

Effectiveness of Rural Advisory Services (RAS) on improving household food security: A case study on maize production of rural small scale farmers in Koderia village, Rachuonyo District- Kenya.



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By

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List of Abbreviation

CAN:	Calcium Ammonium Nitrate fertilizer
CEFA:	Italian Non-Government Organization of International Voluntary Service.
CGD:	Centre for Governance and Development
C-MAD:	Community Mobilization against Desertification
DAP:	Di-ammonium Phosphate fertilizer
FAO:	Food and Agricultural Organization
FFS:	Farmer Field School
FGD:	Focus Group Discussion
FYM:	Farm Yard Manure
FSR/E:	Farming System Research and Extension
IRD:	Integrated Rural Development
IFPRI:	International Food Policy Research Institute
KEPCO:	Kenya Producers Coalition
Kshs:	Kenya Shillings
MOA:	Ministry of Agriculture
NAADS:	National Agriculture Advisory Services
NCPB:	National Cereals and Produce Board
OAF:	One Acre Fund Organization
RAS:	Rural Advisory Services
SAP:	Structural Adjustment Program
ToT:	Trainer of Trainees
T&V:	Training and Visit
USAID:	United States Agency for International Development

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Dedication

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Abstract

Small scale farmers in Koderia village - Rachuonyo district, Kenya are faced with low agricultural productivity caused by low technological knowhow and lack of awareness of improved cultivation methods from poor extension methods. Rural Advisory Services (RAS) therefore is a new extension approach that helps farmers improve their farming knowledge and skills, improves their crop productivity and in general farmers' welfare. One Acre Fund organization is providing RAS to small scale farmers in Koderia village – Rachuonyo district. Their objectives are to double small scale farmers' income per planted acre through providing farmers with farm inputs on credit, delivering the inputs closer to the farmer at a walking distance, providing training on correct usage of farm inputs and enabling farmers to sell their harvest at a significant profit. The study took place in Koderia village in Rachuonyo district because the area has undergone the transformation from traditional extension services offered in the past through the ministry of agriculture to rural advisory services being offered by One Acre Fund organization (OAF). The objective of the study was to assess the effectiveness of RAS to small scale farmers on improving food security.

The following main question was developed to help meet this objective: What has been the effect of rural advisory services implemented by One Acre Fund organization for small scale farmers in Koderia village Rachuonyo district?

To meet the above objective and answer the questions above, a semi-structured interview was held to 40 respondents; 20 small scale farmers accessing RAS from OAF and 20 small scale farmers not accessing RAS. A key informant from OAF was also interviewed. Data collected was then analysed qualitatively through comparing and describing the findings of the above two clusters.

The findings between RAS and non-RAS small scale farmers revealed that RAS is indeed effective in farmers' access to RAS; since positive effect was shown in the quality, timeliness and the method of the advisory services provided to RAS farmers. Its effect is also seen in the adoption and use of modern technology which has helped the RAS farmers in increasing their maize yields. Even though the yields have increased, only a few farmers have surplus to sell.

RAS has also enabled farmers to get easy access to improved inputs (seeds and fertilizers), since OAF delivers these inputs in bulk for farmers at a nearby location. The inputs are also given to farmers on credit where they have to pay for half the amount in advance and the rest they pay later in instalments. This has also helped farmers to increase the use of improved inputs.

Despite the positive effects seen, empowerment of farmer groups is still limited as the available groups are only work during maize production in the long rains; a time when OAF is actively working with the RAS farmers. During the short rains each farmer works alone. In addition, they have limited finances to hire labour to assist in the farm hence get less maize yields during this period.

Marketing of the maize at a significant profit has not yet been established. This was confirmed by some RAS farmers who stated that they are not selling any maize as they have to stock for their household use. In case they need other basic needs they sell other crops like sweet potatoes, vegetables among other crops to get income. This finding shows that even though RAS is effective in increasing the yields, the farmers haven't reached the state of selling surplus hence little cash being realised from the sale of maize.

A first recommendation would be that, OAF should consider empowering farmer groups to demand more RAS through allowing them to interactively participate and involve them in decision making at all stages of the development within the production cycle.

Secondly, OAF should also collaborate with other partners for example, C-MAD, CEFA, MOA through meetings, field days so as to provide some of these services that they don't offer which the farmers need and also to make farmers aware the services provided by the respective service providers.

Thirdly, OAF should consider working with the small scale farmers during the short rains since the farmers also produce maize at this time. This will make them get more maize yields, more surplus to market and increased income.

Fourthly, OAF should also consider introducing other crops other than maize like sweet potatoes by delivering them to the farmers during inputs delivery to help farmers increase their productivity and income and avoid dependence only in maize.

Fifthly, OAF should consider involving non-RAS farmers who wish to access RAS but are hindered by limited finances. This they can do through advising the non-RAS farmers to form groups and then mobilize funds equivalent of half acre inputs as a group, so that they can share the benefits as well as access RAS.

Finally, since OAF is planning to put up a warehouse to buy and sell maize to the farmers at fair and affordable price, further research should be done to find out how this process works between OAF and farmers and if the farmers are selling their surplus at a better profit.

Key words: Effectiveness of RAS, small scale farmer, household, food security

1. Introduction

This report focuses on the findings from the study of effectiveness of Rural Advisory Services on improving household food security of small scale farmers in Koderia village Rachuonyo district. Small scale farmers in Rachuonyo district, Kenya have previously raised concerns on poor extension services from the Ministry of Agriculture (Sikei et al, 2008). Low technological knowhow and lack of awareness on improved cultivation methods among other factors have made them to continue using indigenous farming methods. For instance, the use of dried seeds from the previous season or buying of poor quality seeds by these farmers among other factors have since resulted in to low agricultural productivity. With many small scale farmers deriving their livelihoods from agriculture, low agricultural productivity affects their household food security.

The study focused on maize productivity at households of small scale farmers in Koderia village at Rachuonyo district in Kenya. This is because maize is the most important staple crop in the region; it can be eaten as a green maize when boiled or roasted or it can be ground in to flour to make different products for example, preparing a special cake known as 'ugali', it can be used to make porridge and many more. Most households that have enough maize in stock considers themselves food secure when compared to other produce whereas limited stock of maize within households is deemed as being food insecure. Currently, the small scale farmers in the region have been receiving rural advisory services (RAS) from One Acre Fund organization, an NGO that started its operation four years ago in the region. The aim of the organization is to double small scale farmers' income per planted acre through providing farmers with farm inputs on credit, delivering the inputs closer to the farmer at a walking distance, providing training on correct usage of farm inputs and enabling farmers to sell their harvest at a significant profit. Although One Acre Fund organization have been providing these services for a couple of years now, they want to know the effectiveness of rural advisory services to small scale farmers in increasing household maize productivity and improved income.

The objective of the study is to contribute to the knowledge and understanding of the effectiveness of rural advisory services (RAS) and make recommendations by assessing the effectiveness of rural advisory services provided by One Acre Fund organization on improving household food security focusing on maize production by RAS small scale farmers and non-RAS small scale farmers in Koderia village, Rachuonyo district.

To achieve the above objective, the following main question was developed:

- What has been the effect of rural advisory services (RAS) implemented by One Acre Fund organization for small scale farmers in Koderia village Rachuonyo district?

To get answers to the above main question, the following sub questions were developed:

- What are small scale farmers' perceptions on access to rural advisory services provided by one acre fund organization?
- What is the perception of small scale farmers on group empowerment?
- What modern technologies and information are available to small scale farmers in the Koderia village since inception of one acre fund organization in the area?
- What are the characteristics of One Acre Fund?
- What RAS activities has One Acre Fund undertaken in the research area?
- What was the average yield of maize in the past and now and what do farmers feel has caused the difference?

- What are the small scale farmers' perceptions on marketing of maize surplus to get income?

This report is organized in the following chapters; chapter 1 gives the introduction of the study. Chapter 2 will be the literature review of what have been studied before in relation to effectiveness of Rural Advisory Services; chapter 3 will show the methodology used in the research. Chapter 4 will show the background information of the study. Chapter 5 will show the findings and discussion; chapter 6 will show the conclusion and finally chapter 7 will be recommendations.

2. Literature Review

2.1. Change from Extension to Rural Advisory Services

Kenya's agricultural extension dates back to the early 1900s, but its only success notably was in the dissemination of hybrid maize technology in the late 1960s and early 1970s. The Kenyan government through its Ministry of Agriculture provided the bulk of extension services to both small scale farmers and commercial producers (IFPRI, 2011). FAO (1997) states that, the Kenyan government came under considerable pressure to scale down its dominant role in national economy after the implementation of structural adjustment programs (SAPs) in the 1980s. As a consequence Kenya's agricultural extension budget together with extension staff numbers plummeted significantly and at the same time the performance of the public agricultural extension service and its effectiveness was questioned (Gautam and Anderson 1999).

The traditional public extension system was then perceived as outdated and having top-down approach, paternalistic, operating uniformly (one-size fits-all), inflexible to bureaucratic cope with the dynamic demands of modern agriculture as stated by (IFPRI, 2009). Further, Alex, Zijp and Byerlee (2002) also stated that, public extension services have been under pressure for poor performance and are often criticized for: being inefficient; lacking clear objectives and incentives; having limited coverage in terms of the number of farmers (especially of the poor and women) reached by extension agents; and lacking relevance. Its impact is often viewed as insufficient. This is because past extension strategies relied on improving extension delivery services through technology transfer.

Olubandwa (2011) also stated that the Kenya extension service is severely resource constrained. This is because extension staffs have limited operating funds; funds for transport, vehicle maintenance and fuel, field days, telephone communication and basic stationary are inadequate. Furthermore, extension staff's pay and morale is low, yet at times, officers spend their own money on fuel to go to the field or buy own materials for field days (Kodhek, 2005; Nyoro and Muiruri, 2001). Low budgetary allocation may be the result of these challenges in the agricultural sector (USAID 2010; KEPCO and CGD, 2010. According to Okoboi et al (2013), a study done in Kenya indicated that the extension system was ineffective and inefficient in delivering the desired services to farmers, it had only a limited impact on productivity, and more important, was not financially sustainable.

According to FAO (2007), after most developing countries achieved independence, most national extension systems were units within ministries of agriculture, and these agencies were top-down, multifunctional systems that had limited resources (especially operational resources and competent technical specialists), with little attention given to the needs of resource-poor farmers (small scale farmers). The focus was on higher-resource farmers (large scale farmers), because they were the "innovators" and "early adopters" of new technologies as stated by Rogers (2003). A training and visit (T&V) extension was later developed to overcome some of the inherent weaknesses of public extension systems. This was later met with challenges as the donors didn't fund the projects anymore, and also some officers were appointed without training qualifications, and there was no adequate linkage with research (Anderson et al, 2006). This was later followed by an integrated approach known as Farming System Research and Extension (FSR/E). According to FAO (2007), this approach mainly focused on national food security rather than focusing on small scale farmers' livelihoods to help improve their household food security.

New models of extension have evolved within public extension system. They include T&V, FSR/E and integrated Rural Development (IRD) programmes whose focus went beyond improving crop productivity to improving rural livelihoods. However, its impact was challenged

due to large focus on technology than markets and limited number of well-trained extension staff. Although, the IRD model has helped in shifting the focus to improving rural livelihoods in more decentralised, farmer-led and market-oriented extension. As a result of the above challenges faced in different extension approaches, it emerged an increasing involvement of private voluntary organizations and NGOs in rural development programmes that focus on small scale farmers with more integrated approach like Rural Advisory Services.

2.2. Description of Rural advisory services

2.2.1. What is Rural Advisory Service (RAS)?

Rural advisory services are defined differently depending on the organization as well as countries. The terms 'advisory services' and 'extension' are also used interchangeably (Chipeta 2006). According to Chipeta (2006) RAS is viewed as demand driven where 'demand' refers to what farmers 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 these services. Therefore RAS is also known as demand driven service delivery (Chipeta 2006).

Binder & Schöning (2013) viewed RAS as a cornerstone of rural development policy which should be adapted to local circumstances. They stated that aside from technology transfer, RAS must provide information and services to rural families about markets among others. They must also help to strengthen the technical, managerial and organisational skills of service beneficiaries. They further stated that RAS therefore play an important and dynamic role in connecting up rural communities, research, markets and education. Therefore the service providers must also network more actively with other knowledge providers beyond the sphere of RAS.

According to Adolph (2010), RAS are all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organisational, and management skills and practices so as to improve their livelihoods and well-being. Therefore in the context of this study, RAS referred to services that make new knowledge available to farmers and assist the farmers to develop their farming and management skills so as to improve their household security and income.

2.3. Approaches/methods used in RAS provision

This is the way in which the advisory activities are organised to provide information and advice or learning process (Faure et al, 2012). These methods are as follows:

Participatory and group based method; Farmer Field Schools (FFS) approach which relies on participatory training methods to convey knowledge to farmers. It involves non-formal training of about 20 – 25 farmers during a crop season. Through group interactions, the participants sharpen their decision making abilities and become empowered by learning about leadership, communication and management skills (Anderson& Feder, 2003).

In this approach, some of the participating farmers are selected to receive additional training so as to be qualified as farmer-trainers (facilitators), who then take up training responsibilities (for some fee, possibly paid by their community) with official backup support such as training materials (Anderson& Feder, 2003).

The same view is supported by Fischler, Weigel and Schmidt (2011) who stated that group based approach like FFS, combines training, innovation development through farmer-led experimentation, group formation and empowerment is a standard approach in RAS. In addition to FFS, other approaches are farmer-to-farmer extension, participatory innovation development, participatory learning and action, participatory market chain approach (Helvetas, 2009). In addition, mass media and ICT are also other methods of providing RAS to farmers although some involve payment by the farmers to access the RAS (FAO, 2008).

2.4. Definition of different concepts

2.4.1. Small scale farmer

Small scale farmers are defined differently depending with the country. According to FAO (2010), a small scale farmer in Asia is one who holds an average size of 1ha of land as opposed to other member countries where FAO works. In these other areas a small scale farmer has an average holding of 5.5ha of land. Graham (2012) stated that, a typical small scale farmer in the Caribbean sub-region is predominantly a male between 41 and 54 years of age who operates on less than five acres (two hectares) and includes landless farmers.

Swanson (2008) described small scale farmer as having smaller and more marginal land resources that are frequently located further from villages, paved roads and even water resources. He further added that because these farmers have limited physical and economic resources, they tend to risk trying new technologies or products. This makes them pursue subsistence food production strategies for their families to have sufficient staple food crops, especially during the annual “hunger season”.

In the context of this study, a small scale farmer is a farmer who cultivates a maximum of 2ha of own or leased land. This is because the area of study (Kodera Village) is found within the upper zones of Rachuonyo district in Kenya, and according to (Odhok & Aketch 2000), the farm sizes in this zone are smaller with an average of 2 ha of land per household.

2.4.2. Household

The term according to FAO (2007, p.182), states that “a household comprises to one person living alone or a group of people living at the same address, sharing their meals and the household, and having sole use of at least one room”. This definition was adopted for use in this study because in the study area most households have the same characteristics as stated above in the definition.

2.4.3. Food security

FAO (2007) stated that the concept of food security has progressively evolved from one primarily concerned with achieving national food security to a new focus on the ability of individual households to have access to sufficient, safe and nutritious food to meet their dietary needs (and food preferences) for an active and healthy life. This change has redirected attention to improving the livelihoods of the rural poor. At the same time, it is recognized that many states are not food secure and that this situation may worsen due to increased use of staple food crops for biofuels and the potential impact of climate change. Therefore to improve the rural livelihoods of farmers, extension and advisory services need to be more carefully focused on the needs of different clientele (i.e. farm women, small-scale, medium-scale, commercial farmers and rural youth) within rural communities.

2.5. Impacts of Rural advisory service and extension

A study done in Kenya by Laporte (2013) indicated that certain technologies and practices had been adopted by farmers and also marketing had improved through extension however, the impact on crop productivity was inconclusive. In addition, Anderson (2008), also stated that extension has helped farmers to become better farm managers by reducing the technology gap through accelerating technology transfer.

On the other hand, Swanson and Rajalahti (2010) stated that even though T&V extension did not have much impact especially in rainfed areas, the approach helped in speeding up the

dissemination of Green Revolution technologies, especially in irrigated areas, and did have a short term positive payoff in crop productivity.

In some countries, the impact of public extension services has been seen as positive in the ratio of extension workers reaching a large number of farmers. For example, in China and Vietnam there is an average one extension worker per 280 farm households. In Indonesia, the estimation is that each extension worker covers about 2.8 villages (GFRAS, 2012).

On the other hand, the Indicators for success of Demand Driven Agricultural Advisory Services (RAS) according to Chipeta (2006) are as follows, farmers have;

- Access to agricultural advisory services
- Use the services
- Increased income from agricultural production
- Increased competition among agricultural advisers.

According to GFRAS (2012), rural advisory services enable farmers to take up innovations, improve production, and protect the environment. RAS shows positive effects on knowledge acquisition, adoption of new information and technology, and crop productivity. With studies showing very high (13-500%) rates of return to RAS, it is a cost-effective way to improve farmer productivity and income. Experiences with advisory approaches show the positive impact that farmers have on productivity and incomes. An example is a programme with cacao farmers in Peru that saw productivity rise from 340 to 600 kg per ha in three years (GFRAS, 2012).

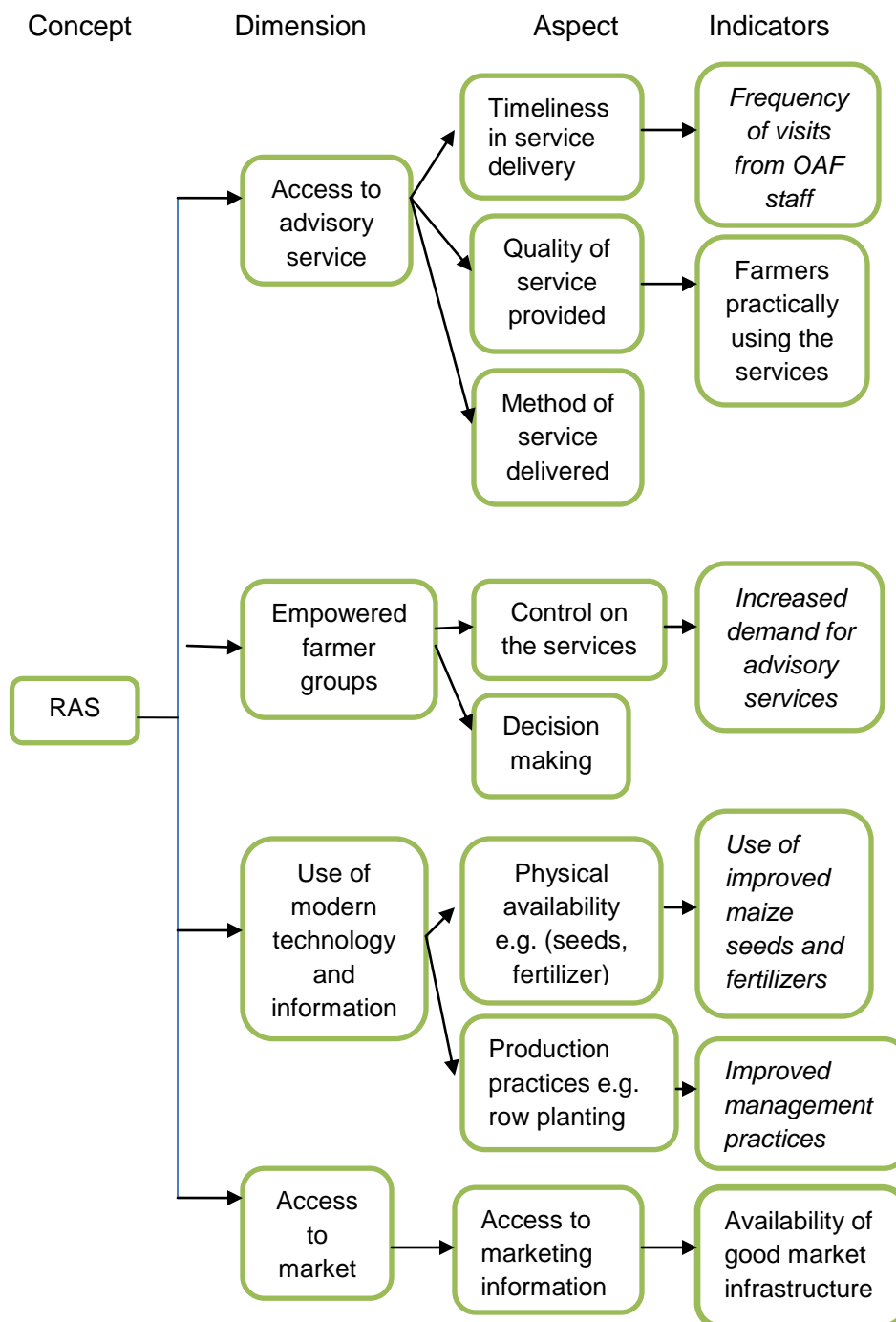
IFPRI (2007) looked at the effectiveness of rural advisory services by assessing the impacts of National Agricultural Advisory services (NAADS) in Uganda. From the study, the effectiveness was measured on how the farmers were empowered and able to demand and control advisory services. They also looked at the availability and quality of the advisory services provided to farmers, promoting adoption of new crop and livestock enterprises as well as improving adoption and use of modern agricultural production technologies and practices. In addition, they also considered the change in yield, the use of post-harvest technologies and commercial marketing of commodities as part of effectiveness of NAADS.

Even though positive effects of NAADS was seen on adoption of improved production technologies and practices, no significant differences were found in yield growth between NAADS and non-NAADS sub-counties for most crops, reflecting the still low levels of adoption of these technologies even in NAADS sub-counties, as well as other factors affecting productivity.

Laporte (2013) also stated that Rural Advisory service on farming households in western Kenya led to beneficiaries of the program picking out and using some sets of practices and technologies. The households also increased their fertilizer dosage use; they were also more likely to use improved water harvesting techniques. In terms of production, treated households appear to have followed the promoted practices of crop rotation, yet productivity per acre is not affected by the treatment; treated households also improved post-harvesting handling and marketing.

2.6. Conceptual framework and operationalizing the main concepts

Figure 1: Unravelled concept of RAS



Source: Author

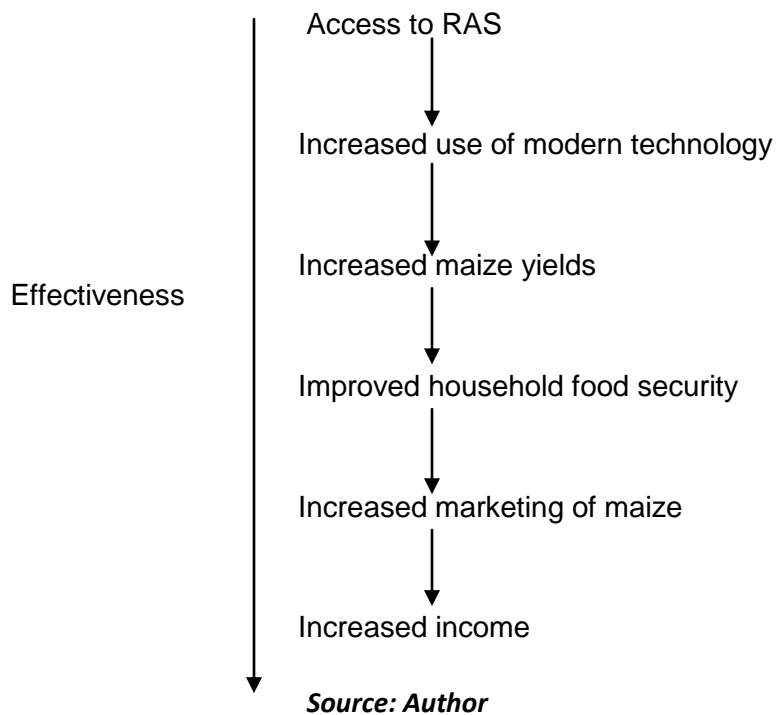
The italicised indicators in the framework were the main focus in the study

The above framework was developed based on the combination of ideas of different authors who previously did some studies on effectiveness of RAS. However, study done by Benin et al (2007) on NAADS was a lot in comparing the findings since the nature of the research was similar as it targeted the NAADS and non-NAADS households which were similar to RAS and non-RAS farmers.

The italicised indicators in the above framework were used during the study to establish the effectiveness of RAS offered to the small scale farmers in the study area.

Based on the above framework, the following causal diagram was adopted to help understand the linkage of the effectiveness of RAS and the expected outcomes which are improved food security and income among others.

Figure 2: Causal diagram of the expected outcomes based on effectiveness of RAS



3. Research Methodology

The strategies used were a desk study which helped in giving an overview of what had been studied before in relation to effectiveness of the traditional extension service and the rural advisory services, and this helped in unravelling the concept of effectiveness as well as defining and understanding some terminologies that were useful for the study. Case study was another strategy that was used in the study since it involved using One Acre Fund organization that offers rural advisory services to small scale farmer in Koderia village as a case to study and this helped to get in-depth information on the effectiveness of rural advisory services. Small scale farmers in Koderia village were the sample choice because they cultivate a maximum of 2ha of own or leased land. Koderia village was the selected area of study because it has undergone the transformation from traditional extension services that was offered in the past by the ministry of agriculture to Rural Advisory Services being offered by One Acre Fund organization. This therefore helped in assessing the effectiveness of the Rural Advisory Services by comparing the small scale farmers who are supported by traditional extension services with the small scale farmers who are supported by Rural Advisory Services.

The tools that were used in this study included semi structured interviews that helped in getting more in-depth information from the respondents. This was done at the respondents homes so as to make them feel comfortable during the interview. The tool also allowed for flexibility as it helped the researcher to come up with detailed questions during the interviews. A checklist was used as a guide during the interviews. Observation was also used to validate some of the information provided by the respondents. Two focus group discussions were held; one from the small scale farmers accessing Rural Advisory Service from One Acre Fund and one from the small scale farmers not accessing Rural Advisory Services to get the farmers' perception on effectiveness of Rural Advisory Services.

40 respondents were randomly selected for interviews because in a day an average of 2 respondents could be interviewed; 20 small scale farmers supported by One Acre Fund organization and another 20 small scale farmers not receiving support were selected and interviewed. In addition, 2 focus group discussions were held; one with small scale farmers supported by One Acre Fund and another with small scale farmers not supported. One key informant from One Acre Fund Organization was also interviewed; this was one of the staff who works directly with the small scale farmers in the field. This helped to get his view on the effectiveness of RAS. Another staff that was to be interviewed an M&E officer of OAF whose response was to help compare the indicators of the organization with what is on ground according to the farmers' response. However, this was not possible due to logistics issues.

Data collection was done by the researcher and an assistant who supported by taking notes during the interview as it would have been difficult for the researcher to record the response and at the same time interview the respondents. In addition, voice recording was also done in some cases so as not to lose any important information. However, the process had some challenges due power issues in the village hence the researcher could not record all the responses therefore researcher depended entirely on the support of the assistant. In all these processes the consent of the respondents was first sought of which all the respondents accepted.

The data collected was analysed qualitatively through descriptive statistics by comparing the research findings from the small scale farmers receiving RAS from OAF and the small scale farmers who are not receiving RAS. To ensure similar treatment the timing to observe the impact was between 2008 when OAF had not come into the region up 2012 when they had their harvest for the year.

3.1. Limitation of the study

The study had a few challenges. There were interruptions from other small scale farmers who were not part of the research and would therefore influence the response of the respondents during individual interviews. This is because these farmers are members of the same group with the respondents and have their own perspective on how they view RAS.

Lack of concentration during the individual interviews caused by the usual demand from other household chores and family needs.

Inadequate supply of power to facilitate the use of the recording device during data collection. This therefore made it only possible to engage in note taking for most of the interviews which could lead to forgetting some important aspects that was said by the respondents.

Since the study was focusing on RAS mainly provided by OAF in Koderia village, the findings cannot then be generalised for other areas and organizations providing RAS.

4. Background information

4.1. The study area

Rachuonyo District is one of the 12 districts of Nyanza Province. It is bordered by Nyando District to the North East, Kisii and Nyamira to the South East, Homabay to the South East, Kericho to the East, and Lake Victoria to the North and West. The district is divided into two agro-ecological zones; the upper midland (UM) and lower midland (LM) zones. The district covers an area of 930 km² of which 741 km² is arable but only 296 km² is under cultivation representing 40% of the total arable land.

4.1.1. Climate and soils

The district is divided into two distinct eco-zones where the upper divisions (Kabondo and Kasipul divisions) have bimodal type of rainfall. The lower divisions (East Karachuonyo and West Karachuonyo divisions) receive only the long rains (unimodal). The long rains are from

March to May while short rains are from August to November/December. The reliability of the long rains is 60%. The rainfall ranges from 700 mm per annum near the Lake shore (lower divisions) to 1800 mm per annum in the upper divisions.

The main soil types in Kasipul/Kabondo divisions are phaeozems, luvisols and nitosols, which are relatively fertile and well drained making these divisions best for agriculture. Koderia village falls within this divisions hence good for agriculture. On the other hand, East Karachuonyo and west Karachuonyo have ferrasols and vertisols soil types, which are infertile and get waterlogged when there is a lot of rain.

4.1.2. Land Use system

In the upper zones (Kabondo and Kasipul), the farm sizes are smaller with an average of 2 ha of land per household. These zones are endowed with deep, well-drained, relatively fertile soils and good rainfall. The major food crops grown include maize, sorghum, sweet potatoes, cassava, beans, cowpeas and green grams (Odhok & Aketch 2000) while the main cash crops grown include coffee and tea. Dairy animals can also be kept in the region. Most farms in these zones have soil conservation structures. In the lower zones (East Karachuonyo and West Karachuonyo divisions), the average farm sizes are bigger and stand at about 3 ha per household. The main cash crop grown is cotton while the food crops include maize and sorghum. The soils in these zones are of poor fertility and drainage and the farms are not well conserved hence large tracts of arable land are left fallow for grazing livestock. Therefore farmers in these areas practice fallow cultivation.

4.1.3. Poverty Analysis

Approximately 230,000 persons the total population are living below the poverty line. 67% of the population is food deficient. The poverty situation is spread over the district and varies from division to division and a cross socio economic groups. There is need to put in place measures to reduce dependency ratio if the vicious cycle of poverty is to be broken. (District Strategic Plan 2005 – 2010).

Table 1: Socio-economic Indicators, 2001

Total number of households	68,152
Average Households size	4.7
Absolute Poverty (Rural & Urban)	77%
Income from Agriculture	70%
Income from Rural Self employment	5.9%
Wage employment	6%
Urban self-employment	10%
Number of unemployed	6,023

Source: District Statistics Office – Kosele in Rachuonyo District Strategic Plan 2005-2010, 2005.

4.1.4. Constraints/problems to agricultural production in the district.

According to Odhok& Aketch (2000), the resource poor farmers in the district encounter numerous problems, which contribute to low crop and livestock productivity. These include continuous cropping on less fertile land, nonuse of the recommended manures, fragile erodible soils and poor crop and animal husbandry. Poor soil management practices, use of unimproved low yielding crop varieties and livestock breeds have culminated to low living standard. Due to the above stated problems therefore RAS is expected to help solve these problems by advising the resource poor farmers (small scale farmers) to use improved management practices on crops among other factors to increase the crop and livestock productivity at household. This will contribute to food security at household as well as improved income. Administratively the district is divided into four divisions and forty locations all previously part of the larger South Nyanza District. Table 2 below shows the population density in the four administrative divisions in the District. The location and population density pattern are shown in Map 1.

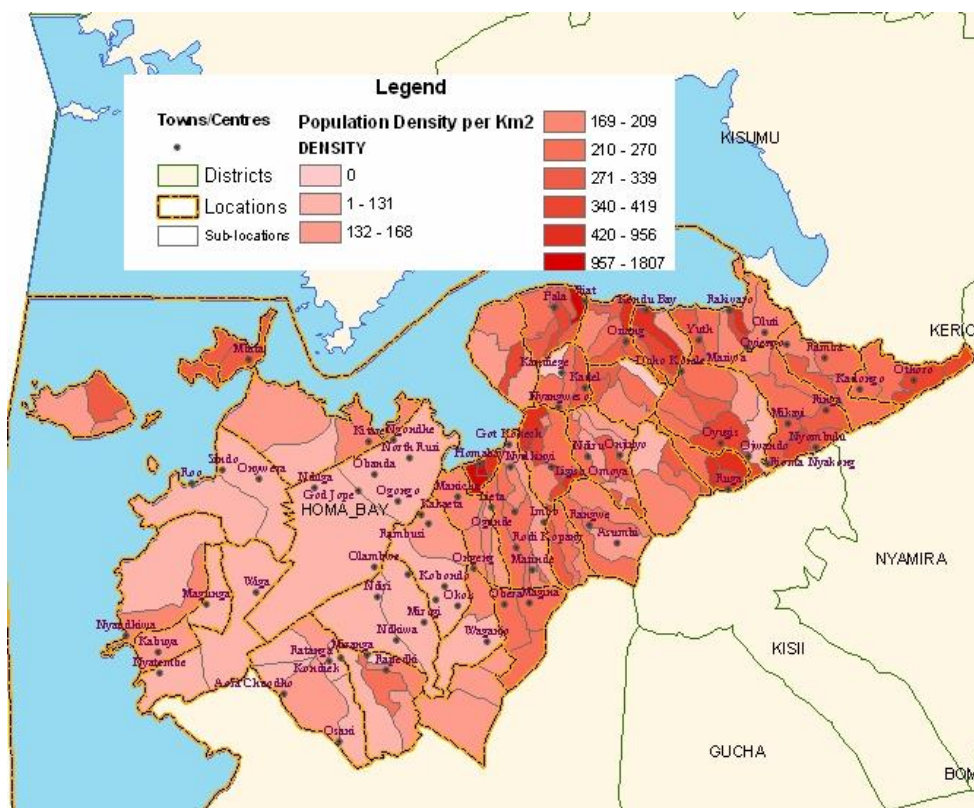
Table 2 : Area and population Density by Division (2001)

Division	Area (sq km²)	Population	Population Density	Locations
Kasipul	365.5	129,854	355	7
Kabondo	141.5	49,934	353	11
East Karachuonyo	251.6	74,578	296	11
West Karachuonyo	186.6	52,754	283	11
Total	945.2	307,120	325	40

Source: District Statistics Office – Kosele – 2001 in Rachuonyo District Strategic Plan 2005-2010, 2005.

The decline in population density in some divisions is attributed to the increase in acceptability of family planning methods, the HIV/AIDS pandemic, high infant mortality and migration from the districts to other areas due to the high incidence of poverty.

Figure 3: A map of Rachuonyo District



Source: Rachuonyo District Strategic Plan 2005-2010

4.2. Overview of OAF

OAF is an NGO that was started in Kenya in 2006, their headquarter office is in Bungoma county; it has since expanded to Rwanda and Burundi. The vision of the organization is; farmers are the answer; which means when farmers improve their harvests, they pull themselves out of poverty. In addition, they also start producing surplus food for their neighbours. OAF further states that when farmers prosper, they eradicate poverty and hunger in their communities at large.

The mission of the organization is to get farming families out of extreme poverty through generating a gain in farm income per acre. Their main objectives are:

- To provide farm inputs (seeds and fertilizers) to farmers on credit so as to make their small farm plots productive.
- To deliver inputs to the nearest location for easy access (within a walking distance) by the farmers.
- To provide trainings on the correct usage of farm inputs so to enhance farm profitability.
- To enable the farmers to sell their harvest at significant profit.

OAF was later expanded to Rachuonyo district- Kenya in 2009 of which they use the name Farmers United. It works in many locations within the district one of them being Koderia (the area of study interest).

The organization has a total of approximately 1,400 staff in Kenya.

The organization measures their success in their ability to make more farmers more prosperous, in Rachuonyo they have reached approximately 30,000 farmers.

4.2.1. How they work.

The criterion for selection of the small scale farmers to be supported by RAS is based on the fact that a farmer can access at least ½ acre of land to be used in planting maize and also the farmers is 18 years and above, all gender inclusive.

- They organize farmers into stable ten-member subgroups (“producer groups”).
- They purchase crop inputs in bulk and deliver them to the producer groups at the nearest location.
- They then train the farmer groups that meet throughout the crop cycle.
- They consolidate crops and sell in bulk to buyers
- They capture repayment in kind or in cash from the loan they gave to the farmers.

4.2.2. The strategy OAF uses in Rachuonyo

OAF has organized farmers in to smaller groups of 6 to 7 members per group instead of 10 because initially the members would form a group of 12 to 14 members, and during working of the group it was so time consuming and tiresome for members to work in all the 12 farms of the individual members. Therefore OAF decided to further sub divide the groups hence a group of 6-7 members per group. This grouping is based on how closer the members are to each other in terms of where they come from (households and farms).

Each group has a facilitator who is a member of the group and is selected by the members themselves. The group facilitator is expected to represent the group in certain meetings involving OAF staff and farmers, and to bring forth the information discussed to the group members. They are also expected to act as trainer of trainees (ToT); since the field staff cannot meet each and every individual farmer all the time, the facilitators are sometimes called upon for trainings in maize production upon which they are expected to go and train the rest of the farmers in their respective groups regarding the subject. They do this by mobilizing the members of the group in one of the group members’ homestead and then they meet next to one of the farms where he/she (the facilitator) gives the training and demonstration on how to apply fertilizer for example. This is also a way to ensure sustainability of the program as the farmers can disseminate information amongst themselves through trainings and demonstrations. However, the field staffs have to sometimes gather all the farmers and train them especially on the technical parts of the subjects that might be difficult for the facilitator to explain to the group members.

OAF purchases input in bulk from the National Cereal and Produce Board of Kenya (NCPB) with whom they are working with closely and offers them a better price. This collaboration helps them not to charge farmers more even during price inflation as the price is guaranteed according to the earlier agreement. The inputs are then to be given to farmers on loans; whereby each farmer has to pay half the total cost of the inputs in advance to be eligible to receive the inputs. The other half can be paid later on instalments after receiving the inputs. This is done by allowing farmers to start paying for the inputs in advance by paying at least Kshs 300 (approx.3 Euros) per week. For example, in 2012, each farmer was expected to pay a total of Kshs 5600 (56 Euros) to be issued with inputs (seeds and fertilizer) for half-acre land. Therefore the farmers had to pay in advance Kshs 2800 (28 Euros) to be given inputs and then they would clear the rest of the payment in instalments after getting the inputs.

Before issuing the inputs to farmers, the OAF field staffs have to assess the farms to know the soil conditions as well as rainfall intensity in the area and then make recommendations on the best seeds suitable for the farm. For example, some farms can perform better with short maturing maize seed varieties while others with long maturing maize seed varieties. These seeds include: DK 8031, Duma 43, Kenya seed DH04 and Western seed 504/505. OAF also

provides other seeds other than maize when they speculate pests and disease outbreak or poor climatic condition that might be unfavourable to maize leading to its failure. For instance, in 2013, they gave out sweet potatoes, sorghum and reduced quantity of maize seeds to act like a backup.

4.2.3. How the farmer groups function:

When the inputs have been brought to the nearest accessible place to the farmers, the group members (6 to 7 members) are expected to go together to receive their share. Each member receives 5kgs of maize seeds, 25kgs of DAP fertilizers and 25kgs of CAN fertilizers this is the standard amount of inputs for a half acre. When it is time for planting all the group members agree on whose farm will be first worked on which is dependent on whose farm was ready first.

All the members are expected to work on all the 6 to 7 farms of the individuals depending on the number of members within the group. This means that they have to dedicate about a week of their time away from doing any other work except for the farm work of the group members, which involves row planting, correct spacing (75cm by 25cm), applying correct amount of DAP fertilizer using a standard tool from OAF to measure, planting one maize seed per hole. They are expected to complete the work on each member's farm in a day since the individual members had already ploughed and harrowed their land earlier. They therefore have to wake up early and go start working as early as 7 to 8 a.m. and are only to leave the individual farm upon completion of work. All these are done in one day so as to allow uniform germination of maize plants.

After the germination of maize, when the plants reach the stage of first weeding, this is done by individual farmers. When the maize plant grows to the 'knee' height then the group members allocate another 6 to 7 days to do second weeding of which they also apply CAN fertilizers around each maize plant. After this, they are expected to wait for the harvest not to eat the maize while still green as they need to know the amount of maize yields produced per given acreage of land. Therefore all the farmers who are receiving RAS do not eat green maize from the farm as required by OAF. However, some of the farmers stated that they prepare a small portion of the farm (different from the half-acre allocated for OAF work), to plant some maize for the family to use as green maize.

5. Findings

The findings of the study are presented based on the following themes; the frequency of visits by the OAF staff, improved management practices in maize production, increased demand for more advisory services, increased maize yields per household, use of improved maize seeds and fertilizers by small scale farmers. These results were presented using tables.

From the study the following were the findings for each theme:

5.1. Frequency of visit by OAF staff to the small scale farmers

Table 3: Frequency of visit by OAF staff to the small scale farmers

Respondents	% Frequency of visit				Total
	None	Once	Thrice	More than thrice	
RAS small scale farmers	0	2 (10%)	7 (35%)	11 (55%)	20
Non- RAS small scale farmers	17 (85%)	3 (15%)	0	0	20
Total	17 (42.5%)	5 (12.5%)	7 (17.5)	11(27.5)	40 (100%)

From the above findings majority of the small scale farmers receiving RAS stated that they were being visited more than thrice by the OAF staff during the last 12 months (2012). All the RAS farmers stated that they are all being visited by OAF staff.

The RAS farmers stated that the main reasons for being visited is to recommend the variety of maize suitable for their farms which is done once when the field staff is going round to assess the farms at the start of a planting season. The second visit is done when the field staffs are checking whether every farmer has ploughed and harrowed his/her farm to a fine tilth in readiness for planting. The third visit is done to check whether they are planting the maize seeds as required, that is using DAP fertilizer, planting one seed per hole, planting in rows and using correct spacing. The fourth visit is done after germination to check if every farmer has done the first weeding. The fifth visit is done to check if the group members are weeding and applying CAN fertilizer as required.

From the FGD, the RAS farmers further added that the field staffs do come to visit them when they call upon them in case of any emergency like poor germination of maize or during incidences of waterlogging of plants which occurs in rainy season. The above statements was also confirmed by the OAF key informant who stated that they have to go round individual farms to assess the type of soil so as to recommend which variety of maize is suitable for a particular farm. He also stated that, some farms need short maturing varieties while other require long maturing varieties depending on the rainfall pattern and intensity of the area. This he further explained that even though, the farmers come from the same village, there is difference in the soil type as some areas have sandy soils while others have loamy. In addition, some soils have been infested with striga weeds while others are not. Therefore recommending short maturing maize seeds for soils having striga weeds as they mature faster and hence evade the attack from the striga weed.

On the other hand, majority of the non-RAS small scale farmers stated that they are not being visited at all. Majority of them stated that this is because they are not members of OAF. They further stated from the FGD that they are not members of RAS because they have limited finances for them to participate in the program.

15% of the non-RAS farmers stated that they were being visited by different staff from different organization. One of the respondent from non-RAS farmers stated that she was visited once by an OAF staff to assess her farm and advice on which maize variety is best suitable for her farm and this was because she was a neighbour to one of the RAS farmers hence benefited from the visit. Another respondent also stated that she was once visited by C-MAD staff to train her on groundnut production. While another respondent from non-RAS farmers also stated that she was visited once by MOA staff to issue her with fertilizers and seeds of which she quoted *“we harvested nothing from the maize issued”*.

Some other non-RAS farmers also confirmed that they were issued with maize seeds and fertilizers by MOA but the maize didn't perform well. They were trying to compare their maize with those of RAS farmers. Probably MOA did not assess the type of soils and seeds suitable for the maize production for non-RAS small scale farmers in the area causing poor performance in maize. There is likelihood that their main focus was on delivering the inputs to the farmers (transfer of new technology) but no training was done to farmers.

5.2. Use of improved management practices in maize production

Improved management practices in this context refers to the following methods; row planting, correct spacing (75cm by 25cm), planting one seed per hole, correct measurement on DAP fertilizer application during planting, weeding twice of the maize plants and top dressing with CAN. All these are 6 methods of improved management practice.

Table 4: Percentage small scale farmers using improved management practices in maize production during the long and short rains.

Respondent	During Long rains			During short rains			Total farmers
	Use all the mgt practice	Use some mgt practice (at most 3)	Dont use mgt practice	Use all the mgt practice	Use some mgt practice (at most 3)	Dont use mgt practice	
RAS Farmers	2 (100%)	0	0	7 (35%)	13 (65%)	0	20
Non-RAS Farmers	0	9 (45%)	11 (55%)	0	9 (45%)	11 (55%)	20
Total	20 (50%)	9 (22.5%)	11 (27.5%)	7 (17.5%)	22 (55%)	11 (27.5%)	40 (100%)

From the above table, all the RAS small scale farmers are using improved management practices in maize production during the long rains whereas during the short rains only 35% use all the improved management practices. Most of the RAS farmers stated that this difference is because, during the long rains they work in groups and it's also at this time that OAF works with the RAS farmers. During the short rains they are advised by OAF to leave the soil to regain its fertility. They however stated in FGD that, they cannot leave the farm to regain fertility because their livelihoods depend on farming and therefore they have to plant to get more maize stock and also have some green maize to eat during the short rains.

It was interesting to note how some RAS farmers felt on the group working approach. Some of the farmers who have worked with OAF for 3 years, during individual interview and during the FGD felt that working as a group really consumes time for them. This is because they feel they already know how to use all the management practices in maize production and can therefore quit working in groups and instead hire workers to work on their farms as they guide them. One of the farmers said *“I am not planning to work with OAF in the next season, as I can I can apply all the management practices in maize. I will hire workers together with my family members to*

work on my farm". They further stated that they have to forgo some of their household chore and family needs which they need to attend to hence bringing conflict of interest. For example, a farmer said that *"I had to hire someone to go on my behalf to the group work in the individual farm for a day since I had other family business to attend to. Therefore I had to pay this person Kshs. 200 (approximately 2 Euros)."* On the other hand, some farmers who are in their 1st and 2nd year liked to work as a group. They stated that group work was helping them finish all their farm work in short time and the yields are also great.

Majority of the RAS farmers stated that during the short rains, it's difficult to apply all the six management practices as they don't work as a group instead each individual farmer works alone. Unless a farmer hires other workers to assist in the farm it becomes a challenge for them to use these practices and therefore resort to using the traditional way and applying at most 3 improved management practices. Although from the FGD, the farmers appreciated that if you use all these improved management practices *"your yields will be good and you will have enough food to eat"* as stated by one farmer.

The key informant from OAF also further confirmed that they train farmers in all the six practices to apply when planting maize. He said *"we have special tools for spacing and application of fertilizers which we give to our farmers to use during planting"*. This shows that farmers use these to give the correct spacing and correct measurement for fertilizers during planting as part of management practices.

Figure 4: Maize farm of a RAS farmer



Source: Author.

On the other hand, majority of the non-RAS farmers are not using improved management practices. However, a few of them use at most three improved management practices. Most of them stated that they plant the local way which is planting 2 to 3 seeds per hole, applying unknown quantity of DAP fertilizers, weeding once and no top dressing is done. 9 (45%) of the non- RAS farmers stated that they are applying some improved management practices like weeding twice, top dressing with CAN, planting one seed per hole and applying correct amount of DAP fertilizer. For instance, one of the farmers stated that she was always weeding twice and top dressing her maize with CAN. The findings show that all the 9 farmers were weeding twice their farms and only 3 were applying DAP fertilizer correctly with right quantity while 2 farmers stated they were only planting one seed per hole as an improved management practice. The

findings above show that the non RAS farmers use the same technique during the long and short rains. From the FGD, one of the non-RAS farmers stated that *“I plant with fertilizer although I don’t know the best ways of using it. Therefore I apply fertilizer and plant using an ox-plough. This makes the spacing so big and inappropriate amount of DAP per hole”*.

Figure 5: Maize farm of a non-RAS farmer



Source: Author.

5.3. Use of improved inputs (seeds and fertilizers)

The use of improved inputs was analysed by relating the inputs used before joining RAS and after joining RAS program.

Table 5: Use of certified seeds by small scale farmers

Respondents	use of seeds before (2009)			Use of seeds in 2012			Total
	A	B	E	A	B	E	
RAS farmers	4 (20%)	16 (80%)	0	19 (95%)	0	1 (5%)	20
Non-RAS farmers	1 (5%)	17 (85%)	2 (10%)	2 (10%)	16 (80%)	2 (10%)	20
Total	5 (12.5%)	33 (82.5%)	2 (5%)	21 (52.5%)	16 (40%)	6 (15%)	40 (100%)

Key: A = Use certified maize seeds; B= Use local seeds; E= Use both certified & local seeds

From the above results, majority of the RAS farmers are using certified maize seeds. This is because in the year 2012, the percentage increased from 20% in the year 2009 to 95%. Majority of the RAS farmers stated that, before in the past years they were using only locally preserved maize seeds but currently none reported to be using the local seeds, except for one farmer who stated that he uses both local and certified seeds since he cannot afford to exclusively use certified seeds due to limited finances. From the FGD, the RAS farmers stated that they know the benefits of using certified seeds, as one of the farmers quoted that *“if we use the certified seeds brought to us by OAF, we are getting good yields”*. This therefore encourages them to continue using the certified seeds.

It was interesting to also note that, RAS farmers had mixed feelings on how much quantity of seeds they have been using in the past. Some farmers said that in the past they would use much quantity of seeds in their farms since they were planting 3 to 5 seeds per hole but

currently they are now using less quantity of seeds because they only plant one seed per hole. Other RAS farmers felt the opposite, as they said that, before they were using less quantity of seeds although they were also planting between 2 to 5 seeds per hole. This is because, before they were using large spacing without any standard measurement but now since they are using standard spacing they felt they are now using much quantity of seeds than before.

On the other hand, the results reveal that majority of the non-RAS farmers are using locally preserved maize seeds in their farms every year as shown by 85% in 2009 and 80% in 2012. Only 10% of non-RAS farmers are using certified maize seeds from the previous 5%. This shows that there has been a minimal reduction on the non-RAS farmers using local seeds. These findings were further confirmed by the FGD that was held, where one of the non-RAS farmers stated that *"I just use local seeds which I pick maize when still on the cobs and I hang them in the kitchen next to a smoke so that they get preserved. I will then use them during planting time"*. They further explained that limited finance has hindered some of them from using certified inputs although they can really see the difference in the yields of the fellow RAS farmers. Some of them said that they only buy fewer amounts of the certified seeds depending on the cash they have.

Table 6: Use of fertilizers by small scale farmers

Respondents	use of fertilizer before (2009)				Use of fertilizers in 2012				Total
	C	D	F	G	C	D	F	G	
RAS farmers	7(35%)	7(35%)	0	6 (30%)	15 (75%)	0	5 (25%)		20
Non-RAS farmers	5 (25%)	6 (30%)	5 (25%)	4 (20%)	7 (35%)	5 (25%)	5 (25%)	3 (15%)	20
Total %	12 (30%)	13 (32.5%)	5 (12.5%)	10 (25%)	22 (55%)	5 (12.5%)	10 (25%)	3 (7.5%)	40 (100%)

Key: C= Use Fertilizers only (DAP & CAN); D= Use only FYM; F= Use both FYM & Fertilizers (DAP & CAN) G= Not using fertilizer or FYM

The results also reveal that in 2009, few RAS farmers used to apply fertilizers and FYM as shown by 35% and another 35% respectively while the rest were not applying any fertilizer or FYM at all. Currently there has been a change with all the 20 RAS farmers using these inputs; the percentage of RAS farmers using fertilizers has increased from 35% to 75% whereas none reported to using only FYM except that 25% stated that they are using both FYM and fertilizers together. It is interesting to note that the RAS farmers who were not using any fertilizer or FYM are now using both. From the FGD, the farmers stated that before some of them were using less fertilizer which they would sprinkle in the whole and yet it was not enough. Now they know it is very important for the crop's nutrition. Some of these farmers also stated that they are mixing the fertilizer and the FYM because using fertilizer alone encourages the growth of striga weeds in the farm hence affecting the maize yields. Most of these RAS farmers stated that the reason for the increased use of these improved inputs is because OAF was delivering the inputs at a nearby place which is easily accessible to them and also that they are being given these inputs on credit as they have to pay for only a half price and they are eligible to get them. These findings were further confirmed by the OAF key informant who stated that they were delivering the inputs to the farmers at a nearby place to allow the farmers have easy access to them and this is one of the objectives of the organization. 25% of the RAS farmers stated that they are mixing both fertilizer and FYM because OAF is encouraging them to also make compost manure from animal waste and other vegetation to add to the farm; therefore some are using the FYM as a way of adding fertility to the soil, although planning to make compost manure.

On the other hand, the findings reveal that few non-RAS farmers are using fertilizers as shown by the increase from 25% before to 35% in 2012. There has been no much increase as those who have been using FYM only was 30% and reduced slightly to 25% in 2012. However, there was no change in those who were using both fertilizer and FYM as it remained to 25% as was before. Also 15% of these farmers are neither using fertilizers nor FYM. This was confirmed by the FGD held, where one of the farmers said *“I don’t use fertilizer because the farms that use fertilizers have been infested by striga weeds”*. Some of the farmers stated that even though they use fertilizers they use less of it because they have limited finance to buy enough.

5.4. Demand for more advisory services

In this context the demand for more advisory services means that the small scale farmers are able to ask for more services they feel that they want from the service providers like the OAF and any other organization.

Table 7: Demand for more advisory services

Respondents	Demanding more RAS		Not demanding RAS	Total
	As a group	As individuals		
RAS farmers	6 (30%)	5 (25%)	9 (45%)	20
Non-RAS farmers	4 (20%)	0	16 (80%)	20
Total	10 (25%)	5 (12.5%)	25 (62.5%)	40 (100%)

From the table above results, the demand for more services was varying in that some were able to ask for the services as a group while others were asking for the services as individuals. 30% of the RAS farmers stated that they were demanding for more services as a group. Some of the services they were directly demanding from OAF are crop insurance which involves compensation when farmers experience crop failure.

They also stated that they are in need of trainings in groundnut production. Since OAF is mostly specialised in maize production, some 2 RAS farmers stated that they have sought services from other service providers like CEFA and MOA to support them. In addition, 25% of the RAS farmers stated that they are demanding for more services as individuals but not as a group working with OAF, since their work as a group ends at the farm after planting and harvesting the maize. This has made some of the RAS farmers to form other independent groups if they want to seek other services as a group. From the FGD, the RAS farmers stated that they don’t demand for more services since OAF are the ones coming with the advisory services therefore they are just looking forward to what OAF has to offer and they use.

On the other hand, it was interesting to note that 20% of the non-RAS farmers were demanding for more services as a group and they have sought services from organization like CEFA, MOA and C-MAD on groundnut production, onion, watermelon production and beekeeping. One of the non-RAS farmers said that, because of availability of good market for watermelon and onions they teamed up together with other farmers with the same interest and formed a group so that they can be supported. In addition to that, CEFA also trained them on Group Savings and Loans (GSL) where they have to come together to do some money saving. However, majority of the non-RAS farmers stated that they are not demanding for services but they are participating in GSL since this can support them during emergencies.

5.5. Change in maize yields per acre /households of the small scale farmers

The % change in maize yields was established by comparing the yields the farmers got in the year 2009 and the year 2012 per acre. The year 2012 was identified because at this time

the farmers had harvested their maize and prepared it well (through post-harvest handling) to know the yield they produced.

Table 8: Percentage change in maize yields of the small scale farmers

Respondents	% change in yields/ acre						Total
	-100 to 0%	1 to 100%	101 to 200%	201 to 300%	301 to 400%	401 to 500%	
RAS farmers	0	6 (30%)	5 (25%)	3 (15%)	4 (20%)	2 (10%)	20
Non-RAS farmers	11 (55%)	5 (25%)	3 (15%)	0	1 (5%)	0	20
Total	11 (27.5%)	11 (27.5%)	8 (20%)	3 (7.5%)	5 (12.5%)	2 (5%)	40 (100%)

From the above table, the results reveal that all RAS farmers experienced 1 to 500% increase in maize yields per acre, after joining RAS program. Whereas majority of the non-RAS farmers experienced a decrease of between -100% to 0% in maize yields per acre. These results show that RAS program is indeed good as some RAS farmers stated that, they appreciate the program because; their yields have increased since they started working with OAF. This finding was further confirmed by the FGD held with RAS farmers who said that RAS is good as it has helped them get increased yields in maize. One of the farmers said that *“since I joined this program 3 years ago, I don’t buy maize anymore. My family and I eat very well”*.

This was further confirmed by FGD held with non-RAS farmers who also stated that they can see the difference in the yields produced by RAS farmers as it has increased. One of the non-RAS farmers said *“I can see that farmers in RAS program are getting good yields and I would really wish to join them because they don’t buy maize from the market anymore. However, because I don’t have money to participate in the program, I resort to continue with the old way of farming. I hope someday if I get money I will join the program”*.

It was interesting to note that the RAS farmers appreciated that they work on less farm size but get increased maize yields as opposed to before in the years 2009, where they would work on larger size of land and get less yields. For example, one farmer in FGD stated that, before he would get 4 bags of maize of 90kg each in one and a half acres of land but after joining the RAS program he is now getting 7 bags to 8 bags of maize in just half an acre. This was further confirmed by OAF key informant who stated that they are out to assist farmers to use less acreage of land to get more maize yields.

On the other hand, the non-RAS farmers stated that the reasons why most of them are experiencing a decline in their maize yields is because they are not into RAS program where they can be advised on the best ways of producing maize as is done to their counterparts (RAS farmers). From the FGD, one of the farmers stated that she uses improved inputs to get more yields but since she doesn’t know how to apply them her yields don’t increase as she desires. Although, it’s interesting to know that she is among the few non-RAS farmers whose yields were notably increasing.

Majority of the farmers also stated that their yields are getting lesser because they are using the traditional way of production which many farmers are now quitting. They further confirmed that even though they know that RAS can help them get more yields limited finance is a hindrance to meet their desires.

5.6. Marketing of maize

Table 9: Marketing of maize by small scale farmers

Respondents	Maize secure		Not maize secure		Total
	selling	Not selling	selling	Not selling	
RAS farmers	9 (45%)	3 (15%)	2 (10%)	6 (30%)	20
Non-RAS farmers	3 (15%)	3 (15%)	1 (5%)	13 (65%)	20
Total	12 (30%)	6 (15%)	3 (7.5%)	19 (47.5%)	40 (100%)

From the table above, the results revealed that 45% of the RAS farmers were maize secure as their family had enough to eat for the whole year and still had surplus maize to sell. Even though these farmers were selling their maize, they were not selling directly to OAF at a significant profit as stated earlier by OAF. This was further confirmed by key informant from OAF who stated that they have plans to establish a warehouse which will be used to store maize for the farmers. He further stated that “plans are underway to buy maize at a better price from farmers (both RAS and non-RAS farmers) at a fair price and then later resell to them at a cheaper price when there is high demand for maize, so that all the farmers can be food secure”.

15% of the RAS farmers did not sell although they had enough. According to the farmers, this is because if they start selling, then their family will become maize insecure and therefore they will be forced to buy maize from the market, which by then will be very expensive so they rather avoid. From the study, the farmers said that they are also growing other crops like sweet potatoes, vegetables among others so as to sell in order to meet their needs.

The findings further revealed that 10% of the RAS farmers are not maize secure but are selling their maize. This is because during the study, some farmers stated that even though they are experiencing increase in maize yields, this is not enough yet to feed their households as some of them have larger households including some of the members in the urban centres who also depend on the same maize produced. They are forced to sell to meet other demands. One of the farmers said that *“I have to sell the maize so that I can pay school fees for my kids. Then later, I will have to buy maize from the market to my family to eat. I sometimes also produce sweet potatoes to help us eat the maize for a longer period”*.

30% of the RAS farmers also stated that they are not maize secure and they are not selling because if they sell they will remain with nothing. They further added that instead of selling the maize, they sell of livestock from the farm e.g. cows, goats and chicken so that they can get money to buy more maize to bridge the gap and also to buy other food needed in the house as well as to meet other financial obligations. In the FGD, some farmers added that they go out and work on other farms so as to be paid wages to meet the needs of their large households. Whereas others stated that they wait for remittance from their family members who are working away from home to help them survive.

On the other hand, 3 (15%) of the non-RAS farmers said that they were maize secure and selling surplus. However, it was interesting to note that one of these 3 farmers had a decline of 40% in her maize yield / per acre yet she was still maize secure and had a surplus. The other 2 non-RAS farmers had an increase in maize yield of 133% to 167% respectively. This result is because some of these farmers stated that their household size have reduced since most members of the family are now in the urban areas and therefore do not depend on the same maize being produced. This means that they have less mouth to feed as the maize is enough to feed them for a year and hence can afford to sell some of the maize. This was further confirmed

in the FGD, where one farmer stated that “*the maize is enough to feed 4 members of my family and therefore I can also sell some*”. Some of the farmers also had surplus to sell because they had increased the land size for producing maize and were also using the improved inputs therefore this made it possible for them to have increased yields enough to feed the family and sell.

15% of the non-RAS farmers stated that they are not selling their maize even though they are maize secure because, just like the RAS farmers they don't want their family to lack maize and therefore are producing sweet potatoes to meet other financial obligations. 5% of the non-RAS farmers stated they are not having enough maize but are still selling. This is because they have to meet their pressing needs like sell to pay school fees for their children, and even to buy other foods like fish and vegetables. Therefore even though they don't have enough maize, after selling they have to consider buying more maize for their families. This becomes difficult and they have to depend on remittance from the other members in the urban centres if any or they have to work in other people's farms to get money. However, majority of the non-RAS farmers stated that they are not maize secure and are not also selling because they are trying to ensure their families can survive on the little maize as it will cost them a lot to buy more maize after selling. This will be very expensive for them and yet they don't have the finances. From the FGD, most farmers stated that they are growing sweet potatoes to support them in financial needs and some also engage in small business like selling fish to generate income. Whereas some stated that they work on the farms of others and get paid. The money they can use to buy more maize stock for the family.

5.7. Discussion

5.7.1. Frequency of visit by service providers

The study has revealed that RAS enables frequent contact between the RAS staff in this case OAF and the farmers which in turn encourages farmers participation. This has been shown by all RAS farmers stating they were being visited by OAF whereas majority of non- RAS farmers not receiving any visit at all. These results are supported by the study done by Benin et al (2007) who also found that more than 60% of the NAADS (RAS) households perceived that the frequency of visits by providers has increased since initiation of the NAADS program. This therefore shows how RAS is effective in terms of farmers to agent or service provider contact.

5.7.2. Use of improved management practices in maize production

The study reveals that RAS farmers have increased their knowledge and use of improved management skills in planting maize especially during the long rains where they apply all the practices whereas majority of the non-RAS farmers are not using the improved management practices because they have limited knowledge on how to apply them, and also limited finance to use in accessing RAS services from which they will learn how to use the improved management practices. This result is contrary to the findings of Benin et al (2007) who found that a greater proportion of households in non-NAADS sub-counties became aware of various crop production practices than their counterparts in NAADS sub-counties. The difference is seen in majority of non- NAADS households being aware of various crop production practices while majority of non-RAS farmers have limited knowledge on improved management practices. The difference is likely to be because non-NAADS farmers were probably getting information from NAADS households therefore information on production practices trickling down from NAADS members to non-NAADS. On the other hand, it seems there is limited information sharing between RAS and non-RAS farmers creating the gap in which RAS farmers have increased their knowledge and use of improved management practices while non-RAS farmers have limited knowledge. .

The study on the other hand is similar to a study done by Rola, Jamias and Quizon (2002) in the Philippines where they documented improved knowledge among trained farmers; even though they went further to establish the diffusion of knowledge from trained farmers to other farmers which they found was little. Davis et al (2009), although comparing FFS and non-FFS farmers, also found out that there is high rate of adoption of various technologies among FFS farmers.

5.7.3. Use of improved inputs (seeds and fertilizers)

The study shows that farmers receiving RAS have increased the use of improved inputs (certified seeds and fertilizers) whereas majority of non-RAS farmers are still using locally preserved maize seeds and few are using fertilizers and FYM, hence no increase in use of improved inputs. These results can be compared to the findings of Benin et al (2007) who indicated that the area under improved varieties of crops has more than doubled in trailblazing NAADS sub-counties and quadrupled in late NAADS sub-counties. However, the results on non-RAS farmers is contrary to his findings as he indicated that, in non-NAADS households, there was an increase of about 60% of those who were using improved seeds and fertilizers.

This result is different since majority of non-RAS farmers are using local inputs and not improved inputs hence no increase. The difference between non-NAADS and non-RAS farmers is likely to be that, non-NAADS are getting information concerning the importance of these improved seeds and fertilizer as well as these inputs might also be cheaper to access by non-

NAADS members. On the other hand, non-RAS farmers are using locally preserved seeds with less or no fertilizer in some cases probably because the improved inputs (seeds and fertilizers) are expensive for them to afford since they said that they have limited finances. In addition, the non-RAS farmer might be lacking knowledge on how to use these inputs due to limited information sharing as well as inability to access RAS.

5.7.4. Demand for RAS

The study reveals that majority of both RAS and non-RAS farmers are not demanding for more advisory services as a group. This shows that there is limited empowerment towards RAS farmers as a group as well as non-RAS farmers to ask for more services. Empowerment is a cognitive state characterized by a sense of perceived control, decision making and competence, and internalization of the goals and objectives of the organization or group by their members (Menon 1999, 2001) in Benin et al (2007).

From previous studies, demands for services as group tend to work better than demand for services as individuals. This finding is supported by Chipeta (2006) who stated that farmers are very heterogeneous, but groups and organisations of farmers with similar interests can secure better and more responsive service provision, and more efficient use of public resources than individuals. They have stronger negotiation power with private providers than individual small-scale farmers.

The finding is similar to the study conducted by Benin et al (2007), who found that NAADS program may have had limited impact in empowering farmers to participate in decision making, since such participation is as strong or stronger in the non-NAADS sub-counties. However, his finding contradicts the finding on non-RAS farmers as he found that participation was as strong or stronger in the non-NAADS sub-counties whereas there was limited participation on non-RAS farmers. The difference in findings between non-NAADS members and non-RAS farmers regarding participation is likely to be that, most non NAADS farmers are in groups and therefore participating actively on their respective groups and asking for more services. On the other hand, most of non-RAS farmers are not in groups hence a likelihood for not participating neither demanding for services.

The findings are similar to study by Davis et al (2009) who also found that the results of empowerment are less clear from the survey data between FFS farmers and non-FFS farmers. They further stated that study also demonstrates some empowerment results of participating in FFS, although ways to measure this construct still need to be refined.

5.7.5. Change in Maize yields

The results show that majority of RAS farmers experienced tremendous increase in maize yields per acre ranging from 1 to 500% while non-RAS farmers experienced a decline in maize yields. This shows that the RAS is beneficial to farmers in increasing the yields. This finding is similar to the findings of Benin et al (2007) who although did not focus on maize found that, NAADS households had experienced increase in sorghum yields than non-NAADS households.

This finding is also similar to that of Davis et al (2009) in which they found that FFS participants had a significant increase in the value of crop productivity (yields) per acre of about (80%). The finding is also supported by GFRAS (2012), which stated that RAS shows positive effects on knowledge, adoption, and productivity; with studies showing very high rates of return of 13-500% in farmer productivity.

Fischler, Weigel and Schmidt (2011, p.16) stated that “through RAS, yield increases in crop and animal production vary greatly, and are typically in the range of 10-100%. In some cases yields have doubled or tripled (usually the case when initial yields were at a very low level). Fastest yield increases are obtained through introduction of new seeds (e.g. hybrid maize), new breeds and inputs (especially fertilizer/manure)”. This result confirms the above finding where RAS farmers maize yield had increased.

5.7.6. Marketing of maize

The results show that more RAS farmers are maize secure (food secure) than non-RAS farmers and therefore some are getting income through selling maize surplus. It is worth noting that majority of the RAS farmers consider first being maize secure (food secure), therefore not so many are selling their maize as they still don't produce surplus hence no income yet.

On the other hand, also majority of the non-RAS are not earning income as they are maize insecure and hence no surplus to sell. This findings are contrary to the study done by Benin et al (2007) who found that, largest share of NAADS households had increased their farm income, while the largest share of non-NAADS households had a decrease or no change in income. This difference might be due to the NAADS members having crop diversification hence able to sell a wide range of crops, increased crop productivity hence getting surplus. In addition, it might be because they have stayed longer within the program since NAADS was started in 2001/2002 and therefore have learnt a lot on ways of marketing of products e.g. how to access market information, management skills and many more.

On the other hand, the non-NAADS might have had a decrease or no change because, they might not have access to market information, or they have a decrease in yields making it impossible for them to market.

This difference is also seen in RAS farmers since majority of them are not selling maize probably because they are still young in the RAS program and therefore haven't gained adequate knowledge and skills like how to access market information, also maybe due to lack of crop diversity as they are mainly growing maize hence can't sell lest they risk being maize insecure. For most of non-RAS farmers they also don't sell their hence no income probably because of lack of market information and also a decrease in crop productivity.

6. Conclusion

This chapter concludes whether RAS is really effective in ensuring food security by answering following sub-questions.

6.1. What are small scale farmers' perceptions on access to rural advisory services provided by one acre fund organization?

Based on the study, it appears that RAS have a positive effect in terms of timeliness of the services delivered, quality of the services and the method by which the service is given to the small scale farmers especially in maize production where the RAS farmers have increased their use of improved management practices in maize and this has led to an increase in the maize yields. In addition, it can be observed that farmers receive frequent visits by service providers, in this case OAF to give them different advisory services which in turn helps them in maize productivity.

6.2. What is the perception of small scale farmers on group empowerment?

The study shows that, RAS has not yet empowered the farmer groups to be able to control and demand for more advisory services. This is because most farmer groups have been formed to help in labour provision during planting of maize hence engaged in functional participation (Pretty, 1995); where the groups are participating to meet predetermined objectives. Moreover, farmers felt that the organization defines and makes decision on what subjects to train farmers, therefore making them to just follow what is provided. They also don't hold meetings on their own as groups except when they are going to be trained on maize production and working on the members' farms. Demands of services are just coming from individuals not as groups hence group empowerment still low by provided RAS.

6.3. What modern technologies and information are available to small scale farmers in the Koderu village since inception of one acre fund organization in the area?

RAS has also shown positive effect on the use of modern technology and information by the farmers. This is due to the increase in the number of RAS farmers who are using the improved management practices which have been made available to them. These improved management practices are as follows; correct fertilizer (DAP & CAN) applications, row planting, correct spacing, planting of one seed per hole and weeding twice. In addition, there study also revealed that there is an increase in the use of improved seeds and fertilizers as shown by RAS farmers with only a few farmers mixing the local and improved inputs. The use of these improved inputs coupled with the improved management practices has shown a positive effect on increasing the maize yields to RAS farmers.

6.4. What was the average yield of maize in the past and now and what do farmers feel has caused the difference?

Based on the study, it appears that RAS helps farmers to increase their crop yields. This is because; before the farmers started receiving RAS, their yields were really low. But after joining OAF and receiving RAS, the RAS farmers have seen a change and are now getting increase in their maize yields. This has helped most of RAS farmers to be maize secure in their households as the families have enough maize to eat hence food secure.

6.5. What are the small scale farmers' perceptions on marketing of maize surplus to get income?

From the study, it appears that RAS still has limited effect on marketing of maize surplus to farmers. This is because only few RAS farmers have surplus to sell at the market. Majority of the RAS farmers have just enough maize yields for use in their households but not enough to sell as a surplus hence only few farmers are getting income from maize.

6.6. What RAS activities has One Acre Fund organization undertaken in the research area?

The study show that OAF is delivering services according to their objectives as they are providing farmers with farm inputs on credit, delivering the inputs closer to the farmer at a walking distance, providing training on correct usage of farm inputs. However, the study also shows that, OAF has not yet enabled farmers to sell their harvest at a significant profit. This is because the farmers have to produce enough for their households before they sell the surplus at significant profit. Although plans are underway to establish a warehouse to store maize hence they are planning to buy the maize from farmers.

6.7. What has been the effect of rural advisory services implemented by One Acre Fund organization for small scale farmers in Koderu village Rachuonyo district?

Based on the study, an effective RAS is one that has the following expected outcomes; empowers farmers, allows farmers to access RAS, increased use of modern technology, improve household food security, increase marketing and increase income. Therefore:

The study reveals that RAS shows positive effect on access of RAS to farmers since they receive quality service, timeliness in service delivery and proper methods of service delivery. There is also increased use of modern technology by farmers. For example using improved seeds and fertilizers and using the improved management practices.

RAS has also shown improvement the household food security of the farmers, since most of the farmers receiving RAS have increased their maize yields from the farm and hence have enough to feed their families in a year. However, RAS has shown limited empowerment to farmer groups since they are not in control of the services and hence are not demanding for more services. In addition, there is limited effect on marketing of maize since only few farmers have surplus to sell hence limited change seen in income.

7. Recommendation

The study has shown that OAF has limited impact on empowering farmer groups and marketing. Hence it recommends that:

OAF stimulates farmer groups to engage in interactive participation where they are also involved in decision making at all stages of the development within the production cycle and outside agriculture e.g. microfinance, leadership and management skills training. This will enhance empowerment amongst the groups.

Secondly, OAF should also collaborate with other partners for example, C-MAD, CEFA, MOA through meetings, field days so as to provide information and services that OAF do not offer yet the farmers are in need of. This will also create awareness to farmers on the respective service providers and the services they offer.

Thirdly, OAF should consider working with the small scale farmers during the short rains since the farmers also produce maize at this time. This will make them get more maize yields, more surplus to market and increased income.

Fourthly, OAF should also consider introducing other crops other than maize like sweet potatoes by delivering them to the farmers during inputs delivery to help farmers increase their productivity and income and avoid dependence only in maize.

OAF should consider involving non-RAS farmers who wish to access RAS but are hindered by limited finances. This they can do through advising the non-RAS farmers to form groups and then mobilize funds equivalent of half acre inputs as a group, so that they can share the benefits as well as access RAS.

Finally, since OAF is planning to put up a warehouse to buy and sell maize to the farmers at fair and affordable price, further research should be done to find out how this process works between OAF and farmers and if the farmers are selling their surplus at a better profit.

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Appendices

A. The Key themes used

Key theme	Indicator
Access to RAS <ul style="list-style-type: none"> - Quality of RAS - Timeliness of RAS given 	<ul style="list-style-type: none"> - Frequency of visit - Farmers practically applying the provided RAS
Empowered farmer groups <ul style="list-style-type: none"> - Control on the services 	<ul style="list-style-type: none"> - Increased demand for RAS
Use of modern technology and information <ul style="list-style-type: none"> - Physical availability e.g. (seeds, fertilizer) - Production practices e.g. row planting 	<ul style="list-style-type: none"> - Use of improved (maize) seeds and fertilizers - Improved management practices
Access to market <ul style="list-style-type: none"> - Access to marketing information 	<ul style="list-style-type: none"> - Availability of good market infrastructure

B. Guiding questions for small scale farmers

1. Frequency of visits from OAF staff

- How many times have you been visited by RAS staff this year 2012?
- What were the reasons for the visit?

2. Demand for more advisory services

- What services are being offered by One Acre Fund since they came to the area?
- What services are needed that are not provided by the OAF?
- Where and who can offer you these services?
- How have you managed to ask for these services; as a group or as individuals?
- Usefulness of services?
- Used services? If yes, how long? If no, why not?
- Attitude of OAF staff? Gender differences of staff and beneficiaries?

3. Increased maize yields

- What was the yield in 2008 before One Acre Fund came to the area? And the yield in 2012? (including the green maize eaten before the real harvest)
- How many months did you eat the maize yield in 2008? And in 2012?
- How much yields of maize is enough to sustain a given household
- What is the average number of a household 2008 and 2012?
- Are all the members of household around or some are in urban areas?
- Are the members in the others receiving some maize yields

4. Use of improved maize seeds and fertilizers

- Where did you get the maize seeds to plant in 2008? And this year 2012?
- Was fertilizer used in maize production in 2008? And this year 2012?
- What were the quantity of seeds and fertilizers used in 2008? And this year 2012?

- What was the way of acquisition of these inputs in 2008 through cash or credit? And in 2012?
- What amount of inputs (seeds and fertilizer) did you use in 2008? And in 2012? Did some remain?
- 5. Use of Improved management practices in maize**
 - What were the management practices done for maize all the way from planting to harvest time in 2008?
 - What about the management practices now in 2012?
- 6. Marketing of maize to earn income**
 - What were the quantities of maize sold in 2008? And what is the quantity sold in 2012?
 - How was price of maize determined before in 2008? And how is price determined 2012?
 - Are members having access to marketing information? If yes, how are they getting it? If no, why not?
 - What are the changes in income in 2008 and now in 2012?
 - How is the amount of maize sold determined (in terms of surplus after storing enough for the house or based on other needs).

C. Guiding questions for OAF Key informant

- What services do One Acre Fund provide to the small scale farmers
- What are they offering in reality in the field (Subjects, timing, how do they inform farmers, decision making by OAF and farmers?)
- Why the difference if any?
- What are the roles of RAS staff? And what is happening in the field in reality?
- Why the difference if any?
- What are the criteria for identifying the farmers?
- What are the indicators of success of their RAS services?
- And what are the outcomes realized (indicators) in the field
- How do they ensure sustainability of the RAS to small scale farmers?