main rainy season using residual soil moisture. This allows farmers to practice double cropping, which in turn increases productivity of scarce land resource and serves as an additional source of

income (Kassie et al., 2009); Jukanti, et al., 2012).Chickpea is grown in Eastern and Southern Africa(ESA) countries particularly in Ethiopia, Tanzania, Malawi and Kenya, Eritrea and to a little extent in Sudan, and Uganda(Rao et al., 2009)

ICRISAT initiated chickpea improvement project with the following objectives: to develop high yielding , disease resistant varieties that can adopt to drought prone environment and to promote their adoptions (Gathecha et al., 2012) Chickpea crop improvement scientists at ICRISAT identified five global chickpea research domains which are based on latitude, length of growing period ,temperature and soil type. Kenya falls under research domain -2 with latitude between 20-25° and medium maturing (110-120 days). ICRISAT-Nairobi received 123 lines of heat tolerance nursery (61 desi and 62 Kabuli) and supplied best lines of desi (ICCVs 07101, 0712, 07104, 07110, 07114) and Kabuli (ICCVs 07304, 07308, 05312, 07306, and 05315) to farmers in Embu (Rao *et al.,* 2009).

2.2. Conceptual framework of the study

The dissemination, diffusion pattern and ultimate adoption of any agricultural innovation often vary from place to place. The variations in dissemination and adoption patterns are because of differences of the environment, institutional factors and social factors. Farmers' adoption behavior, especially in low-income countries, is influenced by a complex set of socio economic, demographic, technical, institutional and biophysical factors (Mihiretu, 2008) farmers' decision to adopt or reject new technologies can also be influenced by factors related to their objectives and constraints. These factors include farmers' resource endowments as measured by :-(a) size of family labors, farm size and asset ownership, (b) farmers' socio–economic circumstance (age, and formal education) and (c) institutional support system available for inputs (CIMMIYT, 1993).

2.3. Agricultural information dissemination

African famers require reliable and relevant agricultural information relating to better farming methods (Chisita, 2012). The author further argues that the current agricultural extension services have failed to meet the information needs of farmers and this is due to the absence of systems that facilitate timely information sharing, gathering and transmission.

The Media plays a major role in dissemination of agricultural innovations to both the literate and illiterate farmers (Muhammad *etal*., 2011). However, adoption of improved varieties remains incomplete (Muange *et al*., 2014). The Consultative Group on International agricultural research (CGIAR) indicates that from their 10 key crops in their mandate, 65% of the cultivated areas have adopted the improved varieties with Sub -Saharan Africa (SSA) recording the lowest adoption rates. Krishna *etal*, (2005) argues that there is a wide gap between research and practice. This calls for need for timely expert advice to make them more productive and competitive. The study however makes an effort to present a solution to bridge the information gap by exploiting advances in information technology.

Information is critical in agricultural development because it is a tool for communication between stakeholders and serves as a channel for assessing trends and shaping decisions (Chisita, 2012). According to Ajayi and Gunn (2009). Communication is a vital issue in agriculture. . Knowledge and information are essential in order to respond to the opportunities and challenges of social, economic and technological changes even those that help to improve agricultural productivity, food security and rural livelihood. The author further argues that in order to be useful, knowledge and information must be effectively communicated to the people.

2.4 Agricultural knowledge/ information dissemination methods

Selection of the right channel is influenced by the size of the target population. The more farmers are exposed to the innovation, the higher the chance that these farmers will adopt it

(Arumapperuma, 2008). Effectiveness of a dissemination channel depends not only on the number of farmers that receive information but also on how successful that channel influences farmers' decision to adopt a given technology (Murage *et al.*,2012) Communication channels are categorized as localite channels and cosmopolite channels that communicates between an individual of the social system and outside sources. Cheboi and Mberia ,(2014) argue that even though interpersonal channels can be local or cosmopolite, almost all mass media channels are cosmopolite (Cheboi and Mberia, 2014).

Effective communication is considered as essential tool for establishing and maintaining good social and working relationship (Agwu *etal*., 2008). Thus, effective communication allows people to exercise control over their environment and the main reason for communication is to bring about change of attitude, knowledge, skills and aspiration of the receivers. Agwu et al, (2008) identifies various communication channels such as farm magazines, leaflets, newsletters, newspapers, pamphlets, radio and television among others that are being used to disseminate agricultural information to farmers. They however found out that radio is the most preferred tool of mass communication. The study recommended the rescheduling of the radio programs to very late in the evening when the farmers will have an opportunity to listen to the programs.

According to Uzokwe, (2014) there is need for Traditional Communication Media (TCM) especially town criers, friends and neighbors, community elders and cooperatives to be integrated into innovation delivery system to facilitate quick dissemination and diffusion of agricultural innovations as it will increase effectiveness of extension service delivery.

Cheboi and Mberia, (2014) records that although interpersonal communication channels were widely used, there was still need for further studies to establish the role of mass media in augmenting interpersonal channels of communication in diffusion and adoption of agricultural innovations especially in areas with lower penetration level of mass media. The

study however makes an effort to present a solution to bridge the information gap by exploiting advances in information technology.

Gathecha et al,(2012), study sought to understand the information needs of farmers and communication channels used to diffuse the improved pigeon varieties in Makueni county Kenya. The study found out that the most commonly used channels for receiving agricultural information in order of importance were another farmer, community leaders, and seed stockiest The study also found out that the most preferred channels by farmers were ICRISAT staff, agricultural officers and field days. The study however showed that about 39% of the respondents had difficulty in obtaining information. Even though the study found high adoption rates of the improved varieties in the study area, it was recommended that ICRISAT should undertake more promotional efforts in the study area to increase the adoption intensity.

According to Rogers, (2003) communication is the process by which participants create and share information/knowledge with each other with the aim of reaching a mutual understanding. Mass media channels are all those means of transmitting messages that entail mass medium such as radio, television, newspapers and magazines, which enable one or few individuals to reach a large audience whereas interpersonal channels involve a face-to-face exchange between two or more individuals (Rogers, 2003). Interpersonal channels could be either local or cosmopolite while mass media channels are entirely cosmopolite. According to Rogers (2003), cosmopolite communication channels are those linking an individual with sources outside the social system. Local (or localite) interpersonal channels are traditional in nature and include songs, poems, and exchange with neighbors, relatives and friends or peers, faith-based organizations, and community-based channels such as farmer field days, workshops, seminars, on-farm demonstrations, farm-to-farm visits, agricultural shows and public community meetings. (Adolwa et al,.2012 ; Rogers, 2003). Knowledge may be an

important variable, but how farmers receive information from different sources has a more significant effect on adoption than just mere knowledge acquisition (Murage et al., 2012)

2.4.1 Factors influencing information dissemination methods and adoption

Factors such as age, farm size, gender, income level, and education level and farmers experience play a major role in determining the media through which farmers are likely to receive information. (Adolwa, 2012) A poor farmer for example who cannot afford to purchase a television set cannot be expected to benefit from agricultural documentaries aired on television channels like "shamba shape up" or" Smart farm "which are examples of Kenyan agricultural information dissemination programs aired in the local TV. Likewise, a farmer who is illiterate or semi-illiterate will definitely be unable to read information in a scientific journal, agricultural magazine, pamphlets book or a thesis in a library. According to Adolwa et al.,(2012) low levels of literacy among smallholder farmers in sub Saharan Africa (SSA) is a major limitation to effective communication and dissemination of agricultural information. On the other hand, a farmer endowed with resources and good education will certainly appreciate television and Information Communication Technologies (ICTs) as well as printed material.

Studies have shown the impact of different information sources on farmers' probability of adopting a particular technology. For example information from crop consultants had the largest impact on adoption of precision farming than media sources in the United States (Murage et al., 2012). The study found that media is key in receiving new information and insights and farmer field schools had the greatest impact on adoption of integrated pest management (IPM) than field days. The study records that even though these studies were carried out in the developed countries where conditions and circumstances are different from those in the developing world, they clearly demonstrate that technology adoption could be

influenced, among other factors by the dissemination channels/ methods (Murage et al., 2012). Adoption is a mental process through which an individual passes from first knowledge of an innovation to the decision to adopt or reject (Mihiretu, 2008). The author further emphasizes that adoption is an outcome of a decision to accept a given technology; it can also be described as the use or no use of new technology by a given farmer at a point in time or during unlimited period. The adoption pattern to a technological change in agriculture is a complicated process. A large number of personal, situational and social characteristics of farmers have been found to influence their adoption behavior. According to Mihiretu, (2008), adopter shave a high rate of literacy and higher level of formal education, operate large sized holdings, own the land they operate, have a relatively high income and economic status, are commercial in farming operation, have relatively high level of extension contact, and belong to upper socio-economic status categories. On the other hand, non-adopters have a low rate of literacy and level of formal education, operate smallholdings, are mostly small and marginal farmers, belong to low income group, have a low level of socio-economic status categories.

Adoption of Green Revolution Technologies(GRT) has indicated that the new High Yielding Varieties (HYVs) were adopted at rapid rates in those areas where they were technically and economically superior to local varieties. Past studies have indicated that the adoption of improved varieties are affected by access to information and many other factors such as farm size, age, family size, education and availability of credit among others(Mihiretu,2008). According to Shivani *et al*. (2000), access to information about improved technologies influences adoption, the more the experience of farm size, age, family size, education ,availability of credit among others(Mihiretu,2008) According to Shivani *et al*. (2000), access to information about improved technologies influences adoption, the more the experience of farm size, age, family size, education ,availability of credit among others (Mihiretu,2008) According to Shivani *et al*. (2000), access to information about improved

technologies influences adoption, the more the experience of growing chickpea ,the higher the adoption of new varieties. Such a pattern is expected because more experienced farmers may have better skills. Research results should therefore be transferred to the farmers to enable them solve their problem. Farmers' problems and concerns on the other hand need to be fed to researchers. This link however has to be fundamental but in reality the practice is problematic(Makari, 2007).

2.5 Gender and information dissemination

Gender, according to (Lubwama, 1999) is the socially defined roles of each sex as well as the relation between them. Women play a key role in agricultural production. It is estimated that women provide 60-80% of the agricultural labor force in most developing countries (FAO, 2011). Kenyan women play a major role in agricultural production as they do over 70% of agricultural activities.

Chickpea production is the responsibility of the household in general, men and women appear to make decisions regarding the sale of chickpea but women are less familiar with modern markets and feel incapable to influence them (Mihiretu,2008). Women are vulnerable to cultural norms, and the lack of access to information on new technology, prices, demand among others. Unlike their husbands, they are rarely given training in modern small-business management. According to Mihiretu. (2008) women are hindered by factors common to all such as lack of adequate transport and communications services, insufficient equipment and amenities in marketplaces and the presence of manipulative intermediaries. Unlike women, men have easier access to technology and training, mainly due to their strong position as head of the household and greater access to off-farm mobility. Mihiretu. (2008) argues that gender differentials are one of the important factors influencing adoption of improved agricultural technologies. Due to long lasting cultural and social grounds in many societies of developing

countries, women have less access to household resources and have less access to institutional services.

Muange *et al* (2014) assessed relevance of exposure and other constraints in the adoption of improved sorghum and maize cultivators in central Tanzania. They found out that female farmers have less exposure to maize hybrids than their male counterparts do.

2.6 Social networks and information dissemination

Social capital concept was derived from sociological theory; it inheres in the structure of peoples' relationships and allows individuals to gain access not only to economic resources but also to human and cultural capital (Magnan *et al*., 2014). Social networks are type of social capital, which are widely recognized, yet differences in access to information through networks within the household have been mostly ignored in the economic literature. Social networks, and the information they provide, are potentially important individually held asset (Sherraden, 2015). Loscocco *et al*, (2009) argues that not only do women's networks have more kin, but also their networks are more diverse which can be leveraged for both personal and professional needs. Both women and men use formal and informal social networks to learn about and gain access to economic opportunities. They form networks that vary in composition, size, and structure and are shaped by dynamics of social identification, and different preferences and constraints that individuals face (Magnan *et al*., 2014).

CHAPTER III

MATERIALS AND METHODS

3.1. Theoretical framework of the study

Several theories such as Individual innovativeness theory, Theory of perceived attributes, Social learning theory, Media Richness theory among others could be applied on the study, the study however found Diffusion theory appropriate. Diffusion process occurs through a combination of mass and interpersonal communication and normally takes years until an idea has spread (Cheboi and Mberia, 2014). According to Rogers (2003), Diffusion theory is the process by which an innovation is communicated through certain channels over time among participants in a social system. Diffusion seeks to explain how, why, and at what rate new ideas and technology spread through culture. Rogers further describes the innovation-decision process as an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation. The innovation decision process involves five steps: knowledge, persuasion, decision, implementation, and confirmation. The innovation-decision process starts with the knowledge stage during which an individual learns about the existence of innovation and seeks information about the innovation. This phase asks "What?" "How?" and "why"? During this phase, the individual attempts to determine "what the innovation is and how and why it works". According to Rogers, the questions form three types of knowledge: awareness knowledge, how-to-knowledge, and principles-knowledge. The persuasion step occurs when the individual has a negative or positive attitude towards the innovation, but the formation of

a favorable or unfavorable attitude toward an innovation does not always lead directly or indirectly to an adoption or rejection. The individual shapes his or her attitude after he or she knows about the innovation. Furthermore, Rogers states that while the knowledge stage is cognitive-(or knowing-) centered, the persuasion stage is more affective-(or feeling-) centered. Thus, the individual is involved more sensitively with the innovation at the persuasion stage. The degree of uncertainty about the innovation's functioning and the social reinforcement from others (colleagues, peers, etc.) affect the individual's opinions and beliefs about the innovation. At the decision stage in the innovation-decision process, the individual chooses to adopt or reject the innovation.

The theory further highlights five factors that determine the speed at which innovations are adopted by members of a social system. Which include; perception of innovation, type of innovation decision, communication channels, characteristics of the social system, and promotion strategies. (Thakadu and Tau, 2012)

3.2. Research design

A household survey was used to collect data from selected farmers in Embu County in the year 2016.

3.3. Study Area

The study was conducted in Karaba, Gategi, Riakanau and Wachoro Sub-locations Mbeere South Constituency in Embu County, Kenya .(Fig 3.1) Mbeere South boarders Kirinyaga to the East, Embu West to the North and Mbeere North to the West. Mbeere South is about thirty-three (33) kilometers from Embu town. According to Singleton (1993), the ideal setting for any study is one that is easily accessible for researchers and permits instant rapport between the researcher and the informants. The constituency is mainly rural with agriculture being the main activity Mbeere South is dry with no cash crop and the kind of farming

practiced is subsistence. The major crops usually grown in the area are maize, bean, green gram, black bean, millet pigeon pea and chickpea among others. The area was purposively selected because; improved chickpea farming has been promoted in the area by both the government, research institution and NGOs such as KARLO, ICRISAT and Egerton. Selected smallholder farmers benefited from inputs and extension support programs that were implemented by participating NGOs. The NGO provides inputs in the form seed to selected beneficiaries to be paid back in the form of grain after harvesting.

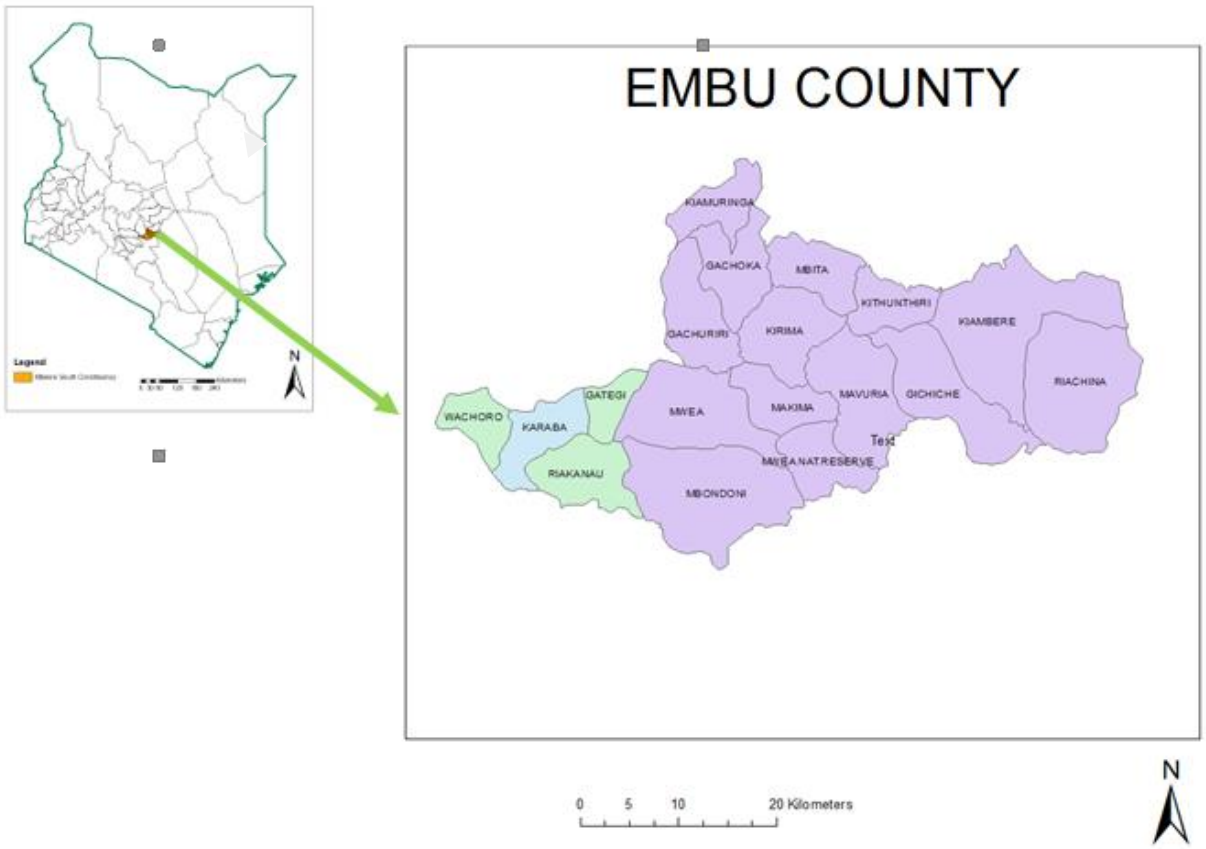


Figure 1. Map of Kenya showing the study area (Source: Extracted using ArcGIS 10.3 from ILRI Kenya data source)

3.4. Sampling Design and Sample Size

A pretested questionnaire (Annex1) was used for primary data collection. Farmers in Karaba , Gategi, Riakanau and Wachoro sublocations in Mwea ward in Embu county. A purposive sampling method was used to draw 120 chickpea farmers from the county. In each location, a

minimum of 10 and maximum of 40 farmers were selected depending with their availability. The selection was done with the help of the agricultural extension officer. The respondents were either household head or their spouses. The identification of chickpea growing areas was made through reviewing secondary data on production and area coverage of the chickpea crop, suggested by ICRISAT during the MOU meeting with the researcher. A reconnaissance done by the researcher also showed that the area was appropriate. The four sub-locations (Karaba, Gategi,Wachoro and Riakanau) in Mwea ward were purposively selected because they are the major chickpea growing areas in Mbeere south Constituency Embu County.

3.5. Data collection

Primary data, both qualitative and quantitative, was collected from farmers. Secondary, qualitative data (literature review) was obtained from books, papers, journals, magazines, libraries and the internet. The data was required in order to evaluate farmers' access to information and knowledge sources as well as their preferred channels for receiving information and knowledge. In addition, the relationship between farmers' socio-economic status and information and knowledge access and the uptake of chickpea information was investigated. Household, social-economic and institutional data was collected. Household data collected included; age, education level, gender and farming experience of the farmer. Economic data collected was; land size, communication asset ownership, labor availability. Institutional factors include; access to market, use of credit, training participation, field day visit, mass media exposure, group membership and extension agent contact. Socio-economic data will include; leadership, farmers preference and group membership.

3.6. Data analysis

Different methodologies for analysis of qualitative and quantitative data were employed in this study.

The SPSS version 20 statistical analysis software (IBM SPSS 20) was used for descriptive. The methodology involved computations of frequencies, the means, percentages and standard deviation.

3.6.2 Binary Logistic Regression

In this study, a logistic regression model was used to determine the factors influencing the most appropriate method(s) of communication as opposed to other approaches.

The form of the regression function used in this analysis is given. Y=A+ X1 +X2 + X3 + X4 + X5. Where Y= Communication channel used by chickpea farmer, A= the intercept (constant) X1 … X5 = variables under study. Where X1 = years of farming, X2= training before planting, X3 =means of transport, X4 = extension staff visit, X5, =training before planting and years of farming. μ= Error term which was assumed to be evenly distributed across the study population

Binary logistic regression was used to determine the choice of chickpea communication channel by the farmer. SAS was used to analyze this data.

Logistic Regression

$$Z = \ln\left(\frac{p}{1-p}\right)^2$$

Where;

$$Z = Z\left(f, d, a\right) + \varepsilon$$

Z is a latent variable that takes the value of 1 if the household used ICRISAT +Fellow farmer to get chickpea information and 0 otherwise, $\boldsymbol{f}$ is a vector of training before farming, $\boldsymbol{d}$ is a vector of means of transport, $\boldsymbol{a}$ is a vector of a combination of training before farming and years of farming and ε is the stochastic term assumed to have a logistic distribution. The

empirical based on the above equation, the logistic regression model estimated in implicit functional form becomes;

Use of ICRISAT + Fellow farmer (Z) = f (training before farming, means of transport, training before farming and years of farming) + e

Definition of variables used in the model and how they were measured;

Use of ICRISAT + Fellow farmer - this was a binary choice variable (1=a household uses ICRISAT + Fellow farmer channel to get chickpea information and0=otherwise) that established whether a household got chickpea information via ICRISAT+ Fellow farmer as the communication channel or not.

Years of farming – this was a continuous variable measured in years. Years of farming greatly affects choice of communication channel in that the higher the number of years of farming the farmer has, the more the experience. The farmer is therefore able to know how reliable, accessible and effective a communication channel is. The farmer is able to make a wise choice This might result in a larger proportion of the population of a village using ICRISAT + Fellow farmer as the communication channel for the chickpea information. Years of farming was expected to positively influence respondents' decision to use a channel.

Training before farming– Farmers who have been trained before farming tends to have lots of chickpea information including communication channel choice Training before farming was expected to positively influence use of a communication channel.

Means of transport Farmers who use faster means of transport like motor vehicles are able to get information faster and from a wide range. Means of transport is expected to positively influence the choice of a communication channel.

3.7. Methods of chickpea information dissemination and factors affecting them

The data from this section helped in addressing objective one of this study. To determine the methods of information dissemination farmers used to access chickpea knowledge and factors affecting them. In order to determine the methods, farmers were asked the methods they used to get chickpea information. The method that leads in terms of percentage (ICRISAT Staff 27.5% and fellow farmer 27.5%) was regressed against the alternative methods. A binary, Logit model was used to analyze this data

3.8. Gender involvement

The data from this section helped to address objective two of this study. To determine the gender involvement in chickpea information dissemination among farmers. The respondents were asked from 'whom,' in terms of gender, they got chickpea information. A descriptive analysis was done to get the highest percentage between the male and the female respondents.

3.9. Social networks

The data from this section addressed objective three of this study. To evaluate the role of social networks in disseminating and communicating chickpea knowledge to chickpea farmers. The farmers were asked the different social networks they belong to. The data was subjected to descriptive statistics.

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Socio-economic characteristics of the respondents

The Table 4.1 shows that 62.5% of the respondents were female while the remaining 37.5 % were male. The results however are not in line with (Cheboi and Mberia, 2014) who reported that male were the majority (67.5%) while women respondents were only 32.5%.Furthermore, Table 1 shows that most of the respondents (88.8%) were married while the others (11.2 %) were single. Majority (86%) of the farmers were in the lower level of education. This means that they had no formal education or left school at primary level, while the remaining 14% were in the upper level of education meaning secondary and tertiary. This can also imply that the literacy level in this study area is relatively low. This might affect negatively the farmers in communication and dissemination of improved chickpea practices. The implication is that most of the farmers will not be able to understand the technology hence affecting adoption. These results are in agreement with (Ajayi and Gunn,2009), who also found low level of education in their study area. The results reveal that only 40% were in leadership and the rest (60%) were not, this affects chickpea information uptake negatively. Those who are in leadership know many people (wider network) and wider influence hence can receive and disseminate information easily. 97.5 % of the respondents were farmers while 2.5 % were not. The table shows that 80.8% of the interviewed respondents grew chickpea.Male headed house hold were 85.5% and only 14.5% were female headed.The chi-square test conducted showed that there were significant difference between the farmers's socio-economic attributes namely: gender,marital status,education level,leadership,occupation and house head.

Table 4.1. Socio-economic characteristics of chickpea farmers

Characteristics	Percentages (%)	p-value
Gender		
Male	37	
Female	63	0.006**
Marital Status		
Married	85	
Not married	15	<0.001**
Education level		
Upper level	14	
Lower level	86	0.715**
Leadership		
Leaders	40	
Non-leaders	60	0.028**
Occupation		
Farming	97.50	
Off- farming	2.50	<0.001**
House hold head		
Male and female adult	85.00	
Adult female no male	11.70	
Adult male no female	3.30	<0.001**

** significance at 5%

4.2 Socio-economic characteristics of chickpea farmers(continous data)

Table 4.2 shows that the mean age of the respondents 55.99 years hence the majority of the respondents were in their middle age. This indicates that youth were not so much into chickpea farming. Farming experience of the respondents had a mean of 25.28 years. This indicates that chickpea has been grown in the area for more than twenty years . The results show that the mean of the farm area for most of the respondents was 5.62 .. The house hold size of the respondents had a mean of 5.00 meaning that majority had 4-5 house hold size. This could be due to the fact that most of them had grown up children.

Table 4.2. Socio-economic characteristics of chickpea farmers

Characteristics	Mean	SD
Age of the respondent	55.99	15.116
Farming experience	25.28	21.321
Acres of the farm	5.62	10.585
House hold size	5.00	1.876

4.3 Evaluation of chickpea informal communication channels

Table 4.3 below shows that majority of the farmers (27.5%) considered fellow farmer and ICRISAT staff to be the best source of chickpea information This results are contrary to (Muange and Schwarze, 2014) who reported that neighbors and friends (69% and 67%) respectively were the best sources of information in their study. The results however are in agreement with (Agwu et al., 2008) who reported that co-farmer (35.3%) was the best communication channel available for adoption of improved technology. Egerton staff (15. 5%) was ranked second while government extension (13.3%) was ranked as the third best source of chickpea information. Six percent of the respondents received information from their relatives while local seed traders, villagers, and field day received a response of 5%, 2%, and 1% respectively. The chi-square test conducted showed that there were significance differences among the communication methods.

Table 4.3 Evaluation of chickpea sources of information

Source of information	Frequency	Percentage(%)	p-value
Fellow farmer	33	27.5	<0.001**
ICRISAT Staff	33	27.5	
Egerton Staff	19	15.8	
Government Extension agents	16	13.3	
Local seed traders	5	4.2	
Villagers	2	1.7	
Relatives	6	5.0	
Field day	1	0.8	

P-value significance level ** refers to 5%

4.4 Evaluation of chickpea information channels

Radio remains to be a very important tool for speedy diffusion of information on agricultural innovations. It is a very powerful, cheap mass medium that can reach large numbers of farmers. Radio promotes dialogue and can be used for training and dissemination of agricultural technologies. It can also be used to develop community cohesion and harmony. Community involvement is essential for the successful use of radio with rural populations. Radio programmes are most effective when produced with audience participation and, in local languages and with consideration for cultural traditions and time. Farmers can express their concerns and speak about their ambitions with extension officers and other external partners such as national policy-makers and development planners through radio.

In Embu County, even though most farmers owned radio (78%) and receive agricultural information via radio, only 7% received information about chickpea technologies through media (radio and television). This is a clear indication that the rest of the respondents (93%) received chickpea information via interpersonal communication methods (table 4.4). The study also found that only 22% of the respondents owned television and among the interpersonal chickpea channels, relative had, the highest percentage (58%) followed by neighbors, government officials and friends 15%, 13.3%, 11.7%, respectively. (table 4.4) A chi-square test conducted revealed that there were statistically difference between the ownership of communication assets (radio and television), chickpea communication methods (interpersonal and media) and source of chickpea knowledge (relative, neighbor, government official and friend).

Table 4.4 Evaluation of chickpea communication channels, source of knowledge and farmers ownership of communication asset

Variable	Percentage(%)	p-value
Ownership of communication asset		
Radio	78.0	
Television set	22.0	<0.001**
Chickpea Communication Channel		
Interpersonal	93.0	
Media	7.0	<0.001**
Source of Chickpea knowledge		
Relative	58.0<0.001**	
Neighbour	15.0	
Government official	13.3	
Friend	11.7	

P-value significance level ** refers to 5%

4.5 Binary Logistic Regression

Table 4.5 shows that socio-economic factors training before farming, means of transport and a combination of training before farming and years of farming significantly affect fellow farmers+ICRISAT staff communication method. As hypothesized, years of farming and extension staff visits have no effect on the fellow farmers+ ICRISAT staff

Table 4.5 Binary logistic regression

Dependent variable = (1=Use 0=non-use)	**OR (odd ratio)**	**P-values**	**Marginal effects (dy/dx)**	**P-values**
Year of farming	1.0215	0.291	0.00469	0.283
Training before farming	9.1242	0.026**	0.48832	0.014**
Means of transport	1.0091	0.028**	0.00201	0.015**
Extension staff visit	0.9867	0.496	-0.00294	0.502
Training before farming X years of farming	0.9347	0.028**	-0.01491	0.017**
Constant	0.9572	0.944		
Number of observations	108			
Wald chi2(5)	12.85			
Prob>chi2	0.0248			
Pseudo R^2	0.0815			
Log pseudo likelihood	-68.1464			

Note: p-value significance level ** *refers to 5%*

Note: Dependent variable was fellow farmer + ICRISAT. Create a name for the dependent variable as combination of those two.

test Training_before_farming Extension_staff_visit

(1) [fxI]Training_before_farming = 0

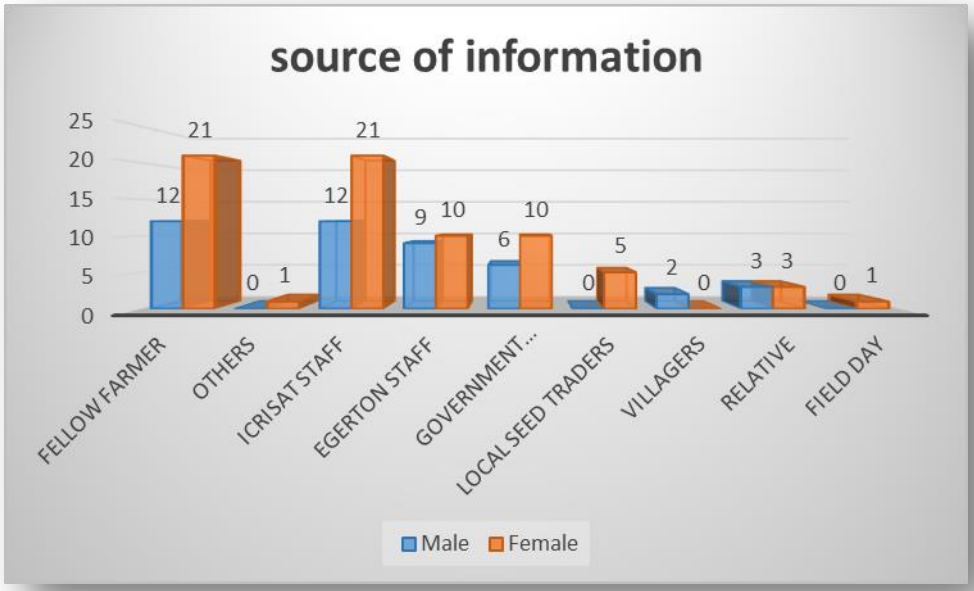
(2) [fxI]Extension_staff_visit = 0

chi2(2) = 7.17

Prob > chi2 = 0.0278

4.6 Gender and source of information

The fig 4.1 below shows that in each communication channel women respondents were the majority. However, the communication channels seem not to be preferred equally by both male and female not This indicates therefore that in the study area, chickpea is grown mostly by women.



4.7 Gender and of the respondents and chickpea source

The table 4.6 below shows that among the 120 respondents interviewed, women were the majority (63%) while the remaining 37% are male. The table further shows that information was mostly disseminated by women. Women had the highest percentages in the following communication channels; -fellow farmers, ICRISAT staff, Egerton staff, government official, local traders indicating that women preferred using them to communicate and disseminate chickpea information more than the men. The male respondents however did not communicate or disseminate chickpea information at all using local trades, villagers, field

days. The female respondents on the other hand did not use villagers as a source of chickpea information dissemination.

Table 4.6 Gender of the respondents and chick pea source

VARIABLE	Percentage (%)
Gender of respondents	
Male	37
Female	63
Gender of the source of chickpea information	
Male	45
Female	55

4.8 Gender of the respondents

The fig 4 3 below shows that women (63%) were the majority of the respondent while men were only 37%

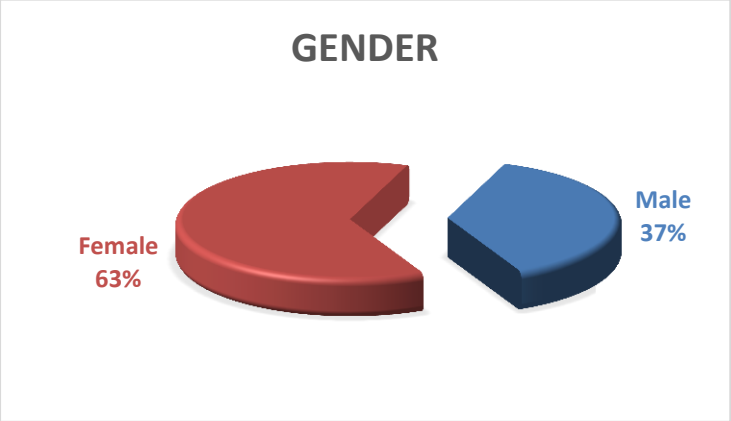


Figure 2 Gender of the respondents

4.9 Gender of the respondents

Fig 4. 4 below indicates that chickpea information was disseminated mostly by women 55% while the remaining 45% was disseminated by men.

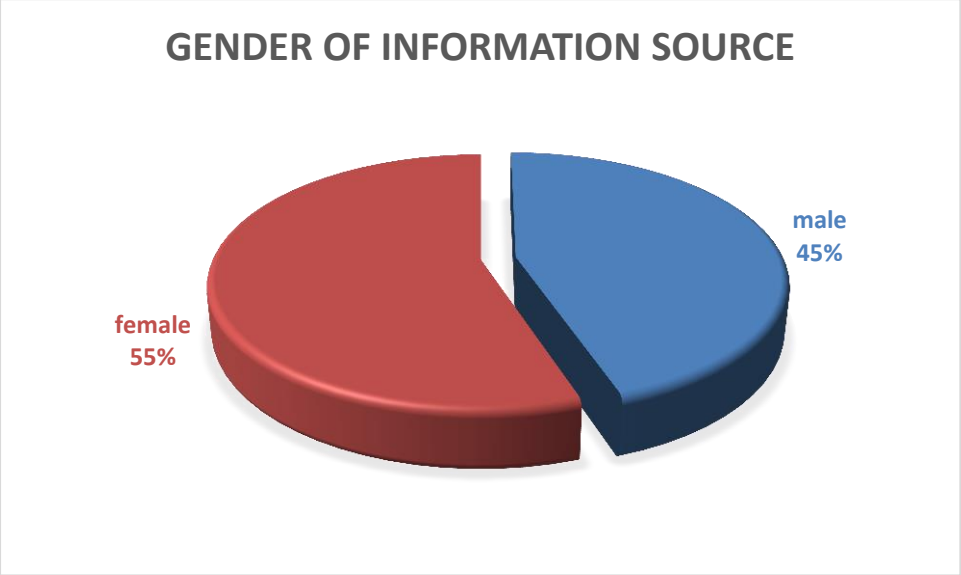


Figure 43 Gender of information source

4.10 Social networks of the chickpea farmers

From the table 4.8below it is observed that 81.7% of the respondents are members of an agricultural group. This means the majority of the farmers are in agricultural groups and this helps in increasing their relation with each other hence strong social networks. The table also shows that relative as a source of chickpea information had the highest percentage (58%) while government official had the lowest percentage (13.3%). This denotes that there are strong relations and strong ties within the family hence information is disseminated at a high rate within the family set up as compared to the rest of the sources. The government official having the lowest percentage shows that strong ties and relations are experienced within a family and community. The relationship of the information source indicates that relative

(52%) were the majority. This shows that chickpea information was disseminated mostly among family members. From the results it is concluded that social networks are strong among family members and within a community.

Table 4.1 Social Networks

Variable	**Percentage(%)**	**p-value**
Respondents agricultural group membership	81.7	
Source of chickpea knowledge		
Relative	58	
Friend	11.7	
Neighbour	15.0	<0.001**
Government official	13.3	
Relationship of information source		
Relative	52.5	
Friend	22.5	<0.001**
Neighbour	18.3	

Significance level at **5%

CHAPTER FIVE

SUMMARY CONCLUSSIONS AND RECOMMENDATIONS

5.1 Summary

Insufficient agricultural information dissemination is a major problem in agricultural sector especially in Sub Saharan Africa. Although agricultural research has generated many technologies with potential to address the stagnation of agricultural productivity, their impact on productivity, livelihood and quality of life has been disappointing due to poor uptake of agricultural innovations. The study evaluated chickpea communication channels, factors affecting them, gender, and social networks role in chickpea information dissemination

The study findings show that communication methods significantly played a major role in chickpea information dissemination. The study found that the information dissemination channel available to most farmers were fellow farmer and ICRISAT staff, Egerton staff, extension officers, local seed traders, villagers and field day. Of all the available communication channels, majority of the farmers considered fellow farmer and ICRISAT staff to be the best source of chickpea information in the study area. Descriptive statistics was used to determine the most used chickpea communication and dissemination channel (s) by farmers in the study area. A binary logistic model was used to determine socio-economic factors influencing the choice of communication channel by chickpea farmers in the study area. Descriptive statistics was also used to determine the role of gender and social networks in information dissemination. The data used was collected using pre-tested questionnaires from 120 respondents in Embu County. The area was purposively selected due to its involvement in production, marketing and consumption of chickpea, good soil that support its growth and improved chickpea promotion by both government and research institutions such as ICRISAT

The study found out that fellow farmer and ICRISAT were the best chickpea information communication methods that was used by most respondents (66%). The study found that even though majority of the respondents owned radio (78%) and listen to local agricultural programs over the radio, only 7% received chickpea information via media channel. This clearly indicate that the rest 93% received chickpea information via interpersonal communication channel. Among the interpersonal chickpea channels, relative was found to have the highest percentage (58%) followed by neighbors, government officials and friends 15%, 13.3%, 11.7%, respectively. Findings show that only 22% of the respondents owned TV. This could be attributed to low level of education in the study area. The binary logistic regression indicates that training before farming positively influences the farmers choice of fellow farmer +ICRISAT as chickpea communication channel, means of transport also influences positively the farmers choice of fellow farmer + ICRISAT as a chickpea communication channel.. When variables training before farming and years of farming were combined, the study found that the combination influenced positively farmers' choice of fellow farmer + ICRISAT as their channel of choice

The study found that in each communication channel women respondents were the majority however the communication channels seems not to be preferred equally by both male and female this indicates therefore that in the study area, chickpea is grown mostly by women.

The study found that the majority of the farmers are in farmer groups and this helps in increasing their relation with each other hence strong social networks. The study found that relatives disseminated chickpea information at a higher rate as compared to government official which had the lowest percentage. This denotes that there are strong relations and strong ties within the family hence information is disseminated at a high rate within the family set up as compared to the rest of the sources. The government official having the lowest percentage shows that strong ties and relations are experienced within a family and

community. The relationship of the information source indicates that relative (52%) were the majority. This shows that chickpea information was disseminated mostly among family members.

5.2 Conclusion

The findings of this study show that the use of mass media as a source of agricultural information is low. Interpersonal methods that were used as important sources and methods of information dissemination in the surveyed communities. Socio-economic factors such as means of transport and training before farming significantly influenced the farmers' choice of communication method(s)

Gender was found to have played a major role in information communication and dissemination. Majority of respondents were women indicating that, mostly women disseminated information. The women farmers continue to source most of their information from informal contacts (relatives, neighbors and friends).

The study showed that farmers' social networks have increased agricultural information flow especially in the study area. Study shows that majority of farmers (81.7%) belonged to a farmer group and from the said group(s,) they are able to communicate and disseminate chickpea information.

5.3 Recommendations

Given the study conclusions, it is recommended that ICRISAT staff should continue and increase their visits and interactions in the study area. They should consider increasing awareness of improved chickpea by increased field days, demonstrations and farmer group meetings. All these will increase adoption of improved chickpea in Embu County. The stakeholders who extensively use research institutions, Community Based Organization, Non-Governmental Organizations to disseminate agricultural information should collaborate

with ICRISAT and promote the same to ensure effective chickpea information dissemination not only in the study area but also in the whole country at large.

Study findings indicate that the majority of the respondents have low level of education. The low level of education affects especially formal communication and dissemination of information. There is therefore need for government intervention to encourage both formal and informal education in the study area. For example, this could be done by promoting adult literacy programs, while at the same time encouraging younger family members of to pursue formal education.

The study found that gender played a major role in chickpea information dissemination. Women are not usually vocal especially on matters related to leadership. It is therefore recommended that policies that target women participation should be encouraged. Chickpea information should be channeled through women who were found to diffuse information faster and among many.

The study found out that chickpea information was communicated and disseminated mostly via interpersonal (face-to-face) communication channels. In order to promote rapid and efficient access to agricultural information, the use of other multiple source of communication channels are recommended. Researchers, extension agents and agricultural support services should use multiple sources of information (print and ICTs) to deliver relevant information to chickpea farmers in the study area. Print formats (such as leaflets, newsletters, magazines, books) and ICTs such as radio, TV, cello phone, internet and e-mails should also be used to share and distribute knowledge among farming communities in order to build on the achievements made so far. Since ICTs is gaining prominence globally and in all sectors of the economy in most countries, a special focus therefore should be given to their use in agriculture.

Initiatives that seek to promote the use of the radio and cell phones which are more available in the study area compared to the other ICTs should be promoted. Some agricultural organizations have developed systems to access information using SMS but the chickpea farmers are not aware of such systems. The use of the radio can also be enhanced by supporting radio stations to air more agricultural programs and combine vernacular languages and other languages to disseminate relevant knowledge to farmers. Incorporating interactive segments with the farmers such as the call-in/SMS systems should be promoted in the study area. The same should be done for TV stations. This way, information and knowledge flow to smallholder farmers, who play a critical role in agricultural production. This will be enhanced for timely decisions for enhanced food security and poverty alleviation.

Insufficient seeds, poor road, poor market price were some of the major constraint to chickpea production in the study area; it is therefore recommended that seeds should be availed to farmers early enough. Good roads should be built to enable smooth transportation of the produce and lastly research institutions, government and NGOs should ensure there are readily available market for the farmers. Since extension services have a greater impact on information delivery to rural farmers, as gents of change, there is an urgent need to equip them with the necessary facilities and funds as well as streamlining their extension activities.

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HOUSEHOLD QUESTIONNAIRE

DISSEMINATION OF AGRICULTURAL INNOVATIONS: SOCIO - ECONOMIC ANALYSIS OF DISSEMINATION METHODS USED IN IMPROVED CHICKPEA (*Cicer arietinum L*) VARIETIES IN EMBU COUNTY, KENYA

Household Questionnaire

(The questionnaire is to be administered to household head or spouse)

GENERAL INFORMATION

Tick( )

Date of interview ..... Questionnaire Serial Number.....

Enumerator.....

Ward.....

Sub location.....

Village.....

G P S Coordinates: Latitude..... Longitude.....Elevation

How would you describe the area in which you are residing? Urban ( ) Peri-Urban ( ) Rural ( )

1. SECTION A: Respondent details

A1.Name of respondent.....

A2. Contact of respondent.....

A3. Age of respondent (in years).....

A4. Gender of respondent (interviewer note)Male ( ) Female ( )

A5. Marital status of respondent monogamous Married ( ) polygamous married ( ) widowed or widower ( ) Separated ( ) Divorced ( ) never married ( )

A6. Education Level: no formal education ( ) primary ( ) post primary ( ) Tertiary ( ) no formal education ( ) other ( )

A7 Do you hold any .social responsibility in the village.....Yes ( ) No ( ) if yes which one…….

A8.What is your main occupation: Farming ( ) of-farm ( ) specify.....

2. SECTION B: Demographic Characteristics of House hold members details

B1.Gender of house hold head: Adult male no female ( ) Adult female no male ( ) Male and female adult ( ) Child no adult ( )

B2. Size of your household, i.e. the number of people, including yourself, who live in your house/dwelling for at least three month of the year.....

B3. What is the education level of the household head ( ) primary level ( ) secondary level ( ) Tertiary ( ) others ( )

B4. What is the education level of the spouse of the household head? Primary level ( ) secondary level ( ) Tertiary ( ) others ( )

B5.What is the education level of adult child/children above 18yrs of age.

Adult child	Age	Gender	Level of education

Adult Child: 1,2,3……..Gender: male ,female Level of education: primary, secondary, tertiary, other

B6. What is the household's current monthly income from all income sources (in Ksh)?

Serial number	Occupation	Monthly income	Annual income	Total income
1	Chickpea farming			
2	Other farming			
3	Employment			
4	Business			
5	Other			

3. SECTION C: Farm details

C1. What is your farm size (in acres).....

C2. When did you start farming? (yrs).....

C3. What type of land do you own?

(i) Freehold with title deed ( )

(ii) Freehold without title deed ( )

(iii) Communal ( )

(iv) Leased

(v) Other ( )

C4. Do you use fertilizer / manure? Manure( ) fertilizer( ) both ( )

C4.1 What is the source of fertilizer/manure: Government ( ) Neighbor /relative/friend( ) You bought ( )

C5.what do you use to plough ?tractor( ) jembe ( )other() if other specify ……..

C5.1 What is the source of labour : Hired ( ) family ( ) Hired and Family ( )

C6.Do you get any assistance from the Government or NGO? Yes ( ) no ( ) if yes what type of assistance .....

4. SECTION D: Chickpea ----------farming details

D1. Do you know chickpea? Yes ( ) No ( )

D2. If yes how did you know about chickpea: A relative ( ) friend ( ) Neighbor ( ) Government official ( ) Media ( )

D3.Do you grow chickpea crop? Yes ( ) No ( )

If no why?.....

D4. If yes, what area of your farm (in acres) did you use to grow chickpea?.....

D5.What is the main reason for you to grow Chickpea? for commercial purpose ( ), for subsistence purpose ( ), both ( ), others e.g for prestige.....

D 5.1 How long have you been growing chickpea (in years)

D6.What other crops do you grow apart from chickpea .....

D7. How many times were you visited by agricultural extension staff in the last one year?

(i).None (ii)once ( )(iii) twice ( ) (iv)more than twice

D8. Which variety do you grow? local ( ) improved ( ) mixed ( )

D9. Did you receive any training on the variety before planting? Yes ( ) No( )

D10. How many years ago did you know of this improved variety? .....

D11. Which variety do you prefer? Improved( ) local( )

D12. Why.....

D13. Is the improved variety more profitable than the local?

(i)Yes ( )

(ii) Not really ( )

(iii) No ( )

D14. Does planting the improved variety reduce the use of hazardous pesticides and yield losses?

Yes ( )

No ( )

D15. Is the use of the improved variety neutral to farm size, labor use, and income? Yes ( )

(2) No ( )

D16. What was your chickpea yield (in bags) in the last season? (Total number of bags)…….

D17. Size of bags used(in kgs)? .....

D18. Was there increase in chickpea yield?

(i) Yes ( )

(ii) No ( )

D19. How can you describe the demand of this improved variety?

(i) Low ( )

(ii) Moderate ( )

(iii) High ( )

D20. What are people's perceptions of this improved variety?

(i) Very bad ( )

(ii) Bad ( )

(iii) Moderate ( )

(iv) Good ( )

(v) Very good ( )

D21. What is your view about planting this improved variety, do you support it or not?

(i) Yes ( ) no( ) and if no why……

D22. Farmer's Knowledge of recommended variety (Assessment by enumerator):

(i) Has no idea ( )

(ii) Seems to have some knowledge ( )

(iii) Has knowledge ( )

(iv) Has very good knowledge ( )

D23. What in your opinion are the advantages of the improved chickpea variety?

(i) Pest resistance ( )

(ii) Palatability (pleasant to taste)( )

(iii) High demand ( )

(iv) High yield ( )

(v)Drought resistance ( )

(vi) Easy to cook ( )

(vi)Others ( )

D24. Why did you adopt the improved variety?

(i) High yield

(ii) Early maturity

(iii) Good taste

(iv) Resistance to pest and diseases

(v) Communication method used

(vi) All the above

(vii) None of the above

(viii)Others (specify).....

D25. Between desi and kabuli which one do you think is the best? .....

D26 Have you consumed chickpea in past six months yes( ) no ( ) if no why.....

D27. Reasons for not consuming:

i. Chickpea is expensive ( )

ii. I have never seen chickpea ( )

iii. I have never heard about it( )

iv .I tasted but I don't like the taste

5. Section v: Awareness details

1. Have you heard of any agricultural program in the media yes ( ) no ( )

2. If yes which one and which media ....

3. Have you heard about chickpea in the media? Yes ( ) No ( )

4.If yes which media channel? Formal () informal ( )

5. Have you heard about improved chickpea variety? Yes ( ) no ( )

6.If yes what was the main source of information (i)**Interpersonal communication**: eg fellow farmer ( ) ICRISAT staff ( ) Egerton staff ( ) Government Extension Agency ( ) Local seed traders ( ) Villagers ( ) relative ( ) field day( )(ii) **Media( )** (iii) **Churches**( )(iv)**others**( )

7. If media, which media: radio ( ) TV( ) Mobile phone ( ) internet ( ) print media ( ) other ( )

8.If interpersonal ,what is the relationship and what gender: Neighbor( )friend ( ) relative ( ) other ( ) Female( ) Male ( )

9. Which communication channel do you own? Radio ( ) TV ( ) Mobile phone ( ) other ( )

If other specify.....

10. How often do you buy newspaper? I don't buy at all ( ) Daily ( ) weekly ( ) monthly ( ) yearly ( )other ( )

If other specify.....

11. Have you ever read an agricultural magazine? yes ( )No ( )

12. If yes where did you get it from? bought ( )a friend ( ) relative( ) an agriculturalist ( )community leader( )an extension officer( )government official( ) other( )

13. Which communication channel (interpersonal or media)would you prefer to be used to disseminate Chickpea information .....

Why .....

14. Where do you get the seeds ICRISAT staff ( ) Friend ( ) another farmer ( ) bought from the market ( ) Relative ( ) other ( )

Information sources	Rank the different information sources on the basis of the following context **1=very good … 5= very poor**					What farmer needs influence the preference for this information source [**Code below**]
Farmer groups	Accessibility	Reliability	Informativeness	Comprehension	preference	
Ministry of Agriculture						
Mass media						
Extension officers						
Research institutions e.g ICRISAT						
Learning institution e.g Egerton						
Neighbours/friends/relatives						
CBOs						
NGOs						
Churches						
Chief barazas						
Agricultural companies						
Farmer cooperatives						
Cooperatives						
Stockists						

Experience						
Others (specify)						

Code; 1=very good, 2=good,3=neutral, 4=poor,5= very poor

15. How many kgs of seeds did you start with ....., <1kg( ) 1-3kgs ( ) 3-5kgs ( ) >5kgs ( )

16. Where do you sell your produce?.....local market ( ), farm gate ( ) Brookers ( ) ICRISAT STAFF ( ) Egerton Staff ( )

17. What is the distance between the farm and the market..... ,< 1km ( ) 1-3kms( ) 3-5km( ) > 5kms ( )

18. What means do you use to transport your produce to the market..... self ( ) donkey ( ) wheelbarrow ( ) vehicle ( ) other ( )

19. Do you face communication problem.....Yes ( ) no ( )

20. If yes which one .....

21. How do you think it can be solved.....

22. Have you ever participated in any agricultural training yes( ) no ( )

23. Have you heard of any agricultural group yes ( ) no ( )

24. If yes are you a member of any agricultural group yes ( ) No ( )

25. If yes how many members are there in the said group .....< less than 10 ( ) , 10 ( ) , > more than 10 ( )

26. Are you a leader in the said group..... yes ( ) no ( )

27. What are the requirements to join the group.....

28. If yes how have you benefitted from the group.....

29. Are you a member of any other group.....

30. Have you heard from any agricultural youth fund? Yes ( ) No ( ) if yes have you benefitted or someone you know yes ( ) no ( ) if yes how.....

31. Have you heard of any agricultural women fund? Yes ( ) No ( ) if yes have you or anyone you know benefitted from it? Yes ( ) No ( ) if yes how.....

32. Have you heard of agricultural men fund? Yes ( ) no ( ) if yes have you or anyone you know benefitted from it? If yes how.....

6. Section vi. Social network features and their influence in chickpea information dissemination

please indicate if you know any person in the categories listed below; the number you know in each, the type of relationship you have with the individual(s) and the type of chickpea related information, if any, you have received from any of them in the in the past 1 year

Categories of people	How many	Relation	Chickpea information	Use codes below
Business				
Farmer				
Self-help/credit				
Mary-go-round				
Women				
Family/clan				
Saccos				
Churches				
Other(specify)				

Information type codes:1 = varieties of chickpea, 2 = production information , 3 = pest and disease information, 4 = post-harvest information, 5 = marketing information

THANK YOU