IMPACTS OF DEMAND DRIVEN AGR

ICULTURAL EXTENSION SERVICES ON MAIZE PRODUCTION AND SOIL CONSERVATION AMONG SMALL SCALE FARMERS IN MOIBEN SUB-CCOUNTY, UASIN GISHU COUNTY, KENYA.

BY

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DECLARATION

This thesis is my original work and has not been presented for a degree in any University.

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DEDICATION

To my husband Amos Mwasi and my children Mwasi, Lulu, Tunu and Mwakau for standing with me and giving me the much needed moral and financial support during my engagement in this study. May the Almighty God bless you abundantly.

ABSTRACT

Demand-driven agriculture extension services emphasize the need to provide services that meet the needs and priorities of farmers. In Kenya demand driven extension services were implemented through National Agriculture and Livestock Extension programme (NALEP) that started in the year 2000 and ended in December 2011.This was after other models of extension services that were supply driven failed to meet farmers' expectations. However the impact of the programme in Moiben Sub-County of Uasin-Gishu County has never been established. The main purpose of this study therefore was to assess the impacts of Demand-driven agriculture extension services (specifically NALEP) on maize production and soil conservation among small scale farmers in Moiben Sub-County, Uasin Gishu County. The study adopted a descriptive survey method and the sampling frame comprised of respondents drawn from household heads, Agriculture extension officers and farmer representatives. Simple random sampling was used to select 5 locations out of the 10 locations in the Sub-County from which purposive sampling was used to identify small scale farmers who practiced maize farming. The sample size per cluster was proportionally determined and simple random sampling used to get the required sample size of 203 respondents. Questionnaires and interview schedules were used to gather information relevant to this study. Quantitative data was analyzed by use of frequencies, means and percentages while qualitative data was summarized and interpreted in line with the research objectives. Inferential statistics involving multiple regression model was used to determine the influence of socio-economic characteristics on farmers' participation in NALEP. Results were presented in form of figures and tables. The study revealed the following: -Age and level of education of the household head influenced farmers' participation in NALEP programme,

NALEP had a positive impact on maize production with a 52% increase in production and 77.9% of the farmers adopting soil conservation measures. Cost involved, low farmer extension officer contact, poor road network and luck of adequate knowledge on extension services were some of the challenges highlighted by the farmers that hindered them access extension services. The study recommended that Uausin-Gishu County should emulate NALEP approach but pay attention to the following: - sensitize the farmers on the importance of participation in extension programmes, employ more agriculture extension offices, improve rural road networks and prioritize agriculture in its budgetary allocation in order to improve on efficiency and effectiveness of extension services.

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LIST OF ABBREVIATIONS AND ACRONYMS

ASDS	Agricultural Sector Development Program
CAP	Community Action Plans
CBOs	Community Based Organizations
CIGs	Common Interest Groups
FA	Focal Areas
FADC	Focal Area Development Committee
FBOs	Faith Based Organizations
FSAP	Farm Specific Action Plans
GDP	Gross Domestic Product
GoK	Government of Kenya
HYV	High yielding varieties.
IFAD	International Fund for Agricultural Development
IRM	Imazapyr-Resistant Maize
KARI	Kenya Agricultural Research Institute
MDGs	Millennium Development Goals
MoALD	Ministry of Agriculture and Livestock Development
MOLFD	Ministry of Agriculture, Livestock and Fisheries Development
NAEP	National Agricultural Extension Policy
NALEP	National Agriculture and Livestock Extension Programme
NASEP	National Agriculture Sector Extension Policy
NEP	National Extension Programmes
NGOs	Non Governmental Organizations
NSWCP	National Soil and Water Conservation Programme

PAPOLD	Participatory Analysis of Poverty and Livelihood Dynamics
PME	Participatory Monitoring and Evaluation
PRA	Participatory Rural Appraisals
SACCOs	Savings and Credit Cooperative Organizations
SHF	Stakeholders Forum
SIDA	Swedish International Development Agency
SRA	Strategy for Revitalizing Agriculture
T&V	Training and Visit

OPERATIONAL DEFINITION OF TERMS

For the purpose of this study, the following definitions were applied:-

Adoption: In this study adoption was considered as the acceptance and continued use of new production technologies introduced to farmers by agricultural extension officers, in any amount, and for any length of time.

Common Interest Groups: Farmers who come together to produce and market a commodity of common interest.

Community Based Organizations: These were considered as groups formed through the members' own efforts, such as self-help groups, merry-go-round, farm groups, etc.

Demand-Driven Agricultural Extension Services: It implies making extension more accountable to farmers and emphasizes the need to provide services that meet the needs and priorities of farmers.

Dissemination: Refers to passing of information from one farmer to the other through the various extension pathways.

Extension: A process of sharing information and technologies among various development stakeholders and farmers.

Innovation: An innovation is an idea, practice, or object that is perceived as new by an individual.

NALEP: National Agriculture and Livestock Extension Programme is a demand driven extension approach implemented in Kenya from July 2000, and lasted until December

2011. The programme aimed at uplifting productivity, encouraging commercialization and enhancing resilience through the increased use of agricultural technologies and improved inputs.

Participation: Is the process by which people become involved in their own development including steps of assessing their own situation and making decision. In this study participants were farmers who were in contact with agricultural extension officers.

Small scale farmer: A farmer whose agricultural orientation is mainly subsistence and cultivates land not exceeding 20 Hectares in Uasin Gishu County.

Socio-economic factors: These are personal characteristics like age, education, household income, household size and farm size that are likely to affect farmers' decision to participate in NALEP programme.

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Finally, to those who helped me in one way or the other in this research, May the Lord bless you all.

CHAPTER ONE

INTRODUCTION

1. 0 Introduction

This chapter gives a general introduction of the study. It includes background Information, Statement of the problem, purposes of the study, specific objectives, research questions, scope, justification, limitations, and assumptions of the study.

1.1 Background of the study

Agricultural extension encompasses the entire set of organizations that support and facilitate farmers engaged in agricultural production to solve problems and to obtain information, skills, and technologies to improve their livelihoods and well-being. Many countries have recognized the need to revive agricultural extension services as a means of reaching marginalized, poor, and female farmers and addressing new challenges, such as environmental degradation and climate change. In recent years, many developing countries have reaffirmed the essential role that agricultural extension can play in agricultural development (Birner *et al.*, 2006 and Anderson & Feder 2007). This renewed interest in extension is linked to the rediscovery of the role that agriculture needs to play in reducing persistent rural poverty (World Bank, 2007). Negative experiences with extension in the past have sparked considerable debate worldwide about the best way to provide and finance agricultural extension.

In recognition of this, the Kenya Government in 1998 initiated the National Agricultural Extension Policy (NAEP) to strengthen agricultural extension and advocated for demand-

driven extension services and participation of other players in the delivery system (GOK, 2004). The policy was prepared to enhance both public and private sector providers of extension service. This was an attempt to find a different path of adequately resolving the complex, systemic issues that faced rural communities. This shift was agitated by an increasing recognition of the socio-economic and agro-ecological conditions of resource poor farmers as being complex, diverse and risk-prone. It was further informed by the general realization that research and extension agencies did not have the capacity to generate a variety of technologies to the level required by farmers. Moreover, the diversity and complexity of rural livelihoods means that efforts to alleviate poverty in rural areas had to be multifaceted and holistic (Amudavi, 2003).

NAEP served as the instrument by which the Ministry of Agriculture, Livestock and Fisheries facilitated extension under the National Agriculture and Livestock Extension Programme (NALEP) and the NALEP Implementation Framework (GOK, 2004). In Moiben, the National Agriculture and Livestock Extension Programme was started in July 2000, and lasted until December 2011. The programme aimed at uplifting productivity, encouraging commercialization and enhancing resilience through the increased use of agricultural technologies and improved inputs, using demand driven and participatory agricultural extension approaches.

The concept of demand-driven extension services implies making extension more responsive to the needs of all farmers, including women, the poor and the marginalized

(Neuchatel Group, 2006). It also implies making extension more accountable to farmers and emphasizes the need to provide services that meet the needs and priorities of farmers.

The importance of extension in rural development is widely acknowledged. In developing countries in particular, where the majority of the population live in rural areas and agriculture is the main source of livelihood, agricultural extension is considered as one of the key drivers and a vital catalyst in rural development (Wanga, 1999). In Kenya agriculture accounts for 65 per cent of Kenya's total exports; provides more than 18 per cent of formal employment; accounts for more than 70 per cent of informal employment in the rural areas, and generally provides a livelihood for close to 80 per cent of the Kenyan population. Extension has however not lived up to its expected impact. (GOK, 2011)

Various reasons have been advanced to explain this failure by Chambers (1993). In the 1950s and 1960s, the problem was said to be farmers' ignorance, apathy, inadequate social arrangements and lack of local leadership. In the 1970s, the problem was said to be farm level constraints such as lack of credit and poor access roads. In the late 1980s, the lack of participatory processes was identified as one of the primary causes of economic decline and social disintegration. In the 1990s, the failure was attributed to lack of technological 'fit' to the needs of the potential adopters. From year the 2000, it has been attributed to poor governance and lack of institutional innovations to ensure greater efficiency and accountability in the mobilization, organization and control of national resources (Chambers 1993)

Various strategies with varying degrees of success have been advanced to address these issues (Rivera, 2005). One of the strategies has been to decentralize the management of programs through farmer participatory involvement in decision-making and, ultimately taking the responsibility for extension programs.

The Government of Kenya through the NALEP initiative recognized the need to diversify and decentralize the provision of agricultural extension services to respond to such challenges. This strategy aimed at ensuring sustainable development in the agricultural sector through a more integrated and holistic approach (GOK, 2001). NALEP incorporated a partnership concept that entailed participation of the various stakeholders in agricultural sector, a move that involved farmers directly in setting and fulfilling their own development goals. This made extension "demand driven", increased efficiency and put in place alternative funding procedures that did not rely so much on external funds such as increasing budgetary allocation to extension services, promoting gender issues in extension and supporting efforts to curb environmental degradation.

According to Uasin Gishu County annual report (2012), the County has a rich agricultural resource base with 80% of the land tenure being privately owned. Private ownership of land has encouraged investment in permanent and long term improvements of development on farms. Small scale farming subsector (maximum 20 Hectares) accounts for 75% of the total agricultural produce. The County has not exploited its potential. Production of main food crops and livestock has generally been low. Farmers depend on rain-fed agriculture and that production costs for most crops are high due to high input

costs, poor and long marketing chains. Low levels of mechanization and high transport costs are other challenges while private sector initiatives have not been fully explored. This untapped potential needs to be harnessed in order to improve local market infrastructural developments in partnership with local authorities. The county has a wide range of crop and livestock enterprises. The crop enterprises include food crops, cash/industrial crops and horticultural crops. (Uasin Gishu annual report 2012),

Despite the existence of these extension services, average crop production per hectare is still low. An example is maize production which averages at 20 bags per acre which is lower than the national average that ranges from 35 to 40 bags per acre and the county potential average of 40 bags per acre (GoK, 2012). The total crop production in the County has also been fluctuating in the past few years (GOK, 2010). In this study, impact of extension services was measured by change in maize production and the adoption of measures to control soil erosion among small scale farmers in Moiben sub-county since the inception of NALEP programme.

1.2 Statement of the Problem

Agriculture extension services can be delivered in many forms, with the aim of increasing farmers' production and curb environmental degradation. Early models of extension including Training and Visit (T&V) that focused on transfer of technology using a" top down" approach failed due to the passive role allocated to farmers and its failure to factor in the diversity of the socio-economic and institutional environments facing farmers (Birner *et al.,* 2006).

The Government of Kenya through the National Agriculture and Livestock Extension Programme (NALEP) recognized the need to diversify and decentralize the provision of agricultural extension services to respond to such challenges. NALEP incorporated a partnership concept that entailed participation of various stakeholders, a move that involved farmers directly in setting and fulfilling their own development goals, making extension become "demand driven" with the aim of increasing efficiency and supporting efforts to curb environmental degradation.

According to Amudavi, (2003) and GOK (2011), NALEP did not realize the expected goals nationally. The study by Amudavi was just after inception and the program was still new. The other study by Republic of Kenya though done at the end of the program focused on the entire country which had no representation from Moiben Sub-County. Residents of Moiben depend on farming as a source of income with maize being the major crop. However the impact of NALEP in Moiben has never been established. It is thus very important for the decision makers at county and sub-county levels together with the general public to know the impacts of this programme. This information is crucial in deciding whether to continue from where NALEP left, correct what went wrong to enhance its efficiency or drop the program in totality. The information is lacking and needs to be presented to county government in good time as they do their subsequent budgets. In response to this problem, the researcher sought to investigate the impacts of NALEP on maize production and soil conservation among small scale farmers in Moiben Sub-County and advice the county government accordingly.

1.3 Objectives of the Study

The main purpose of this study was to determine the impacts of demand driven agricultural extension services on maize production and soil conservation among small scale farmers in Moiben Sub-County, Uasin-Gishu County.

1.4 Specific Objectives

The specific objectives of this study were;

1 To assess the influence of farmers socio-economic characteristics on their participation in Demand driven agriculture extension services implemented through National agriculture and livestock extension programme (NALEP)

2 To determine the impact of Demand driven agriculture extension project (NALEP) on maize production and soil conservation, and

3. To assess the challenges faced by farmers in accessing demand driven agricultural extensions services.

1.5 Research Questions

The study was guided by the following research question:-

1 What is the influence of farmers' socio-economic characteristics on their participation in Demand driven agriculture extension services (NALEP) in Moiben Sub-County, Uasin Gishu County?

2 What was the impact of Demand driven agriculture extension project (NALEP) on maize production and soil conservation?

3 What are the challenges faced by farmers in accessing demand driven extension services?

1.6 Scope of the study

This study was conducted in Moiben Sub-County, Uasin-Gishu County between the months of December 2013 and March 2014. The study focused on National Agriculture and Livestock Extension Programme (NALEP) and respondents were small scale farmers who practice maize farming in the area. The content scope covered the influence of socio-economic characteristics on farmers' participation in Demand driven agriculture extension services, effect of Demand driven agriculture extension services in maize production and soil conservation and to determine the challenges faced by farmers in accessing demand driven extensions services among small scale farmers in Moiben, Uasin Gishu County.

1.7 Justification of the Study

Previous impact evaluations of agricultural extension interventions focused on the entire country which had no representation from Moiben Sub-County . With the current system of devolved Government it is very important for the decision makers at Uasin-Gishu County level, together with the general public to know the impacts of Demand-driven extension services implemented through an agricultural programme called NALEP.

An understanding of the impacts identified in this study will assist policy makers at the county level in deciding whether to replicate NALEP framework as it is and pay attention to solving the experienced challenges in order to enhance its efficiency or drop the

program in totality. This will also enable the policy makers to direct resources in the most effective and efficient way. The study findings will be used as key benchmarks for further research in demand driven based extension service strategies.

1.8 Limitations of the Study

Several limitations affected this study

NALEP took more than 10 years since inception and therefore some respondents could not remember everything about the programme due to the fact that the farmers did not have clear records of their farming activities. The responses may not also be accurate since it depended on respondents' ability to recall.

1.9. Assumptions of the Study

It was assumed that the respondents answered survey questions correctly and truthfully, extension staff and stakeholders provided the required information and that key informants

CHAPTER TWO

LITERATURE REVIEW

2. 0 Introduction

This chapter discusses the available literature related to the study with the review of literature in relation to the objectives and to identify the research gap. It also covers theoretical and conceptual framework.

2.1 The Agricultural Sector

Agriculture is the mainstay of Kenya's economy, currently contributing 24 per cent of the GDP directly and another 27 per cent indirectly (GoK, 2011). The sector also accounts for 65 per cent of Kenya's total exports; provides more than 18 per cent of formal employment; accounts for more than 70 per cent of informal employment in the rural areas, and generally provides a livelihood for close to 80 per cent of the Kenyan population. However, the performance of the sector over the last two decades has been declining with the average growth rate of 3.5 per cent per annum in the 1980s and later declining to about 1.3% per annum in the late 1990s. There was a growth of 5.8% in 2005 while in 2006 it grew by 6%. As a result the absolute poor dropped from 56% in 2003/2004 to 46% in 2006 as stipulated by National food and nutrition security policy (GoK 2008).This shows that there is need to reverse this trend in order to meet the challenges of Millennium Development Goal 1 (MDG 1): To eradicate extreme hunger and poverty by year 2015.

2.2 Extension Services in Agriculture

A general consensus exists that extension services, if properly designed and implemented, improve agricultural productivity (Muyanga & Jayne, 2006). Agricultural

extension services provide farmers with important information, such as patterns in crop prices, new seed varieties, management practices with respect to crop cultivation and marketing, and training in new technologies.

Extension services improve the knowledge base of farmers through a variety of platforms, such as demonstrations, model farms, specific training and group meetings; individual farm visits field days and agricultural shows. The exposure to such activities is intended to increase the ability of farmers to optimize the use of their resources and ultimately increase crop yields. In addition, ideal extension service provides feedback mechanism from the farmers to the research centers. It has also been noted that even where technologies are relevant and available, smallholder farmers sometimes have no access to them (Fliegel, 1993). Agricultural technologies are also rapidly changing. Farmers need to be made aware of what technologies work best, know how to use them, and generate effective demand for viable new technologies to provide signals to input distribution system (Davidson *et al.* 2003).

Agricultural extension service plays an important role in sharing knowledge, technologies and agricultural information, and in linking the farmer to other actors in the economy. The extension service is therefore one of the critical change agents required to transform subsistence farming to modern and commercial agriculture. This is critically important in promoting household food security, improving incomes and reducing poverty (world Bank 2007) NALEP has accorded great importance to agricultural sector extension and there is need to ensure that the agenda for technology development are demand-driven, well formulated and adequately funded; extension agents are well trained and facilitated

to carry out their duties; and that there is a conducive environment for extension clientele to understand and apply the acquired knowledge. It has also been Government's position to encourage the development of a pluralistic extension system to cater for diverse needs of extension clientele in the country. (GoK 2010)

2.3 Agricultural Extension in Kenya

The extension service in Kenya has in the past two decades used a variety of approaches to disseminate research-based innovations to farmers. These approaches include whole farm, integrated agricultural development, training and visit (T&V), regulatory, advisory, educational and participatory extension approaches (MOA & MOLFD, 2005).

The past and current Government policy and strategy documents have all recognized the need for a shift towards an increased role of the private sector in the process of revitalizing and sustaining growth in agriculture (GoK, 2009). The Strategy for Revitalizing Agriculture (SRA) and the National Agriculture Sector Extension Policy (NASEP) emphasize collaboration of the agriculture sector ministries and stakeholders in the provision of extension services. The key stakeholders include farmers, farmers' organizations, Non-Governmental Organizations (NGOs), Faith Based Organizations (FBOs), Community Based Organizations (CBOs), research institutions, agribusiness companies, agricultural professional institutions and development partners. Their roles include provision of extension services, provision and facilitation of farm inputs, agricultural credit, agricultural technology development and transfer, lobbying and advocacy on behalf of farmers and media for quick communication of information to a wide audience Sempeho (2004).

The Republic of Kenya, until 1998, had been providing agricultural extension services through the Ministry of Agriculture and Livestock Development (MoALD) .The Ministry used National Extension Programmes (NEP I and II) which were implemented by the Extension Services Division and funded by the Kenyan Government, IFAD and the World Bank. The programme approach which was "top-down" and supply driven failed to meet farmers' demands (GoK 2011). National Soil and Water Conservation Programme (NSWCP) as a parallel agricultural extension service approach to NEP I and II, was a complementary extension service initiated by Land Development Division, through its Soil Conservation Branch, in 52 districts of Kenya (GoK, 2011). This was achieved with support provided by SIDA. The programme used participatory techniques to determine the kind of extension support farmers demanded. It adopted a shifting catchment (focal) area approach to reach all interested farmers during an intensive one-year support period. Effective guidance and backstopping to field staff was facilitated by "bottom-up" activity based planning and budgeting.

2.4 National agriculture and livestock extension program

The implementation of the National Agriculture and Livestock Extension Programme (NALEP) started in July 2000 and was coordinated jointly by the Ministry of Agriculture and the Ministry of Livestock Development of Kenya. The programme sought to enhance social economic development and poverty alleviation through agriculture and livestock development. The programme generally aimed at providing and facilitating demand driven, pluralistic and efficient extension services for increased production, food security, higher incomes and improved environment. The programme targeted rural populations

engaged in agriculture, livestock and fisheries, with a specific focus on pro-poorness and non-discriminatory access to the program.

NALEP covered first the high-potential agro ecological zones and expanded its coverage in 2007-08 to all districts in Kenya. NALEP strived to support initiatives at different levels: supporting institutional set-up (setting up local institutions for improved marketing, lobbying and decision making, enhancing the use of extension approaches, promoting technical packages, promoting collaboration and networking with other actors (NGOs, Private sector, Other Ministries, etc.), mitigating problems associated with gender and other crosscutting issues (HIV and AIDS, drugs, alcohol and other substance abuse).

NALEP's targeting approach was focused on vulnerability and pro-poorness using participatory methods to identify the needs of beneficiaries. One of the tools used was the Participatory Analysis of Poverty and Livelihood Dynamics (PAPOLD), a community-driven survey tool used to identify potential beneficiaries. The survey was performed at the beginning of the implementation period in each location where NALEP was about to deliver services. It included a census of the location's dwellings and an asset-scale wealth chart, and other location specific agricultural information on soils, production, among others. The PAPOLD survey's goal was to identify the needs of vulnerable households to accessing resources for productivity, and assisting the farmers to commercialize their products.

NALEP's mandate was to deliver services to all divisions in Kenya, even though it was not been achieved fully by the end of the programme. Hence, there was no formal "selection mechanism" that assigned treatment to a location, but rather a progressive roll-out of the programme to the whole country's divisions. The decision making process that determined which division received the programme's support first is not formal and could not be determined accurately. NALEP was operationalized through a structure composed of grass-root institutions. The highest level of institution that was created through NALEP was the stakeholders' forum (SHF), with representation from both the public and private sectors, and which formed the entry point for NALEP in a new area, called focal area by the programme. The stakeholders included private extension service providers, input suppliers, marketing agents, NGOs, community based organizations (CBOs), government ministries and departments, local councils and other development structures.

The SHF was responsible for conducting a Broad Based Survey (BBS) a sort of baseline, in the focal area with the assistance of NALEP technical personnel ending with the production of a Community Action Plan (CAP) defining the community's own projects– a type of "community business plan". Rather than imposing solutions to the households. NALEP mobilized communities to generate their own projects and to link them with development agencies to facilitate implementation of the projects. The community was in charge of project cycle management and ownership of all community development projects, in order to facilitate the phasing out process. One level below the SHF, NALEP helped developing the Focal Area Development Committee (FADC), which was a committee formed for the purposes of steering and coordinating collaborative activities of

the focal area. Among the FADC, NALEP encouraged individuals to work together and to form Common Interest Groups (CIGs).

A CIG is a group of individuals that have come together to develop a commodity (in either livestock or crop production) or activity into a commercial enterprise with marketing as a major thrust. Through these groups, NALEP contributed in building local capacities in: various technical areas, rights of farmers, pastoralists, fisher folk, and other clients and mainstreaming gender and other cross-cutting issues. CIGs provided a platform for bargaining, as well as for extension service provision in general .Although the type of extension programme called "training and visit" (T&V) programs –usually one-on-one sessions – have met quite a degree of success elsewhere, showing high returns on investment from the point of view of the program (Bindlish & Evenson, 1997), NALEP found it more cost effective to collaborate with groups rather than with individuals. The group approach also allows for the infusion of leadership capabilities among members of the community, as they rotate group leadership positions. The decline of central planning, combined with a growing concern for sustainability and equity, has resulted in participatory methods gradually replacing top-down approaches in extension that were used in former programmes.

2.5 Demand-Driven Extension Services

The concept of demand-driven extension services implies making extension more responsive to the needs of all farmers, including women and those who are poor and marginalized. (Neuchâtel Group, 2006) It also implies making extension more

accountable to farmers and emphasizes the need to provide services that meet the needs and priorities of farmers. Demand is defined as what people ask for, need and value so much that they are willing to invest their own resources, such as time and money, in order to receive the services. (Neuchâtel Group, 2006) The Indicators for success of Demand Driven Agricultural Advisory Services are; farmers have access to agricultural advisory services, farmers use the services, farmers have increased income from agricultural production and there is increased competition among agricultural advisers. Preconditions for success are enabling policies and public sector commitment to the transition. An example of demand driven extension project in Kenya is National Agricultural and Livestock Extension Programme (NALEP) approach

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According to Adhikarya, (1996) rather than providing farmers with the spectrum of information and skills related to a given recommended technology, extension service should create a demand (through information and motivation approaches) and to satisfy the demand through education and training among the intended target beneficiaries. The role of extension in NALEP therefore is to provide information that would trigger demand for technological options based on available resources (MOA & MOLFD, 2005).

Demand-led, participatory targeting and prioritization approaches are being increasingly applied in agricultural research and extension (Byerlee, 1998). These participatory demand-led approaches have provided practical, effective and cost-efficient solutions to the very complex problem of how to make agricultural research and extension more relevant to the needs of the farming community. Farmer empowerment is a precondition for development of a farming community consisting of farmers who effectively demand

and access the services they require in order improving agricultural production (Danida, 2004).

The concept of demand driven extension is illustrated by promotion of opportunities and formation of common interest groups (CIGs) that aimed at empowering the farming communities in the Focal Areas (FAs) to take up agri-business opportunities of their choice that are market oriented and market driven. CIGs are viewed as business entities and extension packages are enterprise specific (MOA & MOLFD, 2005). Opportunities promoted by NALEP are based on resource endowment of a focal area and possible enterprises. Divisional Subject Matter Specialists identify and promote opportunities according to their area of specialty. This is done during Community Action Plan (CAP) meetings held in the Focal Areas (FAs). They source necessary information regarding the opportunities thereby triggering demand for extension services. This sensitizes the farmers to make rational choices from the range of opportunities identified (MOA & MOLFD, 2004).

2.6 Socio-Economic Factors Influencing Farmers' Participation in Demand Driven Agriculture Extension Project

A lot of emphasis has been placed on several socio-economic factors as being the most important constraints to farmers changing land practices namely gender of the household head, age, education, farm size and family income (Jeanette, *et al.,* 2010). These are some of the variables that have varying degrees of influence over farmers' participation in NALEP. According to Doss (2001) on the role of women in agriculture female-headed

households represent between 3% and 38% of all households and produce between 2% and 17% of the value of food produced. Further, Mignouna, *et al.,* (2011) on their study on determinants of adopting imazapyr-resistant maize technologies and its impact on household income in western Kenya found out that the gender of the household head is hypothesized to relate positively to the adoption of an IRM package. The assumption is that the head of the household is the primary decision maker and men have more access and control over vital production resources than women due to many socio-cultural values and norms. Further, a report by the World Bank (2013), established that women make up 80% of Kenya's farmers. However, despite their majority, they luck ownership of the land they work on.

The age of a potential adopter has been found with mixed results to influence adoption of innovations. In adoption studies, the age of farmers is often considered to be an indicator of willingness to adopt changed practices, with the assumption that younger farmers are more likely to adapt to change (Jeanette *et al.,* 2010). However, there is conflicting evidence on this relationship, with some researchers finding no significant relationship between age and adoption rates of changed land management practices (Cary *et al*., 2002). Other researchers have found a more direct relationship between adoption rates and an adopter's age. The younger the farmer, the more likely he is to adopt innovations early in his life cycle (Dieldrin *et al.*, 2003).

The positive association on age and adoption indicates that the older the household head, the greater the chances of adopting the improved technology (Mignouna *et al*., 2011). A farmer's age is expected to increase his willingness to participate in the Programme due to the sense that older farmers over time have gained knowledge of improved production technologies and experienced in the adoption of these technologies and are better able to evaluate technology information than younger farmers. An analysis of this study showed that age of the respondent was associated with farmers' participation in NALEP.

Education helps the transformation of information (processed data) to knowledge (information that is modeled to be useful). Knowledge influences adoption. Farmers who have adequate information about knowledge of technology use are likely to adopt it (Abebaw & Belay, 2001 and Rogers, 2003). Sources of information, including extension services through NALEP, enhance the adoption of technology. Education is expected to enhance the decision making and the adoption of agricultural technologies (Rollins, 2009). Traditionally, educated people were expected to understand the benefit of the innovation in question at a faster speed than the uneducated (Makame, 2007). High numbers of illiterate people are living in rural areas and the illiteracy is even higher among women.

In the present study, the researcher sought to find out whether level of education had any influence in awareness about the pros and cons of participating in NALEP. Although it is

not necessary that higher education equates to greater awareness, it is assumed that more educated people have more knowledge about benefits of the Programme than less or un-educated people. Awareness of NALEP in which the respondents had been introduced in the study area was high, the main sources of information being local extension staff, farmer to farmer contact and community groups. In this context, awareness has been identified as a major factor impacting farmers' participation in NALEP. In the study area, the educated respondents were assumed to be more aware of the effects of participating in NALEP on maize production and soil conservation and therefore, formal education may increase farmers' willingness to participate in the programme. Participants had significantly higher contact with extension officers than non-participants.

Household size is the major source of labour for farm activities. Large households have the capacity to relax the labour constraints required during Imazapyr-Resistant Maize introduction (Mignouna, *et al.,* 2011). It is expected, therefore, that a larger household size will affect positively the decision of adopting Imazapyr-Resistant Maize. It is assumed that large families provide the labour required for improved maize production practices and will therefore be more inclined to participate in NALEP.

Land size is one of the first and most widely used factors on which the empirical adoption literature has focused. There are mixed findings in the literature on the influence of landholding size on households' decisions whether or not to adopt new technologies

(Waithaka *et al*., 2007; Kassie *et al*., 2009). Most studies find a positive relationship between size and adoption. Farmers with larger farms are more likely to adopt relatively new innovations (Diederen, *et al*., 2003). Thus, it can be assumed that a household with more landholding will be more likely to participate in NALEP. The importance of including this variable in the study was the fact that acquisition of land is an important determinant of socio-economic status in Moiben. According to Nepal & Thapa, 2009, farmers with larger land size can more easily bear risks such as crop failure, and can better afford expenditure on farm machinery, by virtue of their higher income. Farmers with larger farms are also able to practice crop rotation hence prevent soil erosion. NALEP therefore enhanced productivity on farms with more fallow land because farmers got advice on how best to rotate crops between cultivated and fallow acreage.

2.7 The effect of Demand Driven Agriculture Extension Services on Maize Production and Soil Conservation

NALEP as a development programme, generally aimed at providing and facilitating demand driven, pluralistic and efficient extension services for increased production, food security, higher incomes and improved environment. The programme targeted rural populations engaged in agriculture, livestock and fisheries, with a specific focus on pro-poor and non-discriminatory access to the program. In order to assess the impact of the programme one common enterprise had to be selected and the production evaluated before and after the inception of the programme. Production was also compared between NALEP participants and non-participants. Maize being a staple food in the study area

was selected. Land degradation due to anthropogenic activities has been an issue of concern in the study area and thus the need to study NALEPs impact on soil conservation was justified.

Over the past 10 years, the Kenyan Government has strived to improve agricultural productivity through government and donor supported programs such as National Agriculture and Livestock Extension Programme (NALEP). A study by Muyanga & Jayne (2006) showed a consistent and impressive growth in maize production across most agro-regional zones in Kenya between 1997and 2007. The overall mean maize production measured in 90-kg bags per acre showed a consistent and impressive growth from 10.5 bags /acre in the year 1997 and in 2000, 13.7bags/acre in 2004, to 12.9bags/acre in 2007for high potential maize growing areas in Kenya. Some of the key factors that contributed to production growth in maize included increased percentage of smallholder households that used fertilizer, adoption of high-yielding seed varieties (HYVs), and an increased density of fertilizer retail outlets leading to a decline in the distances to sellers of agricultural inputs. Fertilizer rate of use on maize, however, remained fairly constant. Similar findings have been reported by the Ministry of Agriculture stating that nationally the rising maize yield is attributed to a combination of good weather, use of improved seeds, higher fertilizer application and adoption of modern farming techniques and technologies through NALEP (Kibaara, et al, 2008).

2.7.1 Use of high yielding maize varieties

The quality of planting material has a significant impact on crop production. The limited potential for further expansion of area under maize cultivation due to diminishing availability of arable land implies that future growth in maize production would have to depend on yield gains made by wide-spread use of productivity-enhancing technologies, among which include high yielding varieties (HYVs). Research findings show a high proportion of households planting HYVs over the last 10 years in Kenya.

While HYVs contribute towards improved crop yields, their use must be supplemented by other productivity enhancing inputs, mainly fertilizer, to exploit their full production potential. Regionally, there are distinct variations in the rate of adoption of the combined fertilizer-improved seed package. An impressive increase in the proportion of households combining use of fertilizer and HYVs was observed over NALEP period in High potential maize zone as reported by Muyanga & Jayne (2006).

2.7.2 Fertilizer use

Expanding fertilizer use is widely considered to be a pre-condition for broad-based farm productivity growth. Profitability of fertilizer use is, however, dependent on several factors, one being agro-ecological conditions (Marenya & Barrett, 2008). The differences in agro-ecological conditions facing Kenyan small-scale farmers have contributed to variations in fertilizer use among different regions. The number of households producing maize has increased over the last 10 years, pointing to the importance attached to maize by the smallholder farmers.

There has been a consistent increase in smallholder fertilizer use in Kenya over the past decade. This increase may be attributed to several factors which include; increased accessibility of fertilizer by smallholder farmers due to availability of the input in small packs that more farmers can afford, reduction in the distance from the household to the nearest fertilizer stockist, reflecting increased investment in private fertilizer retailing and a reduction in real fertilizer prices in Kenya, reflecting reduced fertilizer marketing costs (Ariga *et al*., 2006).

The trend was reversed since 2007 with the dramatic rise in world fertilizer prices. It can also be explained by the aggressive nation-wide fertilizer price subsidization policy of the Kenyan Government as reported by Jean-Philippe & Deschamps-Laporte (2013) and the fact that more farmers have been organized into groups, providing a variety of benefits such as group loans for input purchase, information to improve farmers' management practices such as soil testing services, increased awareness of fertilizers' role in increasing maize productivity, and information on which, how and when to apply fertilizer efficiently. This growth in smallholder fertilizer use in general, and on maize in particular, has occurred after the introduction of NALEP in Kenya.

An important element that contributed in lower than expected yields since the year 2011 is that Kenya, and more specifically some parts of the rift valley province including Uasin Gishu county, has been affected by two viruses, the maize chlorotic mottle virus

and the maize dwarf mosaic virus, which induced a synergism referred to as the corn lethal necrosis. The virus forces leaves to dry up and eventually led to plant death. Certain districts, such as Bomet had their maize yields reduced by 80% in 2011. According to the Ministry of Agriculture, Moiben sub-county was not badly hit by the viruses, as they were expecting the maize yields to be 10% lower for the area. As a mitigation method, the Ministry of Agriculture through extension officers have been educating maize farmers on the importance of crop rotation, and more specifically to avoid planting maize during the short rains season (September to November), and opting for leguminous crops instead (Ochieng *et al.,* 2012).

2.8 Demand Driven Agriculture Extension Services and Soil Conservation.

The natural resource base on which the rural poor depend on for their livelihoods is rapidly degrading. The rural population is largely dependent on agriculture, that is facing a number of converging environmental trends that leads to unsustainable production and degradation of natural resources on which rural livelihood depends. National Agriculture and Livestock Extension Programme (NALEP) was designed after several previous projects failed to address the sustainability of such development projects leading to progressive decline in soil fertility and agricultural output (Mutisya *et al*., 2010). For this reason environmental conservation was one of the areas emphasized in agricultural extension and especially NALEP. It fell under soil and water conservation division that entailed teaching farmers on proper land management practices such as control of soil erosion, agro forestry, tree nursery establishment, importance of woodlots, water catchment, use of energy saving devices, proper land preparation techniques, digging

along the contours instead of across the contours that facilitates soil erosion and the importance of using compost manure.

There are other challenges too, such as climate change, which threatens to reduce crop yields, high post-harvest crop losses and environmental degradation. All these need to be addressed by extension agents in order to increase food production. It is also important to note that farmers are the guardians of natural resources, and national policies should encourage sustainable resource management as well as more efficient food production (Ozor & Nnaji 2011)

2.9 Maintaining and restoring soil fertility

Fertile soils with good physical properties to support root growth are essential for sustainable agriculture, but, since 1945, approximately 17% of vegetated land has undergone human-induced soil degradation and loss of productivity, often from poor fertilizer and water management, soil erosion and shortened fallow periods (Tilman, et al; 2002). Continuous cropping and inadequate replacement of nutrients removed in harvested materials or lost through erosion, leaching or gaseous emissions deplete fertility and cause soil organic matter levels to decline, often to half or less of original levels. Soil tillage speeds decomposition of soil organic matter and the release of mineral nutrients. Erosion can be severe on steep slopes where windbreaks have been cleared, vegetative cover is absent during the rainy season, and where heavy machinery is involved in land preparation. The effects of land degradation on productivity can sometimes be compensated for by increased fertilization, irrigation, and disease control,

which increase production costs. Crop rotations, reduced tillage, cover cropping, fallow periods, manuring and balanced fertilizer application can help maintain and restore soil fertility.

Previous research shows that NALEP provided support in the area of soil and water conservation, afforestation, and crop production. Support rendered by NALEP was in the form of training and technical back up only. The findings of a research by of Horacio (2004) indicated that government and nongovernmental organizations played a significant role in promoting soil conservation practices. Support from these institutions positively contributed to farm household decisions to conduct a range of short and long-term soil and water conservation practices. His results confirmed that the frequency of rural extension visits plays a positive and significant role in determining the level of adoption of soil conservation practices. In his research, Horacio (2004) pointed that all respondents ranging from households to focus group participants confirmed the importance of the availability of labour. Female headed households, elders and disabled are labour constrained households and therefore find it difficult to implement soil and water conservation practices on their farms. Child care, house management, reproductive roles and other tasks place additional burdens on female headed households which in turn compete with their time for soil conservation. Furthermore, with the increasing age of a household head, the practice of soil conservation declines unless there is a more able bodied person in the family who can contribute labour.

Poor households with no labour are forced to rent out their farmland which in turn has a negative impact on soil conservation practices as the lessee does not tend to treat the land as their own. Akinbile & Odebode (2007) support this point demonstrating that "tenants (lessees) are less likely to invest in others' lands due to the fact that long-term net benefits are no longer available to them". The results are also consistent with Devereux *et al*. (2003,) who indicated that renting out land was common among elderly and female headed households who lack resources.

2.10 Effects of maize production on small scale farmers' income.

NALEP is seen as a leader in Sub-Saharan Africa (SSA) in terms of coverage and participatory methods according to Jean-Philippe & Deschamps-Laporte (2013). In 2006, a SIDA report by Cuellar *et al*., 2006) claimed "that 80% of the households who took part in the program formed a producer group – called Common Interest Group (CIG) by the programme and that the introduction of the programme offered new opportunities for men, women and youth in agriculture. During the study more than 70% of the farmers interviewed claimed that the NALEP approach had led them to regard farming as a business rather than a way of surviving". Further, Christoplos & Kidd (2000), argued that agricultural education, extension, and advisory services were critical means of addressing rural poverty, because such institutions have a mandate to transfer technology, support learning, assist farmers in problem solving, and enable farmers to become more actively embedded in the agricultural knowledge and information system.

A study by Taiy (2009) looked at the impact of CIGs under NALEP and found that the CIG approach had a significant impact on farmers' access to extension services but no significant impact on farmers' access to agricultural credit and marketing. In addition, the study found that CIGs had a significant impact on the agricultural productivity of group members. The approach also had a significant positive impact on the quality of life of farmers' wives. This is supported by De Janvry & Sadoulet, (2010) who argued that improved agriculture was the centre of poverty reduction in world's rural areas.

High number of inhabitants in rural areas in Kenya can improve their livelihoods through agriculture as indicated by World Bank report (2013), which cited that 61% of the Kenyan population was employed within the agriculture sector. However, farming is still a major source of household income among the rural households. Agricultural productivity growth, therefore, remains a major target in efforts to improve incomes and well-being of the majority of the rural households. This means that there is need for intensive maize farming with the support of new technologies through NALEP which encouraged commercialization and enhancing resilience through the improved inputs, using demand driven and participatory agricultural extension approaches with an aim of improving livelihoods of the rural community as cited by Jean-Philippe & Deschamps-Laporte (2013).

2.11 Challenges faced by farmers in accessing Demand Driven Extension Services

Experience from Vietnam indicates that the challenge for individual farmers is how to access extension services and markets in a cost-effective way. Farmer Interest Group

approach is considered one of the most successful extension models in Vietnam (Birner, & Anderson, 2007). The idea of forming interest groups is to help the farmers exploit existing resources to enlarge their agricultural production by joining together. In this model those farmers who share common interests volunteer to join together and help one another to learn, to plan and to run their own business.

With the increase in the number of delivery methods, largely due to decentralization, challenges facing extension services in Kenya include, re-orienting the public delivery of extension services to improve its efficiency, enhancing its access to farmers and other clients, improving accountability of service providers to their customers, and maintaining relevancy to different end-users (GoK, 2001).

According to Birner & Anderson (2007), the 2003 Situation Assessment of Farmers revealed several major challenges facing agricultural extension in India with regard to access and quality. More than one-half of the surveyed farmers did not access any information source on modern technology, only 6% had accessed a government extension worker, and less than 1% had accessed either NGO or private sector extension providers. The perceived quality of most of the information provided was rated as either good or satisfactory, but only around 60% of the farmers actually tried the technologies recommended by extension workers. This pointed to problems regarding the practical relevance of the advice provided by extension agents.

One of the interesting challenges of NALEP is that of having a direct impact on food security and farm income (Cuellar, *et al*., 2006). Other important challenge faced by NALEP was involving women in its activities. These include; Communities have not been sufficiently sensitized on gender issues or gender analysis, gender has been misconstrued to mean female affairs, gender roles – women's reproductive roles reduce their mobility and the time and energy they have to carry out farming activities, discriminatory social cultural practices that reduce women's economic options and social interactions that restrict their access to the information and resources needed to respond to economic opportunities. Most decisions appear to be made by men and women tend to agree with men's decisions, e.g. on which crops to grow and differential access to wealth and resources determines which projects to begin. This is because men command more wealth and resources they dominate in enterprises that generate higher cash returns (Cuellar, *et al.*, 2006)

.

Another challenges facing extension in Kenya is how to re-orient and renew extension with a vigorous emphasis on partnership, participation and sharing of knowledge and information in development effort and how to balance continuity of extension service provision (Wanga, 1999). There are multiple conceptions of partnerships depending upon the sectors involved, the parties, and where the collaboration occurs. In this regard, four main institutional arrangements of partnerships to restructure and reform extension have been mooted based on modes of delivery and funding; Private delivery and private finance, Private delivery and public finance, Public delivery and public finance and

Public delivery and private finance (Farrington *et al.*, 2002; Anderson & Crowder, 2000 & Rivera, 2000).

2.12 Facilitating farmer empowerment for increased production

Chepsaigutt (1995) found that there exists a gap between farmers' yield and potential yield due to low rate of technology development, dissemination and adoption. According to him, the process of dissemination involves informing farmers of new technology and helping them figure out how to fit it into their farming system.

Farmer empowerment is seen to be a precondition for developing demand-driven advisory services with farmers articulating their demands based on informed analysis of their situation (Danida, 2004). It is also seen to promote farmer groups and organizations that can secure better and more responsive service provision, more efficient use of public resources and stronger negotiation power with the private suppliers and traders. Moreover, farmer empowerment is seen to support farmers to be more potent actors in other areas that influence their livelihood, such as education, health and land rights. The activities of extension officers in the field of agriculture constitute dissemination of information as it involves informing farmers about agricultural technologies. This information empowers farmers to demand for and access technologies.

2.13. Theoretical Framework of the study

This study was based on agricultural system model. The concept originated from an interventionist policy in agriculture based on the idea that in order to accelerate

agricultural modernization, innovation transfer should be strongly coordinated (Rivera *et al,* 2005). The model takes into consideration four main actors whose mission is related to agricultural innovation: research, extension services, education and training, and support systems (that is all organizations related to credit, inputs, producers' associations). All of these domains, according to this model, act upon farmers' and rural actors' knowledge and, by this way, generate innovation.

According to Amudavi (2003), partnership focuses on the role of the farmers as clients in the broad sense in creating a demand for technology and extension education, as well as on the role of social actors within the public agencies, private agencies and non-governmental organizations in creating a supply. It is an interactive system with partnerships among the various actors. Moreover, it reflects the belief that innovations are shaped by social structures and that they often perform a specific social function, which reflects the interests of particular sectors of society (Hogg, 2000). Underlying such a societal system is the need for intervening agencies to respond to clients' research and extension demand, which is not exclusively expressed through market orientations but through processes of social learning, negotiation, information exchange, accommodation and consensus. Rölling, (2009) argued that the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilization of knowledge and information in such a system should be undertaken by all the major parties in the system. NALEP framework also recognized that agricultural and knowledge systems (AKS) are diverse

and networking is a key pathway in optimizing the availability to those who need it (GoK, 2001).

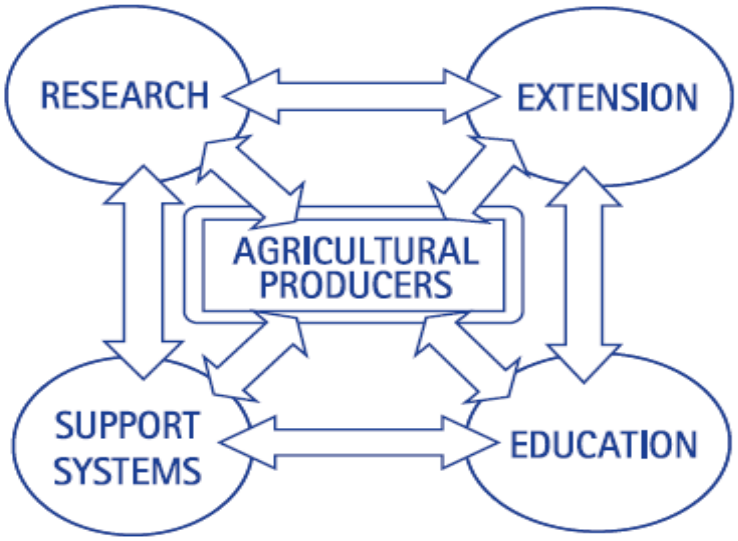

Figure 2.1: An Agricultural Knowledge system model (Source: Rivera *et al.*, 2005)

2.14 Conceptual Framework of the study

Figure 2.2 below suggests that the provision of demand driven extension services (dependent Variable) if done in collaboration with other stakeholders will influence agricultural production and soil conservation resulting to improved incomes of small scale farmers in Moiben sub-County. The intervening variables in this study are the Ministry of Agriculture Livestock and Fisheries /County policies on provision of extension services and the socio-economic backgrounds of farmers which include level of education and age of the household head which directly influences farmers' participation in NALEP and subsequently the adoption of extension technologies). The Strategy for Revitalizing Agriculture (SRA) and the National Agriculture Sector Extension Policy

(NASEP) emphasize collaboration of the agriculture sector ministries and stakeholders in the provision of extension services.

The key stakeholders in Moiben Sub-County included other line ministries like Department of Fisheries, Cooperative Development, Public Health, Social Services, Forestry, Public Administration and Education .Others were individual farmers, farmers' groups (CIGs), Non Governmental Organizations (NGOs), Faith Based Organizations (FBOs), Community Based Organizations (CBOs), agribusiness companies, stakeholder forum (SHF), and focal area development committee (FADC). Their roles included provision of extension services, provision and facilitation of farm inputs, agricultural credit, agricultural technology development and transfer, lobbying and advocacy on behalf of farmers for quick communication of information to other farmers. It is through the collaboration of the above stakeholders that Moiben farming community came up with their own community action plan (CAP) that was used to solve the problems that they themselves identified in the beginning of the programme .This collaboration resulted to increased maize production and adoption of soil and water conservation measures to curb soil erosion which translated to improved maize production and small scale farmers' incomes in Moiben.

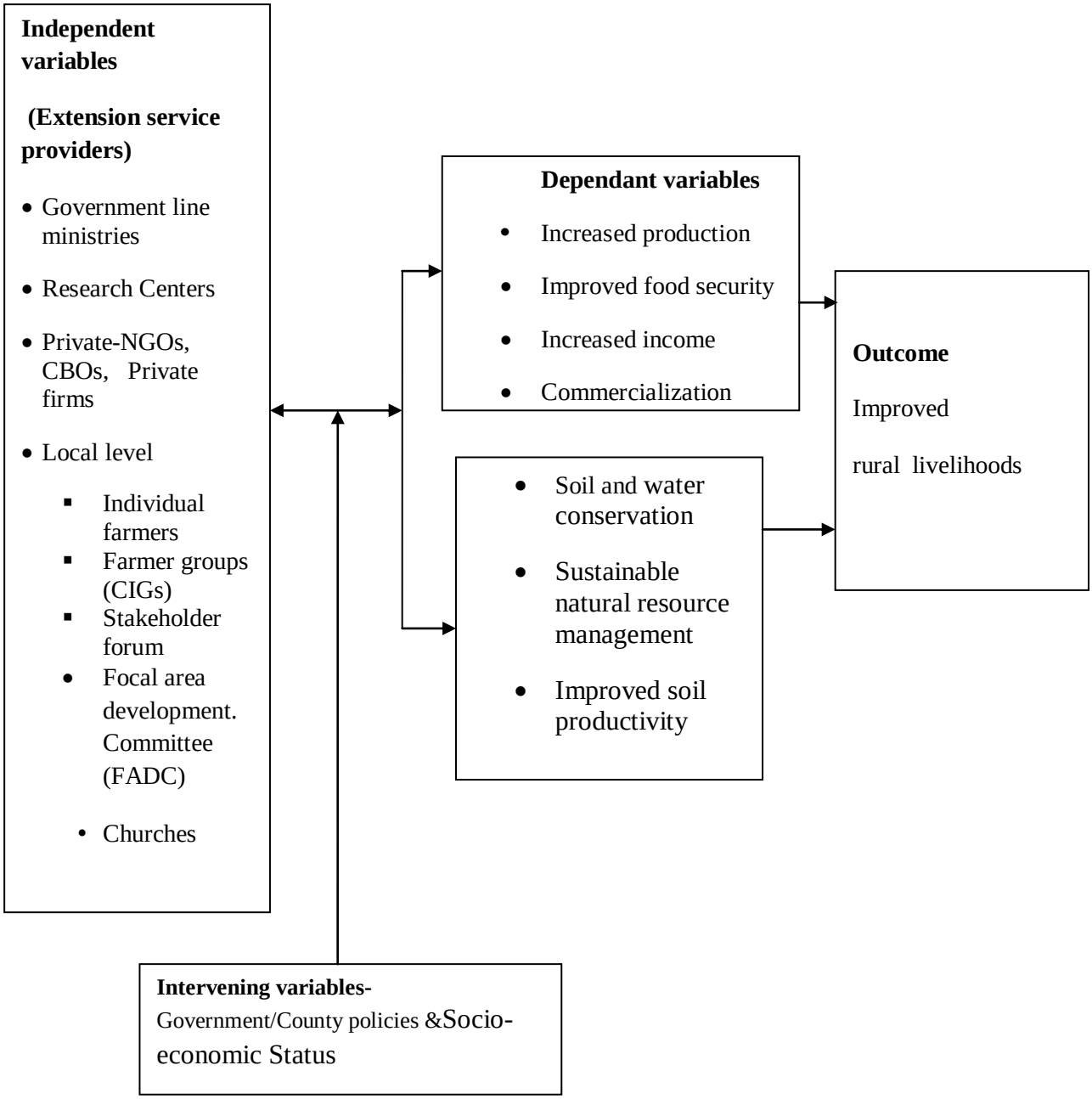

Figure 2.2: Conceptual Framework*:* (Modified from an Agricultural Knowledge system model (Rivera *et al*., 2005)

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter presents the research methodology that was used for data collection, analysis and presentation. It presents the research design, study area, sample frame, sampling procedures, methods of data collection and data analysis. In conducting this study, both primary and secondary data were used, while qualitative, quantitative and inferential techniques were used in data analysis.

3.1 Research Design

This study adopted a descriptive survey method which is appropriate for data collection in household setting. According to Kothari (2004), descriptive survey methods provide a suitable means through which community views, opinions, perceptions, aspirations, and suggestions regarding the phenomenon under investigation are obtained.

3.2 Study Area

The study was conducted in Moiben Sub-County, Uasin Gishu County of Kenya. The area lies at an altitude of 2163 m above sea level and is within latitude 00 49`0 N and longitude 35`0 49`60 E. The average rainfall is 900 - 1200 mm per annum distributed mainly between the months of March and December with two distinct peaks in May and October. Temperatures range from 8.4 ^{o}C to 26.2 ^{0}C (a mean of 18 ^{0}C). The soils are rhodic ferralsols which are acidic, moderately deep and well drained. Vegetation range from open grassland with scattered acacia trees, to natural highland forests and bush land.

It has 3 agro- ecological zones [AEZ] (lower highland, upper highland and upper midland).

According to Kenya 2009 population and housing census (GoK 2009) Moiben Sub-County has a population of 138,409 people with 28,813 households and a density of 178. Farm sizes range between 2-10 acres. The three main livelihoods in the sub-county are mixed farming (food crops and livestock), formal and casual employment.

The effects of population growth on the environment in Moiben include poor soil conservation activities, over exploitation of the environment like cutting down of trees without re-planting and environmental pollution through agricultural activities. Characteristics of agricultural sector in Moiben varies widely from predominantly small scale with low external inputs to highly mechanized large scale farming with very high levels of external inputs. One of the causes of poverty in the area is low agricultural production. An example is maize production which averages at 20 bags per acre which is lower than the national average that ranges from 35 to 40 bags per acre (Karanja, 2003) and the county potential average of 40 bags per acre (GoK, 2012). Administratively the Sub-County is divided into 10 locations and the study was carried out in five of the 10 locations namely; Moibeki, Moiben, Koitoror, Sergoit and Chepkoilel. Simple random sampling was used to select the five locations.

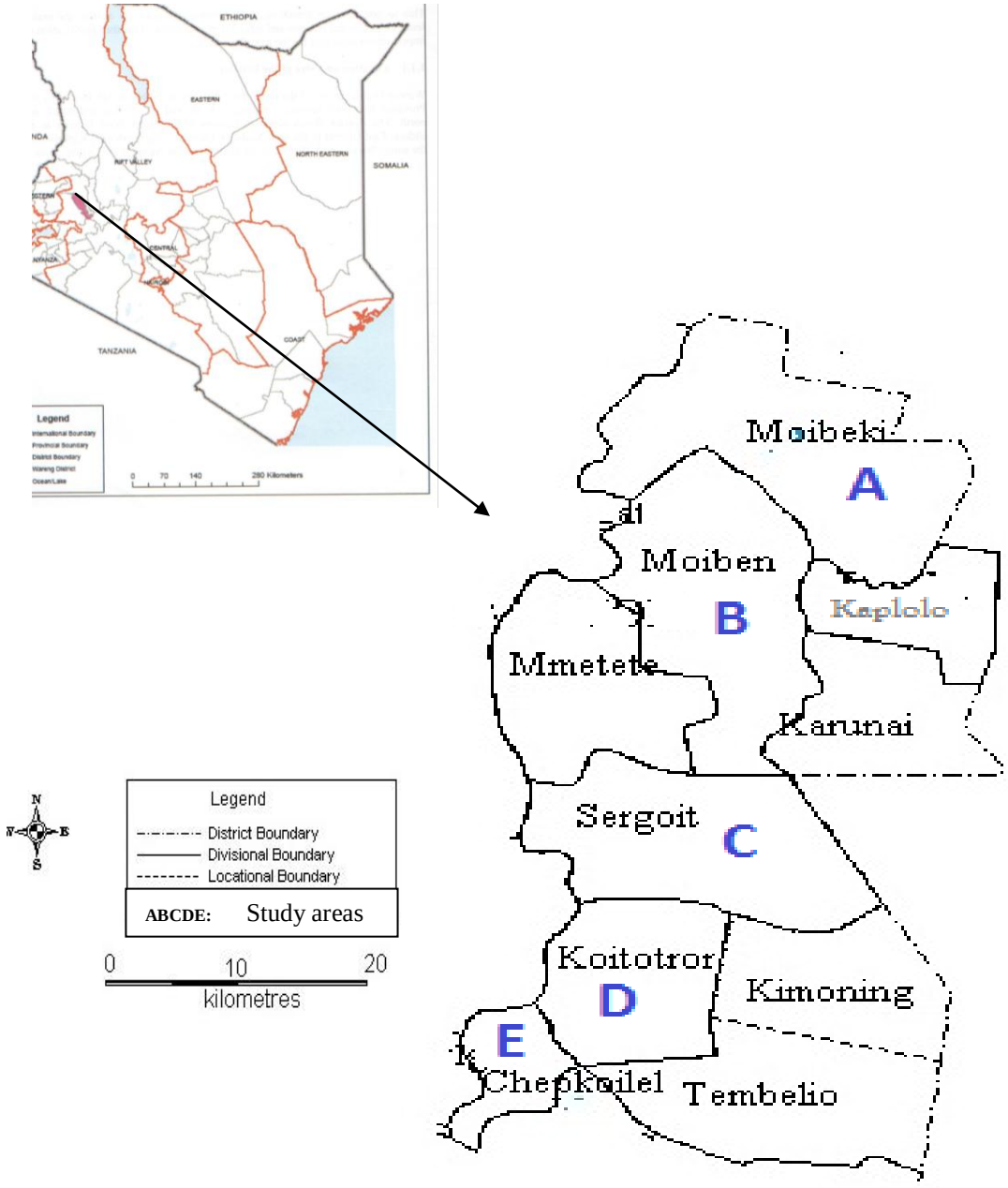

Figure 3.1: Map showing Moiben Sub-County and its location in Kenya.

Source: Modified from Moi University, geography department.

3.3 Target Population

According to Mugenda (2008) the target population is the total population that a researcher specifies in his or her research. In this study, the target population consisted of 26796 households in Moiben Sub-County. The figure was obtained from Ministry of agriculture, livestock and fisheries office.

3.4 Sampling Frame

The sampling frame for this study comprised of respondents drawn from household heads. Key informants comprised of three officers from Ministry of agriculture and 5 representatives from focal area development committees within Moiben sub-county in Uasin Gishu County.

3.5 Sampling techniques and sample size

In order to ensure that representative samples are derived from each category of respondents a formula by Yamane, (1967) was used to determine the sample size. The Sub-County was divided into 10 clusters according to locations. Simple random sampling was used to select five clusters (focal areas) and to get the required sample size in the cluster. Purposive sampling was also used to identify small scale farmers with land of maximum of 20 Hectares because only small scale farmers were relevant to the study. Five focal areas selected (clusters or locations) included Chepkoilel, Sergoit, Moibeki, Koitoror and Moiben. The sample size per cluster was then proportionally determined. Key informants composed of three extension officers from the Ministry of Agriculture and five focal area development committee representatives

The sample size was determined from the formula proposed by Yamane cited by Isreal (2009) which state that:

$n=N/1+N\ (e)^2$

Where n=sample size

N=target population size

e = level of precision (sampling error)

Therefore, N=26796 households and e=7%.

$n =26796/1+26796(0.07)^2$

$=26796/132$

=203 households

3.6 Sources of Data

Primary data was obtained for the study by use of questionnaires and interview schedules. Secondary data was obtained from review of published and unpublished materials from books, refereed journal articles, unpublished theses and dissertations.

3.7 Data Collection Instruments

The instruments used for collection of data relevant to this study were questionnaires and interview schedules

3.7.1 Questionnaire

Although questionnaires were administered to 203 household heads a total of 190 out of the 203 respondents fully filled and returned the questionnaires. Therefore the return rate

for questionnaires used in data analysis was 94.0% which was considered adequate to provide information on the study.

The questionnaire consisted of both structured and non-structured questions. Structured questionnaires were used because they are simple to administer and relatively inexpensive to analyze. The unstructured questionnaires were appropriate because their aim was to probe for attitudes and reasons for certain actions or feelings. They captured opinion, feeling and suggestions of the respondents in a space that was provided. All the questions in the questionnaire were related to the objectives and the research questions of the study.

According to Kothari, (2004) questionnaire allows the collection of a lot of data within a short period of time and it is easy and cheaper to administer. Similarly it also helps to ensure that all respondents reply to the same set of questions and that answers are in the words of the respondents and thus free from the interviewer's bias. However, non-response is usually high as many people do not respond and return the questionnaire without answering all questions. Bias due to non-response often remains indeterminate. The questionnaire method is also likely to be very slow since many respondents do not return the questionnaire in time despite several reminders. Table 3.1 shows the distribution of the sampled respondents in the Sub-County.

Table 3.1: Distribution of Sample Size in the Study Area by Location

Location	Number of Respondents
Chepkoelel	33
Sergoit	37
Moibeki	41
Moiben	48
Koitoror	44
Total	**203**

3.7.2 Interview Schedules

This tool was used to gather information from key informants who included three departments of Agriculture extension officers, and five focal area development committee representatives regarding the Impact of Demand driven agriculture extension services on maize production, and soil conservation in Moiben Sub-County, Uasin-Gishu County. The key informants were interviewed since they were the implementers of NALEP and therefore understood the impacts of the programme clearly. This method of data collection is very useful in extensive enquiries and can lead to fairly reliable results but can be quiet expensive since it involves face to face contact with the respondent.

3.8 Data Analysis and Presentation

The study utilized descriptive and inferential analysis techniques. Data was processed and analyzed using the Statistical Package for Social Sciences (SPSS) version 20. The data collected was assembled, grouped into categories, meanings extracted, coded then entered into SPSS and analyzed to get results. Quantitative data was analyzed by use of frequencies, means and percentages while qualitative data was summarized and interpreted in line with the research objectives. Inferential statistics involving logistic

regression was used to determine the influence of socio-economic characteristics on farmers' participation in NALEP and variation in maize production between pre-NALEP and post-NALEP periods respectfully. Results were presented in form of Figures and Tables.

3.9 Ethical Considerations

Several ethical issues can arise during the academic research, writing, and publishing process. These include plagiarism, fabrication or falsification of data, conflicts of interest, confidentiality, treatment of human subjects and animals in research, and authorship issues. Luey (2005) established that ethics are the norms for conduct that distinguishes between acceptable and unacceptable behavior.

In this study, the following ethical considerations were made. First, before collecting data, the researcher obtained authority to conduct research from University of Eldoret, school of Environmental studies. During data collection, respondents were informed of the purpose of the research and were required to give their consent to participate. The respondents were assured of confidentiality and anonymity of the information they availed. Further, results, methods and procedures used were honestly reported without any fabrications, falsifications or misrepresentation of data.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter contains findings of the data analysis of questionnaires and interview schedules on the impacts of demand driven agricultural extension services on maize production and soil conservation among small scale farmers in Moiben Sub-County, Uasin Gishu County. A total of 190 out of 203 respondents fully filled and returned the questionnaires. Therefore the return rate for questionnaires used in data analysis was 94.0% which was considered adequate for the study.

The chapter is divided into two sections, with section one, dealing with the demographic description of participants involved in the study. The second section is presented as per objectives of the study.

4.1 Demographic and socio-economic characteristics of the respondents

This section presents the demographic information of participants who were involved in the study.

4.1.1 Gender

The respondents were asked to indicate their gender. Figure 4.1 summarizes the results obtained about the respondents' responses.

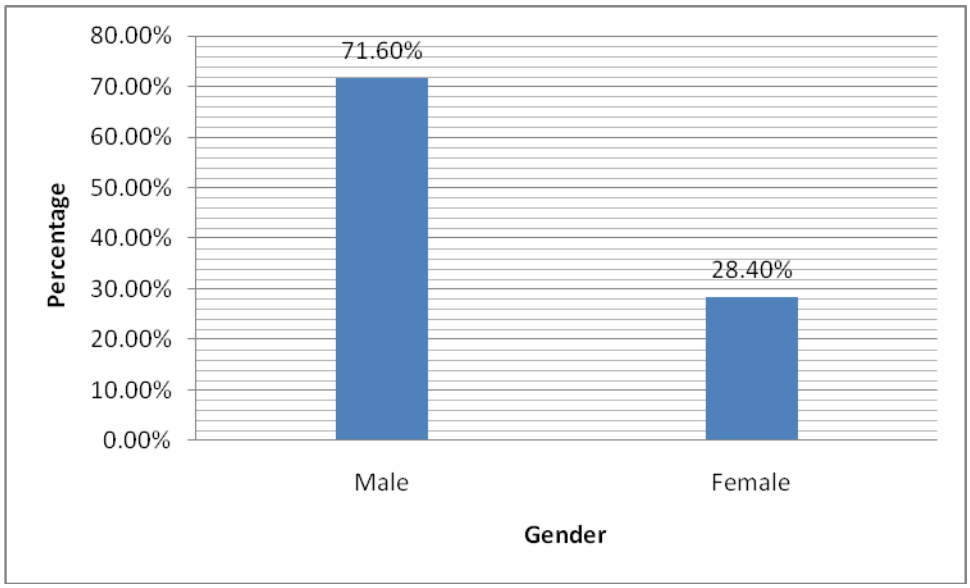

Figure 4.1: Gender of Household Heads in Moiben Sub-County

The study established that 71.6% of the household heads were male while 28.4% were female. This shows that male headed households dominate the small scale farming community in Moiben Sub-County. The respondents were largely household heads, hence the large male representation.

4.1.2 Age of the Respondents

The respondents were asked to indicate their age in years as summarized in Figure 4.2.

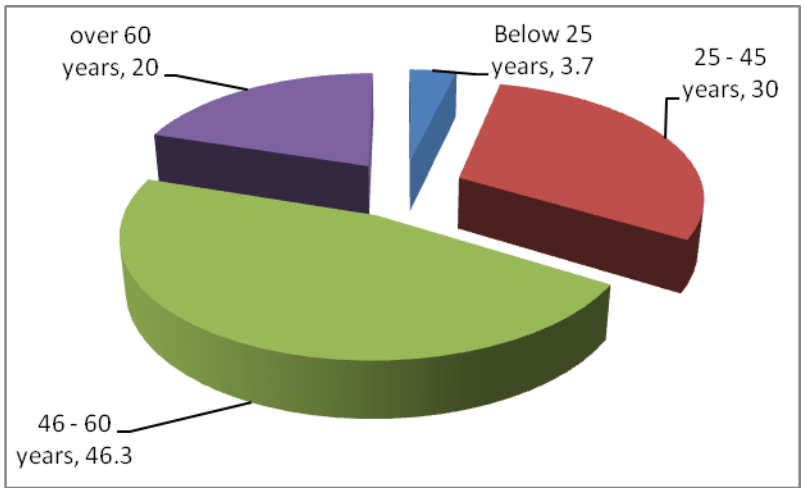

Figure 4.2: Age of household heads in Moiben Sub-County

The study findings indicated that 46.3% of the household heads in the study area were aged between 25-60 years with median age class of 46-60 years. In this study old age was taken to be over 65 years old while younger farmers were those of less than 25 years old.

4.1.3 Level of education of the respondents

Level of education of the respondents ranged from no formal education at all through primary education and secondary education to tertiary education as indicated in the findings shown in Figure 4.3.

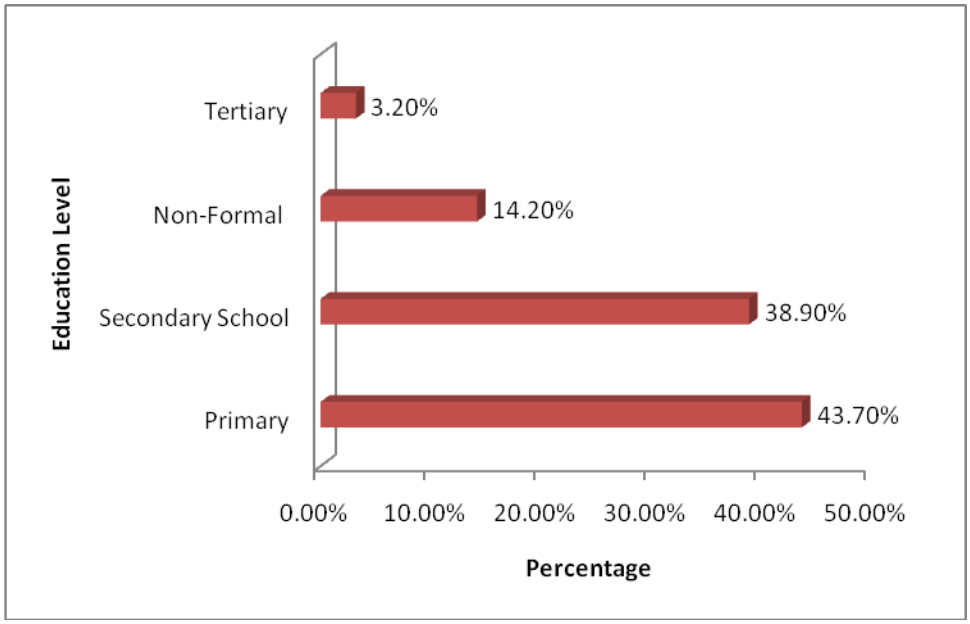

Figure 4.3: Education level of the respondentsin Moiben Sub-County

Information gathered from the respondents indicated that, 57.9 % of the respondents had primary school as the highest level of education. This is in line with Eldoret East district development plan 2008-2012 which stated that 59.9% of the population in Moiben had primary education as their highest level of education. Further analyses revealed that majority of the participants were those educated to secondary level and that 99% of those who went to secondary school participated in NALEP as indicated in Table 4.2 .However those educated to tertiary level had very low participation.

4.1.4 Family Size

The family size of the respondents included all the people living within that household. The respondents were asked to indicate the number of people living in their homes and their responses are summarized in figure 4.4

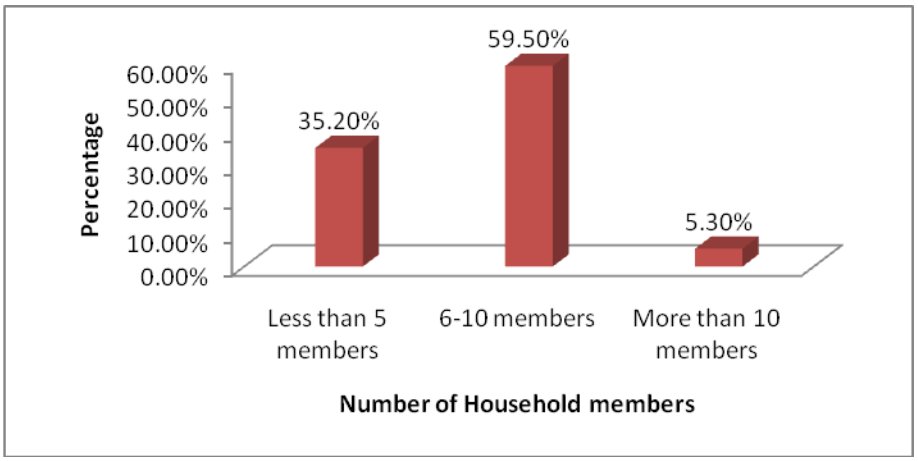

Figure 4.4: Number of household members in Moiben Sub-County

The figure reveals that 59.5% of the households in Moiben Sub-county had between 6 to 10 family members. Agriculture is labour intensive and therefore large households have adequate labour required during technology introduction resulting to adoption of soil conservation measures and increased maize production.

4.1.5 Farm size

Land size owned by the individual households reflects access to land, an important production resource for increasing agricultural production. Results are shown in figure 4.5.

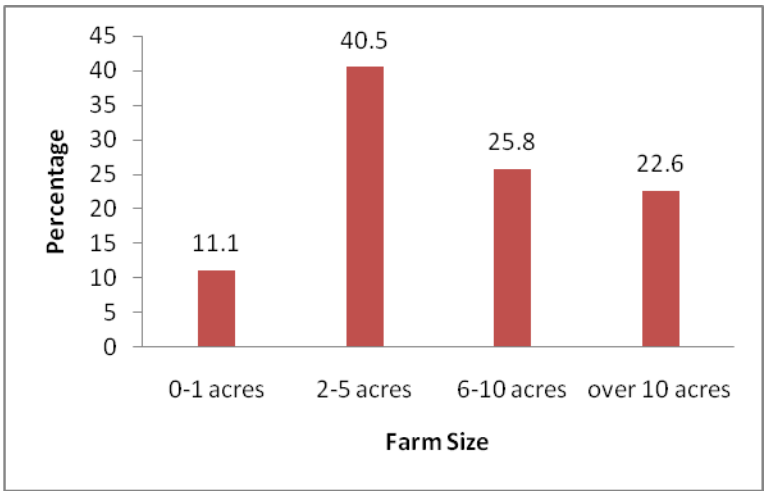

Figure 4.5: Respondents' farm size in acres in Moiben Sub-County

The study revealed that 40.5% of the respondents had 2-5 acres of land. It emerged therefore that most of the small scale farmers in Moiben Sub-County had farms of a maximum of 5 acres.

4.1.6 Land tenure system

On land tenure system, 70.5% of the respondents had land title deeds (private land) as shown in Table 4.1.

Table 4.1: Land tenure system in Moiben Sub-County

Land tenure system	Frequency (farmers)	Percent (%)
Private	134	70.5
Communal	27	14.2
Trust land	26	13.7
Leased	3	1.6
Total	**190**	**100**

The study findings suggests that majority of the small scale farmers had registered land which makes them more secure and can easily participate in the program of choice including NALEP. Security of tenure gives farmers the ability to secure credit by using the farm title deed as collateral and allows the farmer to invest on permanent soil conservation structures.

Table 4.2: Cross tabulation of Socio-economic Characteristics versus NALEP participation

Socio-economic Characteristics	Frequency (yes)	Frequency (total)	Percentage (%)
Gender			
Male	125	136	91
Female	45	54	83
Age (Years)			
Less than 25	0	7	0
25 -45	48	57	84
46 -60	88	88	100
Over 60	34	38	89
Education			
Non-formal	23	27	85
Primary	72	83	87
Secondary	73	74	99
Tertiary	2	6	33
Family Size			
Less than 5 members	64	67	96
6 -9 members	97	113	86
10 and above	9	10	90
Land Size (acres)			
0 -1	11	21	52
2-May	71	77	92
6-Oct	46	49	94
Over 10	42	43	98

Multiple regression model was also used to achieve objective one. The model was used to predict the effect of the independent variables on the dependent variables .Dependent variable was participation in demand driven extension services-NALEP while independent variables were:-Gender, age, level of education, family size and farm size. They are considered as predictors of participation in NALEP programme.

The results were as presented in Table 4.2 which indicated that only age of the household head and the level of education of the household head were significant ($p \leq .05$).

Table 4.3: Influence of socio-economic characteristics on farmers' participation in NALEP programme

Model		Std. Error	Standardized Coefficients	T	Sig.
1	(Constant)	.180		10.730	.000
	Gender	.053	-.052	-.672	.502
	age of respondent	.039	-.416	-4.128	.000
	level of education	.034	-.197	-2.362	.019
	family size	.026	.068	.766	.445
	farm size	.026	-.158	-1.939	.054

Dependent Variable: Farmers participation in NALEP programme.

This shows that age and level of education influenced farmers' participation in NALEP programme. The findings are important as they show that other socio-economic characteristics (gender of household head, family size, and farm size) did not prevent farmer households from participating in NALEP.

4.2 Institutional factors affecting farmers participation in demand driven extension programme

This study looked into other factors affecting farmers' participation in Demand Driven agriculture extension services implemented through NALEP other than socio-economic factors. The findings presented in Figure 4.6 show that most of the farmers in the Sub-County were aware of the existence of NALEP.

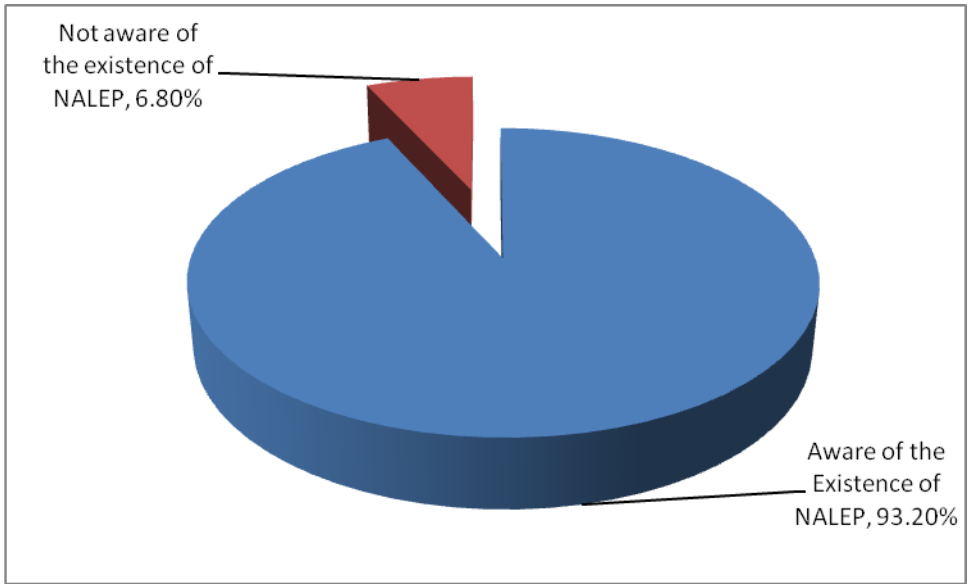

Figure 4.6: Farmers' awareness of the existence of NALEP in Moiben Sub-County

The local agricultural extension officers within the study area were mandated to disseminate information to farmers as per the programme. Despite the low staff to farmer ratio of 1:1920 in Moiben, farmers still responded to calls to attend group meetings, field-days and farmers barazas which were used as avenues for agricultural trainings. In addition, the respondents were asked to indicate their contact with agricultural extension

officers. It emerged that 89.5% of the small scale farmers in Moiben had been in contact with agricultural extension officers as shown in Figure 4.7.

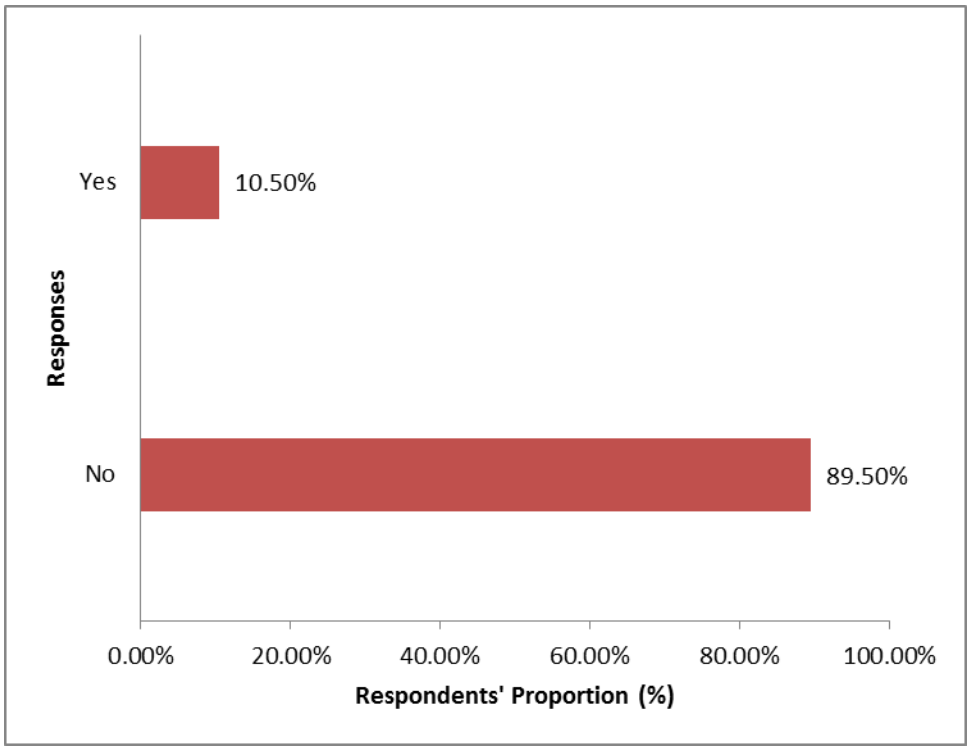

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Figure 4.7: Farmers contact with agricultural extension officer in Moiben Sub-County

In this study, farmers who had been in contact with extension officers were considered as participants of NALEP while those who had never been in contact were considered as non-participants.

Most of the farmers (89%) were in contact with the extension officers through group visits shown in Table 4.4.

Table 4.4: Kind of contact with extension officers in Moiben Sub-County (multiple responses)

Kind of contact	Frequency (farmers)	Percentage (%)
Farmers' field day	163	85.8
Famers field training	97	51.1
Agricultural demonstration	99	52.1
Farmers baraza	159	83.7
Group Visit	169	89.0
Farmers tour	40	21.1
Individual farm visit	44	23.2
Agricultural show	68	35.8

Table 4.4 also shows that group visits was the most preferred mode of contact with agricultural officers by farmers in Moiben sub-County. Almost all farmers had more than one mode of contact with the local extension officer. NALEP encouraged individuals to work together and form Common Interest Groups (CIGs).

NALEP emphasized on groups approach and results indicated that 69.5% of the small scale farmers in the study area belonged to a group while the rest did not. Those who did not belong to any group cited various reasons which included:- lack of trust among group members, lack of interest, lack of time for group activities and lack of awareness on benefits of being in a group. There were however some farmers who had never tried to

join a group while others had the attitude that groups never last and therefore thought it is a waste of time.

Purpose of forming the Groups

The respondents reported that the groups were formed for many different purposes, which were summarized into six broad areas as shown in Table 4.5.

Table 4.5: Purpose for forming the groups in Moiben Sub-County

Purpose	Frequency	Percentage (%)
Income generation	103	54.2
Collective marketing	82	43.2
Common interest group	158	83.1
Community welfare	98	51.2
Savings	47	24.7
Environmental conservation	31	16.

The results in Table 4.5 indicate that Common Interest Groups (CIGs) was the most dominant purpose of forming the group, indicated by 83%.of the responses. CIG was an initiative approach promoted by NALEP. Under CIG concept farmers were encouraged to form groups based on their interest in a particular agricultural or livestock enterprise .This summarizes the fact that farmers in Moiben had the right information on benefits of forming groups and actually benefited from the same.

Benefits to group members

Table 4.6: Benefits of being a member of a group in Moiben Sub-County (Multiple responses)

Benefits	Frequency	Percentage
Access to extension services	126	66.3
Easy access to technologies from research	112	58.9
Easy access to markets	110	57.9
Easy access to credit	96	50.5
Easy access to farm inputs	95	50

Results in Table 4.6 revealed that being members of groups gave the respondents access to extension services and easy access to technologies from research .Because of the magnitude of staff to farmer ratio in Kenya, NALEP focused on group approach in order to reach more farmers in a given time as compared to individual farm visit where a staff was able to visit a maximum of 4 farmers per day depending on the intervention at hand.

4.3 Impact of National Agriculture and livestock extension programme on maize production

It emerged from the study findings that most of the farmers had more than half of their land under maize production, showing the importance of maize crop in Moiben. It was also found out that 53% of the respondents had harvested 21-30 bags of maize in the year

2012 (post NALEP) while 68% had 10 to 20bags before NALEP (pre- NALEP) as shown in figure 4.8.This translated to an average of 25 bags per acre in post- NALEP period and13 bags per acre before NALEP .

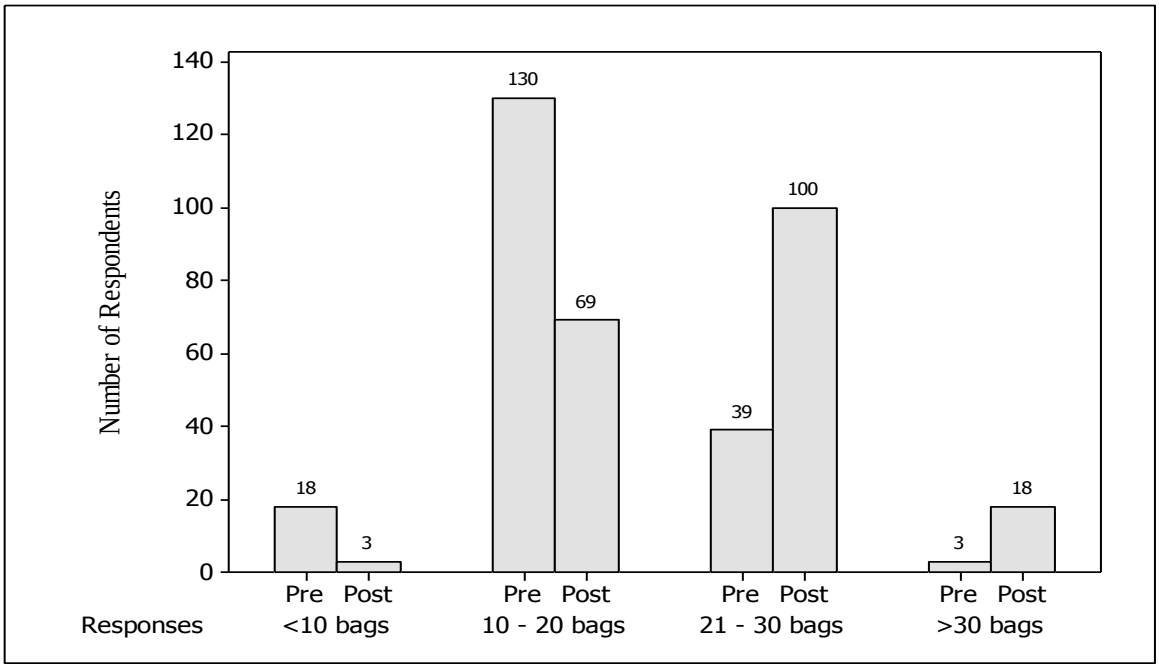

Figure 4.8: Comparison of maize production in number of bags per acre between Pre and post-NALEP periods in Moiben Sub-County

Results further indicated that production after NALEP was higher than production before NALEP .This translated to a yield increase of 52% which is higher than an increase of 48% in the rift valley, revealed by a nationwide NALEP impact assessment of 2011.

Chi-square statistics further revealed significant variation in maize production between pre-NALEP and post-NALEP periods (χ^2 = 66.897, p = 0.0001). This significant

variation is a confirmation that NALEP as a program increased maize production significantly in Moiben Sub-County.

Considering the fact that other factors could have affected maize production other than extension services, production between participants and non-participants of NALEP under the same environmental conditions was compared. The results revealed that farmers who participated in NALEP had higher maize production (26 bags /acre) as compared to those who did not participate who achieved 15 bags /acre as shown in the Figure 4.9 .This is shown by higher number of non-participants with 20 bags per acre and below as compared to participants whose majority had 21 bags per acre and above.

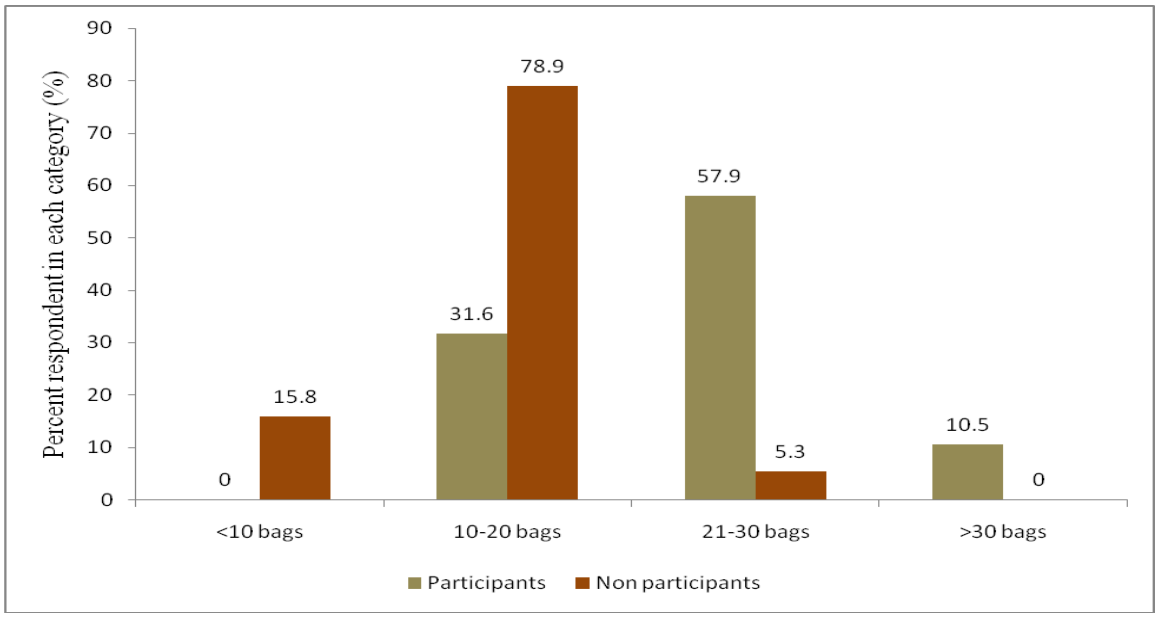

Figure 4.9: Comparison of maize production in number of bags per acre between Participants and non-participants of National Agiculture and Livestock Extension Programme (NALEP) in Moiben Sub-County

In terms of adoption of extension massages promoted by Demand driven extension services implemented through NALEP, the study showed that 54.2% respondents did not keep farm records while 45.8% kept farm records as shown in Figure 4.10.

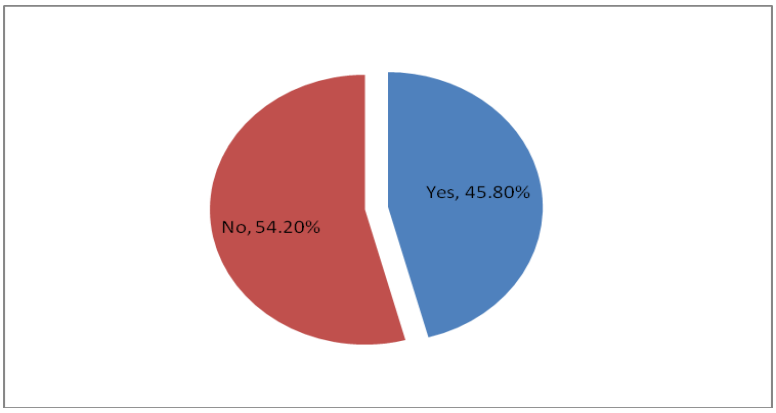

Figure 4.10: Record Keeping among farmers in Moiben Sub-County

This shows that despite the introduction of NALEP, a big percentage of small scale farmers did not keep farm records. This was attributed to farmers' lack of entrepreneurial drive and lack of time in record keeping as revealed during focus group discussion. Record keeping is very essential because it helps farmers to gauge whether they are making a profit or loss.

Fertilizer adoption rates, quantities and types of the fertilizer are other factors that influence maize production costs and production. When other husbandry practices are properly done as recommended, the use of fertilizers increases yield

Table 4.7: Fertilizer use in Moiben Sub-County

Response	Frequency	Percentage (%)
Yes	187	98.4
No	3	1.6
Total	**190**	**100.0**

The findings in this study showed a high adoption rate of fertilizer use in Moiben. It revealed that 98.4% of small scale farmers in Moiben Sub-County used fertilizers in their farms while a small fraction of 1.6% did not use fertilizers as shown in Table 4.5. The 3 farmers who did not use fertilizer used either farmyard or compost manure which was rarely available at no cost. This shows that farmers in Moiben valued maize crop as a source of food and income that they would take up any technology like fertilizer use that would improve production per acre. This was facilitated by the aggressive nation-wide fertilizer price subsidization policy of the Kenyan Government.

High adoption rates of fertilizers are necessary but needs to be accompanied by use of recommended rates in order to increase production. The biggest disparity in fertilizer use in maize production is in the quantities and types used rather than whether farmers adopt it or not. Respondents were asked to indicate the rate of fertilizer they used and these were only those who used fertilizer in their farms thus 187 respondents because 3 did not use fertilizer in their farms.

Table 4.8: Rate of fertilizer use in Moiben Sub-County

Rate (Quantity/Acre)	Frequency	Percentage (%)
less than 1 bag(50 kg bag)	51	27.3
1 -1.5 bags	119	63.6
2 bags	8	4.3
over 2 bags	9	4.8
Total	**187**	**100.0**

Table 4.8 shows that 63.6% of the respondents used the recommended rate of 1 -1.5 bags of fertilizer per acre (50-75kgs). According to National Farmers Information System, farmers in Uasin-Gishu County need to apply 52 -70kgs of Diamonium phosphate (DAP) per acre during planting season. The potential for the hybrid maize is normally not tapped if less than recommended rates of fertilizer are used.

Access to high quality maize seed is a prerequisite for high maize production. Adoption of hybrid seeds is quite high in Moiben with an adoption rate of about 94.7% as shown in figure 4.10.

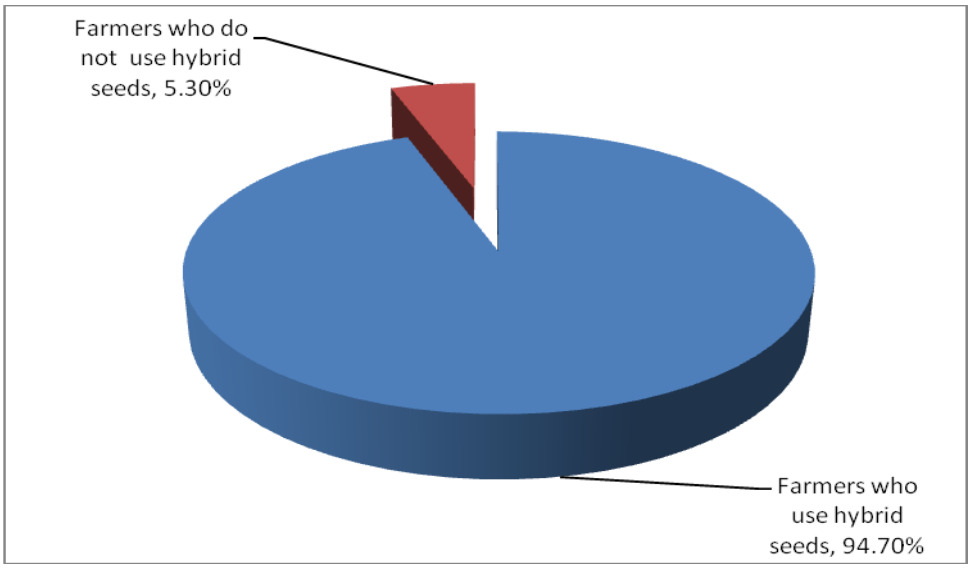

Figure 4.10: Farmers use of hybrid seeds in Moiben Sub-County

The other 5.3% of the farmers used non-hybrid seed maize. Use of the local seeds or retained hybrid reduces yields because these types of seeds are neither cleaned from seed contaminants nor certified. The reasons for not using hybrid seed was not lack of information about the seeds but was either lack of money to buy the seed or lack of confidence of the seed quality as revealed during the focus group discussion.

The study findings showed that most of the small scale farmers in Moiben Sub-county used hybrid maize seeds due to the existence of NALEP. Further, the findings showed that 48.3% of these farmers used 10kgs/acre of hybrid seeds, 41.1% respondents used over 10kgs/acre of hybrid seeds while 10.6% respondents used less than 10kgs/acre of maize seeds. Information derived from extension officers revealed that when a planter that is not calibrated is used in planting, a lot of waste is incurred. This explains why 41.1% of the respondents used more than 10kg of maize seed at planting. The recommended rate of maize seeds per acre is 10kgs/acre. This shows that NALEP has assisted farmers in getting the right information on spacing of maize during planting. However more needs to be done on maize planter calibration in order to avoid waste of seed.

The small scale farmers were asked to indicate the source of information they obtained about fertilizer use, choice of maize seed and rate of planting and record keeping. The results indicated that the most common source of information to farmers was the use of

local agricultural extension officers 86.3% and farmer to farmer contact 64.2% as shown in Table 4.9.

Table 4.9: Farmers' source of information about fertilizer use in Moiben Sub-County

Farmers' Knowledge on NALEP practices	Frequency	Percentage (%)
Farmer to farmer	122	64.2
Radio	22	11.6
Group members	36	18.9
Local extension officer	164	86.3

Results from the Table indicated that NALEP had an impact on maize production in Moiben Sub-County through training by the local agricultural extension officers. Farmers who were trained during NALEP influenced other farmers to adopt modern technologies in maize production.

4.4 Role of NALEP on soil conservation

This study sought to find out the status of soil conservation in Moiben sub-county.

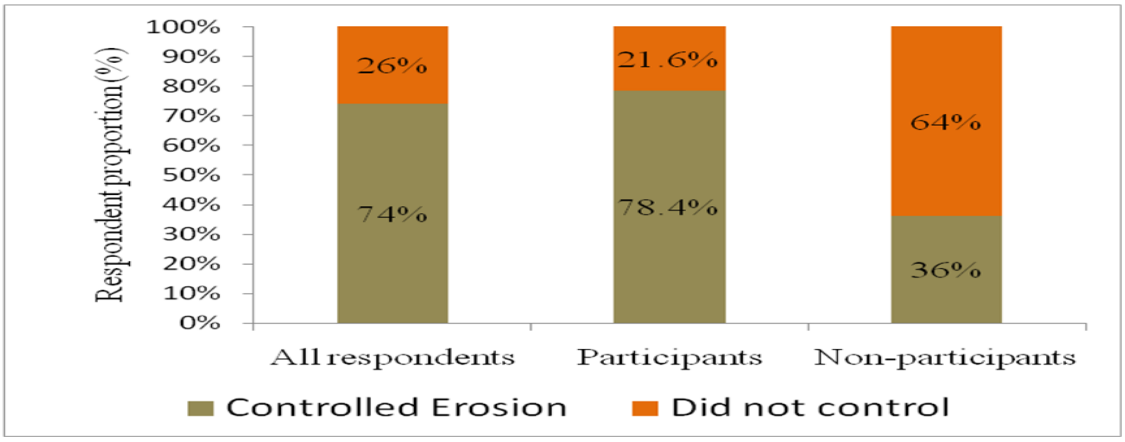

Figure 4.11: Soil Conservation versus NALEP participation in Moiben Sub-County

Respondents were asked to indicate whether they controlled soil erosion. It was revealed that most of the respondents who controlled soil erosion were those who participated in NALEP. Those who controlled soil erosion were then asked to indicate the methods they used. Among the most commonly used methods in Moiben included use of trash lines (52.1%) and unplouhged or grass-stripes (51.6%) as shown in Table 4.10

Table 4.10: Methods mostly used for control of soil erosion in Moiben Sub-County

Practices	Frequency	Percentage (%)
Use of trash lines	99	52.1
River bank protection	46	24.2
Mulching	39	20.5
Cover cropping	38	20.0
Unploughed stripes	98	51.6
Crop rotation	68	35.8

Majority of the farmers in Moiben Sub-County used more than one of the methods indicated in Table 4.8. Respondents were then asked to state the main sources of information related to soil conservation. Results revealed that most farmers got information from the local extension officer as reported by 49.6% of the respondents. Results are presented in figure 4.12.

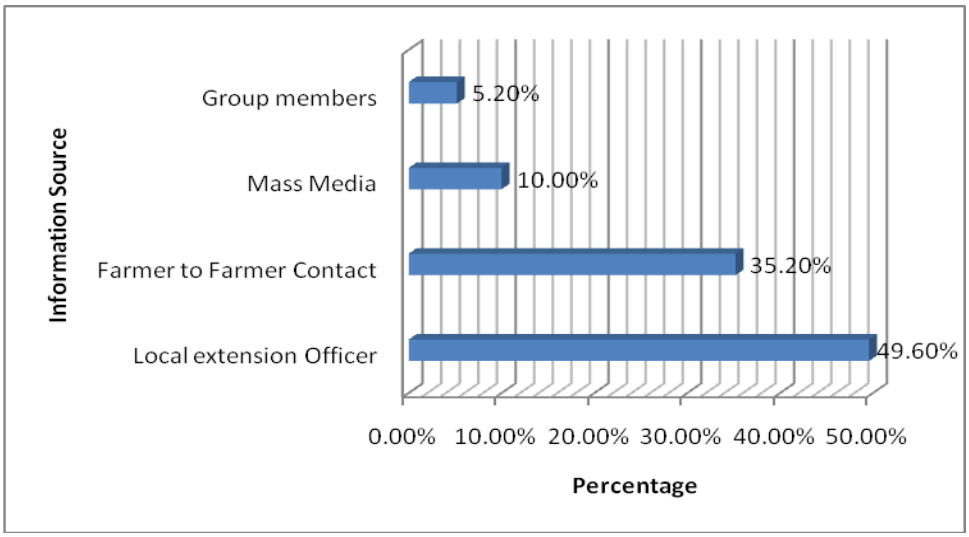

Figure 4.12: Source of information on soil conservation in Moiben Sub-County

Discussions with the focus group showed that NALEP provided a lot of support in the study area on soil and water conservation.

4.5 Impact of maize production on household incomes.

Maize production in Moiben Sub-County had an influence on farmers' income as shown in Table 4.9.

Table 4.11: Sources of income in Moiben Sub-County (Multiple responses)

Source of income	Frequency	Percentage (%)
Wage earnings	32	16.8
Casual work	31	16.3
Trade	73	38.4
Farming	187	94.2

The study revealed that 94.2% of the sampled respondents obtained their income from farming, 38.4% were traders, and 16.8% obtained their income through wage earnings while 16.3% respondents obtained their income from casual work. Maize is the primary staple crop in Moiben and plays an important role in the livelihoods of the people of Moiben. Respondents were asked to indicate the amount of money they earned from sell of maize in Kenya shillings per year. Results are shown in Figure 4.14

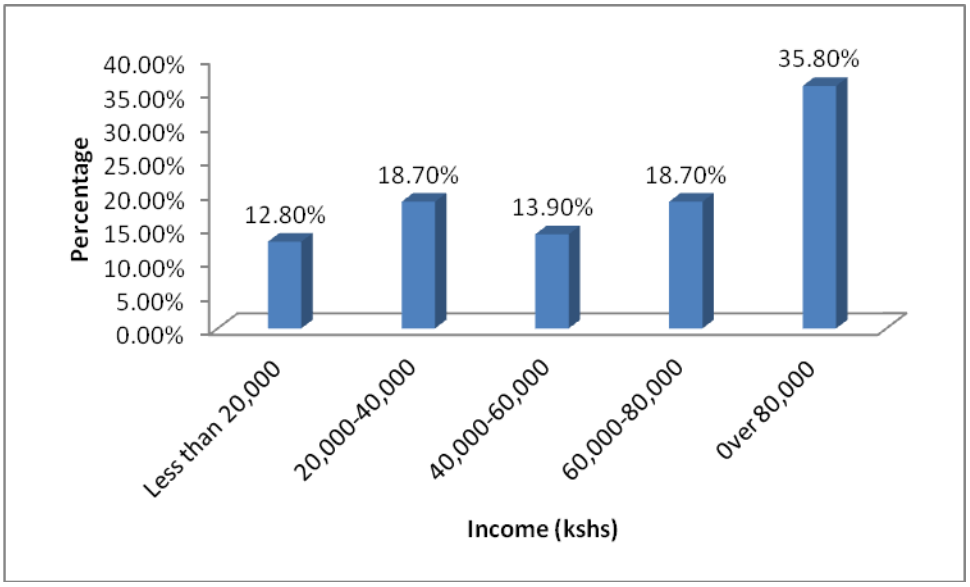

Figure 4.13: Income earned from maize farming in Moiben Sub-County

It was noted that 35.3% of the sampled respondents earned over 80,000 shillings per year from maize farming, and 18.7% of the small scale farmers earned 60,000 – 80,000 shillings in the year 2012.The study findings further showed that 71.6% produced sufficient amount of maize to cater for their family needs throughout the year while 28.4% did not produce sufficient maize for their families as shown in Figure 4.14.

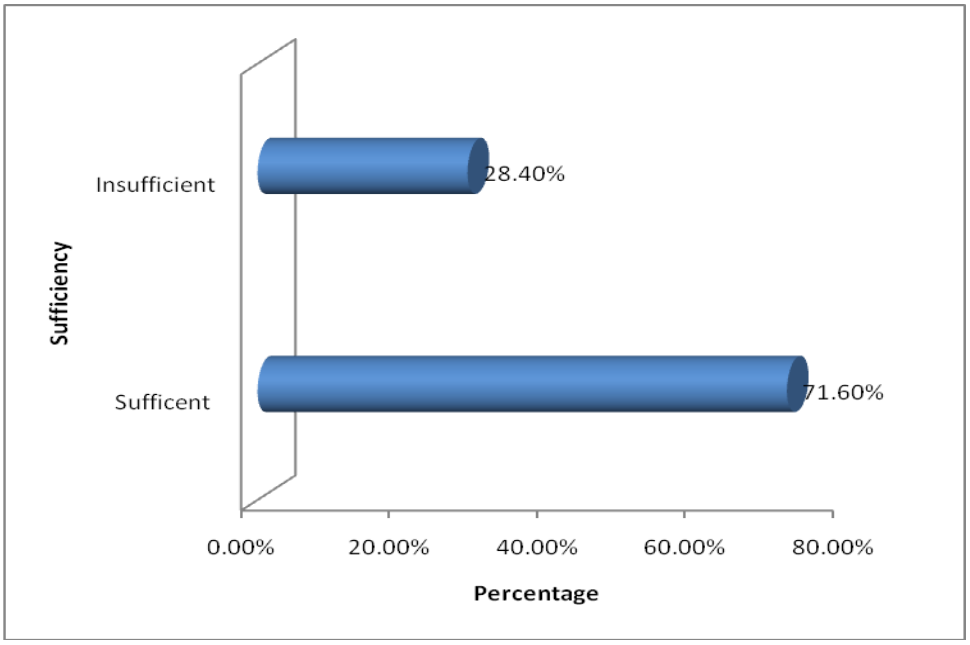

Figure 4.14: Ssufficiency of maize produced in Moiben Sub-County

The study showed that NALEP has taught farmers in Moiben to be self reliant and has made some significant improvements to individual farmers as shown in table 4.10.

Table 4.12: Improvements by NALEP in Moiben Sub-County (Multiple responses)

Improvements by NALEP	Frequencies	Percentage (%)
More profit from my farm than before	176	92.6
More aware about improved agricultural technologies	150	78.9
Access to credit facilities	116	61.1
Involved in group activities now than before	114	60.0
Opportunity to learn other non-farming aspects	125	65.8
Great prospects for farmers through linkage to other stakeholders	120	63.2

4.6 Challenges faced by farmers in accessing extension services

Challenges that were highlighted included: distance to the extension officer**,** Cost involved**,** farmers interest in the program**,** programme content and communication networks.

(a) Distance to the Extension Officer

The studies revealed that majority of the respondents reflected by 45.3% were within a 5km radius to the extension officers while the smallest proportion of 13.1% was at a distance of over 10kms to the extension officers (Fig 4.15)

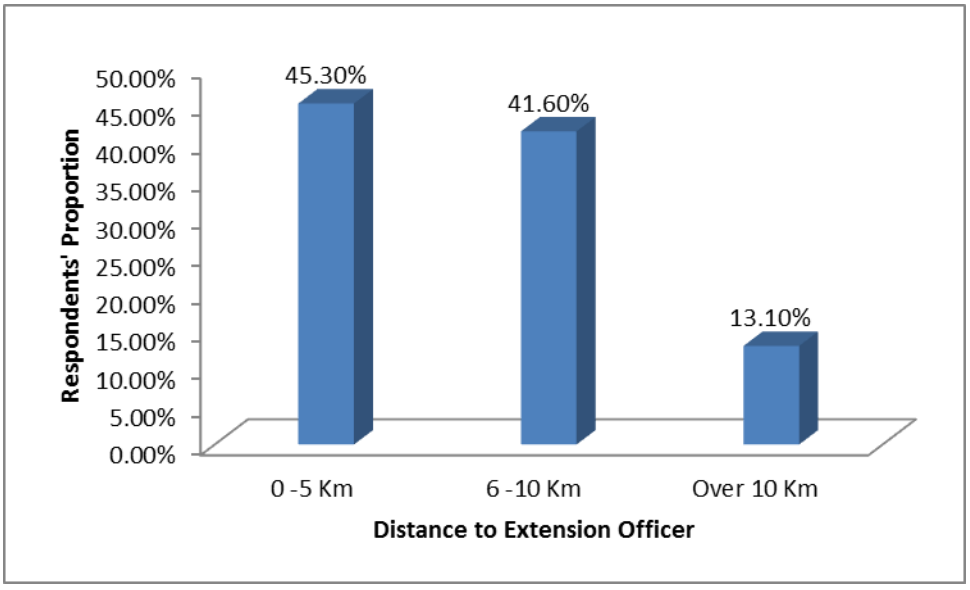

Figure 4.15: Distances from farmers residence to extension officers in Moiben Sub-County

(b) Cost involved

It came out clearly that a farmer sometimes requires the intervention of an extension officer but may lack money for transport or even airtime to communicate with the

extension officer. This hinders information flow. According to this study 50% admitted that cost was a challenge while the other half were of a contrary opinion.

(c) **Farmers interest in the program**

The study revealed that 33.1% of the respondents were not interested in NALEP as illustrated in Fig 4.16.

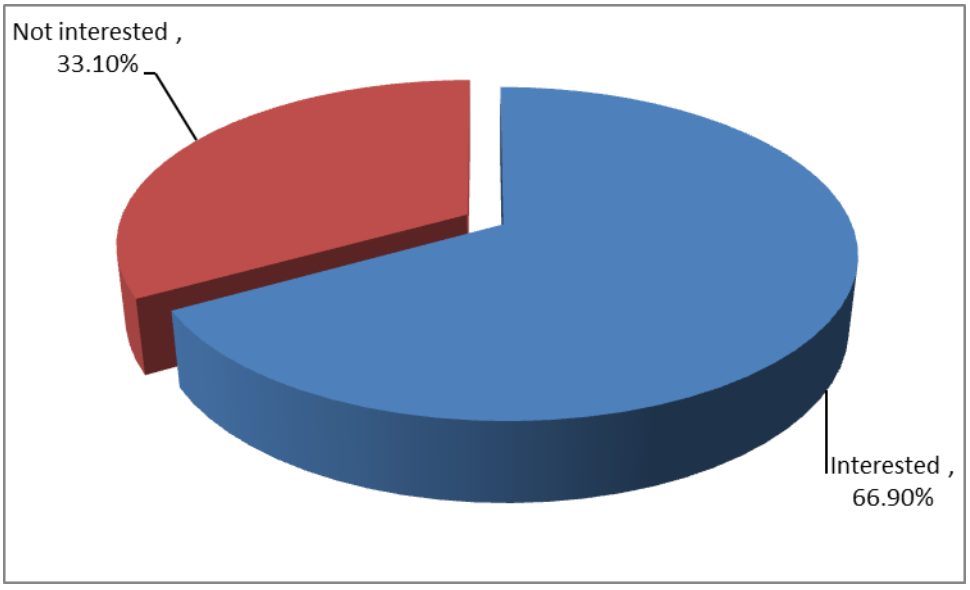

Figure 4.16 Proportion of respondents who were interested in National Agriculture and Livestock Extension program in Moiben Sub-County

(d) Program content and communication networks

The respondents were divided right in the middle on the opinion that NALEP program lacked adequate content to meet the needs of farmers. In terms of communication networks, the study examined farmers' perception on status of their roads in relation to accessing the extension officers. Most of the respondents (56.3%) said the status of the roads in Moiben is pathetic and needs urgent attention. According to key informants, road

network was a major problem and at times extension officers were unable to reach some farmers despite multiple invitations.

(e) Frequency of farmers contact with the extension officers

Respondents were asked how often they came in contact with the extension service providers.

Table 4.13: Frequency of contact with extension officers in Moiben Sub-County

Frequency of Contact	Frequency	Percent (%)
Weekly	38	20.0
Monthly	83	43.7
Every 2-4 months	30	15.8
Once a year	18	9.5
None	21	11.1
Total	**190**	**100**

The study findings presented in Table 4.11 revealed that 43.7% of the respondents were in contact with an extension officer every month, 20% made contacts with extension officers on weekly basis, and 15.8% respondents made contacts every 2-4months and 11.1% respondents never made any contact while 9.5% respondents made contact with the extension officers once in a year.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter presents the discussions of the findings of the study which focused on National Agriculture and Livestock Extension Programme that implemented demand driven extension services in Moiben Sub-County from year 2000 to 2011. The main objective of the chapter is to present inferential results of the findings presented in Chapter 4, with respect to the research questions one to four stated in Chapter 1.

5.1 Socio-economic characteristics affecting farmers' participation in demand driven extension programme-NALEP

NALEP is an extension approach that implemented demand driven agriculture extension services in Moiben from the year 200 to 2011.The programme was meant to reach all small scale farmers in Moiben sub County. However, some farmers participated in the programme while others did not. The researcher therefore sought to find out the socio-economic characteristic that influenced respondents' participation in the programme. Results presented in chapter four were subjected to regression analysis with participation in NALEP programme being a dependent variable. Participation was reflected by farmers contact with extension officers. The results were as presented in Table 4.2 which indicated that only age of the household head and the level of education of the household head were significant ($p \leq .05$).

The multiple regression model was used to achieve objective one and is expressed as:-

$Y = B0 + B1\ X1 + B2\ X2 + 33\ X3 + b4\ X4 + \ldots\ldots\ Bn\ Xn + \ldots + E$

Where:

Y = Participation in NALEP

X1 = Gender (dummy)

X2 = Age (years)

X 3= Level of education (number)

X4 = Household size (number)

X5 = Farm size (number)

B0 = Constant

b1 – n =are the regression coefficients or change induced in Y by each X

E =error

From the regression result the coefficient of gender (X1) had a negative sign. Though this was not in conformity with the expectation, the fact is that male headed households dominate the small scale farming community in Moiben Sub-County. The respondents were largely household heads, hence the large male representation. Coefficient of age (X2) had a positive relationship with the dependent variable and is in accordance with the prior expectation because old age increased the likelihood of participating in NALEP. The positive association on age and participation indicates that the older the respondent, the greater the chances of participating in an extension programme. Coefficient of level of education(X3) had a negative sign indicating not conformity with the prior expectation. This is because a more educated household head will be more interested in participating in NALEP because he will be eager to obtain information on modern

production technologies and try the technology. It is important to note that this scenario is only applicable to a certain level of education, which is secondary level. At tertiary level participation reduces and this is explained by the fact that the programme was too involving and this group of individuals was committed elsewhere and was more interested in white collar jobs. Household size (X4) had a positive coefficient which implies that the higher the number of household size, the higher the workforce and therefore the greater the chances of participating in an extension programme.

Farm size(X5) was not in agreement with a priori expectation due to its negative sign. In this study family size was not a stumbling block for Moiben farmers to participating in NALEP because they had large families. It is important to note that the coefficient of age (X2) and Level of education(X3) tested highly significant at 5% while other variables were statistically not significant.

The probability of participating in an extension programme is higher among older respondents than younger respondents. The average age of the respondents in this study was found to be 42 years and it indicates that the majority (76.3%) fell in the age bracket of 25 to 60 years old which meant that they were within the productive group and thus were able to participate in NALEP, thus age was not a limitation in Moiben. 49.3% of the respondents interviewed were in the age bracket of 46-60 years. According to Eldoret East development plan of 2008-2012, 53% of the population in Moiben was in the age bracket of 15-64 years. This according to the development plan was the active or economically active group and that at 65 years an individual becomes less productive and dependant. Most farmers in Moiben fell in the age bracket that is productive and with

adequate experience in farming and are therefore in suitable position of deciding whether or not to participate in an extension programme. This is consistent with research work done by Okunade (2007) in a study of Nigerian women farmers who found a significant positive relationship between age and adoption of farm technologies. He concluded that the older the farmers were, the more their years of farming experience and hence the better the decision the farmer would make in adopting new technologies.

Cross- tabulation of the findings further revealed that all respondents between the ages of 46 to 60 years and 89% those over 60 years participated in NALEP. It was also revealed that 99% of those educated to secondary school participated in NALEP as indicated in Table 4.2.

Small scale farmers in Moiben Sub-County had the limitation of education because most of them (57.9%) never attended formal education or were educated up to primary school and therefore their participation in NALEP was limited. Further analyses revealed that majority of the participants were those educated to secondary level (38.9%) and that 99% of those who went to secondary school participated in NALEP. Mignouna, et al (2011) established that level of education of the household head increases a farmer's ability to obtain, process, and use information relevant to the adoption of new technologies. Therefore a more educated household head will be more interested in participating in NALEP because he will be eager to obtain information on modern production technologies and try the technology. Further, education catalyses the process of information flow and leads persons to explore as wide as possible, different pathways of getting information about agriculture and food security (Ersado, 2001).

The findings of this study revealed that respondents with low level of education were reluctant to participate in NALEP as a source of agricultural information which resulted to limitation of information flow among this group. Further analysis however revealed that only 33% of those educated to tertiary level and beyond participated in NALEP because the programme was too involving and this group of individuals was committed elsewhere. Though education increases the probability of joining an extension program the scenario in Moiben was slightly different. At tertiary level of education participation was lower than that of respondents with secondary level of education. This reveals that the best recipients of NALEP were those educated to secondary level and that level of education had a positive influence to participation in NALEP. According to the findings of the analysis, gender, family size, farm size and land tenure system tended to be less probable in influencing the decision of a farmer to participate in NALEP.

On gender, male headed households dominate the small scale farming community in Moiben Sub-County. The respondents were largely household heads, hence the large male representation. This is in agreement with Cheryl Doss (2010) on the role of women in agriculture who found out that female-headed households represent between 3% and 38% of all households and produce between 2% and 17% of the value of food produced. The assumption is that the head of the household is the primary decision maker and men have more access and control over vital production resources than women due to many socio-cultural values and norms. Therefore the researcher concluded that production in

Moiben is expected to be higher as the men are the household heads and thus the decision makers which is in line with the culture of the indigenous community, the Nandi. According to the World Bank report (2013), women make up 80% of Kenya's farmers. However, despite their majority in the sector, they still luck ownership of the land they work on**.**

Family size was not significant because 59.5% of the households in Moiben Sub-county had large families of between 6 to 10 members. It is expected, therefore, that a larger household size will affect positively the decision of adopting new technologies and therefore the urge to participate in NALEP programme. Agriculture is labour intensive and therefore requires a large family to provide human labour. In this study family size was not a stumbling block for Moiben farmers to participating in NALEP because they had large families.

Most of the small scale farmers in Moiben Sub-County had farms of a maximum of 5 acres. These findings are in agreement with a study by Gitu (2004) which observed that due to continued land fragmentations in Kenya, 89% of the households in the country are living in less than 7.5 acres of land. The results are also consistent with an internal impact assessment survey conducted by NALEP (2007) that indicated that 71.8% of famers involved in the programme owned between 1 to 5 acres of land, reflecting some success in targeting small scale farmers. The study findings suggests that a majority of the small

scale farmers had registered land which makes them more secure and can easily participate in a programme of choice including NALEP.

In conclusion, the most limiting socio-economic characteristic on farmers' participation in Demand driven agriculture extension services among small scale farmers in Moiben Sub-County was low level of education.

5.2 Institutional factors affecting farmers' participation in NALEP programme

National Agricultural Extension Policy (NAEP) advocated demand-driven extension services and participation of other players in the delivery system (Republic of Kenya, 2004). This study looked into other factors affecting farmers' participation in Demand driven agriculture extension services implemented through NALEP other than socio-economic factors.

The study findings revealed that most of the farmers in Moiben Sub-County were aware of the existence of NALEP. The local agricultural extension officers within the study area were mandated to disseminate information to farmers as per the programme. Despite the high staff to farmer ratio of 1:1920 in Moiben, farmers still responded to calls to attend group meetings, field-days and farmers barazas which were used as avenues for agricultural trainings. Most of the farmers (89%) were in contact with the extension officers and that group visits is the most preferred mode of contact with agricultural officers by farmers in Moiben sub-County. Almost all farmers had more than one mode

of contact with the local extension officer. NALEP encouraged individuals to work together and form Common Interest Groups (CIGs). Through these groups, NALEP contributed in building local capacities in various technical areas such as choice of hybrid seed, fertilizer application, spacing, record keeping, mainstreaming gender and other cross-cutting issues such as environmental conservation through soil conservation.

(a) Purpose of forming the Groups

The results indicated that Common Interest Groups (CIGs) was the most dominant purpose of forming the group, indicated by 83%.of the responses. CIG was an initiative approach promoted by NALEP. Under CIG concept farmers were encouraged to form groups based on their interest in a particular agricultural or livestock enterprise. In this respect, the CIGs approach combined social capital development with the aspect of farmer-driven activity identification. NALEP also facilitated formation of linkages between CIGs and other stakeholders and therefore helped to build networks that connected producers, processors, retailers, consumers and other players in the market value chain. This summarizes the fact that farmers in Moiben had the right information on benefits of forming groups and actually benefited from the same.

(b) Benefits of group members

Results indicated the findings on benefits of group members. Because of the magnitude of staff to farmer ratio in Kenya, NALEP focused on group approach in order to reach more farmers in a given time as compared to individual farm visit where a staff was able to visit a maximum of 4 farmers per day depending on the intervention at hand. Since these farmers were met at a central place, the staff had adequate time to address their

demands and also organize for subsequent visits depending on the farmers' request. Members were also linked to market through the active stakeholder forum and were able to access credit and acquire inputs in bulk which would save on cost. According to Taiy (2009) the association of CIG membership with access to extension services is explained by the prevailing relatively higher levels of production among farmers who were members of CIGs.

5.3 Effects of Demand driven agriculture extension services on maize production

The second objective of the study was aimed at determining the effect of Demand driven extension services on maize production in Moiben Sub-County. In general, the results suggested that there was a significant growth in maize production during the period of the programme. The production figures were based on farmer recall of the base situation and their observation of the yield attained in the year 2012. The results indicated a 52% increase in production from pre- NALEP to post-NALEP period. Increase in production was attributed to use of high yielding varieties of maize seed with recommended spacing and use of the right fertilizer at the recommended rate. However the yields reported by sampled farmers were higher than documented national average of 16 bags per acre in 2012 (Countrystat, 2012) but still below the County potential of 35 bags per acre (Uasin Gishu County annual report 2012).

Below County potential production was explained by the fact that since 2011 maize in parts of the Rift Valley including Uasin Gishu County was affected by the Maize lethal necrosis disease (MLND) (Ochieng *et al,* 2012). This affected the yields in Moiben Sub-County. Recent reports have revealed that farmers in Uasin-Gishu County have

continually used Diamonium phosphate fertilizer (DAP) for a long time until the soils became acidic resulting to production below the potential. Soil cares initiative (2014). Intervention that is presently going on to address this problem is that the county department of agriculture has embarked on countywide soil analysis and advising the farmers accordingly. Chi-square statistics further revealed significant variation in maize production between pre-NALEP and post-NALEP periods ($\chi^2 = 66.897$, $p = 0.0001$). This significant variation is a confirmation that NALEP as a program increased maize production significantly in Moiben sub-county

The results also revealed that there was a higher maize production for NALEP participants than that of non-participants. In terms of adoption of extension messages promoted by NALEP, most of the small scale farmers in Moiben did not keep farm records. This was attributed by farmers' lack of entrepreneurial drive and time consumed in record keeping. Most farmers had the necessary record keeping skills but practicing this skill was difficult due to time involved and laxity amongst farmers facilitated by low literacy level. Analysis of objective one in this study revealed that age and level of education of farmers in Moiben had a significant influence on participation in NALEP. The number of years spent in formal education is one of the important determinants of increased household food production and adoption of new technologies. This explains why record keeping as a technology was adopted by very few farmers in Moiben. However farmers knew and adopted use of high yielding maize varieties, recommended fertilizer types and rates.

On farmers' source of information, the results indicated that the most common source of information to farmers was the use of local agricultural extension officers and farmer to farmer contact. This means that NALEP had an impact on maize production in Moiben Sub-County through training by the local agricultural extension officers. As noted by Jean-Philippe & Deschamps-Laporte (2013), agricultural e xtension services are one of the most common forms of public-sector support for knowledge diffusion and learning. The results agree with the findings of Khasion (1992) who indicated that agricultural technologies might not be adopted if the farmers are not aware of its existence. He continued that lack of awareness acts as a hindrance to effective participation in agricultural activities. Madhur (2000) agreed that impact would be limited if extension services are unable to increase the level of farmers awareness. The results also supported the findings by Mbata (1991) who acknowledged that through extension services the small scale farmer would be made to understand agriculture which in turn would increase productivity. Also notable is the importance of "other farmers" as agents of awareness building. This is consistent with findings of empirical studies on the importance of interpersonal network exchanges in facilitating diffusion (Rogers, 2003).

5.4 Role of Demand driven agriculture extension programme- NALEP, on soil conservation

The aim of soil conservation is to facilitate optimum levels of production from a given area of land while keeping soil loss below a critical value as indicated by Esser *et al*. (2002). Soil erosion is one of the most serious environmental problems in Kenya today.

Small scale farmers in Moiben have been experiencing declining soil fertility and severe soil erosion due to intensive farming on steep and fragile land, tractor ploughing across the contours and other factors attributed to population pressure. These farmers are usually subsistence farmers with limited resources and cultivate on sloppy and marginal land which is highly susceptible to soil erosion and other degrading forces.

This study therefore sought to find out the status of soil conservation in Moiben sub-county. The results showed that 77.9 % of the small scale farmers controlled soil erosion while 22.1 % did not. Further, those farmers who did not control soil erosion gave their reasons for not controlling as; loss of cultivatable land and that soil conservation structures take some land out of production. Other farmers said the structures required extra labour, time and money which they lacked, the structures harbor rodents, while others felt that their land had a moderate slope and to some, the structures pose difficulty in plowing .This is in line with previous research by Tadesse & Belay (2004) which revealed that adoption and maintenance of soil conservation structures depend on farmers' perception on soil conservation. This means that farmers who felt that their farms are prone to soil erosion constructed and maintained the structures. This explains that there is need to increase farmers' understanding of soil conservation problem through trainings and demonstration on benefits of soil conservation and the risks of soil erosion. This is important because the extent to which farmers understand and feel the need for controlling soil erosion affects the adoption of soil conservation measures positively. Other reasons for not controlling soil erosion according to Tadesse & Belay (2004) were number of economically active members of the family and farm size. Further analysis

confirmed that farmers who participated in NALEP were more informed about soil conservation and therefore controlled soil erosion more as compared to those who did not participate.

Among the most commonly used methods to control soil erosion in Moiben included use of trash lines and unplouhged or grass-stripes. Most farmers used more than one of the methods. There was however other methods which were used for controlling soil erosion in the study area though less common. These included contour ploughing, tree planting, digging of terraces, and minimum or conservation tillage.

Majority of the respondents revealed that soil conservation measures were beneficial in terms of improving agricultural outputs. It was also noted that some farmers undertook long-term soil and water conservation measures which included digging of terraces especially for those on steep slopes. On the other hand, a few respondents revealed that terraces are labour intensive, and therefore those labour-constrained households found it difficult to implement these activities on their farms.

(a) Main sources of information related to soil conservation.

Results revealed that most farmers got information from the local extension officer. Jean and Deschamps (2013) in her study found out that agricultural extension services are one of the most common forms of public-sector support for knowledge diffusion and learning. Most farmers in the study area therefore obtained adequate information on soil conservation through NALEP programme.

Discussions with the focus group showed that NALEP provided a lot of support in the study area on soil and water conservation. Support rendered from NALEP was in the form of training and technical back up. The findings of this research indicated that NALEP played a significant role in the study area in promoting soil conservation practices. This support positively contributed to farm household decisions to conduct a range of short and long-term soil and water conservation practices. These results confirm the findings of Horacio (2004) who argued that the frequency of rural extension visits plays a positive and significant role in determining the level of adoption of soil conservation practices. In spite of this fact however, majority of farmers interviewed reflected that future programmes should consider introducing soil conservation technologies which demand less time and labour.

Soil conservation activities, particularly the long-term (physical) ones, are labour intensive and therefore labour constrained households cannot implement them. Kahsay (2011) in her research on effects of land tenure systems on soil conservation practices in northern Ethiopia found out that all respondents ranging from households to focus group participants confirmed the importance of the availability of labour. He further confirmed that female headed households, elders and physically challenged are labour constrained households and therefore find it difficult to implement soil and water conservation practices on their farms. With the increasing age of a household, the practice of soil conservation declines unless there is a more able bodied person in the family who can contribute labour.

Poor households with no labour were forced to lease out their farmland which in turn has a negative impact on soil conservation as the lessee did not tend to equally treat the land as their own. Akinbile & Odebode (2007) support this point demonstrating that "tenants (lessees) are less likely to invest in others' lands due to the fact that long-term net benefits are no longer available to them". These results are also consistent with Devereux et al (2003) who indicated that renting out land is common among elderly and female headed households who lack resources.

Analysis on socio-economic characteristics affecting farmers' participation in NALEP in Moiben in this study revealed that land ownership in Moiben did not have any influence as more than 70% of farmers in Moiben had private (registered land) which facilitated adoption of soil conservation technologies. The study also revealed that 76.3% of the farmers in Moiben are within the productive age that is 25-60 years and that 71.6% of the households are male headed. About 60% of Moiben farmers had large families of 6-10 members, which means labour was not a limitation. This study therefore revealed that small scale farmers in Moiben had adequate information on soil conservation from local extension officers which they adopted and that NALEP had a positive impact on soil conservation.

5.5 Effects of Maize Production on Households Incomes

It was also noted that 35.3% of the sampled respondents earned over 80,000 shillings per year from maize farming, and 18.7% of the small scale farmers earned 60,000 – 80,000 shillings per year. Although income is the most important pointer of the economic status

of a farmer, it was difficult to collect reliable information on income from the respondents as most consider it confidential.

It was also concluded that maize farming contributes a significant portion of farmers' earnings in Moiben Sub-county. There is therefore need for proper land management practices with the support of new technologies through extension services. This encouraged commercialization through the improved inputs, using demand driven and participatory agricultural extension approaches with an aim of improving the livelihoods of the rural community as cited by Jean-Philippe & Deschamps-Laporte (2013).

The study findings further showed that through the farmers' participation in NALEP, most of them were able to cater for their family's needs in terms of food security. The study findings revealed that NALEP has enhanced food security by increasing maize production. This is in line with a study by Cuellar et al. (2006) which stated that the aim of Demand driven extension services was to attain high productivity, increase incomes and improve small scale farmer's standard of living . In the study area, maize is the staple food and therefore there is need for intensive agriculture to produce adequate maize for food. This can only be achieved through effective extension services as evidenced by NALEP.

5.6 Challenges faced by farmers in accessing extension services

Challenges that were highlighted included: distance to the extension officer**,** Cost involved**,** farmers interest in the program**,** programme content and communication networks.

(a) Distance to the extension officer

The studies revealed that majority of the respondents represented by were within a 5km radius to the extension officers while the smallest proportion was at a distance of over 10kms to the extension officers. It seems therefore that distance to the extension officers was not a challenge to most farmers since they were within a 5km radius to the extension officers. This is explained by the fact that all the ten locations in the study area had a locational extension officer (LEOs) deployed by the department of agriculture. These LEOs worked together with subject matter specialists (SMSs) stationed at Sub-County headquarters who are specialists in various areas such as horticulture, agribusiness, environment and land development and land and crop development. The challenge in Moiben therefore was staff to farmer ratio but not distance to the extension officer.

(b) Cost involved

It came out clearly that a farmer sometimes requiredthe intervention of an extension officer but may lack money for transport or even airtime to communicate with the extension officer. This hinders information flow. According to this study majority of the f armers admitted that cost was a challenge while the other half were of a contrary opinion. It is thus obvious that economic strength of the respondents was not the same and as a result did not influence farmers' decisions and actions uniformly.

(c) Farmers interest in the program

The study revealed that only 33.1% of the respondents were not interested in NALEP. Analysis of socio-economic characteristics that affected farmers' decision to participate

in NALEP in this study revealed that age and level of education of the household head significantly affected farmers' participation in NALEP in Moiben. The 33.1% who lacked interest in NALEP could have included the old (above 65 years old), the young (below 25 years old) the sick, and the laggards in the study area. According to Rogers (1962) in his theory of Diffusion of Innovation (DOI), adoption of a new idea, behavior, or product ("innovation") does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt the innovation than others. He further established that there is a category of people he called laggards, who are people bound by tradition and are very conservative. They are very skeptical of change and are the hardest group to bring on board. Since lack of interest was represented by a smaller proportion, the so called laggards, failure in the program cannot be attributed to it but success can be assumed to have arisen from majority showing interest in the program.

(d) Program content and communication networks

Majority of the respondents who agreed that the program lacked adequate knowledge did not belong to any group. This opinion cannot be trusted since NALEP dealt mainly with groups, and those promoting it did not have any contact with NALEP extension officers. It can thus be argued that this was a justification for not participating and not a genuine opinion.

Most of the respondents said the status of the roads in Moiben was pathetic and needs urgent attention. According to key informants, road network was a major problem and at times extension officers were unable to reach some farmers despite multiple invitations. For extension staff to be able to reach out to the poorest and most vulnerable in the rural

areas there is need to improve road infrastructure. Some staff had motorbikes and a few cars but the infrastructure in the Sub-County was incredibly undeveloped. This situation has meant that there are risks for more people to end up in severe poverty in Moiben.

The results further showed that such areas were left out and therefore did not get information on new technologies resulting to poor yields and poor land management practices. The below target performance was therefore attributed to poor road network among other factors.

(e) Frequency of farmers contact with the extension officers

On the frequency of contact of farmers with the extension officers during NALEP period, results shows that most farmers were in contact with extension officers on monthly basis. As suggested by Balakrishan (2001), farmers require constant contact with the extension service providers if their current condition is to be improved sustainably. This is not possible in Moiben because of the low staff to farmer ratio of 1:1920 against the recommended ratio of 1:400.Effective extension service cannot be rendered with such a small number of extension officers. This challenge can only be addressed with an employment of more extension staff. With more frequent contact with extension agents, farmers are highly likely to get in contact with new modern technologies, generate group or self interest in such technologies and eventually demand for them. Face to face contact with extension officers is a prerequisite to farmer motivation and rapport building. Within the focal areas, the farmers are organized into CIGs for easy reach by extension officers.

The resultant level of farmer empowerment and their ability to demand and access modern technologies are therefore likely to be dependent on the groups' contact with extension service providers. This also explains that extension services are demand driven therefore frequent contact with extension service providers implies that farmers were demanding for the services.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

The chapter highlights the conclusions and recommendations of the study.

6.1 Conclusions of the Study findings

Most of the small scale farmers in Moiben Sub-County were aware of the existence of NALEP through their contact with the local agricultural extension officers. Though NALEP was introduced in the whole sub-County some farmers did not participate in the programme. Analysis of the study findings revealed that some socio-economic factors such as age and level of Education of the household head affected farmers' decision to participate in Demand driven extension services implemented through NALEP.

Maize production in the study area was improved through NALEP as compared to production before NALEP. Maize production for NALEP participants was also higher than production for non NALEP participants. This revealed that NALEP had a positive impact on maize production in Moibrn Sub-County.

Small scale farmers in Moiben Sub-County controlled soil erosion through the use of trash lines, digging of terraces, crop rotation, river bank protection, mulching, cover cropping, contour ploughing, tree planting, grass strips and minimum tillage. These initiatives were introduced through NALEP. Farmers who participated in the programme were made aware of the dangers of soil erosion and therefore adopted soil conservation

measures. Thus NALEP had a positive impact on soil conservation in Moibrn Sub-County.

Costs involved low frequency of farmer contact with extension officers, lack of adequate knowledge on extension services and poor transport and communication networks were the major challenges highlighted by farmers in Moiben Sub-county in accessing demand driven extension services.

6.2 Recommendations

In order to make extension services more efficient and effective in Moiben Sub-County and the entire Uasin- Gishu County, this study made the following recommendations: Policy makers at both National and County levels and other organizations dedicated to deal with the delivery of agriculture extension services to farmers should formulate policies to take advantage of the factors that positively influence farmers' participation in these programmes and to mitigate the negative ones.There is need to address the key challenges and constraints identified by the respondents that hinder them from accessing extension services. Non-accessibility of extension services in terms of quantity and time affected respondents participation in NALEP .Employing more extension officers and improving rural road network will improve on the frequency of farmers contact with extension officers which will enhance easy access to extension services.

I. Policy makers at the county level should consider replicating NALEP approach for future extension programmes with the aim of improving maize production and safeguarding the environment through soil conservation.

II. Interventions through mass media and awareness programmes should be introduced in Moiben Sub-County in order to sensitize and enlighten the entire community on the importance of participating in agriculture programmes in order to improve farm productivity.

III. Future projects and programmes should consider introducing new soil conservation technologies which demand less time and labour in addition to the usual physical conservation works which farmers claim are labour intensive and time consuming.

IV. Uasin-Gishu County should invest in education in order to improve on level of education in Moiben which will facilitate farmers' participation in agricultural programmes such as NALEP and subsequently improve maize production and soil conservation.

V. For effective and efficient extension services Uasin-Gishu County Government should prioritize agriculture in its budgetary allocation.

5.3 Suggestions for further studies

Based on the findings of the study, the following further researches were recommended:-

1. It is recommended that similar studies be carried out in other Sub-Counties across the County in order to come up with better generalizations and concrete intervention measures**.**
2. Related studies should be conducted on other agriculture programmes other than NALEP in Moiben Sub-County and the entire Uasin Gishu County.

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APPENDICES

APPENDIX I: QUESTIONNAIRE FOR FARMERS.

INTRODUCTION

The purpose of this questionnaire is to elicit information on impacts of demand driven agricultural extension services (NALEP) on maize production and soil conservation in Moiben, Uasin Gishu County. Your honest answers are very vital to this study and shall be treated with utmost confidentiality and will not be used for any purpose other than this study. Your cooperation was highly appreciated.

Questionnaire No……..

Date of interview----------

Location----------

SECTION A: SOCIO-ECONOMIC BACKGROUND OF FARMERS

Please fill in or tick appropriately

1. Gender?

Male ☐ Female ☐

2. What is your age bracket?

Below 25 years ☐ 25 – 45 years ☐

46- 60 years ☐ Above 60 year ☐

3. What is your highest level of education?

Non-formal ☐

Primary ☐ Secondary ☐

Tertiary ☐ University ☐

Any other (Specify) _____

4. What is your family size?

Less than 3 members ☐ Between 4 – 5 Members ☐

Between 6 – 7 members ☐ Between 8– 9 Members ☐

Over 10 members ☐

5. Farm Size (Acres)

0-1 ☐ 2-5 ☐ 5-10 ☐ Over 10 ☐

6. Land tenure system.

Private ☐ Communal ☐

Trust Land ☐ Leased ☐

7. How much of your land is under cultivation.....

8. Do you keep farm records?

Yes… ☐ No… ☐

Socio-economic factors affecting farmers' participation in demand driven extension programme (NALEP)

9. Are you aware of the existence of agricultural extension services (NALEP?)

in your area?

(a) Yes… ☐ (b) No… ☐

10. Have you ever been in contact with an agricultural extension officer?

(a) Yes…… ☐ (b) No..☐

11. If yes, describe the kind of contact you have had.

Tick as appropriate

Extension pathway	**Number of times attended or participated**						
	0	**1**	**2**	**3**	**4**	**5**	**5+**
Farmers' field day							
Farmer field training							
Agric. Demonstration							
Group visit							
Farmers tour							
Farm visit							
Agricultural show							

12. Do you belong to any group? Tick one

Yes ☐

No ☐

13. If no, kindly indicate the reasons as to why you do not belong to any group?

i) ……

ii) ……

14. If in a group, what was the purpose of forming the group? (*Multiple responses*)

1. Income generation ☐ 2. Collective marketing ☐

3. Training ☐ 4 .Community welfare ☐

5. Savings ☐ 6. Environmental conservation ☐

15. What benefits do you derive from being a member of the group? (*Multiple responses allowed*).

i. Easy access to extension services

ii. Easy access to technologies from research

iii. Easy access to markets

iv. Easy access to credit

v. Improve ability to make group decisions.

vi. Strengthening friendship and trust among members

vii. Groups acts as a voice for farmers

viii. Easy access to farm inputs

Effects of NALEP programme on soil conservation

16. Do you control soil erosion in your farm?

1. Yes ☐ 2. No ☐

17. If no, kindly explain why.

……..

……..

…….

18. If yes which of these practices do you use? (*Multiple responses allowed*)

1. Crop rotation, ☐ 2. Reduced/zero tillage ☐
3. Mulching, ☐ 4. Cover cropping ☐
5. Digging of terraces. ☐ 6. Use trash lines ☐
Any other (specify) ……..
……

19. How did you learn about these practices?

Farmer to farmer contact ☐ Radio ☐ group members ☐

Local extension officer ☐ other (specify)…… .

20. In your own views what do you think should be done to improve on environmental conservation in our farms?

……

……

……

Effects of maize production on incomes of farmers

21. What is the major source of income in your household? (*Multiple responses accepted*)

Wage earning ☐ Casual Work Trade ☐ ☐

Farming ☐

Others (specify)……

22. If farming please indicate the average household income per year from maize farming.

Less than Kshs 20,000 ☐ Between Kshs 20, 000 – 40,000 ☐

Between Kshs 40,000 – 60,000 ☐ Between Ksh s 60, 000 – 80,000 ☐

Above Kshs 80,000 ☐

23. How many bags of maize did you achieve per acre?

(a)last season?

Less than 10 bags ☐ Between 20-30 bags ☐

Between 10-20 bags ☐ More than 30 bags ☐

(b) Before NALEP

Less than 10 bags ☐ Between 20-30 bags ☐

Between 10-20 bags ☐ More than 30 bags ☐

24. What amount of maize produced do you consume in your family per year (*In 90kgs bags?)*

Less than 2 bags ☐ Between 2 – 4 bags ☐

Between 5 – 7 bags ☐ Between 7 – 9 bags ☐

More than 10 bags ☐

25. Is the amount of maize produced from your farm sufficient to cater for your family needs throughout the year?

Yes ☐ No ☐

26.How do you obtain the balance?

Buy ☐ Borrow from friends/relatives ☐

Government relief ☐ others (specify)……

.

27. How has NALEP improved you as an individual?

(Add on list if desired.)

	Tick where appropriate
I am getting more profit from my farm than before	
I am more aware about improved agricultural technologies	
I am able to use most of the agricultural advice I have been given	
I am more involved in group activities now than before	
My farming practices had improved in recent years.	

Challenges faced by farmers in accessing demand driven extension services.

28. How far is the nearest agricultural extension agent from your home?

(a) less than 5kms… ☐ (b) Between 6-10 kms… ☐

(c) Between 11-15 kms ☐ (d) More trhan15kms ☐

29. What is the frequency of your contact with extension officers?

Weekly ☐ Monthly ☐ Every 2-4 months ☐

Once a year ☐ none ☐

30. What challenges do you as a farmer face in reaching extension services? (Multiple responses allowed)

Distance to the extension officer ☐

Costs involved ☐

Uninterested ☐

Lack of adequate knowledge on extension services ☐

Poor communication networks ☐

Any other (specify……...

31. Agricultural Extension these days is demand driven, do you demand for maize production and soil conservation messages? Tick one Yes ☐ No ☐

32. If no, give the 2 main reasons.

i)……

ii)…… ……

33. By responding to the following statements, indicate your general opinion about NALEP programme in improving maize production in your area.

Use the following **key.**

5=Strongly Agree (SA) **4**=Agree (A) **3** =Undecided (U**)**

2 =Disagree (D) **1** = Strongly Disagree (SD)

Item	**1**	**2**	**3**	**4**	**5**
1. Has improved crop production and marketing.					
2. Participation is better than supply driven extension.					
3. Encourages group formation and enhances economic welfare of their members					
4. Group membership is open to all farmers irrespective of age and gender.					
5. Provide members with the opportunity to learn other non-farming aspects e.g. HIV/AIDS 0, gender and environmental issues.					
6. Has great prospects for farmers through linkage to other stakeholders					

APPENDIX II: INTERVIEW SCHEDULE FOR KEY INFORMANTS

1. Name all organizations that offer extension services in your area ranking them from the one that makes greatest contribution to the one that makes least contribution.

.....
.....

2. List all the stakeholders who participated in the NALEP.

.....

.....

3. Give your own views on how extension strategies can be improved in order to be more effective.

.....
.....

4. List all types of trainings you have attended facilitated by NALEP.

.....
.....

5. Have they improved your skills?

Yes... ☐

No... ☐

6. Has maize yield increased over NALEP duration?

If so, by how much?.....

7. What soil conservation measures were introduced to farmers by NALEP project?

.....
.....

8. What challenges do farmers face in accessing extension services?

.....
.....

9. List the problems you experience in extending skills to the farmers ranking them from the most limiting to the least.

.....

End. Thank you for your participation