

**ASSESSMENT OF THE CONTRIBUTION OF SMALLHOLDER AGRICULTURE
TO RURAL HOUSEHOLD FOOD SECURITY IN SEKHUKHUNE DISTRICT,
LIMPOPO PROVINCE**

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DECLARATION

I, **Lungile Pearl Sindiswa Mvelase** declare that:

- i. The research reported in this dissertation, except where otherwise indicated, is my original research.

- ii. This dissertation has not been submitted for any degree or examination at any other university.

- iii. This dissertation does not contain other persons data, pictures, graphs or other information, unless specifically acknowledged as being sourced from those persons.

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As research supervisor I agree to submission of this dissertation for examination:

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.....

Dr Maxwell Mudhara

Date

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LIST OF ACRONYMS

APAP	Agricultural Policy Action Plan
AGRA	Alliance for a Green Revolution in Africa
CASP	Comprehensive Agricultural Support Programme
CSI	Coping Strategy Index
DAFF	Department of Agriculture, Forestry and Fisheries
DDS	Dietary Diversity Score
DOA	Department of agriculture
DOH	Department of Health
DSD	Department of Social Development
DIFD	Department for International Development
DWAF	Department of Water Affairs and Forestry
EIU	Economist Intelligence Unit
FAO	Food Agriculture Organization
FANTA	Food and nutrition technical assistance
GDP	Gross domestic product
GHS	General Household Survey
HDDS	Household Dietary Diversity Score
HEA	Household Economy Approach
HFIAS	Household Food Insecurity Access Scale
HLPE	High Level Panel of Experts on Food Security and Nutrition
HHS	Household Hunger Scale
IFSNP	Integrated Food Security and Nutrition Programme
IFSS	Integrated Food Security Strategy
IFRC	International Federation of Red Cross and Red Crescent Societies
IFAD	International Fund for Agriculture Development
ISR	Integrated Sustainable Rural Development

IFPRI	International Food Policy Research Institute
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
MDA	Ministry of Agrarian Development
MAFISA	Micro Agricultural Financial Institutions of South Africa
NDP	National Development Plan
NFERP	National Food Emergency Relief Programme
NIDS	National Income Dynamic Survey
PPLIP	Pro-Poor Livestock Policy
RDP	Reconstruction and Development Programme
RVAA	Regional Vulnerability Assessment and Analysis
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
SADC	Southern African Development Community
SAFANSI	South Asia Food and Nutrition Security Initiative
SALDRU	Southern Africa Labour Development Research Unit
SANHNES	South African National Health and Nutrition Examination Survey
SAVAC	South Africa Vulnerability Assessment Committee
Stats SA	Statistics South Africa
TLU	Tropical Livestock Units
UNEP	United Nation Environment Programme,
UNCTAD	United Nations Conference on Trade and Development
UN	United Nations
USAID	United States Agency for International Development
WFP	World Food Programme
WHO	World Health Organization

ABSTRACT

While South Africa appears to meet its national food requirements, access to food at household level remains a challenge for 14.3 million South Africans. Paradoxically, the majority of households with inadequate or severely inadequate access to food are smallholder farmers in rural areas. The study assessed the contribution of smallholder agriculture to rural household food security in Sekhukhune district of Limpopo province. The study employed only quantitative research data collection. Data collection was through a random sample of 175 respondents in five localities in Sekhukhune district. A structured questionnaire was administered through face-to-face interviews. The study utilized the sustainable livelihoods framework to explore the smallholder agriculture and food security nexus.

A logit regression model estimated the socio-economic factors affecting household involvement in agriculture. The results suggest that market access, land ownership, gender, education, age, and household size had statistically significant effects on household involvement in agriculture. The food security status of households in Sekhukhune District was determined using the Household Dietary Diversity Score. According to the score classification, about 54.9% households were food secure while 45.1% were food insecure. A higher percentage of households practising agriculture were food secure (62%) compared to non-farming households (50%).

The study then employed a Tobit model to estimate the demographic variables that determine the food security status of households. The results suggest that age, non-farm income, social grants, access to market, agriculture involvement and livestock ownership had a statistically significant impact on household food security.

The study concludes that smallholder agricultural production alone is insufficient to propel households out of poverty and food insecurity. Other livelihood strategies are required to complement smallholder agriculture. Resource-poor agricultural producers only realize limited success in generating income from farming activities. The study recommends improvement of agricultural producer support services to incentivize farmers and to address identified constraints such as the costs of agricultural inputs and access to land and markets.

CHAPTER 1: INTRODUCTION

1. Background of the study

Food security remains a concern in the world, according to Food and Agriculture Organisation (2014), 805 million people were chronically undernourished in 2012 – 2014. Populations that are undernourished exist in both developed and developing regions of the world, however, the differences regarding food insecurity between developing and developed regions lies in the extent and severity of the problem and proportion of the population affected. The vast majority of hungry people reside in developing regions; one in eight or 13.5% of the overall population is chronically undernourished in the developing regions (FAO, 2014). According to the Global Food Security Index report published by the Economist Intelligence Unit (EIU, 2014), the magnitude of food insecurity in developed countries is relatively low in comparison to developing countries because developing countries often struggle with basic infrastructure and low incomes that make affordability of, and access to, nutritious food difficult. EIU (2014) further stated that political risk and corruption frequently compound structural difficulties in developing countries.

Food security is defined as physical, social and economic access to sufficient, safe and nutritious food by all South Africans at all times to meet their dietary and food preferences for an active and healthy life (Department of Agriculture (DoA), 2002). Achieving food security means ensuring quality and continuity of food access, in addition to quantity, for all household members (World Bank, 2010). The presence of food security and proper nutritional status can have long positive effect on the growth of any country (Holben, 2010). Household food insecurity and poverty springs from an inability to meet nutritious daily food requirements and anxiety about the ability to produce, and or access to food in future (Turyahabwe *et al.*, 2013). Ensuring household food security is widely acknowledged as important in advancing the living standards of the rural poor.

Food insecurity remains a concern to policy makers in South Africa as it deprives citizens of their Constitutional right to access to food. Stats SA (2016) reported that 14.3 million South Africans have inadequate to severely inadequate means to access food; among these, women, children and the elderly are the most vulnerable. The cumbersome predicament of food access

in South Africa exists even as the country continues to maintain its ability to meet the national food requirements. The country has a capable commercial agricultural sector and strong bilateral trade links; these ensure that food stocks are generally held adequate to meet the total national requirements, with imports covering deficits in local production. However, food insecure households in South Africa face a wide spectrum of developmental issues such as poverty, increasing prices, rising interest rates, unemployment, loss of employment, urbanisation, population growth, diseases and unstable household food production. Moreover, the country regularly experiences natural disasters such as floods and droughts, mostly localised to communities or districts. These factors appear to be continuously negatively impacting food security (DAFF, 2014).

According to the Stats SA (2012) urbanisation and declining agrarian activities, including the subsistence sector, have transformed the South African economy into a wage economy in which most households are net consumers of purchased food, rather than producers thereof. Access to food has thus become a function of household cash income and thus cash deficit households are more likely to experience inadequate access to food. Furthermore, the cash deficit households are likely to consume less diverse diets. The wide spectrum of challenges experienced by households result in malnutrition, it is estimated that one in four children under the age of six years (some 1.5 million) are stunted due to chronic malnutrition (Shisana *et al.*, 2013). Deficiencies in micro-nutrients such as vitamin A and iron are also widespread and have negative consequences on children's growth and development.

Studies suggest that rural households have historically been able to produce most of their own food (Satterthwaite *et al.*, 2015). The 2012 FAO report emphasised that agriculture is a key function to food security in many parts of the world. The report indicates further that agriculture contributes to poverty alleviation by reducing food prices, creating employment, increasing farm income and increasing wages for farm workers offering a recognized way to escape the poverty trap in rural areas. Thus, agriculture investment is essential for any country to promote economic diversification and growth. Part of agricultural investment could be the provision of support services to achieve growth in the smallholder agricultural sector. This is because the expansion of smallholder farming in rural areas can lead to faster rate of poverty alleviation by raising the incomes of rural cultivars and reducing food expenditure thereby reducing income inequality (Maginxa and Kamara, 2007). Increased investment in agriculture will help redress the current socio-economic inequalities.

Significant populations in some countries in the Southern African Development Community (SADC) region depend on subsistence agriculture for household food consumption. About 76% of the Botswana population, 85% in Kenya and 90% in Malawi and 75% in Zimbabwe depends on subsistence agriculture to meet their households food needs (Ngigi, 2011). However, South African households, unlike their counter parts in the Sub-Saharan Africa, are less likely to practise agriculture for household consumption or income generation. Less than a fifth of households (16,9%) in South Africa are involved in agricultural activities and only 2,3% of these households pin their hopes on agriculture as their main source of income, further emphasising dependence on purchased food (Stats SA, 2015).

The government of South Africa continues to place an importance on smallholder agriculture in its effort to fight food insecurity and poverty. Several policies, programmes and strategies have continuously been developed to promote sustainable agricultural production in the country, particularly the smallholder agricultural sector such as:

- The Integrated Food Security and Nutrition programme (IFSNP), 2002
- Comprehensive Agricultural Support Programme / Ilema Letsema, 2004
- Micro Agricultural Financial Institutions of South Africa (MAFISA),2005
- The New Growth Path, 2010
- The National Development Plan, 2011
- Household Food Production Strategy, 2011
- National Policy on Food and Nutrition Security Policy, 2013
- Fetsa Tlala Production Initiative, 2013
- Agricultural Policy Action Plan (APAP), 2015

These agricultural frameworks and programmes have been designed and implemented in realisation that eradicating hunger sustainably will require a significant increase in agriculture investment and more equitable distribution of resources (DAFF, 2013). However, rebuilding agriculture and specifically the role of smallholder and subsistence farmers and understanding their role towards achieving household food security is a serious challenge in the country.

1.1 Problem statement

The smallholder agricultural sector in South Africa faces various constraints that hinder its growth and ability to contribute effectively to food security. DAFF (2005) identified the following factors as threats to effective food security for the smallholder agricultural sector: lack of access to land and water, poor physical and institutional infrastructure, lack of reliable market, inconsistency in production, lack of human capital, poor technological skills, lack of information and lack of bargaining power. Due to the constraints associated with agricultural activities, agriculture has ceased to be an important component of household food security in South Africa as households increasingly become reliant on purchased food.

Stats SA (2012) reported that poor households tend to diversify their livelihood strategies, which increasingly depend on non-farm sources of income, at the expense of participating in agriculture. Social security increasingly cushions South African households against severe problems related to access to food. However, grants may have an unintended disincentive, which could discourage households to make use of available land to augment household food production. There are cases of success and failures for smallholder agriculture. Examples of failures, recently, an increasing number of failed irrigation schemes have been reported despite the efforts of government to support smallholder farmers and one of the success stories would be when the country's smallholder farmers provided maize meal to Lesotho when there was a food crisis in 2012 (DAFF, 2014). However, even after these cases have been reported, the current understanding of smallholder agriculture contribution to food security is inadequate. Therefore, there is a need to update existing knowledge and to assess the role of smallholder agriculture in bringing about significant improvement to household food security in South Africa.

Understanding the degree to which agriculture contributes to people's food security may be vital in development of decisions that enhance the benefits that agriculture has for communities. Stats SA (2015) reported that Limpopo province had higher percentages (43.8%) of households practising agriculture. Limpopo has better access to food with 91.8% having adequate access to food (Stats SA, 2015). It is not clear whether the better food access situation in Limpopo can be associated with household agricultural activities. An understanding of the contribution of smallholder agriculture to rural household food security is therefore critical. Few studies exist on food security in Limpopo in various districts; however, it seems no study assesses the role and contribution of agriculture on household food security.

1.2 Research objective

The main purpose of this study is to assess the contribution of smallholder agriculture and map out to characterise the socio-economic factors affecting the household food security.

The specific objectives of the study are:

- To assess the food security status of households in Sekhukhune district.
- To determine the socio-economic factors that affect the food security status and agriculture involvement of the households in Sekhukhune community;
- To assess the role of smallholder agriculture to household food security;

1.3 Hypothesis

- Households involved in agriculture are more food secure than those that are not involved.
- There is no difference in socio-economic status among households involved in agriculture and not involved in the study area
- Smallholder agriculture has no or little effect on household food security

1.4 Study limits

The study only covers a certain proportion of farmers, meaning that it only focuses in Sekhukhune district and does not investigate other areas of Limpopo. Therefore, findings of the study cannot be generalized to all households involved in agriculture.

1.5 Definition of terms

- **Dietary Diversity** is defined as the number of different foods or food groups consumed over a given reference period (Ruel,2003)
- **Livelihoods** refers to the means by which households obtain and maintain access to essential resources to ensure their immediate and long term survival
- **Food security** is defined as access by all people, at all times, to the food required for a healthy life (FAO, 2009).
- **Livelihood zone** refers to area within which people share broadly the same means of production and same access to markets.

- **Smallholder farmers** are farmers that are producing mainly for own consumption and for the market.

1.6 Significance of the study

Numerous studies documented the importance of smallholder agriculture production in rural households. However, there are minimal studies on the subject of the contribution of smallholder agriculture to household food security. Thus, the study aims to provide insight into this under-researched dimension by assessing the contributory factors to food security and it further seeks to analyse smallholder farmers' socio-economic factors, which affects their involvement in agriculture. Results and findings from this research will not only contribute to existing academic literature but can also serve as a reference material for policymakers, academics and can also be used by other relevant stakeholders to develop and implement strategies that can uplift the livelihoods of the smallholder farmers.

1.7 Chapter outlay

The study comprises of five chapters.

Chapter 1: The purpose of this chapter is to introduce the dissertation by providing a brief description of the research to be conducted. This chapter is based on orientation which provides an analysis of the background of the study, research problem, objectives and aim of study, hypothesis, and significance of the study.

Chapter 2: This chapter presents literature review on importance of smallholder agriculture, smallholder farmers and their livelihoods. It further discusses the contribution of smallholder agriculture to household food security, constraints faced by smallholder farmers. This chapter discussed rural household sources of income and livelihood strategies, Sustainable Livelihoods Framework and socio-economic factors affecting smallholder farming and food security.

Chapter 3: Research methodology: This section elaborated on the research design and the methodology employed in this study, including the sampling procedure and data collection techniques.

Chapter 4: The chapter provides data presentation, analysis and discussion of the results..

Chapter 5: This chapter provides a summary of the study, and draws some conclusions and gives relevant recommendations based on the findings of the study.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of past research and development work on the contribution of smallholder agriculture to rural household food security. The chapter starts by defining smallholder farmers, followed by looking at the nature of smallholder agriculture and its importance. It also addresses the role of smallholder agriculture in achieving food security and the constraints they face. The chapter discusses important concepts in food security, food and nutrition in South Africa. The chapter concludes by discussing rural household sources of income and livelihood strategies, and sustainable livelihoods framework.

2.1 Definition of smallholder farmers

Different terms are used for defining smallholder farmers around the world. The definition used depends on the context, country and ecological zone (Hazell, 2007). The diversity of definitions is because of the different roles smallholder farmers play in societies at local, sub-national, national and international (Swaminathan *et al.*, 2012). Ambiguous usage of descriptive words such as small-scale farmers, resource poor farmers, land reform beneficiaries, emerging farmers and subsistence farmers has been used to refer to smallholder farmers (Chamberlin, 2007). Cousins (2013) argue that most smallholders produce mainly for own consumption, and regularly market a surplus after their consumption needs have been met. While smallholders are already largely part of the market economy, their participation varies considerably depending on their scale of production (Dixon *et al.*, 2003). In general, terms the term ‘smallholder’ refers to their limited resource endowments relative to other farmers (Dixon *et al.*, 2013; DAFF, 2005).

These farmers are characterized by a small resource base, which is insufficient to render an acceptable livelihood (High Level Panel of Experts on Food Security and Nutrition (HLPE), (2012)). The resource scarcity, especially land, makes it difficult for them to generate a level of income to meet basic needs and achieve a sustainable livelihood (Mahieux *et al.*, 2011). Therefore, smallholders try to improve their livelihood through the development of resource bases by developing non-agricultural activities and agricultural production (HLPE, 2012).

Globally, smallholder farmers are defined by assessing their common characteristics such as land and capital access, exposure to risk and input technologies and market orientation

(Chamberlin, 2008). Most smallholder farmers own smallest plots relative to commercial farmers (Salami *et al.*, 2010). According to the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) (2009), there are 1.5 billion farmers working on 404 million small-scale farms of less than 2 ha. FAO (2012) also revealed that worldwide, 73% of all farm units are less than 1 ha of land. Conversely, Hubbard (2009) argued that there is no universal definition of small and further mention that what is considered as small or large depends on the context. For example in China and India smallholders have less than two hectares of land while the small Brazilian farm may be up to 50 ha (Swaminathan *et al.*, 2012). According to FAO (2012) land size is not a good criterion for defining smallholder farms, as it can be misleading because it does not account for investments in land (e.g. irrigation), tree crops, buildings, improvement in livestock, and equipment for food processing. This shows that land size does not determine farm type, but the level of net farm income does.

Income is yet another indicator used to define smallholder farmers worldwide. The definition that refers to income indicates that smallholder farmers source the majority of their household income from on-farm activities (FAO, 2013). For example, in Chile, Paraguay and Argentina 50% of the households derive most of their income from smallholder farming; while in Brazil 70% of the household derive most of their income from on-farm activities (FAO, 2013). However, this is not the case with most African smallholder farmers, who source some income from non-agriculture activities to supplement farm income. Further, smallholders typically lack access to credit, receive little technical support and often have low productivity due to inability to invest in improved technology such as improved seeds and fertilizers (Longley, 2011).

Smallholders generally rely on labour-intensive production methods using family labour. They often have to hire labour, especially at key moments in the production cycle like planting and harvesting (Swaminathan *et al.*, 2012). The working conditions of hired labourers are usually very poor because the employers are in a situation of poverty themselves (Longley, 2011). Since smallholders rely on family labour, therefore the quality of life in terms of health and access to basic domestic services is of primary importance and this is also true for education and training to improve family's skills (FAO, 2012).

In South Africa, the smallholder farmer's definition is contested in both political and academic circles (Altman *et al.*, 2009; Aliber *et al.*, 2009). The term smallholder farmer is interchangeably used with communal farmers, emerging farmers and black farmers (Kirsten

and Van Zyl, 2008). However, the definition issues are aggravated by lack of data available on this sub-population despite its importance in the country's food system (Cousins, 2013; Stats SA, 2013). This group of farmers has largely been marginalised in the mainstream economy, suffering from double-barreled exclusion, first, excluded by the past regimes along racial lines, and now excluded by market forces (Chikazunga and Paradza, 2012).

Smallholder farmers live primarily in communal lands where there is no individual land entitlement. Their standard of living is characterized by chronic poverty, marginal existence, low and negative growth in income and welfare levels (May and Carter, 2009). Moreover, smallholders are often considered to have limited capacities on various issues compared to more commercial farmers (DAFF, 2012).

South African households unlike their counter parts in the region are less likely to practice agriculture for income generation. According to Stats SA (2013) only 2.3% of South African households place their hopes on agriculture as their main source of income. This shows that the majority of households in South Africa are food deficit producers and they derive most of their income from off-farm activities. Off-farm provides smallholders with additional income and as a way of diversifying risk, thus improving their resilience to the shocks that affect agriculture (Wiggins and Sharada, 2013).

2.2 The nature of smallholder agriculture and its importance

Smallholder agriculture is the overwhelmingly dominant mode of agricultural and pastoral production throughout the developing regions of the world (Dixon *et al.*, 2013). Depending on their asset base, access to markets and services, smallholder agriculture can be very efficient in generating increased output and income (International Fund for Agriculture Development (IFAD), 2015).

Most Sub-Saharan African smallholders combine crop farming with livestock to reduce the risk from seasonal crop failures (Pro-Poor Livestock Policy (PPLIP), 2005). Livestock production contributes to poverty reduction in various ways. It can increase local food supplies, serve as a source of income and a means for capital accumulation, generate employment, and supply inputs and services for growing crops (Alliance for a Green Revolution in Africa (AGRA), 2014).

Smallholder farmers are vulnerable to climate change due to their dependence on rain-fed agriculture (IFAD, 2011; Rockström, 2003). According to FAO (2006) about 90% of smallholder farmers depend on rain-fed agriculture for food production. This implies that they conduct agricultural production based on rainfall, both good and bad. This is a challenge as uneven distribution of rainfall, exacerbated by climate change is being experienced across the SADC region.

According to FAO (2013), 70% of global poverty is rural poverty, and many of the rural poor are dependent on agriculture. The same applies to hunger and undernourishment; it is often located in rural areas. International Food Policy Research Institute (IFPRI) (2007) states that smallholder farmers are among the disadvantaged and vulnerable in the developing world, as half of the world's undernourished people, three quarters of Africa's malnourished children and the majority of people living in absolute poverty can be found on small farms. Under-capitalization in agriculture and a lack of investment in infrastructure remains a barrier to lifting smallholders out of poverty. A large percentage of these smallholder farmers are women, responsible for key components of household production such as weeding, harvesting and processing but do not recoup the economic benefits of production (IFAD, 2011). Women are increasingly heading rural households due to male urban migration (Oxfam, 2008).

Smallholders still dominate most farming systems and account for a majority of rural employment, most food production and significant earnings (Dixon *et al.*, 2013). About 3 billion people reside in the rural areas of the developing countries (FAO, 2013). Of this 3 billion, 2.5 billion are involved in agriculture as farmers or workers and at least 1.5 billion live and work in small family run farms (World Bank, 2007). There are approximately 500 million smallholder farms in the world, supporting almost 2 billion people, and these small farms produce about 80% of the food consumed in Asia and sub-Saharan Africa (United Nation Environment Programme (UNEP), 2013).

In South Africa, smallholder agriculture is concentrated principally in the former homeland areas of the country, thus are on marginal land, with little or no infrastructural support and water resource (Kristen and van Zyl, 1999; DAFF, 2005). These farmers experience a number of challenges ranging from climate change, price volatility, lack of land tenure and limited access to finance. By overcoming these challenges, smallholder farmers can rise from subsistence to profitable farming, and help feeding the world's hungry (IFPRI, 2013). In 2014, less than a fifth of South African households were involved in agricultural production for

various reasons (Stats SA, 2015). Baiphethi and Jacobs (2009) indicated that most people engage in agriculture to procure extra source of food and income. Aliber (2005) asserted that agriculture contributes about 15% of total household income to people with access to arable land in the rural areas.

Smallholder agriculture is significant in various ways and it contributes to rural economies in increasingly diverse means. Smallholder farmers' importance is derived from their prevalence, their role in agriculture and economic development and the concentration of poverty in rural areas (United Nations Conference on Trade and Development (UNCTAD), 2015). Smallholder farming is a major source of food production and income for the global rural population, especially in the developing world (Dixon *et al.*, 2013). For example In Latin America, smallholder farmers produce about 60-80% of staple foods and over 50% of dairy and meat products for domestic food production as well as for export (Schejtman, 2010). In Africa, smallholder farmers supply 70% of total food requirements and provide around 80% of the food consumed in both Asia and sub-Saharan Africa (IFAD, 2013). Furthermore, West African smallholder farmers also support the domestic national and export markets for farm produce, and their production has increased substantially over decades recovering from a low point in the early 1980s (Toulmin and Gueye, 2004).

Smallholder farming is also an important employer in the rural areas particularly for low-skilled and semi-skilled workers. According to Wiggins and Sharada (2013), agriculture is the main industry in Sub-Saharan Africa, employing 65% of Africa's labour force and accounting for about a third of its gross domestic product, and contributes up to 90% of the production in some countries. Ngigi (2011) indicated that in Botswana, 76% of the population depends on subsistence agriculture; in Kenya, 85%; in Malawi, 90%; and in Zimbabwe, 70-80%. In Asia agriculture generates around 20% of GDP and 43% of employment, and in both Eastern Europe and Latin America it generates about 8% of gross domestic product (GDP) and 22% of employment (World Bank, 2007).

However, despite their important contribution to the economy, smallholders have suffered from being neglected by policy makers as well as by the international community. As a result, smallholder farmers in the developing world continue to account for a large proportion of the poor (UNCTAD, 2015). Furthermore, smallholder farming is often perceived as a source of rural poverty and food insecurity, rather than a solution to the very same challenges (Landesa, 2014). As the world looks for ways to improve food security, too often smallholders are seen

as the weak link within the food supply chain (Hazel *et al.*, 2007). Supporting the growth of the sector is crucial because thriving smallholder farms can be an engine for rural development that is more equitable, sustainable, and productive than one based on a large-scale farm model (DAFF, 2013). Therefore, governments need to invest in agriculture in order to increase its productivity and profit margins. This will help smallholder farmers to create sustainable livelihoods and stronger food secure communities (FAO, 2010).

2.3 The role of smallholder agriculture in achieving food security

In recent decades the smallholder agriculture sector has been insufficiently supported, and the orientation of policies and the trends in the economy were not necessarily as concerned with smallholder agriculture (Swaminathan *et al.*, 2013). Future visions were slanted towards commercial farmers, rather than small-scale farmers. During 2010, food security was reprioritised as one of the top priorities nationwide. This was in line with the millennium development goal which aimed to halve the proportion of people who go hungry over the period 1990 and 2015 and to halve poverty and unemployment by 2015 (DAFF, 2011).

According to De Schutter (2013) the state of hunger in developing countries has improved since 1990, decreasing by 39%. However, even with this progress, the number of hungry people in the world remains unacceptably high. In 2012-2014, about 870 million people globally were chronically undernourished, and that approximately 24.6% of the undernourished citizens in the world are found in Sub-Saharan Africa (IFAD and World Food Programme (WFP) (2014). There is also the reality that most of the chronically food insecure and undernourished populations are on smallholder farm environments. This challenge is due to their inability to grow enough food to effectively feed their households. Hence they make up about three quarters of the world's hungry and undernourished (Wiggins and Keats, 2013). Smallholder farmers are faced with a number of challenges such as production constraints, lack of investments, lack of comprehensive land policy, social constraints, environmental constraints, lack of postharvest processing and storage equipment as well as appropriate marketing systems (Dioula *et al.*, 2012). These constraints hinder them from prospering their businesses.

Despite all these challenges, the contribution of smallholder farmers to global food production is significant. Smallholder farmers' importance is derived from their prevalence, their role in agriculture and economic development and the concentration of poverty in rural areas

(UNCTAD, 2015). Smallholder farming is a major source of food production and income for the global rural population, especially in the developing world (Dixon *et al.*, 2013). They also invest in processing raw materials, adding value, developing small and medium size craft industry that can reach large volume in all economies (Bosc, 2012). Furthermore, the West African smallholder farmers also support the domestic national and export markets for farm produce, and their production has increased substantially over decades recovering from a low point in the early 1980s (Toulmin and Gueye, 2004).

Evidence suggests that agriculture growth consistently has a greater impact on poverty alleviation than non -agricultural growth due to its strong linkages to the rural economy in particular (Irz *et al.*, 2001). This has been proven in Rwanda and Kenya where the impact of agricultural growth reduced poverty by three to four times greater than growth generated from other sectors (IFPRI, 2012). In Asia agriculture contributes around 20% of GDP and 43% of employment, and in both Eastern Europe and Latin America it generates about 8 % of GDP and 22% of employment (World Bank, 2007). The Ministry of Agrarian Development (MDA) (2009) revealed that Brazil smallholder farmers produce 58% of the milk, 38% of coffee, 46% of maize and for beans, the contribution reaches 70% and for cassava it is 87%. In Ghana, smallholder farmers dominate in cocoa production and are cultivating less than 2 ha per farm (UNCTAD, 2015). According FAO, 2014, Ghana is the second largest producer of cocoa in the world, with cocoa exports accounting for about 40% of its foreign exchange earnings and for about 8-12% of its GDP.

Agriculture is the most direct pathway by which household agricultural production translates into consumption (Dorward, 2012). Own production has more impact on smallholder farmers since their food consumption and nutritional status is usually affected by what they grow (van Auerbeke and Khosa, 2007; World Bank, 2007). Both urban and rural food consumers in developing countries rely heavily on the efficiency of their local smallholder farmers to satisfy their dietary needs (Dioula *et al.*, 2012).

Smallholder farmers have a key role to play not only in achieving food security through food production; but also in creating employment and increasing the wage offerings for workers, which is a critical element in combating poverty in rural areas (FAO, 2011; DAFF, 2011). Smallholder farming is also an important employer in rural regions, particularly of low-skilled and semi-skilled workers. Smallholder farms can employ a high percentage of rural, unskilled agricultural labourers in countries where labour is relatively cheap and this can have a

significant impact on reducing poverty within this sector (Collier and Decron, 2013). With incentives for enhancing productivity, such as improved access to markets and credit and recognition of land rights, smallholder farmers can also increase the labour-intensity of their operations helping to drive rural employment and economic growth (Landesa, 2014).

In South Africa most households are regarded food insecure because people have become net consumers of purchased food, rather than producers thereof. Declining agricultural performance is a major driving force behind growing poverty among African smallholder farming populations, and its recovery offers fairly positive prospects for rural populations to escape poverty (DAFF, 2012). Access to food therefore becomes a function of household cash income and thus cash deficit households continue to experience inadequate access to food. This shows that income is the principal determinant of household food security in South Africa (Kirsten *et al.*, 2003). A majority of poor households in this country mainly depend on social grants and remittances other than farming.

Improving agriculture should be a central component of policy approaches to food insecurity reduction and increasing economic growth. FAO (2013) argued that policies aimed at enhancing agricultural productivity and increasing food availability, especially when smallholders are targeted can achieve hunger reduction even where poverty is widespread. In addition, when these policies are combined with social protection and other measures that can increase the income of poor families to buy food, they can have an even more positive effective and promote rural development by creating vibrant markets and employment opportunities, making possible equitable economic growth (DAFF, 2012). The World Bank (2007) also emphasised that agriculture is an engine of rural economic growth and poverty reduction. Therefore, increased investment in agriculture will help redress the current inequalities. The livelihoods of many people would be improved if targets of food security, the fight against poverty and economic development were to be met comprehensively.

2.4 Constraints faced by smallholder farmers

Smallholder farmers face various challenges that impede their growth and ability to effectively contribute to food security relative to the commercial farmers. Such challenges vary from system constraints, allocation constraints to environmental-demographic constraints (Kirsten *et al.*, 2002). Some of the system constraints include lack of access to land, poor physical and institutional infrastructure. Many studies show that land tenure and land management systems have been prevalent in many developing countries (UNCTAD, 2011). While many smallholder farmers were given access to land, they did not have title deeds, and this inhibits them from using their land as collateral for both investment and working capital (Obi *et al.*, 2012).

According to Baiphethi *et al.* (2009), smallholder farmers have unsustainable small and falling farm sizes and poor quality land. This is due to land tenure issues which need to be improved. A vast majority of smallholders perform their agricultural activities under insecure customary land ownership. These insecure land tenure systems constrain them from utilizing the land according to their needs and to the optimum capability. For example, insecure property rights do not give farmers incentives to invest in land and thus increase efficiencies in terms of productivity (Tenaw *et al.*, 2009). Land entitlement is an important source of livelihood because productive land may help rural households to meet food requirements and even sell the produce to potential niche markets (Obi *et al.*, 2012).

A vast majority of smallholder farmers have limited market access and related marketing infrastructure (Bienabe *et al.*, 2004). This is a major challenge as smallholder farmers have to compete with resource-endowed large-scale farmers (Mudhara, 2010). Therefore, they end up selling their produce at the farm gate or local market where profitability and growth potential are low (UNCTAD, 2011). Participation in well-functioning markets can encourage farmers to improve their yields, and thus produce a marketable surplus that will enable them to obtain higher prices thereby increasing their incomes (UNCTAD, 2015).

Many studies reveal that a vast majority of smallholder farmers are not capacitated with financial and marketing skills and are unable to meet the quality standards set by the markets (Louw *et al.*, 2007; Bienabe *et al.*, 2004). Smallholder farmers are not consistent in terms of producing the product and supplying them to the market and they also produce low quantities of products that are equally of poor quality, which leads to their products being neglected by output markets (Baloyi, 2010; UNCTAD, 2015). The low quality in production is due to a lack of production knowledge and assets such as land, water and capital assets. Gyau *et al.* (2014)

suggest that smallholder farmers can have market power if they form co-operatives, or work collectively. Collective action is operationalized as an action by members of a group or cooperative who come together to share market knowledge, sell together and develop business opportunities (Devaux *et al.*, 2008).

Lack of bargaining power is also a major challenge for smallholder farmers. These farmers' bargaining power is very low owing to poor access to market information and limited access to financial markets, and this prevents them from selling their products at the most profitable time (Baloyi, 2010). The low levels of literacy amongst the smallholder farmers also limit the ability of farmers to effectively participate in liberalized markets, including entering into contracts to guarantee markets (Mudhara, 2010).

The majority of smallholder farmers are based in rural areas where both physical and institutional infrastructure limits their development. Lack of access to proper roads, for example, restricts the ability of a farmer to transport inputs, produce and also access information (Jari and Fraser, 2009). Poor infrastructure attributes to high transaction costs, which also impede the growth of smallholder farmers in rural areas (UNCTAD, 2015). Poor infrastructure makes transporting of produce too pricey for framers and high transport costs can affect inputs used and the market strategies followed by farmers (DAFF, 2011). Transport and distribution constraints force smallholder farmers to produce large parts of their subsistence food requirements mainly to cushion themselves from food insecurity arising from failure of the marketing system (Mudhara, 2010). Furthermore, poor infrastructure also tends to force farmers to grow less perishable commodities causing a lower productivity (UNCTAD, 2015).

High cost, limited access to improved farm inputs and production technology have been found to be serious disadvantages for smallholder farmers. Farmers use a range of inputs in the production process, including seeds and fertilizers, labour, land and credit (UNCTAD, 2015). However, not so many smallholder farmers in the developing world are able to afford quality agricultural inputs due their high prices, unless they benefit from subsidies (Delgado, 2009). This partially explains the very low levels of fertilizer use in developing countries, and therefore their low productivity when assessed against the standard criteria used for measuring agricultural yield. Baloyi (2010) argued that fertilizer use and the lack of irrigation facilities also account for most of the large productivity differentials between developed and developing countries.

There is also limited adoption of improved crop varieties, and input use remains generally low among the smallholders in the developing world (Kasirye, 2011). This is due to lack of information and sometimes insufficient funds to procure a certain crop variety or input. The adoption of improved agricultural technologies has been associated with higher earnings and lower poverty and improved nutritional status (Kassie *et al.*, 2011; Minten *et al.*, 2007). Technology refers to the knowledge or information that permits some tasks to be accomplished more easily (Lavison, 2013). Farmers' decisions about whether and how to adopt new technology are conditioned by the dynamic interaction between characteristics of the technology itself and the array of conditions and circumstances (Loevinsohn *et al.*, 2013).

The majority of smallholder producers experience difficulty in obtaining credit for production inputs (Mahieux *et al.*, 2011). This is because of their lack of collateral (for example, title deeds), unstable earnings, the risky nature of farming activities and difficulties in evaluating smallholders' capacity to repay their loans, thus formal financial institutions are reluctant to provide financial services to them (UNCTAD, 2015). Where credit is available, interest rates are often too high and repayment terms incompatible with the terms of the investment (Mahieux *et al.*, 2011). Also, smallholders' limited access to risk mitigation or risk insurance instruments reduces their capacity to invest in their productive assets and drives them back into subsistence farming (Simtowe and Zeller, 2006).

Access to credit has been found to be gender biased in some countries where female-headed households are discriminated against by credit institutions, and as such they are unable to finance yield-raising technologies, leading to low adoption rates (Muzari *et al.*, 2013). Therefore, there is a need for policy makers to improve current smallholder credit systems to ensure that a wider spectrum of smallholders are able to have access to credit, more especially female-headed households (Simtowe and Zeller, 2006).

2.5 Concepts in Food security

Food security is a broad term, which is defined in different ways by a number of organisations around the world. This term refers to the ability of people to obtain sufficient food on a day-to-day basis and it is used to describe whether people have access to sufficient quality and quantity of food (Woller, 2011). Food insecurity on the other hand refers to an inability to meet daily nutritious food requirements and anxiety about the ability to produce, and or access food in future (Turyahabwe *et al.*, 2013). According to Woller (2011), food insecurity is both a

primary result and one of the principal manifestations of poverty. Poverty refers to the condition of not having the means to afford basic human needs such as clean water, nutrition, health care, education, clothing and shelter (DAFF, 2011). Living in poverty creates additional challenges which limit the ability for people to search for employment and that contribute to a long term unemployment trap. Further, lack of income due to unemployment contributes to food insecurity and leads to social exclusion problems (du Toit, 2011).

The continuing expansion of food security as an operational concept in public policy has shown a wider recognition of the complex technical and policy issues involved (FAO, 2006). DoA, (2002) defines food security as physical, social and economic access to sufficient, safe and nutritious food by all people at all times to meet their dietary and food preferences for an active and healthy life. In a shortened form, FAO (2006) defines food security as access by all people, at all times, to the food required for a healthy life. This is a widely accepted definition. Achieving food security means ensuring quality and continuity of food access, in addition to quantity, for all household members (World Bank, 2010).

While food security may increase the total quantity of energy available for consumption, only nutrition security guarantees the quality and diversity of food necessary for protecting and promoting good nutritional status and health (Virchow, 2013). Ensuring household food security is widely acknowledged as important in advancing the living standards of the rural poor. Food security is a complex sustainable development issue, linked to health through malnutrition, but also to sustainable economic development, environment, and trade (FAO, 2009). Thus the presence of food security and proper nutritional status can have long positive effect on the growth of any country (Holben, 2010).

Food security is observed at global, national, household and individual levels. Food security at global or national level may not usually address the household level food security problem. The relationship between national food security and household food security is less prominent in developing countries than in developed ones (FAO, 2009). At the national or regional level, food security is measured by indicators such as food production, trade balance, and per capita income and it does not guarantee food security at the household (FAO, 2002). At household level food security refers to the availability of food in one's home which one has access to and a household that does not live in hunger or fear of starvation is regarded as food secure (DAFF, 2011).

Within the context of the definitions given above, food security has four primary components: food availability, food access, food utilization and food stability. Food access is determined in part by availability of food, while utilization is determined in part by access of food. Stability component of food security cuts across the other three components. An understanding of food access, availability and utilization at the household level is essential to understand the potential contribution of food insecurity in the nutrition arena.

2.5.1 Food Availability

Availability refers to the physical existence of food, whether from the household's own farm production or from domestic or international markets (Woller, 2011). Food availability in the definition implies that a country must have sufficient quantities of food available on a consistent basis at both national and household level. This dimension of food security at different levels can be assessed by precipitation record, food balance sheet, food market survey, agricultural production planet (DAFF, 2011). Also, indicators of food security for this dimension at different levels are fertility rate, food production, population flows, harvesting time, staple food production, food storage, consumption of wild foods (FAO, 2009).

The world produces enough food for its entire population, but the problem is distribution, resulting in some people consuming less than 2100 Kcal per day and thus being vulnerable to food insecurity (FAO, 2013; FAO, 2005). According to WHO (2013) food distribution involves the storage, processing, transport, packaging, and marketing of food. Poor transport infrastructure could affect the price of agricultural inputs as well as the transportation of food to the regional market (Godfray *et al.*, 2010).

2.5.2 Food Access

Access refers to the resources individuals have at hand to obtain appropriate foods for a nutritious diet. Food access implies the ability of a nation and its households to acquire sufficient food on a sustainable basis. Households require adequate resources to have access to food in the right amount, with appropriate quality, and at the right time (Mishra *et al.*, 2003). Webb and Thorne-Lynman (2005) noted that the causes of hunger and malnutrition are often not scarcity of food but an inability to access available food due to poverty. Per capita world food supplies are more than adequate to provide food security to all, and thus food accessibility is a greater barrier to achieving food security (Godfray *et al.*, 2010). An individual's ability to

access food is determined by their asset endowment such as land, income and labour because their access depends on whether they have enough income to purchase food at prevailing prices or have sufficient land and other resources to grow own food (IFAD and FAO, 2013). Households with enough resources can overcome local food shortages and maintain their access to food (Garrett and Ruel, 2000).

Some of the indicators of the food access dimension at different levels are food price, wage rate, per capita food consumption, meal frequency, employment rate (DAFF, 2011). There are two distinct types of access to food: direct access, and economic access. Households produce food using human and material resources, or purchase food produced elsewhere. FAO (2006) indicates that location can affect access to food and which type of access a family will rely on. Households' food preferences are determined by their level education, demographics and gender (Ecker and Breisinger, 2012).

2.5.3 Food utilization

Food use refers to the appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation. Utilization is a measure of a population's ability to obtain sufficient nutritional intake and nutrition absorption during a given period (Hauck and Youkhana, 2008). Utilization also includes the existence of appropriate food processing and storage practices, adequate knowledge and application of nutrition and child care and adequate health and sanitation services (FANTA, 2006). Food utilization has both a socio-economic and biological dimension (Mishra, 2003). The socio-economic dimension refers to decisions related to what food is consumed and how the food is allocated within the household (Woller, 2011). For example, household members may have access to food but still suffer from food insecurity due to consumption of unhealthy foods and if they cannot utilize their consumed food due to illness then they can fall prey to a food-insecure predicament (Wasito *et al.*, 2002).

A diversified diet is closely related not only to adequacy in total food consumption needs, but also with adequacy in terms of micronutrients. In many countries, health problems related to dietary excess are an ever-increasing threat, In fact, malnutrition and foodborne diarrhea have become a double burden (WHO, 2016). Research shows that sanitation can decrease the occurrence and spread of these diseases that can affect food utilization (FAO, 2001). Therefore, people should be educated about nutrition and food preparation in order to ensure this pillar of food security.

2.5.4 Stability

Food stability refers to the ability to obtain food over time. Stability of supply is influenced by food production, incomes, markets, transfer programmes and is vulnerable to shocks such as unpleasant weather, price fluctuations and unstable political factors (FAO, 2000). Food insecurity can be transitory or chronic. Transitory food insecurity refers to unavailability of food during certain periods of time; this could be due to drought or natural failures or crop failure (FAO, 2000). Ecker and Breisinger (2012) assert that market instability results in increase in food prices, loss of employment and civil conflicts can also cause transitory food insecurity. Chronic food insecurity on the other hand refers to the long-term or persistent inability to meet food needs (Woller, 2011). In this case, households are constantly at risk of being unable to acquire food to meet the needs of all members.

2.6 Overview of food and nutrition security in South Africa

After 22 years of democracy a large proportion of South Africans still perceive themselves as lacking enough income to meet all their household needs (Stats SA, 2013). The food access problem in South Africa exists even as the country continues to maintain its ability to meet the national food requirements (DAFF, 2012). The country is presently able to boost national food sufficiency through a combination of own production and food imports. South Africa has a capable commercial agricultural sector and strong bilateral trade links; these ensure that food stocks are generally held adequate to meet the total national requirements, with imports covering deficits in local production (DAFF, 2014). Despite this efficiency, large inequities, inefficient food distribution networks and high levels of malnutrition are experienced (South Asia Food and Nutrition Security Initiative SAFANSI, 2014). The high levels of malnutrition and hunger are due to inadequate access to food not by shortages of food.

Koch (2011) indicated that South Africa's inability to meet basic needs has a variety of causes but, in contrast to most other countries, poverty and hunger are particularly shaped by the legacy of apartheid. One aspect of the apartheid system was dispossession of assets, such as land and livestock from black people, while denying them access to markets, infrastructure and human capital (Koch, 2011). Furthermore, household food security in the country is threatened by globalisation, international trade regimes, climate change, and the poor storage and distribution of food (DAFF, 2014).

The food insecure households in South Africa face a wide spectrum of developmental issues such as poverty, increasing prices, rising interest rates, unemployment, loss of employment, urbanisation, population growth, diseases and unstable household food production (Abdu-Raheem and Worth, 2011; Labodarios *et al.*, 2011; DAFF, 2011). These adverse conditions have placed severe pressure on people already struggling to meet their basic household needs (Labadarios, 2009).

Food security in South Africa has to be addressed within the context of issues such as the changing population growth patterns and macroeconomic issues. The RSA population increased by (+3.4%) from an estimated 50.59 million people in 2010 to 54.94 million people in 2015 (Stats SA, 2015). Recently, the price of white maize which forms part of staple foods in South Africa has doubled due to the decline in maize production caused by drought (Grain SA, 2015). This reality worsens the climate of food insecurity as households now face more difficulties in procuring food items from their earnings. In the first quarter of 2015, unemployment rose to 26.4%-the highest in the last ten years (Stats SA, 2015). Employment has expanded substantially since the mid-1990s, but not enough to meaningfully address income poverty (SAFANSI, 2014). Income security is an essential factor to address food insecurity (Altman *et al.*, 2009).

South Africa like other developing countries is in nutrition transition which includes the coexistence of under- and over-nutrition and has a malnutrition problem of public health significance (Steyn *et al.*, 2006). The existence and extent of malnutrition is an important proxy indicator of access to food. Chronic dietary inadequacy is manifested through stunting. The South African National Health and Nutrition Examination Survey (SANHANES) (2012), reported that one in four children under the age of six years (some 1.5 million) are stunted due to chronic malnutrition. While 2.2% and 6.1% are wasted and underweight. Despite evidence that food fortification programmes have improved the micronutrient status of South African children, they have failed to improve dietary diversity and overall micronutrient intake, hence stunting still affects a large proportion of children (Steyn, 2008; Labadarios *et al.*, 2011).

South Africa is also experiencing rapid urban influx as large volumes of people are migrating to cities to search for better employment and education opportunities (van der Merwe, 2011). The UN “World Urbanisation Prospects” projected that in 2010 over 30 million South Africans will be in urban areas (UN, 2007). The Prospects further indicates that the rural annual

population growth rate is negative at -0.92%, compared to positive growth of 1.17% in the urban areas.

Currently, the country is in the grip of the worst drought in 23 years. But so far, drought disaster has been declared in five of the nine provinces, namely: KwaZulu-Natal, Mpumalanga, Limpopo, Free State and North West province. The driest conditions since 1992 have damaged crops and livestock and sent local grain prices to the highest record driving up food prices. The extreme and persistent drought has led to national agricultural production declining by more than 42% and this drop in production resulted in a 1.1% decrease in the country's GDP (Grain SA, 2015). According to DAFF (2015), the estimated amount of maize that South Africa will need to import in 2016 is between 5 to 6 million tons in order to bolster domestic supplies; otherwise the country could run out of maize for human and animal consumption.

Less than a fifth of households (16.9%) in South Africa are involved in agricultural activities and only 2.3% of these households place their hopes on agriculture as their main source of income, (Stats SA, 2015). Access to food has become a function of household cash income and thus cash deficit households continue to experience inadequate access to food (Stats SA, 2012).

Furthermore, the country remains one of the most unequal societies in terms of income distribution which drives a huge disparity in access to food, with a number of poorest households regularly experiencing hunger and under-nutrition (DAFF, 2013). Over the past 10 years South Africa has made strong progress in reducing the proportion of households experiencing hunger, which decreased to 13.4% in 2012, down from 29.3% in 2002.

Although South Africa enjoys national food security, pockets of household food insecurity remain a challenge. Despite all the international, regional and national interventions, the country is still faced with unacceptable levels of household food insecurity. The most vulnerable group to food insecurity are women, children and elderly particularly in rural areas.

Between 2014 and 2015, the proportion of households with inadequate or severely inadequate access to food increased from 22.5% in 2014 to 22.8% in 2015. Figure 1 below shows that food access problems were the most common in North West where 39% of households had inadequate or severely inadequate food access. Inadequate or severely inadequate access to food was also observed in Mpumalanga (31.7%), Northern Cape (31.3%), and Eastern Cape (28.4%).

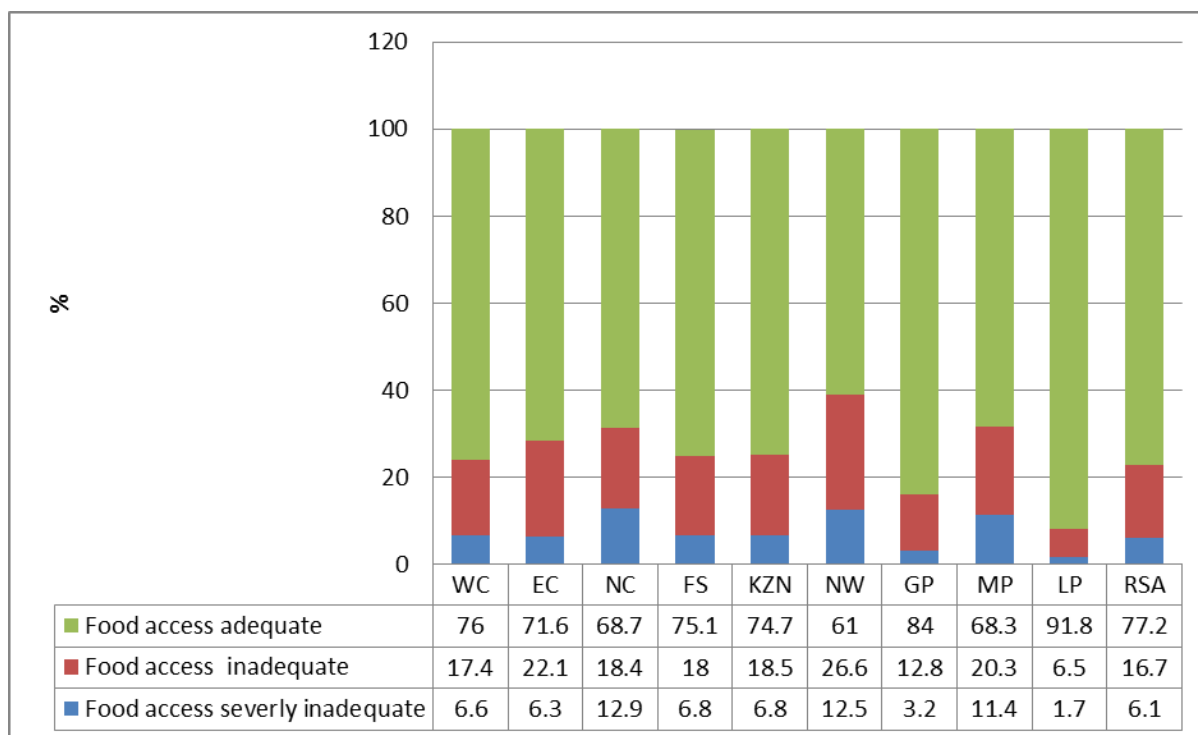


Figure 1: Percentage of households experiencing food adequacy/inadequacy by province, 2015

Source: Stats SA (2015)

FAO (2006) reported that most of the food insecure people are smallholder/subsistence farmers. Even though they grow food, they lack resources to meet their needs through either production or purchase. Declining agricultural performance is a major driving force behind growing poverty among African smallholder farming populations, and its recovery potentially offers beneficial prospects for rural populations to escape poverty (DAFF, 2012).

The South African government places high priority on several national policies and programmes which contribute to the common goal of raising food security and nutritional levels, especially for the more vulnerable sections of the population. These policies, programmes and strategies have continuously been developed to ensure the availability, accessibility and affordability of safe and nutritious food for all South Africans.

The set of policies and programmes include:

- The Integrated Food Security and Nutrition programme (IFSNP), 2002
- Comprehensive Agricultural Support Programme / Ilema Letsema, 2004

- Micro Agricultural Financial Institutions of South Africa (MAFISA), 2005
- The New Growth Path, 2010
- The National Development Plan, 2011
- Household Food Production Strategy, 2011
- National Policy on Food and Nutrition Security, 2013
- Fetsa Tlala Production Initiative, 2013
- Agricultural Policy Action Plan (APAP), 2015

These agricultural frameworks and programmes have been designed and implemented in realisation that eradicating hunger sustainably will require a significant increase in agriculture investment and more equitable distribution of resources (DAFF, 2013).

Government of South Africa approved the National Policy on Food and Nutrition Security and its implementation plan in 2013 and 2014 respectively. The main goal of the National Food and Nutrition Security Policy was to ensure availability, accessibility and affordability of safe and nutritional food at national and household levels. The implementation plan on the other hand was developed to provide synergy for implementation of food and nutrition programs aimed at reducing poverty and addressing the causal factors for the current food and nutrition situation. It translates the policy into clear explicit prioritised outcomes, targets, expected outputs, activities and inputs. Food and nutrition security is a multifaceted and multidimensional issue which will not be effectively addressed through a single approach e.g. agricultural production; however, it requires well-managed inter-sectoral co-ordination, and the genuine integration of existing policies and programmes in health, education, and environmental protection, as well.

2.7 Rural Household sources of income and livelihood strategies

Agriculture is the main industry in Sub-Saharan Africa, and it offers a strong option for spurring growth, overcoming poverty, enhancing food security and provides the primary source of livelihood for 36% of the world's total workforce (FAO, 2012, World Bank, 2008). The sector employs about 65% of Africa's labour force and accounting for about a third of its gross

domestic product, and contributes up to 90% of the production in some countries (Wiggins and Sharada, 2013).

However, recent studies examining agricultural dynamism in Africa found that only a small proportion of farms show any dynamism in terms of intensification and expansion; (Djurfeldt *et al.*, 2008). The agricultural sector is characterized by decreasing farm sizes, low levels of output per farm, low productivity and a high degree of subsistence farming, with increases in production being driven mainly by area and not yield growth (Jirström *et al.*, 2011).

In addition, smallholder farmers are faced with various constraints that hinder their growth and ability to effectively contribute to food security. Due to these constraints, agriculture has ceased to be an important component of household food security in South Africa as households increasingly become reliant on purchased food. Declining agricultural performance is a major driving force behind growing poverty among African smallholder farming populations, and its recovery offers the greatest prospects for rural populations to escape out of poverty (DAFF, 2012). Therefore, with these constraints mentioned above, smallholder agriculture cannot be the sole engine for rural growth, employment and poverty reduction (Alobo, 2013).

Many studies looking at rural livelihoods have shown that people don't solely depend on agriculture for survival however; they have diverse sources of income. Sources of income in rural areas can be classified into three categories as shown in Figure 2 below: farm income, nonfarm income and transfers. Non-farm activity refers to a set of activities that are not agricultural. This includes employment outside of agriculture, family business, etc. Farm income is generated from activities such as selling farm produce, livestock products while off-farm income is obtained from social welfare grants, remittances, wage work or self-employment (Davis and Pearce, 2001).

Stats SA (2012) indicate that most households in South Africa especially those in rural areas employ a mix of livelihoods strategies including salaries and wages contributing to household income followed by social grants, income from business and pension remittances. However, despite these livelihood strategies, agricultural activities continue to play an important role in providing much needed subsistence especially in the form of food (Davis and Pearce (2001).

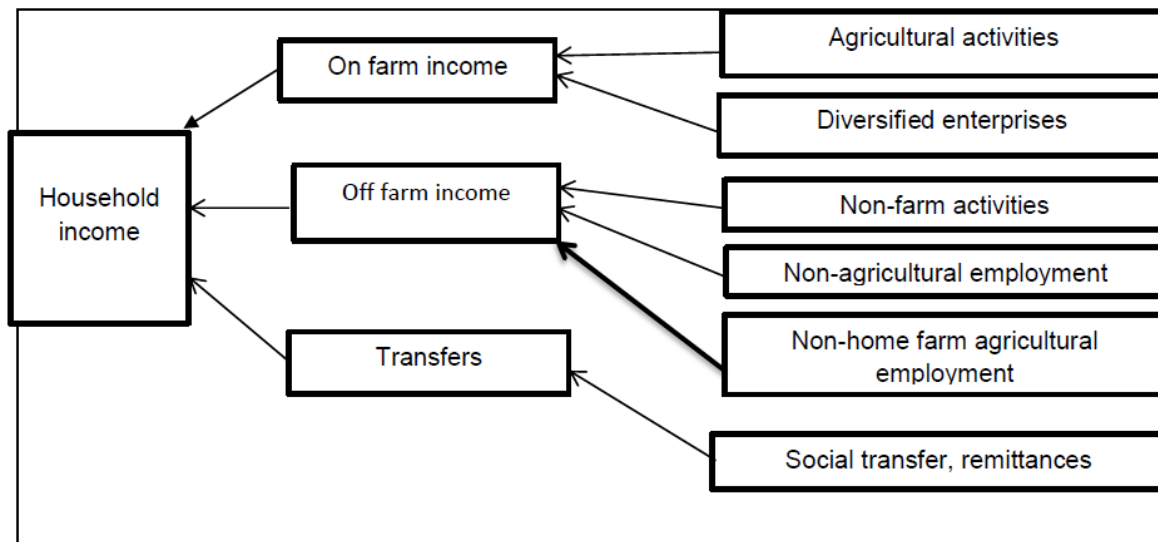


Figure 2: Household sources of income

Source: Davis and Pearce (2001)

Finding a pathway out of food insecurity and poverty requires a multidimensional approach (World Bank, 2000). Studies suggest that rural households are increasingly diversifying their income sources by combining farm and non-farm activities to sustain their livelihoods (DAFF, 2014, Barrett et al, 2001). This is because agriculture alone cannot provide sufficient livelihood opportunities for the population (Mehta, 2002). Analysis of rural households in Asia, and Africa show that rural households derive a significant proportion of their livelihoods from non-farm employment and this income represents a substantial and sometimes growing share (Fraser *et al.*, 2003 and Otsuka and Yamano, 2006).

According to Sanchez (2005), incomes from non-farm sources account for between 35–50% of rural household incomes in SSA, 30-40% in Asia (Onchan, 2001) and 40-50% in Latin America. Machete (2004) also reported similar findings that almost 40% of the total incomes received by households in rural areas of Limpopo were generated from farming and other 60% was from non-farm activities. This indicates that the rural income pattern is not static but growing in favour of non-farm activities hence it plays a huge role in people’s livelihoods. Stats SA (2015) reported that only 1.9% of household have agriculture as their main source of income, 57,5% of households reported salaries/wages/commission as the main source of income, followed by grants (21,5%), and remittances (8,4%). Fraser *at al.* (2003) when analyzing the contribution of agriculture to the total household income in Guquka and Koloni found that agricultural activities respectively contribute 15.4% and 12.3% to the total

household income with the rest of income coming from non-farm sources and transfers. These findings suggest that farmers depend on non-farm income to supplement their agricultural earnings.

Ellis (2000) defines diversification as the expansion of the range of rural activities outside the farm that can be used both as a safety net for the rural poor or as means of accumulation for the rural rich. According to Ellis (2001) diversification may occur either as a deliberate household strategy or as an involuntary response to a crisis. Barrett *et al.* (2001) states that diversification occurs due to push and pull factors. Rural households are pulled into non-farm activities when the returns to labour and capital are greater than for farming.

The motivation for diversification strategies varies in terms of individual characteristics, household variables and community characteristics (Ellis 2000, Davis 2000). For individual characteristics, age for example influences the way the individual choice of livelihood strategies and the propensity to invest (Schwarze, 2004). Matsumoto *et al.* (2006) adds that elderly people may prefer home based activities like agriculture relative to migratory activities.

Matsumoto *et al.* (2006) also argued that household's access to land, asset endowments, demographic composition and transfers determines the capability to participate in non-farm activities. While having various assets could be the determinant of participation, it could also be a result of additional incomes from non-agricultural activities (Barrett *et al.*, 2001). Parkin, (2008) wrote that economic theory of investment support the view that household endowment in assets places them in relatively better position to respond to incentives. Escobal (2001) indicates that household diversification into non-agricultural income varies in extent and nature based on relative household wealth.

A household with limited access to land can only earn income through adoption of non-farm activities and wage employment. In addition, transfers can also facilitate participation into non-farm activities by providing the required capital to venture into non-farm activities, this can happen if transfers coincide with adequate household food production (Ndhleve *et al.*, 2009).

Poor infrastructure, average land productivity, distance to market and distance to the government agencies also influences households to participate in non-farm activities (Matsumoto *et al.*, 2006). Households will diversify their incomes if they are located in areas where physical access to markets is costly and causes factor and product failures (Nel and Binns, 2000). Furthermore, limited access to market, uncompetitive markets, personal and

institutional constraints can also force households to develop local coping strategies which facilitate self-reliance (Ndhlive *et al.*, 2009). Hossian (2006) indicated that a high and increasing portion of rural nonfarm income could be due to rapidly declining land size of farm households, production as well as marketing constraints in smallholder agriculture. Some people have diversified into nonfarm activities in order to reduce pressure on limited land (Machete, 2004).

Literature suggests that the importance of farm income is declining partly due to price variability in the output markets for agricultural produce and escalating prices of inputs (Barret *et al.*, 2001). Therefore, due to the unsustainability of the smallholder agriculture and declining farm income, individuals are sanctioned into nonfarm activities in search for sources of income. Households might also be attracted to non-agricultural activities due to higher returns on production factors in these activities relative to agriculture (Barret *et al.*, 2001). For example, potential higher return to labour from employment outside agriculture could lure individuals or households into diversifying.

Barret *et al.* (2001) pointed out that not all households enjoy equal access to attractive nonfarm activities opportunities, only households with the required capacities are able to make full use of opportunities for increased returns provided by nonfarm income (Deininger and Olinto, 2001). This includes households with required skills, assets and those who have access to credit. Households without these capacities end up being trapped in low return, high-risk livelihood strategies based largely on unskilled labour and self-employed farming (Barret *et al.*, 2001). Thus it is important for government to strengthen policies and programmes aimed at addressing the underlying constraints to activity choice to facilitate the access of the poor populations to livelihood strategies that are more profitable and less risky (Matsumoto *et al.*, 2006).

2.8 Sustainable Livelihoods Framework

A livelihood is defined as a means that a household uses to achieve well-being and sustenance of it. The term livelihood refers generally to economic production, employment, and household income (International Federation of Red Cross and Red Crescent Societies (IFRC), 2015). This term is often used interchangeably with economic strengthening (Woller, 2011). People worldwide have rich and different livelihood portfolios, and display infinite resourcefulness in making ends meet (Munyai, 2012). Urban and rural households adopt diverse livelihood

strategies to maintain food security, including food production, local employment and reliance on social security benefits and local support system (DAFF, 2014). Households belonging to different socio-economic groups have different strategies to earn their own living which, in turn, may ensure different levels of resilience to food insecurity (Alinovi *et al.*, 2010).

The general definition given above is incorporated within a broader context of economic development, reduced vulnerability, and environmental sustainability. According to the sustainable livelihood approach: “A livelihood comprises of capabilities, assets and activities required for a means of living (Carney *et al.*, 1999 cited in Krants, 2001). A livelihood is sustainable if it can cope with and recover from stress and shocks, maintain and enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in short and long term.” (Chambers and Conway, 1992 cited in Krants, 2001). The way a household copes with and withstands economic shocks depends on the options available in terms of capabilities, assets and activities, i.e., on the household livelihood strategy (Krants, 2001).

The livelihoods concept widens the understanding of food security beyond just food availability and instead considers all capabilities, assets, and activities required to live. Therefore, food security is a consequence of livelihood strategies adopted by households. Livelihoods strategies are subject to the behaviour and choice adopted by people to make a living and are influenced by capital (human, social assets and financial resources) available to the household (Department for International Development (DIFD), 2002).

South Africa is food secure at the national level, but surpluses at macro level coexist with increasing rates of household food insecurity. According to Devereux and Maxwell (2003), food insecurity at the national level is caused by either unsustainable livelihoods or livelihood failure to obtain sufficient income. The food insecurity at a household level is due to insufficient income to purchase adequate amounts of food, also food available to the household is not shared according to individual needs and the food is not of sufficient variety, quality and safety (DAFF, 2014).

The quantity and quality of food consumed by the household is positively associated with household income and food production. As the household income increases, members will buy more diverse food varieties and shift to higher quality foods with greater nutritional value (Diskin, 1999). On the other hand, households with non-diversified and unhealthy diet tend to suffer more from illness thereby compromising their labour productivity and their ability to

engage in livelihood activities (Ruel, 2003; Alinovi *et al.*, 2010). Food security will be achieved when equitable growth ensures that the poor and vulnerable have sustainable livelihoods.

The livelihood of the poor could be better understood by studying the sustainable livelihood approach, which is shown below in Figure 3. The main focus of this approach is on the household, specifically the ways in which the household uses its assets to undertake a range of livelihood activities and to ensure its livelihood security (Woller, 2011). The sustainable livelihoods approach improves understanding of the livelihoods of the poor and it organizes the factors that constrain or enhance livelihood opportunities (Serrat, 2008). It further shows how these factors relate to one another. The sustainable livelihood approach can help plan development activities and assess the contribution that existing activities have made to sustaining livelihoods (Alinovi *et al.*, 2010). Furthermore, this framework shows that food security is but one of many household needs and there are a range of factors households consider in determining how they balance competing interests so as to subsist in both the short and longer terms.

South Africa is a diverse country with 119 livelihood zones. Of the 119, 96 are rural zones (27 open access zone and 69 exclusive access zone) and 24 urban access zones. A livelihood zone is a geographical area within which people share basically the same patterns of access to food and income and have the same access to markets. Households in exclusive zone have secure land tenure, this allows them to use the land exclusively. Therefore, exclusive access farms will have a strong business approach with workers who are dependent on their employment. Conversely, households in the open access zone have insecure land tenure, and there are more independent farmers but some are more successful than others. Furthermore, in open system there is a variation in dependence on production vis-a-vis employment or other sources of livelihood. Urban zones on the other hand are categorized in terms of physical access to services, dwelling types and local unemployment rate. Majority of the smallholder farmers are found in open access zone complementing their agriculture activities with non-farm activities.

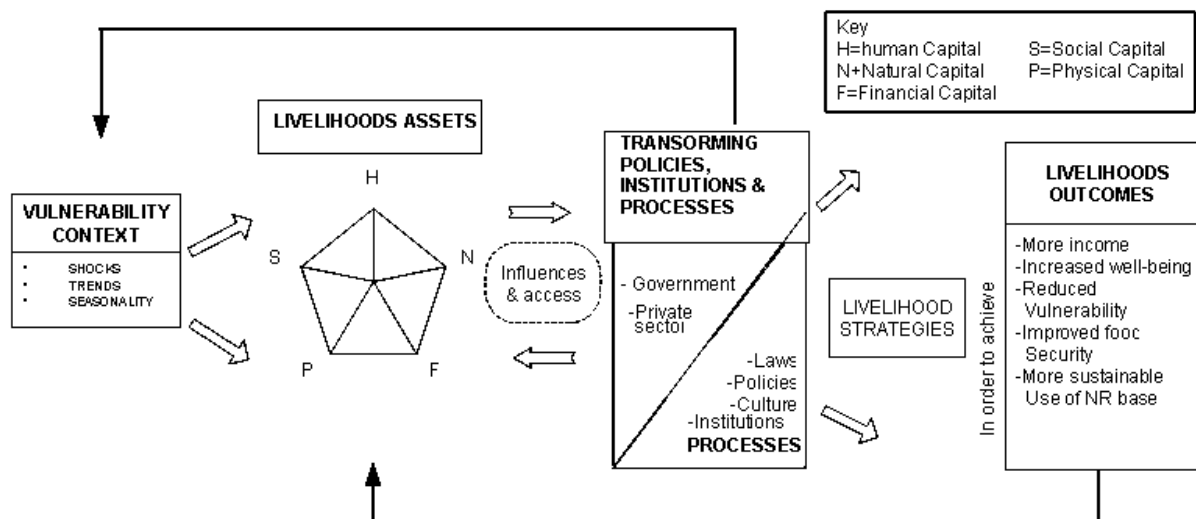


Figure 3: The Sustainable livelihood approach

Source: Adopted from Department for International Development (DFID) (1999)

2.8.1 Livelihood assets

Since the primary focus of the sustainable livelihood framework is on people, it is therefore crucial to understand people's strengths in order to analyze how they convert their assets into positive livelihood outcomes (Bebbington, 1999). People require a range of assets to achieve their self-defined goals, and these assets play a crucial role in the livelihoods framework (Kollmair and Juli, 2002; Serrat, 2008). Assets represent the stock of resources on which households can draw to generate income, meet their basic needs, manage risk, and cope with stresses and shocks (Woller, 2011). Research indicates that a larger asset base generally translates into greater livelihood opportunities and greater livelihood security (Woller, 2011, Bebbington, 1999). This means that households with more assets are more likely to have greater livelihood options with which to pursue their goals (Serrat, 2008). The livelihood assets, which the poor household must often make trade-offs and choices about, are:

- **Human capital** refers to the livelihood knowledge and capabilities possessed by individuals, e.g., education, knowledge and skills, capacity to work, capacity to adapt. Bhandari (2013) argues that education increases access to information, which enhances farmers' ability to process information ultimately helping to increase their income. Human capital such as the quality and quantity of available labor is a building block for acquiring livelihood objectives and sustaining livelihood outcomes for smallholder

farmers in rural areas (Bhandari, 2006). These farmers employ a large number of mostly unskilled family labor to perform farm activities.

- **Social capital** refers to various “social resources upon which people draw in pursuit of their livelihood objectives (DFID, 1999). It is generated by the household’s connections in a social network, and the trust, and resource-sharing qualities of those connections (Ashley and Carney, 1999). Previous studies show that participation of smallholder farmers in social networks can exert a positive impact on production), reducing transaction costs and improving land management through better access to information and technologies (Pender & Gebremedhin, (2007); BenYishay & Mobarak, (2013)). Acting collectively can assist farmers to exploit new market opportunities arising from higher economies of scale and increased bargaining power in negotiating prices (Poli, 2015).
- **Natural capital** refers to the physical environment and the natural resource stocks that can be used by the household to expand or enhance livelihoods (Woller, 2011). These include land and produce, water and aquatic resources, trees and forest products, wildlife, wild foods and fibers, biodiversity, environmental services. In rural agrarian societies, the access to farm land and its ownership is crucial for sustaining livelihoods. Evidence suggests that secure land tenure encourages the farmers to make long term investment decision on land and thus get increased incomes (Obi *et al.*, 2012).
- **Physical capital** comprises the basic infrastructure and producer goods needed to support livelihoods, such as affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean, affordable energy and access to information. Farmers located closer to these services have a number of options open to them that are lacking in many other communities. In addition, access to these services may encourage farmers to improve their production systems and thus sustainable livelihoods.
- **Financial capital** refers to the financial resources that people use to achieve their livelihood objectives and the availability of funds to adopt different livelihood strategies (Kollmair and Juli, 2002). It comprises of savings, credit and debt (formal, informal), remittances, pensions, wages. Large farmers, unlike smallholder farmers have better access to financial capital and have capability to use these resources to strengthen their livelihoods (Bhandari, 2013). Majority of the smallholder farmers have no access to credit due to lack of collateral to secure their bank loans.

2.8.2 Vulnerability Context

Woller (2011) define vulnerability as the household's susceptibility to shocks and stresses that affect the household's ability to generate sufficient income to earn a livelihood and achieve a threshold level of nutritional requirements for a healthy life at the present and in the future. How well a household can draw on its assets to pursue its diverse livelihood activities depends on its vulnerability context. People's livelihoods and the wider availability of assets are fundamentally affected by critical trends as well as by shocks and seasonality, over which they have limited or no control (DIFD, 1999). The factors that make up the vulnerability context include seasonal fluctuations in prices, production, economic or resource trends and natural shocks (Devereux, 2006). These factors can have a direct impact on people's assets and on the options available to them to pursue beneficial livelihood strategies (Clark and Carney, 2008). Some of these factors like natural shocks are outside of household's control, and they affect the household's livelihood and food security. Alinovi *et al.* (2010) mentioned that the vulnerability context of poor people's livelihoods is usually influenced by external factors outside their direct control and is dependent on wider policies, institutions and processes.

2.8.3 Livelihood strategies and outcomes

Recent studies have shown that people across the world have rich and different livelihood portfolios, and display infinite resourcefulness in making ends meet (Munyai, 2012). Livelihood strategies are the combination of activities that people choose to undertake in order to achieve their livelihood goals (DFID, 1999). The household livelihood goals can include more income, increased well-being, reduced vulnerability, improved food security, more sustainable use of the natural resource base, and recovered human dignity, between which there may again also be conflict (Alinovi *et al.*, 2010, Devereux, 2006). The livelihood strategies that households undertake include productive activities, investment strategies and reproductive choices (Serrat, 2008). For household members, livelihood strategies also depend on their gender, age, and health status. For example, younger and educated members of the household frequently migrate to the cities in search for jobs while elders and women in particular are usually involved in agricultural production. Poor households are often engaged in a continuously changing portfolio of income generating activities to spread risk or take advantage of earning opportunities (Woller, 2011).

People's access to different levels and combinations of assets has the major influence on their choice of livelihood strategies. For example households endowed with assets are more likely able to make positive livelihood choices; they will not be forced to any strategy because they have the luxury of choosing from a range of options in order to maximize their achievement of positive livelihood outcomes (DFID, 1999).

2.8.4 Policies and Institutions

Policies and institutions refer to the complex social, economic and political context within which people pursue their livelihood strategies (Alinovi *et al.*, 2010). Livelihood strategies and outcomes are not just dependent on access to capital assets or constrained by the vulnerability context; they are also transformed by the environment of structures and processes (Serrat, 2008). DIFD (1999) indicates that policies and institutions effectively determine access to livelihood strategies and to decision-making bodies and sources of influences; they also determine the terms of exchange between different types of capital; and returns to any given livelihood strategy.

South Africa has a National Food and Nutrition Security Policy which aims to reduce the number of individuals that experience inadequate access to food thereby contributing towards overall poverty eradication. This Policy is built on existing initiatives and systems, and put in place with mechanisms that ensure stricter alignment, better coordination, and stronger oversight.

2.9 Summary

The chapter reviewed literature on smallholder farmers and smallholder agriculture definitions, followed by nature of smallholder agriculture and its importance. The chapter has also highlighted the important role played by smallholder agriculture in achieving food security. The concept of food security was critically discussed. The rural household sources of income and livelihood strategies were also highlighted and it was noted that off-farm activities are a common feature of rural economies, both in developed and developing countries, and offer opportunities for investments in support of smallholders. Challenges that constrain smallholder farmers from contributing effectively to household food security were also discussed and they included production constraints, limited access to market and poor

infrastructure, lack of bargaining power, limited access to credit and insecure land tenure systems.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

The main purpose of this study is to characterise the livelihoods of smallholder farmers and assess the contribution of agriculture to household food security in Sekhukhune district. In this chapter, the research methodology used to collect data is described, including the research design, data collection procedures and statistical analysis. The chapter ends with a summary.

3.1 The research design

The study employed quantitative research data collection. Quantitative research focuses on gathering numerical data and generalizing it across groups of people to explain a particular phenomenon (Babbie, 2010). This approach seeks to establish relationships between two or more variables, using statistical methods to test the strength and significance of the relationships (Polit, 2001). The findings from quantitative research can be predictive, explanatory, and confirming (Babbie, 2003). (Creswell *et al.*, 2011) states that quantitative methods allow the researcher to summarize vast sources of information and facilitate comparisons across categories and over time.

3.2 Study area

This research was conducted in Limpopo Province of South Africa. The province is characterised by abundant agricultural land and is one of the country's major agricultural production regions, noted for livestock, fruits and vegetables, cereals and tea (Stats SA, 2014). Large-scale commercial farming and smallholder farming are the two dominant modes of production. The latter are located mainly in the former homeland areas, and cover approximately 30% of the provincial land surface (Cooperative Governance and Traditional Affairs, 2011). Limpopo has continuously been reported to have the highest percentage of households experiencing adequate access to food compared to other provinces i.e. 79,4% in 2010 to 91,3% in 2013 (Stats SA,2013). Moreover, Limpopo has the highest percentage of households (43.8%) involved in agricultural activities (Stats SA, 2015). The study was limited to Sekhukhune District.

Sekhukhune district is located in the south eastern part of Limpopo Province, the northern part of South Africa. The District municipality is situated in the North West of Mpumalanga and South of Limpopo. This district is the smallest in the province making up 11% of its geographical area and it covers an area of about 13,527.73 ha. Sekhukhune district is largely rural (94%) and 5.3% urban with a population of about 1,083,555. Half the population is younger than 18 years of age, and women make up 60% of the over 18 working age population (Cooperative Governance and Traditional Affairs, 2011). The lower percentage of men in the study area is probably due to migration to cities in search of work (Gaffney, 2009). The population is mainly made up of Pedi (82.2%), Ndebele (4.4%), Zulu (3.3%), Tsonga (2.2%) and English speaking people (0.22%) (Stats SA, 2015). The district is divided into five local municipalities, namely Fetakgomo, Greater Groblersdal, Greater Marble Hall, Greater Tubatse and Makhuduthamaga. Figure 4 below shows the study area.

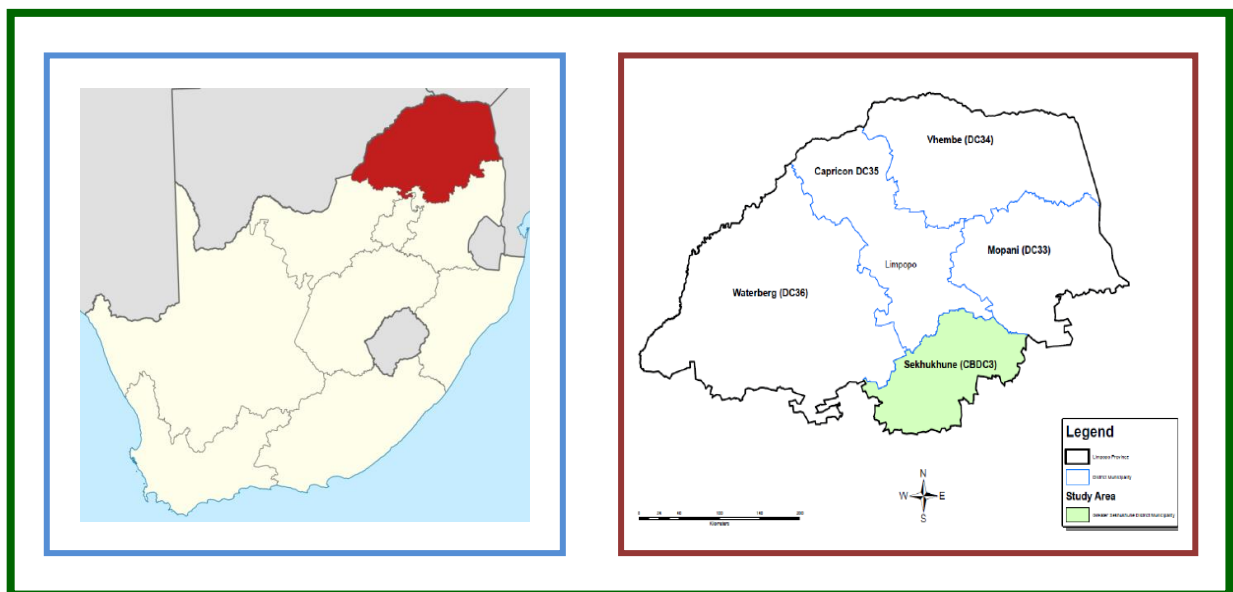


Figure 4: Map showing the study area

Sekhukhune district is regarded as the ‘poorest of the poor’ with a poverty rate of 68% (Cooperative Governance and Traditional Affairs, 2011). It is one of the districts, which are part of an Integrated Sustainable Rural Development (ISRD) node prioritised by the South African government for development in 2001 (South African National Roads Agency, 2007). ISRD nodes constitute some of the poorest areas in the country and are characterised by poor infrastructure, limited resources and economic depression (Drimie *et al.*, 2009).

There are three types of land ownership in Sekhukhune e.g. privately owned land - mainly used for commercial farming purposes, state-owned land - used for both farming and residential purposes, and tribal land, which is used for residential, cropping, and grazing purposes on communal basis (Siambi *et al.*, 2007).

Sekhukhune district has a variety of economic activities such as mining (20%), community services (15%), trade (17%), business services (12%) and agriculture (9.7%) (Greater Sekhukhune District Municipality, 2011). Siambi *et al.* (2007) indicated that 70% of farming in the district is smallholder agriculture whilst the other 30% is commercial agriculture. Most commercial farms are situated near Groblersdal and Marble Hall in the south west and Zebediela in the north (DWAF, 2005). Smallholder farmers are not doing well in the district due to water shortage, lack of agricultural inputs and the uncertain status of land ownership (Greater Sekhukhune District Municipality, 2005). Livestock production has a strong comparative advantage and provides much of the agricultural output in the district.

3.3 Data collection method

This study employed only primary data collection method. Gratton & Jones (2010) define primary research as the collection of new data for a particular research project. A structured interview schedule was used in order to capture relevant data, which answers the study objectives. The structured interview tool was formulated to obtain information regarding demographic details of the participants. Information pertaining to food security status, household livelihoods, agricultural activities, incomes and food group consumption for households was collected through the structured interview. These sections helped to include relevant content for the achievement of the study's objectives. Before data collection the questionnaire was pretested using households within the study area.

3.4 Sampling process

Random sampling was used for this study because data gathered was to be generalised to the whole population. Random sampling is the process of selecting a sample that allows individuals in the defined population to have an equal and independent chance of being selected (Mertens, 2003). This sampling technique was employed because it is relatively easy to implement, cheap to use and it requires minimum knowledge of the population to be sampled. Obtaining data from the entire population as well as analysing and interpreting vast amounts of data would

have been impossible to accomplish within the time constraints and with the limited financial resources available for conducting this research.

The sample size refers to the representatives selected for a study whose characteristics exemplify the larger group from which they were selected. Dattalo (2008) argues that the determination of a sample size is essential and must be similar to the restrictions of the selected population. A general rule is to always use the largest sample possible because large sample covers most representatives of the population while smaller samples produce less accurate results and they are likely to be less representative of the population (LoBiondo-Wood & Haber 1998). The study targeted 250 households but due to budget constraints the researcher ended up sampling 180 households. After data collection the sample size was reduced to 175 households due to questionnaires with incomplete information. Table 1 shows the distribution of respondents per sub-place.

Table 1: Distribution of respondents per sub-place in Greater Sekhukhune district

Municipality	Sub-place	Sample
Elias Motsoaledi	Tafelkop	24
Ephraim Mogale	Selebaneng	25
Makhuduthamaga	Ngwalemong (Phokoane)	46
Greater Tubatse	Mantsakane	56
Fetakgomo	Mohlalestsi	29
Total		180

3.5 Ethical consideration

The study was in line with ethical standards as required by academic research. It ensured that the necessary permission and procedures to conduct the study were obtained to ensure that traditions and beliefs are well respected. The written and verbal communication, were used to interact with different rural households, other relevant stakeholders. Participants were not forced to provide information against their will, they provided information freely and on a voluntarily basis. Information obtained from the participants was kept in strict confidence and was only used for the purpose of the study.

3.6 Data analysis method

The questions and responses were coded and entered in the computer using Microsoft Excel software. Coding of variables in quantitative research is very critical for better interpretation of results. The data was analysed using Statistical Package for the Social Sciences (SPSS 18.0 Windows). This program was used for descriptive statistics, modelling using logistic regression analysis, t-test and chi-square tests for selected indicators.

3.6.1 Socio economic factors affecting household involvement in agriculture

Three analytical approaches were used to determine socio economic factors affecting the household involvement in agriculture. These analytical approaches are t-test, chi square and the logit model.

3.6.1.1 Logistic model

Logistic regression model is a statistical method for analyzing a dataset in which there are one or more independent variables that determine an outcome (Menard, 2010). In logistic regression, the dependent variable is binary or dichotomous, i.e. it only contains data coded as 1 or 0. The goal of logistic regression is to find the best fitting model to describe the relationship between the dichotomous characteristic of interest and a set of independent variables. Logistic regression generates the coefficients (and its standard errors and significance levels) of a formula to predict a logit transformation of the probability of presence of the characteristic of interest (Quinn and Keough 2002).

Econometric model:

$$\text{Log} (P_i) = \ln (P_i/1-P_i) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \mu_i$$

Where:

$$\text{Log} (P_i) = (P_i/1-P_i) = \text{Logit for household agriculture involvement}$$

P_i - Predicted probability that $Y = 1$ (meaning that household is involved in agriculture)

$1-P_i$ - Predicted probability that $Y = 0$ (meaning that household is not involved in agriculture)

α – Intercept term

β - Estimated parameters

X- Represents covariates

μ_i - the error term

One of the key features of the logit model is if $Log (P_i)$, the logit, is positive, it means that when the value of the regressor increases, the odds that the regress equal 1 (meaning some event of interest happens) increases. If $Log (P_i)$ is negative, the odds that the regress and equals 1 decrease as the value of X increases (Gujarati and Sageetha, 2007).

3.6.1.2 Model specification

Table 2 summarises variables specified in the binary logistic model and the expected signs.

Table 2: Description of variables used in the logistic regression model

Variables description	Measurement	Expected signs
Dependent variable Household agriculture involvement	Involved=1, Not involved=0	
Independent variable		
Gender	Male=0, female=1	-
Age of the household head	Years	-
Household head's education level	Never attended school=0; Primary level=1, Secondary level=2, Matric=3, Tertiary=4	+
Household size	number of members in the household	-
Market access (Dummy variable)	Yes=1, No=0	+
Land ownership	owns the land=1, otherwise 0	+
Economic activity	Formally employed=1, Self-employed=2, Unemployed=3, Informal employment=4, Inactive=5, Farming=6	
Non-farm income	Amounts in Rands	+
Social grants	Receives social grant=1, otherwise 0	+

Based on critical review of the literature, the following explanatory variables were hypothesized to have an influence on household agriculture involvement.

Gender of the household head: Household head is a person who economically supports or manages a household or for reason of age or respect is considered as head by other members of the household (Bayene, 2010). Gender of household head is an important factor affecting household agriculture. Women play a predominant role in agriculture. They stand out as pillars of economic growth, especially when it comes to agriculture and agribusiness, which dominate rural economies throughout Africa (FAO, 2002). Thus, female headed households are more likely to be involved in agriculture than male headed households.

Age of household head: Age is a continuous explanatory variable. As age of a household head increases, it is assumed that farmers could acquire more knowledge and experience. They are more risk averse and their chance to be involved in agriculture increases with age. Thus, it is hypothesized that age of the household heads and agriculture involvement are positively correlated.

Education level: Education is an important variable affecting agriculture involvement where educated households have a better chance of managing their farm by adopting improved practices, which in turn increases total yield. It is assumed that a literate household head often tends to adopt new skills and ideas which in turn have positive effects on food security (Garrett and Ruel, 1999). Thus education level was hypothesized to have a positive association with household agriculture involvement.

Household size: Household size refers to the total number of household members who live and consume from the same household and is expressed in adult equivalent. An increase in household size implies more people to be fed from the limited resources. The larger the household size, the higher the likelihood of adopting the farm livelihood strategy in order to supplement non-farm livelihood. Thus, household size was hypothesized to have a positive association with agriculture involvement.

Market access: It is dummy variable that takes a value of 1 if a household has market access and 0 otherwise. Markets are of fundamental importance in the livelihood strategy of most rural households (IFAD, 2003). It is thus, expected that a household having better access to market has better opportunity to be involved in agriculture food secure than the one which does not have access. Therefore, a positive association between access to market and household agriculture involvement was hypothesized.

Land ownership: Land is essential for farming. A person who owns arable land tends to invest more on it and thus increase their agricultural production and productivity. Land ownership is therefore expected to have a positive relationship with agriculture involvement.

Non-farm income: People derive income not from the agricultural production only but also from non-farm activities. Barrett *et al.* (2001) indicated that the success of households and their members in managing food insecurity is largely dependent on their ability to get access to non-farm job opportunities, which could serve as livelihood diversification strategies. Many studies show that many farmers use non-farm income to purchase agriculture inputs and also to expand their agriculture businesses. Therefore, it is expected that the non-farm income will be positively associated with household agriculture involvement.

Social grants: Social grants are very important in many South African households as they have become one of their main sources of income. Although they target specific vulnerable groups, social grants generally benefit households as a whole (Abel, 2013). Samson *et al.* (2008) cited in Sinyolo *et al.* (2016) mentioned that most rural households used part of their social grant income to fund agricultural activities and other microbusiness. Social grants are therefore expected to have a positive relationship with agriculture involvement.

3.6.2 Measurement of household food security status

In this study the household food security status was measured by the Household Dietary Diversity Score (HDDS). Household dietary diversity is defined as the number of the unique foods consumed by household members over a given period (IFPRI, 2000). The respondents were asked to recall all foods eaten and beverages taken in the previous days prior to the interview. A scale of sixteen food groups was used in assessing the dietary diversity of the respondents as summarised in Table 1. The dietary diversity score is measured by adding the number of food and food groups consumed over a given reference period (Ruel, 2002). A single point was awarded to each of the food groups consumed over the reference period giving a maximum sum total dietary diversity score of 16 points for each individual in the event that his/her responses are positive to all food groups.

Table 3: Categories of food groups
Source: Hoddinott & Yohannes, (2002).

Food groups	Points
Cereals: maize, wheat, sorghum, millet and any other foods made from cereals such as porridges and bread	1
White roots and tubers: potatoes, white sweet potato	1
Orange-fleshed vegetables: pumpkin, carrot, butternut	1
Dark green leafy vegetables	1
Other vegetables (tomato, onion, green beans, gem squash, eggplant, including wild / indigenous vegetables)	1
Orange-coloured fruit (ripe mango, apricot, papaya, dried peach and 100% fruit juice made from these)	1
Other fruit (oranges, banana, apple, pear etc)	1
Organ meat (liver, kidney, heart or other organ meats)	1
Meat (e.g. beef, goat, sheep, poultry, pork)	1
Eggs from any animal	1
Fish and seafood (fresh, tinned or dried and shellfish)	1
Dried beans, peas, lentils, nuts, seeds or food made from these (e.g. peanut butter)	1
Milk and milk products (e.g. yoghurt, maas, cheese)	1
Oils and fats (e.g. sunflower oil, rama, lard, butter added)	1
Sweets (e.g., sugar , honey, sweetened juices or fizzy drinks, sugary foods such as chocolates, cookies, cakes)	1
Spices (e.g. pepper and salt, condiments (e.g. tomato sauce) coffee, tea, alcoholic beverages)	1
Total Points	16

Key: Yes=1, No=0

To classify household into either food secure or insecure average household dietary diversity score was calculated by dividing the sum of household dietary diversity score by the sample size. If the household dietary diversity is above or equal to the average household dietary diversity score, the household would be deemed food secure. The household would be deemed food insecure if dietary diversity is less than the average household dietary diversity score.

There is no standard methodology for measuring food security, despite an improved theoretical understanding of the subject. While many authors suggest use of multiple measures of food security, a single food security measure can be used to assess food security depending on the study objectives. Many researchers have used a single measure to assess food security, e.g., Ndofo, (2013); Wineman, (2014) and Toringepi, (2016).

3.6.2.1 Tobit regression model

The Tobit model, also known as a censored regression model has been used in many areas of applications. It has been designed to estimate linear relationships between variables when there is either *left- or right-censoring* in the dependent variable. Censored regression models generally apply when the variable to be explained is partly continuous but has positive probability mass at one or more points (Wooldridge, 2002). Censoring occurs when data on the dependent variable is limited but not data on the regressors. Censoring from above takes place when cases with a value at or above some threshold, all take on the value of that threshold, so that the true value might be equal to the threshold, but it might also be higher. In the case of censoring from below, values those that fall at or below some threshold are censored. The Tobit model coefficient allows estimation and inference of an exposure effect on the latent dependent variable.

Econometric Model:

$$y_i^* = \mathbf{x}_i \boldsymbol{\beta} + \varepsilon_i$$

Where $\varepsilon_i \sim [N(0, \sigma^2)]$. y^* is latent variable that is observed for values greater than τ censored otherwise. The observed y is defined by the following measurement equation

$$y_i = \{y^* \text{ if } y^* > \tau, \tau_y \text{ if } y^* \leq \tau\}$$

In the typical Tobit model, we assume that $\tau = 0$ e.g. the data are censored at 0. Thus, we have

$$y_i = \{y^* \text{ if } y^* > 0, 0 \text{ if } y^* \leq 0\}$$

3.6.2.2 Model specification

Table 4 summarises variables specified in the Tobit regression model and the expected signs.

Table 4: Description of variables used in the Tobit regression model

Variables description	Measurement	Expected signs
Dependent variable Household food security status	food secure=1, Food insecure=0	
Independent variable		
Gender	Male=0, female=1	-
Age of the household head	Years	-
Household head's education level	Never attended school=0 Primary level=1, Secondary level=2, Matric=3, Tertiary=4	+
Household head's marital status	Married=1, Not married=0	+
Household size	number of members in the household	-
Agriculture involvement	Involved=1, Not involved= 0	+
Market access (Dummy variable)	Yes=1, No=0	+
Farm size	Hectares	+
Land ownership	owns the land=1, otherwise 0	+
Non-farm activities	Petty trading=1, office work=2, crafts=3, domestic work=4, mining=5, none=6	+
Agricultural assistance	Training=1, grants=2, loan=3, dipping and vaccination services=4, transport to market=5, None=0	+
livestock ownership	Ownership=1, No ownership livestock= 0	+
Economic activity	Formally employed=1, Self-employed=2, Unemployed=3, Informal employment=4, Inactive=5, Farming=6	
Non-farm income	Amounts in Rands	+
Social grants	Receives social grant=1, otherwise 0	+

3.6.3 Description of the variables in the Tobit regression model

3.6.3.1 Gender of the household head

In all cultures, gender determines roles and responsibilities, as well as power and resources of women and men. In this study gender of head of household is anticipated to negatively influence food security. Numerous studies have found female-headed households are more likely to be vulnerable to food insecurity and poverty as compared to their male counterparts (Kassie *et al.*, 2011, D’Haese *et al.*, 2011 and De Cock, 2012). This was supported by Frayne *et al.* (2009), who also found that among the three biggest cities in South Africa; female-headed households were most affected by the incidents of food insecurity as compared to male-headed households. Women are vulnerable to food insecurity because they are poor than their male counterparts. Barros *et al.*, (1997) observe that in the context of urban Brazil that the main reason for female-headed households being poor is that males earn more than females in the same jobs, thus female headed household will be likely to be poor. Furthermore, cultural restrictions on women’s ability to participate fully in food production activities have left them particularly vulnerable in times of economic crisis (Kabeer, 1990). Dreze and Srinivasana (1997) pointed out that widow-headed households are more disadvantaged than other types of female-headed households.

3.6.3.2 Age

Age is a continuous variable and it is expected to negatively influence food security. This implies that the higher the age of the household head the higher the probability of that household to be food insecure. This is because older household heads might be inactive while they have many members to feed. Omonona *et al.* (2007) in Nigeria showed that the prevalence of household food insecurity increases with age; household heads above the age of 60 are usually retired, with large household size and low income, thus this increases their likelihood of food insecurity. Young people are economically active than old people and can operate in challenging jobs within the labour market.

3.6.3.3 Educational level

Educational attainment of a household head is considered by this study to be a qualitative variable and is expected to influence the food security status of households positively.

Educated household heads have the likelihood of attaining improved financial resources, which in turn raises their productive capacity (Pankomera *et al.*, 2009:3). Furthermore, education enhances better job opportunities especially for farm workers who live in rural areas (Heidhues, 2009). Educational attainment by the household head could lead to awareness of the possible advantages of modernizing agriculture by means of technological inputs. These would enable them to read instructions on fertilizer packs and diversification of household incomes which, in turn, would enhance households' food supply (Najafi, 2003). Household heads that have attained a minimum of primary education have an advantage with agricultural production than those with no formal education (Bogale & Shimelis, 2009:1917). Further, education makes the households aware of the importance of consuming diverse diets.

3.6.3.4 Household size

Household size is a continuous variable and measured in by the number of members in a household. Household size is another factor expected to have influence on food security status of households. Olayemi (2012) found that there is a negative relationship between household size and food security. This is because as the household members increase the total food expenditure also increases *ceteris paribus* (Paddy, 2003). Jacobs (2009) also added that households with many members are expected to consume more food than small households. In addition, since land and finance to purchase agricultural inputs for smallholder farmers are very limited, therefore, increasing family size tends to exert more pressure on consumption than the labour it contributes to production (Alemu and Kudhlande, 2005). It is for this reason that household size increase, decreases with their food security status. Amaza *et al.* (2009:11) argue that the higher the number of inactive individuals in households the higher the burden for active individuals in the provision of food, which in turn increases the likelihood of food insecurity. Therefore, a negative correlation between household size and food security is expected in this study.

3.6.3.5 Marital status

Kaloi *et al.* (2005) argued that single household heads bear a large burden on the attainment of food as they usually enjoy a limited support structure. Cancian and Reed (2009) on the other hand, found that a household with a head and a spouse is most likely to avoid food insecurity,

as the spouse is likely to contribute to the means of getting food. Therefore, the relationship between marital status and food security in this is expected to be positive.

3.6.3.6 Agricultural involvement

This variable is expected to positively influence dependent variable since agriculture is a key to food security as it contributes to poverty alleviation and improving farm income (FAO, 2004). Smallholder agriculture contributes to household food security through food production, livelihoods and creation of income (The High Level Panel of Experts on Food Security and Nutrition (HLPE), 2013). Literature indicates that smallholder farmers have the potential to produce and sell their produce to increase their well-being which could create a more resilient and abundant food supply (Livingston *et al.*, 2011). Dorward (2012) asserted that agriculture as a source of food is the most direct pathway by which household agricultural production translate into consumption own production and has more impact on smallholder farmers since their food consumption nutritional status is usually affected by what they grow. For household involved into agriculture, dietary diversity is linked to crop diversity because much of what smallholder farmers produce is consumed at home (Msaki, 2010). An increase in household dietary diversity and dietary quality on continual basis improve household food security status.

3.6.3.7 Access to market

A market is a specific medium that allows buyers and sellers of specific good or service to interact in order to facilitate an exchange. Well-functioning markets transmit price signals, which allow changes in demand to be met by supply. Agricultural markets serve as a powerful tool for economic growth in less developed countries (IFPRI, 2008). Markets play a crucial role in achieving food security by increasing access to food (Hebebrand and Wedding 2010). In addition, markets are necessary to boost agricultural productivity and food availability since access to viable markets could encourage farmers to increase their production. Boosting agricultural productivity is essential to food security for a growing population in which one in seven people goes to bed hungry (World Bank, 2014). IFRPI (2002) also added that farmers can turn their surpluses into income only if they have the ability to access markets. Increased incomes, in turn increase food security and help alleviate poverty. In this market, access was used a proxy for farm income since selling of farm produce has direct connotation as having farm income. This variable is also expected to affect food security positively.

3.6.3.8 Non-farm activities

In this study households diversify their incomes by working on farms as daily labourers, selling crafts, trading, and working in mines. The participation in non-farm activities was measured by whether or not a household was engaged in those activities. This variable is expected to influence food security positively since increase in household income increases food security. Literature suggests that the employment in non-farm activities is essential for diversification of the sources of farm households' livelihoods (Alemu and Kudhlande, 2005). Several studies reveal that diversification of sources of income has long been a survival strategy which allows household heads to reduce the risk of starvation for themselves and their families during periods of chronic or transitory food insecurity (Devereux 1993, Maxwell and Frankenburger, 1992).

3.6.3.9 Land ownership

Land tenure refers to a set of rights which a person or organisation holds in land (FAO, 2010). Security of tenure is not limited to private ownership but can exist in a variety of forms such as lease on public land or user rights communal property (Ghonemy, 1998). Most farmers in developing countries have insecure rights to land hence the large amount of land is owned by the state. If tenure is secure, land holders would invest more to land and use it to their best advantage in order reap fair returns (FAO, 2010). Land ownership in this study is anticipated to affect food security positively.

3.6.3.10 Livestock ownership

Livestock contributes to households' economy in different ways, e.g. as a source of pulling power, source of cash income, source of supplementary food, and means of transport (Bashir *et al.*, 2010). Further, livestock are considered a means of security and means of coping during crop failure and other calamities (Kang'ara *et al.*, 2001). In developing countries almost every rural household owns some livestock because livestock serve as an asset and may provide a reserve that can be converted to cash in times of need (Ali and Khan, 2013). Many studies found that households who own livestock have good food security status as well as sustainable farming (Kassa *et al.*, 2002, Bashir *et al.*, 2010). Bashir *et al.*, (2012) found that an increase in small livestock increases the chances of a household to become food secure by 31% in the rural Punjab, Pakistan. It is thus expected by this study that livestock ownership will affect food

security positively. Households' livestock ownership was measured by the number of tropical livestock unit (TLU) owned. Conversion factors were used in order to change each livestock of a household to its equivalent tropical livestock unit.

3.6.3.11 Social grants

Social grants have played a vital role in reducing poverty and inequality throughout the country (Appel 2008). Studies in Poverty and Inequality Institute (SPII) (2012) indicate that social grants continue to improve the wellbeing of many recipients in the country, providing minimal standard of living and a source of income for many people. Social grants recipients spend a large share of their income on food as compared to other grocery items (Neves *et al.*, 2009). Samson et al. (2004:78) found that social grants positively affect the share of household food expenditure through the improvement of household nutrition. Due to the reasons mentioned above, this study expects social grants to positively influence household food security.

3.7 Summary

This chapter gave an overview of the methodological framework used in this study. It outlined the research design that had been followed; addressing the data collection method, sampling procedure, sample size and data analysis method. Further, it gave a description of the study area, its demographic location and social, cultural and economic characteristics. Ethical concerns which have a crucial impact on research in general were also attended to.

CHAPTER 4: RESULTS AND DISCUSSIONS

4. Introduction

This chapter presents analysis and discussion of the data collected in Sekhukhune district. The results of the study are discussed in relation to the respondents' socio-economic profile, household food security status, socio-economic factors affecting the household agriculture involvement and determinants of household food security.

4.1 The t-test results for the continuous variables

Four variables were analysed in this section against household agricultural involvement; i.e., age, household size, farm size and total non-farm income. Among the four variables only two (household size and farm size) were significant.

4.1.1 Age of the household head

The study examined if age differed between farmers and non-farmers. The t-test results show that the average age of farmers was 56 years whereas for non-farmers it was 54 years. The results propose that household heads still fall within economically productive population, which Standard deviation is 15–64 years old. However, there was no statistical significant difference in the mean age of farmers and non-farmers.

Table 1: Descriptive Statistics of Continuous Variables

Variables	All respondents		Farmers		Non-farmers		t-test
	Mean	Stddev	Mean	Stddev	Mean	Stddev	
Age (years)	55.7	16.0	56	15.5	54	17.1	ns
Household size	4.8	2.6	5.2	2.8	4	2	***
Farm size (ha)	1.7	1.7	2.4	0.1	0.3	0.2	***
Total non-farm income (Rands)	3300	291	3581	284	3268	397	ns

Significant 1% ***, 5% **, 10% * probability level. ns = not significant, Stddev = Standard deviation

4.1.2 Household size

There is a statistically significant ($p < 0.01$) difference between the household sizes of farmers and non-farmers. The results imply that the larger the household size the higher the chances of them participating in agriculture to supplement their foods. Meanwhile, larger household sizes are also associated with increased spending on food. According to Manza and Atala (2014) the sizes of the household determines the availability of labour for farm production, the total area cultivated to different crop enterprises, the amount of farm produce retained for domestic consumption, and the marketable surplus. Literature indicates that the engagement of majority of the family members on the farm can increase the possibility of the household being food secure (Ogunmefun and Achike, 2015).

4.1.3 Farm size

The results show that there are statistically significant ($p < 0.01$) differences between the farm size of those involved in agriculture and those that are not involved. This suggests that households with larger farm sizes are more likely in to be involved in agriculture.

4.2 The Chi-square results for discrete variables

Nine variables were analysed in this section against household agricultural involvement; i.e., education, storage, gender, marital status, social grants, market access, agriculture assistance and off-farm activities. Of the nine variables, five were statistically significant while others were non-significant.

4.2.1 Education level

Level of education in this study was measured by the number of schooling years attained by farmers and non-farmers. The education level of the household head was classified as no schooling, primary level, secondary level, matric and tertiary (levels 1, 2, 3, 4 and 5 respectively). Table 2 shows the educational attainment of household heads. The results show that education was not a major constraint in the study area as 59.3% of the farmers and 46% of non-farmers had acquired formal education. The results further show that 31.4% of farmers and 50% of non-farmers had never went to school.

Table 2: Education level of household heads

Education level	Farmers (n=121)	Non-farmers (n=54)
	%	%
Never attended school	31.4	50.0
Primary level	9.1	1.9
Secondary level	24.8	37.0
Matric	17.4	7.4
tertiary qualification	17.4	3.7
Total	100.0	100.0

$\chi^2 p < 0.01$

Source: Output survey (2015).

A further investigation was carried out using chi-square to determine whether the differences in levels of education attained by farmers and non-farmers were statistically significant. The

chi-square results indicate that there are statistically significant ($p < 0.01$) differences between farmers' and non-farmers' levels of education.

Literature suggests that the years of schooling of the household head determines the levels of opportunities available to improve the household livelihood strategies, enhance food security and reduce poverty levels (Oni *et al.*, 2013). Manza and Atala (2014) add that farmers' education level would also enhance the ability to make informed and accurate decisions on management of the farm. Najafi (2003) stated that educational attainment by the household head could lead to awareness of the possible advantages of modernizing agriculture by means of technological inputs; enabling them to read instructions on fertilizer packs and diversification of household incomes, which, in turn, would enhance households' food supply.

4.2.2 Storage

Storage assumed two possible values; i.e., 0 and 1 where 0 represents the no storage facility and 1 the access to storage facility. The results in table 3 show that 53% of farmers against 13% of non-farmers had storage facilities. Farmers with no storage are 47% against 87% of non-farmers.

Table 3: Storage facility of the households

Storage	Farmers (n=121)	Non-farmers (n=54)
	%	%
Storage	53	13
No storage	47	87

Source: Output survey 2015

The chi-square results showed that storage has a statistically significant difference ($p < 0.01$) between farmers and non-farmers access to market. Effective storage plays an important role in stabilizing food supply at the household level by smoothing seasonal food production (Mazibuko and Oladele, 2012). In addition, effective storage will encourage farmers to keep their produce and sell it when it is on demand at higher price.

4.2.3 Access to markets

The Chi-square test was performed based on the household access and non-access to the output market. In this case, the variable for access to the markets two possible values; i.e., 0 and 1

where 0 represents the non-access to market and 1 the access to market. The results revealed that access to markets have a statistically significant difference ($p < 0.01$) between farmers and non-farmers. The access to output markets plays a significant role in a farmer's decision to participate in agriculture. It encourages them to expand and diversify their production and thus increasing their farm income (Barret, 2008). Literature suggests that smallholder farmers' participation in output market is low due to various reasons, including small land sizes and low asset values. These factors constrain them from producing marketable surplus and thus limit their ability to exploit available market opportunities (Olwande and Mathenge, 2012).

4.2.4 Off-farm activities

This variable was classified as petty trading, office work, crafts, domestic work mining and none. Table 5 shows the off-farm activities engaged in by respondents. The results show that petty trading was the most dominant (farmers 29% against 35% of non-farmers) followed by domestic work (15% for farmers against 20% of non-farmers). Only 7% of farmers were doing the office work against 10% of non-farmers.

Table 4: Off-farm Activities engaged in by Household heads

Off farm activities	Farmers (n=121)	Non-farmers (n=54)
	%	%
Petty trading	29	35
Office work	7	10
Crafts	11.9	15
Domestic work	15	20
Mining	13.2	10
None	24	13

Source: Survey output 2015. A specific household can be engaged in more one activity. Percentages therefore do not add up to 100%.

The chi square was used test whether the engagements in off-farm activities between farmers and non-farmers were statistically significant. The results showed that there were statistically significant ($p < 0.01$) differences between farmers and non-farmers engagement in off-farm activities. This shows that most people in the study area are engaged in non-farm activities. Studies reveal that rural households in Asia, and Africa derives a significant proportion of their livelihoods from non-farm employment and this income represents a substantial and sometimes growing share (Fraser et al., 2003, Otsuka and Yamano, 2006).

4.3 Food security status of households in the study

In this study the household food security status was measured by the Household Dietary Diversity Score. The average household dietary diversity was employed to classify households into either food secure or insecure categories. The household was deemed food secure if its dietary diversity score was above or equal to the average household dietary diversity score. Households with dietary diversity of less than the average household dietary diversity score were regarded as food insecure. Several studies have explored the validity of dietary diversity indicator and the findings suggest that they are relatively valid across households within countries (Headey and Ecker, 2012).

The maximum number of food groups consumed by households the previous day was eleven while the minimum was three. The average household dietary diversity was six. The results indicate that about 54.9% households were deemed food secure. This is a high level of food insecurity considering that Limpopo province has least number of households (8.2%) with inadequate access to food (Stats SA, 2015). The reason for their food insecurity is not known however, it could be due to limited resources that hinder them from consuming or growing enough food (Boussard *et al.*, 2006). Food security at household level is an outcome of several socio-economic factors (Mishra, 2013). Devereux and Maxwell (2001) argue that food security at household level is not viewed as a problem of food supply but rather as a livelihood failure because of inadequate means to acquire food.

The result of the analysis of the food security status of households in Table 5 showed that the percentage of households that were food secure among the households that were practising agriculture was 62% as against 50% of non-farming households. While 38% of farming households were food insecure as against 50% of non-farming households.

Table 5: Household Food security status

Food security status	General food security status (n=175)	Farmers (n=121)	Non-farmers (n=54)
	%	%	%
Food secure	54.9	62	50
Food insecure	45.1	38	50
Total	100	100	100

Source: survey output 2015

Further analysis was done to determine whether the differences in the food security status of farmers and non-farmers were statistically different. The results showed that there was no statistically significant difference in the food security status of farmers and non-farmers.

4.4 Socio-economic factors affecting the household agriculture involvement

Table 6 provides the parameter estimates for the logit model. The logit model was employed to look at the socio-economic factors affecting the household agricultural involvement in the study area. This model seeks to explain the probability of agriculture involvement as the result of nine identified independent variables. The signs of the coefficients of the independent variables and significance of the independent variables were employed in determining the factors affecting household involvement in agriculture. Among the nine explanatory variables fitted in the model, seven have a significant effect on household agricultural involvement. These variables include; i.e., access to market, landownership, gender, education level, household head age, and household size. All the explanatory variables had the expected signs with the exception of social grants.

Table 6: The logistic regression results of socio-economic factors affecting household agriculture involvement

Variables	B	S.E.	Wald	Sig.	Exp(B)
Market access	4.836	0.883	30.014	0.080*	125.982
Land ownership	2.184	0.587	13.852	0.053*	8.881
Social grants	-0.818	0.67	1.488	0.222	0.441
Gender	1.048	0.588	3.178	0.075*	2.851

Total non-farm income	0.056	0.034	0.32	0.571	1.023
Farm size	1.071	0.178	36.384	0.001***	2.919
Education Level	0.609	0.209	8.446	0.004***	1.838
Age	0.036	0.021	2.955	0.086*	1.037
Household Size	0.416	0.143	8.469	0.004***	1.516
Constant	-5.776	1.84	9.855	0.002	0.003
Model Summary					
-2 Log likelihood	103.122				
Significance level	0.015				

Notes: ***, ** and * indicates significance at 1%, 5% and 10%. S.E=Standard Error, Sig.= Significant level.

4.4.1 Access to market

The dummy variable has a positive statistically significant ($p < 0.1$) relationship with the dependent variable. The sign of market access coefficient complied with a priori expectation. The odds ratio in favour of household agricultural involvement increases by the factor 125.982 as output market access increased by one. The access to output market plays a significant role in a farmer's decision to participate in agriculture. It encourages them to expand and diversify their production and thus increasing their farm income. Thus, markets are very important in reducing poverty and improving livelihoods of households (Jari and Fraser, 2009). According to Senyolo *et al.* (2009) smallholder farmers can be amongst other targets developed through having access to and usage of output markets. Failure thereof could prevent them from transiting into commercial farming thereby restricting them from participating in contribution towards economic growth.

4.4.2 Land ownership

The results show that land ownership was positive and statistically significant ($p < 0.1$). The odds ratio in favour of household agricultural involvement increases by the factor 8.881 as landownership increased by one. Ownership of land determines the level of production of a farm household. Further, ownership of land will have impediments to increased production for

especially households who do not inherit land and have little or no money to acquire land (Ghonemy, 1998). Agriculture participation could increase among farmers that gain land, while it is likely to decrease among farmers that lose land. Lerman (2005) showed that an increase of farm size could encourage farmers to expand their production and thus lead to higher household incomes and greater readiness to engage in sale of the farm products.

4.4.3 Gender

This variable is positive and statistically significant ($p < 0.10$) with the dependent variable. The results indicate that a female-headed household has a higher chance of being involved in agriculture as compared to a male-headed household, *ceteris paribus*. The probabilities of agriculture involvement increase if a household is headed by female as compared to a household headed by a male.

The results are in line with Thamaga-Chitja (2012) findings, where she found that women are responsible for almost all the production activities in farming. FAO (2002) cited in Thamaga-Chitja (2012) indicates women execute most of production activities due to their traditional and cultural roles. They make essential contributions to agriculture and rural enterprises across the developing world.

4.4.4 Education status of household head

This variable was positive and statistically significant ($p < 0.05$). This implies that household with educated heads are more likely to be involved in agriculture than one with uneducated household heads. The need for education in agricultural production is very important and cannot be over emphasized. Education would assist the farmers to accept and test innovations available at their disposal and it would also enhance the ability to make informed and accurate decisions on management of the farm (Adebayo, 2010).

4.4.5 Age of household head

Age of household head is statistically significant ($p < 0.1$) in explaining agriculture involvement. The positive sign of the coefficient indicated that an increase in age leads to an increase in the probability of a household to be involved in agriculture. Hofferth (2003) added that older

household heads have relatively richer experiences of the social and physical environments as well as greater experience of farming activities than young household heads. Adubi (1992) cited in Manza and Atala (2014) showed that age in correlation with farming experience, has a significant influence on the decision making process of farmers with respect to risk aversion, adoption of improved agricultural technologies, and other production related decisions.

4.4.7 Household size

The results showed a positive statistically significant ($p < 0.05$) relationship between household size and agriculture involvement. The odds ratio in favour of household agricultural involvement increases by the factor 1.037 as household size increased by one. The size of the household determines the availability of labour for farm production, the total area cultivated to different crop enterprises, the amount of farm produce retained for domestic consumption, and the marketable surplus (Manza and Atala, 2014). Literature indicates that the engagement of majority of the family members on the farm can increase the possibility of the household to being food secure (Ogunmefun and Achike, 2015).

4.5 The contribution of smallholder agriculture to household food security

Table 7 provides the parameter estimates for the Tobit model. The Tobit model was employed to assess the contribution of smallholder agriculture to household food security in the study area. This model seeks to measure the contribution of each eleven identified independent variables to the household food security. The signs of the coefficients of the independent variables and significance of the independent variables were employed in determining mainly the impact of each variable on the probability of food security status among the smallholder farmers.

The overall measure of goodness of fit model is given by the R^2 value. In model, R^2 value is 0.56. This is an indication that 56% of the variation in contribution of agriculture on household food security is explained by selected eleven explanatory variables in Table 8. Among the eleven variables considered in the model, six had a significant impact on household food security. They included age of the household head, non-farm income, social grants, access to

market, agriculture involvement and livestock ownership. All the explanatory variables had the expected signs with the exception of farm size and agriculture involvement.

4.5.1 Age of the household head

The results showed a positive statistically significant relationship between the age of the household head and household food security. The age of the head had a significant relationship with the response variable at 5% level. This indicates that an increase in age of household head with one year increases the chances of household becoming food secure by 0.029. The possible explanation for such positive association is that an older household head devotes his/her time on farming activities compared to young household head. Young people spend much time in towns and prefer urban life than the rural for a number of reasons (Beyene and Muche, 2010). Moreover, as age increases, one can acquire more knowledge and experience becoming effective in exploiting these experiences. The findings of this study are in line with Onianwa and Wheelock (2006) findings, where they found that an increase in the age of the household age reduces the chances of them becoming food insecure by 2%.

4.5.2 Agriculture involvement

The results showed a negative relationship between agriculture involvement and household food security. The sign of coefficient of the agriculture involvement did not comply with a prior expectation but it is statistical significant at 10% level. The inverse relationship between agriculture involvement and the household food security might be due to the fact that majority of households in the study area produced food from small plots resulting in low production that are unable to sustain them with adequate food supply. Better off households sold most of their produce only for them to purchase food including staples further exposing even the better off households to market related shocks. These results suggest that agricultural production alone is not enough to propel households out of poverty and food insecurity. Hence, it needs to be complemented with other livelihood strategies.

Table 7: Tobit regression results of the factors contributing to food security

Food security	Coef.	Std. Err.	t	P>t
Marital Status	0.022	0.341	0.07	0.948
Household Size	0.029	0.062	0.47	0.638

Age	0.029	0.014	2.02	0.045**
Market access	-1.014	0.323	3.14	0.002***
Education				
Primary level	-0.656	0.653	-1.01	0.316
Secondary level	0.173	0.444	0.39	0.696
Matric	0.175	0.528	0.33	0.74
Tertiary	0.182	0.575	0.32	0.752
Gender	-0.541	0.373	-1.45	0.15
Agriculture involvement	-0.825	0.467	-1.77	0.079*
Social grant	0.776	0.379	2.04	0.043**
Livestock ownership	0.750	0.390	1.92	0.056*
Farm size	-0.104	0.111	-0.94	0.351
Total nonfarm income	0.098	0.052	1.86	0.064*
Constant	1.489	1.304	1.14	0.255

Notes: *, ** and * indicates significance at 1%, 5% and 10%. Coef. = coefficient, Std.Err.=Standard Error**

4.5.3 Market access

Market access for farmers to sell their produce plays a vital role in household food access through generation of income. The dummy variable is found to have a negative relationship with the dependent variable. The sign of coefficient of the market access did not comply with a priori expectation and it is statistical significant at 1% level. The inverse relationship between market access and household food security might be due to the negative impact of market forces from the demand and supply side affecting household food availability. Smallholder farmers have poor or no storage facilities, and thus they experience losses to damage due to their lack of appropriate storage facilities (Mazibuko and Oladele, 2012). Smallholder farmers' inability to access storage facilities often forces them to sell at peak times when prices are low (Ghura and Leita, 2000). Mazibuko and Oladele (2012) argue that efficient and effective storage of farm produce plays an important role in the attainment of food security by stabilising food supply at the household level.

Another reason for the negative market access may be due to fact that most people have become deficit producer of food due to unreliability or little income they derive from smallholder

agriculture. Households derived less than 10% of income from smallholder agriculture (Stats SA, 2014).

4.5.4 Social grants

Social grants had a positive and significant relationship with food security at the 5% significant level, implying that the probability of food security increases with increase in the number of people receiving grants in the household. Samson *et al.* (2008) indicate that social grants have a positive impact on food security, as they increase monthly food consumption expenditures amongst social grant recipients. Van der Berg *et al.* (2010) also reported that social grants has improved food accessibility and availability among beneficiaries and has most importantly reduced both child and adult hunger in households where social grants are injected . Gutura and Tanga (2014) found that an extra R1140 received by a household in old-age pension increases food consumption expenditures by at least 24%. An extra R1000 in other types of social grants increases food expenditures and home consumption by approximately 25%.

Social grants are a central component of government's efforts to alleviate poverty and addressing problem of hunger (Ndlovu *et al.*, 2014). The number of people receiving social grants has significantly increased in recent years from 10.9 million in 2005 to almost 15.7 million in 2013 (Ndlovu *et al.*, 2014).

Edmonds *et al.* (2006) and Surender *et al.* (2007) believe that social grants can promote employment through accumulation of human capital and enhancing productivity of poor household in the long run. However, Ranchord (2006) and Klasen and Woolard (2009) reported that social grants have possible disincentive effects on labour market activity through the relaxing of household budget constraints which may lead to a reduction in labour supply.

4.5.5 Livestock ownership

Most households in the rural communities accumulate their wealth in terms of livestock. The livestock ownership in the study had a positive and significant relationship with food security at the 5% significant level. The results imply that households with large livestock are less vulnerable insecurity. A unit increment in the TLU will increase food security by 0.75. The findings of this study are in line with Bashir *et al.* (2012) findings which found that an increase

in small livestock increases the chances of a household to become food secure by 31% in the rural Pakistan.

4.5.6 Non-farm income

Non-farm income was a relevant factor of food security among the households. The Tobit model showed a positive significant relationship between non-farm income and household food security. This variable was significant at 10% level. These findings suggest that households that derive most of their livelihoods from non-farm income are likely to be food secure than the households that are solely dependent on agriculture for survival. Off-farm income generating activities have a paramount significance to diversify the sources of farm households' livelihoods. The activities enable farmers to modernise their production by giving opportunities to reduce the risks of food shortage during periods of increase production and food availability at the households level (Aidoo *et al.*, 2013). Further, off-farm income is also invested in agriculture to increase production and food availability at the household level.

Fraser *et al.* (2003) on their analysis of rural household in Asia and Africa found that households derive a significant proportion of their livelihoods from non-farm activities and the income derived from these activities represents a substantial share. Machete (2004) reported that income from non-farm account for 60% in Limpopo, South Africa, between 40-50% in Latin America (Sanchez, 2005), 35-50% of rural household income in SSA (Reardon, 1997).

4.5.7 Summary

In this chapter, study results and discussion of the findings were presented. The socio-economic characteristics of respondents of the study were discussed comparing farmers and non-farmers. A further investigation was carried out using chi-square and t-test to determine whether the differences in levels of these variables were statistically significant or not. Out of nine variables analysed against household agricultural involvement, only seven were statistically significant. The socio-economic factors affecting the household involvement in agriculture and food security were also discussed. Findings from this study are consistent with the findings of several related studies on the factors affecting household agriculture involvement.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The study sought to assess the contribution of smallholder agriculture to household food security. This chapter provides an overall summary of the research and draws conclusions on the basis of the research findings. Lastly the chapter generates recommendations on the basis of the research findings.

5.1 Research summary

Rural households are generally more vulnerable to food insecurity and hunger. About 40% of South Africa's underprivileged population reside in rural areas and its members are dependent, either directly or indirectly, on land for their livelihoods. Farming is widely viewed as an activity that could improve food security mainly in developing countries where the majority of farmers are smallholders. A vibrant agricultural sector is important for economic growth of developing countries.

Smallholder agriculture contributes in an indispensable and strategic way to food and nutrition security at a global level. The contribution of smallholder agriculture to food security has to be examined in relation to the four dimensions of food security, namely; availability, access, utilization and stability. Smallholder farmers can play a key role in improving dietary patterns with their production, both for themselves and other populations. Furthermore, smallholder agriculture can improve the nutritional status of households when production generates substantial monetary income, or when it enables a substantial reduction in household food expenditure.

The main purpose of this study is to assess the contribution of smallholder agriculture and map out to characterise the socio-economic factors affecting the household food security.

The specific objectives of the study are:

- To assess the food security status of households in Sekhukhune district.
- To determine the socio-economic factors that affect the food security status and agriculture involvement of the households in Sekhukhune community;
- To assess the role of smallholder agriculture to household food security;

Data collection was through a random sample of 175 respondents in five localities in Sekhukhune district. A structured questionnaire was administered through face-to-face interviews. To analyse data, descriptive statistics were used together with the logistic and Tobit regression model. The main descriptive statistics were analysed using Chi-square, and t-test. The logistic regression model was used to estimate the socio economic factors affecting the household involvement in agriculture. While the Tobit model used to estimate the determinants of household food security. An understanding of major determinants of food security at household level is important for designing appropriate interventions that ensure food security for food insecure households.

The descriptive statistics suggested that more female-headed households (44%) were involved in farming than male-headed households (25%). The results further revealed that education was not a major constraint in the study area as 59.3% of the farmers and 46% of non-farmers had acquired secondary education.

The logistic regression results suggest that market access, land ownership, gender, education, age and household size had statistically significant effects on household involvement in agriculture. The odds ratio in favour of household agricultural involvement increases by a factor of 125.982 for farmers without market access. The access to output market plays a significant role in farmer's decision to participate in agriculture. Land ownership also had a positive statistically significant relationship with agriculture involvement. Secure land tenure and an increase in farm size could encourage farmers to expand their agricultural production and thus leads to higher household incomes. The logistic results also showed that female-headed households were more likely to be involved in farming than male-headed ones. Households headed by the educated were more likely to be involved in agriculture than those with uneducated household heads. Age of the household head and household size also had a positive and statistically significant effect on the agriculture involvement. Larger households were more likely to be involved in agriculture to supplement their foods.

The Household Dietary Diversity Score was used to classify households either into food secure or insecure categories. According to the score classification, about 54.9% households were food secure while 45.1% were food insecure. A higher percentage of households practising agriculture were food secure (62%) compared to non-farming households (50%).

The results of the Tobit Model regression may have important implications as it indicates that age, non-farm income, social grants, access to market, agriculture involvement and livestock

ownership had statistically significant impacts on household food security. A one year increase in age of household head increases the chances of household becoming food secure by 0.029. Older household heads are expected to be wealthier, experienced and food secure than younger heads.

The social grants contribute positively to household food security. The amount of social grants increases with increase in the number of people receiving grants in the household. Indications are that the safety net provided through social grants cushions households against severe conundrums related to access to food thereby relieving many households from the debilitating poverty line. However, grants may have an unintended disincentive which could discourage households from making use of available land to augment household food production.

A negative relationship existed between household involvement in agriculture and access to food. This could be attributed to lack of resources such as land. It was observed that the majority of households in the study area produced food from small plots resulting in low production that cannot sustain them with adequate food supply. Further, a negative relationship could also be because most producers have become net food purchasers. Access to market also had a negative relationship with the household food security. This could be due to limited or no access to market.

Livestock contributes to food security status in various ways. Livestock also serve as savings of assets and used for curbing food insecurity problems during periods of food shortages. Households with large volumes of livestock are more likely to be food secure than those with smaller herds. Most households in the study derived a significant proportion of their livelihoods from non-farm activities and the income derived from these activities represents a substantial share. Non-farm income contributes significantly to household food security.

5.2 Conclusions

Households adopt diverse livelihood strategies to maintain food security, including food production, local employment and reliance on social security benefits and local support system. Social security grants are a source of livelihood for many rural households, regardless of their involvement in agriculture. Many producers in rural areas are net consumers of food and are vulnerable to food insecurity. Even though some households grow food, they lack resources to meet all their needs. The production levels of smallholder farmers are critically low and

incapable of addressing the food security on their own. The smallholder agricultural sector is faced with various constraints that hinder their growth and ability to effectively contribute to food security. The constraints identified include lack of access to land, poor physical and institutional infrastructure, lack of a reliable market, inconsistency in production, poor technological skills, and lack of bargaining power.

The study revealed that declining agricultural performance is a major driving force behind growing poverty and food insecurity among smallholder farming populations. Recovery of agriculture could offer positive prospects for rural populations to escape poverty and food insecurity.

Several efforts have been made towards resourcing smallholder farmers across South Africa, with an aim of increasing their production and thus eradicating poverty and also alleviating food security. However, this has resulted in little or no progress in agriculture employment and food security as quite a number of people unfortunately still go to bed hungry. The study concludes that smallholder agricultural production alone is not enough to propel households out of poverty and food insecurity. Other livelihood strategies are required to complement smallholder agriculture. The study concludes that the agricultural programs can be more effective when combined with social protection and other measures that can increase the household income, and thus household food security.

5.3 Recommendations

It would be crucial to reflect on possible options to bolster agricultural contribution to food security and flag the relevance of the sector. The agricultural sector can explore the following recommendations:

- Improvement of agricultural producer support services to incentivize farmers and to address identified constraints such as the costs of agricultural inputs.
- Improve access to infrastructure, resources and market to enhance productivity. Improved access to markets will lead to improved farmer's livelihoods, and can encourage households to produce more food and more sustainably.
- Evidence showed that many households in the country are increasingly reliant on purchased food. This is yet another serious area that requires both short and long term solutions as food prices continue to increase affecting the affordability of food items

for poor households who currently spend high proportions of their income on food. Therefore, creation of non-farm activities to supplement farm income is recommended in order to alleviate food insecurity.

- This study further recommends improved extension services to improve the involvement of rural households in agriculture.
- There is a need for upgrading South Africa's food security coordination, analysis and programming structures to enable government and other stakeholders to deliver focused and well-targeted support through initiatives aimed at curbing the food and nutrition insecurity challenges in the country.

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ANNEXURE A

Food Security: Household survey questionnaire

Date: _____

Purpose of the questionnaire is to collect data that would help the contribution of smallholder agriculture to rural household food security in Sekhukhune District of Limpopo province.

The information provided in the questionnaire will remain confidential, and will only be used for research purposes.

SECTION A: HOUSEHOLD GENERAL DEMOGRAPHICS

Name of Respondent:

House number: _____

Q1. What is the name of the household head?

Q2. What is the identity number of the household head?

Q3. How many members are there in a household (fulltime members of the house)

Q4. What is the gender of the household head?

Male Female

Q6. What is the age of the household head?

Q8. What is the marital Status of the household head?

1 – Single

2 – Married

3 – Living together

4 – Divorced

5 – Separated

6 – Widowed

Q11. What is the highest level of education that the household head has successfully completed?

- 1 – No schooling
- 2 – Primary schooling
- 3 – Secondary schooling
- 4 – Matric
- 5 – Tertiary schooling

Section 2: General Household Livelihoods

Sub section 2.1 Income and Economic Activities

Q1. What is the employment status of the household head?

- 1 – Formally employed
- 2 – Employed (informal sector)
- 3 – Self-employed (entrepreneurs)
- 4 – Unemployed (active)
- 5 – Unemployed (inactive)

Q2. Off-farm Activities engaged in by household head?

1. Petty trading
2. Office work
3. Crafts
4. Domestic work
5. Mining
6. None

Q3. Which of the following is the household head source of income?

- 1 – Salary (formal employment)
- 2 – Wage (informal employment)
- 3 – Social safety nets (government grant)
- 4 – Farm income
- 5 – Business income (Revenue /profit) 2
- 6_ Remmitances

7_Other specify

Q4.How many members of the household receives any of the following social safety nets

- 1 – Old age
- 2 – Disability grant
- 3 – Child support
- 4 – Care dependency
- 5 – Foster child
- 6_War veterans

Q5. What is the household total monthly income_____?

- 1 – R1-500
- 2 – R550-1000
- 3 –R1050-2000
- 4 – R2050-3000
- 5 –R3050-4000
- 6_R4050-5000
- 7_R5050+

Q6. How much is the household total monthly expenditure_____?

- 1 – R1-500
- 2 – R550-1000
- 3 –R1050-2000
- 4 – R2050-3000
- 5 –R3050-4000
- 6_R4050-5000
- 7_R5050+

Q7. How much does the household spend monthly on food?_____

- 1 – R1-500
- 2 – R550-1000
- 3 –R1050-2000
- 4 – R2050-3000
- 5 –R3050-4000
- 6_R4050-5000
- 7_R5050+

Q8. How much does the household receives from the following sources of income that contribute to the household's total monthly income (**Please tick the appropriate box**)

Income sources	Salary	Wage	Social safety nets	Farm income	Business income	Remittances
1 – R1-500						
2 – R550-1000						
3 –R1050-2000						
4 – R2050-3000						
5 –R3050-4000						
6 - R4050-5000						
7 – R5050 +						

Sub-section 2B: Livelihoods and Agriculture

Q9. Does the household practice any kind agricultural production (e.g. livestock, crops, poultry, food gardening, forestry, fish, etc.)

1 = Yes

2 = No

Q10. What kind of food production/agricultural activities is the household involved in? *Read all*

the options

01 = Livestock production (cattle, goats, sheep, pigs, etc.)

02 = Poultry production (chickens, ducks, geese, guinea fowl, etc.)

03 = Grains and food crops (maize, wheat, beans, sorghum, millet, Groundnuts etc.)

04 = Industrial crops (e.g. tea, coffee, cotton, sugar, tobacco)

05 = Fruit production

06 = Vegetable production

07 = Fodder, grazing/pasture or grass for animals

08 = Fish farming/aquaculture

- 09 = Forestry
- 10 = Game farming
- 11 = Other

Q11. What are the household's reasons for agricultural production (grow farm produce or keep livestock for the household)?

- 1 = As a main source of food for the household
- 2 = As the main source of income/earning a living
- 3 = As an extra source of income
- 4 = As an extra source of food for the household
- 5 = As a leisure activity or hobby e.g. gardening

Q12. Does the household sell any of its produce or livestock?

- 1 = Yes
- 2 = No

Q13. If produce is sold, in which of the following does the household sell their produce?

Read all the options

- 1 = Local buyers from this district
- 2 = Buyers from neighboring cities and towns
- 3 = Formal markets in South Africa
- 4 = Export agencies in international buyers.
- 5 = Other

Q14. Do you store any foods for later use?

- 1=yes
- 2=no

If yes, what foods? _____

Q15. Did the household receive any of the following kinds of agricultural related assistance from the government ?*Read all the options*

- 1 = Training
- 2 = Extension services/advice
- 3 = Grants (money /Inputs that does not have to be paid back)
- 4 = Loans (money /Inputs that has to be paid back)
- 5 = veterinarian service(Dipping and vaccination services for livestock)

8 = Other (specify)

Q16. Did your household receive agriculture-related assistance from any other entity than government?

1 = Yes

2 = No

Q17. Where does the household practice its crop planting activities? Read all the options

1 = Farm land (communal or private)

2 = Backyard garden (can include, vegetables, fruits, grains)

3 = School garden (can include, vegetables, fruits, grains)

4 = Communal land (more than one household involved)

5 = On the verges of roads and unused public/municipal land

6 = Other

Q18. Approximately how big is the land that the household uses for production? Estimate total area

1 = Less than 500m² (approximately one soccer field)

2 = 500m² to 9 999m² (between one soccer field and one hectare)

3 = 1 but less than 2 hectares

4 = 2 but less than 5 hectares

5 = 5 but less than 10 hectares

6 = 10 but less than 20 hectares

7 = 20 or more hectares

Q19. On what basis does this household have access to the land used for crop production? If more than one kind of tenure system applies for different pieces of land, give an answer for the biggest piece.

1 = Owns the land

2 = Rents the land

3 = Sharecropping

4 = Tribal authority

5 = State land

6 = Other (specify)

Q20. How many of the following does the household own?

1 = Cattle for food or investment

2 = Donkeys and mules

3 = Sheep

4 = Goats

5 = Pigs

6 = Poultry

Sub-Section 1: HOUSEHOLD FOOD SECURITY

Q22. Please describe the foods (meals and snacks) that **any household** eaten yesterday during the day and night, at home **not** outside of the home

Question Number	Food Group	Examples	Yes = 1 No = 0
A.	cereals	bread, noodles, biscuits, cookies foods made from millet, sorghum, + insert local foods e.g. ugali, nshima, porridge or pastes or other locally available grains	
B.	Vitamin a rich vegetables and tubers	pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside + other locally available vitamin-A rich vegetables	
C.	White tubers and roots	White potatoes, white yams, cassava, or foods made from roots.	
D.	Dark green leafy Vegetables	Sweet pepper, dark green/leafy vegetables, including wild ones + locally available vitamin-A rich leaves such as cassava leaves etc.	
E.	Other vegetables	including wild vegetables	
F.	Vitamin a rich fruits	Ripe mangoes, papayas, other locally available vitamin A-rich fruits	
G.	The fruits	other fruits, including wild fruits	
H.	Meat	beef, pork, lamb, goat, rabbit, wild game, chicken, duck, or other birds, liver, kidney, heart or other organ meats or blood-based foods	
I.	Eggs	And fresh or dried fish or shellfish	
J.	Legumes, nuts and seeds	beans, peas, lentils, nuts, seeds or foods made from these	
K.	Milk and milk products	milk, cheese, yogurt or other milk products	
L.	Oils and fats	oil, fats or butter added to food or used for cooking	
M.	Sweets	sugar, honey, sweetened soda or sugary foods such as chocolates, sweets or candies	
N.	Spices and caffeine or alcoholic beverages	spices, coffee, tea, alcoholic beverages or local examples	
O.	P. Other	Did the household eat anything outside of the home	



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28 July 2015

Dear Dr Mudhara;

RE: PERMISSION FOR USE OF DATA

I hereby inform you that Ms Lungile Mvelase have been granted permission to use the Livelihoods, Food and Nutrition Security Baseline Assessment data collected in the four (4) livelihood zones in Limpopo, February – March 2015. Permission is granted expressly for use in her Masters Dissertation project titled, “**Assessment of the contribution of smallholder agriculture to rural household food security in Sekhukhune District of Limpopo Province**”.

The data remains the property of the South African Vulnerability Assessment Committee (SAVAC) as the originator and users are expected to respect the intellectual property rights of the SAVAC. It is therefore expected that analysis and insights emanating from the use of this data will be shared with the SAVAC Chair.

Should you have any questions, please feel free to contact me.

Yours Sincerely,

Mr M. Mamadi

Director: Subsistence Farming & SAVAC Chairperson