Assessing farmers' aspirations and goals to expand irrigation crop production from homestead gardens to irrigation plots in Mhlontlo Local Municipality

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DECLARATION

I, Tabisa Nomava Finiza, hereby declare that the work contained in this thesis is my own and that other scholars' work referred to here has been duly acknowledged. I also declare that this thesis is original and has not been submitted for a degree in any other University, and will not be presented at any University for a similar or any other degree award.

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Tabisa Nomava Finiza Date

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DEDICATION

To my late father Nkosana Finiza and late brother Lizo Phakathi

ABSTRACT

Most land is still state owned and is granted to users through traditional authorities. Even though the government has undertaken some programmes to reduce rural poverty and has initiated land reform programmes, improved service delivery and formed new water rights legislation in rural areas, the problem of low crop production still persists among South African farmers. The study was undertaken to identify different farmers' aspirations and goals for expanding their crop production from homestead gardening to irrigation plots in Mhlontlo Local Municipality, in the Eastern Cape of South Africa. The central problem is that smallholder farmers are not expanding their scale of crop production even though they have access to natural capital which includes land and water. The broad objective of the study was to determine the aspirations and goals of farmers to expand irrigation crop production from homestead gardens to irrigation plots. The specific objectives of the study were to assess factors that addressed smallholder farmers' aspirations and goals to expand crop production, to identify challenges that smallholder farmers encountered in expanding from homestead gardens to irrigation plots and to determine the current state of homestead gardens and irrigation plots.

A list of 20 goals were identified from the field survey with 54 homestead food gardeners and 50 smallholder irrigation farmers in the different villages of the Mhlontlo Local Municipality. Random sampling was used to select the farmers who were asked to score the identified farm enterprise goals in terms of their relative importance. The goals were categorised into five factors using Gasson goal ranking methods which ranked goals on the basis of intrinsic, expressive, instrumental, and social criteria. The next step was to determine the standard deviations and means of the ranked goals. Descriptive statistics was then used to profile the farmers according to such factors as age, gender, years of farm experience, types of plot, the availability of water and land for crop production, the income farmers generate from the sale of crops produced and these are cross-tabulated with their goal rankings. The Logit model was used to estimate the probability that farmers would belong to a particular goal ranking and performance category. The logit model was also used to identify the factors that influence the expansion of the cropped area. The results revealed that maize production and land size where significant at 1%. Age and type of irrigation used were also positively significant at 1%. The results also revealed that the adoption of agricultural technology by smallholder irrigation farmers and homestead food gardens contributed to better quality produce.

Key words are: Aspirations and goals, expanding crop production, homestead food gardeners, smallholder irrigation scheme, Mhlontlo Local Municipality

List of Acronyms

ARD-Agricultural Research for Development

DAFF-Department of Agriculture, Forestry and Fisheries

DWA- Department of Water Affairs

ESCECC- Eastern Cape Socio Economic Consultative Council

FAO- Food and Agricultural Organization

GDP-Gross Domestic Product

ICRA-International Centre for Development Oriented Research in Agriculture

IDP-Integrated Development Plan

IWMI-International Water Management Institution

LED-Local Economic Development

MDG- Millennium Development Goals

NGOs-Non-Governmental Organizations

SANRAL- South African National Road Agency Limited

ORTDM- Oliver Reginald Tambo District Municipality

PPP- Public Private Partnership

SIS-Smallholder Irrigation Sector

WUAs-Water User's Association

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CHAPTER 1: INTRODUCTION

1.1 Background

Water is a central and basic natural resource, which sustains life and provides for various social and economic needs including irrigated agriculture (Dar es Salaam, 2009). Water is also considered a key factor in the socio-economic development and the fight against poverty in the rural areas of the country. Thus, smallholder farmers use water for many different purposes, including drinking, cooking, irrigating, and washing (Gleick, 1996). The irrigation sector, on the other hand, still largely fails to reach the majority of rural poor smallholder farmers directly and tends to prioritize irrigation over other uses, even where domestic water needs have not, as yet, been met, particularly so for poor farmers (Pérez de Mendiguren Castresana, 2003). Hence, agricultural crop production in the rural areas of South Africa is likely to continue to be on a small scale and make only an insignificant contribution to household livelihoods, considerably less than wage employment and welfare payments. However, poverty and unemployment are still heavily concentrated in the rural areas, particularly in the former homeland areas but also in the former white commercial farming areas (Lahiff and Cousins, 2005). In South Africa crop production takes place in farmers' small gardens, demarcated fields or on open rangelands.

One effective means of increasing crop production and productivity for curbing food shortages and increasing export of crop produce is irrigation. According to De Villiers *et al.* (2004), South Africa is a water scarce country and water consumption through irrigation has decreased from 80% to about 50% over the past 25 years and there is need to improve use efficiency in irrigation farming. Given the situation of water scarcity in South Africa, increasing water productivity in agriculture is essential (Hamdy *et al*., 2003). While the majority of smallholder farmers in South Africa no longer lack access to land, they are largely excluded from the irrigation development taking place in their rural areas. Hence, the irrigation sector also needs to take account of the importance of both smallholder productive uses for households and other non-agricultural uses of water, which can have an even higher priority for the users. (Rama Mohan Rao, 2003).

According to Lipsey (1977), smallholder farmers normally have numerous goals and aspirations in making decisions and they are able to identify relationships among relevant goals for the individual farmer. However, some of the farmer's goals tend to be hierarchical in nature, which meanss that some goals may have to be met before others can be reached, or that the satisfaction of 'lower' goals may create a desire for 'higher' goals (Georgescu-Roegen, 1967). Goals may be defined as ends, objectives or states that an individual farmer wishes to achieve or as gaining more desired ends. Thus, an aspiration is a goal or objective that a human being strongly desires to achieve and they sustain, empower and give purpose to a person's direction in life towards ultimate fulfillment and happiness (Harper, 2010). Aspirations describe a future state and they are typically intangible and subjective.

Furthermore, farmer's goals are likely to be influenced by household's stage in the life cycle, during which the family goes through a process of maturation, decline and regeneration (Gasson and Errington, 1993). This process will have implications in terms of the households development and operation of the farm business. Goals give purpose and direction to decision making and performance, therefore they must be defined since they serve as a measure of the success or failure of a farm (Osburn and Schneeberger, 1983). The goal of the smallholder's farm firm as a basic unit of economic activity is to maximise profits and generate income. However, the farmers' goals may be frustrated by institutional and technical constraints confronting them on a day-to-day basis. On the other hand, the smallholder farmers may adopt measures that minimise their vulnerability and enhance their profitability and welfare in their farm business (Obi, 2011).

According to Burton (2004), farm decision-makers have long-term aspirations or motivations that are unique to their families. This means that farming families seek to fulfil their motivations by creating and implementing opportunities across all aspects of their lives and throughout their lives. Thus, market and farm resources are the main factors influencing the decision making (and risk taking) which are the farmers' own choice. In South Africa, the term smallholder irrigation is mainly used to refer to irrigated agriculture practised by black people. Most smallholder homestead households are characterized by joint consumption-production decisions, but not in a tightly defined subsistence setting (World Bank, 1983). Smallholder homestead

households base their consumption and production decisions on farm input prices, the prices of consumer goods from the market, the opportunity cost of their members' time either in outside labour markets or on farm production, and demand for leisure.

According to Backeberg (2006a), South Africa has about 1.3 million ha under irrigation, of which 0.1 million ha is in the hands of smallholders farmers. Irrigation refers to the artificial application of water to land for the purpose of enhancing plant production (Hazell and Haggblade, 1990). Irrigation helps to reduce or remove water insufficiency as a limiting factor to crop production in order to increase crop yield and make it possible to grow crops in dry areas. According to Hazell and Haggblade (1990), irrigation is an important tool in generating sustainable agricultural incomes but there are also greater and wider opportunities for employment in agriculture or in other jobs created to serve the agricultural community. Water as an input in productive activities contributes to farming, livestock, forestry, fisheries, power generation, navigation, and small and large industries (World Bank, 2000/2001).

Irrigated farming has the potential to contribute significantly to food security and the income of participating homesteads in the rural areas of South Africa (Lipton et al., 1996; Bembridge, 2000), and to create employment, both directly and through forward and backward linkages to primary production (Backeberg et al., 1996).Agriculture is likely to be central to rural development and rural poverty alleviation in rural areas of South Africa. And reducing rural poverty directly is essential if the Millennium Development Goals are to be met (Overseas Development Institute, 2003). Reducing rural poverty means that rural development, as pursued by Governments and Non-Government Organisations, has to find paradigms and programmes that reduce rural poverty. Several policies such as effective land reform, development of irrigation and drainage systems, subsidized inputs and credit facilities to achieve economic and social development in rural areas of the country should be implemented by these institutions (Overseas Development Institute, 2003). Moreover, farming has high potential to create jobs, to increase returns on the assets that the poor smallholders possess, which is their labour and land; and to push down the price of staples food, which is crucial when so many of the poor are net buyers of food.

According to Backeberg and Groenewald (1995a), the South African Government rendered substantial support to irrigation development in rural areas by providing subsidies to state irrigation schemes and irrigation board schemes. The state irrigation schemes were created to increase food production, insure agriculture against drought, establish new owner-operators in the farming sector, provide rural employment opportunities and develop new rural settlements. Moreover, sustainable irrigation growth is a basis for improved food and livelihood security and the reduction of poverty in rural areas; which includes provision of irrigation infrastructure, institutional arrangements and capacity building, both technical and financial that is consistent with irrigated area expansion targets and intensification; respond to the new decentralised, demand driven, service oriented paradigm; and engagement of the private sector participation in terms of investment and service delivery for the poor (Dar es Salaam, 2009).

Moreover, crop production in small farmer's gardens and large irrigation plots is an important mainstay of the rural economy of South Africa. Thus, the biggest challenges faced by smallholder farmers in rural areas of South Africa is to maintain food self-sufficiency in the face of increasing human population and degrading agricultural production (Binns, 1996; Nel *et al*., 1997). In South Africa the majority of poor people leave in rural areas, where poverty and water are closely intertwined.
Smallholder farmers in South Africa continuously make decisions concerning how they allocate their resources of land, labour, capital and entrepreneurial ability. According to Romero and Rehman (1989), economic theory identifies that such behaviour from smallholder farmers is motivated by the desire to maximise levels of satisfaction or utility in their farms or garden plots. In light of the manner in which smallholder farmers allocate their resources and their responses to changes in agricultural policy, they require knowledge of the important motivational factors such goals, objectives and morals, which are the focal points of their decisions.

According to the World Bank (2007), the Millennium Development Project's Hunger Task Force concluded in 2005 that "the world could meet the Millennium Development Goal (MDG) of halving hunger by 2015", and that the "development of agriculture is critical to that goal". Smallholder farmers in the rural areas are

dependent on their ability to produce sufficient amounts of food crops on their fields for their own consumption This means that smallholder farmers operate on a smaller scale of crop production. In the rural areas of South Africa, smallholder farmer's standard of living is defined in terms of their social status, wealth and aspirations, which are linked to land ownership so as to determine their scale of production (FAO, 2001). Thus, smallholder farmers are the key group requiring attention from the government and NGOs in agricultural and rural development. Increasing their scale of production and incomes can make a major contribution to reducing hunger and poverty.

Moreover, smallholder commercialization and the expansion of crop production are crucial features of the structural revolution process considered by most development economists to be the major pathway from a semi-subsistence agrarian society to a more food secure and diverse economy with higher general living standards. The structural transformation process in the regions of Asia, where it was named the Green Revolution, was first recognised by Johnston and Kilby (1975) and Mellor (1976). The structural transformation process starts with broad-based agricultural growth, causing a build-up of purchasing power by millions of smallholder farmers in rural areas. Hence, the main starting point of structural transformation is broad based smallholder-led agricultural growth and commercialization. The smallholder farmers in most developing countries are pulled off the farm into viable non-farm activities, not pushed off the farm into low-paying desperation jobs in the towns as a result of the inability of local agriculture to provide a reasonable standard of living (Johnston and Kilby, 1976).

The key factors in the value chain in agricultural production of smallholder farmers in South Africa are the commercialization and expiation of crop production by smallholder irrigation farmers and raising their competitiveness to enable them reach their goals and aspiration a farm business (Sharp et al, 2008). Thus, there is a view promoted by scholars such as Paul Collier that smallholder farming in Africa is not capable of meeting the challenges of contemporary agricultural development, hence is not able to take part in the global value chain (Sharp et al, 2008). According to the DAFF (2012), smallholder irrigation farmers can play a significant role in livelihood creation among the rural poor in the South African economy. Even though smallholder farmers' production is important for household food security, the

productivity of this sub-sector is quite low in the rural areas of the country. Poor yields may be one of the reasons that urban and rural households either abandon or are uninterested in agricultural production, since they are not reaching their goals and aspirations of the farm business (DAFF, 2012). Therefore, there is a need to significantly increase the productivity of smallholder farmers to ensure long term food security and enable farmers to expand their crop production scale. This can be achieved by, among others, encouraging smallholder farmers to pursue sustainable intensification of production through improved inputs.

During the apartheid era, the South African government developed irrigation schemes in the former homelands, but even these schemes are experiencing serious institutional, financial, technical problems, and have been earmarked for rehabilitation and transfer to water user's associations to assist the schemes expand their scale of production (Perret, 2002). However, such transformation contributes very little., It is believed these smallholder irrigation schemes could play a major role in rural development and the livelihoods of the farmers. The South African government has adopted a new water legislation, which promotes equality, efficiency, representatively and sustainability through water management, water user's registration and licensing, water right's markets and new local and regional institutions. However,the problem of farmers not commercializing still persists among smallholder irrigators.

Perret (2002), suggests that, through, the transfer policies and rehabilitation, the new National Water Act of 1998 promotes the creation of Water User's Association (WUAs) among the rural farmers to enable them expand and commercialize their production. According to Bembridge (2000), these local WUAs take over the irrigation management function, through which they distribute and allocate water, financial management, maintenance and water charging systems within the irrigation schemes and this might be the cause for most inactive smallholder irrigation schemes in the country.

Smallholder farmers in rural areas encounter various farm problems which include low investments, declining productivity and climate change which hinder their reaching their farm business goals and aspirations. Substantial fluctuations in the economic, political and social circumstances affect most smallholder farmers badly but a few respond positively. IFAD (2012), indicated that there is a significant body of

knowledge on the problems encountered by poor rural smallholder farmers, and there is significant change in their economic environment. Hence, numerous developing countries are successfully and rapidly transforming their economies. However one consequence is that smallholder farms are challenged by growing competition from larger and more capitalized farms that can capture economies of scale in production and marketing, especially of food staples (IFAD, 2012).

It is argued that smallholder farmers are definitely private sector operators or small-to-medium enterprises, and are already entrepreneurs in the sense that they seek out profitable opportunity, manage costs of production and marketing, and aspire to grow their business (IFAD, 2001). On the other hand, complex land ownership rights are a persistent disincentive. Ultimately, irrigated agriculture is undergoing a transformation, particularly in Africa, and this brings opportunity and potential for growth but also uncertainty and problems for poor rural farmers as it is difficult for them to adopt new agricultural technologies. In this perspective, farm business for smallholder farmers is critical for the spirit and inspiration they bring and are best poised to realize the goals of rural economic development.

1.2 Problem statement

Smallholder farmers in rural areas of South Africa are faced with water scarcity. Agricultural crop production is highly constrained by rainfall unreliability, frequent dry spells, irrigation water scarcity and conflicts over water in most rural areas of South Africa. Hence, these constraints threaten food availability and tend to increase the food aid dependency of government. Poverty and water are closely intertwined in South Africa and household water for drinking is essential for health and nutrition (World Bank, 2000). Poor smallholder farmers are typically deprived of the benefits of water in rural areas. Hence, they are the only people in this world who suffer from life-threatening water-scarcity.

From the past to the present, the shortage of water for agricultural activities has been a major problem facing smallholder farmers in South Africa. The impact of such water shortage is severe for the agricultural areas, which rely heavily on rainwater (Withaya, 1995). Furthermore, smallholder farmers are exposed to high risks and damage due to adverse environmental conditions of soil, climate, and inconsistent rainfall patterns (Withaya, 1995). Even though, efforts have been made in rural areas

to tackle water shortage problems, by digging ponds to store water their appropriate sizes or systems have never been determined.

Moreover, smallholder farmers lack the technological assets to access water. In South Africa irrigation technologies for smallholder farmer's use have been developed at a much slower pace and on a much smaller scale than dams and irrigation schemes for those who already have much land, capital, skills, and markets to make profitable use of large quantities of water. However, some of the factors identified as having potential to influence farmers' decisions about innovation adoption include age, gender, farm size, annual income, education and experience (Bengesi et al., 2004).

South Africa has invested substantially in smallholder irrigation to benefit smallholder farmers in less developed areas of the country (Backeberg, et al., 1996). Nevertheless, production in these smallholder irrigation schemes is not intensive and often involves production of low-valued food crops which do not even meet subsistence food requirements. Thus, some of the irrigation schemes were administered in a top-down manner with emphasis on food self-sufficiency. There are various constraints on the development and viability of irrigation schemes in rural areas of South Africa and these can include small plot sizes, allocation of plots to individuals not interested in farming, inadequate access to credit, inadequate infrastructure, and lack of interaction between farmers and extension officers. The same problems of low productivity, poor relations among farmers' groups and support institutions may exist in the irrigation schemes making it difficult for farmers to reach their goals and aspirations. The problem with rural poor smallholder farmers is that they do not operate on equitable terms in local, regional or global markets. They often lack access to markets because the condition of the roads is poor or transportation is very expensive. Thus, higher food prices do not always filter down to the farm-gate, where poor smallholder farmers often have to sell their produce.

The majority of poor people in South Africa live in former homeland areas, while the remaining 20% live in freehold land areas or commercial farms (World Vision, 2003). Hence, a number of agricultural innovations have been introduced in the former homeland areas by the government and Non-government organizations (NGO) to

improve the livelihoods of the poor. Nevertheless, the goals of agricultural innovation are not attainable if rural people do not adopt and disseminate the innovations within their rural area (Quinn et al., 2003). In most rural areas of South Africa, development projects that are introduced to smallholder farmers have often been unsuccessful because they have introduced practices that the rural community did not perceive to be immediately relevant to their livelihoods.

Furthermore, smallholder farmers are regarded as being slow or unwilling to invest in their own livelihood by development agents who do not understand the decision-making processes or investment options available to the rural poor. According to Ngigi et al., (2005), the smallholder farmers themselves are interested in improving their own livelihoods, but their decisions are constrained by risks and uncertainties associated with past experiences and limited opportunities. Smallholder farmers in South Africa have many risks, aspiration, goals, limitations and opportunities to consider when they are making their livelihood decisions. Therefore, before smallholder farmers decide whether an innovation is worth investing in, they should have a realistic understanding of its risks and benefits.

Smallholder farmers essentially aim to increase production and achieve food self-sufficiency, rather than producing products for the market and making a profit, thus improving their livelihood. This problem could be partly due to the fact that different departments outside agricultural extension such as NGO's are responsible for marketing, processing and value addition to farm produce (Hussein, 2000). And declining agricultural performance is a major driving force behind the growing poverty among South African smallholder farming populations, and its recovery offers the greatest prospects for rural populations to escape poverty (DAFF, 2012). Hence, food insecurity amongst the vulnerable poor rural farming inhabitants induces a risk-minimising conventional attitude towards farming and livelihoods systems. The potential role of smallholder agriculture makes it significant to either be ignored or treated as just another small adjusting sector of the market economy (DAFF, 2012).

Most poor smallholder farmers are located in the rural areas of South Africa, manly in the former homelands areas where they lack institutional support and infrastructure, which limits their expansion in crop production, and reaching their

goals, aspirations and perceptions of the farm business. The lack of roads limits farmers in transporting their products, inputs and information about marketing of their agricultural products. Lack of assets, information and access to services hinders smallholder participation in potentially profitable markets in order to reach their farm goals of increasing profit and making income. Smallholder farmers in rural areas of South Africa are not expanding their scale of production because of the many challenges they face such as the lack of extension services as the extension officers do not train farmers on how to produce the best quality and quantity crop products for marketing purposes.

In most rural areas, water for irrigation purposes is very scarce and in some areas it is far and difficult to access, as most rural poor farmers are very old. There is also a challenge of low rain falls during the year which makes it difficult for smallholder irrigation farmers to cultivate and prepare their soils for production. They do not even have agricultural tools and irrigation infrastructure which prevents rural farmers from expanding the sale of theirproduce. Access to title deeds is one of the major problem the poor smallholder farmers face and this restricts commercialization as they have to rent land as they only have ownership of a small piece of land.

Some smallholder farmers are not willing to expand and commercialize their farm businesses as they are only interested in producing for home consumption, and their goal is to be food secure. Smallholder farmers' aspirations and goals on the farm business have a key influence in terms of decision making as some goals are for social status and not to expand farm income. According to DAFF (2012), the lack of human capital has also been found to be a serious constraint for smallholder farmers to expand their scale of production, which will lead to commercialization. Rural poor smallholder farmers are often illiterate, with poor technological skills in agriculture, which can be a serious problem in accessing useful formal institutions that disseminate technological knowledge for them to produce better quality crop products (DAFF, 2012).

The majority of smallholder farmers are not capacitated with financial and marketing skills and are unable to meet the quality standards set by fresh produce markets and food processors. Lack of production knowledge leads to lower quality in production, hence constraining these rural poor smallholder farmers in reaching their farm

business goals and aspiration by expanding their sale of production. According to IWMI (2001), factors that cause smallholder farmers not to expand their scale of operation are: beneficiaries and government-assigned extension officers lacking technical know-how and ability, inappropriate land tenure, arrangements, absence of people involvement and participation, infrastructure deficiencies emanating from inappropriate design, management and maintenance, inadequate institutional structures, low land productivity and high cash costs, local political power games and a history of dependency and subsistence orientation.

There are three vital conditions that must be met by smallholder irrigation schemes in rural areas to restore the pro-poor economic potential of irrigated agriculture: productivity, equity and sustainability and this this is mostly lacking in the irrigation in South Africa. The productivity of irrigated agriculture is substantially below its potential in the rural areas of South Africa as smallholder farmers are not expanding their scale of production reaching their farm business goals and aspiration. Moreover low productivity in irrigated agriculture is largely a consequence of inappropriate policies and weak management institutions, which were designed for very different conditions in the past and that need to be revised to close the gaps and challenges the farmers are facing in terms of production.

The productivity and sustainability of the South African environment is heavily dependent on how assets are managed. This in turn affects the availability, functioning of remaining assets, either enhancing opportunities or putting livelihoods art risk. Hence, the aspirations for sustainable development are linked to the integrity of natural resources and functioning of the environment. It has been argued that smallholder irrigation farmers need to find new business opportunities to increase their farm income or supplement their income from non-farm sources to sustain their livelihoods. On the other side, the lack of human capital has been found to be a serious constraint for poor smallholder farmers. Smallholder farmers are often illiterate with poor technological skills, which can be a serious factor for them to be able to access useful formal institutions that disseminate technological information.

1.3 Justification of the study

Smallholder farmers in South Africa are located in former homelands areas where most poor people are situated. Most are in developing countries where they can represent up to 70 percent of the national population (Bardhan and Udry, 1999). The study elaborated on the roles played by irrigation schemes in attracting rural farmers to expand their crop production from homestead garden production to irrigation plots. The study also revealed the factors that influence decision making by farmers and trends in production that enables them reach their goals and aspirations at the end of the day. The rural areas of the former Transkei homelands are poor and under developed, and they derive their livelihoods from crop production. The study explored whether the farmers are willing to move from their present disadvantaged backgrounds. It also looked at whether the irrigation schemes are active, and whether farmers achieve their goals by the end of harvest seasons.

1.4 Objectives of the study

The broad objective of this study was to determine the aspirations and goals of farmers to expand irrigation crop production from homestead gardens to irrigation plots. More specifically, the study is intended to:

- To assess factors that address smallholder farmers' aspirations and goals to expand crop production which includes profit maximization and output, commercialization and create jobs, increase standard of living and adopt technology.
- To identify challenges that smallholder farmers' encounter by expanding from homestead gardens to irrigation plots.
- To determine the current state of homestead gardens and irrigation plots.

1.5 Research questions

This section of the study addresses the research questions used in conducting the research. The primary and secondary questions of the study which stem from the study objectives are addressed in this section.

Primary question

What are the aspirations and goals of farmers in expanding irrigation crop production from homestead gardens to irrigation plots?

Secondary question

- What are the factors that influence smallholder farmers' aspirations and goals to expand crop production?
- What are the challenges that smallholder farmers encountered when expanding from homesteads to irrigation plots?
- What is the current state of homestead gardens and irrigations plots?

1.6 Hypothesis

H_O: There are no factors that influence smallholder farmers to expand crop product

H_O: There are no challenges that are encountered when expanding from homestead gardens to irrigation plots

H_O: There is current state of homestead gardens and irrigation plots.

1.7 Outline of the study

The study is organized into six chapters; chapter 1 is the introduction to the study, Chapter 2 is the description of the study area, Chapter 3 covers literature review, Chapter 4 is the research methodology, Chapter 5 is composed of the results and discussion and Chapter 6 is conclusion and recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The purpose of this study is to assess farmers' aspirations and goals to expand irrigation crop production from homestead food gardens to irrigation plots and also overviewing South Africa's irrigation schemes. The literature review also examines the water efficiency and productivity by smallholder irrigation farmers and homestead food gardens in order to reach their farming goals, at the same time consuming water. Water and land are the scarce resources which are the natural capital that homestead food gardeners and smallholder irrigators use to produce effectively, the homestead food gardeners and smallholder irrigation farmers need policy rights in order to be able to assess them. Hence, the smallholder farmers' need to have water licences for irrigation purposes in the rural areas to enhance them to reach their farming goals and aspirations.

The literature review will also highlight the importance of water and food security to ensure that rural households have the right to be food secure. It explores the South African rural livelihoods and poverty alleviation by producing agricultural products. This chapter will focus on the technology adoption by homestead food gardens and smallholder irrigation farmers to product better quality and quantity of products. This chapter will also take into consideration the challenges that are encountered by homestead food gardeners and smallholder irrigation schemes in order to reach their farming goals and aspirations. Review of previous work done will also be covered to date on goals and aspirations of farmers to expand their level of production

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2.2 Conceptual framework: Smallholder farmers' aspirations and goals

The smallholder farmers' aspirations and goals conceptual framework presents the main factors that affect farmers' aspirations and goals that they are willing to achieve at the end of the day to bring about better livelihoods and to expand their production system, and relationships between these factors. Factors that this framework will be focusing on are the aspirations and goals that can improve the livelihoods of smallholder farmers by expanding their crop production from homestead gardening to irrigations schemes, production systems, marketing, inputs, off farm activities and productivity to enhance food security.

Smallholder farmers' aspirations and goals are represented at the centre of the framework, indicating that all the factors have an impact on their investment in order to achieve their aspirations and goals.

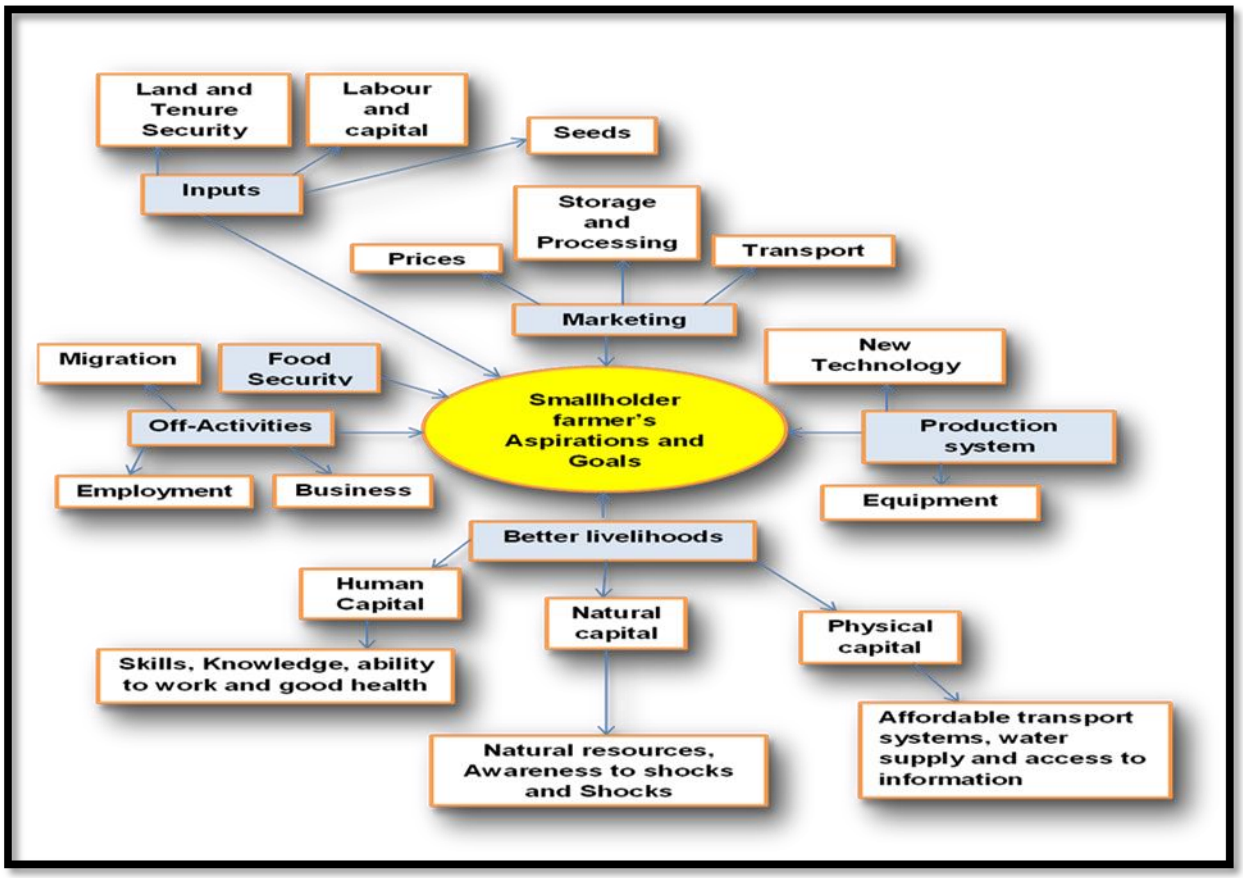


Figure 2.1: Conceptual framework

One of the main goals and aspirations of poor smallholder farmers is to have a better livelihood by taking in agricultural activities in order to produce better yields. Livelihoods of people encompass the capability and how different types of capital or assets (human, natural, physical) are used to provide a means of living. Human assets encompass the skills, knowledge, and the ability for a farmer to work and for people to have a healthy life. The physical assets refer to the basic infrastructure and physical goods that support livelihoods. Smallholder farmers in the rural area produce crop in order to be food secure in their households and the surplus will be for marketing purpose. Market mediators can play a significant role in stimulating entrepreneurship among smallholder farmers in rural areas of South Africa (IFAD, 2011). Therefore, from the trader whose raw material is at risk if smallholder farmer stop producing to the more complex relationships in contract farming. According to IFAD (2011), there is incentive along the value chain to engage with smallholder

farmers, for them to be able to reach their goals and aspirations. The incentive can translate into flows of inputs to production, technical assistance, credit, or even business training, and has been shown to be a catalyst for entrepreneurship among farmers (IFAD, 2011). And therefore markets should be supported by government agencies and private sectors so as for farmer to be aware of marketing prices, transport subsidies and have storage and processing facilities. Smallholder farmers want to have better production system so as to produce better quality and quantity products.

2.3 Goals of smallholder irrigation farmers in South Africa

According Kydd (2002), majority of the world poor rural people derive their livelihoods which are bond closely to smallholder agriculture as farmers, marketers, processors of agricultural produce and as suppliers of non-agricultural service to households whose income is principally agricultural driven, transporters, labourers and marketers of agricultural products. Perret (2002a) stated that the smallholder irrigation sector (SIS) accounts for approximately 4-5% of irrigated areas in the rural areas of South Africa. Hence, nearly two thirds of SIS are dedicated to smallholder farmers' food plots that maintenances the livelihood of 300,000 black poor farmers. Smallholder irrigation schemes have become a common agricultural property for smallholder farmers as irrigation schemes play an important role in terms of agricultural production (Samakande et al., 2004). Nevertheless, in most rural areas water allocation in the irrigation schemes among poor farmers is not always reasonable or effective, especially during drought years (Munamati et al., 2005).

Thus, agricultural production is likely to occur when water and other inputs and resources are accessible at the correct period; hence they are all used in a suitable way. According to FAO (Undated), the improvement of farmer's welfare can be subdivided into goals of minor order; at different level the goals are hierarchically dependent. Smallholder irrigation farmers have four main goals which are classified from low to high level which include an appropriate use of water for irrigation, remunerative selling of agricultural produce; appropriate use of other agricultural inputs and improvement of social facilities. However, institutional support from government agencies and private is need by smallholder irrigation farmers to achieve the goal of improvement of social facilities (FAO, undated).

2.4 Overview of South Africa's smallholder irrigation schemes

The term smallholder irrigation is mainly used when referring to irrigated agriculture practised by black farmers in mostly in rural areas of the country. In South Africa most smallholder irrigation schemes are found in the former homelands, where the rate of poverty peaks (May, 2000; Aliber, 2003). Bembridge (2000), states that the importance of smallholder irrigation schemes in South Africa arises primarily from the number of participants involved. Hence, different types of irrigation schemes has evolved in the country, and it was estimated that 1.3 million ha of land under irrigation for both commercial and subsistence agriculture (Backeberg and Groenewald, 1995). According to Backeberg (2006), the estimated number of smallholder irrigators in South Africa range between 200 000 and 250 000, even though most of these were farming very small plots primarily to provide for home consumption. In South Africa smallholder irrigators are being categorised into four groups being the home gardeners, community gardeners, independent irrigation farmers and farmers on irrigation schemes (Crosby et al., 2000; De Lange 1994)

Nonetheless, 30% of the country's GDP is contributed by agricultural sector. And these smallholder irrigation schemes consume about half of the currently available water resources of South Africa and contribute 30% of the total agricultural production (Backeberg and Groenewald, 1995). Therefore, in 1952 the Commission for the Socio-Economic Development of the Bantu Areas within Union of South Africa identified 122 smallholder irrigation schemes after their data collection. These irrigation schemes covered 11 406 ha of land and these irrigated areas where held by 7 538 plot-holders each holding a plot with an average size of 1.513 ha of land (De lange et al., 2000). Then, Commission for the Socio-Economic Development in 1955 identified a total area of 54 051 ha that the potential for irrigation development in these territories. According to the data supplied by Arcus (2004), it estimated that exploitation of this potential could enable the settlement of 36 000 farmer families in the areas where there are these irrigation schemes.

According to Van Averbeke (2008), several new smallholder canal irrigation schemes were built and all of these canal schemes have had concrete linings. At that time, the commission for the Socio-Economic Development of the Bantu Areas within the Union of South Africa in1955 predicted that these lined canal schemes would have a 20 year to 40 year life span. Nonetheless, some of these irrigation

schemes had been operational for more than 50 years, but most of them are in need of repair service (Van Averbeke, 2008). Hence the construction of canal schemes came to an end around the year of 1975.The irrigation projects established during the smallholder canal scheme period obtained their water from a river by means of a concrete weir diversion, but schemes using storage dams were also built. Also water for irrigation was brought to field edge by means of a concrete canal conveyance system.

The plot size on these schemes was considerably smaller than the 8 ha to 20 ha plots that were allocated to white settler farmers on irrigation schemes developed during the Great Depression and WOII (Bembridge, 1997). The schemes were established for the same purpose as the smallholder schemes, namely to provide for poorwhite families with full land-based livelihoods (Bruwer and Van Heerden, 1995; Backeberg and Groenewald, 1995). And the difference between the plot size for the smallholder irrigation schemes allocated to white and black farmers suggests that irrigation planning proceeded under the assumption that black families required less landand income to attain a full livelihood than white families.

According to Van Averbeke et al,. (1988), substantial smallholder irrigation development occurred between 1975 and 1985, particularly in the Eastern Cape Province. And some of the large smallholder schemes that were developed duringthis period in South Africa included Ncora, Keiskammahoek,Tyefu, Shiloh and Zanyokwe in the Eastern Cape which they were all capital-intensive (Bembridge, 1987; VanAverbeke et al., 1998; Laker, 2004).

2.5 Farm investments decision and smallholder farmers' behaviour

Smallholder farmers in developing countries operate in extraordinarily hazardous environments in order to produce products and generate income. There are policies that aim to increase agricultural productivity in such environments in order for smallholder farmer's to be able to come up with farm investments decisions. Policies may include research and extension, rural infrastructure and crop insurance for farm business to operate at a convenient environment. According to Hills (2010), smallholder farmers' investment decisions have an effect at household's income and consumption in the long term, predominantly at poor rural farm households.

Implemented development policies for the rural sector have always targeted improvements in smallholder farm productivity, rather than productivity in the non-farming sector, in an effort to eradicate rural poverty for rural poor. Reardon et al. (1998) indicated that regardless of this bias, growing evidence suggests that rural sector in developing countries reflects more activities other than farming. Hence, typical agricultural household in a developing economy is hypothesized to make decisions between farm and non-farm employment, and engage in a number of agricultural production activities aimed at both subsistence and the market (Reardon et al,. 2001). Rural poor household supply of labour to farm and non-farm sectors is described as a function of the economic returns to farm and nonfarm activities, the household's preferences, and its capacity to undertake the activities, which is determined by access to public assets and private asset. Thus, the public assets which refer to roads infrastructure and private assets refer to education and credit.

Financial markets in South Africa are imperfect and possibly they can affect decision-making behaviour of economic agents, especially smallholder farm households in rural areas. Rural financial markets in South Africa are segmented into formal and informal markets with little market share. According to Komicha (2007), lack of effective financial institutions in rural areas has compounded effects on the economic performance of smallholder farmers and rural entrepreneurs.

2.5.1Goal striving behaviour and goal setting

According to the model of accomplishment phases by Heckhausen & Gollwitzer (1987), forming an intention to pursue a specific goal is only the first step on the path to goal attainment. Thus, to attain the goal the person must also effectively standardize actual striving for the goal by implementing their goal intention successfully. According to Gollwitzer & Sheeran (2006), this is the basis for realizing one's goal intentions and it can be difficult because individuals often confront problems en route to goal attainment. Goal striving is the behaviour directed toward existing goals, hence addressing problems of moving towards the chosen goals.

Gathered evidence about goals striving behaviour indicates that if then plan formation promotes effective management of various problems in goal striving, thus increases rates of goal attainment by individuals (Gollwitzer, 1999). As a result,

these effects are observed because component processes of implementation intentions mean that people are in a good position both to see and to seize good opportunities to move toward reaching their goals. Implementation intention effects are stronger when self-regulatory problems beset goal striving and when the planning is supported by strong goal intentions. Einstein et al., (2003) quantified that there are three factors that are involved in failures to get started with goal striving. The first problem is remembering to act; this means dealing with many things at once, hence this makes it difficult to remember to act on one's goal intention.

The second problem is seizing an opportune moment to act, this occur when people are faced with tight deadlines or small windows of opportunities. And the third problem is second thoughts at the critical moment; this is a problem of overcoming initial reluctance. According to Gollwitzer & Sheeran (2006), second thoughts at the critical moment arises when people intend to perform behaviours that are perceived as having benefits in the long run but costs in the short run. Furthermore, goal setting addresses the question of what goals a person will choose and consider the expected value of the available choice options (Lewin et al., 1944). The German researchers studying goal-oriented behaviour earlier than Lewin dedicated themselves exclusively to the issue of goal striving by studying the initiation and execurion of actions serving chosen goals or instructions given by others.

2.5.2Human being levels of aspiration

Level of aspiration is defined as personal goals of an individual which are set by a person when asked what he would like to do in two goal striving situations. Lewin et al., (1944) stated aspiration levels as to how a person would like to perform or what he would like to accomplish. Youth may sometime aspire to levels to assure success and in other situations may aspire to levels to avoid failure when the situation is evaluated by some standards of brilliance (Atkinson, 1958). People are unwilling and unable to make absolute adjustments, hence they are drawing comparisons from their environment from the past from their expectations of the future and this causes deviations from aspiration level.

2.6 Water use efficiency and productivity by irrigators and homestead farmers

Agricultural sector is highly constrained by rainfall unreliability, frequent dry spells, irrigation water scarcity and conflicts over water for crop production purposes. Hence, in turn this threatens food availability and tends to increase food aid dependency for the government and other agencies. Molden et al. (2001) claimed that the increase of water productivity is more appealing through water conversation than development of new irrigation scheme facilities for smallholder farmers. However, agricultural sector in developing sectors no longer receives priority from government in their allocation of funds for development projects or even the allocation of water and irrigated agriculture is the biggest consumer of world's fresh water resources (Seckler et al, 1998). Besides water for irrigation use is transferred out of agriculture to meet the growing demand in other areas, either with the compensation for the farmers with irrigated land and water rights or without their agreement or compensation.

Different stakeholders in agricultural sector have diverse perceptions about water use productivity. This is evident by the different definitions of productivity of water. According to Henry et al., (2007), these stakeholders defined three types of water use efficiencies which include water use efficiency in technical terms which is defined as the mass of agricultural produce per unit of water consumed. They further defined water use efficiency in economic terms which is defined as the value of product(s) produced per unit of water volume consumed and lastly water use efficiency in hydraulic terms which is defined as the ratio of water actually used by irrigated agriculture to the volume of water supplied (Henry et al. 2007). In addition Singh (2005) argued that this water use efficiency does not follow the classical concept of efficiency, which uses the same units for input and output. Hence, the concept of economic efficiency when applied to agriculture can be termed as water productivity in agricultural sector.

Molden (1997), further states that water use productivity entails the net socioeconomic and environmental benefits achieved through the use of water in agricultural production activity. However, the water use productivity analysis can be done at different scales either through the crops or animals, a field or farm and an

irrigation system with interacting ecosystems. Then and there the water use may be accounted as depleted or diverted (Molden, 1997).

2.7 Water use rights policy

According to Guerin (2003), water rights are defined in water law as the right of water user to use water from a water source. Hence, formal laws and regulations can provide barriers or opportunities to water users to sustain one's claim and mobilise water resources and people (Beccar et al., 2002).Water sources include the rivers, dams, steams, pond or source of groundwater that are available for livelihoods use or for crop irrigation purpose. Hence in areas with abundant water and few users such water rights systems are generally not complicated or contentious (Guerin, 2003).Commonly, water rights are based on the water law that applies in a particular country and, at their most basic, are classified as land-based or use-based rights. Some countries allow their subdivisions to establish independent water laws.

There is a need to look beyond formal laws and analyse water rights in the context of actually these water laws and regulations function in practice (Beccar et al., 2002). IFAD (undated) maintained that the irrigation scheme raises specific issues in relation to water rights with the concern of level right to abstract water from the natural source to feed the irrigation schemes. And the other concern is the right held by irrigation agency through licence or permit and the water delivery rights held by individual farmers on basis of water contract within the irrigation agency in return for water fee they have to pay (IFAD, undated). Hence, the key water delivery rights issues include smallholder farmer's security of access to water, responsibilities and operative of water users associations, accountability mechanisms to ensure timely and effective water distribution and the level and nature of water fee that the users will have to pay in receiving water.

Globally there is a rising considerate that water rights are important and that a lack of operational water rights systems creates problems for the management of increasingly scarce water supplies to the users in a country (Matthews, 2004; Bruns *et al*., 2005; Meinzen-Dick and Nkonya, 2005). Herrera et al., (2004) stated that if the water rights are better defined, then the water users will be willing to pay higher water prices for water use because the transaction costs will be reduced. In addition,

this makes it possible to use dependent valuation methods to evaluate alternative water rights policy options (Herrera et al., 2004).

The primary reason for irrigation is to increase agricultural productivity where surface soils are unusually drier and semi-arid regions often have higher agricultural productivity if their soils are irrigated. According to World Resources (1995), irrigated land is more productive than the rain fed land for crop production; hence the development of irrigation land over the previous 30 years it has contributed to gain in food production. World Bank (1991) also stated that irrigation process has influenced not only agricultural productivity but also employment, development and incomes in the economy. Smallholder irrigation schemes play a vital role in rural development, thus improved water rights policy can encourage smallholder farmers to use water more productively and invest in water preserving technologies in order to save water (Bruns, 2003; Wichelns, 2004: Brooks and Harries, 2008).

2.8 Rural livelihood strategies and poverty

According to FAO (2003) in rural areas of South Africa, poverty is one of the main causes of food insecurity and public conflict; hence it denotes a barrier for the achievement of countries sustainable economic and social development. Poor rural dwellers are engaged in diverse and multiple activities to improve their livelihoods by maximising income generating activities; thus minimising vulnerability and risk and achieving other household objectives in terms of nutrition, education and improvement of health (FAO, 2003). Livelihoods of people comprise the capabilities, assets and activities required for means of living. Hence; a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain its capabilities and assets, while not undermining the natural resource base (Chambers and Conway, 1992).

Acharya (2006), acknowledged four principal ways that rural households of acquire livelihoods which includes the production-based livelihood, labour base livelihood, exchange or market based livelihood and transfer-based entitlements. Production-based livelihood is a large proportion of small and marginal farmers gain livelihoods through production of small pieces of land. Therefore, the access or availability of inputs for production and methods of improved production are quit critical for

livelihoods of rural people. Acharya (2006), also pointed out that some of the small landholders and landless rural households derive their livelihoods by selling their land, as wage rates and food prices are the main critical factors. Rural households without any income earning asset depend on government or other social organisations for their livelihood transfers. And also, those livelihoods that produce surplus food and non-agricultural products earn their rural livelihoods by selling the surplus in the market.

Furthermore, the capability for a household to pursue different livelihood strategies on the basic of social, touchable and intangible assets that people have in their possession of assets (Johnson, 1997). However, improving rural people livelihoods in a sustainable way may involve viewing rural poor people as the primary actors in the development process and ensure that interventions promote activities that will be socially, economically and environmental sustainable to the livelihoods of the poor rural people. FAO (Undated) also stated that generating a favourable macro environment for rural and agricultural development in accordance with specific comparative advantage can improve rural people's livelihoods. And also rural livelihoods can be improved by access for the poor rural people by different forms of capital (human, social, natural, financial and physical) to enhance people's diversification of livelihoods. Hence, livelihood strategies of rural households' vary massively, but a common rural strategy is for household members to embark on a variety of activities which each in some way contributes to one or more of household needs (Ashley, 2000). A study done by Ashley (2000), shows that a number of rural derive households rely on a range of natural resource uses and on off-farm income from employment or remittances in order to reach their goals and aspirations. Rural poverty in most developing countries is measured in terms of income and rural poverty has been and remained at higher levels compared to urban areas (IFAD, 2001).

Devereaux (1993) and Davies (1996) made a difference of rural livelihood strategies among the accumulative, adoptive, coping and survival strategies. Accumulative livelihood strategies are those strategies that increase consumption outcomes and stocks of assets in response to opportunity. Thus, an adoptive strategy seeks to spread risks of consumption failure in response to anticipate adverse trends. However, this may be possible through the intensification of existing livelihood

strategies or diversification into new activities. Hence, the coping strategies are those livelihood strategies that absorb the impact of an opposing shock by drawing assets and reducing consumption and coping may lead to survival strategies or rural livelihoods (Devereaux, 1993 and Davies, 1996). Now in the survival strategy not only consumption is drastically reduced, but household assets are extensively eroded in an attempt to ward off destitution and death by rural people. The table below shows the livelihoods strategies into new activities by rural people to attain their livelihood goals.

Table 2.1 Typology and examples of different livelihood strategies

Types of livelihood strategies	Internal livelihood component		
	Change to assets	**Strategies/activities**	**Consumption outcomes**
Accumulative	Increased stock of assets. Increased flexibility across asset base	As for adaptive.	More income. Improved nutrition. Increased security
Adoptive	Change in mix of assets.Precautionary saving offinancial & other assets.	Extensification (cultivation ofmore land). On-farm & off-farmdiversification (e.g. change incropping mix, wage labour). Intensification of cashcropping. Investments in social capital. Migration	Income and consumptionsmoothing. Risk reduction. Risk spreading. Labour smoothing.
Coping	Intensified sale oflivestock.Calling down informalclaims (e.g. through kinnetworks).	Piecework, agricultural labour. Temporary migration. Withdrawing children fromschool.	Reduced frequency, quantity and quality of meals. Use where available of relieffood. Social and ceremonial obligations reduced
Survival	Sale of productive assets(e.g. bicycle, land). Sale of household effects(e.g. bed).	Illegal activities. Begging. Permanentout-migration.	Starvation and destitution.

Source: Devereaux (1993) and Davies (1996)

2.9 Sustainable livelihood framework

The livelihoods framework is a tool to improve our way of understanding livelihoods, particularly the livelihoods of the rural poor (DFID, 1999). This livelihood framework was developed over a period of several months by the Sustainable Rural Livelihoods Advisory Committee, building on earlier work by the Institute of Development Studies. Hence, the sustainable livelihood framework places people at the centre, particularly rural poor and how these people create a livelihood for themselves and their households. Furthermore, Scoones (1998) developed a conceptual framework to guide research into sustainable livelihoods and Carney (1998) slightly adjusted the version of sustainable livelihood framework to guide development aid policy. Therefore, sustainable livelihood framework presents the main factors that affect people's livelihoods and the relationship between these factors. According to IFAD (1999), sustainable livelihood framework provides important issues and sketches out the way these factors link to each other, draws attention to core influences and process and emphasises the multiple interactions between various factors which affect rural livelihoods of the poor. Thus, such literature have been utilised to better develop understanding of the external determents and decision-making mechanisms associated with rural livelihoods strategies and their goals and aspiration.

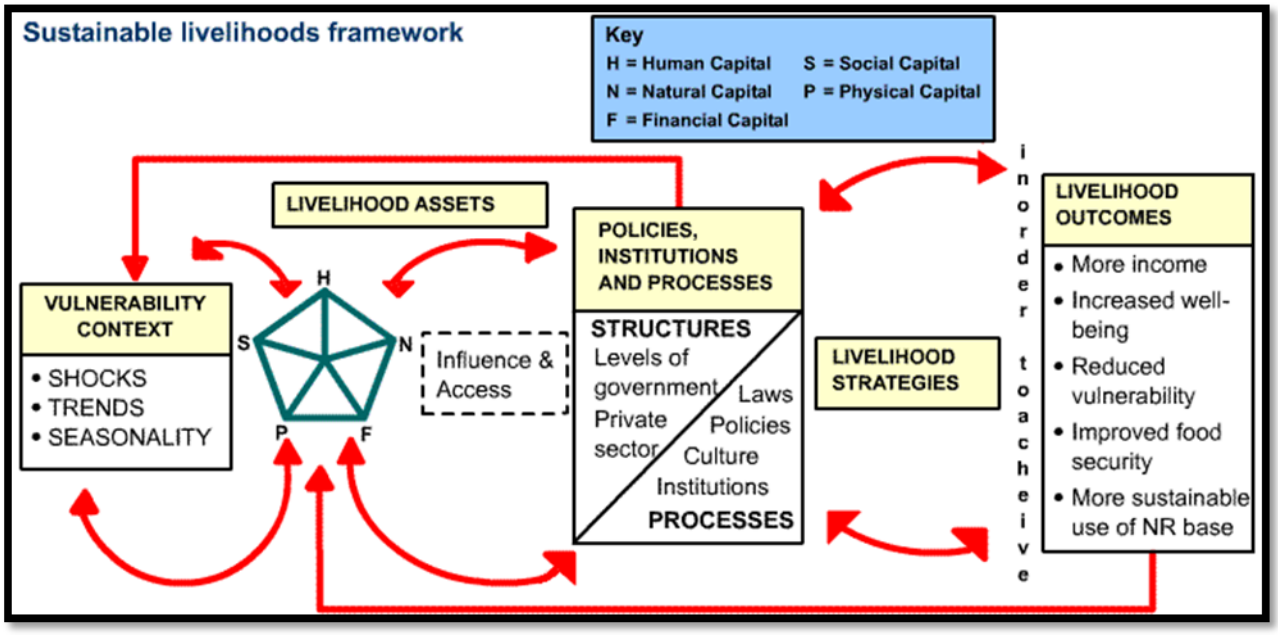


Figure 2.2 Sustainable livelihoodsframework
Source: Scoones and Carney, 1998

Livelihood assets which people rely upon play a vital role in the livelihood framework for the poor people. Rural people with more assets are more likely to have greater livelihood options with which to pursue their goals and aspirations, thus reducing the level of poverty (Clark and Carney, 2008). Conventionally, there are five categories of capitals or assets which includes; financial, social, natural, physical and human capitals. According Carney (1998) to livelihoods assets are the basic building blocks from which the livelihoods of people are generated. In table 2.2 below by DFID (1999) the livelihoods assets are further described.

Table 2.2: Types of livelihood assets

Human capital (H): the skills, knowledge, ability to labour and good health important to the abilityto pursue different livelihood strategies;
Physical capital (P): the basic infrastructure (transport, shelter, water, energy and communications)and the production equipment and means that enable people to pursue livelihoods;
Social capital (S): the social resources (networks, membership of groups, relationships of trust,access to wider institutions of society) upon which people draw in pursuit of livelihoods;
Financial capital (F): the financial resources which are available to people (whether savings,supplies of credit or regular remittances or pensions) and which provide them with differentlivelihood options; and
Natural capital (N): the natural resource stocks from which resource flows useful for livelihoods arederived (e.g. land, water, wildlife, biodiversity, environmental resources).

Source: DFID (1999)

2.9.1 Vulnerability

Vulnerability for poor rural households the interaction between internal livelihood components and the external influences typically reveals a pattern of vulnerability. According to Ellis (2000b) vulnerability is often a key component of poverty and the context that seeks to portray the dynamic of macro-environment influencing livelihoods. Hence, diversification of livelihood objective of the rural poor, in turn influence the choice of livelihood strategies of the rural poor people (Ellis, 2000b). The external side of vulnerability has dimensions of shock, trend or cycle in season's fluctuations in price, production, health and employment. Therefore, factors can have a direct impact on people's assets and on the option available to them pursue beneficial livelihoods strategies, thus reaching their livelihoods goals and aspirations (Clark and Carney, 2008). And shocks are related with the ability of livelihoods of rural poor to cope while trends that are associated with the flexibility of livelihoods (ODI, 2000). Thus, seasonality may relate to commodity of prices, production capabilities, access to natural resources and employment of the rural poor. The table 2.3 shows the vulnerability context in details.

Table 2.3: Trends, Shocks and Seasonality

Trends	**True shocks**	**Regular or seasonal shocks**
Population trends • Resource trends • Environmental degradation • National/international economic trends • Trends in governance • Technological change • Human health trends	Human health shocks • Droughts, floods • Economic shocks • Conflict, civil upheaval • Pestilence, crop diseases • Livestock health shocks	Of prices • Of production • Of health • Of employment Opportunities

Source: Devereux (1999)

Furthermore, the policies, institutions and processes refer to the complex social, economic and political context within which people pursue their livelihood strategies of the rural poor and for them to be able to achieve their goals and aspirations. These factors can have a great influence on rural people's access to assets, hence creating them, determining access and influencing rates of asset accumulation. Nonetheless, the key to understanding their impact on local livelihoods is an analysis of the operation, or absence, of links between micro and macro levels (Devereux, 1999).

2.9.2 Livelihoods outcome

Chambers (1983) stated that livelihood outcomes refer to the outcomes of the people's livelihoods strategies. Hence, livelihood outcomes are the goals to which people aspire such as an increased income, increased well-being, improved food security, reduced vulnerability and sustainable use of natural resources as indicated in figure 2.2 (Chambers and Conway, 1992).

2.10 Technology adoption by smallholder farmers

In the Africa countries, the widespread of poverty in the rural areas is often impugned on the fact that significant proportion of agricultural growth comes from area of expansion instead of increased productivity (Asenso-Okyere, 2009). Hence, if poverty should be alleviated in the African economy, then the productivity in agricultural sector which employs the majority of citizenry must be increased. Asenso-Okyere (2009) argued that agricultural productivity will not increase in the African countries if the capacity of farmers and other actors in the agricultural value chain remains low, inhibiting them from transforming. However, innovation in agriculture includes new technologies or knowledge that is related to primary production, commercialization and processing of products and which can affect the productivity, competitiveness and livelihoods of farmers to achieve their goals so as to aspire.

According to Hayami and Ruttan (1985) agricultural technology adoption is the significant key to understanding intense improvement in agricultural productivity as proved in Asia's Green Revolution which occurred since the late 1960s and which

was nothing but the development of new technologies invented through scientific research. However, there is a current low adoption of technology by smallholder farmers which is having an impact in their low agricultural productivity. Morris et al,. (2007) stated agricultural researchers and policy makers had agree that to realize a Green Revolution in Africa, an increase in the use of fertilizers and improved seed technologies is should be inevitable.

Asfawand Shiferaw (2010) indicated in terms of achieving agricultural productivity growth in rural areas of developing countries, it will not be possible without increasing and distributing yield-increasing technologies because it is no longer possible to meet the needs of increasing numbers of people by expanding areas under cultivation. Moreover, agricultural research and technological improvements are crucial to increase agricultural productivity and thereby decrease poverty and meet demands for food without irreversible degradation of the natural resource base in rural areas. And there is still extensive food insecurity issue in rural areas of the developing countries; hence without adoption of agricultural technology the situation will be unimaginable (DFID, Undated).

According IFAD (2001), rapid technological change leads to increase in productivity increases in rural areas of developing country and new technologies have been developed for non-cereals for resistance to pests and diseases. However, new agricultural technologies are important for poverty reduction in rural areas, and if not carefully managed, they can create additional demand on resources which may simply not be sustainable in the future. Consequently, the most understandable example of this is water; for example the lowering of water tables and loss of aquifer water, but other resources, including biodiversity and chemicals.

Lipton and Longhurst (1989) argued that there are multiple objectives involved in planning for the development and distribution of agricultural technology are remarkably challenging, hence any new technology may set off a series of second order changes related to institutions, competing enterprises, labour markets that are very difficult to predict. Therefore, these factors lead to some moderate warnings about the limitations of planning to maximise impact on the poor (Lipton and Longhurst, 1989). Nevertheless, Alston et al. (1995) acknowledged the different technology development strategies that can have profound and quite different effects

on equity. Alston et al., (1995) subsequently urge that other policy mechanisms must be in place to correct for negative impacts and they concluded that it is unwise to rely solely on agricultural research as a primary instrument for the pursuit of objectives other than economic efficiency. Furthermore, Byerlee (2000) concluded that research in terms of improving broad-based efficiency will often produce better benefits for the rural poor smallholder farmers than those efforts which seek to specifically target poverty alleviation.

2.11 Challenges faced by smallholder farmers to attain their goals

Globally smallholder farmers are faced with many challenges that hinder them to reach their farm goals in terms of maximizing production and generation more income. According to Baloyi (2010), largely, smallholder farmers in less develop countries face major challenges which includes lack of finance for production inputs, extension and research support services from government and private sectors, poor access to land, lack of on-farm and off-farm infrastructure, lack of access to mechanisation, limited access to high-value markets and transport logistics (Baloyi, 2010). Smallholder farmers are the main drivers of many economics in African countries, even though their potential to the economy is often not brought forward.

Department of Agriculture, Forestry and Fisheries (2012) further stated that smallholder farmers in the rural areas of South Africa are faced with various challenges that hamper their growth and ability to effectively contribute to food security relative to attain their goals to commercialisation. Hence, some of the constraints these smallholder farmers face relate poor physical and institutions that are available to them which limit their expansion. Therefore, this implies that the acquisition of agricultural resources becomes different and the supply of market services also becomes limited for the smallholder farmers (DAFF, 2012). Lack of assets, information and access to services hinders smallholder participation in potentially lucrative markets.

2.11.1 Lack of finance

Munshi (2004) stated smallholder farmers in rural areas of developing countries do not always possess full information when making their farm business decisions. And lack of financial access for production is one of their main challenges. Access to

finance is one of the major problems faced by poor rural smallholder farmers in most less developed countries. International Finance Corporation (undated) identified that lack of access to credit prevents farmers from obtaining the necessary inputs and capital to undertaking into farming business to benefit their households and stain their livelihoods. In the rural areas of South Africa, financial arbitrators have not been able to accommodate poor smallholder farmers because it is uncertain, costly and a difficult task associated with high transaction cost as these farmers produce manly for consumption (Spio, 2002).

Furthermore, Oettle et al., (1998), claim that the exceedingly dualistic agricultural sector purposely supported the white-dominated large-scale farming during the apartheid era, which acknowledged subsidized interest rates, unlike the smallholder farmers. Thus, this increased the accessibility of cheap credit and an increase in the hunger for credit by large-scale farmers. Kalinda et al., (1998) argued that the major credit source is largely dominated by government which is a reflection of the unwillingness of private financial institutions to invest in rural markets and agricultural production. This then means that available credit for agricultural production is often taken by larger producers (commercial farmers) whilst the poorer smallholder farmers may have little or no access to credit because of institutional barriers (Ani et al., 2009). However, poor rural farmers often have difficulty obtaining credit and financial institutions are typically biased against smallholders.

According to Machethe (2005), improving access to credit for poor rural smallholder farmers is one of the key elements in raising agricultural productivity and establishing parastatal institutions with mandate to channel credit to farmers is of the approaches used by government in developing countries to promote smallholder agricultural development. As a result, in South Africa the government introduced Comprehensive Agricultural Support Programme was towards addressing the problem of lack of access to farmer support services which appears to have incorporated some of the lessons for the agricultural development experience in the 1960s by poor smallholder farmers (Machethe, 2005). Thus, the department of agriculture, forestry and fisheries introduced a programmed called MAFISA scheme to provide financial support to smallholder farmers in the rural areas of former homelands. MAFISA loan provided services which include production loans, capacity building for members of owned

financial institution and facilitation of saving mobilization for rural poor smallholder farmers (DAFF, Undated).

2.11.2 Limited access to high-value markets

Previous studies have mentioned several challenges faced by rural poor smallholder farmers to access formal markets or links in existing competitive markets. However, the World Bank (2007) stated issues associated with the lack of access to markets by smallholder farmers which includes: difficulty in meeting quality standards, weak technical capacity, exposure to additional risks and difficulty in meeting contract conditions. Hence, the high-value markets can offer profitable opportunities for improving smallholder farmer's income as domestic markets for livestock and horticultural products exhibit particular vitality. Van der Heijden and Vink (2010), identified that many smallholder farmers in developing countries had limited choice of output markets, thus depending on thin local markets. These rural smallholder farmers remain the poorest and most vulnerable groups and one of the challenges to barriers to markets are the transaction costs, which leads to marginalization of large number of African peasant from the economy. Johnson (2005) further stated that in remote rural areas markets fail because of risks and costs of participating especially for poor people may be too high, or there maybe economic and social barriers to market entry.

Bienabe et al. (2004) distinguished lack of access for rural poor smallholder farmers to high-value markets as the following constraints for trade: barriers to entry; risks; transaction costs; lack of scale; lack of capital; lack of human capital; asymmetry of information or lack of information on markets; lack of bargaining power and asymmetry of negotiation. On the contrary, Maxwell (2004) argues that the higher-value market participation of rural smallholder farmers will be strictly constrained by the requirements of more discerning buyers and supply chain. Hence, over the past decade, many developing country governments and worldwide development organizations have concluded that increased smallholder participation in higher-value agri-food markets is essential for meeting economic development and poverty reduction objectives.

2.11.3 Extension and research support services from government and private sectors

The agricultural sector is essential to rural development and contributes significantly to any initiative to alleviate poverty in developing countries. Thus, there is a great need for strong extension and advisory services led by government's operations in partnership with relevant role-players to promote rural development (DAFF, 2005). Lack of successfully functioning extension systems is a critical impediment to improving producer livelihoods and meeting smallholder farmer's needs and these extension services are important for both the private and public sector (Feed the future, Undated). Therefore, the private and public sectors provide supervision that allows smallholder farmers to solve their own problems associated to low productivity, lack of market access and even pest and diseases. Adebayo (2004) claimed that agricultural extension agencies information, advices and other services to rural poor smallholder farmers to assist them to improve their farm and non-farm income. The public sectors goals for the smallholder farmers is to work towards national policy, thus commercial entitles are guided by profit considerations and seek to achieve high quality standards in crops and meet market capacity (Adebayo, 2004).

According to DAFF (2005), widening the access to extension services it is the government's policy, and agricultural extension presents serious problems in respect to efficiency and relevance. Hence, the government needs to review and reform the agricultural extension in terms of its effectiveness of its structure and relevance of its content and focus which is to improve farmer's livelihoods. The extension agencies are experiencing constraints and pressures on their ability to provide effective extension and advisory services to smallholder farming communities in the rural areas of South Africa. Swamson(2008) indicated agricultural extension is seen as a playing a wider role by developing social and human capital, increasing knowledge and skills for production and processing, enabling access to markets and trade, working with rural smallholder farmers towards sustainable natural resource management practices and also organising smallholder farmers groups.

Furthermore, smallholder farmers need diverse range of information to support their farm enterprise thus reaching their goals in crop production and adopt new

agricultural technologies. According to Van den Ban (1998), smallholder farmers require information related to the following:

- Most appropriate technological options
- Management of technologies, including optimal use of inputs
- Changing farm system options (mixed farming and diversification, animal husbandry, fisheries)
- Sourcing reputable input suppliers
- Collective action with other farmers
- Consumer and market demands for products
- Quality specifications for produce
- Time to buy inputs and sell produce
- Off-farm income-generation options
- Implications of changing policies (input subsidies, trade liberalization)
- Access to credit and loans
- Sustainable natural resource management and coping with climate change

Therefore, this means extension service should strive to enable the farmers to become more effective leaners. The smallholder farmers should learn more farm environment and countless complex relations in order to be a better producer and be sustain their livelihoods. Hence, agricultural extension is generally poorly equipped in terms of staff skills and financial resources for identifying and communicating technology needs for smallholder farmers and managing local level interventions.

2.12 Chapter Summary

This chapter reviewed literature on factors that address smallholder farmers' aspirations and goals to expand scale of crop production which included adoption of technology, profit maximization and output, commercialization and job creations. The chapter further reviewed that the irrigated agriculture is manly practise by poor black farmers in the rural areas of South Africa. Hence, agricultural sector in rural areas no longer receives priority from government in allocation of funds for water and irrigated agriculture, as production is the main water consumer.

The literature reviewed that the primary reason for irrigation is to increase agricultural productivity, thus most rural farmers' do not know the formal water laws and regulations of South Africa. Water rights are important as there is a growing demand of fresh water for irrigation purposes. Rural livelihood strategies and poverty, sustainable livelihood framework and livelihoods outcomes of rural smallholder farmers were also reviewed.

This chapter reviewed challenges encountered by smallholder farmers in rural areas of South Africa to attain their farm business goals which include lack of finance, limited access to high-value markets and lack of support from extension and research support services from government and private sector. Thus smallholder farmers are the main drivers of the economy, even though their potential is not being recognised.

CHAPTER 3: DESCRIPTION OF THE STUDY AREA

3.1 Study area

The study was conducted in the Mhlontlo Local Municipality, which is located in the Oliver Reginald Tambo District of the Eastern Cape Province. Mhlontlo Local Municipality was established in terms of section 12 of the municipality structure Act no, 117 of 1998 (IDP, 2009). Mhlontlo Local Municipality covers an area of approximately 2826.1660 square kilometres and it lies on the north east side of the Eastern Cape Province border alongside the N2 route between Mthatha and Mt. Frere and R396 route between Tsolo and Maclear (IDP, 2009). The area has two main urban centres, Tsolo and Qumbu, and is located along the N2 and R396 routes. The study area comprises rural and urban communities. It is administered through 21 wards. The local municipality has a huge potential for agriculture and improved utilisation of available arable agriculture that still needs to be realised (Mhlontlo local municipality IDP, 2009; Mhlontlo local municipality LED Strategy, 2007).

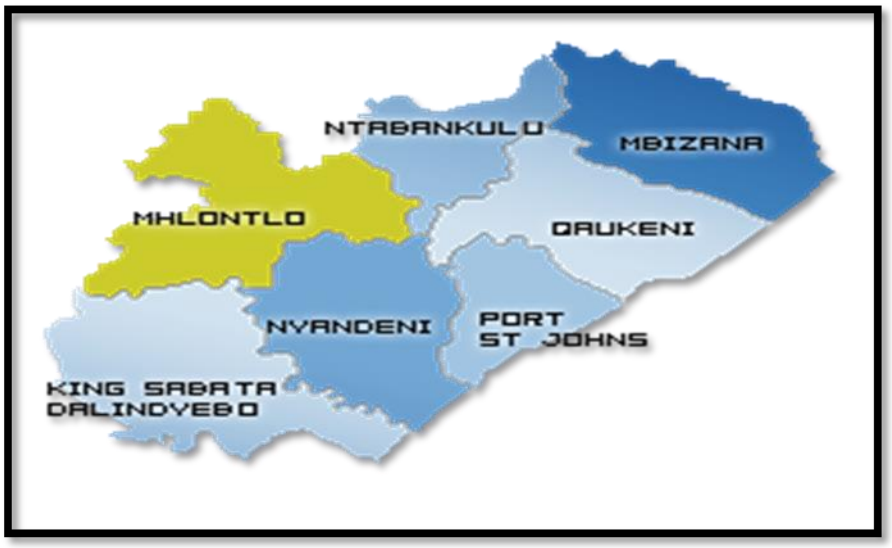


Figure: 3.1 Source: Google map, 2013

3.1.1Demographic information

Mhlontlo Local Municipality has a total population of 197 723 people including Tsolo and Qumbu towns which fall under the local municipality (IDP, 2012). The population is composed of 99% Black Africans and the rest of the population is made up of Coloureds, Indians and Whites (Statistics SA, (2001).According to Statistics SA (2001), the population in Mhlontlo Local Municipality reflects that a large portion of

the population (116 989) is children under the age of nineteen (19). The economically active population makes up 35% of the population. Therefore, the number for youth is 25 442, middle age 30 942 and the elderly people15 924. Pensioners make up about 16 547 of the population which amounts to8% of the total population (Statistics SA, 2001).

3.1.2 Socio-economic profile

Mhlontlo Local Municipality is characterized by a high level of poverty which is more than 78% and is significantly higher than the provincial level (IDP, 2011). According to ESCECC data (2008), roughly 43,000 or 21% of the adult population in Mhlontlo Municipality has formal education. Another 134,000 or 65% has not gone beyond grade 12 or matric. This may be due to poor access to schools in the area and social factors such as (high rates of income and poverty and teenage pregnancy) also play a role.

Mhlontlo Local Municipality's share of GDP-R was 8.7% in 2007, which is the second biggest contribution in the OR Tambo District after King Sabata Dalindyebo Local Municipality. However, tourism, which also forms part of the wholesale and trade sector is one of the priority industries in the local municipality. According to the LED strategy (2007), the local municipality boasts natural beauty in the form of waterfalls, rivers, cultural and historic heritage.

3.1.3 Climatic conditions

The Local Municipality has a huge potential for agriculture. The good climatic conditions, soils and land abundance point to the richness of the municipality and potential in high value crops and fruit production (Mhlontlo Local Municipality and LED strategies, 2007).

3.1.4Topography and rainfall

The topography of Mhlontlo Local Municipality shows that the western area is relatively steep, while the eastern portion is relatively flat. The major river in the local municipal area is the Tina River, which cuts through the eastern section of the local municipality (IDP, 2012).In Mhlontlo local municipality the annual average rainfall for

the majority of the area is between 701 and 800mm, with the western area having a higher rainfall and the eastern area with a rainfall of less than 600mm per annum (IDP, 2012).The topography and rainfall together have implications for the potential productive use of the land in the municipality.

3.1.5 Spatial Analysis

Mhlontlo Local Municipality is characterised by two urban settlements and settlements with low density and rural areas in nature. Thus, these settlements are characterised by low levels of government services. According to the IDP (2012), allocation of traditional land and land tenure are still taking place in the rural areas of this municipality. However, there is enough land for commercial agriculture and industries in the urban areas of this municipality. As the land in rural areas of Mhlontlo local municipality is under the traditional leader, it is meant for grazing, residential and mielie fields purposes for the rural people. Furthermore, the municipality is composed of a variety of natural and cultural features such as availability, agricultural potential and existing infrastructure, favourable climate (IDP, 2012).

3.1.6 Water availability and infrastructure

According to the DWA (2011), there is very little information available on the current water supply and water requirements in most of the villages within the Mhlontlo local municipality. However, the abolition of the bucket system of waste removal has been extremely slow in the villages of the municipality and the provided alternative of water supply is of poor quality (IDP, 2012). A high number of T roads of the local municipality have also been identified as requiring serious attention. According to IDP (2012), the Mhlontlo Local Municipality has formed public private partnerships (PPP) with SANRAL, ORTDM and Camdekom in the construction of roads (Tsolo main road) and bridges (Lalini Bridge). According to Mhlontlo Local Municipality (2008), more than 90%of roads in the local municipality are gravel and generally not in good condition and this poses major challenge for socio-economic development. Thus, maintenance of road infrastructure is identified as a major challenge for the local municipality.

3.1.7 Irrigation development

Smallholder irrigation for poor farmers is a promising vehicle for rural development in the villages of Mhlontlo local municipality (Chakwizira, 2010). The irrigation schemes offer farmers in the rural areas of the village increased crop production thereby improving the household food basket and reducing the poverty of the households involved in the scheme. Smallholder irrigation development in Mhlontlo Local Municipality can make a significant contribution towards the productive utilization of land in the rural setup (Chakwizira, 2010).

3.2 Summary of the chapter

The study was conducted in Mhlontlo Local Municipality located in the Oliver Reginald Tambo district of the Eastern Cape Province. A study concluded by IDP (2011) concluded that Mhlontlo Local Municipality had total population of 197 723 and is characterized by high levels of poverty. The study area's annual average rainfall is between 701 and 800mm, and the biggest river in the Local Municipality is in the eastern part. Most roads in the area are not in a good state and infrastructure is identified as one of the major challenges in the Municipality. Thus the irrigation development in the Municipality is a promising vehicle for development of poor farmers.

CHAPTER 4: METHODOLOGY

4.1 Introduction

This chapter describes the Agricultural Research for Development (ARD) research approach, which details methods and tools used in the information gathering from farmers and other relevant stakeholders used in the study. In carrying out this filed study, the ARD procedure developed by International Centre of Development-orientated Research in Agriculture (ICRA) will be applied. It utilizes a participatory and systems approach to integrate the diverse perspectives of all relevant stakeholders. This section also designates the sampling procedure, data collection and statistical analytical tools that were deployed in the study.

This study covers three specific objectives, which were analyzed with three different techniques to answer specific questions of the study. In this study qualitative and quantitative data was collected and the relevant analytical techniques were used accordingly for each specific objective.

4.2 Preparatory phase

This process involved the key concepts, skills, ARD procedures, inter-disciplinary team concepts, introduction to the tools for information gathering and analysis of how to conduct a participatory research through a series of workshops. I will formulate the research and work plan to illustrate the purpose and expected output of the study.

4.3 Analytical framework

An analytical framework provides practical tools and methods used in the study to gather information from respondents. This section of the analytical framework is to elaborate more on sampling and data collection, survey data, data analysis and model description and how and where these are used in the study.

4.3.1 Data collection tools

Data collection tools that were used in the study included key-informant interview, focus-group discussions, transect walks, seasonal calendars, semi-structured

interviews, resource maps and secondary data. Their use and application can be seen in the diagram below.

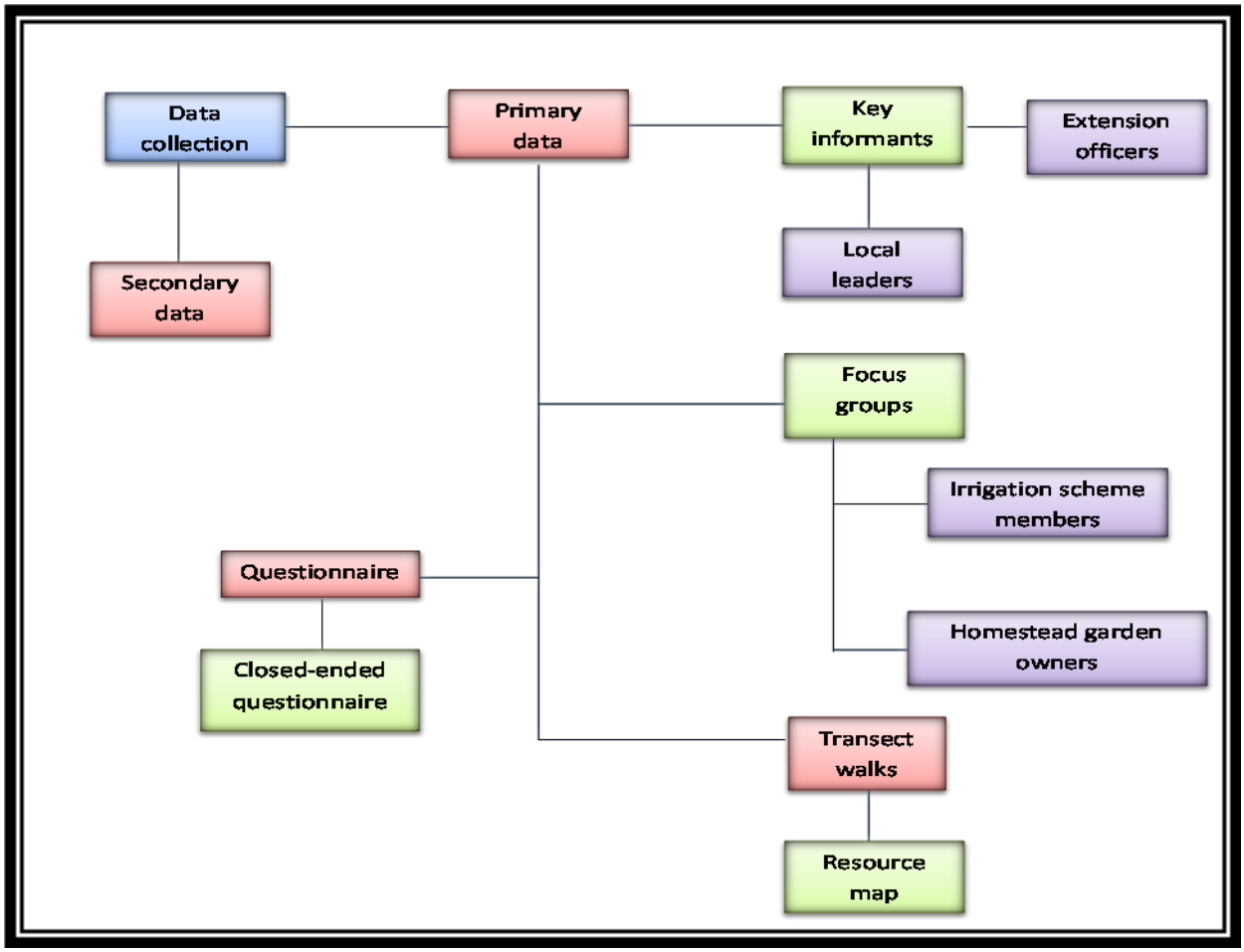


Figure 4.1 Data Collection tools

4.3.1.1Key informant interviews

The Key informant interviews with various stakeholders were conducted to attain relative and specific information about irrigation schemes and homestead garden plots, thus attaining the perspectives of different stakeholders. Key informants interviews for this study include extension officers working with the smallholder farmers both in the irrigation scheme and homestead gardens, the local chief, headman and the Mhlontlo Local Municipality officials.

4.3.1.2 Focus group discussions

The focus group discussions helped to attain information from both irrigation scheme members and homestead gardeners in the villages of Mhlontlo. A focus group is a form of a qualitative research in which groups of farmers in the study were asked

about their goals, aspirations and perceptions in terms of crop production both from homestead food gardeners and smallholder irrigation schemes. The questions were in an interactive group setting which was where the farmers were able to talk freely.

4.3.1.3Transect walks

The transect walk in the villages helped to identify village resources (available land and water) and their placement.

4.3.1.4 Semi-structured interviews

They were structured in such a way as to gain information about specific or individual farmer farming goals and aspiration towards crop farming activities in their households.

4.3.1.5 Resource maps

The resource map was used to determine resource distribution over the village in which they are using to perform their farming activities.

4.3.2 Sample Size

Multiple random sampling was used as a suitable method of sampling. The sample size was made up of 75 smallholder farmers from Ntsongweni irrigation scheme and another 75 farmers sampled from homestead gardens in Mhlontlo Local Municipality.

4.3.3Data analysis

Specific objectives	Data analysis tool
To assess factors that address smallholder farmers aspirations and goals to expand crop production	Descriptive statistics And Gasson goal ranking model
To address challenges that smallholder farmers encounter by expanding from homestead gardens to irrigation plots	Descriptive statistics Logit Model
To provide the current state of homestead gardens and irrigation plots	Descriptive statistics

4.3.3.1 Descriptive statistics

Tools were used to answer the descriptive statistics by means of pie charts, graphs and tables. Hence, descriptive statistical analysis presents data in a more meaningful which allow for a simpler interpretation of the data.

4.3.3.2 Gasson goal ranking model

Smallholder farmers and other enterprise people commonly consider multiple goals or objectives in their decision making, especially long run investments. In this study Gasson (1973) goal ranking model was applied to measure multiple farmers' goals to illustrate differences in decision making. The goal programming approach ranks goals in terms of their importance. Hence, target or satisficing levels of achievement are specified by the decision maker for each of the goals. This goal model may be represented as follows:

$\sum \lambda i - \alpha i \mp \sum \lambda i + \alpha i + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$..1

Subject to

$$\sum Gij\ Xj + \ \alpha j\ --\ \alpha j+ = gj\ for\ all\ i \quad \text{.....2}$$

$$\sum akjXj\ \leq bk\ for\ all\ i \quad \text{.....3}$$

$$Xj, \alpha j-, \alpha j \geq 0 \quad \text{.....4}$$

Where λ_I^- and I_i^+ are the proactive priority levels for negative and positive goals i, α_I^- and α_i^+ are the negative and positive deviations from the target level of goal i, G_{ij} is the matrix of objective achievement per unit of the decision variable X_i, g_i is the target objective level and equation limits resource use to resource availability, b^2.

4.3.3.3 Logit model

The logit function is the reciprocal function to the sigmoid logistic function. It maps the interval [0, 1] into the real line and is written as:

$$\text{logit}(p) = \ln(p/(1- p))$$

$$y = \text{logit}\ P = \log(p/1\text{-}p)$$

The binomial logit model is used to estimate the probability of goals and aspirations of farmers to expand their crop production. Where Y is a binary random variable, taking values 0 and 1, to be analysed in a logit model

$$y = \text{logit}\ P = \log\ (p/1\text{-}p) \quad \text{.....1}$$

Since P/ (1-P) denoted the odds for homestead farmers' willingness to expand their production, thus it is also called *log odds*. The factor is to assess aspirations and gaols of farmers, and hence measure categorical variable which are the homestead farmers and smallholder irrigation schemes. P_0 and P_1 denote the associated probabilities.

Where P is transformed to

$$P = \frac{\exp(y)}{1} + \exp(y) \quad \text{.....2}$$

The key parameter, which is both estimable from both case-control study and interpretable as relative outcomes, it is the odds ratio.Its logarithm, meaning, the log

relative outcomes from the willingness of farmers to expand, may be expressed as following with the difference between two logist:

$$\beta = log\varphi = logit\, P1 - logit\, P0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

In this study the binary regression variable X by X_0 for smallholder irrigation farmers and X_1 for homestead gardeners. Therefore, if P(x) for the farmers probability associated with reaching their goals and aspirations X, r(x) = P(x) Q_0 /P_oQ (x) for the relative outcomes for their willingness to expand crop production (odd ratio relative to X = 0), further expressed as following

$$logit\, P(x) = \propto + \beta x \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Where α = logit $P_{0,}$ and there is a perfect correspondence between the two parameters α and β in the model and the two types of farmers homestead and smallholder farmers such that

$$P1 = \frac{\exp(\propto + \beta)}{1} + \exp(\alpha)$$

And

$$P0 = \exp\frac{(\propto)}{1} + \exp(\propto)$$

However, formula 4 focuses on the key parameter which is β, hence suggests how to extend the model for more complex problems. Therefore, in general the logit model regression analysis involves a binary dependant variable, Y, and multiple independent variables, denoted as $X_1, X_2, \ldots, X_p$. And the form of the multiple linear regression equation is:

L= In (0) - IN $(\frac{P}{1} - P)$= $\beta_0 + B_1X_1 + \beta_2 X_2 + \ldots + B_pX_p +$ €,

Where Y is binary and also represents the events of interest, coded as 0/1 for failure/success,

p represents the proportion of success,

O represents the odds of the event,

L represents the In (odds of the event),

$X_1, X_2, ..., X_p$ are the independent variables,

β_0 is the intercept and $\beta_1, \beta_2, \ldots \beta_p$ are the slope coefficient and

€ is the random error

Table 4.2 Variables examined in the study

Variable	Unit	Type of variable	Hypothesis
Gender	Male, female	Categorical	+/-
Marital status	Married, single, widowed or divorced	Categorical	+/-
Age	Actual years	Continuous	+/-
Household size	Actual number	Continuous	+
Level of education	Non, primary, secondary, tertiary	Categorical	+
Employment status	Farmer, farm labour, self-employed, private labour, student	Categorical	+
No. of years farming	Actual years	Continuous	+/-
Source of drinking water	Tap, tank, rain, boreholes, dam, river	Categorical	+
Land acquire	Traditional leader, land affairs	Categorical	+
Type of plots	Homestead, smallholder irrigation	Categorical	+
Land size	Actual number of hectors	Continuous	+
Condition of the garden/field	Fenced, partly faced	Categorical	+
Ploughing methods	Garden tools, own tractor, hired tractor, animal plough	Categorical	+
Source of water for crop production	Dam, river, boreholes, taps, rain	Categorical	+
Provider of source of water	None, government, municipality	Categorical	+
Member of irrigation schemes	Yes or no	Categorical	+
Irrigation system used	Sprinkle, watering can, pipes, bucket	Categorical	+

Crop farming income	Actual amount	Continuous	+/-
Non-farm income	Actual amount	Continuous	+/-
Remittances	Actual amount	Continuous	+/-
Extension services	Receives service or not	Categorical	+
Organisation that renders service	Government, NGOs	Categorical	+
Inputs used	Seeds, fertilizer, tractor, oxen-draught	Categorical	+
Output produced	Type of quality of output (Kg/ha)	Continuous	+/-
Price of output	Price of the output sold (Rand/kg)	Continuous	+/-
Source supplier	Local shops, stores in town, Co-operative, individuals, donations	Categorical	+/-

4.4.1 Definition of variables used in the study

Gender- This variable seeks to measure the participation of both males and females in homestead food gardening and smallholder irrigation farming, to find out their goals and aspirations in term of whether they are willing to expand their crop production. This variable is expressed as a dummy variable in this study.

Marital status- This variable is used to determine the household's involvement in farming, to measure whether married households share farming activities and whether single, widow or divorced household deals with farming as some of them tend to hire agricultural labour for assistance in farming.

Age of household head- This variable is important as it seeks to measure the actual age of the household head. It is therefore significant in the study as its impact is to determine the commitment of the household head in agricultural practices. This

variable is continues variable and is measured in years and see whether the older and younger are willing to expand their scale of production.

Household size-This variable determines the number of people living under one roof and is measured in actual number of people residing in one household. In this study the household size number aims to determine whether the larger the household size are able to help the household to reach the farming goals and aspirations.

Level of education- The level of education in this study is a measure of the household head**.** This variable is fitted into the discriminant analysis to determine whether the level of education of household heads could influence the expansion from homestead to smallholder irrigation farming, hence attaining their goals and aspirations. And education is an important variable in terms of decision making and determines the ability for farmers to adjust in term of new innovation in agricultural practises.

Employment status- This variable measures different employment categories which include self-employed, casual worker, private sector, farm labour or just being a farmer. Employment has an impact on agricultural practices by both homestead food gardening and smallholder irrigation schemes because the households will be devoted to their jobs. This variable seeks to assist measurement of the income the household earns to be able to sustain their livelihoods it.

Number of year's farming- This variable is seeks to measure the actual years of the household head in farming. It is therefore significant in the study as its impact is to determine the commitment of the household head in agricultural practices and the experience (indigenous knowledge). This variable is continues variable and is measured in years and see whether the older and younger are willing to expand their scale of production and have they reached their goals in term of longer years of farming.

Source of drinking water- This variable seeks to attain relevant information about the sources of water that the households used for their daily life. In this study both homestead and smallholder irrigation farmers use taps, tanks, rain, boreholes, rivers and dams.

Land acquisition- Land acquisition illustrates how the respondents in this study area acquire land for homestead and irrigation scheme purposes, thus reaching their agricultural farming goals and aspiration in order to expand their crop production. In most rural areas people acquire their land for agricultural [practices from the traditional authorities in their villages.

Type of plots- In this study type of plots referred to the homestead food gardeners and smallholder irrigation farmers. The plots sizes can define whether the farmers prefer cropping in plots or bigger field.

Land size- This variable measures the total land size owned by household which is in hectares. Thus, the land size has an impact on agricultural production as farmers needs this natural capital. Therefore, land size has the impact on the amount of the crop products because bigger land size produces a higher level of production.

Condition of the garden/field- This variable states the conditions of farmer's gardens and irrigation scheme fields whereby it highlights whether they are fenced and party fenced. If the gardens or fields are fenced that means there will be no easy access for livestock to pass through and damage the crops that are being produced.

Ploughing methods- Ploughing methods are the different tools that are used in the garden to prepare soils for crop production. The variable determines whether which kind of tools does the smallholder irrigation farmers use and the homestead gardener's use. In this study the farmers used the garden tools, own tractor, hired tractor and animal plough to prepare their soils.

Source of water for crop production- This variable seeks to get relevant information about the sources of water that the households use to irrigate their crop products. In this study both homestead and smallholder irrigation farmers use taps, tanks, rain, boreholes, rivers and dams.

Provider of source of water- This determinate seeks to determine the water source provider for rural farmers for the household and for watering the crops. In this study the source of water is categorised as source provided by government, municipality and others.

Member of irrigation schemes or non-members- This variable shows how many respondents are irrigation members and non-irrigations. Farmers become members of irrigation schemes in their villages to expand their crop productions. Mostly the irrigations schemes have their goals they want to achieve and this turns to attract farmers as they may have the same goals as the irrigators to secure their household food basket.

Irrigation system used- Crops need to be irrigated daily for them to grow and be a quality. The deferent type of irrigation system used by these farmers includes watering can, pipes, buckets, sprinklers and it is a categorical.

Crop farming income- Crop farming output is the income received from crop products by farmers from both homestead and smallholder farmers. Most of rural farmers sustain their livelihood from selling agricultural crops that they produce in their gardens or plots.

Non-farm income- Rural people derive their livelihoods from different sectors, hence generating income from different sources in order to reach their goals and sustaining their lives. Non-farm income in this study can be generated from self-employment, casual labour, pensions and grants.

Remittances- Rural households tend to receive extra cash from relatives and working children in the urban areas in the form of remittances.

Extension services- This is a categorical variable, it determines whether the homestead farmers or the irrigators receive extension services from the government or any private sector.

Inputs used- This variable is used to determine what kind of inputs does the homestead gardeners and smallholder irrigation farmers use**.** There are different production inputs that farmers normally use for crop farming which includes fertilizers, seeds, tractors and oxen-draught and this is a categorical variable.

Output produced- This variable is a continuous variable that shows the amount of crop harvested and quantity sold by the household and the smallholder irrigation farmers. It also determines that households are food secure as they manage to produce for themselves.

Source supplier- This is a categorical variable which is used to determine the sources whereby the farmers sell their products. Farmer's gaols and aspirations about farm business are to have markets to sell their crop production to generate income. In the study the source supplier includes, individuals, local shops, and stores in town, co-operatives and donation to the villagers.

4.5 Summary of the chapter

In this chapter, the data collection tools and methods used to analyse the data were reviewed. The study targeted 54 members of homestead food gardens and 50 smallholder irrigator in Mhlontlo Local Municipality. A total number of 104 respondents were interviewed using semi-structured questionnaire. Hence, data analysis was done by means of Gasson goal ranking model to assess factors that address smallholder farmers' aspirations and goals to expand crop production. Logit regression was used to address challenges that farmers encounter from expanding scale of production. And a descriptive statistical analysis was use to capture demographic characteristics of the households and variables used in the study were defined.

CHAPTER 5: RESULTS AND DISCUSSION

5.1 Introduction

This chapter presents the results of the study which was carried out in Mhlontlo Local Municipality. In this section the demographic characteristics of the study are presented from the study carried out at Ntshongweni irrigation scheme including the homestead food garden farmer's in the Mhlontlo Local Municipality in the Eastern Cape Province of South Africa. The aim of this chapter was to highlight the biographic characteristics of the respondents in Mhlontlo area which includes the gender of household, age, marital status, household size, educational levels, employment status and number of years farming. This chapter also determined the different types of water sources used in Mhlontlo Local Municipality for household use, irrigation purposes, type of irrigation system do they use, access to land, land utilization, source of income, scale of production, constraints that farmers are experiencing in farming, technology adoption, farmer's aspirations and goals on farm business. And finally the chapter discusses the findings that are obtained from the data analysis.

5.2 Demographic characteristics

This section of the chapter analyses household information obtained from respondents of Mhlontlo local municipality being the homestead garden farmers and smallholder irrigators. The demographic information is analysed using descriptive statistical measures. These include tables and charts, frequnces, minimum, maximum and mean values, standard deviations and percentages.

5.2.1 Gender distribution of household head

Gender analysis is important in a scientific research in order to understand the local dynamics that local rural people experience such as challenges and benefits that women and men are exposed to. In most rural areas of the Transkei area, women mostly take part in agricultural farming activities as most men work off-farm to bring about the well-being of the household. Figure 5.1 shows the gender distribution of

household head for both homestead food gardeners and smallholder irrigation farmers in Mhlontlo Local Municipality.

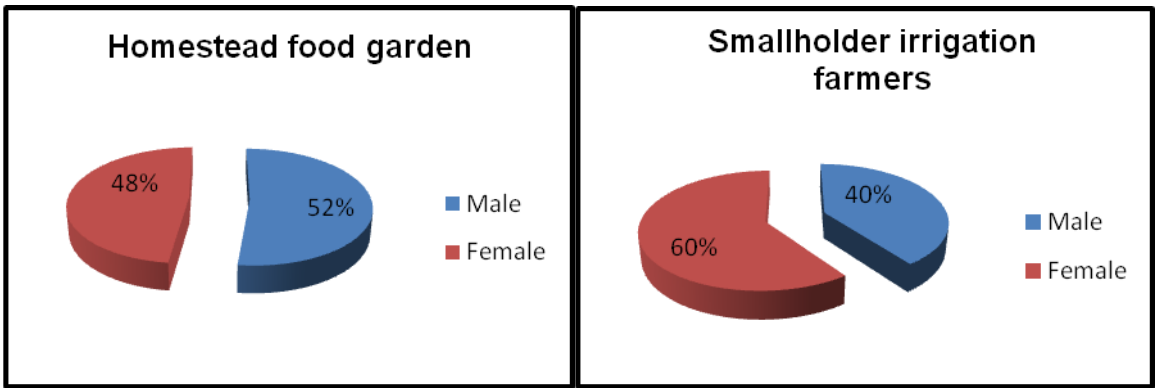


Figure 5.1: Distribution of gender of household (Source: survey data 2013)

Figure 5.1 shows results for both homestead food gardeners and smallholder irrigation farmers where females are in the majority in the smallholder irrigation schemes (60%) and males are in the majority in the homestead food gardens by 52%. Hence, in the homestead food garden the female participation is48% and male participation is by 40% in the smallholder irrigation farms. These results show that both male and female farmers in Mhlontlo Local Municipality have interest and participation in farming. However, the females are more interested in being involved with the smallholder irrigation schemes, to expand their crop production and form scheme membership. This speculate that male farmers in the municipality want to produce to sustain household food basket and female famers in this wants to produce more as the large number is part of the Ntshongweni irrigation scheme.

5.2.2 Marital status of household

Figure 5.2 shows the marital status of the respondents for both the homestead food gardeners and smallholder irrigation farmers in Mhlontlo Local Municipality. The survey shows four main groups of marital status of the respondents which are single, married, divorced and widowed.

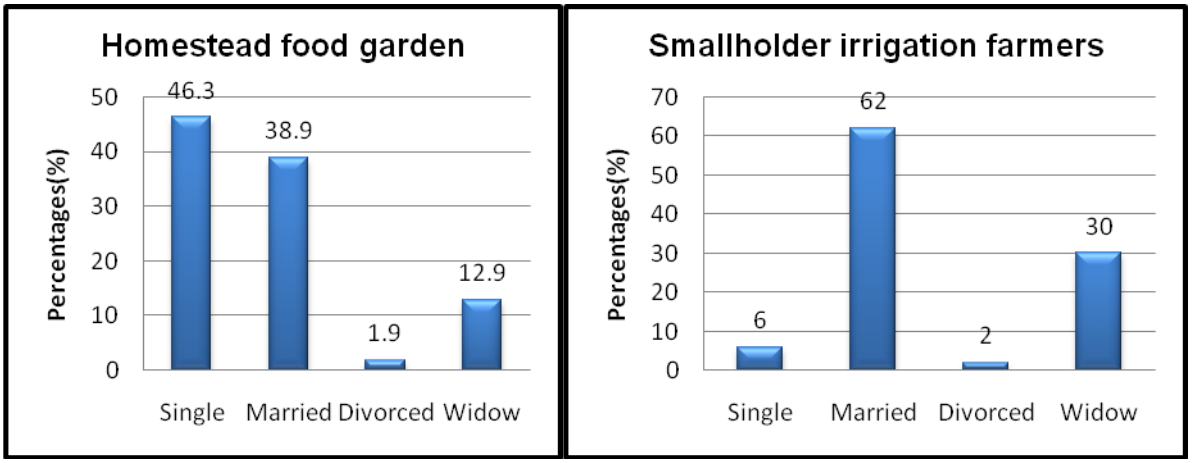


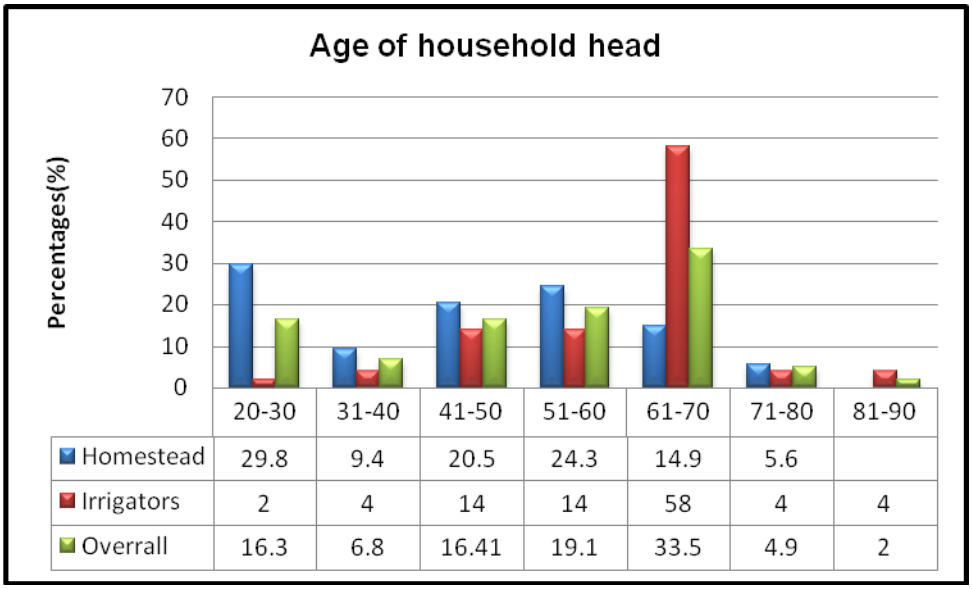
Figure 5.2: Distribution of marital status of household (Source: survey data 2013)

Figure 5.2 demonstrations that 46.3% of respondents involved in homestead food gardening were single, married respondents were represented by 38.9%, divorced respondent were represented by1.9% and widowed respondents constituted 12.9%. Respondents involved in the irrigation schemes shows that 6% were single, married respondents were represented by 62%, divorced respondents were represented 2% and the widowed respondents where represented by 30%. These survey results displays that most people in Mhlontlo Local Municipality who are married and single are more involved in agricultural practices than the divorced and widowed people. The head of the household is the one who is responsible for decision making and the type of returns does on want to achieve at the end of the production season, hence achieving his/her aspirations and goals. Married people will decide together their level of investment in agricultural crop production, so as to enhance their household's well-being. Furthermore, married people make their households decision together, as to what kind of returns to they want to achieve in their crop production.

5.2.3 Age of the household heads

Age is one of the human assets which determines the indigenous knowledge and skills of crop farming by most farmers. The age of household heads have impact on decision making and production goals. Old age people in the rural areas of Mhlontlo Local Municipality are mostly illiterate and this impedes them from adopting new

agricultural technology in order to attain their production goals. Hence, the youth of Mhlontlo Local Municipality are interested in farming, and that shows how far they want to stretch themselves so become better farmers in the long run by improving the economy and livelihoods in the area. The distribution of households by age of household head is shown in Figure 5.3 and Table 5.1.



	20-30	31-40	41-50	51-60	61-70	71-80	81-90
Homestead	29.8	9.4	20.5	24.3	14.9	5.6	
Irrigators	2	4	14	14	58	4	4
Overall	16.3	6.8	16.41	19.1	33.5	4.9	2

Figure 5.3 Distribution of age of household head (Source: survey data 2013)

Figure 5.3 shows the age categories of the homestead food gardeners, smallholder irrigation farmers with their overall age category. The respondents' ages were placed in seven categories starting from 20-30, 31-40, 41-50, 51-60, 61-70, 71-80 and 81-90 years. Therefore, the study revealed that large portion of farmers that are part of smallholder irrigation scheme are between the ages of 61-70 represented by 58% and the lowest portion of farmer's ranges from 20-30 years represented by 2%. And also the farmers being part of the smallholder irrigation scheme have the same percentages in the categories between 41-50 and 51-60, represented by 14%. Hence, between the age category of 31-40, 71-80 and 81-90 years are represented by 4%. This means that most farmers that form part of the smallholder irrigation scheme in the Mhlotho Local Municipality are the old age people who are getting old age grants and the youth is less interested as they have the lowest percentage.

However, homestead food gardeners in this local municipality have the highest portion of farmers ranging from 20-30 years which is represented by 29.8% and these categories are followed by age category 51-60 years which is represented by 24.3% and age category ranging from 41-50 years represented by 20.5%. The lowest age category ranges from 71-80 years represented by 5.6% and age category which ranges from 31-40 years represented by 9.4%. In the survey, under the homestead food gardeners there were no farmers which fold under the age category ranging from 81-90 years. This means that in Mhlontlo Local Municipality the youth is more interested in producing food for household food basket and as they lack experience in farming they still to learn more about farming and are willing to learn more. Youth have the advantage to adopt easily when it comes to technology as they are still young and most of them went to school, whereas old people prefer their own indigenous knowledge and most of them are illiterate.

Table 5.1 Distribution of household by age

	Homestead gardeners	**Smallholder Irrigators**
N	54	50
Minimum	22	30
Maximum	80	85
Mean	45.89	60.56
Median	47.50	62.00
Standard deviation	16.278	10.891

Source: Field survey 2013

Table 5.1 shows the distribution of household by actual age for both homestead food gardeners and smallholder irrigation farmers in the Mhlontlo Local Municipality. There were 54 respondents from the homestead food gardens and 50 respondents from the smallholder irrigation farm. The study revealed that under homestead food

gardener's the mean age for household head was 45.89 and the median was 47.50, and this point out that the majority of household heads were not too old to farm. And their minimum age was 22 years and their maximum age was 80 years, with a standard deviation of 16.278. The smallholder irrigation farmer's mean age of household head was 60.56 and the median was 62.00. Hence pointing out the farmers involved in the irrigation scheme were a bit older that the ones practicing homestead food gardening. Their minimum age was 30 years and maximum age was 85 years with a standard deviation of 10.891.

5.2.4 Education level of household

Education level of the household is one of the significant human assets which can determine farmer's behavioural change in term of skills and knowledge, which a farmer can gain in order to apply in the farm enterprise for better returns. Smallholder irrigation farmers and homestead food gardeners with a higher level of education adopt easily on the new agricultural technologies, so as to produce high quality produce that can be sold in markets. The education level of household that were interviewed for both homestead food gardeners and smallholder irrigation farmers is the direct measure of a human capital as it is associated with the skills that people can learn and the knowledge acquired. In other words the level of education plays a vital role in decision making of farms modern technology. In Figure 5.4; the level of education is classified according to non, primary, secondary, high school and tertiary.

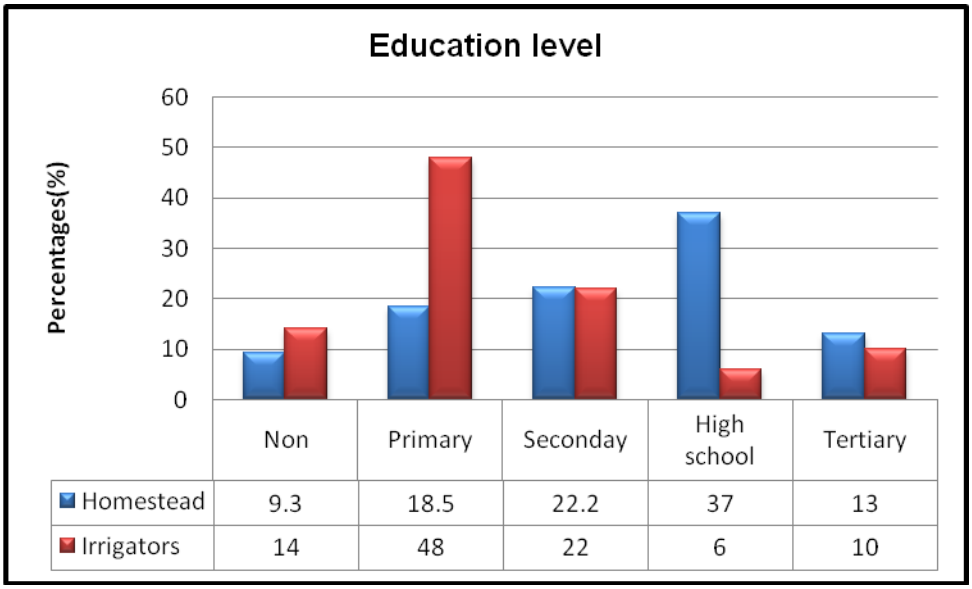


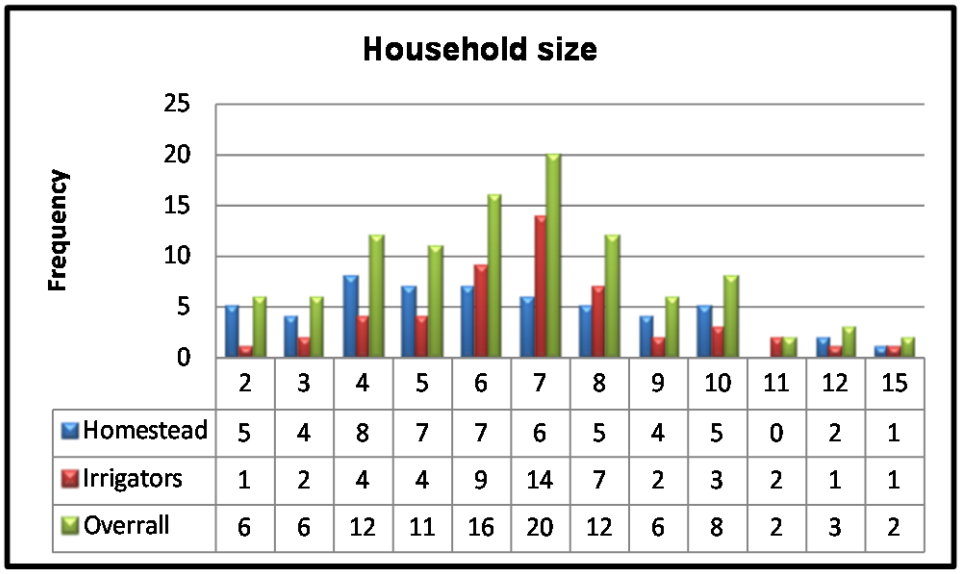
Figure 5.4 Distribution of education level of respondents (Source: survey data 2013)

Figure 5.4, shows education level for both homestead food gardeners and smallholder irrigation farmers in the Mhlontlo Local area and that they have basic literacy foundation. The study survey revealed that farmers who participate in smallholder irrigation schemes are illiterate as they have the high percentage in primary education. This will make it impossible to adapt to new farm technologies as they have no formal technology. Farmers who were engaged in homestead food farming had 9.3% of no education, 18.5% of the respondents had primary education, 22.2 of the respondents had secondary education, 37% of the respondents had high school education and 13% of the respondents had tertiary education.

On the other hand, farmers who were engaged in smallholder irrigation schemes had 14% of no education, 48% of the respondents had primary education, 22% of the respondents had secondary education, 6% of the respondents had high school education and 10%of the respondents had tertiary education. This means that smallholder irrigation farmers are less educated as most of them had primary education level.

5.2.5 Household size

The household size in this research study was measured as the number of individuals that live in the respondents household, both old and young people. However, the household size has an impact of labour availability in a certain household which can either be on-farm or off-farm activity in order to sustain their livelihoods. Household size further implies that the number of people that reside in the same household shares agricultural farming activity to attain their crop production goals and aspirations. Moreover, Figure 5.5 shows the distribution of household size of the study area of sampled farmers.



	2	3	4	5	6	7	8	9	10	11	12	15
Homestead	5	4	8	7	7	6	5	4	5	0	2	1
Irrigators	1	2	4	4	9	14	7	2	3	2	1	1
Overrall	6	6	12	11	16	20	12	6	8	2	3	2

Figure 5.5 Distribution of household size (Source: survey data 2013)

The data in Figure 5.5 revealed that the highest overall average household size in Mhlontlo Local Municipality for members of the Ntshongweni irrigation scheme and for homestead food member was 20.0 and the lowest overall frequency was 2.0. The study further revealed that the household size of the homestead food gardeners was in the range of 2 and 15 per household sampled in the study. And for farmers that were part of the Ntshongweni irrigation scheme where also in the range of 2 and 15 per household. This shows that a large number of household sizes can divide agricultural farming activities as they have enough labourers within the household, reading to farmers to attain their farming goals and aspirations. Nonetheless,

smallholder farmers in Mhlontlo Local Municipality relay solely of faming labour as they cannot afford to hire people to assist with crop production.

5.2.6 Employment status

Most rural farmers in the Mhlontlo Local Municipality do not have formal employment and they sustain their livelihoods through the production of crops and self-employment. Therefore there is high level of unemployment in the study area, which has led to high level of poverty. Smallholder irrigation farmers and homestead food gardeners in rural areas of Mholntlo Local Municipality have different livelihood strategies and diverse income strategies. In this study the employment status of respondents had been categories into farmers, students, self-employed, pensioner and casual worker.

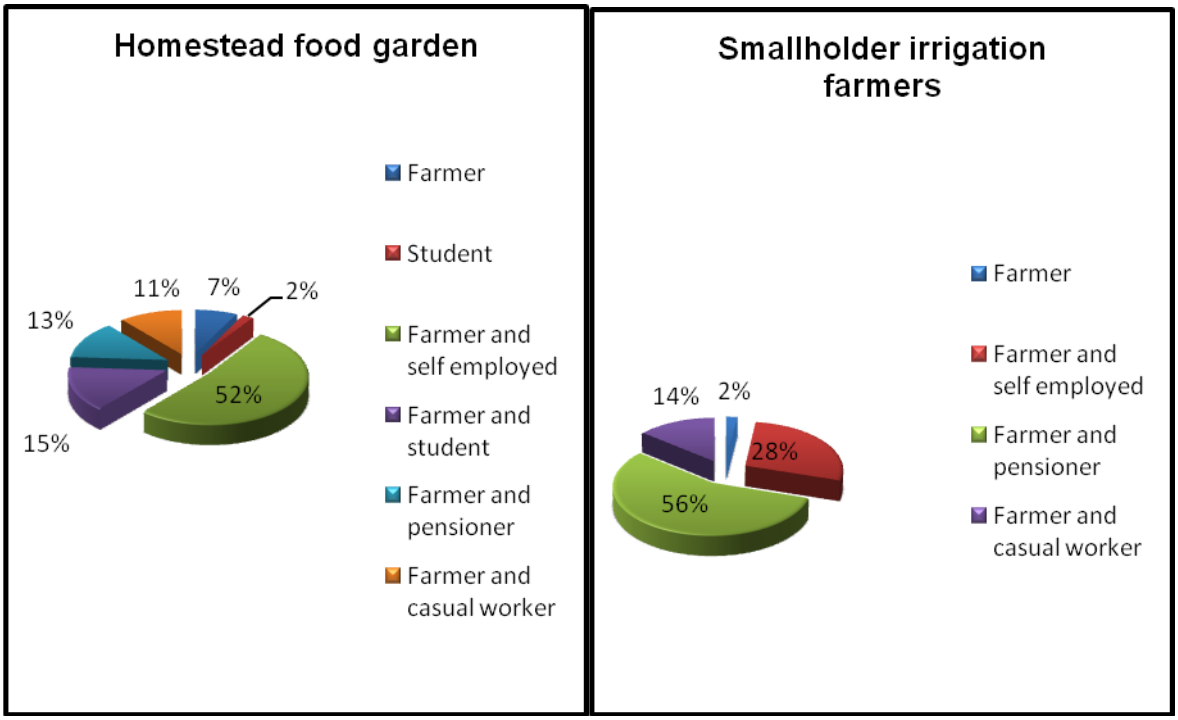


Figure 5.6 Distribution of employment status (Source: survey data 2013)

In Figure 5.6 above the employment status for both homestead food gardeners and smallholder irrigation farmers is being revealed. This study shows that there were 52% respondents that were both farmers and self-employed being engaged in the homestead food gardening. At the same time there were 15% of respondents that

were farmers and students, 13% of respondents that were farmers and pensioner, 11% of respondents that were both farmers and casual workers, 7% of respondent's hat were only practising farming and 2% being a student. Thus, the survey data speculated that a large number of homestead food gardeners derive their livelihoods from farming and self-employment strategies. And the least present of farmers derive their livelihood from farming and old age and child grants for their household well-being.

Nevertheless, the farmers that where part of the smallholder irrigation scheme had 56% of respondents that were farmers and pensioners, 28% of respondents that were farmers and self-employed, 14% respondents that were farmers and casual workers and 2% of respondents that were only farmers. Hence, the study revealed that most homestead irrigation farmers depend on crop farming and pension funds to make a living as they are old. Certain smallholder farmers depend on crop farming activities and they were self-employed, thus proving that they make a living through different livelihood strategies to alleviate poverty and provide household food basked.

Table 5.2 Employment status

	Homestead gardeners	**Smallholder Irrigators**
N	54	50
Minimum	1	1
Maximum	9	9
Mean	7.44	6.31
Standard deviation	1.402	1.911

Source: Field survey 2013

The Table 5.2 further revealed the distribution of employment status in the rural area of Mhlontlo Local Municipality who participates in the homestead food gardening and smallholder irrigation farming. The field survey that took place in Mhlontlo and it shows that there were 54 respondents from the homestead food gardening and 50 respondents from the smallholder irrigation farm. The homestead food gardeners which were part of the field survey shows that their employments mean was 7.44 and the employment mean for smallholder irrigation farmers was 6.31, which means that the respondents practising smallholder irrigation farming are less employed than the ones practising homestead food gardening. The minimum employment status for both homestead food gardeners and smallholder irrigation farming was 1. Hence, the maximum employment status for homestead was 9, with the standard deviation of 1.402. On the other hand, the maximum employment status for smallholder irrigation farmers was also 9, with the standard deviation of 1.911.

5.2.7 Analysis by actual years of farming experience

Farming experience is one of the human capitals which are measure by the age of the respondent in order to be able to determine how many years they have been farming. In the Mhlontlo area the farmers started at very young age farming as their parent thought them how to practise agricultural farming. Respondent that where part of smallholder irrigation schemes where old and most of them have no formal education as they grow up working in the fields instead of attending school. Hence, they are applying their indigenous knowledge and skills into crop farming.

Table 5.3.Farming experience by communities

Farming experience (years)	Type of plots			
	Homestead food gardens		Smallholder irrigation farmers	
	Number of respondents	Percentage (%)	Number of respondents	Percentage (%)
1-10	14	26.6	2	4
11-20	18	33.4	7	12
21-30	9	16.8	8	16
31-40	7	13.1	17	34
41-50	2	3.8	11	22
51-60	2	3.8	4	8
61-70	3	5.6	1	2
Total	54	100	50	100

Source: Field survey 2013

Table 5.3 shows the farming experience of the respondents which participated in the field survey and there was a total of 54 homestead food gardeners and a total 50 smallholder irrigation farmers with their percentages. The respondents with the farming experience ranging from 1-10 years were more in the homestead food gardens than at the smallholder irrigation farm. There were 26.6% of respondents in the homestead food gardens and 4% in the smallholder irrigation farming. However, most participants in the homestead food gardening ranging from 11-20 years of farming experience had the highest percentage of 33.4% and the lowest percentages between the 41-50 and 51-60 years of farming experience. On the other hand, the respondents practising smallholder irrigation farming with the highest farming experience range from 31-40 years which was 34% and their lowest being 2% from farming experience ranging 61-70 years and 4% from respondents with

farming experience ranging from 1-10 years. This means that the respondents in Mhlontlo Local Municipality being part of the homestead food are less experienced in farming as compared to the participants involved in the smallholder irrigation farming.

5.2.8 Land acquisition

Land is one of the scare resources in the former homeland of Transkei and Mhlontlo Local Municipality falls under this region. Hence, it is one of the basic resources for crop production and an important natural asset that should be accessible to every farmer who is willing to produce crops. The respondents claim that land is available for farming activities and the chief (traditional leader) in the rural areas is the one responsible for distributing it. So, this means in this study area land is acquired through the chief and not by the department of land affairs.

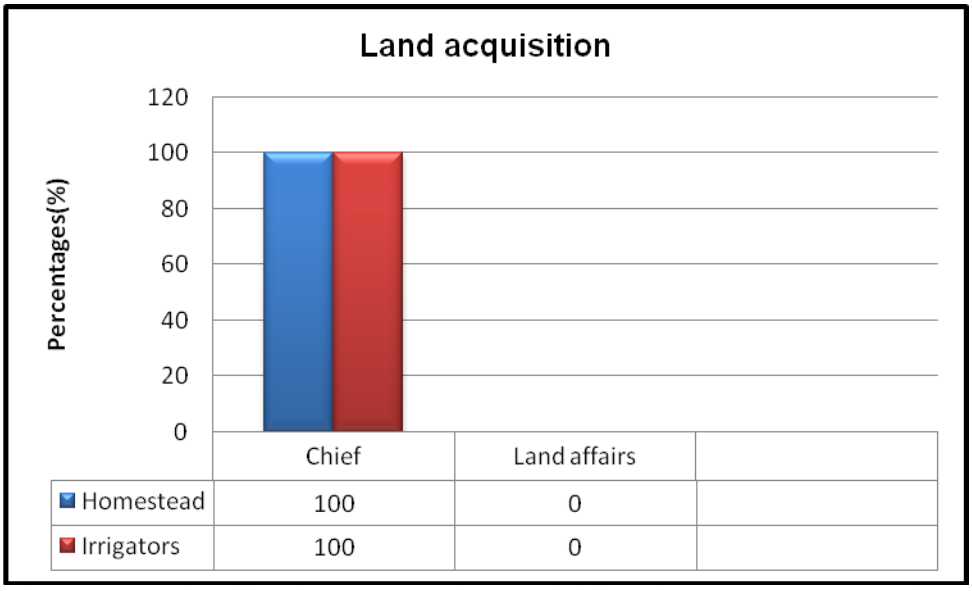


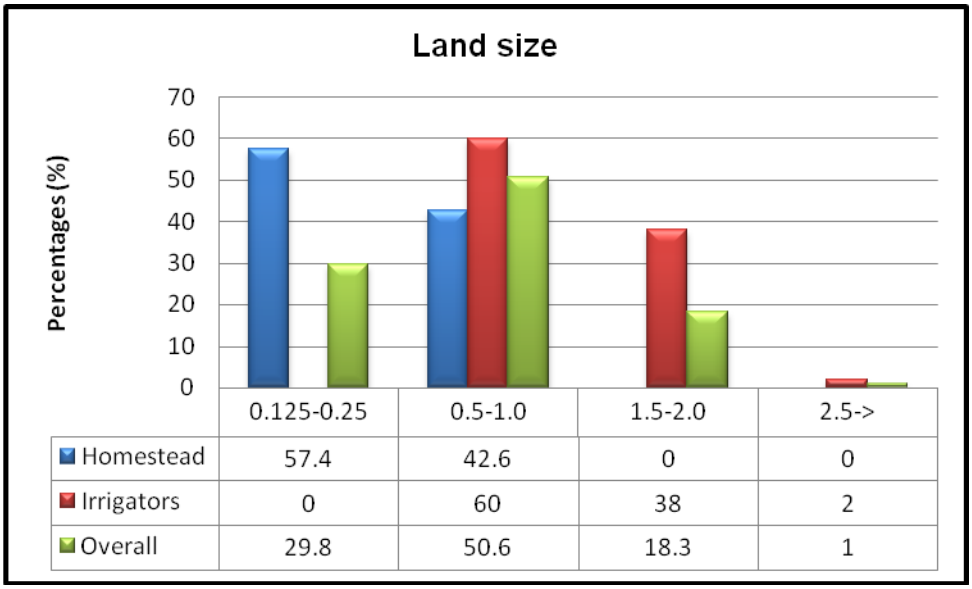
Figure 5.7 Distribution of Land acquisition (Source: survey data 2013)

Figure 5.7 shows the distribution of land acquisition by respondents in the study area for both homestead food gardeners and smallholder irrigation farmers. The survey revealed that land that was used to practise homestead food gardening is represented by 100%, as it was acquired from the chief in the municipality. And also the land acquired for smallholder irrigation farming is represented by 100%, which is

the land distributed by the chief. Hence, there was available fertile land for crop farming in the villages of Mhlontlo Local Municipality and it was accessible to any farmer who needs to use it.

5.2.9 Land size

Land is one of the most important natural capitals that is utilised by homestead food gardeners and smallholder irrigation schemes to practice crop production and ownership to land is one of the rural farmers goals. The results of this study revealed that poor rural farmers of Mhlontlo Local Municipality have access to the production of crops in order to sustain their livelihoods in the rural areas. Hence, the Chief 'traditional authority" always provide land to any rural dweller who is in need of the land for agricultural purposes.



	0.125-0.25	0.5-1.0	1.5-2.0	2.5->
Homestead	57.4	42.6	0	0
Irrigators	0	60	38	2
Overall	29.8	50.6	18.3	1

Figure 5.8 Distribution of land size (Source: survey data 2013)

Figure 5.8 revealed that 25 homestead food gardeners (42.6%) out of 54 that were interviews owned of 0.5-1.0 hectors of land and 30 smallholder irrigation farmers (60%) that were interviewed owned the similar amount hectors of land for crop production. However, the overall (1%) of farmer's had 2.5 and more hectors of land size. Hence, 19 smallholder irrigation farmers (38%) have access to 1.5-2.0 hectors of land and 31 homestead food gardeners (57.4) owned 0.125-0.25 hectors of land.

This then shows that homestead food gardeners needs less land size to produce crops that smallholder irrigation farmers. And one of the crops that these farmers produce in their fields or gardens includes maize, cabbage, potatoes, spinach, carrot, tomatoes and beetroot.

5.2.10 State condition of the field/garden

The state condition of the field or garden is very important, especially for crop farming as animals can damage the crops that are being grown. The smallholder irrigation farmers and homestead food gardeners of Mhlontlo Local Municipality has their gardens fenced and partly fenced in order to be able to harvest most of the crops they planted. However, no fenced field can be a problem as animals can enter the gardens and destroy the produce and its quality. Then, smallholder farmers and homesteads of the sampled respondents will not be able to reach his/her goals if they harvest fewer products and planted either for marketing or consumption purposes. The figure 5.9 illustrates the state condition of the homestead food gardeners and smallholder irrigations farmers cropping gardens and fields in Mhlontlo Local Municipality.

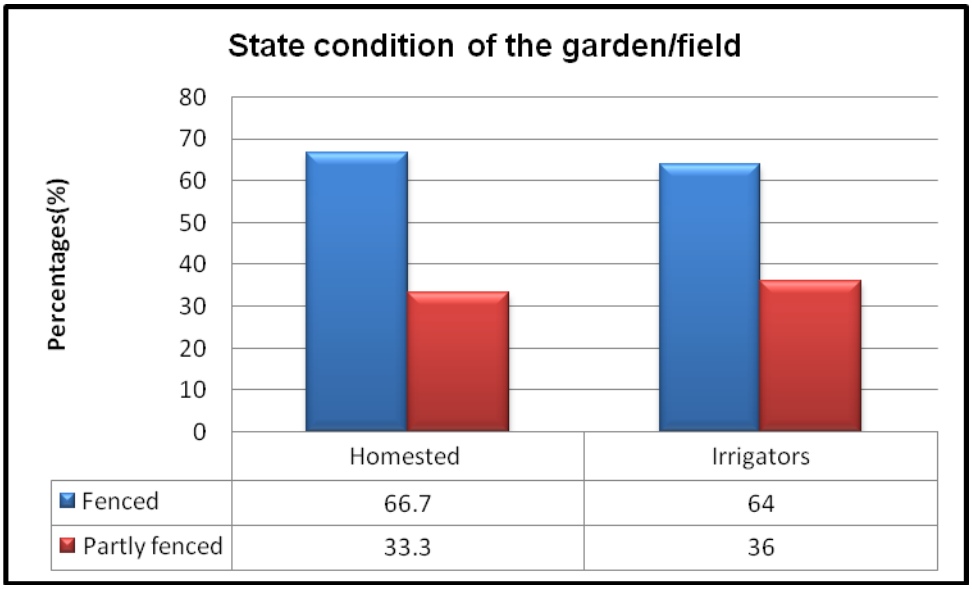


Figure 5.9 Distribution of state condition of the garden/field (Source: survey data 2013)

Figure 5.9 revealed that 66.7% of respondent's homestead food gardens are fenced and the 33.3% are partly fenced in the study area. And from those respondents that are part of the smallholder irrigation farming, the study revealed that 64% of their field are fenced and 36% are partly fenced. Hence, the data revealed that the state gardens or field for crop production are fenced ad the farmers were able to reach their farming goals and aspiration by securing products.

5.2.11 Ploughing methods

Figure 5.8 presents farmers' responses the ploughing methods smallholder irrigators and homestead for gardeners used to prepare their soils for crop production. In the Mhlontlo Local Municipality the homestead food gardeners and smallholder irrigation farmers use different tools for ploughing their fields/gardens. They used different tools to prepare land for crop production purposes. Hence, the common ploughing methods used by sampled farmers were the garden tools, animal plough, hired tractor, as to reach their cropping goals on farm business.

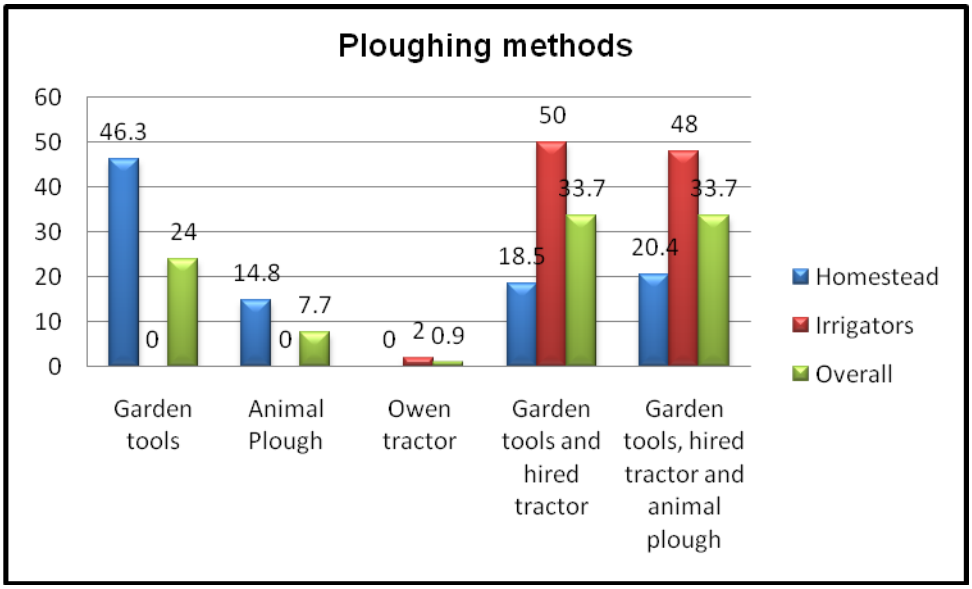


Figure 5.10 Distribution of ploughing methods (Source: survey data 2013)

Figure 5.10 shows the distribution of ploughing methods in Mhlontlo Local Municipality by both homestead food gardeners and smallholder irrigation farmers. Hence, 46.3% of homestead food gardeners only use garden tools to plough the

soils and they don't own any tractors. On the other hand, the smallholder irrigation farmers use garden tools and hired tractor from the people who own them it the local municipality and they are represented by 50%. The homestead food gardeners were using 18.5% of garden tool and hired tractor for ploughing methods followed by a 20.4% of garden tools, hired tractor and animal plough as their garden tools and smallholder irrigation farmers only use 48% of the ploughing tools. Furthermore, the overall of farmers using animal plough is 7.7% and homestead food garners were using 14.8% of animal plough. Even though, the 2% of smallholder irrigation farmers where using owned tractor for ploughing methods and an overall of 0.9% farmers where using hired tractor as a tool for ploughing their land.

5.2.12 Household sources of water

Water is one of the vital natural assets that humans should have access to for their daily needs as it one of the primary resources for crop production. Crops need to be irrigated in order to be of better quality and its availability to farmers will be play an important role. Hence, the common source of water used by respondents was the tanks that are available to the community. Furthermost, farmers used natural water from the rain, which is stored in tanks as their main source for household use. In Mhlontlo Local Municipality both homestead food gardeners and smallholder irrigation farmers claimed that they do no pay water they use for household use. The study revealed that they do not who installed the taps in the villages, as they do not have licences for water. In the figure below rn, rv, tp and tk represents rainfall, rivers, taps and tanks. And also tp, bh ,tk and m represents taps, boreholes, tanks and dams. And lastly tp, dms, rv and tk represents taps, dams, rivers and tanks as sources of water being used by farmers as their source of water for home consumption.

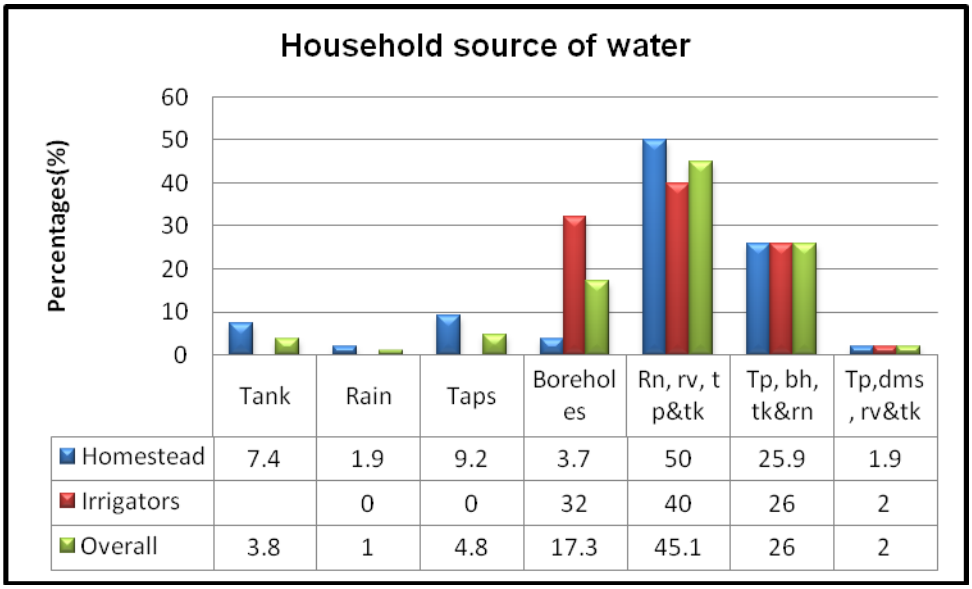


Figure 5.11 Distribution of household source of water (Source: survey data 2013)

Figure 5.11 present farmer's response to the questions about the household source of water for home consumption. The tank provides 7.4% of water for home consumption for homestead food gardeners and the overall water use is 3.8% from the tank for both homestead food gardeners and smallholder irrigation farmers. Hence, the boreholes provides 32% of water for home consumption for smallholder irrigation farmers and 3.7% for homestead food gardeners with their overall 17.3% water use. Homestead food garners in Mhlonhlo Local Municipality were using rainfall, rivers, taps and tanks for home consumption as their sources of water which was represented by 50% and smallholder irrigation farmers use 40% of the same sources of water, with their overall water use of 45.1%. Moreover, smallholder irrigation farmers tend to use taps, tanks, boreholes and dams as their main source of water for household consumption which is represented by 26% and the homestead food gardeners which were using 25.9% of the same resources. Lastly, some of the homestead food graders used taps, dams, rivers and tanks as their source of water which was represented by 1.9% and smallholder irrigation farmers used 2% of the water resources with their overall of 2%.

5.2.13 Sources of water for crop production

There are different main sources of water for crop irrigation purposes which includes rainfall, dams and rivers. Hence, the homestead food gardens and smallholder irrigation farmers of Mhlontlo Local Municipality where using them to irrigate their crop production. Smallholder irrigation farmers and homestead food gardens do not pay for any water rates of fees; hence they do not need water licences for irrigation purposes. In the figure 5.11 Rn represents rain, tp represent taps, rv represents river and tk represents tanks as sources of water used by farmers to irrigate their crop production.

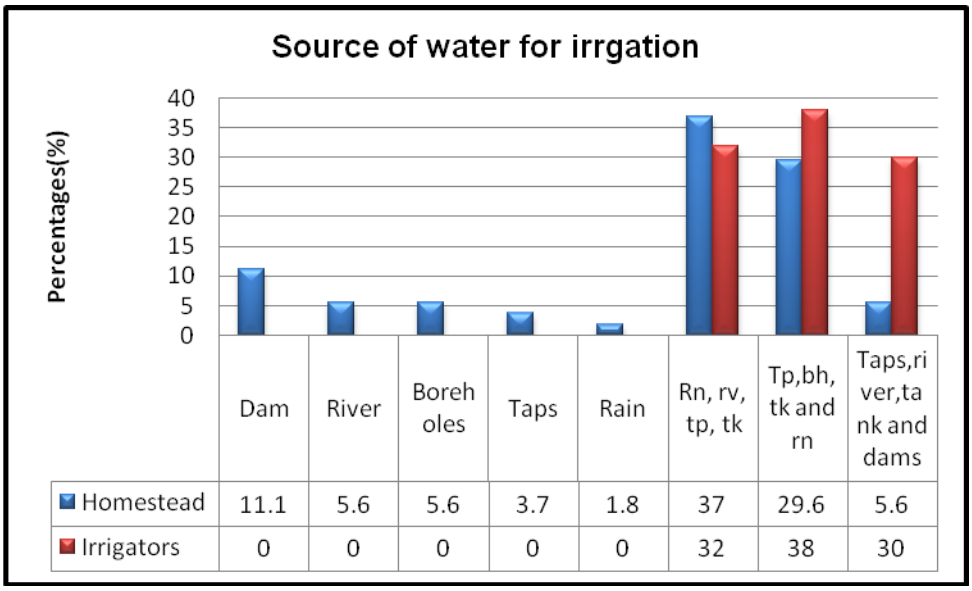


Figure 5.12 Distribution of source of water for irrigation (Source: survey data 2013)

Figure 5.12 revealed famer's responses to survey questions about the sources of water for crop irrigation purposes. The dam as a natural asset provides 11.1% water for homestead food garners to irrigate crop and river provide 5.6%, while boreholes were providing 5.6% of water to these farmers. However, 37% of water used for irrigation purposes by homestead food gardeners was provided by rainfall, rivers, taps and tanks, whereas smallholder irrigation farmers used 32% of the water resource mentioned above. These farmers do not pay for the water which is generated from taps and they do not who installed them and the water directly comes from the waterfalls in the mountains. Smallholder irrigation farmers received their 38% of water from the taps, tanks, boreholes and rainfall and the homestead

food gardeners received 29.6% of water from these sources. The farmers claimed that the rainfall pattern had changed over the years as they had been receiving most of the rainfall in summer. Furthermore, 30% of smallholder irrigation farmers received their water for crop production from the taps, rivers, tanks and dams and 5.6% of homestead food gardeners received water from the sources of water mentioned. Moreover, the irrigation scheme extracted its water from Tsitsa River which travelled through Tsitsa Bridge.

5.2.14 Analyses of non-irrigation members

Table 5.4 represent farmers that are not part of the irrigation scheme. There are many challenges that the sampled farmers are non- irrigation members due to the fact different factors such as lack of knowledge concerning irrigation schemes in the area. Lack of funds from the government or any NGO's to finance the existing schemes in terms of new technologies including systems for irrigation. Hence, so of the old age farmers are not interested to be member of any agricultural schemes as they claim they are very old and they can manage to plant crop in a small portion of land. However, some of the youth in Mhlontlo Local Municipality did not know of any existing irrigation schemes, they only knew about small agricultural projects that were implemented by government.

Table 5.4 Non-irrigation members

Non irrigation members	Number of respondents	Percentage (%)
Not interested	3	5.6
Lack of information	21	38.9
No funds	1	1.9
Lack of information, no funds and there are no irrigations available	18	33.3
Lack of information, no funds and social conflicts	11	20.4
Total	54	100

Source: Field survey 2013

Table 5.4 shows respondents who were not part of the irrigation scheme and their reasons as for not being part of the irrigation scheme. There were 54 respondents who were not irrigation members and 5.6% of them were not interested because they were very old. 38.9% of the famers were not part of the irrigation scheme because they lack information about becoming members and what are the rules that one need to follow and mostly the membership fee which they do not have means to pay for as they were not working. Hence, 33.3% of the respondents claimed that they were not members of the irrigation scheme as they lack information, no funds and there is no irrigation scheme that is nearer to them that they could join. The old age farmers claimed that they couldn't be able to walk long distances and these irrigation schemes will require their full participation. Only 20.4% farmers were interested to become irrigation members but some of their challenges were lack of funds to construct an irrigation scheme as it will require expensive pipes to pump water for irrigation and there where social conflicts involved.

5.2.15 Type of irrigation system used

In Mhlontlo Local Municipality there are several types of irrigation systems used by homestead food gardening and smallholder irrigation farmers, namely, buckets, watering can, pipes sprinkler and direct water from rainfalls. The data revealed that these farmers were still using old irrigation system to water their crops. Only the smallholder irrigators where using the sprinkles as one of the modern type of irrigation system. While the homestead food gardens were still using the olden days irrigation systems which includes the watering cans. The farmers claimed that throughout the years, the level of rainfall had decreased. Thus, they were experiencing dry seasons, causing their soils to dry up.

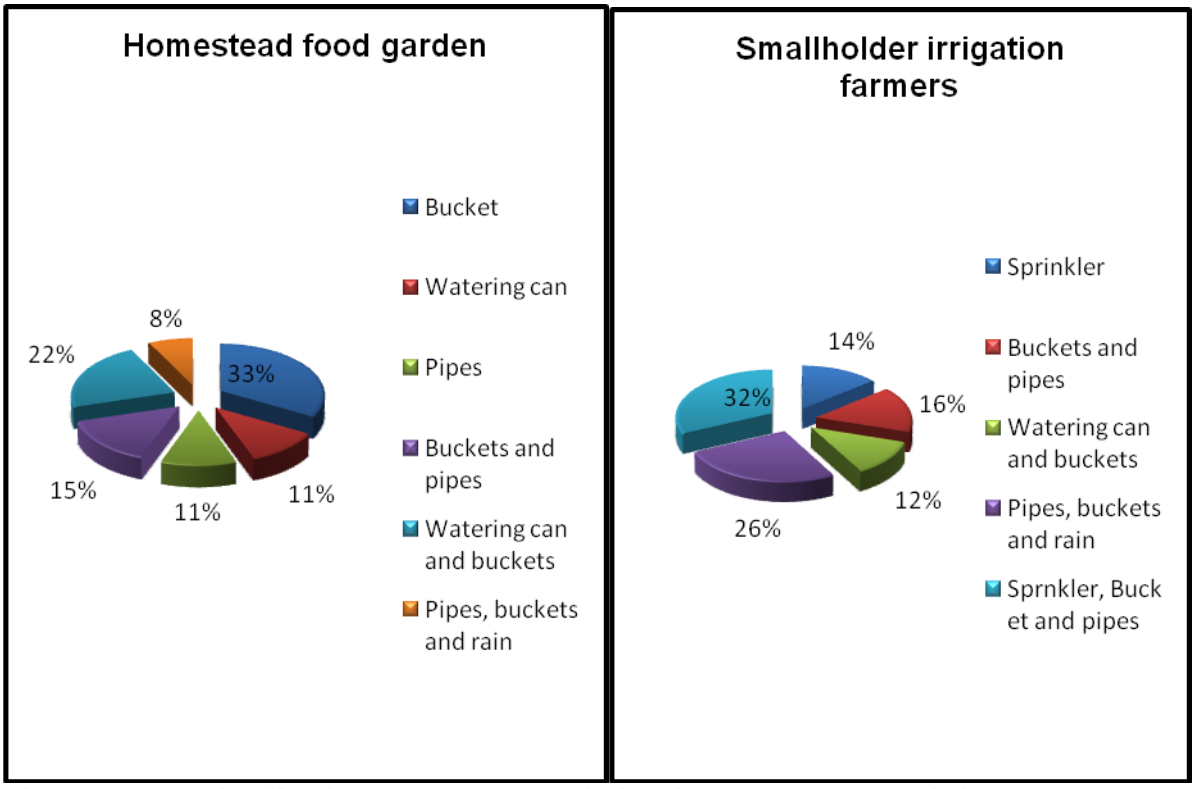


Figure 5.13 Distribution of types of irrigation system used (Source: survey data 2013)

Figure 5.13 shows that sprinklers, buckets and pipes were the most used irrigation system by the smallholder irrigation farmers which are represented by 32% followed by the use of pipes, buckets and rainfall which accounted for 26% respectively. On the other hand, homestead food gardeners used buckets the most which are represented by 33%. These homestead food gardeners used the buckets mostly because they are cropping on small land as compared to smallholder irrigation farmers and they could afford to purchase these buckets. Secondly for homestead

food garners the other irrigation system they used were the watering can with buckets which were represented by 22% followed by the use of buckets and pipes which were represented by 15%. The smallholder irrigation farmers also used buckets and pipes as their irrigation system which was represented by 16% followed by the use of sprinklers which was represented by 14%. Hence, watering cans and buckets were less used by smallholder irrigation farmers which are represented by 12%. The use of watering cans and pipes were the least used irrigation system among homestead food gardens which accounts for 11% and 11% respectively. The farmers claimed that they were not receiving any assistant from the government, in terms of improving their ways of irrigating. Moreover, most farmers that were part of the smallholder irrigation schemes were old, and irrigating using buckets and watering cans was strenuous and casing back pains.

5.2.16 Analysis of inputs used in the gardens/ irrigation field

Agricultural inputs which include fertilizers, oxen-draught, tractor and seeds are essential for crop farming. The fertilizer is important in terms of nourishing the soils, whereas tractor and oxen-draught well prepares the soil for seed planting. Both the homestead food gardeners and smallholder irrigation farmers from the sampled farmers were applying these inputs in preparing the land. However, most farmers were not receiving assistance from government in subsidising them, and their only option was to purchase them.

Table 5.5 Inputs used in the gardens/irrigation fields

Farming experience	Type of plots							
	Homestead food gardens				Smallholder irrigation farmers			
	Yes	%	No	%	Yes	%	No	%
Seeds	54	0	0	0	50	100	0	0
Fertilizers	54	0	0	0	50	100	0	0
Tractor	20	37	34	63	50	100	0	0
Oxen-draught	31	57.4	23	42.6	23	46	27	54

Source: Field survey 2013

Table 5.5 revealed famer's responses to survey questions about the type of inputs they apply in their gardens or irrigation fields. The table depicts that out of 104 respondents both homestead food gardeners and smallholder irrigation farmers, 100% of them were using seeds and fertilizers for crop production in order to accomplish their production goals. On the other hand, 37% of homestead food gardeners were using hired tractor to prepare their soils, and 100% of smallholder irrigation farmers used hired tractor as they are cropping in bigger land sizes. Lastly 57.4% of homestead food gardeners used their own oxen's to prepare the soils and 46% smallholder irrigation farmers also used the oxen's to prepare the soils. These farmers do not have enough money to hire tractors as most of them were unemployed and their sources of income were from pensions and crop sales.

5.2.17 Analysis of government inputs received by farmers

The South African government normally provides farmers with agricultural inputs in terms of subsidising these poor farmers. Hence, in some deep rural areas, these poor smallholder farmers do not receive these inputs. The Mhlontlo Local Municipality claimed that they buy their own inputs. Table 5.6 shows the number of farmers that are taking part in homestead food gardeners and smallholder irrigation farming, whether they have access to the inputs or not.

Table 5.6 Government inputs received by farmers

Receive inputs from government	Homestead food gardeners		Smallholder irrigation farmers	
	Frequency	Percentage (%)	Frequency	Percentage (%)
No	45	83.3	35	70
Yes	9	16.7	15	30
Total	54	100	50	100

Source: Field survey 2013

Table 5.6 depicts the number of farmers receiving agricultural inputs from government in Mhlontlo Local Municipality. 83.3% of respondents who are practising homestead claimed they were not receiving any agricultural inputs from government, hence 16,7% of these farmers said that they once received the inputs from government few years ago. However, 70% of smallholder irrigation farmers claimed to have received some agricultural inputs from government agency and only 30% of theses farmers were not getting any assistance from government.

5.2.18 Homestead food gardener's income source from crop sales

Most farmers in Mhlontlo Local Municipality are food secure since they are able to produce their own food (crop farming) and sale a little portion to individuals in their community. Hence the majority of sampled homestead food gardeners derived their livelihoods from crop sales that the produce. The farmers do not have a formal market to sell their produce, thus they sale their crop produce the individuals in the community and local shops and donate the surplus to the neighbours.

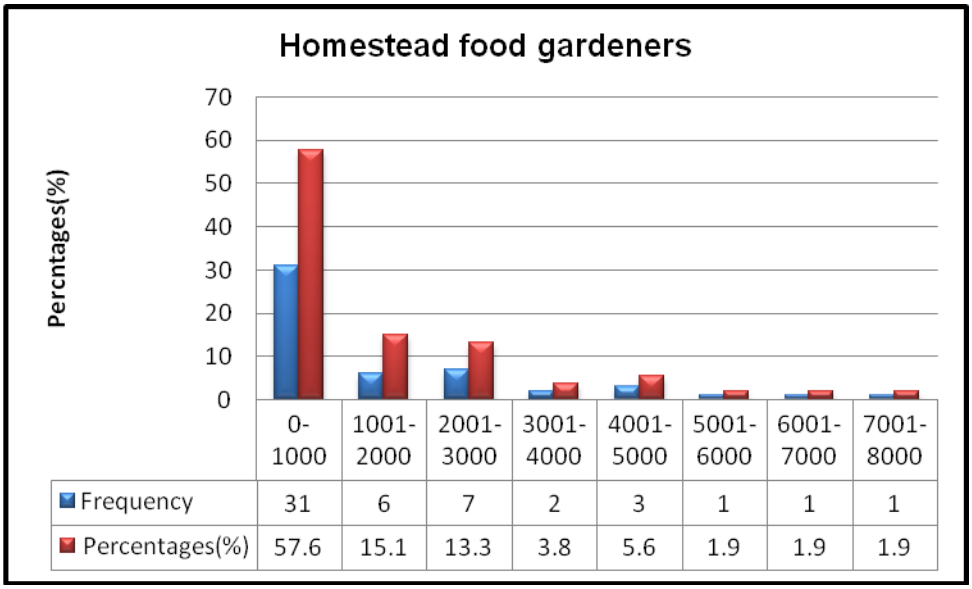


Figure 5.14 Distribution of crop farming income source for homestead food gardeners (Source: survey data 2013)

Figure 5.14 revealed the amount of income generated from crop sale by sampled homestead food gardeners. A portion of respondents were producing to sell, hence they did not consider the income for crop as their main source of income, because they did not have market linkages and this made it difficult for them to sell. Out of 54 homestead food gardeners being interviewed, 31 of these farmers made were getting income which ranged from R 0-1000. The data showed that only 57.6% of farmers made a maximum of R1000/per month from sales and a 1.9% of farmers made a minimum of R7001 from their sales. These farmers mostly sold their produce at the local shops, few stores in town and individuals in their community. 15.1% of homestead food gardeners made a maximum of R 2000/per month from sales of their produces, hence 13.3% of these farmers bring about a maximum of R 3000 income from their sales.

5.2.19 Smallholder irrigation farmers' income source from crop sales

Some of the farmers were willing to expand their scale of production, thus they ended up joining the irrigation scheme. These smallholder farmers had the intensions of increasing their scale of production and by doing so, being part of the scheme was their main drive. Hence, these smallholder irrigation farmer's major goals were to make profit from crop sales and maximize their farm output. On the

other hand the farmers do not have markets to sell their crop produce, this then deprive them from their goals and aspirations of farm business.

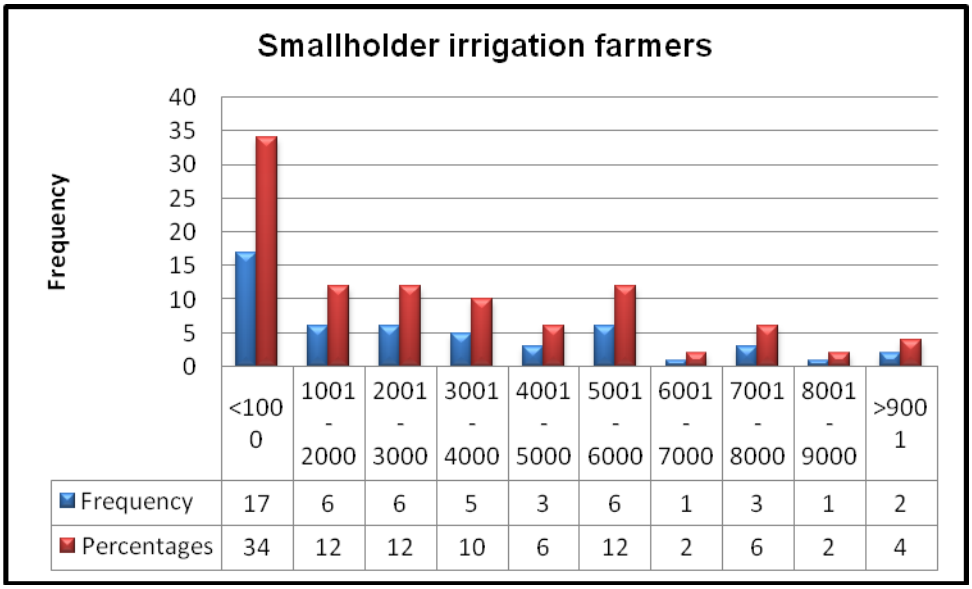


Figure 5.15 Distribution of crop farming income source for smallholder irrigation farmers (Source: survey data 2013)

Figure 5.15 shows the crop income from sales made by smallholder irrigation farmers in Mhlontlo Local Municipality. 34% of farmers were making income from sales of crop produce from their large irrigation scheme land which ranged from R 0-R 1000per month. Thus, they have invested a lot of their time and energy in their fields to get better quality products for sales and also to obtain household food basket to secure their well-being. However, 12% of these farmers managed to generate income that ranged from R 1001- R2000 per month to R5001-6001 per month for those who are able to transport their products to town and sold them to the shops. The income from sales had attained one of the farmers' goals; to improve the quality of life and make profit. Only 4% of the farmers were making income more than R 9000 per month from sales and 6% of the farmers made a maximum income that ranges from R 5001-6000per month from crop produce.

5.2.20 Analysis of other sources of income by Homestead food gardeners

The sampled homestead food gardeners during the interview were given options to indicate other sources of income they received excluding sales from agriculture (crop produce) and they specified the exact amount of income. In this analysis, the responses are categorised according to choices of sample households from the options they were given.

Table 5.7 Other income sources received by homestead food gardeners

Sources of income	Frequency	Percentage (%)
Non-farm category:		
0-1000	23	42.6
1001-2000	23	42.6
2001-3000	8	14.8
Total	54	100
Remittances category:		
0-1000	37	68.5
1001-2000	10	18.5
2001-3000	7	13
Total	54	100

Source: Field survey 2013

Table 5.7 stipulates that farmers were getting R0-R1000/per month from non-farm activities which include self-employment, child grants, old age grants and casual workers which are indicated by 42.6% of the sampled farmers. The study revealed that 14.8% of the sampled farmers they were getting non-farm income which ranged from R2001-R3000/per month. However, 68.5% of the farmers were receiving remittances from relatives and working children which ranged from R0-R1000/per

month. And 13% of the farmers received remittances that ranged from R2001-3000/per month and 18.5% were receiving remittances that ranged from R1001-R2000. Hence, this shows that non-farm income have a significant contribution to rural households in Mhlontlo Local Municipality.

5.2.21 Analysis of other sources of income by smallholder irrigation farmers

The sampled number of smallholder irrigation farmers of different households was given options to indicate from the semi-structured question other sources of income they receive excluding sales from agriculture and they must specify the exact amount of income. In this analysis, the responses are categorised according to choices of sample households from the options they were given which include the non-farm income and remittances they received monthly.

Table 5.8 Other income sources received by smallholder irrigation farmers

Sources of income	**Frequency**	**Percentage (%)**
Non-farm category:		
0-1000	6	12
1001-2000	27	54
2001-3000	13	26
3001-4000	3	6
4001-5000	1	2
Total	50	100
Remittances category:		
0-500	41	82
501-1000	5	10
1001-Above	4	8
Total	50	100

Source: Field survey 2013

Table 5.8 discovered that farmers were getting R0-R1000/per month from non-farm activities which include self-employment, child grants, old age grants and casual workers which are indicated by 12% of the sampled farmers. The study further showed that a large number of the farmers received an income that ranged from R1001-R2000per/ month and only 2% of the farmers sampled received income which ranged from R4001-R5000/per month. Thus, 26% of the farmers received non-farm income that ranged from R2001-R3000/per month and 6% received R3001-R4000 per month. Nonetheless, 82% of the farmers received remittances from relatives and working children which ranged from R0-R500/per month. And and 8% were receiving remittances that were above R1001. Therefore, this shows that non-farm income and remittances have a significant contribution to rural households; in terms of food security in Mhlontlo Local Municipality.

5.2.22 Analysis of maize harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Maize is one of the most grown agricultural product in the rural areas of Mhlontlo Local Municipality, thus it serves as a staple food for most households. The farmers claimed that it's easy to grow it and their four fathers were growing and they just continued from where they left. Hence, for some farmers who keep livestock, they use maize as one of the feeds.

Table 5.9: Analysis of maize harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Maize	Number of respondents	Minimum	Maximum	Mean	Median	Std. Deviation
Quantity harvested of maize	104	0	90	29.76	28.00	16.608
Unit price of maize	104	0	30	23.94	30.00	12.1014
Quantity sold of maize	104	0	86	23.89	24.00	18.3868

Source: Field survey 2013 Std. Deviation = standard deviation

Table 5.9 revealed that out of 104 sampled respondents, the minimum harvested maize was 0bags and the maximum of harvested bags was 90bags for both homestead food gardeners and smallholder irrigation farmers. Thus, the unit minimum price was R0.00 as some of the farmers were only producing for consumption and the maximum unit price was R30.00 per bag. This then proves that they lack market information on how to price their maize products. Furthermore, the maximum quantity that was sold from the harvested maize was 86 bags and a minimum of 0 bags. The mean of the harvested maize was 29.76 with a median of 28.00 and a standard deviation of 16.6.8. Thus, the mean of the unit was 23.94, the median being 30.0 and the standard deviation were 12.1014. Lastly the mean for sold maize was 23.89, with the median 24.00 and standard deviation 18.3868.

5.2.23 Analysis of cabbage harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Maize and cabbage are the most grown vegetables in the rural areas of Mhlontlo Local Municipality, thus they serve as a staple food for most households. The farmers claimed that it's easy to grow cabbage and it adds nutritional value to their daily meals. Therefore, some farmers who keep livestock, they use cabbage leaves as a feed for pigs.

Table 5.10: Analysis of cabbage harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Cabbage	Number of respondents	Minimum	Maximum	Mean	Median	Std. Deviation
Quantity harvested of cabbage	104	0	79	25.7	23.00	14.545
Unit price of cabbage	104	0	30	23.22	30.00	10.9038
Quantity sold of cabbage	104	0	75	20.60	24.00	15.9985

Source: Field survey 2013 Std. Deviation = standard deviation

Table 5.10 shows that out of 104 respondents, their minimum harvested cabbage was 0bags and the maximum of harvested bags was 79bags for both homestead food gardeners and smallholder irrigation farmers. Consequently, the unit minimum price was R0.00 as some of the farmers were only producing for consumption and the maximum unit price was R30.00 per bag of cabbage. This proves that they lack market information on how to price their maize and cabbage products. Additionally, the maximum quantity that was sold from the harvested cabbage was 75 bags and a minimum of 0 bags. The mean of the harvested cabbage was 25.7 with a median of 23.00 and a standard deviation of 14.545. Thus, the mean of the unit was 23.22, the median being 30.0 and the standard deviation were 10.9038. Lastly the mean for sold cabbage was 20.60, with the median 24.00 and standard deviation 15.9985

5.2.24 Analysis of potatoes harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Potato is grown in the rural areas of Mhlontlo Local Municipality for different uses. This crop functions as a staple food that is included within daily meals for salads or for hot chip potato. The farmers claimed that it's easy to grow this kind of agricultural crop and the community as large grows it.

Table 5.11: Analysis of potatoes harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Potatoes	Number of respondents	Minimum	Maximum	Mean	Median	Std. Deviation
Quantity harvested of potatoes	104	0	65	21.91	22.00	12.824
Unit price of potatoes	104	0	30	23.17	30.00	11.5456
Quantity sold of potatoes	104	0	64	17.58	19.00	13.783

Source: Field survey 2013 Std. Deviation = standard deviation

Table 5.11 revealed that out of 104 farmers that were part of the study, harvested a minimum of 0 bags and a maximum of 65 harvested bags of potatoes for both homestead food gardeners and smallholder irrigation farmers. Hence, the unit minimum price was R0.00 as some of the farmers were only producing for consumption and the maximum unit price was R30.00 per bag. This then proves that they lack market information on how to price their potatoes. Moreover, the maximum quantity that was sold from the harvested potatoes was 64 bags and a minimum of 0 bags. The mean of the harvested potatoes was 21.9; median of 22.00 and a standard deviation of 12.824. Consequently, the mean of the unit price for potatoes was 23.17, the median being 30.0 and the standard deviation were 11.5456. Lastly the mean for potatoes that were sold was 17.58, with the median 19.00 and standard deviation 13.783.

5.2.25 Analysis of spinach harvested, unit price and sold by homestead food gardeners and smallholder irrigation farmers

Spinach is one of the healthiest vegetables that the rural dwellers of Mhlontlo Local Municipality prefer to grow. Therefore it also serves as a staple food for most households and to balance their diet with nutritional products. The table below illustrates the spinach production its unit price in the rural village and the consumption.

Table 5.12: Analysis of spinach harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Spinach	Number of respondents	Minimum	Maximum	Mean	Median	Std. Deviation
Quantity harvested of spinach	104	0	55	18.94	21.00	12.555
Unit price of spinach	104	0	8.00	3.048	7.00	3.4819
Quantity sold of spinach	104	0	50	14.98	17.00	12.508

Source: Field survey 2013 Std. Deviation = standard deviation

Table 5.12 show that out of 104 sampled respondents, the minimum harvested spinach was 0 per bunch and the maximum of harvested bunch was 55 bunches for both homestead food gardeners and smallholder irrigation farmers. Thus, the unit minimum price was R0.00 as some of the farmers were only producing for consumption and the maximum unit price was R8.00 per bunch of spinach. Also, the maximum quantity that was sold from the harvested spinach was 50 bunches and a minimum of 0 bunch. The mean of the harvested spinach was 18.94; median of 21.00 and a standard deviation of 12.555. Hence, the mean of the unit price per

bunch was 3.048, the median was 7.00 and the standard deviation was 3.4819. Last but not least the mean for sold spinach was 14.98; median 17.00 and standard deviation 12.508.

5.2.26 Analysis of carrot harvested, unit price and sold by homestead food gardeners and smallholder irrigation farmers

Few farmers in Mhlontlo Local Municipality were growing carrot that was added to their meals, some on special occasions. This vegetable is good for eye sight purposes and most rural people still have good vision, which is being catalysed by the carrot.

Table 5.13: Analysis of Carrot harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Carrot	Number of respondents	Minimum	Maximum	Mean	Median	Std. Deviation
Quantity harvested of carrot	104	0	45	10.64	4.00	11.915
Unit price of carrot	104	0	8.00	3.327	0.00	3.6958
Quantity sold of carrot	104	0	40	8.34	0.00	10.570

Source: Field survey 2013 Std. Deviation = standard deviation

Table 5.13 revealed that out of 104 sampled respondents, the minimum harvested carrot was 0 bunch and the maximum of harvested bags was 45 bunches for both homestead food gardeners and smallholder irrigation farmers. Thus, the unit minimum price was R0.00 and maximum unit price was R8.00 per bunch of carrots. Furthermore, the maximum quantity that was sold from the harvested carrot was 40 bunches and a minimum of 0 bunch. The mean of the harvested carrots was 10.64; a median of 4.00 and a standard deviation of 11.915. As a result, the mean of the

unit price was 3.327, the median was 0.00 and the standard deviation was 3.6958. Last of all, the mean for sold carrot was 8.34; the median 0.00 and standard deviation 10.570.

5.2.27 Analysis of tomatoes harvested, unit price and sold by homestead food gardeners and smallholder irrigation farmers

Tomato is not generally grow by rural dwellers of Mhlontlo Local Municipality, thus it does not serves as their major staple food in their households. The table represents the data was collected concerning the number of tomatoes that was harvested, its unit price for sales and the quantity sold.

Table 5.14: Analysis of tomatoes harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Tomatoes	Number of respondents	Minimum	Maximum	Mean	Median	Std. Deviation
Quantity harvested of tomatoes	104	0	39	7.53	0.00	11.659
Unit price of tomatoes	104	0	20	5.77	0.00	8.441
Quantity sold of tomatoes	104	0	37	6.47	0.00	10.638

Source: Field survey 2013 Std. Deviation = standard deviation

Table 5.14 revealed that out of 104 sampled respondents, the minimum harvested tomatoes was 0bags and the maximum of harvested bags was 39 bags for both homestead food gardeners and smallholder irrigation farmers. Thus, the unit minimum price was R0.00 as some of the farmers were only producing for consumption and the maximum unit price was R 20.00 per bag. This then proves

that they lack market information on how to price their tomatoes. Besides, the maximum quantity that was sold from the harvested tomatoes was 37bags and a minimum of 0 bags. The mean of the harvested tomatoes was 7.53; a median of 0.00 and a standard deviation of 11.659. Therefore, the mean of the unit price for tomatoes was 5.77; the median was 0.00 and the standard deviation was8.441. and lastly the mean for sold tomatoes was 6.47; the median 0.00 and standard deviation 10.638.

5.2.28 Analysis of beetroot harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Beetroot was the least grown agricultural crop in the villages of the municipality of the study. The surveyed data bellow interprets the minimum and maximum amount of the beetroot being harvested and sold in Mhlontlo Local Municipality

Table 5.15: Analysis of beetroot harvested, unit price and quantity sold by homestead food gardeners and smallholder irrigation farmers

Beetroot	Number of respondents	Minimum	Maximum	Mean	Median	Std. Deviation
Quantity harvested of beetroot	104	0	34	5.18	0.00	9.427
Unit price of beetroot	104	0	30	5.89	0.00	11.353
Quantity sold of beetroot	104	0	30	3.92	0.00	7.995

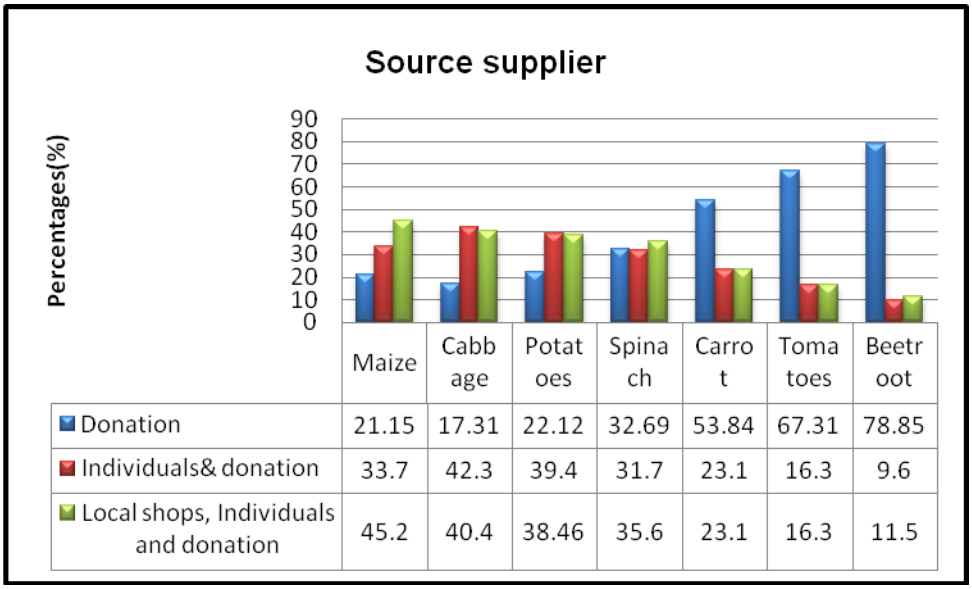
Source: Field survey 2013 Std. Deviation = standard deviation

Table 5.15 shows that 104 sampled respondents from the villages of Mhlontlo Local Municipality, their minimum harvested beetroot was 0 bunches and the maximum of

harvested bags was 34 bunches for both homestead food gardeners and smallholder irrigation farmers. Thus, the unit minimum price was R0.00 and the maximum unit price was R30.00 per bag. Moreover, the maximum quantity that was sold from the harvested beetroot was 30 bunches and a minimum of 0 bunches. Hence, the mean of the harvested beetroot was 5.18; a median of 0.00 and a standard deviation of 9.427. However, the mean of the unit price was 5.89, the median being 0.00 and the standard deviation were 11.353. Last but not least the mean for sold beetroot was 3.92; the median 0.00 and standard deviation 7.995.

5.2.29 Homestead food gardeners and smallholder irrigation farmers source suppliers

There are many channels on which homestead food gardeners and irrigation farmers can use to sell their crop produce. These channels in Mhlontlo Local Municipality included the sales to individuals in the communities, local shops and few managed to sell their products in shops that are located in town. However, due to lack of markets in the village, most of the farmers were donation to their neighbours and to some rural dwellers which did not practice any agricultural activities. Figure 5.15 shows the distribution of source supplier of the crop produce by homestead food gardeners and smallholder irrigation farmers.



	Maize	Cabbage	Potatoes	Spinach	Carrot	Tomatoes	Beetroot
Donation	21.15	17.31	22.12	32.69	53.84	67.31	78.85
Individuals& donation	33.7	42.3	39.4	31.7	23.1	16.3	9.6
Local shops, Individuals and donation	45.2	40.4	38.46	35.6	23.1	16.3	11.5

Figure 5.16: Distribution of source supplier for both homestead and irrigation farmers (Source: survey data 2013)

Figure 5.16 revealed farmers' response to the questions about their products source suppliers for farmers both homestead food gardeners and smallholder irrigation farmers. In the above figure 5.17; 21.15% of farmers were donating maize to the rural dwellers and 45.2 % of the farmers were selling to the local shops, individuals and donating their surplus and the 33.7% of respondents were selling their products to individuals and also donating. Hence, 42.3 % of these farmers were selling and donating cabbages to rural dwellers; 40.4% was selling their cabbages to local shops, individuals and also donating the surplus. For the farmers who were growing potatoes, they sold and donated 38.46%; donated 22.12%. This means most farmers reached their farm goals and aspirations in terms of making profits from sales. The tomatoes did not have markets and most farmers were growing them for home consumption. 67.31% of farmers donated their tomatoes, and 16.3% donated and made sells to individuals who were willing to buy them. And also for beetroot producers, they donated 78.85%, sold to local shops and individual and donated 11.5%, hence donating and selling to individuals 9.6% of the product. Spinach growers sold to local shops and individuals and made donation which accounted to35.6%; 32.69 was donated to the people in the village. Furthermore, 38.4% of potatoes was sold and donated, 38.46% was sold to local shops, individuals and donated and the remaining 22.12 was only donated to people. Last but not least, 53.84% of carrot was donated, and the 23.1 were sold to local shops, individuals and the surplus being donated.

5.2.30 Adoption of technology by homestead food gardeners and smallholder irrigation

Adoption of technology is the significant key to understanding intense improvement in agricultural productivity as proved in Asia's Green Revolution which occurred since the late 1960s and which was nothing but the development of new technologies invented through scientific research (Hayami and Ruttan, 1985). Hence a number of rural poor smallholder farmers challenges is the adoption of improve technology for agricultural production. In Mhlontlo Local Municipality the smallholder farmers and homestead gardeners are having difficulties in terms of adopting new technology because they do not get any extension services from the government and most of the farmers are illiterate and too old to learn more information. Table

5.16 shows the adoption of technology by homestead food gardeners and smallholder irrigation farmers in the study survey.

Table 5.16: Analysis of adoption of technology by homestead food gardeners and smallholder irrigation farmers

Adoption of technology	Mean	Std. deviation	Minimum	Maximum
Not afraid to try new technology	1.05	0.729	0	3
Not afraid of investing money in new technology	0.52	0.502	0	1
Spend more time on new technology where you anticipate profit	0.85	0.436	0	3
Risk of new technology isn't your first priority to take a decision	0.85	0.436	0	3
Do not wait for subsidies before applying new technology	0.52	0.502	0	1
You take your own judgement about the new technology before consulting a friend	1.00	0.00	1	1

Source: Field survey 2013; ranked Agree=1 and Disagree=0

Table 5.16 presented that out of 104 sampled respondents, the adoption of technology by farmers was ranked from 0 to 1. Thus, 0 represents disagree and 1 represents agree, and farmers ranked their goals in terms of adopting their

technology. The maximum of farmers that are not afraid to try new technology ranked to 3 points and the minimum is ranked at 0. This means that these poor farmers are willing to try innovative technology in enhance their production and reach their farming goals. Their mean was 1.05 and standard deviation was 0.729. The study further revealed that the maximum for the farmers that were not afraid to of investing money in new technology was ranked at 1 and the minimum was ranked at 0. This shows that, most rural farmers of Mhlontlo are not willing to invest money in trying new technology, rather they are subsidized. Their mean was 0.52 and standard deviation was 0.502.

However, the mean for the farmers who spend more time on new technology where they anticipate profit was0.85 and their standard deviation was 0.436. And the maximum ranked at 3, with the minimum of 0. This revealed that farmers are eager to spend time trying to learn more about new agricultural technologies if they expect profit from applying this technology in as a production tool. The study revealed that the maximum of 3 farmer's risk of new technology was not their first priority and a minimum of these farmers was 0. The mean was 0.85 and standard deviation was 0.436. The study also shows that a maximum of 1 farmer did not wait for subsidies before applying new technologies in their gardens, with the minimum of 0. Their mean was 0.52 with a standard deviation of 0.502. Last but not least, the study showed that a maximum of 1 farmer took their own judgement about new technology before consulting a friend and a minimum of 1. Thus, their mean was 1.00 and standard deviation of 0.00.

5.2.31 Challenges faced by homestead food gardens in crop farming

In most rural communities homestead food gardeners are faced with many challenges that hamper them from achieving their farming goals and aspiration in terms of production. Hence these rural poor smallholder farmers derive most of their livelihoods from crop production and generate income through sales of their produce. Mhlonlto Local Municipality farmers are facing many constraints which include: water for irrigation, lack of capital to purchase agricultural inputs, lack of information to market access, extension services from government and private sectors, low rain fall and access to credits. Table 5.17 revealed these challenges according to their percentages and frequencies of the sampled respondents.

Table 5.17: Analysis of challenges encountered by homestead food gardens in crop farming

Challenges faced by crop farmers	Problem		No Problem	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Land	0	0	54	100
Labour	0	0	54	100
Water for irrigation	22	40.7	32	59.3
Lack of capital	38	70.4	16	29.6
Lack of information to market access	35	64.8	19	35.2
Extension service	53	98.1	1	1.9
Access to credits	31	57.4	23	42.6
Lack of inputs	34	63	20	37
Low rainfall	39	72.2	15	27.8
Poor soil fertility	0	0	54	100

Source: Field survey 2013

Table 5.17shows that 40.7% of homestead food gardeners are facing challenges of irrigation water, hence 59.3% have no problem towards the access of water to irrigate crops. One of the problems they were facing was access to market information as 64.8% were experiencing this problem and 35.2% where not experiencing this problem as they claimed that they research about market prices so that they will not charge less and run at a loss. On the other hand 98.1% of these farmers were facing a problems related to extension services. The farmers were not receiving any extension service from government or any other NGO. And the other 1.9% claimed that he received training few years ago and that was the last time he received the service. However, the homestead gardeners claimed that they were receiving low rainfalls in the past few years. And this caused soils to dry up, hence decreasing agricultural production and they end up no achieving their goals.

5.2.32 Challenges encountered by smallholder farmers in crop farming in crop farming

In most rural villages of the former homelands areas, the smallholder irrigation farmers encounter certain challenges towards attaining their different farm business goals and aspirations. Thus, they derive their livelihoods mostly from agricultural sector to attain household food security and generate on-farm income.

Table 5.18: Analysis of challenges encountered by smallholder irrigation farmers in crop farming

Challenges faced by crop farmers	Problem		No Problem	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Land	0	0	50	100
Labour	25	50	25	50
Water for irrigation	14	28	36	72
Lack of capital	26	52	24	48
Lack of information to market access	0	0	50	100
Extension service	50	100	0	0
Access to credits	18	36	32	64
Lack of inputs	18	36	32	64
Low rainfall	32	64	18	36
Poor soil fertility	0	0	50	100

Source: Field survey 2013

Table 5.18 revealed that 52% smallholder irrigation farmers are facing challenges of lack of capital access; thus 48% of the farmers have no problem towards the capital access. On the other hand, 100% of the farmers that were interview had problems related to extension services. The rural farmers claimed that they never received any

extension training from the government extension officers. Hence, when they had challenges about pest and crop diseases they had to consult each other, so as to tackle the problem. However, 64% of the farmers had problems concerning low rainfall that they had been experiencing and 36% claimed they had no problem with the current rainfall. These farmers were only receiving summer rainfalls, which was a problem and they had to make sure they frequently water their crops. Therefore, 28% of the farmers had problems concerning water for irrigation and the other 72% of the irrigators were not having any problems. However, 100% of the irrigators revealed that they were no experiencing any poor soil fertility as their soils where rich for crop production.

5.2.33 Farmers aspirations and goals on farm business

Table 5.19 shows the farmers' aspirations and goals on farm business by homestead food gardener's and smallholder irrigation farmers in Mhlontlo Local Municipality.

Table 5.19: Farmers' aspirations and goals on farm business

Variables	Mean	Std. deviation	Minimum	Maximum	N
Intrinsic					
Self-employed	2.61	0.703	1	3	104
Like farming life	3.00	0.00	3	3	104
Doing the work you like	3.00	0.00	3	3	104
Being able to arrange hours of work	2.65	0.76	1	3	104
Have more leisure time	1.38	0.486	1	2	104
Expressive					
Be recognised as a top producer	3.00	0.00	3	3	104
Be recognised as an adopter of	2.61	0.703	1	3	104

technology					
Be recognised as specialist in growing crops	2.61	0.703	1	3	104
Be recognised as owner of land	3	0.00	3	3	104
Social					
Be the farmer of the year	2.61	0.703	1	3	104
Involve family in decision making	2.37	0.813	1	3	104
Leave business for the next generation	3	0.00	3	3	104
Provide employment for local people	2.53	0.763	1	1	104
Belong to crop farming community	3	0.00	3	3	104
Spend time with family	2.47	0.812	1	3	104
Instrumental					
Increase standard of living	3	0.00	3	3	104
Increase maximum farm income	2.65	0.760	1	3	104
Expand the business	2.57	0.747	1	3	104
Keep debt as low as possible	2.89	0.309	2	3	104
Save children's education	3	0.00	3	3	104

Source: Field survey 2013

Table 5.19 shows farmers' goals on the farm business which are being categorized in to five factors. Factor 1 is regarded as Goal 1 which is farmer's social status and hence goal 2 represents the objectives that are essentially financial in nature. The intrinsic values define the third factor where by farmers are doing the work they like "farming" and being to arrange hours of work. This factor is called the independence representing goal 3. The social and instrumental values which load on the fourth factor (goal 4) are attributable to a farmer's family-oriented values. The fifth factor compromises of two intrinsic values and it can be termed as leisure orientation.

Under the intrinsic goals the lowest mean was for farms having the more leisure time which was represented by 1.38 and the highest was farmers doing the work they like and like farming life which was 3.00. And the minimum for intrinsic goal was represented by 1 and the maximum was represented by 3 with the total number of 104 respondents. In this goal the highest std. deviation was 0.76 for "being able to arrange hours of work" and lowest being 0.00 which were "doing the work you like and like farming life".

In expressive goal the highest mean was 3.00 which represent "be recognised as a top producer" and "be recognised as owner of land" goals and the goal with the lowest mean were both the "Be recognised as an adopter of technology" and "Be recognised as specialist in growing crops". The expressive factor had the minimum of 1 and maximum of 3 with the total number of 104 respondents. The lowest standard deviation was 0.00 for "Be recognised as a top producer" and "Be recognised as owner of land" goals and the highest which was 0.703 for "Be recognised as an adopter of technology" and "Be recognised as specialist in growing crops" goals.

In the social goals the highest mean was 3.00 which represent "Leave business for the next generation" and "Belong to crop farming community" goals and the goal with the lowest mean was 2.37 which was represented by "involving family in decision making" goal. The social factor had the minimum of 1 and maximum of 3 with the total number of 104 respondents. The lowest standard deviation was 0.00 for "Leave business for the next generation" and "Belong to crop farming community" goals and the highest which was 0.813 for "Involve family in decision making goal.

In instrumental goals the highest mean was 3.00 which represent “Increase standard of living” and “Save children’s education” goals and the goal with the lowest mean was 2.57 which was represented by “expand the business” goal. The instrumental goals had the minimum of 1 and maximum of 3 with the total number of 104 respondents. The lowest standard deviation was 0.00 for “increase standard of living” and “save children’s education” goals and the highest were 0.760 for “increase maximum farm income” goal.

5.3 Estimation of binary Logit regression for homestead food gardener’s smallholder irrigation farmers on factors which influence their production goals and aspirations

This section present the results of the Logit (Binary) regression model and discuss the results of the significant variables determining the factors that influence crop production for both homestead food gardeners and smallholder irrigation farmers in Mhlontlo lLocal Municipality, Eastern Cape of South Africa. Table 5.20 shows contained six independent variables (age, gender, land size, source of water for crop irrigation, type of irrigation used and household size). The table further shows the estimated coefficients (B values), standard error (S.E.), Wald statistics, degree of freedom (df), significant values (sig) and Exp (p) of the predictor in the model. The statistical significance at 1% is represented by ***, at 5% is represented by ** and at 10% is represented by *.

Table 5.20: Factors which influence crop production

Variables	B	S.E.	Wald	Df	Sig.	Exp(B)
Age	-.097	.036	7.216	1	0.007***	.907
Gender	-1.659	.094	3.106	1	0.078**	.190
Land size	-6.083	1.669	13.293	1	0.000***	.002
Sourceof waterforirrigation	-1.127	.292	2.998	1	0.083**	.324
Typeofirrigationused	-1.066	.172	13.293	1	0.000***	.344
Householdsize	.076	5.914	.193	1	0.660	1.079
Constant	21.959		13.787	1	0.000	
-2 Log likelihood 38.418[a] Cox & Snell R Square 0.634 Nagelkerke R Square 0.846 Chi-square 104.02						

***, **, * statistically significant at 1%, 5% and 10% respectively

The Logit (Binary) regression model analysed age was 0.007 and significant at 1%, with 0.036% standard error hence the coefficient value was -0.097 with a negative livelihood increase. Gender on the other hand was 0.078 and significant at 5%, with 0.094% standard error and a negative coefficient value of -1.659. Land size was significant at 0.000 at level 1, whereby the standard error term was 1.669 and coefficient value of -6.083. Thus, for the source of water for irrigation was significant at 0.083 at 5%,with 0.292% standard error and coefficient value of -1.127. The type of irrigation used was significant at 0.000 and the standard error term was 0.172 and coefficient value of -1.066. This means age, land size and type of irrigation used are

proven to be highly significant at 1 % level of statistical significance. Gender and source of water for irrigation followed a a statistical significance level of 5 %.The -2 Log likelihood is represented by 38.418, and the Cox & Snell R Square which was represented by 0.634 and Nagelkerke R Square which was represented by 0.846 and last the Chi-square which was represented by 104.02.

5.4 Adoption of technology by homestead food gardener's smallholder irrigation farmers

Adoption of technology by rural farmers is one of the factors that affect the crop production goals and aspirations of the farm business. The adoption of technology is weighted between the homestead food gardeners and smallholder irrigation farmers in Mhlontlo local municipality. Hence, the two tailed Pearson's correlation analysis was computed to indicate the strength and direction of the linear relationship.

Table:5. 21 Adoption of technology- Pearson‘s correlation matrix

		Notafraidtotrynewtechnology	Notafraidofinvestingmoneyinnewtechnology	Spendmoretimeonnewtechnology	Riskofnewtechnology	Donotwaitforsubsidies	takeyourownjudgementaboutthenewtechnology
Notafraidtotrynewtechnology	Pearson Correlation	1	.043	.753**	.753**	.043	.b
	Sig. (2-tailed)		.663	.000	.000	.663	.
	N	104	104	104	104	104	104
Notafraidofinvestingmoneyinnewtechnology	Pearson Correlation	.043	1	-.084	-.084	1.000**	.b
	Sig. (2-tailed)	.663		.396	.396	.000	.
	N	104	104	104	104	104	104
Spendmoretimeonnewtechnology	Pearson Correlation	.753**	-.084	1	1.000**	-.084	.b
	Sig. (2-tailed)	.000	.396		.000	.396	.
	N	104	104	104	104	104	104
Riskofnewtechnology	Pearson Correlation	.753**	-.084	1.000**	1	-.084	.b
	Sig. (2-tailed)	.000	.396	.000		.396	.
	N	104	104	104	104	104	104
Donotwaitforsubsidies	Pearson Correlation	.043	1.000**	-.084	-.084	1	.b
	Sig. (2-tailed)	.663	.000	.396	.396		.
	N	104	104	104	104	104	104
Takeyourownjudgementaboutthenewtechnology	Pearson Correlation	.b	.b	.b	.b	.b	.b
	Sig. (2-tailed)	.	.	.	.	.	
	N	104	104	104	104	104	104

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5.21 the correlation is significant at the 0.01 level at 2-tailed. Six major contributors to the level of adoption by farmers in order to be able to attain their aspirations and goals of farming, if the apply innovative technology for better quality and quantity of products. There is a positive correlation at 0.01 level of significance between the spending more time on a new technology where you anticipate profit and risk of new technology isn't your first priority to take a decision. Thus there is also a positive correlation at o.o1 level significance between not afraid to try new technology and risk of new technology isn't your first priority to take decision.

5.5 Estimates for goals and aspirations for maize production

The Logit (Binary) regression model estimates farmer's goals and aspirations in terms of producing maize. Farmers perception, aspirations and goals on production of maize where interpreted in table 5.22. Thus, the statistical significant level at 1% is represented by ***, at significant level at 5% is represented by ** and at significant level 10% is represented by*.

Table 5.22 Estimates for goals and aspiration of maize production

	Unstandardized Coefficients		Standardized Coefficients		T	Sig.
	B	Std. Error	Beta	Std. Error		
(Constant)	1.255	.483			2.600	.011**
Involvingfamilyindecisionmaking	-.016	.067	-.025	.108	-.235	.815
Expandthefarmbusiness	-.267	.124	-.396	.183	-2.161	.033**
Beregornisedasaleaderinthetechnologyadoption	.395	.140	.561	.199	2.821	.006***
Provideemploymenttoruralpeople	-.171	.088	-.259	.133	-1.947	.055**
Increasefarmincome	-.042	.138	-.064	.208	-.306	.761
Keepdeptsaslowaspossible	.001	.206	.000	.124	.003	.998
Spendtimewithfamily	-.290	.093	-.469	.150	-3.133	.002***
Haveleisuretime	.131	.063	.175	.085	2.068	.041**

***, **, * statistically significant at 1%, 5% and 10% respectively

Table 5.22 shows the farm business goals and aspiration by homestead food gardens and smallholder irrigation farmers in Mhlontlo Local Municipality. The farm business goal and aspiration of “spending time with family” was positively significant at 0.002 in level 1% and having leisure time goal was significantly positive at 0.041 at level 5%. Thus being recognised as a leader in the adoption of technology was positively significant at level 1% which was represented by 0.006 of significance.

5.6 Summary of the chapter

Research finding are analysed in this chapter. The results show that youth of Mhlontlo Local Municipality are more interested in producing for homestead food baskets than working in a large scale of land. The results further showed that 60% of female farmers are more interested in practicing and being involved in irrigation schemes by producing at a larger scale. Hence, 60% of smallholder irrigation farmers are producing in land size between 0.5-1.0 hectors and 57.4% of homestead food gardeners are producing in land size between 0.125-0.25 hectors of land. This means that, smallholder irrigation farmers were producing at a bigger scale and they had greater output compared to homestead food gardeners.

The results shows that homestead food gardeners and smallholder irrigation farmers encounter challenges which includes lack of capital, access to extension services, low rainfall during the year, lack of information to market access, lack of inputs and access to credits for crop productivity. Hence, providing employment is not one of their major goals.

Goals and aspirations of smallholder farmers’ were tested using Gasson goal ranking model. Variables such as age, gender, land size, source of water for irrigation, household size and types of irrigation used were analysed using Logit regression model; and their significance were tested in different levels. Adoption of technology was tested using pearson’s correlation matrix.

CHAPTER 6: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents summary of the dissertation findings and conclusions based on the results of the study and recommendations put onward on goals and aspirations of farmers in terms of expanding their crop production scale and commercializing.This chapter started by summarizing chapter two which focuses on the literature review with respect conceptual framework of smallholder farmers aspirations and goals, overview of south Africa's smallholder irrigation schemes, water use efficiency and productivity by irrigators and homestead farmers, water use rights policy, rural livelihood strategies and poverty, sustainable livelihood framework, technology adoption by smallholder farmers and challenges faced by smallholder farmers to attain their goals. Chapter three dealt with the description of the study area which is Mhlontlo Local Municipality and chapter 4 with the analytical data collection tools.

The broad objective of this study was to determine the aspirations and goals of farmers to expand irrigation crop production from homestead gardens to irrigation plots. The analysis was done using descriptive statistical analysis and Logit (Binary) regression model applying SPSS version 21 computer software.

6.2 Summary

The dissertation is broadly divided into six chapters. Chapter one encompassed of the study introduction, objectives, research questions, hypothesis and justification for the study. Chapter two dealt with a broad review of literature that focused on the issue of smallholder farmers goals and aspiration in term of expanding their farm business, detailed review of relevant literatures on conceptual framework of smallholder farmers aspirations and goals, overview of south Africa's smallholder irrigation schemes, water use policy and challenges faced by these smallholder farmers in terms of crop production, that may hinder them from reaching their farm business goals and aspirations. Hence, authors that were cited in this section where acknowledged.

Chapter three provided details of the methodology of the study area which included the study sites, data collection and the model used in the study. Chapter four highlighted the data collection tools that were used in the study and details about the variables that would be examined. Chapter five presented the research findings which include demographics, farmer's goals and aspiration, adoption of technology by both the homestead food gardeners and smallholder irrigation farmers; and Logit (Binary) regression analysis results. Chapter six provided detailed information about the summary, conclusion and recommendations.

6.2.1 The review of the literature

The literature focused on different subtopics related to the objectives of the dissertation. This part of the study played a most important role as it focussed through towards the elements in the study. The purpose of this study was to assess farmer's aspirations and goals to expand their irrigation crop production from homestead food gardens to irrigation plots and also overviewing South Africa's irrigation schemes and those factors are highlighted. The literature reviews also examines the water efficiency and productivity by smallholder irrigation farmers and homestead food gardens in order to reach their farming goals and have better perspectives about the farm business, at the same time consuming water. Water and land are the scarce resources which are the natural capital that homestead food gardeners and smallholder irrigators use to produce effectively, these farmers need policy rights in order to be able to assess them. Hence, these farmers need to have water licences for irrigation purposes in the rural areas to enhance them to reach their farming goals and aspirations.

The literature also reviews the role of technology and the smallholder irrigation and homestead food gardens technology. Hence, irrigation is one technology that is adopted by smallholder farmers in Mhlontlo Local Municipality whereby they use the sprinklers. Therefore, agricultural technology adoption is the significant key to understanding intense improvement in agricultural productivity for improved quality and quantity crop product for marketing purpose. And the challenges there farmers faced in the process of expanding their scale of production in order to reach their farm production gaols.

6.2.2 Description of the study area

The study was carried in the Mhlontlo Local Municipality, Eastern Cape Province of South Africa. The study area has two main urban centres, namely, Tsolo and Qumbu, and is located along the N2 and R396 routes. The study area comprises rural and urban communities of Mhlontlo Local Municipality.

6.2.3 Methodology

The structured questionnaires in the form of a survey were used as a method of data collection in rural areas of Mhlontlo Local Municipality. Hence, the unit of analysis that was identified for the study surveys were rural households of Mhlontlo Local Municipality and about 104 households' head sampled was interviewed. Furthermore, the Logit (Binary) Regression model was used to test the factors that affect production of crop by smallholder farmer in expanding their scale and reaching their goals and aspirations of farm business and Gasson goal ranking method was applied to rank farmers goals and aspirations that where identified.

6.2.4 Results and discussion of the descriptive statistics

This section highlights the finding of the research study and it will commence with the summary of figures and tables. Hence, is section also summarizes the finding on the research study based on the objectives. The study was conducted in Mhlontlo Local Municipality rural villages where two groups of farmers where critically research. The idea was to compare the different goals and aspirations of both homestead food gardeners and smallholder irrigation farmers. And also look into factors that are causing them not to expand their scale of production for commercialization process. Hence the primary objective was to determine the aspirations and goals of farmers to expand irrigation crop production from homestead gardens to irrigation plots. The number of individual farmers from both groups that were interview was 104, questionnaires and other relevant research tools where applied in accessing more information from the farmers.

The study observed that the number of female farmers involved in the homestead farming amounted to 52% and in the irrigation scheme they amounted to 60%. The male farmers in the study that where involved with in the homestead food gardening

where 48% being greater than those involved in the irrigation schemes which amounted to 40%. The study also revealed that farmers involved with the irrigation schemes where much older ranging between the ages of 61-70 years, meaning that they also derive their livelihood from government old age grants. The study also revealed that the farmers had access to land for farming which was provided by the chief (traditional leader) in their villages and they also had access to water for irrigation and drinking purposes.

Mhlontlo Local Municipality farmers had very small land sizes for both homesteads gardening and smallholder irrigators which range between 0-2.5 hectors. Homestead food gardeners where operating in small land sizes which where ranging between 0-0.25, hence its very small and this was causing them not to be able to be efficient enough for expansion of their crop scale of production. Smallholder farmers had bigger land sizes as compared to homestead food gardeners and their land size ranged between 0.5-2.5 ha. And they were operating in gardens and field which where fenced, thus protecting their product from livestock's.

Water usage in the study area was characterized into two categories: Water usage for crop production and water for domestic uses. And the water sources in this local municipality are available in difference sources which include dams, rivers, tanks, taps and boreholes for both domestic use and irrigation purposes. The stud also revealed different factors which were caused some farmers not to be part of the irrigation schemes. The factors include 5.6% of farmers not to be interested because they claimed to be very old; hence 38.9% lack information about irrigation schemes. Thus some of the farmers claimed that there were not irrigation schemes that where available and nearer to them. Hence there were no funds from government to operate more irrigation schemes in the area. The operation irrigation scheme used different tools and methods to irrigate their crop which included sprinklers, buckets, pipes and watering cans.

Furthermore, majority of the homestead households were dependent of agricultural cropping as their primary source of income, and only a few respondents were working off farm to derive their livelihoods. Thus, 57.6% homestead farmers were making incomes from sales of crops per month which was less than an R1000.00 and 34% of smallholder irrigation farmers were making an income of more than a

R1000/month. However, most homestead respondents were donating most of their crop products to the people in the villages and the smallholder irrigators were selling most of their produce to the individuals in the village.

The challenges that are highly faced by homestead farmers in terms of expanding their scale of production and being able to reach their goals and aspirations of the farm business that they anticipate include: lack of capital, lack of extension services from government and NGOs, access to credits, low rainfalls throughout the year, lack of inputs and lack of information about the market access. These factors hence hinder these farmers to expand their scale of production from homestead food gardens to smallholder irrigation schemes. And farmers goals where ranked according to their importance using Gasson goal ranking methods.

Logit (binary) regression model was used in the study assess the impact of different variables on crop production by both group of farmers. The variable includes: age, gender, land size, source of water for crop irrigation, type of irrigation used and household size. Thus three of these factors were positively significant at 1% and others were significant at 5% and 10% level.

6.3 Conclusions

The interviewed respondents from Mhlontlo Local Municipality were farming for different goals and aspirations of the farm business they need to achieve. These farmers' goals includes: being recognised as a top crop producer in the local municipality, being recognised as the owner of land to be able to expand scale of production, increase maximum farm income from sales of crop, involving farming member in decision making about the farm business, improve the standard of living, being recognised as a specialist in growing different crops and the leader of the technology adopter, self- employed and independent, provide employment for rural people, leave the farm business for the next generation for them to generate a livelihood from it, like farming life and keeping debts as low as possible. Most of these rural households are uneducated as 48% of smallholder irrigation farmers only have primary education as most of them have more than 20 years of farm business experience.

The homestead respondents were not expanding their scales of production due to many factors which included lack of markets. They donated most of their produce because they don't have markets and proper road infrastructure to transport the product, even transports to transport these crop products. Some of the respondents claimed that they do not have enough time for cultivation and taking care of their gardens as they had off farm employment and they are satisfied with the end products they are receiving from their small size gardens.

The smallholder irrigation farmers and homestead garden farmers have access to land and water for their crop production; hence they lack technical training on how to produce quality and quantity products or the market. And this is one of their major constraints that is leading them not to expand their scale of production. In the past years they have been experiencing low rainfall during the year, which makes it difficult to cultivate because the soils would become dry and hard. One of their major crops is the production of maize, cabbage and potatoes as they are easy to grow, staple food and the community mainly grows it. As they were able to access the natural access which include water and land.

6.4 Recommendations

The study has highlighted various factors affecting the farmers not to expand their scale of production to achieve their different farm business goals and aspiration with their different perception towards farming. For that reason there is a need for these households to be equipped with the current agricultural technologies. The agricultural technologies include irrigation tools and ploughing tools, market related information, and how to be better farmers by exchanging information among themselves. The government also needs to provide more access to irrigation schemes and access inputs and access to credits by poor rural farmers. And also the government should improve agricultural institutions for smallholder farmers to be able to acquire their farm business goals and aspirations.

There is a need for government intervention to improve service delivery in terms of extension services which includes trainings of production of crops, infrastructure, monitoring and evaluation of the irrigation schemes. There is a need for a strong

extension support also from private sectors and advises to help people on how to diversify their crop production, provide market information thereby enhancing production and opening channels to the market. These Mhlontlo Local Municipality farmers need value adding practices that do not require a lot of capital such as drying out of vegetables, sorting and cutting must be considered for them to be able to mark sales and generate profit. It has been highlighted in the study results that smallholder farmers both homestead and irrigators needed to be equipped on how to increase their produce using the same allocated land and have market quality produce. The government institutions and private sectors have to work together to find formal market linkages for the rural farmers; and provide training that will enhance the crop production of these farmers to be able to commercialize.

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APPENDIX: QUESTIONNARE

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ASSESSING FARMER'S ASPIRATIONS AND GOALS TO EXPAND IRRIGATION CROP PRODUCTION FROM HOMESTEAD GARDENS TO IRRIGATION PLOTS IN MHLONTLO LOCAL MUNICIPALITY

Questionnaire No……Interviewer's Name…….

Date……..Village Name……..Municipality…….

Irrigation scheme1) Yes [ ] 0) No [ ] Homestead garden 1) Yes [ ] 0) No [ ] .Both homestead and irrigation scheme 1) Yes [ ] 0) No [ ]

A. HOUSEHOLD INFORMATION

A. **Gender of Household head** 1=Male 2=Female	**B.** **Material Status** 1=Single 2=Married 3=Divorced 4=Widow	**C.** **Age (yrs)**	**D.** **Household size**	**E.** **Level of Education** 1=Non 2=Primary 3=Secondary 4= High school 5=Tertiary	**F.** **Employment status** 1=Farmer 2=Self employed 3=Student 4=Pensioner 5=Casual worker 6=Other	**G.** **No of years farming** (actual years)

B. Land access and utilization

How did you acquire land	Type of plots	Land size (ha)	State condition of the field/garden	Ploughing Methods
1= Traditional leader (Chief) 2= Land Affairs 3=Both	1= Homestead garden 2=irrigation scheme 3=Dry land		1=Fenced 2=Partly fenced 3=Not fenced	1=Garden tools 2=Own tractor 3=Hired tractor 4=Animal plough

C. Water use

Household sources of water	**Sources of water for crop production (irrigation)**	**Who provides the water source**	**Do you pay for water?**	**If yes, how much (R) is the rate?**	**Are you member of any irrigation schemes?**	**If not a member why?**	**Which type of irrigation system do you use?**	**Number of times you irrigate per week (Actual number)**
1=Tank 2= Rain 3= Taps 4=Dam 5=River 6=Boreholes	1=Dam 2=River 3=Boreholes 4=Taps 5=Tanks 6=Rain	1=Government 2=Municipality 3=Others (specify)	1=Yes 2=No		1=Yes 2=No	1=Not interested 2=lack of information 3=No funds 4=Social conflicts 5= Other	1=Sprinkle 2=Bucket 3=Watering can 4=Pipes 5=Rain 6= others (specify)	

D. Production information

1. Which inputs do you use in your garden or irrigation scheme?

Seeds	Fertilisers	Tractor	Oxen-draught
1=Yes 2=No	1=Yes 2=No	1=Yes 2=No	1=Yes 2=No

2. Do you receive these inputs from government? 1=Yes [ ] 2=No[ ]
3. Fill in the following production information

Crop name	**Area Planted** (ha, square, metre)	**Quantity harvested** (kg, bags, tons)	**Unit price**	**Quantity sold** (kg, bags, tons)	**Source supplier** 1.Local shops 2.Stores in town 3.Co-operative 4.Individuals 5.Donation
1.Maize					
2.Cabbage					
3Potatoes					
4.Spinach					
5.Carrot					
6.Tomatoes					
7.Betroot					

E. General information

1. Please estimate your source of income (Rand) from the following sources

Crop farming	Non-farm income	Remittances

2. Do you have access to extension service? 1. Yes [ ] 2. No [ ]
3. If yes, which organisation renders the services?

1=Government		2=NGOs		3=Others (Specify)	

4. Do you have any intensions of increasing your scale of production? 1. Yes [ ] 2. No [ ]
5. If yes, please reason why willing to expand your scale of production

1=Maximize output	2=Profit	3=Improve quality of life	4=Obtain household food from production	5=Create employment for local people	6=Others (specify)

6. What challenges/ constraints are you experiencing in farming (crop production)?

Challenge/constraints	**1=No problem**	**2=Problem**
1= Land		
2= Labour		
3= Water for irrigation		
4=Lack of capital		
5=Lack of information to market access		
6= Extension service		
7=Access to credits		
8=Lack of inputs		
9=Low rain falls		
10=Poor soil fertility		

7. What are the possible solutions to the above mentioned challenges/constraints?

1= Government improves on financial agricultural institutions and roads	2=More extension services	3=Government and NGOs provides formal market linkage service to farmers	4=Provision of more irrigation schemes by government and NGOs	5=Provision of more and fertile land	6=Provision of input subsidies and farm implements	7= Others (specify

8. Adoption of technology

Description	**Rank or rate as indicated below**	
	Agree	Disagree
1.Not afraid to try new technology		
2.Not afraid of investing money in new technology		
3.Spend more time on new technology where you anticipate profits		
4.Risk of new technology isn't your first priority to take a decision		
5.Do not wait for subsidies before applying new technology		
6.You take your own judgement about the new technology before consulting a friend		

9. Farmer's aspirations and goals on farm business

Which crop do you grow most? 1=Maize 2=Cabbage 3=Spinach 4=Potatoes 5=Carrot 6=Beetroot 7=Butternut 8= other (specify)	**Why do you grow mostly the crop mentioned?** 1= Staple food 2=Easy to grow 3=Profitable 4=Easy to Market 5=Community grow it	**If you are to expand your production scale, which crop is considered first?** 1=Maize 2=Cabbage 3=Spinach 4=Potatoes 5=Carrot 6=Beetroot 7=Butternut 8= other (specify)	**Why choose to expand production of mentioned crop?** 1= Staple food 2=Easy to grow 3=Profitable 4=Easy to Market 5=Community grow it	**Why do you farm?** 1=Consume 2=Market 3=Both

10. Are your goals as a farmer related to the irrigations scheme goals? 1. Yes [ ] 2. No [ ]
11. If no, how are they different?

……
……
……..…..

12. Ranking farmers perception, aspirations and goals on farm business

		Ranking from 1= Least important to 3=Very Important		
		1	**2**	**3**
1	Top producer in the community			
2	Self-employed			
3	Involving family in decision making			
4	Expand the farm business			
5	Increase standard of living			
6	Be recognised as specialist in growing crops			
7	Like farming life			
8	Be recognised as a leader in the adoption of technology			
9	Provide employment for rural people			
10	Increase maximum farm income			
11	Keep depts. As low as possible			

12	Be recognised as owner of land			
13	Be the farmer (female) of the year			
14	Save for children’s education			
15	Belong to a farming community			
16	Leave business for next generation			
17	Spend time with family			
18	Being able to arrange hours of work			
19	Have more leisure time			
20	Doing the work you like			

THE END!!