TO ESTABLISH THE INFLUENCE OF EXTENSION SERVICES ON CHICKPEA PRODUCTION AMONG SMALL-SCALE FARMERS IN KARABA WARD OF EMBU COUNTY

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ABSTRACT

Chickpea can be a staple food as well as an essential cash crop for smallholder farmers in many countries including Kenya. It can withstand serious drought conditions because it extracts water deep in the soil profile. However, the production of this crop has not attained the maximum production in Kenya and in particular Embu County. This research sought to establish the influence of extension services on chickpea production among small-scale farmers in Karaba Ward of Embu County. It used a Cross Section survey research design to an accessible population of 3518 farmers. Cluster sampling was used to a select a sample of 246 respondents from four ward from whom primary data was collected using semi-structured questionnaire and analysed using frequencies, percentages, mean, standard deviation and chi-square test. The study established that extension services influenced the chickpea production among small-scale farmers of Karaba Ward, Embu County, Kenya ($X^2(l) = 162.213$, $p<0.05$). The study recommends ministry of agriculture should enhance the provision of extension services to chickpea farmers in the area.

Key words: Chickpea production, Extension services, Small-scale farmer.

1. INTRODUCTION

1.1 Background of the Study

Chickpeas are the second most important food legume crops in the world after the common bean (*Phaseolus vulgaris* L) (Food and Agriculture Organization (FAO), 2013). It is grown in over fifty countries and mostly in developing countries (FAO, 2013). Asian countries produce approximately 80 percent of the world production with India being the leading producer of 60 percent production (FAO, 2013). India is also the largest importer of chickpea importing one million tons followed by Pakistan that imports about 100,000 million tons (Gaur et al., 2010). Africa only contributes 3.9 percent (0.32 metric tonnes), North and Central America 4.9 percent (0.40 metric tons), Oceania 1.3percent (0.11 metric tonnes) and Europe 0.5percent (0.04 Metric tonnes) to world chickpea production (Upadhyaya et al., 2008). Methvin (2017), signals that smallholder farmers have become the most important piece of the global agricultural system. He says that close to 80 percent 0f of the total population in Asia and Sub-Saharan Africa support the livelihoods of nearly two billion people worldwide.

In Eastern Africa, chickpea is cultivated in Ethiopia, Tanzania, Malawi, Zambia, Uganda, and Kenya (Smithson et al., 1985). Ethiopia leads in chickpea production in Africa (312,080tons from 233,440 ha), followed by Malawi (52,423 tons from 107,851 ha), Tanzania (38,259 tons from 82,260 ha), Morocco (38,000 tons from 65,000 ha) and Sudan (11,200 tons from 6,667 ha) (FAOSTAT, 2006).In India, chickpea is a major food for the vegetarian population and is considered a healthy food in Western countries (Abbo et al., 2005). Kenya produces approximately 40,000-55,000 tons of chickpea from an approximate area of 18,000-20,000 ha (Kibe & Onyari, 2007). The national average yield is estimated at 540-1200 kg/ha (Kaloki, 2009). There is a deficit of approximately 120,000-150,000 kgs required to cater for Kenyan consumption demand.

Kenya chickpea (*Cicer arietinum*) production is typically undercapitalized and inefficient (Eleni, 2003, Fafchamps, 2004). Some of the major factors that contribute to less-developed are related to social as well as market imperfections due to poor market infrastructure, low marketable surplus and poor quality products Fafchamps, 2004; Fafchamps & Eleni, 2006). An improvement in the production the performance always brings about an improvement in the livelihood of the most populous smallholder farmers due to the positive relationship between farm productivity and economic growth (Hulten, 2000; Easterly & Levine, 2001; Rachel, 2001). Moreover, the production of commercially oriented chickpea has many advantages even in improving the performance of markets (Ruben and Pender, 2004), contributes towards new employment opportunities (Oskam et al., 2004).

Chickpea is mostly grown as single crop or intercropped with maize, barley, linseed, mustard, pea, sweet potato, wheat or sorghum (Ahmad et al., 2010). Research in Kenya have shown that intercropping improves soil fertility and maize yields by 24 – 68 percent in a cereal-legume relay system due to fixing substantial nitrogen (Cheruiyot et al., 2001, Cheruiyot et al., 2002). In one growing season, chickpea can fix up to 140 kg N ha-1 (Pande et al., 2005) but the range commonly is between 20 to 60 kg N ha (Haigh, et al., 2005). It is gaining importance in dry lowlands as alternative drought tolerant legume to dry bean in addition to cowpea. Recent efforts in Njoro, Bomet, Koibatek, and Naivasha has seen its adoption increase to a recorded an average yield of about 1500-3000 kg/ha (Gaur et al., 2010; Kimurto et al., 2009; Thagana et al., 2009).

Chickpea is primary a staple food as well as an essential cash crop for smallholder farmers in Kenya. They contain high levels of the iron, phosphorous, calcium, magnesium, manganese, vitamin K, protein, fat and fibre that have health and nutritional benefits. Chickpea has also been associated with a number of possible health benefits for medical conditions against diabetes, bone health, blood pressure, heart health and cancer among others. In Kenya, chickpea is planted as an off season crop after the main season are harvested providing an alternative crop in an otherwise fallow season. The major growing areas are Eastern (Embu, Tharaka) and Rift Valley (Bomet, Nakuru, Narok). There is need to carry out study that will determine factors that contribute to the decline of chickpea production. The focus of the study was in Karaba Ward, which is a major production area in Embu County.

1.1.2 Agricultural Extension Activities Promoting Chickpea Production

Agricultural extension is the application of scientific research and new knowledge to agricultural practices through farmer education. The field of extension now encompasses a wide range of communication and learning activities organized for rural people by educators from different disciplines including agriculture, agricultural marketing, health and business studies (FAO, 2016).

Agricultural extension agencies in developing countries receive large amount of support from international development organizations such the World Bank and the Food and Agriculture Organization of the United Nations. Experts argue that training farmers on the best methods of farming, the best varieties and the best farm practices is one of the best ways of increasing chickpea production (Kimurto et al., 2008). It is through training that extension officers and all stakeholders train farmers on various aspects of improved crop and seed production, seed storage and utilization technologies of chickpea.

Organizing field days and farmers' fairs are some of the best events that should be conducted in target locations of Kenya for increased production of chickpea (Pouresmaeil et al, 2012). During the field days, farmers are required to select preferred varieties along with preference criteria. The comprehensive analysis from this activity facilitates the release of the new varieties in each country and helps in planning for seed production strategy (Abbo et al., 2005). Farmers' preference criteria also provide feedback to researchers and development personnel involved in chickpea to devise the research strategy. In Kenya, field days and farmer 's fairs can enable researchers along with human nutritionists to demonstrate the utility aspect of chickpea in the form of various products such as chapati, githeri, stew, mandazi, cake, samosa, doughnuts, buns, grits, and beverage and elicit feedback on preferred products (githeri and stew). Without such events chickpea production and demand may continue declining in Kenya (Abbo et al., 2005).

In order to boost demand and production of chickpea, experts have cited that awareness activities through radio, television, newspaper, popular articles and telephone conversations are inevitable (Barrett, 2007). Therefore, village network, demonstrations, annual farmer field days, rural seed fairs, and agricultural shows are significant in creating awareness (Gaur et al., 2010). In Kenya, policymakers are supposed to be engaged in awareness creation. Experts have argued that a lot of impact is created when the proceedings of all the field days are broadcast on public media (Asfaw, 2010). Television and radio broadcasts with live interviews and newspaper articles about new varieties are the most influencing in the production regions.

At the Government level, there should be training courses for scientists and research technicians. So far, ICRISAT has engaged in training scientists and technicians in sub-Saharan parts of Africa on the production of chickpea production (Ethiopian Economic Association [EEAI], 2004). The trainees in these courses are covering useful topics on reproductive biology, crossing, breeding methods (conventional and biotechnological, conduct of multi-locational trials, data collection, resistance breeding, quality seed production and safe seed storage (Gaur et al., 2010). The participants also get opportunity to visit other organizations working on seed-related research, seed production, and seed quality testing. These activities are expected to contribute to increased production of chickpea in sub-Saharan Africa.

Study reports predicted that chickpea seed production would be enhanced during 2012-2014 starting with the production of breeder seed and foundation seed of six major varieties to meet 40 percent adoption of total area in key agro-ecological zones (Akibode & Maredia, 2011; Gaur et al., 2010; Mahendar, 2014). This would be achieved by involving seed companies, Non-Governmental Organizations (NGOs), Community-based organizations (CBOs) and farmers. Many experts argue that incorporating gender components is significant since gender equality is a major factor to achieving the objective of improving food security and nutrition. Therefore, capacity building in seed production will involve all stakeholders (farmers, entrepreneurs, Extension, NGOs, (CBOs), women farmers, women's groups and their cooperative societies.

One reason for Africa's elusive Green Revolution has been low investment in agricultural research and development (R & D). Agricultural research in Kenya relies almost exclusively on the public sector and foreign aid. Donor funding to R & D in Kenya peaked in the mid-1980s, and thereafter

started to decline (Pardey et al., 2007). National investment in agricultural R & D has also declined and currently averages only 0.7 percent of Gross domestic product (GDP) (FAO, 2010). The Kenya Agricultural Extension officers provided farmers with a full package of recommendations and it is the farmers' decision whether to take up individual components or the full package.

Poor farmers are sensitive to risk associated with early adoption of any new technology, and take time to observe positive effects before increasing adoption (Akibode & Maredia, 2011). The dissemination of the agricultural technologies and advice in Kenya is delegated to government extension. Once a new technology is developed, it is handed over to the extension to disseminate to farmers (Pardey et al., 2007). Studies have proved that high farmer-extension ratio and low funding have led to low farmer-extension contacts (Kimurto et al., 2008: Bekele et al., 2007; IITA, 2001). Following the structural adjustment programmes in Kenya, extension-farmer contact was further curtailed, and this resulted into slow diffusion of new information to farmers. Farmers can be successful if they have full access to extension services provided by agricultural extension officers (IITA, 2001). The impact of decline of extension services on chickpea production has not receive notable attention in research.

1.2 Statement of the Problem

Worldwide, Chickpea is a food crop that is undervalued or neglected and is branded as development opportunity crop (DOCS). Chickpea is grown for food, fiber, fodder, as well as nitrogen fixation in the soil. It is well adapted to marginalized land. It matures fast, produce high yields and it fetches good prices in the market. It constitutes a rich diet to the local communities often lacking in the staple cereal crops. If well managed, chickpea can contribute to global poverty reduction. It can also act as a food security crop. The crop can withstand serious drought conditions because it extracts water deep in the soil profile. Karaba Ward is an arid and semi-arid land that can support the crop successfully. However, data has shown that the production of this crop has been declining for the last ten years. No much information has been documented concerning this trend therefore this study focused on the influence of extension services on chickpea production among small-scale farmers in Karaba Ward of Embu County.

1.3 The Purpose of the Study

To establish the influence of agricultural extension services on chickpea production among small-scale farmers in Karaba Ward of Embu County.

1.4 Research Hypotheses

Ho_1: There is no statistically significant influence of agricultural extension services on chickpea production among small-scale farmers in Karaba Ward.

1.5 Conceptual Framework

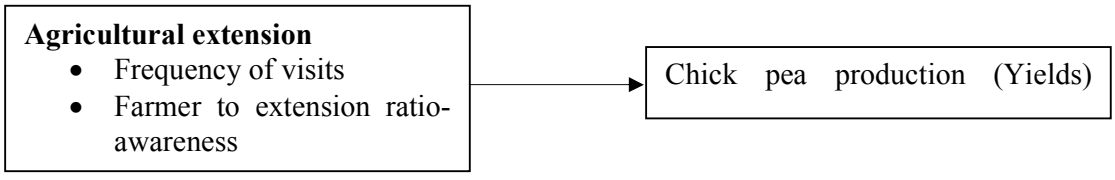

Figure 1: Conceptual framework.

2. RESEARCH METHODOLOGY

2.1 Research Design

A cross sectional survey research design was adopted in this study. Both primary and secondary data was used in this study. Shuttle worth (2010) outlines that a cross sectional study takes a snapshot of a population at a certain time, allowing conclusions about phenomena across a wide population to be drawn. It enabled the researcher to look at wide range of ages, ethnicities and social backgrounds. According to Carlson (2009), cross sectional studies was most appropriate for screening hypotheses because they required a relatively shorter time, commitment and fewer resources to conduct, yet has high statistical precision and also guarantees better coverage of population. This enabled the researcher to access varied levels of producers of chickpea in Karaba location.

2.2 Sampling Procedure and Sample size

Ashley (2017) defined a stratified sample as that which ensures that sub-groups (strata) of a given population are adequately represented within the whole sample populating of a research study. Proportionate-Stratified sampling was used in this study in which the population was handled in strata or groups. Data was collected from the four sub locations and different sub groups of respondents was regrouped proportionately based on gender, age and experience by the chickpea farmers' i.e. Proportionate stratified sampling, where same fraction for all strata/subset was considered. In addition, snowball sampling procedure was used where initial key informants were selected and used to identify other potential members with similar characteristics to take part in the study. The sample selected was divided into subgroups by age, gender and experience as follows; ages below 35, 36-45, 46-55, 56-65 and above 66. The experience was addressed by each respondent filling in the number of years they have cultivated the crop.

Table 1: Distribution of sample respondents in the study area

Sub location	Accessible	Sample size
Karaba	879	61
Wachoro	870	61
Riakanau	880	62
Gategi	889	62
Total	**3518**	**246**

According to Kathuri and Pals (1993) the sample size for the study was determined using the sample determination table (see appendix A) from the total population. In this case, from the total population of 15,786; accessible population was 3518 and the sample size is 246 respondents. The sample will enable the researcher to obtain sufficient data to come up with conclusions and recommendations for the study. Based on Sarah., (2012), the sample size can be calculated using the formula:

$$n = \frac{z^2 * p(1-p)}{m^2}$$

Where:

n = required sample size

t = confidence level at 95percent (standard value of 1.96)

p = estimated prevalence of the variable of interest (e.g. 20 percent or 0.2 of the population are chickpea producers)

m = margin of error at 5 percent (standard value of 0.05)

Strictly adhering to the sample size facilitates a higher precision in the results because having participants less than the sample size leads to low representativeness of the target population. On the other hand, going over the sample size may cause a diminished rate of enhancement in the precision of the survey outcomes.

2.3 Data Collection Procedures

Before proceeding to the field for data collection, the researcher sought an approval from the Graduate School, Egerton University. Thereafter the researcher sought a permit from the National Commission for Science, Technology and Innovations (NACOSTI). Upon getting the permit the researcher sought further permission from Embu Agricultural Offices in order to access the target population of study. The researcher collaborated with the Mbeere Sub County Agricultural Officers who assisted in farm to farm visits. The researcher used a questionnaire to collect data from the chickpeas farmers, explaining all the details to the respondents. Time was given to the respondents to fill the questionnaire after which the researcher collected the filled in scripts.

2.4 Data Analysis

The data obtained was quantitative and therefore quantitative data analysis was used for analysis. Analysis was done using SPSS software in which different statistics was tested. In order to identify the variety of chickpea grown in Karaba ward descriptive statistics was carried out. In this case, the means, standard deviation and variance was generated and presented in form of percentages, frequencies and other graphical presentations for easy understanding. In order to establish the trend of chickpea in the study area, the researcher calculated mean, standard deviation and variance for analysis. Chi-square test was used to determine influence of agricultural extension services on chickpea production among small-scale farmers in Karaba Ward of Embu County. A 0.05 level of significance was used in data analysis.

3. RESULTS AND FINDINGS

3.1Agricultural Extension services

Five elemenrs related to agricultural extension services were assessed namely Visits by extension worker's to farmer's farms, the extent by which extension workers visit farmers in the area, training of farmers on chickpea production, methods of training undertaken by chickpea farmers and information on chickpea production. Respondents were asked to respondent to questions related to these elements. Their responses are summarized in Table 2.

Table 2: Agricultural Extension services

Elements of Extension services		Frequency	Percent	Mean	Std.Dev.
Extension workers visit farmers farms	Yes	78	32	1.68	0.469
	No	163	68		
The extent by which extension workers visit farmers in the area	Never	150	62	2.07	1.446
	Weekly	1	0		
	Monthly	29	12		
	Twice in a year	45	19		
	Annually	16	7		
Farmers are trained on chickpea production	Yes	12	5	1.95	2.18
	No	229	95		
Methods of training undertaken by chickpea farmers	None	115	48	2.01	1.065
	Field days	28	12		
	Group meetings	80	33		
	Farm visits	17	7		
	Group meetings and Farm visits	1	0		
Farmers get enough information on chickpea production	Yes	2	1	1.99	0.91
	No	239	99		

Results in Table 2 shows that the majority of the respondents (68%) acknowledged the failure of extension workers to visit their farms. This finding implies that there is deficiency in access to extension services by pea farmers. The findings show that extension workers only reach a small section of pea farmers (32%) within the study area. This finding is consistent with the study by studies byKimurto et al. (2008), Bekele et al. (2007) and IITA (2001), which observed that there was high farmer-extension ratio and low funding that have led to low farmer-extension contacts. The studies further noted that the problem of limited access to extension services in Kenya had been compounded by the structural adjustment programmes that compelled the Kenyan government to reduce its workforce. The previous studies provide plausible explanation as to why only a small proportion of farmers in the study area have access to extension services.

In terms of the extent by which extension workers visit farmers in the area, the majority of the respondents (62%) reported that they had never received any visit from extension workers. This findings reinforce previous results that the majority of the farmers in the study area do not have access to extension services. Results in Table 2 further showed that 19% of the farmers receive two visits in a year, 12% receive monthly visits, and 7% are visited by the extension workers annually. These findings indicate that even among farmers who have access to extension services, the frequency of visits by extension officers is very low, which limits the magnitude of the impact of these services in the agricultural productivity of farmers.

Regarding training, the majority of the farmers (95%) disclosed that they had not been trained on chickpea production. This finding further underlines earlier results that farmers in the study area have no access to extension services and those who have access, the frequency of visit is low. Current finding further suggests that even among farmers who get visits from extension farmers, the majority are not trained on chickpea production. This finding suggest the existence of apathy towards chickpea production hence less emphasis on training farmers on this crop.

The study further established that group meetings were the most popular method of training with 33% of the farmers reporting that they had been trained using this method. About 12% of the farmers identified field visit as the method commonly used in their area while 48% the respondents acknowledged that they were not trained on chickpea production. Additionally, the majority of the farmers (99%) acknowledged that they did not get enough information on chickpea production while 1% acknowledged that they had enough information on chickpea production.

3.2 Influence of Extension Services on Chickpea Production

The first objective of the study was to determine the influence of extension Services on chickpea production among small-scale farmers in Karaba Ward of Embu County. This relationship was examined using the chi-square tests, whose results are presented in Table 3.

Table 3: Influence of Extension Services on Chickpea Production

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	162.213[a]	32	.000
Likelihood Ratio	97.327	32	.000
Linear-by-Linear Association	29.527	1	.000
N of Valid Cases	241		

Chi-square results in Table 3 indicate that Extension Services significantly influence chickpea production among small-scale farmers in Karaba Ward of Embu County ($X^2(l) = 162.213$, $P<0.05$).The hypothesis of the study (H_{01}) was thus rejected. The findings showed that farmers who have greater access to extension services marked by frequent visits by extension farmers, training on chickpea production, and access to adequate information were more likely to record higher chickpea productivity. The findings are consistent with the study by Kimurto et al. (2008), which found that training farmers on the best methods of farming, the best varieties and the best farm practices is one of the best ways of increasing chickpea production. Current finding reinforce the premise that the training that extension officers provide adds notable value to chickpea farming.

4. CONCLUSIONS AND RECOMMENDATIONS

Findings of the study led to the conclusion that Extension Services have statistically significantly and positive influence on chickpea production among small-scale farmers in Karaba Ward of Embu County. This suggests that chickpea farmers are likely to enjoy significant improved yields when extension services are provided by extension workers. Extension services are likely to have a meaningful impact on chickpea production when the majority of the farmers get visit from extension workers, the visits are done on a regular basis, and training on chickpea production is done during each visit. Based on this conclusion, the study made the following recommendations:

4.1Institutional Recommendations

First institutions should come up with proper initiatives to counter the factors that significantly influence the chickpea production among small-scale farmers. This could involve introducing of extension services to enable farmers to increase production and maximize profit from chickpea production. Organizations also may allocate sufficient funds to research to enhance chickpea production. Finally, chickpea farmers need to be involved in key decision making to enhance chickpea production.

4.2 Policy Recommendations

As indicated from the findings of the study extension services significantly influence the chickpea production among small-scale farmers, it is therefore necessary that public institutions implement/adopt initiatives such as extension services to enhance chickpea production among small-scale farmers. It is also important that agricultural institutions be responsive to the needs and constantly changing requirements for chickpea production among small-scale farmers. This will enhance the chickpea production by small scale farmers.

4.3 Recommendations for further research

This research was based on influence of extension services on chickpea production among small-scale farmers in Karaba Ward of Embu County. Basically there are other factors that contribute more to chickpea production. Therefore, there is need for more research to capture these factors to determine whether they have a significant influence on chickpea production among small-scale farmers or not. Such information obtained from the study shade more light on factors influencing the production of chickpea production among small-scale farmers. The study focused on small-scale farmers in Karaba Ward of Embu County only. This limits the generalization of results. Similar studies need to be conducted in other counties where chickpea production is embraced. A further research can be done to capture other horticultural crops in other counties to establish whether the findings was the same.

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