AN INVESTIGATION ON THE ROLE OF FOOD GARDENS TO FOOD SECURITY AND COMMUNITY DEVELOPMENT IN THULAMELA MUNICIPALITY

By

PFANANI CHARLOTTE KWINDA

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DECLARATION

Name: Pfanani Charlotte Kwinda

Student number: [0728-720-8]

Degree: PhD in Agriculture

AN INVESTIGATION ON THE ROLE OF FOOD GARDENS TO FOOD SECURITY AND COMMUNITY DEVELOPMENT IN THULAMELA MUNICIPALITY

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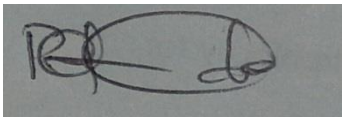

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DEDICATION

I dedicate this thesis to my family whose support, encouragement and confidence in me has given me the reason and courage to finish this work. I dedicate this work and give special words of gratitude to my children Vele, Ramudzuli and Phuluso and my grandson Lwenzhe who in their big and small ways have been my greatest motivation and best cheer leaders. Further, i want to dedicate this work to my supervisor Dr M. R. Masekoameng, who encourages me to finish my work and never gave up on me. Above all, i dedicate this thesis to the Almighty God for the strength, courage, patience, wisdom, time, guidance and perseverance in realising this work.

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ABSTRACT

This study was conducted in the Thulamela Municipality, Vhembe District of Limpopo Province, South Africa. The study area is characterised by poverty-stricken rural households. A high proportion of households relied on agriculture to supplement food for their families. The main objective of the study was to investigate the role and contribution of food gardens to food security and community development. Prior studies elsewhere and experiences of developing countries recognised the positive impacts of food gardens in providing food security, household economic welfare and rural development. A longitudinal study was undertaken to collect data from a sample of 383 households and 82 focus groups individuals selected through purposive and snowball sampling. Qualitative and quantitative research methods were used to collect data using interview questionnaires, observation checklists, a 24-hour food recall, a food frequency questionnaire, and a focus-group checklist. Data were gathered on socio-demographics; the role and contribution of food gardens to food security, household income and community development; challenges to food gardening and strategies for sustainable year-round availability of food. The Statistical Package for Social Science Version 23.0 was used to analyse quantitative data while the content of qualitative data was analysed to develop themes. Inferential statistics was done to determine the significance of the findings through correlation testing and regression analysis.

The findings revealed that 56% of food gardeners were men, with people of different age groups, educational background, training and experiences in food gardening. Almost all (99.7%) participants had food gardens, which allowed them access to food for consumption and selling. Food gardens enabled households to spend less money on food. Income earned by selling garden produces helped to buy uncultivated food stuff and other basic necessities. Different kinds of garden produces were available in different seasons, which allowed households to access food throughout the year. Indigenous vegetables were also utilised. Food gardens played a major role and contributed significantly to food security and community development. Moreover, food gardens promoted avenues for job creation, self-employment and self-reliance. Challenges to food gardening were addressed to ensure a sustainable year-round supply of food. The study provided a framework for understanding the relationship between food gardening and food security.

Key words: food security, community development, food garden, household income, food availability, food accessibility, food utilisation, food stability, household food security, food insecurity

Ngudo iyi yo itwa kha Masipala wa Thulamela, Tshiṱirikini tsha Vhembe kha Vundu ḽa Limpopo, Afrika Tshipembe. Sia ḽa ngudo ḽo ṱalulwa nga miṱa ya mahayani i re na vhushai. Tshipiḓa tshihulwane tsha miṱa tsho ḓisendeka nga zwa vhulimi u tikedza zwiḽiwa zwa miṱa yavho. Tshipikwa tshihulwane tsha ngudo ho vha u ṱoḓisisa mushumo na u dzhenelela ha ngade dza miroho kha tsireledzo ya zwiḽiwa na mveledziso ya tshitshavha. Ngudo dzo rangelaho idzi huṅwe na tshenzhemo dza mashango ane a khou bvelela dzo dzhiela nṱha masiandaitwa mavhuya a ngade dza zwiḽiwa kha u ṋekedza tsireledzo ya zwiḽiwa, mutakalo wa ikonomi ya muṱa na mveledziso ya vhupo ha mahayani. Ngudo buḓa dzo itwa u itela u kuvhanganya data u bva kha miṱa ya 383 na zwigwada zwo sedzwaho zwa vhathu vha 82 vho nangiwaho nga kha tsumbonanguludzwa dzi re na ndivho na u vhudzisa vhaṅwe vhathu vha re kha ṱhoḓisiso. Ngona dza ṱhoḓisiso khwaḽithethivi na khwanthithethivi dzo shumiswa u kuvhanganya data nga u shumisa mbudzisombekanywa dza inthaviwu, mutevhe wa mbudziso dza mbono, u elelwa zwiḽiwa zwo liwaho kha awara dza 24, mbudzisombekanywa dza misi yoṱhe dza nga ha zwiḽiwa, na mutevhe wa tsedzuluso wa tshigwada tsho sedzwaho. Data yo kuvhanganywa kha demogirafi ya matshilisano, mushumo na u dzhenelela ha ngade dza zwiḽiwa kha tsireledzo ya zwiḽiwa, mbuelo ya miṱa na mveledziso ya tshitshavha; khaedu dza ngade dza zwiḽiwa na zwiṱirathedzhi zwa u wana zwiḽiwa ṅwaha woṱhe zwi sa nyeṱhi. Tshiputelo tsha mbalombalo tsha Saintsi dza Matshilisano Vesheni ya vhu 23.0 yo shumiswa u saukanya data ya khwanthithethivi, ngeno zwire ngomu zwa data ya khwaḽithethivi zwo saukanywa u bveledza thero. Mbalombalo khumbulelwa yo itwa u itela u vhona ndeme ya mawanwa nga kha u linga u elana na musaukanyo wa khumela murahu.

Mawanwa o dzumbulula uri 56% ya vhoradzingade dza zwiḽiwa vho vha vhe vhanna, hu na vhathu vha vhukale ho fhambanaho, vhubvo ha pfunzo, vhugudisi na tshenzhemo kha ngade dza zwiḽiwa. Vhadzheneli vhane vha ita mbaloguṱe (99.7%) vho vha vhe na dzingade dza zwiḽiwa dzine dza vha konisa u swikelela zwiḽiwa u itela u ḽa na u rengisa. Ngade dza zwiḽiwa dzo konisa miṱa u shumisa tshelede ṱhukhu kha zwiḽiwa. Mbuelo yo wanalaho nga u rengisa zwibveledzwa zwa ngadeni yo thusa u renga zwiḽiwa zwine zwa sa tou limiwa na zwiṅwe zwithu zwa ndeme. Tshaka dzo fhambanaho dza zwibveledzwa zwa ngadeni dzo vha dzi hone nga khalaṅwaha dzo fhambanaho, zwe zwa konisa miṱa u swikelela zwiḽiwa ṅwaha woṱhe. Miroho ya vhongwaniwapo na yone yo shumiswa. Ngade dza zwiḽiwa dzo shuma mushumo muhulwane na u dzhenelela zwihulwane kha tsireledzo ya zwiḽiwa na mveledziso ya tshitshavha. Zwiṅwe hafhu, ngade dza zwiḽiwa dzo bveledza nḓila dza u sika mishumo, u ḓishuma na u ḓisendeka nga iwe muṋe. Khaedu dza ngade dza zwiḽiwa dzo tandululwa u itela u khwaṯhisedza nḓisedzo ya zwiḽiwa i sa nyeṱhi ṅwaha woṱhe. Ngudo dzo ṋekedza muhangarambo wa u pfesesa vhushaka vhukati ha u ita ngade dza zwiḽiwa na tsireledzo ya zwiḽiwa.

Maipfi a ndeme: tsireledzo ya zwiḽiwa, mveledziso ya tshitshavha, ngade ya zwiḽiwa, mbuelo ya muṱa, u vha hone ha zwiḽiwa, u swikelelea ha zwiḽiwa, tshumiso ya zwiḽiwa, vhudziki ha zwiḽiwa, tsireledzo ya zwiḽiwa muṱani, u shaya tsireledzo ya zwiḽiwa

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LIST OF ABBREVIATIONS

FAO	Food and Agriculture Organisation
FFQ	Food Frequency Questionnaire
STATS SA	Statistics South Africa
UNISA	University of South Africa
IDP	Integrated Development Plan
USDA	United State Department of Agriculture
IFAD	International Fund for Agricultural Developments
CBPs	Capacity Building Programmes

CHAPTER 1

INTRODUCTION

This chapter focuses on the background and justification of the study. It introduces the research problem, the aim and objectives of the study, the hypotheses, the research questions that this study intended to answer, as well as the study limitations. This chapter also presents the theoretical framework of the study and the definitions of key terms and concepts which relate to this study.

1.1. Background

Food security is when a person is able to obtain a sufficient amount of healthy food on a daily basis (FAO, 2010, 2014; Fahy, 2021). When people lack regular access to adequate food because of limited money or other resources, they experience food insecurity, which leads to health and nutrition issues. Food inadequacy is a global crisis and millions of people around the world are unable to afford the cost of a healthy diet (Hallberg, 2009; Abdu-Raheem & Worth, 2011; Labadarios, Mchiza, Steyn, Maunder, Gericke, Davids & Parker, 2011; Earl, 2011; FAO, 2021). The issue of food inadequacy is high amongst the African population and rural areas of the developing countries (Abdu-Raheem & Worth, 2011; du Toit, Ramunyai, Lubbe & Ntutshelo, 2011**;** Jowell, 2011; De Cock, D'Haese, Vink, van Rooyen, Staelens, Schonfeldt & D'Haese, 2013).

Many South African communities and households have inadequate to severe inadequate access to food which mostly affects poor households in rural areas and households with many children (du Toit, *et al.,* 2011**;** Jowell, 2011; De Cock, *et al.,* 2013). In South Africa many people remain vulnerable to inadequate access to food and their food security status continue to deteriorate resulting in the rise in the numbers of those who are affected (Hallberg, 2009; Labadarios, *et al.,* 2011; Earl, 2011; Stats SA, 2019; Roser & Ritchie, 2019; Oguttu, Mbombo-Dweba & Ncayiyana, 2021; IPC, 2021).

All people should have access to nutritious and sufficient food all year round (Loewe & Rippin, 2015). To attain this it is important to have a food-based rural centered approach

focusing on access to food and overall food availability and it should adequately address the utilisation of food and stability of food security (Loewe & Rippin, 2015). According to Maccarthy (2021), food security can only be attained if there is reliable and consistent access to food. As a result, there is a need to ensure household food security, and this could be attained through developing strategies that would help communities and households to achieve food security (Earl, 2011).

Agriculture is regarded as a strong option and a central element for enhancing food security (Byerlee, De Janvry, Sadoulet, Townsend & Klytchnikova 2007; FAO, 2015; Loewe & Rippin, 2015; Pawlak & Kolodziejczak, 2020; FAO, 2021). According to Pawlak and Kolodziejczak (2020), agriculture plays a strategic role in improving the availability of food and achieving food security. Food production has a positive impact on the food security status of poor households and it can lead to important gains in hunger and poverty reduction (FAO, 2015; Pawlak & Kolodziejczak, 2020). According to Galhena, Freed and Maredia, (2013), home gardens are an auspicious approach to improve household food security and wellbeing. Promoting sustainable food production systems and agriculture is therefore very crucial in order to maintain food security (Maccarthy, 2021).

Food production on small plots adjacent to human settlement is the oldest and most enduring form of cultivation (Galhena *et al.*, 2013). In their different names such as home, mixed, combined, backyard, kitchen, farmyard, school, compound, homestead or small-patch gardens, food gardens are found in many countries worldwide and they have an intrinsic economical and nutritious benefits (FAO, 2011; Jowell, 2011; Oguttu, Mbombo-Dweba & Ncayiyana, 2021). According to Galhena *et al.*, (2013), home gardens are recognized as an important supplemental source contributing to food and nutritional security and livelihoods. In developing countries, home gardens are usually established to increase household production of fruit and vegetables to supplement the cereal-based diet of rural households. These gardens supplement the diet with vitamin rich vegetables and fruits as well as energy rich vegetable staples and thus contributing to food security (FAO, 2010, 2011; Njuguna, 2013). Food gardens are therefore regarded as successful contributor to food security and alleviators of hunger over the years (Earl, 2011; FAO, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021).

Home gardens can contribute to household food security by providing direct access to food that can be harvested, prepared and fed to the family members regularly on daily basis (FAO, 2010). These gardens can be an effective approach to ensuring food security in terms of quantity and dietary quality. This applies even to the landless or near landless that practice gardening on small patches of homestead land, vacant lots, roadside and edges of a field or in containers (Njuguna, 2013).

Another recommended innovative and effective approach to address food security is the school gardening project. Food security is cited as the most important issue in school gardens (FAO, 2010). These gardens can play a major role in promoting good diet and it can become a starting point for a nation's health and food security (FAO, 2010). School gardens are therefore seen as a long-term solution to ensure food security and to increase access to a variety of food in the diet. It is a way to bring hunger relief to children coming from areas where there is extreme unemployment and food insecurity (Lander, 2013). Likewise, community gardens have the potential to address factors contributing to food insecurity by providing access to a secure, culturally appropriate, available and nutritious food source for local communities (Mutami, Chazovachii & Bowora, 2013; Mercado, 2021).

Food gardens are more important in rural areas where people have limited income and poor access to the markets. According to the study done by Adekunle (2013) in the Eastern Cape, home gardening plays a remarkable role in ensuring food security of rural household. Worldwide, most poor people live in rural areas and agriculture is their most important means of sustenance (Baiphethi & Jacobs, 2009; du Toit, *et al.,* 2011; Abdu-Raheem & Worth, 2011). According to Byerlee *et al.,* (2007) and Townsend, Ceccacci, Cooke, Constantine, and Moses (2013), three out of every four people in developing countries live in rural areas and most of them depend directly or indirectly on agriculture for their livelihood. This was supported by USAD (2020) who maintained that nearly 75% of poor people in developing countries live in rural areas and growth in agriculture sector has been shown to be at least twice as effective as growth in other sectors.

To address the issue of food security we need to target the rural areas of the developing countries where most of the poorest and the hungry lives (Galhena *et al.,* 2013). Food production in most rural households predicts food status of the individual household, thereby promoting nutritious diets through providing direct access to food on a daily basis (Musotsi,

Sigot & Onyango, 2008; Baiphethi & Jackobs, 2009; Mutami, Chazovachii & Bowora, 2013; FAO, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021; Mercado, 2021). Accordingly, the problem of food insecurity may well be addressed to some extent in rural areas through food productions (Musotsi, Sigot & Onyango, 2008; Baiphethi & Jackobs, 2009; FAO, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021; Mercado, 2021). Agriculture is therefore regarded as a strong option for overcoming poverty and enhancing food security (Byerlee, *et al.,* 2007; FAO, 2015; Pawlak & Kolodziejczak, 2020; FAO, 2021).

Home gardens have also become more important source of food in peri-urban and urban areas (FAO, 2010). A link has been established between urban food gardens, community development and food security (Nicolle, 2011; Mutami, Chazovachii & Bowora, 2013). Urban agriculture has a key role to play when it comes to addressing poverty and food security (Adekunle, 2013; Nicolle, 2011). According to Jowell (2011), the development of food gardens at an individual household level, in homes, early childhood development centers and schools, is a possible intervention to address food insecurity. Jowell (2011) further maintained that government on the other hand should design and implement agriculture for development that can make a difference in the lives of the rural and urban poor. Therefore, more effective support and agricultural productivity increase in home gardening is vital (Byerlee, *et al*., 2007).

Besides food and nutritional security food gardens can contribute to economic wellbeing of the resource poor families (Galhena *et al.,* 2013). According to Galhena *et al.,* (2013), these gardens promote entrepreneurship, and they can contribute to household income through the sales of garden products and through the savings as a result of consuming food from the home garden and no longer buying from the shops or marketplaces. According to Townsend *et al.,* (2013), food gardens are more effective in raising incomes among the very poor people and they promote rural development. Moreover Townsend *et al.,* (2013) suggested that agriculture can contribute to a comprehensive economic development, and it can help to reduce poverty for 75% of the world's poor who live in rural areas and work mainly in agriculture. According to Lander (2013) and Abdu- Raheem and Worth (2011), smallholder agriculture can promote community development through creating employment, while supporting self-empowerment, self-reliance and building a sense self-worth and welfare.

Based on this background information, it is clear that South Africa has to develop food security strategies to ensure that food insecure groups in the country are assisted. Amongst others food gardening, particularly home gardening is considered an appropriate strategy that can guarantee and bring about access to a stable year-round food availability for consumption at household level. Home gardening can play an important role in food security and development of rural households (Adekunle, 2013). Adekunle (2013) further maintained that households should be empowered and encouraged to improve their practice of home gardens to realise food security. When there is access to water and land a well-developed home garden can offer foods that can feed the family every day of the year (FAO, 2010). Therefore, it is important that the food insecure groups should gain access to land and other agricultural productive resources and inputs to cultivate food products.

To ensure sustainable food production systems and agricultural practices that increase productivity and production, agricultural productivity and income of small-scale food producers should double through secure and equal access to agricultural productive resources (Loewe & Rippin, 2015; Pawlak & Kolodziejczak, 2020; FAO, 2021). Though not discounting the importance of other agricultural sectors this study mainly focused on the importance of food gardens in alleviating food insecurity and it aimed to investigate and provide a review and evidence regarding the role of food gardens to food security and development of communities in Thulamela municipality.

1.2. Statement of the research problem

The problem of inadequate access to food remains a challenge faced by many people in South Africa today. The main research problem for this study is food insecurity which results from food not available, lack of consistent access to adequate food, unstable food supply and poorly utilized food. Food insecurity is a complex challenge and one of the pressing issues in South Africa (Oxford, 2018; Oguttu, Mbombo-Dweba & Ncayiyana, 2021; Evert, 2022). Inadequate access to food which is exacerbated by increased cost of food, poverty, unemployment and lack of income are the main cause of food insecurity in South Africa (Oxford, 2018). In spite of the national food security in South Africa some households continue to experience food insecurity (Abdu-Raheem & Worth, 2011; Earl, 2011; du Toit *et al.*, 2011; Jowell, 2011; Stats SA, 2019).

According to Statistics South Africa (2011), upheld by Abdu-Raheem and Worth (2011) and Earl (2011), 11.5% South Africans were vulnerable to food insecurity in 2011. Statistics South Africa (2019) showed that there was not much progress that had been made because food inadequacy was still a challenge to many South Africans. About 11% of South Africans were still vulnerable to food insecurity in 2019 (Stats SA, 2019).

Alongside other nations of the world the South African prevalence of food insecurity had suddenly been on the rise (16%) since 2020 (FAO, 2020). South African food security continues to wane in 2021, and subsequently there was an upsurge (20%) in the number of people who were affected by food inadequacy (IPC, 2021). Food supply and consumption are unequal and there is a need to produce more food. The problem of lack of access to adequate food remains a great concern for many households in South Africa, particularly in rural areas (Baiphethi & Jacobs, 2009; De Cock, D'Haese, Vink, van Rooyen, Staelens, Schonfeldt & Haese, 2013). According to Evert (2022), food insecurity is a global and national concern and it has always been seen as a rural problem. It exposes rural communities and households to the risk of hunger and poor health due to nutrients deficiency, and it also worsen poverty thereby adding to pressures of increasing living costs (Abdu-Raheem & Worth, 2011). The rural communities suffer the most than those in urban areas (Evert, 2022).

Poor availability of food, lack of access to stable food supply and inappropriate utilisation of food are factors that contribute to increased food insecurity at household levels. This is further aggravated by lack of resources such as land and water, lack of skills and knowledge and factors such as seasonality and climate conditions (Baiphethi & Jacobs, 2009; du Toit *et al.*, 2011). Food security also raises issues that are linked to development particularly the fight against poverty. Therefore, there is an urgent need for increased food security, more secure livelihoods and better nutrition for all, which warrant and justify the importance of food gardening (FAO, 2010; Pawlak & Kolodziejczak, 2020; FAO, 2021).

Food inadequacy may well be addressed to some extent through own food production initiatives, and food gardens are considered to have the potential to contribute to food security and sustainable livelihood (FAO, 2021; Evert, 2022). According to FAO (2010, 2015) and Evert (2022), home gardens are important source of food and supplementary income and they offer great potential for improving household food security. It is likely that food gardening may serve as an alternative strategies that can be put in place to achieve food

security for the landless potential farmers (du Toit *et al.*, 2011; Pawlak & Kolodziejczak, 2020; FAO, 2021). Therefore this study proposed to investigate the role and contribution of food gardens to food security and development of communities in Thulamela municipality.

1.3. Justification

It was important to conduct this research because food is a basic necessity for everyone and food security is very crucial in people's livelihoods (du Toit *et al.*, 2011; FAO, 2020). Food security is dependent on availability, accessibility, stability and proper utilisation of food (Hanson, 2013; Fahy, 2021). Food security for all is enshrined in the South African constitution and it is the most important developmental priority in South Africa. Access to adequate food supply is the most basic human need and right. Thus, establishing food security, particularly household food security is widely recognized as an urgent target in advancing the living standards of the rural and urban poor, and one way of achieving this is through food gardening (Abdu-Raheem & Worth, 2011; Galhena *et al.*, 2013; FAO, 2018; IPC, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021). Literature revealed that South Africa is only food secure at national level but not at household level (Roser & Ritchie, 2019; Stats SA, 2019; Evert, 2022). To attain food security the country must be able to grow enough food for everyone. Thus the engagement in agricultural activities can play a role in reducing the vulnerability to food inadequacy of many South African households (Baht, Tlalang & Lombard, 2019).

It is anticipated that food gardening can play a crucial role in sustainable development and in hunger and poverty reduction (Baiphethi & Jacobs, 2009; FAO, 2010; Stats SA, 2019; FAO, 2020). Food gardening is important because it is multifunctional, producing not only food but also sustaining rural areas, generating employment and contributing to the development of rural communities (FAO, 2010; GroundUp, 2020). The majority of poor household mostly reside in rural areas especially the former homelands, and it is possible that the food insecure are also in these areas (Baiphethi & Jacobs, 2009; Stats SA, 2019). It is believed that an alternative or a strategy to ensure food security through the reduction of the risk of hunger and the prevalence of food insecurity in these communities is to have communal land where households can grow food products (Woods, 2011). Food gardens can ensure access to nutritious food and income for the local community (Evert, 2022). They are considered as an

important source of food that play an essential role in maintaining good diets and providing income for poor households in rural, peri-urban and urban areas (FAO, 2010). Agricultural developments are crucial for poverty reduction, economic growth and development of the poor communities (Townsend *et al.*, 2013).

Food gardening can be a sustainable strategy for improving food security and incomes for many households (Hallberg, 2009). It can increase the availability of foods and income through sales of surplus, and it ensure direct access to a stable year-round food supply for household utilisation. Thus improving agricultural performance is the most powerful tool available to ensure food security, thereby reducing global poverty and hunger. The development of food gardens is a possible intervention to address food insecurity (FAO, 2010, 2021). Home gardening can bring about lasting solutions and it is regarded as a long term strategy which can help to enhance household food security through direct access to nutritionally rich foods (Abdu-Raheem & Worth, 2011; Lander, 2013; FAO, 2011; Njuguna, 2013). It was important to conduct this research in order to provide an analysis and substantiation regarding the role and contribution of food gardens to food security and development of communities. The rural communities are the most vulnerable, therefore recommendations that would help to improve their food gardening activities and hence their food security status and their wellbeing are made in this study.

1.4. Research objectives

Main objective of the study

The main objective of the study is to investigate the role and contribution of food gardens to availability, accessibility, utilisation and stability of food at household level, to household income and in developing the communities.

Specific objectives of the study

The specific objectives of the study are:

(i) To investigate the role and contribution of food gardens to food security as follows:

- The role and contribution of food gardens to food availability at household level.
- The role and contribution of food gardens to household food accessibility.
- The role and contribution of food gardens to food utilisation at household level.
- The role and contribution of food gardens in providing stability to household food availability.

(ii) To investigate the correlation between the socio demographic profiles and food security components (availability, accessibility, utilisation and stability).

(iii) To determine the role and contribution of food gardens to household income.

(iv) To investigate the correlation between the socio demographic profiles and household income.

(v) To investigate the contribution of food gardens to community development.

(vi) To investigate the correlation between the socio demographic profiles and community development.

(vii) To develop a framework of understanding the link between food security and food gardening initiatives.

(viii) To investigate challenges to food gardening.

(ix) To investigate the correlation between the socio demographic profiles and challenges to food gardening.

(x) To identify strategies for sustainable year-round availability of food gardens.

(xi) To investigate the correlation between the socio demographic profiles and strategies for sustainable food gardens.

1.5. Research question

The study attempted to provide answers to the following research questions:

(i) Can food gardens play a role and contribute meaningfully to food security?
- Can food gardens contribute to food availability at household level?
- Can food gardens contribute to household food access?
- Can food gardens provide household food stability?
- Are members of the household continually utilizing the food from their gardens?

(ii) Can food gardens contribute to household income?

(iii) Can food gardens contribute to the development of communities?

(iv) Is there a link between food security and food gardening initiatives?

(v) What are the challenges to food gardening?

(vi) What are the strategies for sustainable year-round food gardens?

(vii) Is there a correlation between the socio-demographic profiles and food security components (food availability, food accessibility, food utilisation and food stability)?

(viii) Is there a correlation between the socio-demographic profiles and household income?

(ix) Is there a correlation between the socio-demographic profiles and challenges to food gardening?

(x) Is there a correlation between the socio-demographic profiles and strategies for sustainable food gardens?

(xi) Is there a correlation between the socio-demographic profiles and community development?

1.6. Hypotheses

The following hypotheses were tested

(i) Food gardeners' socio-demographic profiles do not correlate with food security components (availability, accessibility, utilisation and stability).

(ii) No correlation exists between food gardeners' socio-demographic profiles and household income.

(iii) There is no correlation between food gardeners' socio-demographic profiles and community development.

(iv) There is no correlation between food gardeners' socio-demographic profiles and challenges to food gardening.

(v) No correlation exists between food gardeners' socio-demographic profiles and strategies for sustainable food gardens.

1.7. Theoretical framework of the study

This study used the modified model by Musotsi, Sigot and Onyango (2008) that indicates causative factors affecting food production and food availability in the household. The model

shows that food availability at household level is a factor that affects the nutritional status of the family and individuals. The model further outlines that food production in most rural households predicts the food status of the individual household members. It shows that resources such as land, technology, labour, education, climate and environment affect food production and food availability at national, community, household and individual level, which in turn affect the success of home gardening strategies and the food status at household levels. The model also depicts that food availability is affected by income whereby money influences food purchases. Money becomes important during seasonal hunger when households have to make food purchases almost on a daily basis (Musotsi, Sigot & Onyango, 2008).

The study by Musotsi, Sigot and Onyango (2008) focused on how food production through home gardening could affect food availability in the household. Thus their model considered the influence of various processes affecting the availability of food in the household, and expressed the interrelations of various factors as a flow of resources determining food availability. This model was used as a point of departure in theoretical foundation for this study and it has guided the formulation of the conceptual framework for this study. The focus of the present study was on how home gardening affected household food security and development of communities.

It is believed in this study that the practice of food gardening is one of the strategies that can assist in addressing food insecurity and developmental challenges in rural and urban settings in South Africa and around the world. It has the potential to provide a survival strategy for the poor and thus contribute to poverty alleviation, employment, food security and social integration (Nicolle & Williams, 2011; FAO, 2018; IPC, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021).

Figure 1.1 therefore shows the conceptual framework for this study that shows the link between food gardens and food security as well as food gardens and the development of communities. The framework displays the flow of factors and how these factors affect each other as they contribute to the desired outcome. The framework starts by highlighting the problem, which is food insecurity at community and household level and the causal factors which include, lack of food as in no access to food, food not available, food supply not stable and food poorly utilised; lack of income; unemployment and poverty. It also highlights other

factors such as lack of land, lack of skills and knowledge, lack of water and planting materials and lack of technical assistance that challenges the year-round availability of food from the gardens. These factors challenge food security at household and community levels.

The framework further indicates that the production of food in home gardens contributes to availability, accessibility, utilisation and stability of food in the household and increased household income through the sales of garden products. Thus, the availability of food in food gardens all year round at household and community levels result in food security and development of the communities.

The framework outlines that the problem of food insecurity can be addressed through the development of food gardens at household and community levels and thus contributes to food security and development of the community. The framework also shows that challenges to food gardens exacerbate food insecurity. In accordance with Swaen & George, (2022) this conceptual framework highlights what this study entails, it conveys the objectives for this study and maps out how they come together to draw a coherent conclusion. It also illustrates the expected answers to the research questions of this research. Overall Figure 1.1 gives the conceptual framework of the study, which has directed this research.

CONCEPTUAL FRAMEWORK OF THE STUDY

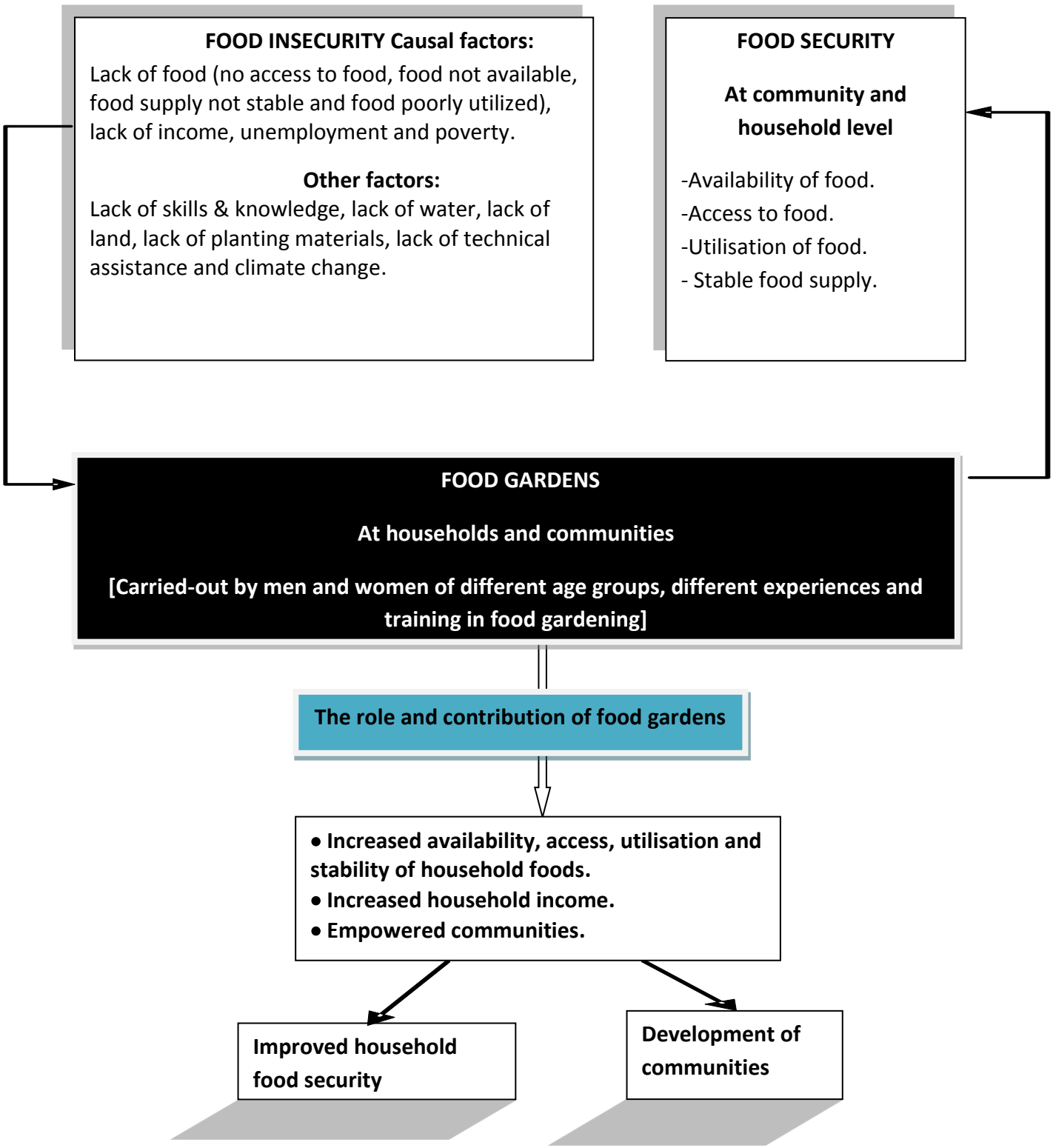

FIGURE 1.1: CONCEPTUAL FRAMEWORK OF THE ROLE AND CONTRIBUTION OF FOOD GARDENS TO FOOD SECURITY AND COMMUNITY DEVELOPMENT

1.8. Definitions of key terms and concepts

Figure 1.1 which appears above gives the conceptual framework of the study and it had been designed to guide the collection of information in this research. The following concepts that are included in the framework are defined as they apply to this study:

Food Security

Food security exists when all people at all times have physical, social and economic access to enough food that meet their food preferences and dietary needs for an active healthy life. It includes the availability of nutritious and safe food, ability to procure and acquire food of good quality in a socially acceptable way (Labadarios, Mchiza, Davids, & Weir-Smith, 2009; FAO, 2010; Labadarios *et al.*, 2011, USAD, 2020; Fahy, 2021). Food security entails four major aspects which are availability, access, utilisation and stability (Hanson, 2013; Fahy, 2021) and that is what food security implies in this study, direct access, year-round availability, stability and proper utilisation of food from home gardens.

Food availability

Food availability simply refers to the existence of food within the community. It is about food supply and trade which include the quantity, quality and diversity of food (FAO, 2006; FAO, 2014; Fahy, 2021). Food availability is dependent on domestic food production, international importation and efficiency of food distribution and it is assessed in the light of food requirements of the population (FAO, 2006; FAO, 2014; Fahy, 2021). As it relates to this study food availability refers to domestic food production and it is ensured if adequate amounts of food are produced and ready to have at people's disposal (Dladla, 1997; Hanson, 2013).

Food accessibility

Food accessibility refers to the ability of households to obtain sufficient food for all members at all times, either through production for own consumption or through exchange for consumption (Dladla, 1997; Fahy, 2021). It covers economic and physical access to sufficient resources for acquiring appropriate food (FAO, 2006; Hanson, 2013; FAO, 2014; Fahy, 2021). In this study it implies the ability to obtain food through production for household consumption.

Food utilisation

Food utilisation refers to the final use of food by individuals at household level. It implies the range of household food practices including preservation and storage, selection, preparation and final consumption by household members (Hanson, 2013; FAO, 2014; Fahy, 2021). For the purpose of this study food utilisation refers to the use of food from the home gardens by members of the household (Dladla, 1997).

Food stability

Food stability is all about being food secure all the time (FAO, 2011; FAO, 2014), that is when food is available, accessible to and appropriately utilized (Hanson, 2013; Fahy, 2021). In this study food stability refers to year-round supply (availability, accessibility and utilisation) of food from the home gardens.

Food insecurity

Food insecurity exists when food is not regularly accessible and household has difficulty securing enough food for normal growth and development and for an active and healthy life. It is a situation of limited or uncertainty availability of adequate, nutritious and safe food (Labadarios *et al.,* 2009; Labadarios *et al.,* 2011; Fahy, 2021; FAO, 2021). As it relates to this study food insecurity refers to inability to acquire adequate food for an active healthy life.

Household food security

Household food security refers to physical and economic access to adequate food for all household members, without undue risk of losing such access. Households are food secure when they have year-round access to the amount and variety of safe food (du Toit *et al.*, 2010; FAO, 2011, Maxwell, Coates, Vaitla, 2013). As it relate to this study it refers to the ability of a household to secure from its own production, adequate food for meeting the dietary needs of all members of the household.

Food gardens

Food gardens in their different names such as, home, mixed, combined, backyard, kitchen, farmyard, school, compound, homestead, smallholder or small-scale gardens, roof top gardens, community gardens, school gardens, urban food gardening refers to land use where several species of crops, fruit and vegetables are cultivated and maintained by households and

are primarily intended for family consumption and utilisation (Musotsi, Sigot & Onyango, 2008; Jowell, 2011; Galhena *et al.*, 2013). In this study it implies that an area around the home or demarcated place is cultivated to produce vegetables and fruit that could be grown seasonally or throughout the year primarily for domestic consumption and income generation (FAO, 2011; Jowell, 2011)**.**

Household income

Household income refers to all money that comes onto a household. It is a measure of the combined incomes of all people sharing a particular household (Altman, Hart & Jacobs, 2009). Household income may come from remittances, wages, and salaries, government grants or any other source. In this study household income refers to extra money that comes into the household as a result of selling the surpluses of gardening products**.**

Community development

Community development is action that helps people to recognise and develop their ability and potential and organise themselves to respond to the problems and needs that they share. It supports the establishment of strong communities that control and use assets to promote social wellbeing and help improve the quality of life (Smith, 2019; Altman, Hart and Jacobs, 2009). According to Herrman and Tsutsumi (2017), community development aims to develop the social, economic, environmental and cultural well-being of communities with a focus on marginalised people. For the purpose of this study community development refers to agricultural initiatives in the household and communities, their actions and perspectives in agricultural activities as a way of developing and improving the quality of life for all (Abdu-Raheem and worth, 2011; Woods, 2011).

1.9. Limitations of the study

a) Due to time constraints, and lack of resources, the time span for the study was limited to a period of one year following the major growing seasons which is summer and winter. As a result the researcher might not have got the comprehensive picture of the role and contribution of food gardens to food security in the study area. In order to realise this, it would have compelled the research to be conducted over a period of several years.

b) One participant answered no to all the questions relating to having a food garden or accessing and utilising food from the garden. This is regarded as a limitation to the study which occurred during data collection wherein the researcher or either the assistance had interviewed a household without a food garden which differed from the initial intentions of the study that only people with food gardens during the time of data collection will be considered or selected for data collection.

1.10. Outline of the study

This study is comprised of thirteen chapters as outlined below. Each chapter introduces, expands on and finally recapitulates the salient points made in the chapter. This chapter presents the background and justification of the study. It introduces the research problem, hypothesis, objectives and the theoretical background which guided the formulation of the conceptual framework for the study. The important terms and concepts that are used throughout the study are defined in the present chapter, and it also discusses the study's limitations.

Chapter two provides a review of the literature related to the topic and other studies that have been conducted to support the hypothesis and objectives of this study. The intended area of investigation is identified and the main concepts are introduced in this chapter.

In chapter three the study area and the population that was studied are clearly highlighted. The research design and the techniques that were used to measure the concepts of this study as well as the sampling procedure, data collection processes and methods of analysis used for this study are addressed. It describes the methods to combat error as well as the ethical considerations applied in this research. The envisaged outcomes of the study as well as the feedback and dissemination plan of the research results are provided in chapter three.

The results of this study are presented in chapter 4-12 which presents data analysis, reporting and discussion of the research results and they are organized as follows: chapter 4 illustrates the initial treatment of the data and provides a descriptive statistics of participants' demographic profiles; chapter 5 provides the introduction to the role and contribution of food gardens to food security and the role and contribution of food gardens to food availability at

household level; chapter 6 presents the results on the role and contribution of food gardens to food accessibility at household level; chapter 7 provides the results based on the role and contribution of food gardens to the utilisation of food at household level; chapter 8 presents the results on the role and contribution of food gardens to food stability at household level; chapter 9 presents results based on the role and contribution of food gardens to household income; chapter 10 presents results on the role and contribution of food gardens to community development; chapter 11 presents results on the challenges to food gardening and strategies for sustainable year-round availability of food gardens; whilst chapter 12 presents results from chi-squared tests and logistic regression as well as the framework for linking food security and food gardens

Lastly chapter 13 presents the conclusions of the research findings, explores the implications of the study and suggests recommendations for future research areas.

CHAPTER 2

REVIEW OF LITERATURE

2.1. Introduction

This chapter reviews various literatures, model and other studies that have been conducted which support the role of food gardens to food security and community development. Different journals have been reviewed in this study in order to recognize the value of food gardens in enhancing food security and livelihood. The review provides a theoretical background that facilitates the formulation of a conceptual model for the study and the approach to this study. As stated by Jowell (2011), the ultimate focus was that the development of food gardens at an individual household or community level, in and around homes, schools, early childhood development centers and vacant places, is a possible intervention to address food insecurity and to enhance development of communities that can make a difference in the lives of the poor.

Home gardening is an ancient and widespread practice all over the world. Much attention should thus be given towards home gardening as strategy to enhance household food security. Home gardening is considered an important part of local food system and it has been successful over the years in many developing countries around the world. Households maintain these gardens for easy access to fresh plants. Many studies have been done on the subject of food security and home gardens and they have recognized the positive impacts of home gardens towards food security, malnutrition and household income as well as livelihood benefits for the resource-poor families (Galhena *et al.*, 2013; Evert, 2022). Food security is pivoted in four major aspects, which are availability, accesses, utilisation and stability.

2.2. The state and prevalence of food insecurity

Millions of people around the world are unable to afford a healthy diet and as result they suffer from food insecurity which results in hunger and undernourishment (Hallberg, 2009; Labadarios, *et al.*, 2011; Earl, 2011; FAO, 2020, 2021; Oguttu *et al.*, 2021)**.** Food insecurity

has been identified as the major cause of malnutrition and it is an issue of concern as it affects many households around the world (Musotsi, Sigot & Onyango, 2008; Hallberg, 2009; Labadarios, *et al.*, 2011; Earl, 2011; FAO, 2020, 2021; Oguttu *et al.*, 2021). The global prevalence of the undernourished had been identified as 11.3 percent and 13.5 percent in developing country in 2014 (FAO, 2014), which was an improvement from 18.7 and 23.4 in 2010. According to FAO (2015), the number of the hungry dropped from 805 to 795 million in 2014-2015 which was 216 million less than in 1990-1992 and only 72 out of 129 countries achieved the Millennium Development Goal (MDG) hunger target. According to FAO (2015), the proportion of the undernourished fell by almost half and extreme poverty declined to 14% in 2015.

Although the figures seem to suggest that the MDG hunger target of halving the amount of undernourished people in developing countries had been achieved in 2015, it was apparent that only the higher performers in Africa have met the MDG hunger targets while those that made slow progress did not achieve the target. According to Roser and Ritchie (2019), one in every four people (1.9 billion) was moderately or severely food insecure in 2017 and around 697 million of the world population were severely food insecure in 2018. Although there was a decrease in the number of those suffering from food insecurity over the years, millions of people around the world are still found to be chronically undernourished (Roser & Ritchie 2019; FAO, 2020).

The global prevalence of food insecurity has suddenly been on the rise since 2020 and nearly one in every three people in the world was not having food (FAO, 2020). The number of people in the world faced with hunger had increased after remaining unchanged from 2014 to 2019. Aproximately118 million more people were facing hunger in 2020 than in 2019 with the highest prevalence in Asia then followed by Africa (FAO, 2021). According to FAO (2021), in 2021 between 720 and 811 million people faced hunger. According to FAO, IFAD, UNICEF, WFP and WHO (2022), world hunger rose further in 2021 and it had affected 46 million more people than in 2020, which amount to a total of 150 million people since 2019. According to FAO, IFAD, UNICEF, WFP and WHO (2022), it is estimated that between 702 and 828 million people in the world (corresponding to 8.9 and 10.5 percent of the world population, respectively) faced hunger in 2021.

The prevalence of the undernourished climbed to 9.9% in 2020 from 8.4% in 2019 (FAO, 2020). According to FAO, IFAD, UNICEF, WFP and WHO (2022), the prevalence of the undernourished continue to rise to around 9.8% in 2021. The numbers show persistent regional disparities, with Africa bearing the heaviest burden (FAO, IFAD, UNICEF, WFP & WHO, 2022). According to FAO, IFAD, UNICEF, WFP and WHO, (2022), one in every five people (20.2% of the population) in Africa was facing hunger in 2021, compared to 9.1% in Asia, 8.6% in Latin America and the Caribbean, 5.8% in Oceania and less than 2.5 Percent in Northern America and Europe. The majority of the hungry lives in developing countries and the highest prevalence of the severely food insecure is in Sub-Saharan Africa where nearly one third of the population were defined as food insecure (Roser & Ritchie, 2019; FAO, 2020). According to Roser and Ritchie (2019), about 40% of those living with severe food insecurity were in Africa.

South Africa as a country is being regarded as nationally food secure, but locally many households still face poverty and hunger (De Cock *et al.*, 2013; Roser & Ritchie, 2019; Stats SA, 2019; Evert, 2022). The country produces enough food to feed its population but it still experience increasing rates of household food insecurity (du Toit *et al.*, 2011; Abdu-Raheem & Worth, 2011; Stats SA, 2019; Evert, 2022). According to Abdu-Raheem and Worth (2011), approximately 35% of the South African population which is about 14.3 million people was reported to be experiencing hunger and under-nutrition. Stats SA (2019) revealed that food inadequacy was still a challenge and many South Africans (approximately 6.5 million (11%)) were exposed to food insecurity.

In 2017 about 20% of South African households were reported to be having inadequate or severe inadequate access to food (Roser & Ritchie, 2019; Stats SA, 2019; Oguttu, Mbombo-Dweba & Ncayiyana, 2021). In 2020 many South Africans (9.34 million (16%) faced high level of severe food insecurity whilst in 2021 food security further declined culminating in the increase up to 11.8 million (20%) of people who were affected (IPC, 2021). Stats SA (2019) also revealed that although the number of households suffering from food insecurity has dropped (from 13.5 in 2002) it still affects many households across South Africa (1.7 million in 2017). Stats SA (2019) further indicated that poor households and households with more children were experiencing severe inadequate access to food than households with fewer children, also revealed that Black African and Coloured headed families were more affected by inadequate access to food than their white, Indian/Asian counterpart.

The extent of food security in South Africa differs from province to province. According to Statistics South Africa (2011), Limpopo Province was regarded as the poorest province in South Africa wherein half of the population was living below the poverty line. In their study on food security in rural areas of Limpopo Province in South Africa De Cock *et al.,* (2013) stipulated in their findings that 53% of the respondents declared themselves to be severely food insecure. The people most affected by this situation were the landless, female-headed families together with both the rural and urban poor (Abdu-Raheem & Worth, 2011). However, according to Stats SA (2019), the situation has since changed where Limpopo was reported as the province with the highest percentage (93.6%) of households that had adequate access to food.

In line with du Toit *et al.,* (2011); Townsend, *et al.,* (2013) and USAD (2020), Abdu-Raheem and Worth (2011) indicated that the vast majority of poor South African population lives in rural areas and they depend on agriculture as their main source of livelihood. This suggests that intervention strategies to eradicate food insecurity should basically be intended to rural communities. The South African government has applied various strategies to address food insecurity within the country, such as social grants, School Nutrition Programmes and Community Based Nutrition Programmes. However, these strategies have not made any appreciable progress in the area of food insecurity since many South Africans are still suffering from food insecurity in the country (Oxford, 2018; Stats SA, 2019; FAO, 2020; IPC, 2021). Various pathways have been explored to address food insecurity and it has been found that food insecurity requires a multidimensional approach such as the agricultural pathway which refers to the use of agricultural production by the rural poor who have access to land and other farming resources. This path contributes to rural development interventions and it has been recommended as one of the existing rural development intervention strategies (Abdu-Raheem & Worth, 2011).

As compared to other areas in the country, Vhembe district in the Limpopo province where Thulamela municipality is located is found to be highly concentrated with households that are actively engaged in agricultural practices, yet they experienced hunger as a result of being unable to buy enough food (Altman, Hart & Jacobs, 2009). The rise in the price of wheat and maize which form part of staple food in South Africa worsens the food insecurity situation as households faces more difficulty in procuring food items from their earnings. Another

contributing factor is the increase in the price of oils and electricity which result in higher prices of food items (Altman, Hart & Jacobs, 2009; Evert, 2022).

According to FAO (2014), in July 2014 the African heads of states had committed to end hunger in the continent by 2025. Yet this could only be made possible through comprehensive agricultural development programmes and new partnership for development (FAO, 2014). This indicates strong confidence in that focusing on strategies to improve food gardening can bring about a long-term solution to the problems of food insecurity and rural poverty. However this is an area which needs to be investigated further.

2.3. The role and contribution of food gardens to food security

Food gardens are found in many countries around the world and they played a major role in food security and alleviation of hunger over the years (Earl, 2011; FAO, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021). Agriculture is regarded as a strong option for overcoming poverty and enhancing food security (Byerlee, *et al.*, 2007; FAO, 2015; Pawlak & Kolodziejczak, 2020; FAO, 2021). According to FAO, (2010), home gardening is one of the possible interventions for enhancing food security for the poor and it should be considered in the context of broader national food security strategy. Musotsi, Sigot and Onyango, (2008) also maintained that there is a recognized potential of home gardening to improve household food security and agriculture is recognized as the main method to procure food for the household. Hallberg (2009) and Carstens, Hay, and van der Laan (2021) also stated that food gardens can offer great potential for improving and fostering sustainable solutions to food insecurity.

World-wide, most poor people live in rural areas and agriculture is their most important means of sustenance (Baiphethi & Jacobs, 2009; du Toit *et al.*, 2011; Abdu-Raheem & Worth, 2011). According to Townsend, *et al.*, (2013) and USAD, (2020), nearly 75% of poor people in developing countries live in rural areas and growth in agriculture sector has been shown to be at least twice as effective in reducing poverty as growth in other sectors. Food production in most rural households predicts food status of the individual household, thereby promoting nutritious diets through providing direct access to food on a daily basis (Musotsi, Sigot & Onyango, 2008; Baiphethi & Jackobs, 2009; Mutami, Chazovachii & Bowora, 2013;

FAO, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021; Mercado, 2021). Accordingly the problem of food insecurity may well be addressed to some extent in rural areas through food productions (Musotsi, Sigot & Onyango, 2008; Baiphethi & Jackobs, 2009; FAO, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021; Mercado, 2021).

Food gardens also improve nutrition and livelihoods for the urban poor (Hallberg, 2009; Nicolle, 2011; Mutami, Chazovachii & Bowora, 2013). According to Hallberg (2009), the urban poor are also affected to an extent by food insecurity. Urban agriculture around the world is part of a survival strategy for the urban poor and its contribution to food security is substantial in many developing world cities (Nicolle, 2011; Mutami, Chazovachii & Bowora, 2013). According to Baiphethi and Jackobs (2009), food gardens are popular amongst African women in South Africa and the main aim is to improve nutrition and livelihoods for the poor. Baht, Tlalang and Lombard (2019) also highlighted that homestead food gardening programmes were suitable and beneficial to alleviate food insecurity, hunger and malnutrition to the vulnerable groups such as women, youth and the unemployed in rural, urban and semi-urban areas in South Africa. Therefore, focusing on factors that enhance food production and smallholder agriculture can bring about lasting solutions to the problem of food insecurity (Abdu-Raheem & Worth, 2011). According to Lander (2013); FAO (2011) and Njuguna (2013), a food garden is a long term strategy to ensure food security and to increase access to a variety of food in the diet and the most important social benefit of home gardens emanate from their contributions to household food security by increasing availability, accessibility and utilisation of food products.

2.3.1. The role and contribution of food gardens to household food availability

The core concept of food security is the availability of healthy food and optimal nutrition for all (Wagle, 2018; Evert, 2022). Household food security is the application of this concept to the family level, with individuals within the household the focus of concern (Wagle, 2018). According to David and Grobler (2022), food security is directly associated with the state of food availability. Therefore, a lack of availability of sufficient food in the household can lead to food insecurity (Wagle, 2018). According to Wagle (2018), food security exists when food is available for all people, at all times, and when people have physical, social and economic access to sufficient, safe and nutritious food that meet their dietary needs and food

preferences for an active and healthy life. A country can only be regarded as food secure when the concept of food availability is met (Evert, 2022).

According to FAO (2016), Fahy (2021) and Evert (2022), availability is about food supply and trade, not just the quantity but also the quality and diversity of food at a given time and place. Changes in seasonal availability can cause serious shortage of food and it affects household food security (Hanson, 2013). It is therefore important to ensure that food is available at households and communities all the times (FAO, 2016; the Australian International Food Security Research Centre (AIFSRC), 2018; Fahy, 2021). The availability of food through own production is a vital component of food security (FAO, 2016; Fahy, 2021). Consequently communities can improve availability of food through well managed natural resources, sustainable productive farming systems and policies to enhance productivity (Carney, Hamada, Rdesinski, Spragar, Nicols, Liu, Pelayo, Sanchez & Shanna, 2012; FAO, 2016; Fahy, 2021).

A well-developed food garden can supply households with most of the needed non-staple foods every day of the year, including roots, tubers, vegetables and fruits, legumes, herbs and spices (FAO, 2010). Swindale & Bilinsky, (2005) maintained that food security is achieved when sufficient quantities of appropriate and necessary types of food from domestic production are consistently available to the individual. According to Hanson (2013), food accessibility is dependent on its availability, thus to ensure household food security food must be locally available, accessible and stable.

2.3.2. The role and contribution of food gardens to household food accessibility

Food security has been defined by many researchers as the access to adequate amount of healthy food by all people at all times (FAO, 2010, 2014; du Toit *et al.*, 2011; Fahy, 2021; Wagle, 2018). Food security aligns with the state of food accessibility and it covers economic and physical access to food (David & Grobler, 2022). Access to food is when individuals have adequate resources to obtain the correct amount of food that is required to maintain utilisation of a sufficient diet (Swindale & Bilinsky, 2005; Hanson, 2013; FAO, 2010, 2014; Fraanje and Lee-gammage, 2018; Fahy, 2021; Evert, 2022). According to Baiphethi and Jacobs (2009), access to food is given a greater importance and it has appeared as the major focus area in food security debates in modern societies. According to Evert (2022), the

phenomenon of access to food has led to research focusing more on the coping strategies of people experiencing food insecurity. Food insecurity is seen as a problem of inadequate access to food which must be addressed in order to achieve food security (Evert, 2022).

According to Maccarthy, (2021), food security can only be attained if there is reliable and consistent access to food. As a result, there is a need to ensure that households have access to safe, nutritious and sufficient food all year-round, and this can be attained through developing strategies that help communities and households to achieve food security (Earl, 2011; Evert. 2022). Therefore food production is regarded as the best way to solve this problem (Baiphethi & Jacobs, 2009; Carstens, Hay, & van der Laan. 2021; Evert, 2022). Home gardening has been identified as a means to provide year round access to food for the rural poor (Musotsi, Sigot & Onyango, 2008; Lander, 2013; Freedman, 2015). Vegetable gardens are considered as the great ways to promote food security and access to better diets (Musotsi, Sigot & Onyango, 2008; Lander, 2013; FAO, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021).

Food gardens are critical tools in food access and contributing to food security and they can provide an opportunity for individuals and their neighborhoods to access fresh produce (Tims, Mark, Jemison, Ladenheim, Mullis, & Damon, 2021; Matshobane, 2022). These gardens can be a feasible way to increase access to food in low-income households (Matshobane, 2022). This study sought to establish that food gardening, particularly home gardening, is an appropriate strategy that can guarantee and bring about access to stable year-round food availability for consumption at a household level.

Although vegetable gardens can provide year-round and direct access of readily available food, they can be constrained by factors such as climate changes, natural disasters, lack of resources and poor management (Hanson, 2013). As a result, access to locally produced food can be withdrawn and to people who do not have enough income access it becomes a sensitive food security problem (Hanson, 2013). According to Hanson (2013), food can be accessed through purchase and production. Therefore, to improve food access households must have resources for production and access to better market in order to generate more income from gardening products. Rural communities rely on agricultural activities as a primary source of food and self-production can aid in reducing food prices and increasing access to food (Evert, 2022). However, access to food is not merely having food within reach

but it also means consuming a diversified diet that contain different foods (Swindale & Bilinsky, 2005).

2.3.3. **The role and contribution of food gardens to utilisation of food at households**

The concept of utilisation covers aspects such as dietary quality, food safety as well as absorption and metabolism of essential nutrients and it is often regarded to be the key in attaining food security (Evert, 2022). Food security entails proper utilisation of food, it means that food is properly stored, processed and prepared and people have knowledge of nutrition (Swindale & Bilinsky, 2005; Fahy, 2021). Furthermore Swindale and Bilinsky (2005) stated that food security does not necessarily means eating different food but it implies adding variety in the diet by eating food from different food groups. Utilisation of food is ensured when people have access to adequate, nutritious and a variety of safe diets for proper health and to avoid diseases (Hanson, 2013; Lander, 2013; Fraanje & Lee-gammage, 2018). According to Earl (2011), South African households in rural areas consume a monotonous diet without variety. Vegetable gardens can thus provide multiple nutrients simultaneously thereby, improving the overall quality of the diet (Lander, 2013). According to FAO (2010, 2016) and Fraanje and Lee-gammage (2018), gardening can enhance food security through direct and diversity of nutritionally rich foods as well as provision during seasonal lean periods.

Food gardens are the easiest ways to ensure access to healthy diets that contain adequate macro- and micronutrients (Fraanje & Lee-gammage, 2018). These gardens can make a significant contribution in meeting the daily household needs for better nutrition and health (Musotsi, Sigot & Onyango, 2008; Hanson, 2013; Fraanje & Lee-gammage, 2018). According to Carney *et al.,* (2012), food gardening in communities can reduce food insecurity and improve dietary intakes of fruit and vegetables. Thus, home gardens not only provide immediate access to food but they provide a variety of food throughout the year and thus making them a significant resource for increasing food security (Freedman, 2015). According to Loewe and Rippin (2015), in Sub-Saharan Africa diversification of diet is the key to fighting malnutrition, therefore diversification of crops and income generating activities through food gardening are fundamental to ensure stable access to food.

2.3.4. The role and contribution of food gardens to household food stability

According to Evert (2022), little research has been conducted on food stability and sustainability. Stability is ensured when food is available, accessible and properly utilized over the time (Hanson, 2013; FAO, 2014; Fahy, 2021). Hunger and malnutrition result from inadequate and unstable food supply at the household level (Earl, 2011). Therefore, access to stable and sustainable food supplies is important for the realisation of food security at household level (FAO, 2010, 2014). Sustainability means long-term stability and if production is not sustainable over time then it is not stable (Hanson, 2013). According to Earl (2011), South Africa has a role to play in helping to stabilize the food security in the region as well as domestic food supply. It is fundamental to have stability of home gardening activities for year-round availability and ultimately access to food in the household.

2.4. The role and contribution of food gardens to household income

Income is the major determinant of household food security in contemporary South Africa (Musotsi, Sigot & Onyango, 2008). The growth in agricultural activities such as home gardening is considered to be more effective in raising incomes among the very poor than growth in other sectors (Townsend *et al.*, 2013; USAD, 2020). Njuguna (2013) stipulated that homestead production is an important source of household income for the rural poor and it can be regarded as an adaptive strategy of communities and an entry point for development and income for the rural poor.

According to Lander (2013) and Baht, Tlalang and Lombard (2019), food gardens can be the source of additional income through the sale of surplus produces. These gardens can increase the purchasing power from savings on food bills and income from sales of garden products and can thus help to limit household financial constraints (FAO, 2010, 2016; Evert, 2022). According to Abdu-Raheem and Worth, (2011), smallholder agricultural production in rural South Africa helps to reduce rural poverty and it's a source of household income accounting to 40% of total household income. Thus, home gardens are important since they provide income and year-round availability and access to food from a variety of crops grown within them which are harvested at different times of the year (Musotsi, Sigot & Onyango, 2008).

While many studies maintained that food gardens can contribute to household income, some studies shows that the contribution of subsistence agriculture to household income is minimal. Baiphethi and Jacobs (2009) and Altman, Hart and Jacobs (2009) stated in their studies on food security in South Africa that the most common reason for engaging in agriculture is to secure an extra source of food rather than as the main source of food or household income. However, even though subsistence agriculture was not found as an important source of income in these studies, there was a rise in the number of households engaged in subsistence production (Baiphethi & Jacobs, 2009). It is therefore believed that the uptake of food gardens by the poor households can considerably minimize their dependence on purchasing food from the market and thus release some income for other household responsibilities (Baiphethi & Jacobs, 2009; Galhena *et al.,* 2013; Evert, 2022).

According to Galhena *et al., (*2013), home gardening is extensively promoted in many countries as a means to prevent poverty and as a source of income for subsistence families in developing countries. These gardens have constantly endured the test of time and continue to play an important role in providing food and income for the family (Galhena *et al.,* 2013; Carstens, Hay, & van der Laan, 2021). In line with this and as maintained by Altman, Hart and Jacobs (2009) who is of the opinion that small scale and subsistence agriculture can contribute to household incomes and savings, this study seeks to find out the role of food gardens to household income.

2.5. The role and contribution of food gardens to community development

Community development takes place when people take actions that help them to identify their abilities and potential to respond to their problems and needs and to organise themselves in order to come up with viable solution (Altman, Hart & Jacobs, 2009; Smith, 2019). Community development promotes the institution of robust communities that organise and use resources to improve the quality of life and support social wellbeing of the communities (Altman, Hart & Jacobs, 2009; Herrman & Tsutsumi, 2017; Smith, 2019). One of the key developmental priorities in South Africa is food security for all (Townsend *et al.,* 2013). According to Woods (2011), agriculture is multifunctional, producing not only food but also supporting rural settings, creating employment and contributing to the viability of rural areas. Agriculture accounts for one third of gross domestic product and three quarters of

employment in Sub-Saharan Africa (Woods, 2011). It remains essential in poverty reduction, economic growth and environmental sustainability (Townsend *et al.,* 2013; Herrman & Tsutsumi, 2017).

Moreover, Townsend *et al.,* (2013) stated that agriculture can help reduce poverty for 75% of the world's poor who live in rural areas and work mainly in farming. It can raise incomes, improve food security and benefit the environment. It can support self-empowerment, self-reliance and in the process builds a sense of achievement, self-worth and confidence (Lander, 2013). According to Abdu- Raheem and Worth (2011), smallholder agriculture is a major tool for creating employment and for welfare and stability in Sub-Saharan Africa, particularly in rural areas. Furthermore, Abdu- Raheem and Worth (2011) upholds that economic output and employment rates receive a quicker and better growth when development interventions are concentrated on peasant and small-scale farmers.

According to Galhena *et al.,* (2013), the economic benefits of home gardens go beyond food and nutritional security and subsistence, especially for resource poor families. These gardens can contribute to economic wellbeing in several ways: garden produce can be sold to earn additional income and earnings from the sale of garden products and the savings from consuming home-grown food products can lead to more disposable income that can be used for other domestic purposes (Galhena *et al.,* 2013; Evert, 2022). Additionally, Galhena *et al.,* (2013) suggests that home gardens contribute to income generation, improved livelihoods and household economic welfare as well as promoting entrepreneurship and rural development. Agricultural development in particular is herein perceived as a source of economic growth which can be more effective in raising incomes among the very poor than growth in other sectors (Townsend *et al.,* 2013). The world and particularly South Africa need agriculture to contribute to a comprehensive economic development.

2.6. Strategies for sustainable year-round availability of food gardens

Food insecurity and malnutrition are complex problems that cannot be solved by one sector alone but need to be addressed in a coordinated way, taking into account the lesson learned as they are essential in hunger reduction. According to FAO (2010), some lessons learned from gardening initiatives around the world could greatly increase the chances of long-term

successes in terms of cost-effectiveness and contribution to household food security needs. According to FAO (2010), to ensure year-round availability, access and consumption of food from the gardens, improved nutritional status, health, mental ability, productivity and economic development, it demand an integral approach to solving food insecurity in the long term. Home gardening has a special role in this strategy in providing direct access to food through self-reliant rather than dependence on externally supported programmes such as food for work, targeted subsidies and supplementation and fortification schemes none of which can be counted on for sustained support (FAO, 2010). Strategies for sustainable year round availability of food gardens may include but not limited to the following:

- **Farmer collaborations / Partnership**

Partnership is an important consideration in sustainable gardening initiatives. The situation for small scale farmers calls for stronger collective action which will contribute in offering not only financing but also knowledge of agricultural production systems (Abdu-Raheem & Worth, 2011). According to Abdu-Raheem and Worth (2011), food gardening is a strategy that assists to resolve food insecurity predicament which entails collaboration of people in order to increase their agricultural production. Partnership can increase the financial input, knowledge and skills that can help to improve small scale farming (Abdu-Raheem & Worth, 2011). Collaborative arrangement allows gardeners to work together for their own advantage, allowing them to share resources such as skills, knowledge of agricultural practices, equipment, land, sales, marketing and distribution plans, business plans and business networks amongst others for mutual benefits (United State Department of Agriculture (USDA, 2020).

Collaboration of farmers is a viable practice but it requires cooperation, trustworthiness, partnership, commitment, compromise and teamwork mentality (USDA, 2020). Partnership with the department of agriculture is very crucial for the provision of support facilities which is needed to support the small-scale farmers for them to become more profitable (Abdu-Raheem & Worth, 2011). South African government needs to give more support to small-scale farmers to improve agricultural production, especially at the rural household level (Abdu-Raheem & Worth, 2011). Food gardening as a strategy to help resolve the food crisis requires participation and people working together for their own benefit. It requires as a pre-condition that people should have access to certain productive resources and that they may

not be denied access to a piece of land, water or advice from government extension agents (Abdu-Raheem & Worth, 2011; USDA, 2020).

- **Building on indigenous knowledge**

Building on indigenous knowledge and understanding the traditional gardening system is of utmost importance as it will give more thorough understanding of the limitations that inhibits gardening in the past (Abdu-Raheem & Worth, 2011). According to Swiderska and Ryan (2020) modern food production systems are basically unsustainable; they contribute to greenhouse gas emissions and are responsible for global loss of biodiversity. Swiderska and Ryan (2020) further stated that modern practices destroy the natural resources such as water, soil and genetic resources that are needed to sustain agricultural production. It is important to build on the indigenous gardening skills within families especially with regard to the cultivation and use of indigenous plants and the traditional methods of conserving water and combating pests (Abdu-Raheem & Worth, 2011).

The loss of traditional diets in many developing areas is one of the most destructive health consequences which resulted in the decrease in regular consumption of fresh fruit and vegetables (Freedman, 2015). Freedman (2015) further maintained that this could be easily rectified by transplanting readily available indigenous wild food plants into home gardens. As well as being rich source of micronutrients the domestication of wild food plants can create income potential through sales of surplus food (Freedman, 2015; Swiderska & Ryan, 2020).

According to Agize, Demissew and Asfaw (2013), home gardening is a traditional agricultural practice which plays an important role in conservation and sustainable utilisation of plants and it calls for indigenous knowledge on the management of home gardens for their sustainability. Indigenous knowledge could be helpful towards the achievement of food security at household level, it can also help to alleviate poverty if it is effectively applied in agriculture and supported by appropriate technology interventions that consider peoples' circumstances (Awuor, 2013). Understanding indigenous knowledge increase cultural pride and motivation to solve local problems with local resources and it can help to sustain agricultural practices by preventing plant genetic erosion and environmental deteriorating (Awuor, 2013).

- **Mixed cropping and intercropping**

Promotion of mixed cropping and intercropping strategies can help to maximize year round availability of food gardens and increased crop yield (Abdu-Raheem & Worth, 2011; Freedman, 2015). Mixed cropping is gardening in which different kinds of crops are grown on a single piece of land (Abdu-Raheem & Worth, 2011). This process ensures that the amount of one type of nutrient does not get depleted thereby helping the gardener by having a good yield even without using fertilizers (Abdu-Raheem & Worth, 2011; Freedman, 2015).

According to Richford (2016) and Spengler (2021), planting two or more crops together can benefit one or both plants. In most cases both plants provide a service to another plant wherein the companion plant may help to control weeds, insects, pests or boost the growth of the plants (Richford, 2016; Spengler, 2021). According to Abdu-Raheem and Worth (2011), and Freedman (2015), promotion of mixed cropping and intercropping strategies can help to maximize year-round availability of food gardens and increased crop yield. Strategies for home gardening as an intergraded food security strategy and integrated farming systems may also entail introduction of new crops, promotion of unexploited traditional foods and home gardens, promotion of improved preservation and storage of fruits and vegetables to reduce wastes, post-harvest losses and effects of seasonality as well as strengthening of small-scale agro-processing and food industries (Abdu-Raheem & Worth, 2011).

- **Water conservation practices and organic farming**

Water is the most important resource and a basic requirement in food production which entails the success of the food production activities (Musotsi, Sigot & Onyango, 2008; FAO 2010; Galhena *et al.*, 2013). According to Musotsi, Sigot and Onyango (2008); FAO (2010) and Galhena *et al.*, (2013), resources available for food production such as water are scarce and costly and its inaccessibility could be a major constraint to food production and hence food security. Water accessibility needs to be increased in order to enhance food production.

Technology such as rain water harvesting, which is the process of concentrating, collecting and storing rain water for use at a later stage can be used to increase water accessibility (Carstens, Hay, & van der Laan. 2021; Water Management-South Africa. 2021). This technology can ensure water availability for gardening purposes during the dry seasons. The study by Carstens, Hay, and van der Laan. (2021), revealed that the use of harvested rain

water increased home gardening yields by 40-60%. Rainwater harvesting, water conservation practices and organic inputs can increase yield and reduce risk of crop failure (Baiphethi & Jacobs, 2009; Carstens, Hay, & van der Laan. 2021).

- **Crop rotation**

Crop rotation is one of the food production strategies that are used to ensure year round stability of food in the food gardens. It is one of the most basic principles of vegetable production which involves moving the growing location of plant families in the garden each and every season (Spraque, 2019). Crop rotation programme is a planned cycle of crops that will be planted in a particular land in a defined order over three to five years (Hamilton, 2017; Spraque, 2019). The continuous planting of the same crops all the time in every growing season is not good because it depletes the soil of needed nutrients and allow weeds and insects to adapt and thrive thereby negatively affecting the yield of the products (Hamilton, 2017; Spraque, 2019). Growing different crops at different times has been a beneficial strategy which helps to break the circle of diseases and improve soil health (Spraque, 2019). According to Hamilton (2017), crop rotation is a recommended strategy that has sustainable benefits to the crops that are grown because it introduces new nutrients and reduce emissions, it prevent soil erosion, help to provide ground moisture and provide pest control.

2.7. Challenges to food gardening

Community gardens face many challenges that limit their production (Galhena *et al.*, 2013). The challenges that inhibit home gardens may include but not limited to the following:

- **Climate change and land degradation**

Food production is largely affected by the growing issues of climate change. According to TANGO International (2009), the impact of climate change poses a significant challenge to the availability of food as it affects crop production. Food supply can be inhibited when crop yield declines due to extreme weather conditions such as cold fronts and extended heat waves (Hanson, 2013). According to FAO (2015), climate change and environmental degradation undermine the food production progress achieved and poor people suffer the most. South

African food security is susceptible to climate change and resource deprivation (Dube, Scholes, Nelson, Mason-DÇroz & Plazzo, 2013). Besides the global economic conditions, other challenge that hinders progress towards fully achieving the 2015 food security target is the extreme weather events and natural disasters (FAO, 2015).

- **Natural disasters**

Like any other food production system, home gardens maybe vulnerable to harsh environmental conditions such as drought and floods. South Africa does not have a structured system of dealing with food security disasters such as floods and drought (FAO, 2015)**.** This situation was evident in 2016 in Limpopo and Thulamela municipality in particular when many farmers were unable to produce food and rear their livestock, which resulted in many losses and shortage of food because of drought (Maponya & Mpandeli, 2016). Thus, the increasing incidence and extent of these natural disasters poses serious conditions and challenges for sustainable agriculture and rural development (FAO, 2010; Galhena *et al.*, 2013). When these disasters occur, they put the food security position of agricultural dependent households under threat. As a result, it leads to inadequate and unstable household food supply for the majority of producers, more especially in the former homelands (FAO, 2015) where this study was conducted. In such instances households are unable to feed their families from the emaciated production base which in turn results in hunger and malnutrition (FAO, 2015).

- **Lack of land and water**

The resources available for food production such as water and land are becoming scarce and costly and their inaccessibility can be a major limitation to food security (Musotsi, Sigot & Onyango, 2008; FAO, 2010; Galhena *et al.*, 2013; Baht, Tlalang & Lombard, 2019). According to Hanson (2013), access to land can be the most important determinant of people's participation in agricultural activities**.** Inadequate land inhibits food production and poses many challenges to home gardening (Galhena *et al.*, 2013). Access to land is not enough and many households produce food in their backyards mainly for their own consumption and it is not enough to feed more people.

Though access to land is important for people to produce more food, alone it is not enough. Lack of sufficient water to irrigate crops can become a limitation to food supply and availability (Hanson, 2013; Baht, Tlalang & Lombard, 2019). Dube *et al*., (2013) postulate that in some areas where there are irrigation schemes such as Tshiombo in Thulamela municipality the situation is worsened by maladministration of the irrigation schemes and lack of maintenance of the irrigation canal by government which result in lack of water. The study by Carstens, Hay, and van der Laan (2021) revealed that water unavailability resulted in fluctuations in food production and it has undermined the success of home gardening. Even though households can have access to land without water they cannot be productive (Baht, Tlalang & Lombard, 2019).

- **Mismanagement and lack of sustainability of gardening projects**

According to FAO (2010), mismanagement of gardening projects and lack of sustainability usually result from failure to invest in the necessary agricultural resource and understanding the gardening systems. Lack of gardening skills and poor management of food gardens is another hindrance to food production (Galhena *et al.*, 2013). In spite of the fact that home gardening activities require less amount of horticultural knowledge, crops losses and other negative implications can be reduced when household members are empowered with better skills and knowledge.

- **Lack of support**

Weak support networks and disaster management systems are another drawback. In former homelands these challenges are inhibiting both home gardens and the cultivation of communal land (Baiphethi & Jacobs, 2009; Breene, 2016). Dube *et al.,* (2013) and Baht, Tlalang and Lombard (2019) maintained that lack of extension services is one of the major constraints to food gardening which result in lack of gardening skills and poor management of food gardens. Amongst others some limitations to food gardening include lack of fencing, pest control, lack of irrigation equipment, lack of planting materials and seeds, lack of gardening skills and poor management (Galhena *et al.,* 2013; Baht, Tlalang & Lombard,1019; Carstens, Hay, and van der Laan, 2021).

2.8. Summary of literature review

It is clear from the literature review that food insecurity still exists in many parts of the world including South Africa. Many studies have been conducted in the area of food gardens and their contribution to food security and income generation. It is revealed that gardening remains the most important method of food production for the majority of people in the developing world and it play a significant role in food security (Musotsi, Sigot & Onyango, 2008; Pawlak & Kolodziejczak, 2020; FAO, 2015, 2021; Oguttu, Mbombo-Dweba & Ncayiyana, 2021). It is also evident from literature that home gardens are part of agriculture and food production systems in many developing countries and are widely used to alleviate hunger and malnutrition. Therefore, food gardening is regarded as an important strategy to address food insecurity and community development in many countries. The findings from earlier reviews, recommended that home gardening, has the real potential to increase access and year-round availability of nutritious foods, especially vegetables and fruit, (Faber & Wenhold, 2007; Maunder & Meaker, 2007; FAO, 2010,2021; FAO; Oguttu, Mbombo-Dweba & Ncayiyana, 2021; Fahy, 2021; Evert, 2022).

Ultimately the food gardening initiatives should be seen as an integral part of this research as a possible means for ensuring and improving food security, household income and the development of communities. This is illustrated in the conceptual framework of this study (Figure 1.1) and it is supported in this study that agricultural interventions such as food gardening can be able to make a progress in the area of food insecurity. According to Galhena *et al.*, (2013), there is a continuous need to increase global food production by 70% in order to meet the food demands of the expected world's population of 9 billion people by 2050. Overall the literature review supports the promotion of home gardens as a sustainable practice to improve food security and economic growth hence development of communities.

The methodology and the research design used for this study is explained in chapter 3.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter addresses the research approach and the techniques used to measure the concepts of this study. It describes the study area, the research design, study population, sampling procedure, data analysis, ethical consideration, and relevant data collection techniques that were used to generate data that was collected in this study. It also highlights the envisaged outcomes of the study, feedback and dissemination and the methods to combat error.

3.1. Description of the study area

The study was undertaken in Thulamela municipality area which is located at the eastern tip of Vhembe district, in the Limpopo province, South Africa. Thulamela is a countryside municipality situated in the far north of Limpopo Province that is found in the former Venda homeland. It is the fourth largest of all municipalities falling under Limpopo province and the largest out of the four local municipalities comprising Vhembe district municipality, covering an area of 2 893.936 km²: 22˚ 57 S 30˚ 29 E (IDP review 2020/2021). In terms of population it is the second largest of all municipalities in Limpopo Province (IDP review 2020/2021). Thulamela municipality shares the borders in the south with Collins Chabane municipality while bordering Musina municipality in the north east and Makhado municipality in the west. Rural and semi-rural areas characterize this municipality with small urban areas and a few farms.

Thulamela municipality covers a vast track of land which is mainly tribal and Thohoyandou is its political, administrative and commercial center (IDP review 2020/2021). According to Statistics South Africa (2011), and based on the Census 2011, Thulamela local municipality had a population of 618 462 in which more than 85% of the people live in tribal areas. However as a result of the demarcation changes in 2016 the Thulamela population declined by 121 225 to 497 237 (IDP review 2019/2020, 2020/2021). Statistics also indicated an unemployment rate of 43.8% and a poverty rate of 68.8% which might suggest that

Thulamela municipality is characterized by poverty-stricken households who live below the poverty line. Thulamela is made of 41 wards which encompass approximately 130,321 households (i.e. 107 927 traditional areas; 22,372 urban areas and 22 farms) in 225 areas. Of these households around 71,812 are engaged in agricultural activities wherein 57.8% are growing vegetables for household consumption and for sales (IDP review: 2013/2014; Statistics South Africa, 2011; Community Survey, 2016; IDP review, 2020/2021).

The study mainly focused on households from different areas in Thulamela municipality that were engaged in agricultural activities such as Matangari; Tshiawelo; Tshiombo; Mungindini; Mianzwi; Maraxwe; Mbahela; Muhotoni; Mutshenzheni, Tshibvumo; Matshavhawe. Thongwe; Baiomoro; Madadani; Tshapasha; Pile; Tshandama; Tshilamba; Mulodi; Bashasha; Shadani; Sambandou; Tshitavha; Mukondeni; Khubvi; Tshidimbini; Vondwe, Hamakhuvha; Tshitereke: Vhufuli; Gondeni; Phiphidi; Mukumbani, Lunungwi, Tshilapfene; Khalavha; Ngovhela; Maungani; Sibasa; Thohoyandou; Tshilonwe; Tshivhilwi; Haluvhimbi; Mukula; Tshidzini; Tshifudi; Tshikambe; Gaba; Tshaulu; Muhuyu; Thenzheni; Tshipako, Vhutalu; Mudzidzidzi; Tshilungwi; Magidi; Mauna; Matatshe; Ngudza; Dzingahe; Tshivhulani; Makwarela; Mbaleni; Tshiulungoma; Miluwani; Dumasi; Makhuvha; Bunzhe; Mangondi; Maniini; Muledane; Shayandima; Matieni; Itsani; and Tshisaulu. The households in these areas, who were in one way or the other involved in food gardening, either having communal land, traditional field, vacant lot, backyard gardens, near the road or rivers gardens or in school and clinic yards were purposefully selected to form the unit of analysis for this study. Figure 3.1 below represent the map of the study area.

MAP OF THE STUDY AREA

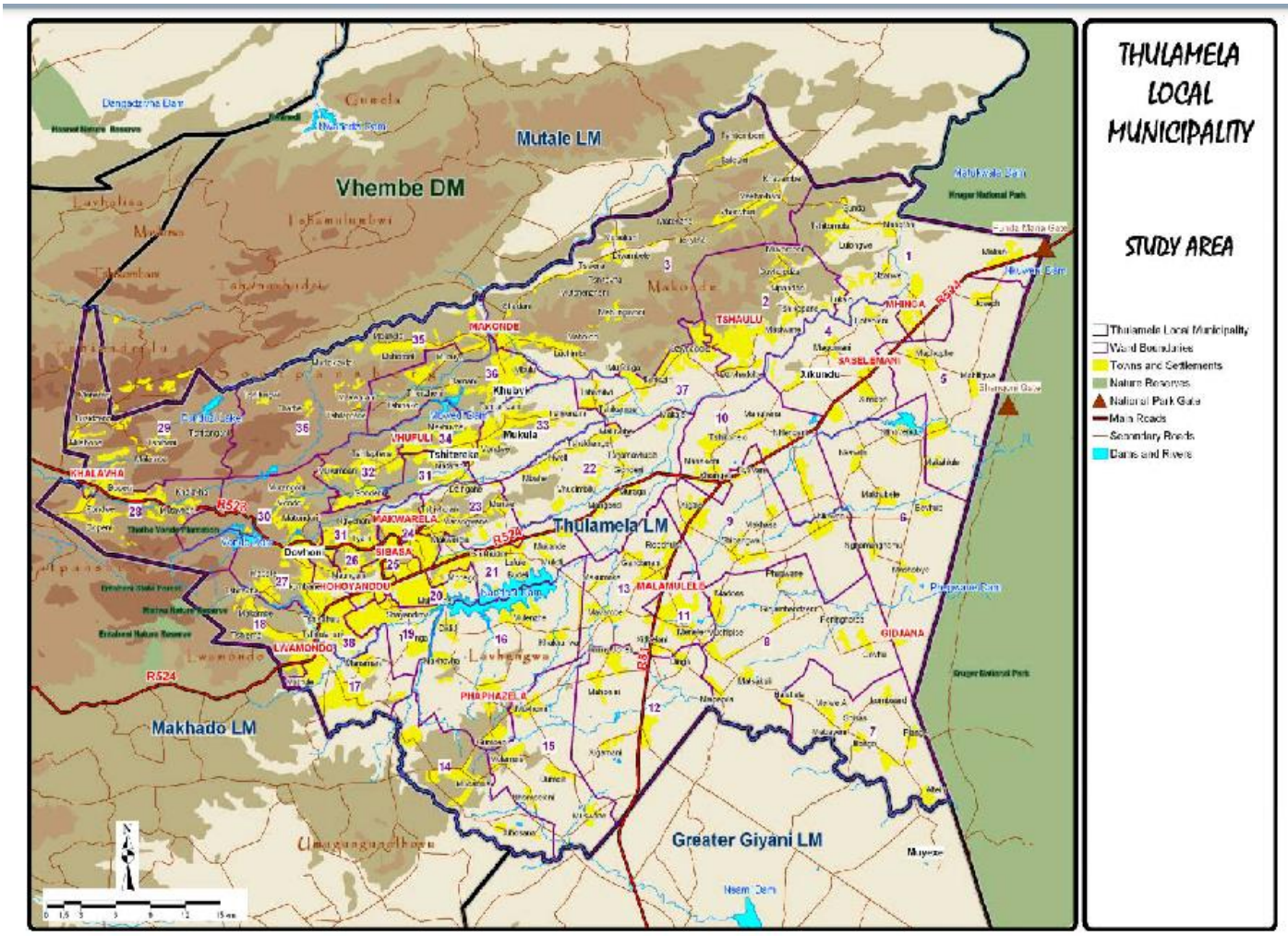

FIGURE 3.1: LOCALITY MAP OF THULAMELA MUNICIPALITY

3.2. Research design

The selection of an appropriate research method is critical to the success of any research project. A longitudinal research design was implemented for the purpose of this study. Longitudinal studies are observational in nature and a type of correlational research which can be used to discover the relationship between variables that are not related to various background variables (Babbie & Mouton, 2010, 2016; Bhattacherjee, 2012; Cherry & Trust, 2020). According to Cherry and Trust (2020), longitudinal studies are carried out over a short or long period and they can take place over a period of weeks, months or years and even decades.

As opposed to cross- sectional studies, longitudinal studies involve collecting data over an extended period beyond a single moment in time by establishing a sequence of actions (Babbie & Mouton, 2010, 2016; Bhattacherjee, 2012; Cherry & Trust, 2020). In this study the researcher intended to analyze food gardening activities in different food production seasons over a period of a year. A longitudinal study design was used because the researcher wanted to get a comprehensive idea of food gardening activities and food security issues in the study area in-line with the objectives of the study. The researcher conducted several observations and gather data for the same subjects repeatedly over the study period without interfering with the subjects (Leedy & Ormrod, 2005; Bhattacherjee, 2012; Cherry & Trust, 2020).

The benefit of longitudinal studies is that researchers are able to detect developments or changes in the characteristics of a target population at both the group and the individual level (Babbie & Mouton, 2010; Bhattacherjee, 2012). Longitudinal data allows the researcher to explore dynamic rather than static concepts. This is important for understanding how people move from one situation to another and the link between earlier life circumstances and later outcomes. By building up detailed information over time, longitudinal studies are able to paint a rich and accurate picture of the participants' lives.

Longitudinal data also allows the researcher to assess the time related characteristics of particular events or circumstances (that is their duration, frequency or timing) (Cherry & Trust, 2020; Gaille, 2017). In this study the researcher intended to notice the consistency of food gardens and household gardening activities in providing food for the participants at different seasons. The researcher's objectives were achieved by collecting primary empirical data together with secondary empirical data (Babbie & Mouton, 2010; Bhattacherjee, 2012), using various measuring instruments such as interview questionnaires, 24 hour food recall, food frequency questionnaires, focus group discussions and observation checklists over a period of two growing seasons (summer and winter) from January 2017 to December 2017.

This study was conducted through mixed methods research wherein different methods of data collection and analysis were used. The combination of research methods was most effective in achieving the research aim and objectives (Bhattacherjee, 2012; Diwadi, Shrestha & Giri, 2021). For the purpose of this study, triangulation which is a powerful technique that facilitates validation of data through cross verification from two or more sources was applied (Trainor, 2013; Diwadi, Shrestha & Giri, 2021). Triangulation can be used in both qualitative

(inquiry) and quantitative (validation) studies and it is an appropriate strategy of ensuring the credibility of the research analyses. In particular it refers to the application and combination of several research methodologies in the same phenomenon (Trainor, 2013; Diwadi, Shrestha & Giri, 2021).

This research was thus conducted within both the qualitative and the quantitative methods. By combining multiple methods and techniques of data collection the researcher hoped to overcome the weaknesses or intrinsic biases and the problems that come from single methods (Trainor, 2013; Diwadi, Shrestha & Giri, 2021). The important premise in this study was that the use of quantitative and qualitative approaches in combination will provide a better understanding of the research problem than either approach alone. The two research methods have different complementary strength and when used together can lead to a more comprehensive understanding of a phenomenon (Babbie & Mouton, 2009; 2016; Bhattacherjee, 2012; Diwadi, Shrestha & Giri, 2021), hence triangulation.

The quantitative research method was implemented in this study. In an attempt to answer the research questions, to achieve the research objectives and to test the validity of the hypotheses for this study, a survey technique was used to collect quantitative data using closed questionnaires. This method places emphasis on variables in describing and analyzing human behavior and it examines the effects of an independent variable on the dependent variable (Babbie & Mouton, 2010, 2016; Diwadi, Shrestha & Giri, 2021). It is the strongest way to prove or disprove a hypothesis (Bhattacherjee, 2012). This method can be very useful in collecting information on people's needs, behaviour, attitude, environment and opinion about a particular group by asking them questions as a way of getting data for analysis, interpretation and tabulating their responses (Bhattacherjee, 2012; Babbie & Mouton, 2009; Diwadi, Shrestha & Giri, 2021). In addition, food frequency questionnaire was also used to collect quantitative data. The strength of this design is that it does not require much time and money and it require relatively few subjects and can be applicable to several different groups of subjects (Babbie & Mouton, 2010, 2016).

The qualitative research method was also implemented for the purpose of this study. This method is designed to explore the human elements of a given topic, it examines how individuals see and experience the world and it is typically used to explore new phenomenon and to capture individual thoughts, feeling or interpretation of meaning and process (Given,

2008; Busetto, Wick & Gumbinger, 2020). A survey collected qualitative data for this study using open-ended questionnaires (Bhattacherjee, 2012). To increase the credibility and validity of the results of this study 24-hour food recall, focus group discussions and observation checklists were used to collect qualitative data. Consequently, the combination of qualitative and quantitative data gave an expansive picture on the role of food gardens to food security and development of communities. Data was analyzed both quantitatively and qualitatively.

3.3. Study Population and Sampling procedure

The population is the set from which the individuals or units of the study are chosen (Babbie & Mouton, 2010, 2016). According to Bhattacherjee (2012), the study population which is the unit of analysis, refers to the person, collective or object that is the target of the investigation. The unit of analysis for this study was men and women from households in Thulamela municipality who operated home gardens. These participants were identified from the world of everyday life and lay knowledge which is scientifically referred to as world one (Babbie & Mouton, 2009, 2016; Bhattacherjee, 2012).

According to the Thulamela municipality Integrated Development Plan (IDP) review, 2013/2014) for local government, 71,812 of households in Thulamela were engaged in agricultural activities wherein 57.8% of these households were growing vegetables for household use. The population for this study was taken from different areas in Thulamela municipality where households were practicing food gardening. Therefore 75 areas that were purposefully selected in Thulamela municipality were visited for the purpose of this study. Out of the 75 areas households were purposefully chosen from each area to constitute the sample for the study. The sample size was determined based on the percentage of confident levels, margin of error/confident interval and response distribution (Smith, 2013). For the purpose of this study the sample size depended on the confident level of 95%, 5% margin of error and the response distribution of 50% (Smith, 2013).

The Creative Research System Software which is a sample size calculator based on the percentage of confident levels, margin of error and response distribution was used to attain the sample size for this study. Therefore, based on the figures mentioned above a sample of

383 households was established and data was gathered from that sample. Data was also collected from a sample of 82 individuals who formed different focus groups consisting of a minimum of six people in each group. Nine focus groups were formulated wherein there were five groups of gardeners, two groups of chiefs and civic leaders, two groups of extension workers and community gardening leaders. The population for this study was therefore made of a total sample of 465 respondents which according to Babbie and Mouton (2010), is referred to as the observation unit or element from which information is collected. The researcher generated original data from that sample in order to determine the role of food gardens to food security and development of communities. The selection of participants is a very vital part of planning research and it requires careful planning and choosing of an appropriate method for sampling. It is very easy to obtain a biased sample that does not represent the entire population (Bhattacherjee, 2012), and thus effort was made in this study to minimize biases. The following sampling procedure was used to select the sample for this study.

- **Non-probability sampling**

In non-probability sampling the population is not entirely known and individual probability cannot be known. Common sense or ease is used to choose the sample but efforts are made to avoid bias and keep the sample representative (Leedy & Ormrod, 2005; Etikan & Bala, 2017). The researchers can select units from the population that they are interested to study and collectively the units form a sample that the researcher studies (Leedy & Ormrod, 2005; Etikan & Bala, 2017). The researcher drew a sample from households in Thulamela municipality using non-probability sampling procedure because it was suitable for the purpose of this study. The sample was comprised of household that were engaged in gardening activities. Two types of non-probability sampling techniques were used to select the sample for this study, which are purposive or judgmental sampling and snowball sampling.

Purposive or judgmental sampling:

Non-probability sampling was adopted in this study using a purposive or judgmental sampling type (Singh & Masuku, 2014; Babbie & Mouton, 2010, 2016). It is a strategy where the researcher chooses the sample based on who they think is appropriate for the study

(Yates, Moore & Starnes, 2008; Babbie & Mouton, 2010, 2016; Etikan & Bala, 2017). The population is selected because of some specific characteristics that the researcher is interested in (Singh & Masuku, 2014; Etikan & Bala, 2017; Nikolopoulou, 2023; Aransiola, 2023). Unlike probability sampling, where every element in the population has a known and equal chance of being chosen, judgmental sampling relies on the subjective judgment of the researcher to identify the most relevant or representative sample (Nikolopoulou, 2023; Aransiola, 2023). Judgment sampling allows the researcher to go directly to the target population of interest (Nikolopoulou, 2023). This technique can be used to select a more representative sample that can bring more accurate results than by using other probability sampling techniques (Babbie & Mouton, 2010; Etikan & Bala, 2017).

Furthermore, judgmental sampling allows the researcher to select a sample that is specifically tailored to the research objectives and the population being studied (Nikolopoulou, 2023; Aransiola, 2023). This can result in a more focused and accurate representation of the population (Nikolopoulou, 2023; Aransiola, 2023). In addition judgmental sampling can be used to target specific subgroups of the population that may be difficult to access with other sampling techniques. Such subgroups may include those with specific interest, characteristics, or experiences (Nikolopoulou, 2023; Aransiola, 2023). To ensure that the sample is representative of the population, factors such as the size of the population, the characteristics of the population, the desired sample size and the budget available were taken into consideration (Aransiola, 2023). Since the aim of this study was to investigate the contribution of food gardens to food security it was best for the researcher to collect data from households that were engaged in food gardening. The researcher used this technique to choose the households that constituted the study sample.

The researcher went to 75 Thulamela municipality areas (urban and tribal areas) and from those areas households that were engaged in gardening activities during the time of data collection for the purpose of household consumption and selling of surpluses were selected to constitute a study sample of 383 households. The number of participants in each area was dependent on the size of the visited area and the engagement in food gardening. Initially the plan was to collect data from at least 5 to 6 participants in each area in an attempt to cover as wide the Thulamela municipality areas as possible. However due to the difference in sizes of the areas and the availability of food gardens, more or less than 6 participants were selected depending on the size of the area and availability of food in the gardens.

To ensure that the sample within each village was representative, the researcher and the research assistants first met at the central point in the village. From there households were selected between the central point and the end of the village. In small areas and areas with few households who were involved in food gardening less households between 4 and 5 were selected, while in large areas and areas with more households who were involved in food gardening about 6 households were selected to form a sample for the study. Households were purposively selected and only households that volunteered to be interviewed participated in the study.

For the purpose of this study the researcher applied the inclusion and exclusion criteria (Mallert, Hagen-Zanker, Slater & Duvendack, 2012; Aransiola, 2023; Nikolopoulou, 2023), by excluding the households that were not engaged in food gardening activities. The sample of participants was therefore chosen based on the fact that they were participating in food gardening activities and they had gardens with live crops during the time of data collection. This sample was best suitable to achieve the researcher's objectives for this study. The researcher asked one individual in each household, where possible the breadwinners to participate in the study. This technique was found to be useful and more appropriate for this study because it enable the researcher to use the participants that were suitable for the study who were able to answer the research questions and to prove or disprove the hypothesis for this study rather than taking everyone including those that were not participating in food gardening.

Snowball sampling:

Snowballing, also known as chain sampling or network sampling method is a type of purposive and convenient sampling (Naderifar, Goli & Ghaljaei, 2017; Nikolopoulou, 2023). It can happen in a number of ways, but generally is when a group of people recommends potential participants for a study or directly recruit them for the study (Naderifar, Goli & Ghaljaei, 2017; Aransiola, 2023). According to Nikolopoulou (2023), snowball sampling is a non-probability sampling method where new units are recruited by other units to form part of the sample. Those participants then recommend others and a sample build up like a snow rolling down the hill (Yates, Moore & Starnes, 2008; Aransiola, 2023; Nikolopoulou, 2023). Snowball sampling begins with one or more participants, it then continues on the basis of referrals from those participants (Nikolopoulou, 2023). For example, the first participant is a

friend, the friend refers a friend and the sample buildup in this manner until the intended number of participants is arrived at (Yates, Moore & Starnes, 2008; Naderifar, Goli & Ghaljaei, 2017; Nikolopoulou, 2023). Snowball sampling can be a useful way to conduct research about people with specific traits who might otherwise be difficult to identify (Nikolopoulou, 2023). Although such samples can be biased because people given have more social connections that are unknown, it provides higher chance of selection and can be used primarily as a response to overcome the problems associated with understanding and sampling concealed and isolated populations (Yates, Moore & Starnes, 2008; Naderifar, Goli & Ghaljaei, 2017; Aransiola, 2023).

For the purpose of this study the researcher selected people separate from the sample to form the focus groups, such as the gardeners, extension officers and community gardening projects leaders and the chiefs and civic leaders from the identified areas. Members of the focus groups were chosen based on their purpose to the study and according to the researcher's judgment that they are somehow related to food gardening activities. The researcher went into the study areas and recruited the initial participants and thereafter asked the participant to indicate other individual members that fall in the same category and included them until the required number of participants was reached. The participants were allowed to recommend other potential participants who the researcher might not have known and could not include them in the study sample. This helped the researcher to get hold of the correct participants as members of the focus group because those people knew each other. The researcher find this technique suitable because a snowball sample responded differently than a random sample from the same population and that the research questions were adequately answered using this sampling technique (Leedy & Ormrod, 2005; Yates, Moore & Starnes, 2008; Naderifar, Goli & Ghaljaei, 2017; Aransiola, 2023; Nikolopoulou, 2023).

Non-probability sampling technique is the least expensive way of selecting a sample and it guarantees the inclusion of the type of people the researcher needs (Trainor 2013; Etikan & Bala, 2017; Nikolopoulou, 2023). Although this technique is likely to be biased (Bhattacherjee, 2012; Nikolopoulou, 2023), it is justifiable in this study and the target population was selected based on the researcher's judgment as well as the purpose of the study. Risky though, the researcher counteracted this possibility by choosing a sample based on the confident level, margin of error and response distribution (Smith, 2013) as highlighted above, taking into account the total number of households from different areas of study in

order to be as representative of the entire population as possible. This allowed the findings of this study to be generalized.

3.4. Data collection

For the purpose of this study both qualitative and quantitative data collecting techniques were used to collect data. Methodological triangulation which involves the use of more than one method of collecting data was applied to ensure reliability and validity of the study (Trainor, 2013; Diwadi, Shrestha & Giri, 2021). According to Trainor, (2013) and Diwadi, Shrestha and Giri (2021), triangulation crosschecks information to produce accurate results for certainty in data collection. The idea is that one can be more confident with the results if different methods lead to the same results.

Various data collection techniques such as interviews using a questionnaire, focus group, observations, 24 hour food recall and food frequency questionnaire were used to gather data for this study. Data was gathered on participants' demography, the role and contribution of food gardens to food security (looking at availability, accessibility, utilisation and stability), the contribution of food gardens to community development, the contribution of food gardens to household income, strategies to ensure sustainable year-round availability of food gardens and on challenges that food gardening initiatives are faced with.

- **Qualitative data was collected as follows:**

Questionnaires

The semi-structured questionnaires were designed for this study, and important steps in designing the questionnaires were followed. The researcher took the main and specific objectives into consideration and formulates questions based on the specific objectives and research questions of the study. The type of participants was considered and questions that could be understood without ambiguities were formulated. The questions were clearly and sequentially formulated addressing the objectives of the study in a logical way. The questionnaires included open-ended questions to collect qualitative data. This is the most common source of data in qualitative studies and it's very useful to collect data where there is low level of literacy by the participants. They were administered on a one-to-one face

interview where the researcher was able to collect information verbally and directly from the participants (Babbie & Mouton, 2010, 2016). Although this method was time consuming the researcher had the opportunity to probe for answers when necessary. Care was taken so that participants did not influence each other and the interviewer did not make predictions about the responses of the participants nor be influential in the manner in which participants responded.

Observation

Simple observation where the researcher was the outside observer was used to collect data in this study. Observation is advantageous in that it can be done anywhere and that the observing, thinking researcher is there at the scene of action and notes could be taken on the observations (Babbie & Mouton, 2010, 2016). Prepared observation checklist was used to record the findings that were gathered by directly observing and talking to people. Observation was useful in gathering information on availability of food in the food gardens, accessibility and utilisation of food from the gardens as well as on those who were generating income from selling the garden products.

Focus group

A focus group is an organised discussion structured in a flexible way of between 6 and 12 participants and it is composed of homogeneous members of the target group. It is useful in collecting qualitative data and it usually last one to two hours and provides the opportunity for all the participants to participate and give their opinions (Harris & Brown, 2010; Busetto, Wick & Gumbinger, 2020). Focus group help to further explore the research topic thereby providing a broader understanding of why people may behave or think in a particular way and assist in determining the reason for their attitude and beliefs (Harris & Brown, 2010). According to Harris and Brown (2010), pre-determined criteria are used to recruit focus group participants and the topics to be discussed are decided beforehand. For the purpose of this study the focus groups were selected according to their interest and willingness to participate. Being actively engaged in food gardening activities and experiences in participating in food gardening were also used as a criterion for participating in focus group discussions. A checklist of key questions was used to conduct focus group discussions in this study.

The researcher used a list of open-ended questions arranged in a natural and logical sequence (Harris & Brown, 2010) to collect information from participants in different focus groups. The focus groups were constituted in different areas where households were engaged in food gardening activities. A sample of 82 participants was formed and it was comprised of five groups of gardeners with 12 members per focus group, two groups of chiefs and civic leaders, one with 8 members and the other with 10 members and two groups of extension officers and community gardening leaders of which one group had 6 members and the other one had 8 members. During data collection, whilst the researcher was asking the questions, a note taker observed and recorded the responses of the group while a technician recorded all the group discussions with an audio recorder which was then transcribed and analysed.

24-hour food recall

This is a dietary recall in which a trained interviewer ask the subjects to recall in details all the food and beverages consumed over the past 24 hours (Kye, Kwon, Lee, Lee, Kim, Suh & Moon, 2014). It can be useful in collecting data on the adequacy of people's diet. This instrument is more reliable in giving relevant and accurate information than a longer reference period such as a week or a month recall where people tend to forget what they have eaten (Kye *et al.*, 2014). For the purpose of this study a 24-hour food recall tool was formulated and tested in a pilot study outside the study group. This tool was used to establish the current diet and consumption pattern of the households in Thulamela municipality who participated in this study. The 24-hour food recall helped the researcher to generate data on current household access to food and utilisation thereof. The participants were asked if the previous 24 hours was normal or usual for the household. If it was not a normal day, for instance if there was an occasion, a feast or a funeral, then another day was considered for the interview.

The recall was expected to provide information on the type of meals and food eaten by different household members on a previous day. The researcher was able to generate data on household food consumption patterns at that time. The participants were also required to indicate whether the food was eaten at home or outside the home since people can eat food either at home, at the store/restaurant, at the gardens or elsewhere depending on where they were. The researcher was of the opinion that foods that were eaten outside the home might not reflect household dietary patterns since people can eat food not prepared at home but

bought from restaurants. Therefore, the researcher focused more on food that was eaten either at home or at the garden, believing that this could have been the food prepared from some of the participants' food garden produces.

- **Quantitative data was collected as follow:**

Questionnaires

Questionnaires with close-ended questions was developed and used to collect quantitative data. They were only available in English and the researcher had to read out, translate and complete the questionnaire on behalf of the participant in case of language barrier and low level of literacy. Privacy and anonymity were ensured and the participants were encouraged to be honest when answering the questions. The length of questions was limited to avoid participants from being discouraged to participate. The questionnaires were tested in a pilot study beforehand for content, length and wording.

Food frequency Questionnaire

A food frequency questionnaire (FFQ) consists of a finite list of foods with response categories. It estimates how frequently certain foods were consumed during a specified period, usually the past month or a year (Gibney, Lanham-New, Cassidy & Vorster, 2013). FFQ is easier to describe one's usual frequency of consuming a food than to describe foods eaten at a specific meal in the past (Gibney *et al.,* 2013). Dietary data from FFQ can be used to rank persons according to their intake of specific foods (Gibney *et al.,* 2013). The list was short enough to prevent subject fatigue but it was comprehensive enough to adequately capture the food items which were of interest. The strength of a FFQ is that it can be self-administered without the assistance of trained personnel. However, where literacy was low interviewer-administered FFQ was done. The participants' burden was generally low and it required small time commitment. For the purpose of this study, only vegetables were listed on the FFQ with the aim to investigate household availability, access and utilisation of food from their food gardens. Therefore, the FFQ provided information on the kinds of food consumed that helped the researcher to examine and estimated how frequently different households consume certain foods during a specified period.

3.4.1. Summary of data collection and analysis

The following table provide a summary of data collection and analysis

TABLE 3.1: SUMMARY OF DATA COLLECTION AND ANALYSIS

Objective	**Method**	**Analysis**	**Statistics**
To investigate the role and contribution of food gardens to food security as follows: -Whether the food gardens contribute to food availability at household level. -The role and contribution of food gardens to household food accessibility. -Whether the food produced from the gardens contribute to food utilisation at household level. - Whether food gardens provide stability to household food availability. -To investigate the correlation between the socio demographic profiles and food security components (availability, accessibility, utilisation and stability).	Interview questionnaire Focus groups Observation Food frequency questionnaire 24 hour food recall	SPSS Content Correlation and Regression	Descriptive Inferential Themes, Frequencies Two-way table
To investigate the role and contribution of food gardens to community development. To investigate the correlation between the socio demographic profiles and community development.	Interview questionnaire Focus groups Observation	SPSS Content Correlation	Themes, Frequencies Descriptive Two-way table Inferential
To determine the role and contribution of food gardens to household income To investigate the correlation between the socio demographic profiles and household income.	Interview questionnaire Focus groups Observation	SPSS Content Correlation and Regression	Themes, Frequencies Descriptive Two-way table Inferential
To identify strategies for sustainable year-round availability of food gardens To investigate the correlation between the socio demographic profiles and strategies for sustainable food gardens.	Interview questionnaire Focus groups Observation	SPSS Content Correlation	Themes, Frequencies Content Inferential
To investigate challenges to food gardening To investigate the correlation between the socio demographic profiles and challenges to food gardening.	Interview questionnaire Focus groups Observation	SPSS Content Correlation	Themes Content Frequencies Inferential
To develop a framework of understanding the link between food security and food gardening initiatives.			

3.5. Data analysis and measurement of variables

Data was analyzed using appropriate statistical analysis system (SAS) such as descriptive and inferential statistical procedures (Babbie & Mouton, 2010; 2016). Quantitative data was analyzed by the Statistical Package for Social Science (SPSS) programme version 23 to give descriptive and inferential statistics. Descriptive statistical techniques are concerned with organizing and summarizing the data at hand to render it more comprehensive while inferential statistics helps to assess the strength of the relationship between the independent and the dependent variables. The study looked at the relationship between variables by performing tests for association between the dependent and the independent variables, which in this case the dependent variables are the food security components (Food availability, accessibility, utilisation and stability) variables, development of the community variables, household income variables, challenges to food gardening variables as well as strategies for sustainable year-round availability of food gardens, and the independent variables are the socio-demographic variables such as age, gender, experience in food gardening, education level and institution where food gardening was learnt. To look at the relationship among these variables data was analyzed using correlation tests and regression analysis.

Quantitative data was thus analysed using the following statistical methods of data analysis:

- Pie graphs, bar graphs and frequency tables.
- Summary statistics
- Cross-tabulation test of association was used to evaluate the strength of association between variables. The following variables were employed for cross-tabulation to determine the association between food security variables (availability, accessibility, utilisation, stability), income generation variables and the socio-demographic variables: Does food gardens enhance household food availability; How do you get the food that you eat every day; Does the garden provide enough food all year-round; Can food gardens enhance household food access to better diets; How often do you eat food from your own garden; What role does food gardens play to household food utilisation; Does your garden provide food for the household; Does the food gardens provide vegetables for the whole year; How can food garden be a source of income; How often do you sell vegetables; How can home gardens limit household financial constraints.

- Pearson Chi-squared test for association was used to identify factors that are significantly or insignificantly associated with food security variables. The tests were performed to reveal how socio-demographic variables have influenced food availability, food access, food utilisation, food stability, development of the community, household income, challenges to food gardening as well as strategies for sustainable year-round availability of food gardens. The following variables were used for Chi-squared test: How often are vegetables prepared and served to members of the family; What are the means of getting vegetables that were utilized; Food gardens can be a source of additional income to the household; Do you sell some of the food from your garden; Can selling garden produces help to limit household financial constraints; Home gardens can increase household purchasing power; Food gardens can help to develop the community; Food gardens can reduce poverty; Can food gardens create employment; Food gardens support self-employment and self-reliance; How can food gardens contribute to economic growth; Are there any challenges that limit your production; What challenges are you faced with; Which constraints affect you as food gardeners; How do you deal with these challenges; Do food gardens provide food for the whole year; What strategies do you use to ensure year-round availability of food gardens; Do you receive any form of support as gardeners; As gardeners do you work together and share ideas on gardening activities; Do you mix modern gardening with traditional gardening activities; Do you cultivate any indigenous plants in the gardens.
- Binary logistic regression is a statistical technique used to predict the relationship between the predictors (the independent variables) and the predicted (the dependent variables) variables. It determines how strong is the relationship between the variables and if there is a statistical significant between the variables (Edgar & Manz, 2017; Patel, 2021). Binary logistic regression analysis (Hosmer & Lemeshow) was performed in order to identify key factors which affect food security. The details of the dependent and independent variables considered in the logistic regression model are as follows: The dependent variable (Y) is the variable “Do food garden provide food for the whole year” and the independent variables (Xs) are: X1-Where did you learn how to do food gardening; X2-Does food garden enhance household food availability; X3 Do you think every household should have food gardens; X4-Do household members like to eat these food; X5-Food gardens can be a source of additional income to the household; X6- Do you cultivate any indigenous plants in the

gardens. Unadjusted and adjusted odds ratios were obtained for influential predictor variables.

- The likelihood ratio test, the sensitivity and specificity tests were also performed in order to assess the reliability of the fitted logistic regression model.

Qualitative data was analysed through content analyses to generate themes. All qualitative data was carefully reviewed and coded for certain words and content. Responses were arranged into categories whereby similar and related pieces of information were grouped into meaningful themes. The themes were generated through categorizing ideas that emerged from grouping of data points. Once the themes were identified data was organized into thematic groups and recurring themes were noted and compared. The meaning of the themes was analysed and connected to the research questions (Burnard, Gill, Steward, Treasure & Chardwick, 2008; Busetto, Wick & Gumbinger, 2020). Data was aptly prepared and the results was then described and interpreted in details (Babbie & Mouton, 2010).

The statistician was contacted to advice on data analysis before the study was conducted. The findings of the study were compared with what other researchers have found regarding the same research problem so as to analyze it more critically.

3.6. Ethical consideration

Research ethics involves protecting the rights of the respondents and institutions in which the research is done and maintaining scientific integrity (Burns & Grove, 2009; Bhandari, 2021). Approval to conduct research was obtained from the College of Agriculture and Environmental Sciences Research Ethics Committee before the research was conducted (Reference number**: 2017/CAES/013**). Furthermore, approval letter was asked from the Provincial Department of Agriculture and Rural Development Research Directorate, the local authority offices (the chiefs of the area) the municipalities and the department of agriculture extension sections. Ethical consideration with regard to the rights of the participants was applied when collecting data (Bhattacherjee, 2012; Bhandari, 2021). The researcher handed out consent forms and they were signed by all the participants. Therefore, no one was forced to participate (autonomy). These consent forms also indicated that participants had

participated on their own free will and that they were free to withdraw from the study at any time.

According to Bhattacherjee (2012) and Bhandari, (2021), informed consent implies that subjects are made adequately aware of the type of information the researcher wants from them, the reason for seeking information, the purpose the information will serve, how the subjects are expected to participate in the study, and how the study will directly or indirectly affect them. Participants were allowed to ask questions regarding the study. The researcher also ensured anonymity and confidentiality by protecting the information provided by the participants and by using the information only for the stated purpose of the research. This implies that data collected and analysed was used as research findings without using the real names of the participants. All participants were not harmed, thus ensuring non-maleficence (Bless, Higson-Smith & Sithole, 2013; Bhandari, 2021). The researcher also adhered to the principle of beneficence whereby the research conducted was significant in promoting the welfare of people.

3.7. Outcomes

The findings of this study are useful to the community as well as government and non-governmental organizations involved in promoting food security and development of communities. The following are the outcomes of this study:

- The findings of this study can be used by policy makers to design intervention programmes aimed at improving participation levels in home gardening among the residents of the study area in order to improve household food security in the area.
- The recommendations may be used as input into the current food security programmes in Vhembe district.
- Recommendations based on the research findings would be made available to different stakeholders such as households, extension workers, rural development practitioners, food security specialist, government and training institutions for their consideration.

- The findings of the study helped to develop a framework that outlined how food gardens could be linked to food security and the development of rural communities and expand the participation of the communities for sustainable community-driven food security programmes. Therefore, the benefits would be extended to the wider community.

- The developed framework might benefit policy makers in that they can use it to encourage and support food production activities with reference to food gardens around rural communities, thereby alleviating hunger and creating job opportunities.

- Moreover, the framework may include corrective measures for the challenges that would be identified in order to strengthen the good food gardening practices in future.

- The findings of the study will be made available for a wider body of professionals/ researchers in the form of a thesis and scientific publications.

Through this study new research areas are recommended and new literature for the subject area is being built and hence a major contribution to the existing knowledge. The conceptual framework which has been developed for this study which tend to highlight the link between food gardening and food security certainly add to the existing body of knowledge. This study provides an understanding that people viewed the importance of food garden as they relate it to food security and improved livelihoods. Although in many prior studies that are similar to the present study women were viewed as the principal role players in food gardening and the wellbeing of their household in general, it is of great significance in this study when men are viewed as the principal role players in food gardening and taking charge of the welfare of their families by providing food security. Another important contribution to the body of knowledge has been made through analyzing the association between food security variables and the participants' socio-demographic variables. Through these analysis knowledge has been gathered that socio-demographic profiles such as age, gender, education level, experience and training in food gardening, including institution of training can have an influence on food gardening which could have an impact on food security, income generation and community development.

3.8. Feedback and dissemination

Research dissemination, as the written or oral representation of the research findings, usually happens at the end of a research project (Keen & Todres, 2007; Wilson, Petticrew, Calnan & Nazareth, 2010). The report of the study in the form of thesis will be submitted to the library of the University of South Africa. The results of the study will also be disseminated through a thank you letter to participants, research summary document, community meetings, workshops, seminars and conference presentations. It is also envisaged that the findings of the study will be published in relevant journals, newsletters and the websites so that it will be accessible to many audiences.

3.9. Methods to combat error

A study cannot be considered valid unless it is reliable. The value and applicability of any research study depend on the validity and reliability of the respective data collection methods (Babbie & Mouton, 2010, 2016; O'brien, Cairns & Hall, 2018). Problems in terms of validity and reliability of the information given might be posed in research and they should be avoided. To control errors, the research was conducted in the natural setting and everyday context of the participants, with their full permission and at the times that suits them (Given, 2008; Babbie & Mouton, 2010, 2016; O'brien, Cairns & Hall, 2018). The quality of the study was therefore attended to through the elimination of potential error in the following ways:

3.9.1. Validity

Validity is the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration (Babbie & Mouton, 2010, 2016; O'brien, Cairns & Hall, 2018). It refers to whether the study measures or examines what it claims to measure or examine (Harris & Brown, 2010; O'brien, Cairns & Hall, 2018).

- **Content validity**

Content validity refers to the extent to which an assessment measure covers the entire range of meaning included within the concept. To support content and measurement validity in this

study, questionnaires were evaluated by the statistician and the experts of the subject (the promoters). A pilot testing of questionnaire was done to ensure content and measurement validity (Babbie & Mouton, 2010).

- **Construct validity**

Construct validity is the extent to which a scale index measures the relevant construct and appropriate terminology and nothing else (Babbie & Mouton, 2010). It is based on the logical relationship among variables (Babbie & Mouton, 2010). To support construct validity in this study more than one measurement technique was used to gather information and it was linked with known theory in the area and with other related concepts (Bless, Higson-Smith & Sithole, 2013; O'brien, Cairns & Hall, 2018). A valid measurement instrument was obtained through good conceptualization. Triangulation was incorporated through different data collection methods such as interview questionnaire, simple observation, focus groups, 24hour food recall and food frequency questionnaire.

- **Face validity**

Face validity refers to the way the instrument appears to the participants. It is the establishment of a link that each question in this study is linked to the objective of the study (Kumar, 1999; O'brien, Cairns & Hall, 2018). This was ensured in this study by using the objectives of the study to construct questionnaires.

3.9.2. Reliability

The key for validity in data collection is reliability and the study cannot be considered valid unless it is reliable (De Vos, Strydom, Fouche, & Delport, 2005; Babbie & Mouton, 2010; Mohajan, 2017). Reliability refers to how consistent a measuring device is. It is a matter of whether a particular technique, applied repeatedly to the same object would yield the same results each time (Babbie & Mouton, 2010; Harris & Brown, 2010; Mohajan, 2017). It means that if the same measures were used and a condition under which data was collected was held constant, the results should be the same from time to time (De Vos *et al.,* 2005; Babbie & Mouton, 2010; Mohajan, 2017). To maximize reliability during data collection, errors were minimized in this study in the following ways:

The researcher treated all the participants with dignity and recorded answers and observations accurately; Confidentiality and anonymity was ensured; Questionnaires were simple and straight forward; Questionnaires were assessed and verified for wording, concepts and relevancy and also checked if they covered the scope of the research objectives (Babbie & Mouton, 2010; O'brien, Cairns & Hall, 2018). All constructs were clearly conceptualized. Questionnaires were pre-tested by means of a pilot study. Additional interviewers were well trained for their purposes. All these contributed to the accuracy and precision of information that was supplied by the participants thereby enhancing the reliability of data that was collected in this study.

3.10. Conclusion

This chapter presented the research methodology and the material used in the study. Triangulation was ensured wherein a combination of quantitative and qualitative research methods were used to collect and analyse data. The study area, the study design, the sampling procedure, the sample size of study, data analysis, and the quantitative and qualitative methods used to collect data in the study have been explained in the chapter. The methods to combat error such as validity and reliability were discussed in this chapter. The chapter also explained the ethical procedures and guidelines that were followed in the study. The envisaged outcomes of the study, feedback and dissemination were outlined.

CHAPTER 4

TREATMENT OF DATA AND DEMOGRAPHIC PROFILES OF THE PARTICIPANTS

4.1. Introduction

This chapter together with the following chapters (chapter 5-12) presents data analysis, reporting and discussion of the research results. The data which were collected from selected participants through the use of questionnaires, 24 -hour food recall, engaging in focus group discussions, completion of observation checklist and food frequency questionnaires was transformed from merely raw facts into meaningful, actionable and insightful information.

Accordingly, a summary of descriptive statistics describing several variables whose data were gathered from the survey participants will be presented in these chapters. Of course, the transformation process was made possible through deploying data analysis methods as previously outlined in chapter 3. The data analysis whose results are reported in these chapters is based on the research aim and objectives and was performed while aiming to address the key research questions underpinning the rationality of undertaking this study as per outline previously tabled in chapter 1.

Hence, the present chapter is organized as follows: a) the first section illustrates how collected data were initially treated; b) the second section provides descriptive statistics of participants' background information.

4.2. Treatment of Data

All data analyses were analysed using the Statistical Package for the Social Sciences (SPSS v 23.0) and Microsoft Excel 2010. Prior to initial data analysis, the data on all variables were examined for accuracy of data entry and missing values. In total, 383 food gardeners participated in the study and their views and facts were gathered in relation to socio-demographic factors, food gardens and food security (availability, accessibility, stability and

utilisation), food gardens and household income, food gardens and community development, strategies for sustainable year round food gardens as well as challenges to food gardening.

4.3. Descriptive Statistics on Socio-Demographic Profiles

In this section, we present summary of statistics on socio-demographic variables of participants who took part in this study. According to Sakyi (2012), demographic profile of the head of the household play a pivotal role in determining household food security. It was thus important to study the demographic profiles of the participants in this study. Therefore, descriptive statistics generated on all socio-demographic variables (age group of the subjects, gender, highest education level, training institutions and tenure of gardening) are presented as follows.

4.3.1. Gender of the participants

The participants' gender was important in this study in order to determine whether men or women are the main role players in food gardening and food security. In summary, of the 383 participants, 55.6% (n = 213) represented male food gardeners while the remaining 44.4% (n = 170) were female food gardeners (n = 383) (see Table 4.1). This implies that nearly 6 in every 10 participants were males while the remaining 4 in every 10 were females. The results show that men were more active in food gardening than women. This also means that more males than females were into food gardening. This finding disagreed with Galhena *et al.,* (2013) who postulated that women are the main managers of home gardens and Thomas, Parwinder, Ashley and Darrin (2010) whose studies on profiling community gardeners revealed that there were more women than men who were participating in the community gardening projects.

Another study by Asangha (2015), about food garden and household food security status in Embo Community in KwaZulu-Natal in South Africa also revealed that women were the main cultivators of food gardens than men. A study conducted by Masekoameng and Maliwichi (2014) also indicated that the majority of the participants were women while men were in the minority. This information reveals that numerous studies that have been conducted on issues related to food security showed that women have a strong relationship

with food security and they are more involved than men. This is basically so because women are the ones who are more responsible in ensuring that food is available for their household members. However, the results of this study simply revealed that the trend has since changed with regard to the position of women in food gardening and it can be associated with AIFSRC (2018) who maintained that men have more access to food gardening resources (such as land and gardening inputs like seeds and agricultural equipment) than women.

4.3.2. Age of the participants

To fully understand the demographics of the participants in this study it was of utmost importance for the researcher to recognise the age group that was involved in food gardening activities. The result with regard to the age groups from which the survey participants belonged to, shows that 9.1% (n = 35) of the participants were aged between 20 to 35 years (the youths), 23.5% (n = 90) were aged between 36 and 45 years (young adult), 26.1% (n = 100) were between 46 and 55 years (the adults), 21.9% (n = 84) were between 56 and 65 years (old age) while 19.3% (n = 74) were above 65 years old and represented the senior citizens (see Table 4.1). These reported figures implied that nearly 1 in every 10 people who were involved in food gardening were youths while nearly 3 in every 10 people who practiced in food gardening were young adults. The figures also indicate that old-aged and senior citizen people who engaged in food gardening activities constituted 2 in very 10 participants.

These results reflected the intensity of working in the garden by indicating that the younger generation were not so much involved in doing food gardening whereas the adults were the once who were more involved than any other age group in this study, followed by the young adults and then the old-age group and lastly the senior citizens. The results of this study displayed similar trends as presented in the study by Thomas *et al.,* (2010) where the participation in food gardening rose with age and the majority of the participants were in the 50-59 age group and then fall down with older generation. Overall, the results showed that people across all ages in Thulamela municipality were involved in agricultural activities, namely food gardening.

4.3.3. Educational background and training in food gardening

For the purpose of this study, it was of paramount importance to know the education background of the participants and their training in food gardening. Therefore, in this study, the education background of the participants and their previous training in food gardening were also investigated. Regarding educational background of the participants, the results show that 13.1% (n = 50) of the participants had no formal education, 22.5% (n = 86) had attained education level between Grade 1-7, 19.8% (n = 76) had attained education level between Grade 8-11 while more than a third of the participants (n = 130; 33.9%) had attained Grade 12 (see Table 4.1).

There were other participants who indicated they were educated up to ABET level 4 (n = 33; 8.6%) and tertiary education (n = 8; 4.8%). These results show that participants who had an education level lower than Grade 12 were more than those who had attained Grade 12 and higher. This might imply that the majority of the participants might not be on a better chance to receive, understand and practice new information and gardening initiatives. However, it cannot be underestimated that their experience in food gardening might had been the best teacher.

Furthermore, the researcher investigated the participants' training in food gardening wherein they had to indicate if they were trained and who trained them. Table 4.1 shows that 43% of the survey participants (n = 163 food gardeners) had learned food gardening from other gardeners, followed by 26% (n = 101) of the participants who indicated that they had acquired their training in food gardening from their secondary school, 16.7% (n = 64) of participants indicated that they were trained by the Department of Agriculture, while 7.3% (n = 28) were trained at ABET school and 7.1% (n = 27) received their training from extension workers (see Table 4.1). Although extension workers are part of the Department of Agriculture, there were participants who were not trained by extension workers but they were trained at the departmental level through organised training programmes.

The researcher realised that the Department of Agriculture have special training programmes that they organise for a specific period of time wherein food gardeners would be trained for consecutive days or weeks for free. These programmes aimed at empowering food gardeners with skills and knowledge on food gardening such as planting seasons for specific crops, crop

spacing, weeding, watering, how to handle food gardening equipment and chemicals and on product marketing. At some point after these training the gardeners would be given some gardening aids such as seeds and fertilisers for free. Extension workers on the other hand are the agents of the Department of Agriculture who operate as facilitators and communicators at community levels. Extension workers educate gardeners and give them information on how to improve their production, productivity, processing and marketing of their products. They also help gardeners with decision making on issues related to food gardening.

Although nearly half (43%) of the participants had no formal training in food gardening it was interesting to realise that they learnt about gardening from other gardeners. The results revealed that training was viewed as an important aspect of food gardening as no participant had reported not being trained at all. It can thus be noted that food gardeners who had no formal education were trained by the older generation through their many years of experience in food gardening. An education level had been hugely linked to improvement in household food security and empowerment, and the lower the level of education the higher the chances of being food insecure (Sakyi, 2012; Maponya & Moja, 2012). In line with the study by Modirwa and Oladele (2012), the researcher was of the opinion that food gardening requires knowledge of growing food, pest control, water harvesting techniques, managing post-harvest losses and knowledge of product marketing.

4.3.4. Tenure of gardening (years in gardening)

In order to learn the participants' level of tenure in food gardening, the researcher asked the survey participants to indicate the number of years they had ever since they started practicing food gardening. Participants' experience in gardening was divided into four categories as depicted in Table 4.1. The results show that 42.8% (n = 164) of the participants had food gardening experience ranging from 2-9 years, 30.3% (n = 116) had an experience ranging from 10-29 years, 19.1% (n = 73) participants had an experience of 30-49 years while only 7.8% (n = 30) participants indicated that they had over 50 years of experience. The results demonstrated that a greater proportion of surveyed participants had the experience in food gardening of below 30 years (that is, (2-29 years)) which might indicate that more and more people were realising the importance of food gardening which motivated them to join others who were already actively involved.

Table 4.1: Summary of the Background Information of the Participants

Variables	Category	Frequency	Percentage	Mean	Median	Mode
Age group (years)	20-35 (Youth)	35	9.1	3.19	3.00	3
	36-45 (Young adult)	90	23.5	(SD=1.25; SD Error = 0.064)		
	46-55 (Adult)	100	26.1			
	56-65 (Old age)	84	21.9			
	66+ (Senior citizen)	74	19.3			
	Total	**383**	**100.0**			
Gender	Male	213	55.6	1.44	1.00	1.00
	Female	170	44.4			
	Total	**383**	**100.0**			
Highest educational level	No formal education	50	13.1	3.27	3.00	4
	Grade 1-7	86	22.5	(SD=2.12 ; SD Error = 0.108)		
	Grade 8-11	76	19.8			
	Grade 12	130	33.9			
	ABET level 4	33	8.6			
	Tertiary (University/Degree/Diploma)	8	4.8			
	Total	**383**	**100.0**			
Training Institution	At Secondary School	101	26.4	3.78	4.00	4.00
	Trained by the Department of Agriculture	64	16.7	(SD=2.89; SD Error =0 .061)		
	Trained by the extension worker	27	7.1			
	Learned from the gardeners	163	42.6			
	ABET school	28	7.3			
	Total	**383**	**100.0**			
Tenure of gardening (years)	2-9 years	164	42.8	2.03	2.00	1.00
	10-29	116	30.3	(SD=1.19; SD Error = 0.148)		
	30-49	73	19.1			
	50+	30	7.8			
	Total	383	100.0			

Source of data: from the study

4.4. Conclusion

The results of this study in this section illustrated that food gardening is done by people of different age groups, gender, educational background, training and experience in food gardening. The low percentage (44.4%) of females involved in food gardening in this study can be likened with the suggestion made by AIFSRC (2018) that men have more access to productive resources than women.

Predominantly people across all ages in Thulamela municipality who participated in this study were involved in food gardening activities. The age distribution of those who were involved in food gardening ranged from youth to senior citizen. This indicates that more people were realising the importance of food gardening to secure food in the household and they felt the need to partake in food gardening activities. However, it can be concluded that the low percentage of the young gardeners in this study indicated that there is no interest in food gardening by the young generation which might negatively affect the future of food security in households. It was also interesting in this study to learn that the overwhelming majority of the participants were trained by other gardeners.

The following chapter provides an introduction to the role of food gardens to food security as well as the results and discussions on the role and contribution of food gardens to food availability at household level.

CHAPTER 5

THE ROLE AND CONTRIBUTION OF FOOD GARDENS TO FOOD SECURITY AND THE ROLE OF FOOD GARDENS TO FOOD AVAILABILITY AT HOUSEHOLD LEVEL

5.1. Introduction

The chapter summarizes participants' responses to the research questions and it is organized as follows: the first section (5.2.) presents an introduction to the role and contribution of food gardens to food security; the second section (5.3.) illustrates the role and contribution of food gardens to food availability at household level.

5.2. The role and contribution of food gardens to food security

The principal aim of this study was to investigate the role of food gardens to food security. To properly understand the unequivocal role and contribution of food gardens to food security, it is important to understand the term "food security", which according to FAO (2018) and AIFSRC (2018) means that *"all people at all times have physical, social and economic access to adequate safe and nutritious food that meets their dietary needs and food preferences for an active healthy life, and it entails four major aspects which are availability, access, utilisation and stability".*

Consequently, to investigate the role of food gardens in maintaining food security, participants were asked if they had a food garden at their homes. The results shows that nearly everyone 99.7% (n = 382) had a food garden at her/his home while only 0.3% (n = 1) indicated not having a food garden. However, the fact that a single participant had no food garden can be challenged considering having a food garden at home was one of the inclusion criteria for survey participants in this study. Nevertheless, the results concurred with Statistics South Africa (2019), which illustrated that 91.4 percent of households in Limpopo were involved in agricultural activities. The findings from the focus groups indicated that, although not every household has a food garden, many households take home gardening as an

important method of procuring food for their household members which has the potential to improve food security.

Furthermore, observation results proved that all the participants were having a food garden during the time of data collection. More so, the researcher observed the types of food gardens that the participants had in their homes. The graph below presents a summary of results for the types of gardens mainly observed at the participants' homesteads. The main top three were home or backyard gardens (43.98%), small patch of homestead land (23.19%) and the field (20.13%) while edges of the field (0.44%), compound garden (0.66%), and combined (1.31%) and schoolyard garden (1.31%) were the least experienced types of food gardens in Thulamela municipality. Other types of food gardens reported were farmyard (4.60%) and roadside gardens (4.38%). Thus, almost all of the participants had a food garden at their homes and in any form of the above mentioned types of food gardens.

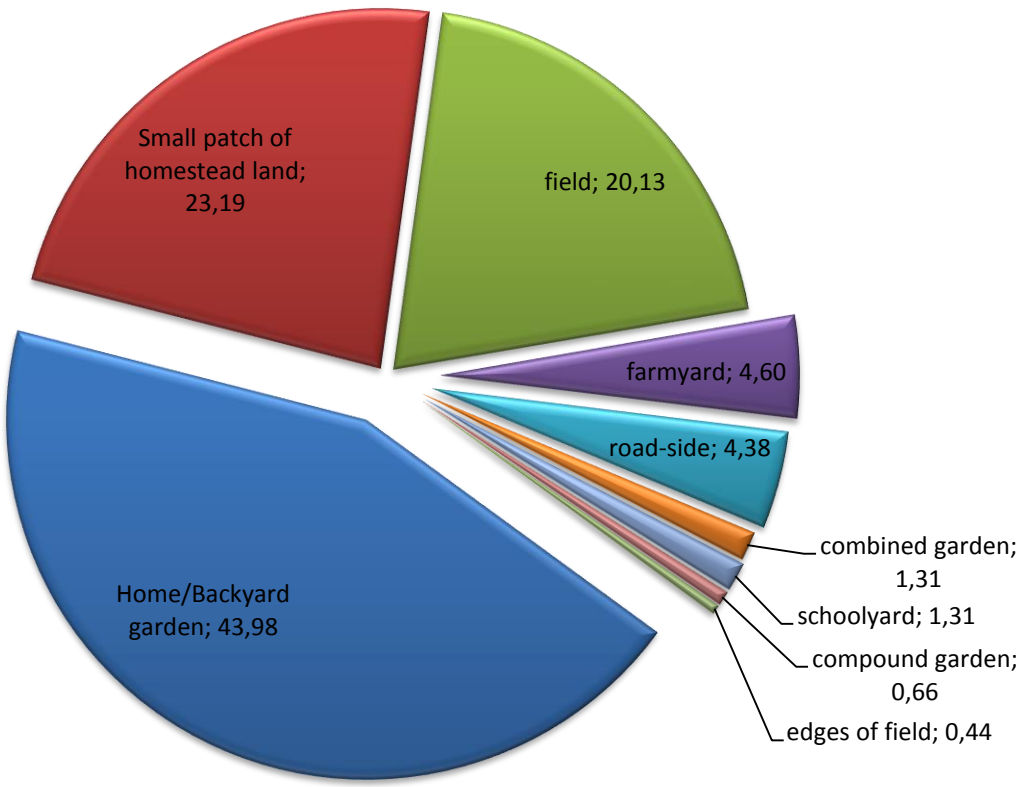

Figure 5.1: Types of food gardens
Source of data: from the study

The results, as shown from Figure 5.1 above, home or backyard garden, small patch of homestead land, field, farmyard and road-side garden constituted 43.98%, 23.19%, 20.13%, 4.60% and 4.38% of the total observed food gardens respectively and formed five major types of food gardens of the participants of this study in Thulamela municipality. The results concurred with Galhena *et al.,* (2013) and Njuguma (2013) who maintained that home gardens are found in many countries worldwide and had been successful contributors to food security over the years. These results were also supported by the focus groups who mentioned similar types of gardens that were found in many households. The main food crops grown in those food gardens by the participants respectively are depicted in Table 5.2.

Furthermore, the researcher asked participants to indicate the reasons for having food gardens. Table 5.1 below gives a summary of the reasons why Thulamela municipal residents who participated in the study were engaged in food gardening activities. Chief among the many reasons why participants had food gardens includes the health and nutrition aspects where participants indicated that they grew vegetables mainly for consumption in order to improve their health (reported by 51.6% of the total survey participants). The other reasons were social and income generation as evidenced by 24.5% of the survey participants who reported the need to alleviate poverty, generate income, and minimize costs and overspending as their reasons for having food gardens at their homes.

Moreover, seventy-nine participants (20.6 %) reported self-empowerment as another reason why they had food gardens as driven by their need to become self-employed, curb lack of jobs and promote self-reliance. The passion (n = 2 (0.5%)) for food gardening constituted one of the least reason why people engaged into food gardening activities at their homes. Overall, health and nutrition (51.6%), social and income generation (24.5%), employment (20.6), community development (2.6%) and passion (0.5%) were the cited reasons for having food gardens (see Table 5.1). The findings similarly agreed with Altman, Hart and Jacobs (2009) and Galhena *et al.,* (2013) who maintained that home gardens play an important role in providing food and income for the family. These findings also stood out in focus group discussions where it was highlighted that food gardeners produce food both for the purpose of consumption and for making extra household income.

Table 5.1: Summary of reasons for having food gardens at homes

Main Category	Sub-categories	Frequency	Percentage
Passion		2	0.5
Community development		10	2.6
Employment	(1) self-employment; (2) curb lack of job and; (3) promote self- reliance	79	20.6
Social and Income generation	(1) poverty reduction and alleviation; (2) income generation; (3) food costs minimisation and; (4) avoid over-spending	94	24.5
Health and Nutrition	(1) Grow food for consumption; (2) Support and provide family with healthy food and; (3) improve health	198	51.6
Total		**383**	**100.0**

Source of data: from the study

The participants had to indicate the types of food which were grown in their food gardens. The Table below shows different types of foods, which were grown by food gardeners in Thulamela municipality, and hence, represents the main food types grown in those food gardens. The findings show that 91.9% (n = 352) of the participants indicated that a blend of different food crop types constituted the main food produced in the food gardens. This means that for every 10 selected food gardeners, 9 of them were found to grow a mixture of food crops in their food gardens.

However, participants who only grew specific types of crops were reported, for instance, those who grew tomatoes (n = 1; 0.3%), maize (n = 4; 1.0%), African night-shade (n = 4; 1.0%) and those who indicated they were only growing Chinese cabbage (n = 5; 1.3%). Of those participants who reported growing an array of food types, 91.9% (n = 352) grew a combination of vegetables such as tomatoes, onions, cabbage, green beans, Chinese cabbage, African night shade, spinach, chilies and including maize as well as fruit trees such as mango, litchis, oranges and avocados, 0.5% (n = 2) participants indicated that they grew a combination of maize, peanuts, tomatoes, cabbage and chilies, another 1.0% (n = 4) grew a combination of maize, avocado, litchis and mango while 2.6% (n = 10) participants indicated that they grew fruits and vegetables in their food gardens without specifying which fruits and vegetables they were growing (see Table 5.2).

Table 5.2: Types of food grown in food gardens by survey participants

Food Type	Frequency	Percentage
Tomatoes	1	0.3
Maize, peanuts, tomatoes, cabbage and chillies	2	0.5
Maize	4	1.0
African night shade	4	1.0
Maize, mango, litchis and avocados	4	1.0
Chinese cabbage	5	1.3
Fruits and vegetables	10	2.6
A combination of various food crops, i.e. tomatoes, onions, cabbage, green beans, Chinese cabbage, African night shade, spinach, chillies, maize, mango, litchis, oranges and avocados	352	91.9
Total	**383**	**100.0**

Source of data: from the study

These results also agreed with the researcher's observations that some participants specialised only in growing certain types of crops and those were the participants who grew their crops mainly for the purpose of selling and making profit. It was also learned from focus group discussions that although people were using food from their gardens to meet their households' food demands, many were growing food for purposes of selling their products to the market. Such participants were observed to focus on seasonal crops so that in each season they would be having food produces from their gardens to sell. Another observation made was that some participants who indicated they grew single crops like maize were growing those foods only for household consumption.

The role of food gardens to food security was investigated based on the four major aspects or pillars of food security, namely; food availability, food accessibility, food utilisation and food stability. Thus, the results on the role and contribution of food gardens to food availability are discussed in the following section.

5.3. The role and contribution of food gardens to food availability at household level

One of the specific objectives in this study was to investigate whether food gardens contribute to food availability. In this section, the results summarising the role of food gardens in contributing to the availability of food at household level are presented. Food availability is about food supply and it is dependent on domestic food production (FAO,

2014; FAO, 2016). Hanson (2013) states that availability of food through own production is a food security component. This statement is propounded in this study.

The summary of descriptive statistics on whether food gardens enhanced household food availability for the survey participants revealed that majority of participants believed food gardens carried the potential to enhance food availability, as reported by 81.5% (n=312) of the participants, 8.4% (n=32) of the participants believed food gardens do not enhance food availability at household level while 10.2% (n=39) participants were not sure if food gardens enhanced household food availability (see Figure 5.2). This implies that nearly 8 in every 10 participants believed food gardens had a role to play in increasing food availability while only 1 in every 10 believed food gardens do not enhance household food availability.

Figure 5.2 below gives a graphic representation of the summary of statistics for the participants' responses highlighting their views on whether they believed that food gardens enhanced food availability at household level. Contrary to the hypothesis the results of this study promote FAO (2010) who maintained that a well-developed food garden can supply the household with the needed food throughout the whole year and Carney *et al.,* (2012) who espoused that availability of food in communities can be improved through well managed, sustainable and productive agricultural systems. The results of this study also agreed with Galhena *et al.,* (2013)'s postulation that properly managed food gardens can provide the solution to food security by increasing availability to food.

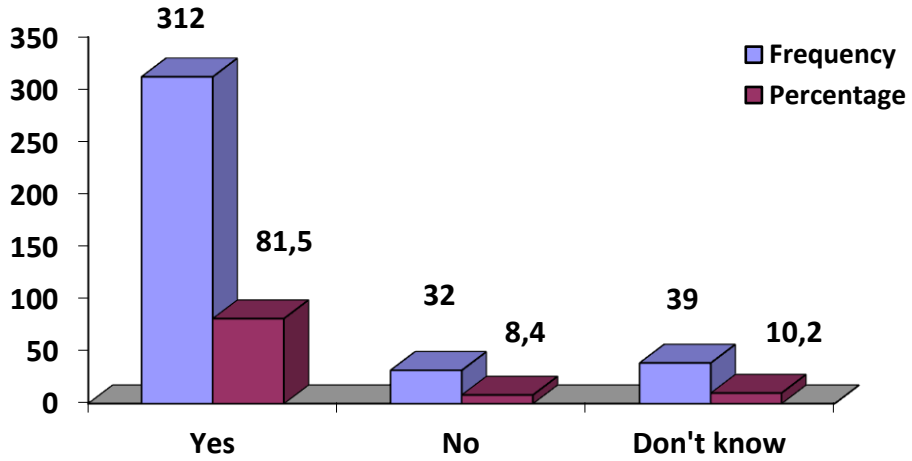

Figure 5.2: Participants' responses on the role of food gardens in enhancing household food availability.
Source of data: from the study

The result above reveals that 18.6% (n = 71) of the participants were either "not sure" or "were not in support" of the view that food gardening can enhance food availability. This proportion is adequate to warrant further investigation. As such, the researcher found it compelling to consider the association between the socio-demographic profiles of the participants and the availability of food at household levels. Table 5.3 below presents the results obtained from performing cross-tabulations between food availability (while filtering out 'yes' responses) and socio-demographic variables. Only those variables, which were found to be significantly associated with food availability, are shown in the Table below. The association between food availability and variables such as gender, age, years of experience were statistically insignificant at 5% level of significance.

Table 5.3: Cross-tabulation results between food availability and socio-demographic variables

	Does food garden enhance household food availability						
Highest educational level	**no**	**Don't know**	**Total**	**Chi-Square Value**	**DF**	**P-value**	**Cramers V value**
No formal education	2	2	4	24.872	5	< 0.05	**0.592**
Grade 1-7	3	8	11				
Grade 8-11	2	19	21				
Grade 12	18	10	28				
ABET level 4	6	0	6				
Tertiary (University/Degree/Diploma)	1	0	1				
Total	**32**	**39**	**71**				
Where did you learn how to do food gardening	**no**	**Don't know**	**Total**	**Chi-Square Value**	**DF**	**P-value**	**Cramers V value**
At Secondary School	12	21	33	8.369	4	<0.1	**0.343**
Department of Agriculture and Extension Worker	2	6	8				
Learned from the gardeners	9	6	15				
ABET school	0	2	2				
Other	9	4	13				
Total	**32**	**39**	**71**				

Source of data: from the study

Table 5.3 above shows that participants' responses to question "Does food garden enhance household food availability" is associated with "highest education level" and "where

participants learned food gardening" at 5% and 10% level of significance respectively. Cramer's V values of 0.592 and 0.343 represent a strong and statistically significant relationship between food availability and "highest education level" and "where participants learned food gardening" respectively. The cross-tabulation between 'food availability" and 'highest qualification level" reveals that majority (78.2%) of food gardeners who do not believe food gardens enhanced food availability had a highest qualification of at least Grade 12 (Grade 12, ABET and Tertiary Education) whilst majority of those food gardeners who were not sure food gardens enhanced food availability had highest qualifications of at most Grade 11 (No formal education, Grade 7 and Grade 8-11). However, the cross-tabulation results for 'food availability" and "where food gardeners learned food gardening" were inconclusive which might also explain the reason why the test for association failed to be statistically significant at 5% level of significance.

Also, a weak relationship between contribution of food gardens to household food security and the socio-demographic variables revealed a weak but significant relationship between contribution of food gardens to household food security and highest qualification level of food gardeners. No statistically significant relationship was found between the contribution of food gardens to household food security and other socio-demographic variables such as age, gender, where food gardeners learned food gardening and the number of years of doing food gardening.

To further understand if participants believed food gardens could enhance food availability, participants were asked to give their views to the question "Do you think every household should have food gardens?" According to Swindale and Bilinsky (2005), food security is achieved when enough of the essential type of food is available from domestic production. The results showed that the majority of the survey participants 82.2% (n = 315) thought every household should have food gardens while the remaining 17.8% (n = 68) thought that not every household should have food gardens. This implies that approximately 8 out of 10 people think that households should have food gardens. Thus, having a food garden is considered a good alternative for addressing food insecurity leading to the alleviation of food shortages. This agrees well with the views gathered through focus group discussions (FGDs) in which participants agreed that every household should have a food garden.

Reasons were also gathered from participants who viewed having food gardens at households as an incredible idea. Table 5.4 below gives a summary of the responses given by the survey participants on the importance of food gardens at household level. The results show that 37.3% (n = 143) of the survey participants believed that food gardening was important because it promoted self-employment (job creation), self-reliance and poverty alleviation. On the other hand, 32.9% (n = 126) of participants believed that food gardens in households reduced household expenditures, promoted savings and improved the standard of living.

These results are in line with AIFSRC (2018) who maintained that agriculture has an important role in addressing food insecurity by pulling households out of poverty and improve livelihoods. Food gardens were also recognised as a vital vehicle to ensuring food availability, helping in providing good diet, healthy food which meet all dietary requirements (n = 71; 18.4%). Moreover, gardening was also considered good in that it allowed survey participants to build an internal sense of pride amongst them while also allowing them to contribute to the development of the community (43; 11.3%) (See Table 5.4.)**.**

Table 5.4: Importance of food gardens in households

Importance	**Frequency**	**Percentage**
(1) Reduce household expenditure in buying food (2) Improve standard of living, (3) Promote saving	126	32.9
(1) Job creation (2) Self-reliance (3) Poverty Reduction	143	37.3
(1) Ensure food availability; (2) Help having good diet and healthy food	71	18.4
(1) Build sense of pride and; (2) Contribute to community development	43	11.3
Total	**383**	**100.0**

Source of data: from the study

In order to establish the seasons when food gardeners normally grew their food, participants were asked to respond to the following question "At which time of the year do you grow food in the garden?" The researcher found it essential to gather or learn the times of the year when food gardeners mostly grew their food so that recommendations on necessary interventions

for arresting the limitations contributing to intermittent availability of food at household levels could be made. In addition, the researcher also found it essential to check the availability of food in the gardens during all the seasons of the year. Accordingly, the results in Figure 5.3 shows that of the 383 survey participants, 90.9% (n = 348) said they grew their food crops during summer and winter, 6.0% (n = 23) participants said they grew theirs during winter while 3.1% (n = 12) participants indicated that they grew their foods during summer.

This means that regarding availability of food at household level, 90.9% of the participants were able to avail food for their households throughout the year while 3.1% and 6% of the participants were at the risk of running out of food and hence, buying food during winter and summer respectively. The results also shows that some participants were growing a single type of crop such as maize, peanuts, sweet potatoes, vegetables such as African nightshade, Chinese cabbage, spinach and cabbage, at different seasons for the purpose of selling. This could imply that participants who grew food crops during one season were experiencing seasonal food insecurity, a condition of food insecurity which takes place predictably following the cyclical patterns of the seasons (Fraanje & Lee-gammage, 2018).

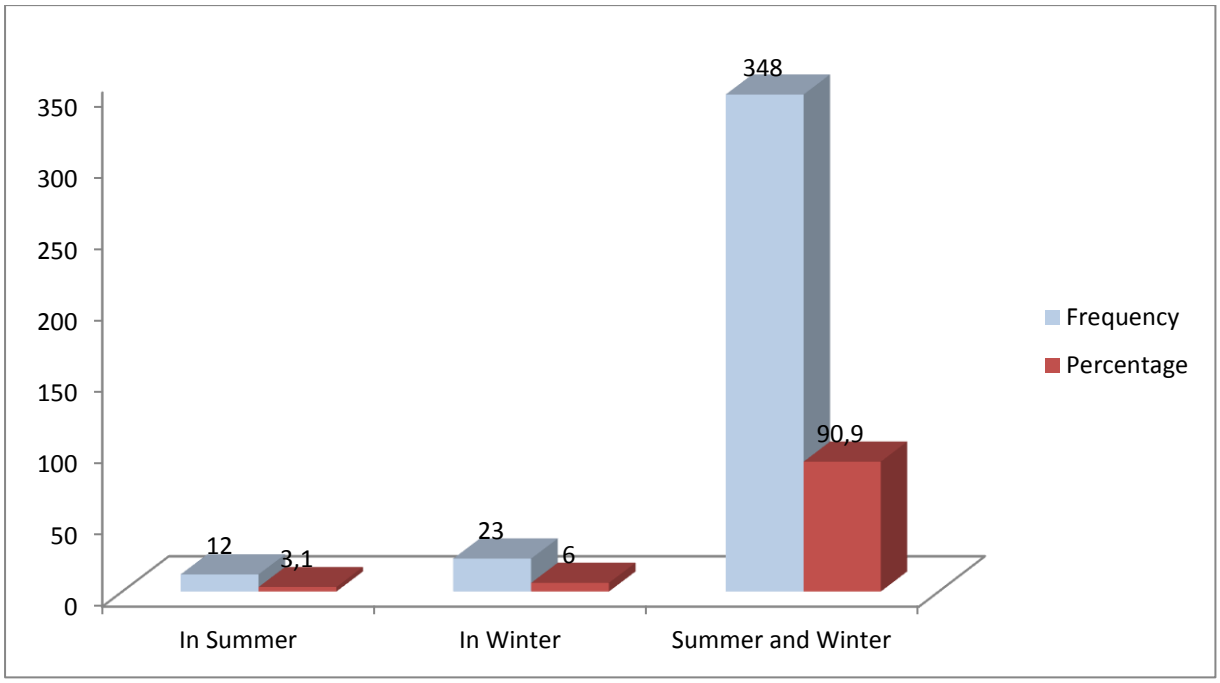

Figure 5.3: Times of the year when food gardeners grow food in their gardens.
Source of data: from the study

Food availability is affected by how much and what type of food is locally produced (AIFSRC, 2018). To find out about the contribution of the produced food to availability of food to the households, the types of food that were grown by food gardeners during different seasonal times were also gathered, and the responses of participants to the question "What type of food do you grow during that time?" were analysed and presented as shown in Table 5.5 below.

The investigation on the types of foods mainly grown by food gardeners revealed that 9 in every 10 food gardeners grew a combination of different crops depending on season of the year. For instance, 342 (89.3%) agreed to practicing diversified cropping whose crop diversity depended heavily on the time or season of the year while the remaining 37 (10.7%) participants indicated that they practiced mono-cropping and the food types grown includes maize, spinach, African night shade, green beans, sweet potatoes and Chinese cabbage. Table 5.5 gives a summary statistics on different types of food that the food gardeners were growing during different times of the year.

Table 5.5: Different types of food grown by food gardeners

Food types	**Frequency**	**Percentage**
Spinach	1	0.3
Sweet potatoes	2	0.5
Maize, mango, avocado & litchis	4	1.0
African night shade	5	1.3
Chinese cabbage	5	1.3
Cabbage	7	1.8
Green beans	7	1.8
Maize	10	2.6
Depend on season (combination of different crops)	342	89.3
Total	**383**	**100.0**

Source of data: from the study

Apart from relying on the views and beliefs of the participants on the role of food gardens to ensuring food availability at household level, the researcher observed vegetables that were in the food gardens at the time of data collection. Consequently, Figure 5.4 below shows the proportion of occurrence of food gardens products as recorded on the observation sheet. Maize (11.93%), African night shade (11.37%), spinach (11,14%), tomatoes (10.00%), sweet potatoes (9.55%) and cabbage (7.61%) were among the top six food garden products recorded on the observation sheet. On the contrary, delele (Okra or Corchorus olitorius) (0.34%), blackjack (1.02%), vowa (amaranth) (1.02%), pumpkin (1.70%) and butternut (1.70%) are amongst the least 5 garden produces recorded on the observation sheet on the day of data collection.

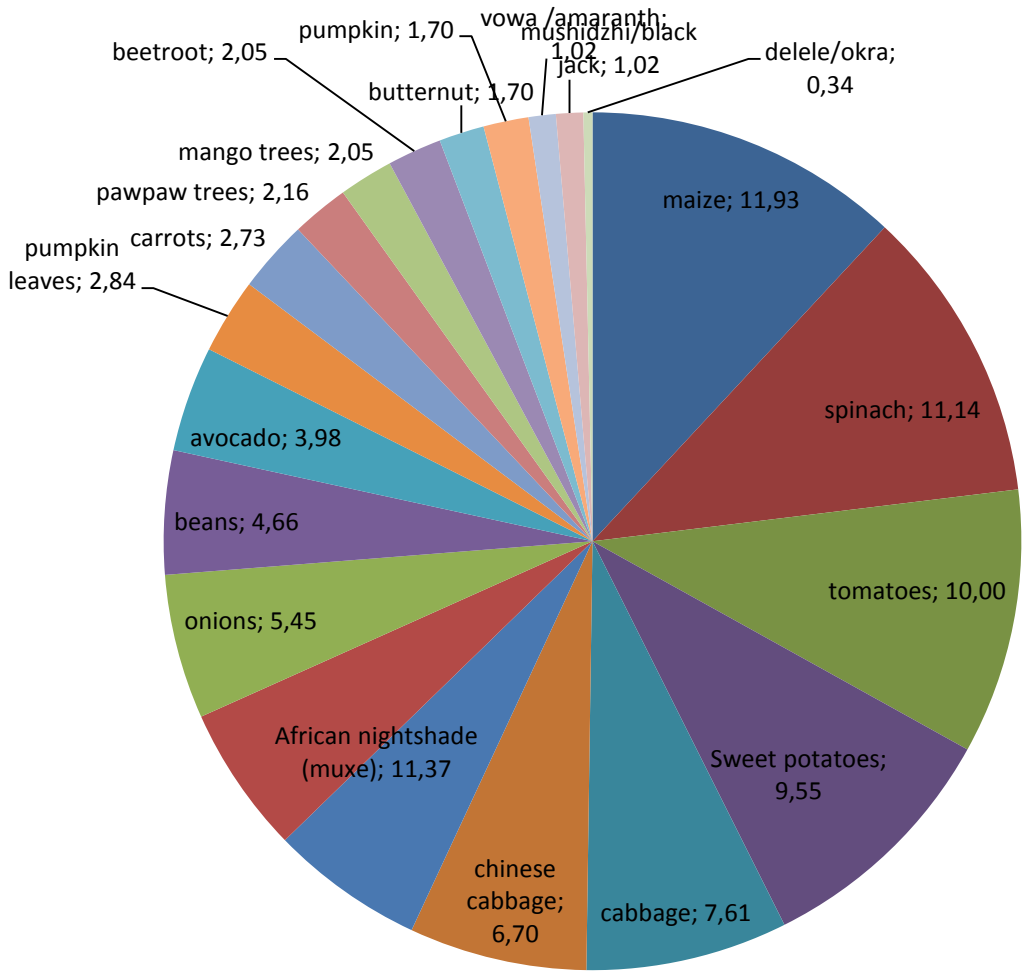

Figure 5.4: Observed vegetables that were in the food gardens
Source of data: from the study

The availability of food in participants' food gardens as observed in this study can be seen as a contributing factor to the availability of food in their households.

5.4. Conclusion

The results of this study as depicted in the present chapter shows that the majority of the participants had food gardens wherein various food crops were grown at different seasons of the year. It is significant in this study that food gardens are considered an option for addressing food insecurity and for ensuring food availability. When food gardens provide food throughout the whole year, it contributes to the availability of food which in turn capacitated the access to food by the households.

The following chapter discusses the results on the role and contribution of food gardens to food security based on food accessibility.

CHAPTER 6

ROLE AND CONTRIBUTION OF FOOD GARDENS TO FOOD ACCESSIBILITY AT HOUSEHOLD LEVEL

6.1. Introduction

This chapter provides the results and discussions on the role and contribution of food gardens to food accessibility at household level. Access involves physical access to food which implies that individuals and households must be able to acquire adequate food and to be able to eat a healthy nutritious diet. It also entails that all people within the household are having access to adequate resources such as money to buy food and the land needed to grow their own food (Sakyi, 2012; Hanson, 2013; Fraanje & Lee-gammage, 2018). In the following section, the summary of statistics describing the responses given to questions of relevance to accessibility of food at household level is presented.

6.2. The role and contribution of food gardens to food accessibility at household level

The participants were asked about how they usually access the food they eat on daily basis. Figure 6.1 gives a summary of responses given by survey participants to the question "how do you get the food that you eat every day?". The graph shows that only a small proportion of the participants accessed their food either through buying (3%) or growing (5%) while majority of households revealed that they accessed their food for daily consumption through both buying and growing (92% of the total number of participants).

According to Fraanje and Lee-gammage (2018), access to food also means affordability, that is, individuals, households and communities have the ability to afford the price of food or the land to produce their own food. Similarly the results are showing that the majority of the participants had accesses to food through both buying and growing, suggesting that participants had access to a piece of land which allowed them to produce their own food and did not solely rely on buying food from the markets. In line with Hanson, (2013) the results of this study indicate that all participants in this study had access to food either through purchase or production. The focus groups also supported these findings that many households accessed their food through both gardening and buying.

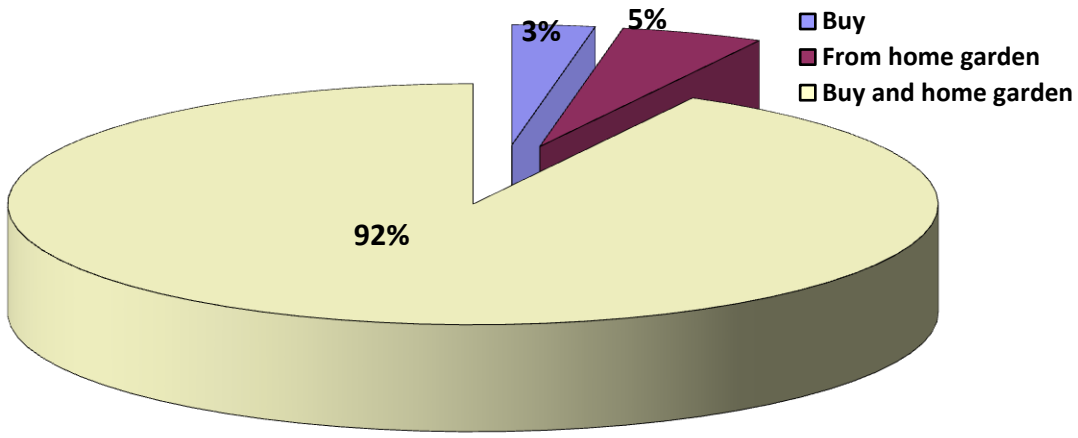

Figure 6.1: Ways food gardeners use to access food on daily basis
Source of data: from the study

The results presented above showed that 8% (n = 30) of the total participants accessed their food either through buying (3%) or growing (5%). The researcher investigated further using cross-tabulations, to understand the relationship between "food accessibility" variable and the socio-demographic variables. Table 6.1 below shows that age, highest educational level and experience variables are significantly associated with food accessibility at 5% level of significance. Other variables like gender and "where food gardeners learned food gardening" were statistically insignificant ($p > 0.05$) and as a consequence the results are not presented in the table. These findings differ from those of Masekoameng and Maliwichi (2014), who maintained that gender was a relevant factor of food security in households. Needless to say, Table 6.1 presents chi-squared test results for those socio-demographic variables whose association with "food accessibility" were shown to be statistically significant.

Results from Table 6.1 reveal that majority of food gardeners who accessed food through buying were below 45 years of age whilst majority of food gardeners who accessed their food through growing were at least 45 years old. The results also reveal that majority of food gardeners who accessed their food through buying had at least Grade 12 certificate (Grade 12, Abet level 4) whilst participants who accessed food from the garden had at most Grade 8-11 certificate (No formal education, Grade 1-7, Grade 8-11). With regards to experience, results show that majority of food gardeners who accessed food through buying had experience of less than 9 years whilst majority of food gardeners who accessed their food from the garden had over thirty years of experience in food gardening activities.

Table 6.1: Cross-tabulation results between food accessibility and socio-demographic variables

Age	How do you get the food that you eat everyday		Total	Chi-Square Value	df	p-value	Cramers V
	Buy	From home garden					
20-35 (Youth)	2	1	3	20.530	4	p < 0.05	0.733
36-45 (Youth adult)	7	2	9				
46-55 (Adult)	2	2	4				
56-65 (Old age)	0	5	5				
66+ (Senior citizen)	0	9	9				
Total	**11**	**19**	**30**				
highest educational level	**Buy**	**From home garden**	**Total**	**Chi-Square Value**	**df**	**p-value**	**Cramers V**
No formal education	0	6	6	17.696	4	P<0.05	0.699
Grade 1-7	1	6	7				
Grade 8-11	0	3	3				
Grade 12	5	1	6				
ABET level 4	5	3	8				
Total	**11**	**19**	**30**				
number of years you have been doing gardening	**Buy**	**From home garden**	**Total**	**Chi-Square Value**	**df**	**p-value**	**Cramers V**
9 years or less	10	5	15	16.515	2	P<0.05	0.653
10 - 29 years	1	2	3				
30 years and above	0	12	12				
Total	**11**	**19**	**30**				

Source of data: from the study

These results might be understood to denote that the youth are not as yet considering food gardening as a viable solution to food accessibility, which in turn suggest that programmes that aim at promoting involvement in food gardening to enhance food security should target the youth, those with education lower than grade 12 and those with less experienced in food gardening.

To further understand on food types that were accessed by survey participants through buying, the participants were asked to indicate food types they had access to through buying. Table 6.2 summarises food types that were normally purchased by the surveyed participants. The table shows that majority 88.0% (n=337) of participants mainly purchased a combination of foods like meat, eggs, bread, oil, rice, maize meal and fruits, a combination of beetroot and broccoli, (n = 3; 0.8%) and a combination of spinach, beetroot and broccoli, (n = 3; 0.8%). On the other hand, participants revealed that they only purchased one food type such as bread (n = 10; 2.6%), fruits (n = 8; 2.1%), maize meal (n = 7; 1.8%) Chinese cabbage (n = 6; 1.6%), tinned stuff (n = 4; 1.0%), meat (n = 2; 0.5%) and eggs (n = 3; 0.8%).

The observation that participants were buying maize-meal which is their most staple food might suggest the inability of food gardens to produce food adequate to feed their families. In total, the results revealed that only 10.7% (n = 41) participants were not buying maize. This result agree well with knowledge learned from focus group discussions which established that food gardens provided the means for ensuring food security although, food gardens alone were inadequate to sustain households and hence, households still needed money to buy some of the basic food stuffs.

It has also been observed in this study that participants were buying food products that they were not grown in their respective food gardens. However, the results also revealed that the participants purchased maize-meal which the majority of the participants also produced. Another observation was that participants were selling some of their garden products including maize (as sweet-corn or dried in sacks) and preserving some as seeds for the next growing season, which could elucidate the reason why they were buying maize meal despite being the food type that they were producing the most. Nonetheless, the researcher observed seasonal food inaccessibility amongst the participants during the period of data collection.

Table 6.2: Foods accessed by food gardeners through buying

Food types	**Frequency**	**Percentage**
Meat, bread, oil, rice, maize meal, eggs and fruits	337	88.0
Bread	10	2.6
Fruits like apples, pineapple	8	2.1
Maize meal	7	1.8
Chinese cabbage	6	1.6
Tin stuff	4	1.0
Beetroot and Broccoli	3	0.8
Spinach, beetroot & broccoli	3	0.8
Total	**383**	**100.0**

Source of data: from the study

Interestingly, the researcher noted that male gardeners who formed the majority of participants in this study were the ones who were more engaged in selling their products than women. This finding could be related to Breene (2016) who stipulated that in developing countries many people choose farming as an occupation rather than for food and they grow their crops not for food but for making profit.

The researcher through observation also revealed that the participants who were selling maize either as sweet-corn or as dried and packed in sacks were doing so to avoid the processing of the maize into maize meal. Subsequently, as a matter of convenience they preferred to buy rather than to go through all the process as it was considered to be strenuous, time consuming and required money for the process. As a result, they ended up buying the same product that they were also producing in their food gardens.

In agreement with Musotsi, Sigot and Onyango (2008) and Lander (2013) who maintained that vegetable gardens are considered to play an important role in promoting food security by providing access to better diets, this study also revealed that food gardens were used to access food for the households. Moreover, participants were asked of the food they got from their food gardens. Table 6.3 gives a statistical summary of the responses given by the participants to the question "Which food do you get from your garden?". Majority of participants (n = 232; 60%) indicated that they got different foods from their gardens. For instance, a

combination of foods such as spinach, African nightshade, maize, tomatoes, onions, peanuts, Chinese cabbage, sweet potatoes, green beans and pumpkin leaves were common amongst the participants while tomatoes and onions were the most popular combination.

Some participants grew only one type of food, such as those who mentioned tomatoes (n = 44; 11.5%), fruits (n = 12; 3.1%), cabbage (n = 7; 1.8%), Chinese cabbage (n = 9; 2.3%), green beans (n = 5; 1.3%), carrots (n = 3; 0.8%), peanuts (n = 1; 0.3%) and beetroot (n = 1; 0.3%). Table 6.3 also shows that at least 13 (3.4%) of the participants were having indigenous vegetables in their gardens.

Table 6.3: Foods accessed by participants through gardening

Food types	**Frequency**	**Percentage**
Peanuts	1	0.3
Beetroot	1	0.3
Carrots	3	0.8
Green beans	5	1.3
Cabbage	7	1.8
Pumpkin leaves and spinach	7	1.8
Maize & Fruits	7	1.8
Chinese cabbage	9	2.3
Spinach	11	2.9
Fruits	12	3.1
Amaranth, Okra/Corchorus olitorius and Blackjack (Indigenous)	13	3.4
Maize/ maize meal/ corn	31	8.1
Tomatoes	44	11.5
(Any combination including maize)	232	60.6
Total	**383**	**100.0**

Source of data: from the study

Home food gardening has been recognized by many researchers as a means to provide year round access to food (Musotsi, Sigot & Onyango, 2008; Lander, 2013). According to Freedman (2015), food gardens not only provide immediate access to food but they provide a variety of food throughout the year, making them a significant resource for increasing food security. The researcher also investigated food accessibility by assessing the ability of food gardens to meet food demands of households by providing adequate food at all times throughout the year.

As a result, participants were asked the question "Does the food garden provide enough food for consumption all year-round?" The results as depicted in Figure 6.2 show that 220 (57.4%) participants agreed that food gardens were able to provide enough food for the whole year, 103 (26.9%) participants reported food gardens sometimes provided enough food while 59 (15.4%) participants did not agree that food gardens were capable of providing food throughout the whole year. Thus, nearly 6 in every 10 food gardeners receive adequate food to sustain their families for the whole year leaving the remaining 4 in every 10 food gardeners having to purchase food at some point of time during the course of the year.

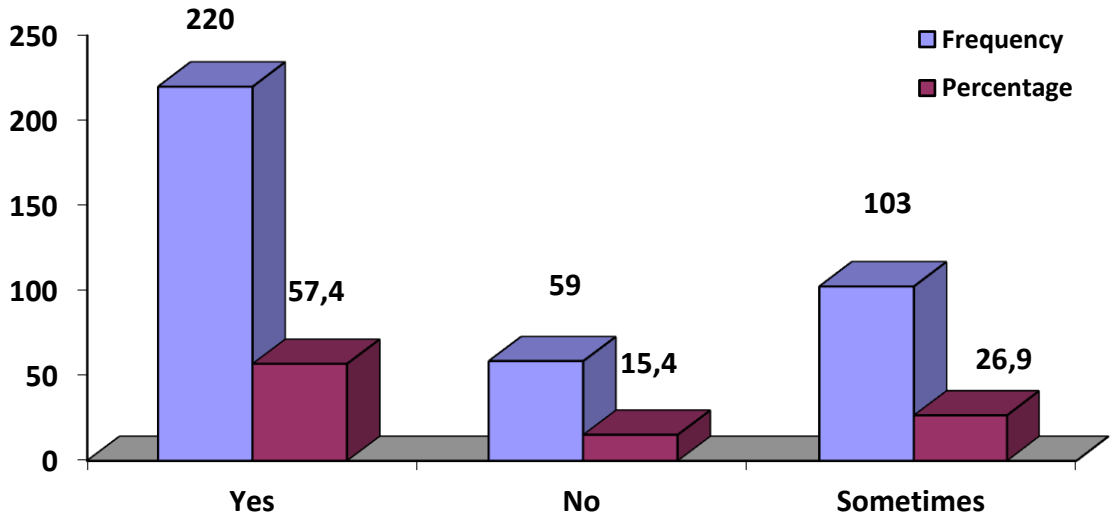

Figure 6.2: Participants' responses on the role of the gardens in providing food all year-round
Source of data: from the study

Figure 6.2 shows that nearly 42% (n = 162) of the participants did not agree that their gardens provided food for the whole year. These findings concurred with the focus group discussions which revealed that due to seasonality some gardens were not providing food throughout the whole year. Consequently, it is important to understand the socio-demographic characteristics of these 162 food gardeners so that efforts to mitigate this identified threat to food security are properly targeted. To understand this phenomenon, tests for associations were performed relating the dependent variable "Does the garden provide enough food all year- round?" and the socio-demographic variables. Table 6.4 present results from the cross-tabulations.

Table 6.4: Cross-tabulations results between the question "Does the garden provides enough food all year- round?" and the socio-demographic variables.

Age	Q17: Does the garden provides enough food all year- round?		Total	Chi-Square Value	DF	p-value	Cramers V
	no	Sometimes					
20-35 (Youth)	12	8	20	14.244	4	P <0.05	0.297
36-45 (Youth adult)	18	18	36				
46-55 (Adult)	11	16	27				
56-65 (Old age)	8	26	34				
66+ (Senior citizen)	10	35	45				
Total	**59**	**103**	**162**				
highest educational level	**no**	**Sometimes**	**Total**	**Chi-Square Value**	**DF**	**p-value**	**Cramers V**
No formal education	4	21	25	17.913	5	P<0.05	0.333
Grade 1-7	11	36	47				
Grade 8-11	16	18	34				
Grade 12	23	17	40				
ABET level 4	5	10	15				
Tertiary (University/Degree/Diploma)	0	1	1				
Total	**59**	**103**	**162**				
Where did you learn how to do food gardening	**no**	**Sometimes**	**Total**	**Chi-Square Value**	**DF**	**p-value**	**Cramers V**
At Secondary School	24	9	33	38.105	4	P<0.05	0.485
Department of Agriculture and Extension Worker	9	17	26				

Learned from other gardeners	15	71	86				
ABET school	6	3	9				
Other	5	3	8				
Total	**59**	**103**	**162**				
Number of years you have been doing gardening	**no**	**Sometimes**	**Total**	**Chi-Square Value**	**DF**	**p-value**	**Cramers V**
9 years or less	29	24	53	11.759	2	P<0.05	0.274
10 - 29 years	16	45	61				
30 years and above	12	31	43				
Total	**57**	**100**	**157**				

Source of data: from the study

Results from Table 6.4 show the relationship between the dependent variable (Q17 Does the garden provides enough food all year- round?") and the independent variable (Age). The figures show that the youth (20-35) are more prone to yearly food security risk whilst those food gardeners who are 46 years or older are more likely to experience erratic food shortages from time to time. Consequently, efforts to address food accessibility problems should seek to target the youths (20-35 years) and the adults (45+ years). However, priority should be given to the youthful food gardeners who are likely to be faced with food accessibility issues on yearly basis. Similar conclusions can also be reached by looking at the results for highest level of education, where food gardeners learned food gardening and the number of years the gardeners had been doing food gardening.

The role of food gardens was also assessed in terms of their perceived ability to enhance household access to better diets. Consequently, participants were asked to respond to the following question, "Can food gardens enhance household access to better diets?". A summary of frequencies of responses to the question are depicted in Figure 6.3 below. The graph shows that nearly 8 in every 10 participants agreed that food gardens enhanced households' access to better diets while 2 in every 10 participants jointly indicated they either did not know or do not agree at all that food gardens enhanced households in accessing better diets.

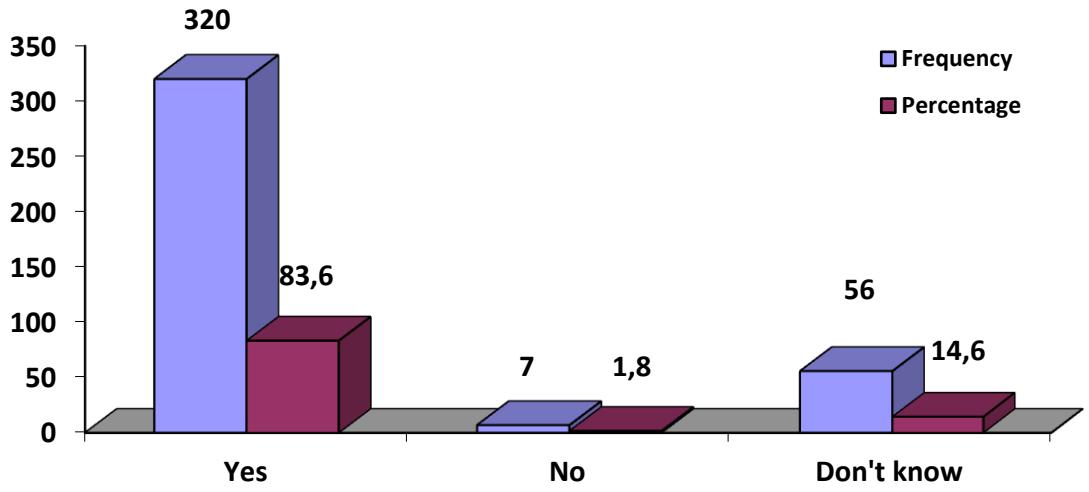

Figure 6.3: Can food gardens enhance household access to better diets?
Source of data: from the study

The researcher's direct observation of food gardens supported the participants' view that food gardens play a role in food accessibility at household level since different types of vegetables were available in their home gardens during the period of data collection (see Figure 5.4 in chapter 5). To further understand the responses of food gardeners who responded "No" and "Don't know" (n = 63; 16.4%), cross-tabulations were performed relating to the question "Can food gardens enhance household access to better diets?" and other socio-demographic variables. Highest qualification level was found to be statistically significant (Chi-Square = 10.043, $p < 0.05$) and therefore strongly associated with "household access to better diets" (Cramer's V = 0.41) while age, gender, experience and institution where food gardening was learned were statistically insignificant.

Table 6.5: Cross-tabulations results for the question "Can food gardens enhance household access to better diets" and highest qualification level

highest educational level	Can food gardens enhance household access to better diets		Total	Chi-Square Value	df	p-value	Cramer's V Value
	No	Don't know					
No formal education	0	5	5	**10.043**	**4**	**0.040**	**0.410**
Grade 1-7	3	7	10				
Grade 8-11	2	3	5				
Grade 12	2	30	32				
ABET level 4	0	11	11				
Total	**7**	**56**	**63**				

Source of data: from the study

The results in Table 6.5 shows that food gardeners whose highest qualification level were Grade 1-7, Grade 8-11 and Grade 12 disagreed that food gardens enhanced household access to better diets whilst food gardeners who did not know were evenly distributed across all highest qualification level categories. Hence, programs aimed at informing food gardeners about the role of food gardens in enhancing household access to better diets, and in case of educating those who disagreed, they should target food gardeners who are educated up to Grade 1-7, Grade 8-11 and Grade 12 levels. On the other hand, programs designed to inform those who do not know the role of food gardens in enhancing household access to better diets should be equally directed to all different educational classes of food gardeners.

6.3. Conclusion

This chapter addresses the specific objective which sought to investigate whether food gardens played a role in contributing to food access at household level. Based on the results of the study, through the researcher's direct observation of the participants' food gardens, supported by the focus groups and the participants' views, it can be concluded that food gardens can play a role in food accessibility at household level. These results also correspond with Musotsi, Sigot and Onyango (2008); Baiphethi and Jacobs (2009); du Toit *et al.*, (2011) and Townsend *et al.*, (2013) who postulated that home gardening is an important method of procuring food and it has the potential to improve food security. When food is accessible it can thus be utilised by members of the household. The following chapter provides the results and discussions on the role and contribution of food gardens to the utilisation of food at household level.

CHAPTER 7

ROLE OF FOOD GARDENS TO THE UTILISATION OF FOOD AT HOUSEHOLD LEVEL

7.1. Introduction

In this chapter, the researcher present results following an investigation seeking to establish how foods produced from food the food gardens were frequently utilised. ***Food utilisation*** refers to the final use of food by individuals at household level. It involves the range of household food practices including proper use, processing, preservation and storage, selection, preparation and final consumption by household members (Fraanje & Lee-gammage, 2018; FAO, 2014; Hanson, 2013; USAD, 2018). Utilisation of food also means that people must have access to sufficient quantities and diversity of food to meet their nutritional needs (Fraanje & Lee-gammage, 2018). Consequently, all these aspects of food utilisation were investigated and the results are presented in sections to follow. Furthermore, the chapter presents the results and discussions from the 24-hour food recall and the food frequency questionnaires.

7.2. The role of food gardens to the utilisation of food at household level

This section summarizes participants' responses to the research questions on the role of food gardens to the utilisation of food at household level. For instance, it is shown in chapter 5 (Table 5.2) that approximately 92% of the survey participants indicated that their main food garden produces constituted a mix of different food products. Therefore, to establish whether vegetables produced by food gardeners were really used, participants were asked to respond to the question "Are vegetables cooked and served for household members?". Figure 7.1 below presents a summary of results from the participants' responses.

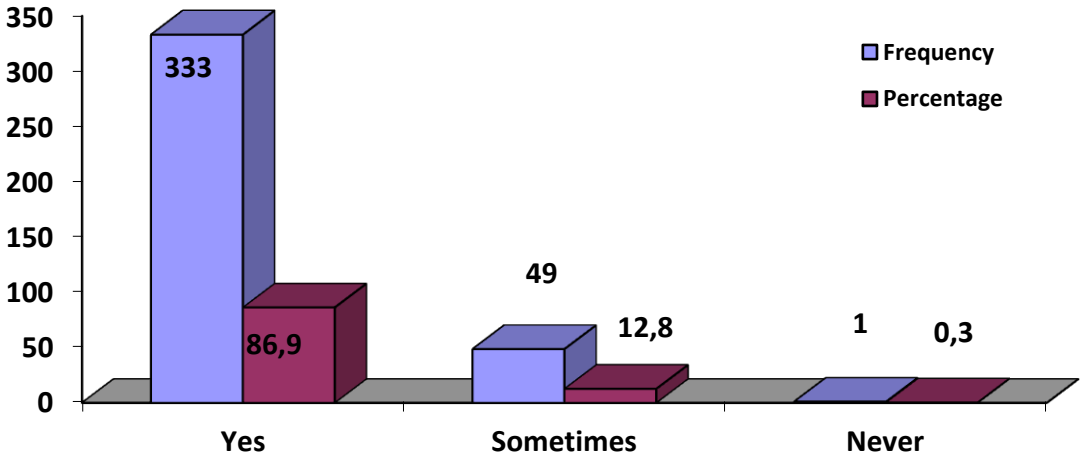

Figure 7.1: Are vegetables cooked and served for household members?
Source of data: from the study

As shown on the graph above, majority 86.9% (n = 333) of food gardeners cooked and served vegetables for their household members while only 12.8% (n = 49) of the participants said they sometimes cooked and served the vegetables to household members. However, only 1 (0.3%) of the participants said they never cooked and served the vegetables to their household members. Since the results above revealed that nearly 9 in every 10 households cooked and served vegetables for their family members, it became indispensable for the researcher to investigate the frequency of preparation and serving of those vegetables to members of the family. As a result, Figure 7.2 below presents results of the responses to the question "How often are vegetables prepared and served to members of the family?"

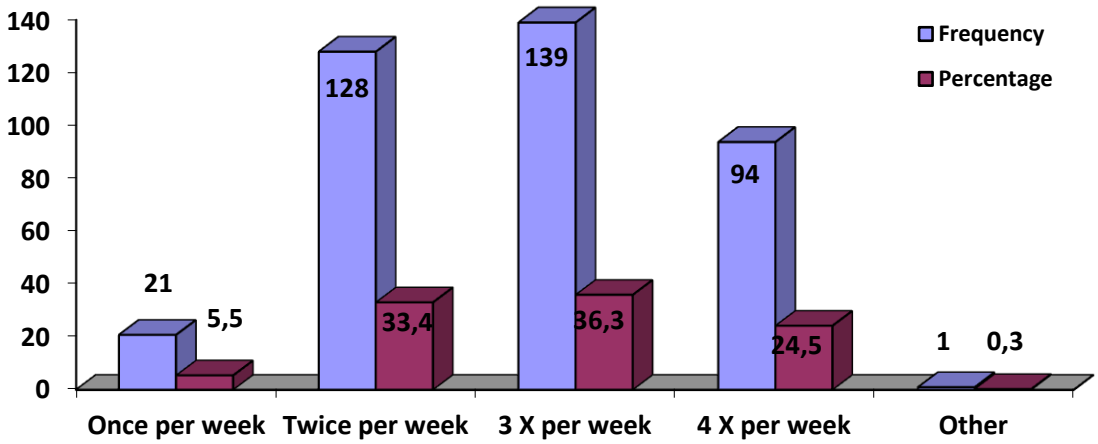

Figure 7.2: How often are vegetables prepared and served to members of the family?
Source of data: from the study

Figure 7.2 above shows the frequent times within which vegetables were prepared and served to members of the households. The graph shows that nearly 4 in every 10 households prepared and served vegetables to members of the family for a frequency of 3 times per week, 3 in every 10 households prepared and served vegetables for a frequency of 2 times per week while 2 in every 10 households prepared and served vegetables for a frequency of 2 times per week. Moreover, nearly 1 in every 10 households prepared and served vegetables for a frequency of once per week. Descriptive statistics showed that households prepared and served vegetables 3 times per week (mean = 2.81, SD = 0.88). Earlier the results of this study showed that 60% (n = 232) of the participants obtained a combination of different vegetables from their food gardens. The assumption here is that vegetables produced by food gardeners in their own food gardens were cooked and served to their household members. The focus groups also agreed that vegetables from the gardens were cooked and served to members of the households. Accordingly, it can be concluded that food gardens contributed to the utilisation of vegetables at households of the participants of this study.

Further investigations were performed seeking to reveal how households' preparation and serving of vegetables were influenced by socio-demographic variables. The results, as shown in Table 7.1 shows that household preparation and serving of vegetables depends on highest qualification level, where food gardeners learned about food gardening and number of years food gardeners have been practicing food gardening. On the other hand, age and gender showed no statistically significant influence on households' decision to prepare and serve vegetables to their household members. The Chi-Squared test for association results are as given in the table below.

Table 7.1: Chi-Squared tests results for the question "How often are vegetables prepared and served to members of the family?" and socio-demographic variables

	How often are vegetables prepared and served to members of the family?								
Highest educational level	Once per week	Twice per week	3 times per week	4 times per week	Total	Value	df	p-value	Cramer's V Value

No formal education	3	12	16	19	**50**	38.140	15	P<0.05	0.173
Grade 1-7	6	18	35	27	**86**				
Grade 8-11	4	33	24	15	**76**				
Grade 12	8	51	40	30	**129**				
ABET level 4	0	13	17	3	**33**				
Tertiary (University/Degree/Diploma)	0	1	7	0	**8**				
Total	**21**	**128**	**139**	**94**	**382**				
number of years you have been doing gardening	**Once per week**	**Twice per week**	**3 times per week**	**4 times per week**	**Total**	**Value**	**df**	**p-value**	**Cramer's V Value**
9 years or less	9	75	69	25	**178**	29.172	6	P<0.05	0.197
10 - 29 years	9	33	44	30	**116**				
30 years and above	3	19	26	35	**83**				
Total	**21**	**127**	**139**	**90**	**377**				
Where did you learn how to do food gardening	**Once per week**	**Twice per week**	**3 times per week**	**4 times per week**	**Total**	**Value**	**df**	**p-value**	**Cramer's V Value**
At Secondary School	8	43	33	16	**100**	80.703	12	P<0.05	0.253
Department of Agriculture & Extension Worker	8	21	17	6	**52**				
Learned from the gardeners	5	26	75	57	**163**				
ABET school	0	7	0	6	**13**				
Other	0	31	14	9	**54**				
Total	**21**	**128**	**139**	**94**	**382**				

Source of data: from the study

Although the Table 7.1 suggest the existence of a relationship between "How often are vegetables prepared and served to members of the family?" and the socio-demographic

variables (Qualification, Institution of Learning and Experience), the Cramer's V Values suggest that the relationships are not strong. However, the following observations are worth noting:

- A general increase in number of households belonging to food gardeners with no formal education, Grade 1-7, ABET and Tertiary education, who prepare and serve vegetables to household members **more often**. Thus, people with no formal education, Grade 1-7, ABET and Tertiary education prepares and serves vegetables more often than their Grade 12 counterparts.
- A general increase in the number of households belonging to food gardeners with Grade 12, who prepare and serve vegetables to household members **less frequently**.
- A general increase in the number of households belonging to food gardeners with less than 9 years of experience who prepare and serve vegetables to household members **less frequently**.
- A general increase in the number of households belonging to food gardeners with more than 10 years of experience who prepare and serve vegetables to household members **most frequently**.
- A general increase in the number of households belonging to food gardeners who learned food gardening at secondary school, department of agriculture and extension workers who prepare and serve vegetables to household members **less frequently**.
- A general increase in the number of households belonging to food gardeners who learned food gardening from other food gardeners who prepare and serve vegetables to household members **most frequently**.

Having established the occurrence times within which households were utilising vegetables, the researcher was eager to know how households sourced for vegetables they were consuming. According to Fraanje and Lee-gammage, (2018), utilisation of food also means that people must have access to adequate and a variety of food to meet their daily dietary requirements. Consequently, participants were asked to respond to the question "From where does the household get these vegetables?". Although the question was paused earlier on to test how participants got access to their food, it was imperative to reiterate this question in this section in order to determine whether the utilised foods were actually sourced from the participants' own food gardens. Figure 7.3 below present a description of the distribution of

responses across the possible sources of vegetables considered in this study, namely; (1) buy, (2) from home garden and (3) buy and home garden.

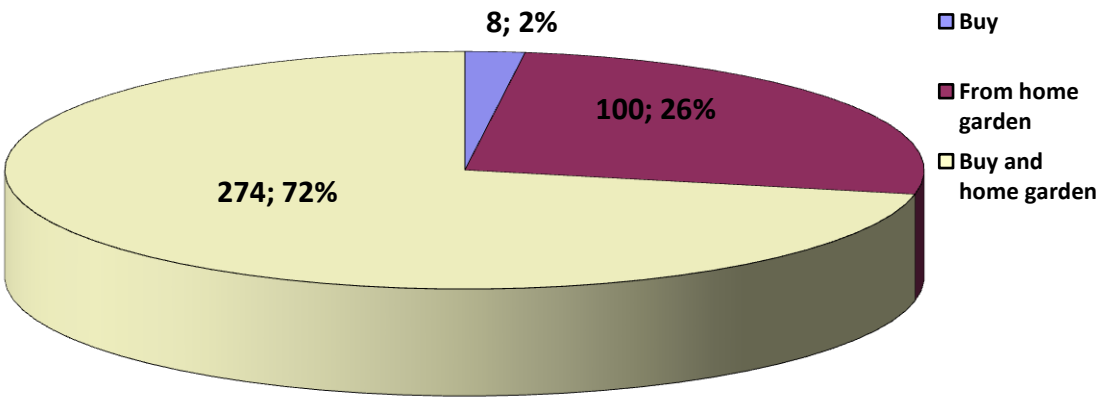

Figure 7.3: From where does the household get these vegetables?
Source of data: from the study

To determine whether the participants were utilizing food from their own vegetable gardens, the researcher found it imperative to ask where they got their vegetables from. As shown in Figure 7.3, majority (72%, n = 274) of the households indicated getting most of their vegetables from buying and home food gardens, 26% (n = 100) of the households revealed that they got vegetables from home gardening only while the remaining small proportion (2%, n = 8) of total households indicated that they obtained their vegetables from buying. Thus, nearly 7 in every 10 households obtained their vegetables from both the food gardens and the vegetable markets while nearly 3 in every 10 households obtain their vegetables from home gardening. Nearly none of the households obtained their food from buying.

It was interesting to note that although the figures were not exactly the same there were very close similarities (F1-Score = 0.35, Accuracy Score = 0.69) in the participants' responses to the similar question in the previous chapter (see Figure 6.1, (question 14" How do you get the food that you eat every day?" versus question 25 "From where does the household get these vegetables?". A greater number of participants still held that they got their food from buying and gardening followed by those who indicated getting their food from home gardens only and then by those who sourced their food through buying which constituted the least. From these results it is clear that a greater number of the participants were eating food from their gardens which substantiate the role that food gardens were playing in the utilisation of food in the households.

An investigation which sought to establish how socio-demographic variables affected where households were obtaining their vegetables was carried out using Chi-Squared test for association. The results are as presented in Table 7.2 below.

Table 7.2: Test for association between the households' means for getting vegetables and the socio- demographic variables

Age	From where does the household get these vegetables?			Total	Value	df	p-value	Cramer's V
	Buy	From home garden	Buy and home garden					
20-35 (Youth)	0	10	25	35	21.438	8	P<0.05	0.162
36-45 (Youth adult)	5	17	68	90				
46-55 (Adult)	3	19	78	100				
56-65 (Old age)	0	34	50	84				
66+ (Senior citizen)	1	20	53	74				
Total	**9**	**100**	**274**	**383**				
highest educational level	**Buy**	**From home garden**	**Buy and home garden**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
No formal education	0	27	23	50	34.665	10	P<0.05	0.212
Grade 1-7	1	27	58	86				
Grade 8-11	3	14	59	76				
Grade 12	3	24	103	130				
ABET level 4	2	8	23	33				
Tertiary (University/Degree/Diploma)	0	0	8	8				
Total	**9**	**100**	**274**	**383**				
Where did you learn how to do food gardening	**Buy**	**From home garden**	**Buy and home garden**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
At Secondary School	3	14	84	101	31.198	8	P<0.05	0.202

Department of Agriculture and Extension Worker	0	17	35	52				
Learned from the gardeners	2	57	104	163				
ABET school	2	0	11	13				
Other	2	12	40	54				
Total	**9**	**100**	**274**	**383**				
number of years you have been doing gardening	**Buy**	**From home garden**	**Buy and home garden**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
9 years or less	6	25	147	178	30.548	4	P<0.05	0.191
10 - 29 years	3	42	71	116				
30 years and above	0	32	52	84				
Total	**9**	**99**	**270**	**378**				

Source of data: from the study

Although the results are not that strong as measured by Cramers V of 0.162, 0.212, 0.202, 0.191 for age, highest qualification level, where food gardeners learned food gardening and experience in food gardening respectively. It is important to reiterate that the higher and statistically significant the Cramers' V value, the stronger the association would be the means with which households get their vegetables (buy, garden or buy and garden) and the socio-demographic variables. As demonstrated by the figures presented above, the proportion of households who relied on food gardens for vegetables are the same for all socio-demographic variables (see Table 7.2). Gender was found to have no statistically significant relationship with households' means for getting vegetables and hence, the results were excluded from the above table.

These results demonstrate the important role of food gardens in contributing towards the participants' daily dietary needs. Observed vegetables in food gardens served as evidence that participants were in fact utilising food from their own food gardens. This result agrees well with conclusions reached by Musotsi, Sigot and Onyango (2008), Hanson (2013) and Freedman (2015) who noted that food gardens contributed significantly to the daily dietary needs of people for better nutrition and health of households.

To further understand the food garden products that were commonly consumed by participants' households, hence, the commonly accessed foods from the food garden, participants were asked the following question "Which food from the garden do you commonly eat?". The majority of the participants (n = 162; 42.3%) indicated that they commonly consumed a combination of various foods, followed by participants who commonly ate maize (n = 70; 18.3%), tomatoes (n = 31; 8.1%), African night shade (n = 26; 6.8%), sweet potatoes 22 (5.7%), indigenous vegetable (n = 21; 5.5%), spinach (n = 17; 4.4%) and Chinese cabbage (n = 9 (2.3%)) (see Table 7.3). The results show that the majority of the participants were having variety in their diet as many were indicating a combination of various vegetables.

Table 7.3: Commonly eaten foods from the garden

Food	**Frequency**	**Percentage**
Pumpkin Leaves	4	1.0
Fruits: Mango, Avocados, Litchis, Pawpaw, Oranges	5	1.4
Cabbage	8	2.1
Carrots	8	2.1
Chinese cabbage	9	2.3
Spinach	17	4.4
Black jack, Amaranth, Okra/Corchorus olitorius (Indigenous vegetables)	21	5.5
Sweet potatoes	22	5.7
African night shade	26	6.8
Tomatoes	31	8.1
Maize/ maize meal	70	18.3
Any combination of the different foods	162	42.3
Total	**383**	**100.0**

Source of data: from the study

As depicted in Table 7.3, the results revealed that the study participants were able to utilize food from their own food gardens and hence, food security was ensured at household level. Nonetheless, the researcher also realised through information obtained from focus group discussions that there were observed seasonal scarcity of certain garden produces in the food gardens. For instance, it was noticed that some people grew food mainly in summer and little crops in winter (such as those who primarily grew maize and ground nuts), they would wait for another season to grow the same crops again. As a result, this could lead to reduced utilisation of garden produces at households during such times.

Survey participants' reasons for eating foods listed in Table 7.3 above were also sought and identified, which served to demonstrate that households were utilizing food from their home gardens. Indications from Table 7.4 are that 50.7% (n = 194) of the participants revealed they commonly ate those foods because they could be grown all-year round, 32.6% (n = 125) of the participants reported that they commonly ate the foods because they could be easily grown while a minor proportion, represented by 16.7% (n = 64) of the participants did not give any reasons to support why they liked to eat the identified foods.

Table 7.4: Reasons why the participants like to eat the chosen foods

Reason	**Frequency**	**Percentage**
Easy to grow	125	32.6
Can be grown in all seasons	194	50.7
Other	64	16.7
Total	**383**	**100.0**

Source of data: from the study

As a converse, the researcher investigated vegetables that were least eaten by the survey participants. Participants were asked to indicate vegetables they least consumed Table 7.5 shows that 39.4% (n = 151) of the survey participants revealed indigenous vegetables were the least eaten, followed by cabbage, pumpkin, spinach, green beans, Chinese cabbage, broccoli, potatoes, carrots, beetroot and sweet potatoes. Only 2 (0.5%) of the participants mentioned watermelon whereas the other 3 (0.8%) never mentioned any food.

Table 7.5: Vegetables that are least eaten

Vegetable	Frequency	Percentage
Water melon	2	0.5
Carrots	7	1.8
Beetroot	7	1.8
Sweet potatoes	7	1.8
Potatoes	8	2.1
Broccoli	10	2.6
Chinese cabbage	15	3.9
Cabbage, Beetroot, carrots	15	3.9
Green beans	17	4.4
Spinach	19	5.0
Pumpkin/Butternut	49	12.8
Cabbage	73	19.1
Indigenous vegetables	151	39.4
Other (none)	3	0.8
Total	**383**	**100.0**

Source of data: from the study

Putting all together, in Table 7.3 the researcher found that the four commonly eaten foods from the garden were maize, tomatoes, African night shade and sweet potatoes while Table 7.5 show that the least four eaten foods were indigenous vegetables, cabbage, pumpkin/butternut and spinach. Table 7.6 below presents participants' reasons for least eating those vegetables in Table 7.5 which were related to the seasonality and scarcity nature of certain vegetables which rendered them inaccessible, hence least consumed by survey participants.

The other reasons pertained to the difficulty associated with growing such vegetables. For example, excessive costs which were mainly associated with the process of maintaining the vegetables including adverse perceptions that linked certain vegetables to posing health challenges. Moreover, participants stated that they did not have those vegetables in their gardens while others indicated costs of vegetable seeds to be beyond the reach for many food gardeners. This result concurs with observations made by Hanson (2013), who observed that lack of resources and poor management of food garden restrained all-year round and direct access to readily available food.

Table 7.6: Reasons for non-consumption of vegetables

Reason (s)	**Frequency**	**Percentage**
They give health challenges	15	3.9
Not in household garden	58	15.1
Expensive to buy seeds and hard to maintain	88	23.0
Not easy to grow	103	26.9
They are seasonal, rare and hard to find	119	31.1
Total	**383**	**100.0**

Source of data: from the study

The results were accentuated by the researcher's observation of certain vegetables such as cabbage which was rarely grown and this could be due to the cost of seedlings and its maintenance which was mentioned during the focus group discussions. According to Fraanje and Lee-gammage (2018), utilisation of food is also affected by preferences. This was also true in this study, as a greater number of the participants (n = 151; 39.4%) did not prefer to eat indigenous vegetables. This could mean that in line with van der Hoeven, Osei, Greeff, Kruger, Faber and Smuts (2013), some people in many communities still regard indigenous vegetables as inferior and associated with low class people living in poverty. Therefore, these people would prefer to grow and eat cash crops as opposed to domesticated or cultivated indigenous plants.

The concurrence by the participants that food gardens provided food for households' utilisation motivated the researcher to inquire from the participants of how often households consumed food from their own food garden. Figure 7.4 shows a description of the responses gathered from participants in response to the following question, "how often households eat food from their own garden". The results in Figure 7.4 present the frequency distribution depicting how different frequencies of eating food from the food gardens were distributed amongst the 383 participants. As depicted in Figure 7.4 below, 148 (38.6%) of the households ate food from their gardens as often as 3 times per week followed by 108 (28.2%) households who ate food from their gardens for 2 times in a week. Interestingly, more than 65% of the households ate food from their own food gardens for a frequency of more than 3 times per week and less than 35% of the households ate from their gardens for a frequency of less than 2 times per week.

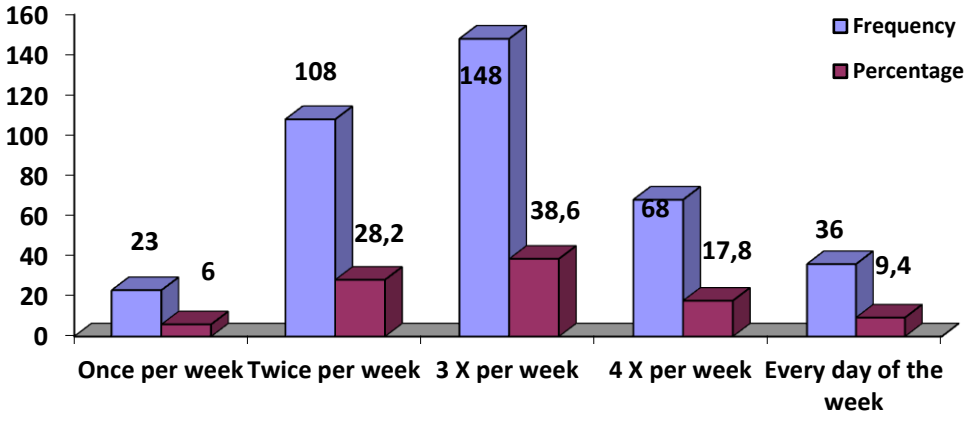

Figure 7.4: Frequency of eating food from the food garden
Source of data: from the study

From these findings, it can thus be concluded that food gardens contributed to regular intake of vegetables in households of the participants in this study. Table 7.7 presents Chi-squared results revealing the existence of a statistically significant relationship between the frequency of eating food from the food gardens and the socio-demographic variables such as age (Chi-square = 34.880, df =16, $p<0.05$), highest qualification level (Chi-square = 73.987, df =20, $p<0.05$), where food gardeners learned food gardening (Chi-square = 78.353, df =16, $p<0.05$) and experience (Chi-square = 69.414, df =16, $p<0.05$).

Table 7.7: Summary of cross-tabulations between the question "How often do you eat food from your own garden?' and socio-demographic variables

Age	**How often do you eat food from your own garden?**					**Total**	**Value**	**df**	**p-value**	**Cramer's V**
	Once per week	Twice per week	3 x per week	4 x per week	Every day of the week					
20-35 (Youth)	4	8	14	4	5	**35**	34.880	16	P<0.05	0.151
36-45 (Youth adult)	5	30	38	15	2	**90**				
46-55 (Adult)	3	36	42	14	5	**100**				
56-65 (Old age)	6	20	32	18	8	**84**				

66+ (Senior citizen)	5	14	22	17	16	**74**				
Total	**23**	**108**	**148**	**68**	**36**	**383**				
Highest educational level	**Once per week**	**Twice per week**	**3 x per week**	**4 x per week**	**Every day of the week**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
No formal education	2	12	10	17	9	**50**	73.987	20	P<0.05	0.213
Grade 1-7	3	10	47	19	7	**86**				
Grade 8-11	5	33	18	17	3	**76**				
Grade 12	9	44	48	14	15	**130**				
ABET level 4	4	8	18	1	2	**33**				
Tertiary (University/Degree/Diploma)	0	1	7	0	0	**8**				
Total	**23**	**108**	**148**	**68**	**36**	**383**				
Where did you learn how to do food gardening	**Once per week**	**Twice per week**	**3 x per week**	**4 x per week**	**Every day of the week**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
At Secondary School	7	43	32	15	4	**101**	78.353	16	P<0.05	0.215
Department of Agriculture and Extension Worker	5	17	24	2	4	**52**				
Learned from the gardeners	6	18	77	42	20	**163**				
ABET School	1	5	2	5	0	**13**				

Other	4	25	13	4	8	**54**				
Total	**23**	**108**	**148**	**68**	**36**	**383**				
Number of years you have been doing gardening	**Once per week**	**Twice per week**	**3 x per week**	**4 x per week**	**Every day of the week**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
9 years or less	10	72	78	9	9	**178**	69.414	8	P<0.05	0.303
10 - 29 years	8	23	45	33	7	**116**				
30 years and above	5	12	25	24	18	**84**				
Total	**23**	**107**	**148**	**66**	**34**	**378**				

Source of data: from the study

The results as depicted in Table 7.7 above shows that frequency with which food gardeners ate food from the food gardens depended on experience in food gardening possessed by food gardeners who had acquired the knowledge of food gardening at secondary school and whose highest level of qualification were Grade 8-11 (Chi-Square = 18.014, df = 6, $p < 0.05$) and Grade 12 (Chi-Square = 32.105, df = 8, $p < 0.05$). Furthermore, the results show that the frequency with which food gardeners ate food from their food gardens depends on the level of experience in food gardening possessed by food gardeners who had acquired the knowledge of food gardening from other food gardeners and whose highest levels of qualification was ABET Level 4 (Chi-Square = 10.879, df = 3, $p < 0.05$) and Tertiary level (Chi-Square = 7.00, df = 1, $p < 0.05$).

It was also important to establish if the participants liked to eat the vegetables from their gardens as gathered information might be important for further improving the role of food gardens to food security. As such, Figure 7.5. below present a summary of responses distribution by food gardeners to the question “Do household members like to eat these foods?”

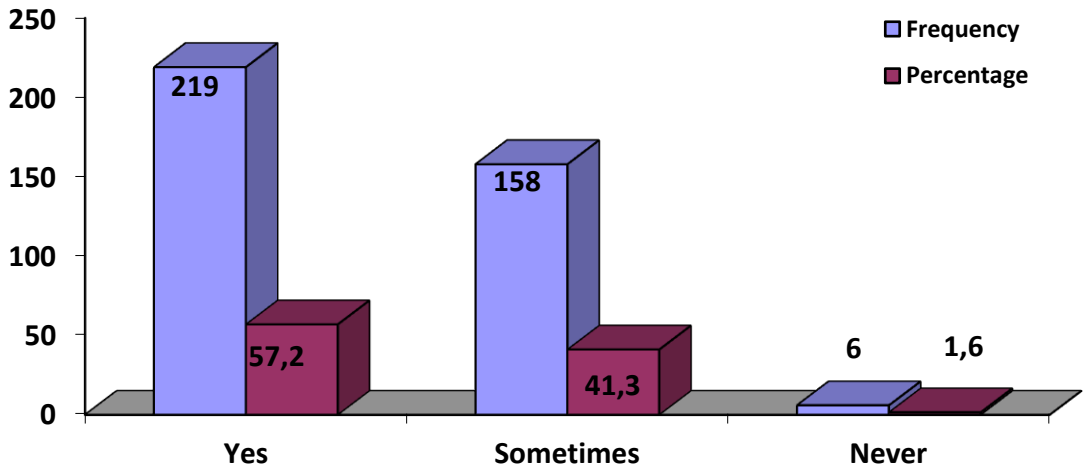

Figure 7.5: Do household members like to eat these foods?
Source of data: from the study

Over half of the participants 57.2% (n = 219) indicated that their household members liked to eat the foods, 41.3% (n = 158) revealed household members sometimes liked to eat the foods while a very small number 1.6% (n = 6) indicated they never liked eating those foods. A combination of various vegetables were consumed by the participants of this study as depicted previously in Table 7.3 which gave a summary of commonly eaten foods from the survey participants' food gardens. These results were supported by the views gathered from focus group discussions which established that households were using vegetables from their own home gardens.

Following the establishment that more than half of the households liked to eat the vegetables, the researcher had to inquire from participants if there were any indigenous foods that were served to family members. It was important to investigate the utilisation of indigenous foods in order to establish if these indigenous foods were being included in daily diets at household level. As supported by Freedman (2015), it is believed that traditional diets and consumption of readily available indigenous wild food plants can increase the consumption of fresh fruit and vegetables which are rich sources of micronutrients and thus enhancing food security. Figure 7.6 below presents a bar graph describing the distribution of responses gathered from survey participants to the question "Are there any indigenous foods that are served to family members?

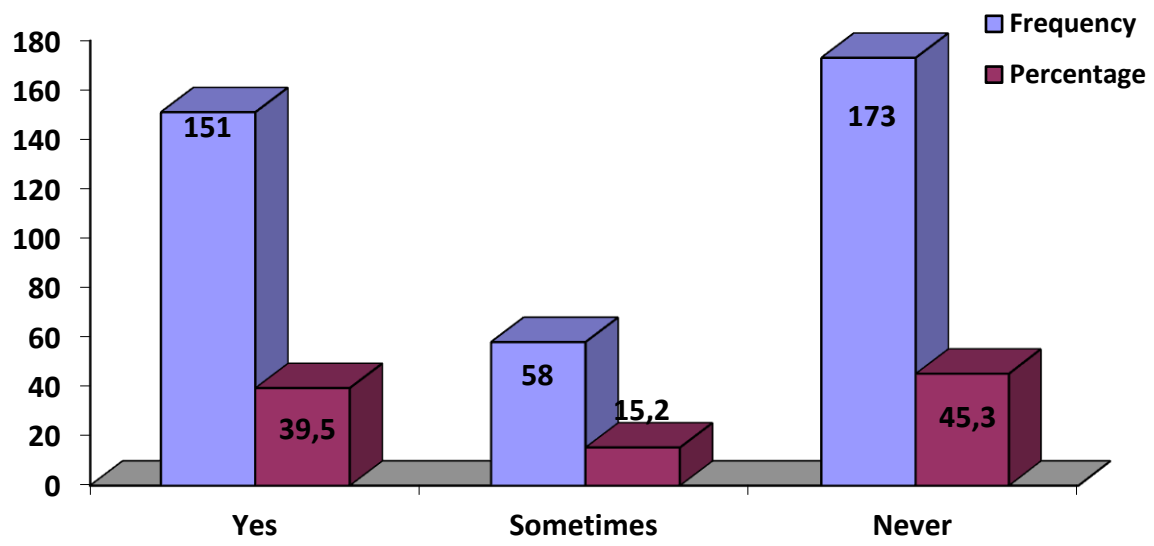

Figure 7.6: Are there any indigenous foods that are served to family members?
Source of data: from the study

The results above show that approximately 4 in every 10 (n = 151; 39.5%) households revealed that they served any of the indigenous foods to their family members while 1 in every 10 (n = 58; 15.2%) households indicated indigenous foods were sometimes served to family members. Interestingly, almost 5 in every 10 (n = 173; 45.3%) households indicated they never served indigenous foods to their family members. Hence, the majority of the participants were not actually utilising indigenous vegetables.

Since food utilisation also include how harvested food is processed and stored (Swindale & Bilinsky, 2005; FAO, 2010, 2014; Hanson, 2013; Fraanje & Lee-gammage, 2018; USAD, 2018), Figure 7.7 below presents the distribution of responses provided by food gardeners when they were presented with the question "What do you do with the surplus of garden products?" which sought to establish how food surpluses were handled.

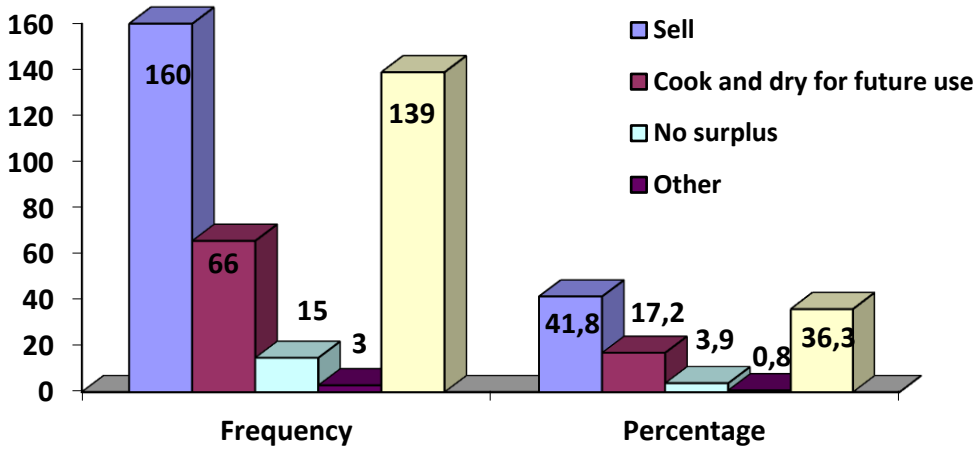

Figure 7.7: What do you do with the surplus of garden products?
Source of data: from the study

In Figure 7.7 above it is shown that surplus foods were sold and also preserved for future use as reported by 41.8% (n = 160) and 17.2% (n = 66) of the total participants respectively. Apart from establishing that food surpluses were either sold or preserved for future use as ways to ensuring food garden products were properly used, processed and stored, data collected by the researcher through observation revealed some other dimensions to food utilisation as presented in the following graph. Consequently, Figure 7.8 below presents a summary of statistics depicting the researcher's observation on the utilisation of garden products. The observed results agree with the responses that were given by participants which showed that a big proportion of garden products were used at home (48.37%), followed by selling (42.45%), seed keeping (7.14%) while a very small proportion (1.84%) of the food products were preserved for future use.

Drying vegetables is one of the methods used to process and preserve food, it prolongs the shelf life of food and make it available for future use (FAO, 2007; Hill, 2015; Fredman, 2015). Although the participants were never asked which preservation methods they were using and the food products that they were preserving, the researcher had the opportunity to observe during data collection that the participants were drying maze, peanuts, beans and cooked vegetables such as cabbage, bean leaves (munawa), pumpkin leaves (phuri), pumpkin flowers (vhuluvha) and sometimes Chinese cabbage. It was also observed that indigenous vegetables such as Okra that grow freely amongst other cultivated crops were harvested and dried in their natural state (the dried Okra locally known as mutshovhotshovho) without

being cooked. Furthermore and most interesting, the results also revealed that a small proportion of food gardeners exchanged their harvests for other foods or commodities with neighbours (0.20% of total surveyed participants).

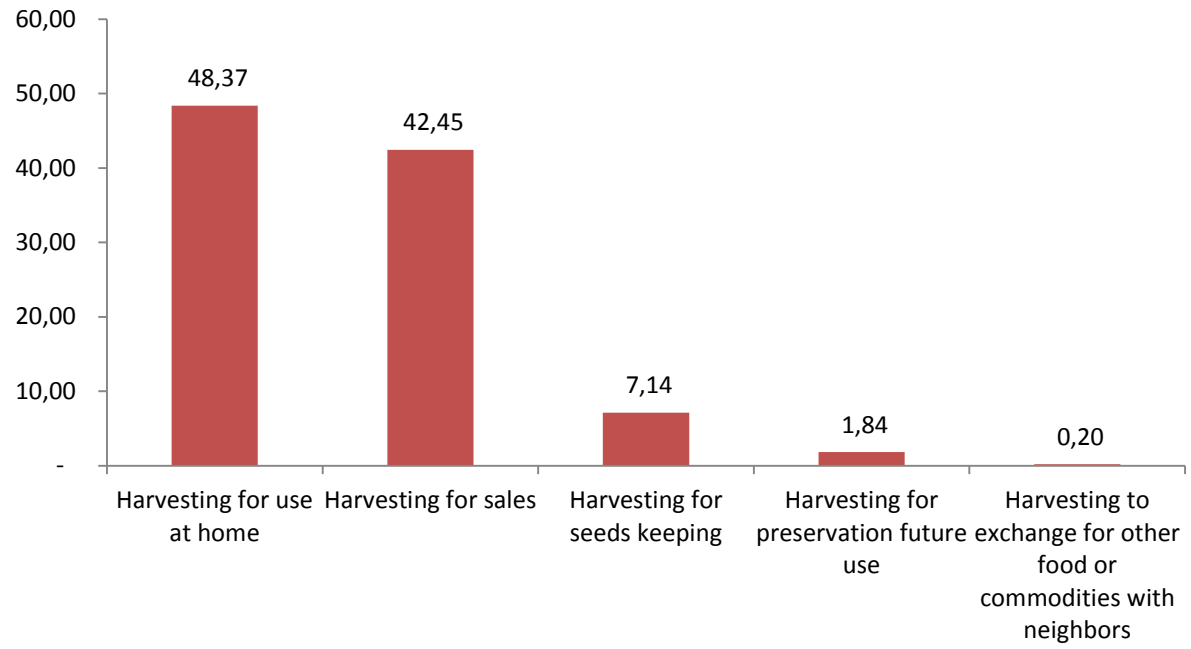

Figure 7.8: Observation on the utilisation of garden products
Source of data: from the study

Since utilisation affects nutritional value of food and health status of people, participants were also asked about the benefits that food gardens can have on their daily diet. Table 7.8 below presents the benefits of food gardens on daily diet.

Table 7.8: Benefits of food gardens on daily diet

Benefits	**Frequency**	**Percentage**
Improve health by providing nutrients and fight diseases	261	68.1
Having fresh food from home gardens than from markets	56	14.6
Vegetables will be on daily meals	42	11.0
Help to eat a balanced diet	16	4.2
Saving money when not buying	8	2.1
Total	**383**	**100.0**

Source of data: from the study

In accordance with Lander (2013), Table 7.8 above shows that food gardens played a very critical role of ensuring that households ate fresh and balanced diet which contributes to improved health through provision of necessary nutrients. Moreover, since healthy and balanced diet contribute to a healthy body, the participants believed that food gardens were of great help in fighting diseases there by providing nutrients and making individuals to become healthy and less prone to disease attacks. The results agree with Hanson (2013) who maintained that utilisation is achieved when people have access to enough nutritious foods for good health and to avoid diseases.

In the context of linking the role of food gardens to food utilisation, Table 7.9 below presents the contribution of food gardening to household food security. Since food utilisation extend to ensuring that adequate knowledge of nutrition and adequate health exist (Fraanje & Lee-gammage, 2018; Swindale & Bilinsky, 2005), the results underlying the participants' knowledge on the role of food gardening to household food security are quite significance and presented below.

Table 7.9: Contribution of food gardening to household food utilisation to ensure food security

Contribution	**Frequency**	**Percentage**
Improved diet	21	5.5
Provides money for buying other essential food stuff such as oil and salt	21	5.5
Provide nutritional food which aid in the fight against infections	53	13.8
Improve direct access and availability of food for utilisation at home even without money	288	75.1
Total	**383**	**100.0**

Source of data: from the study

Utilisation is an important pillar of food security and it entails having access to sufficient quantities and diversity of food to meet nutritional needs (Fraanje & Lee-gammage, 2018). Overall, participants believed that food gardens contributed to household food security by improving diet through direct access and availability of food for utilisation at home even without money. Alongside the provision of nutritious food, food gardens are believed to provide money for buying other essential food stuff to utilise such as oil and salt.

Based on the contributions mentioned by participants in Table 7.9 above, a test for association between socio-demographic variables and the contribution of food gardens to household food utilisation to ensure food security was conducted. Table 7.10 below presents the results for Chi-Squared Tests for association.

Table 7.10: Cross-tabulations results between question "What role does food gardening play to household food utilisation to ensure food security and "What is your highest educational level?"

What role does food gardening play to household Food security?	What is your highest educational level?						Total	Value	df	p-value	Cramer's V
	No formal education	Grade 1-7	Grade 8-11	Grade 12	ABET level 4	Tertiary (University/Degree/Diploma)					
Provide nutrients and fight infections	8	12	2	19	10	3	54	40.130	20	P<0.05	0.152
Improve direct access and availability of food at home	29	44	56	78	15	3	225				
It makes money to buy other food stuff such as oil and salt	4	6	4	4	2	0	20				
Can have food without buying	9	16	13	21	3	1	63				
Improve diet	0	8	1	8	3	1	21				
Total	**50**	**86**	**76**	**130**	**33**	**8**	**383**				

Source of data: from the study

The results revealed a weak but significant relationship between contribution of food gardens to household food security and highest qualification level of food gardeners. No statistically significant relationship was found between the contribution of food gardens to household food security and other socio-demographic variables such as age, gender, where food gardeners learned food gardening and the number of years of doing food gardening.

7.3. The results and discussions based on the 24-hour food consumption recall

To further understand how participants utilised food, a 24-hour food recall was used to collect data on foods that participants had eaten a day prior to data collection. The results from the 24-hour food consumption recall sheet presents the place and the food garden products that were consumed by the survey participants during breakfast, lunch and dinner times.

For the purpose of this study, it was deemed fit to consider the place where food was consumed. The researcher was of the opinion that food that could have been consumed elsewhere beside the home or the garden might not had been cooked at home but bought at the shops or the market place. This precedent view would mean that consumed foods were not from their own food gardens which could be misleading in terms of the results of this study. Therefore, only the foods that were consumed from the garden or at home were taken into account and only the foods that were related to this study were considered for analysis. For instance, if the participant reported having eaten bread, soft porridge tea and milk during breakfast, only soft porridge was considered for analysis because it is the food that is prepared from the participant's food garden products.

The graphs below in Figures 7.9.1A-B, 7.9.2A-B and 7.9.3A-D depict the garden products that were consumed by different participants at different locations during breakfast, lunch, dinner or supper. Figure 7.9.1A illustrates the foods that survey participants mentioned they had consumed in the last 24 hours during breakfast meal, wherein porridge including soft porridge was very popular amongst the participants as having been consumed, followed by avocadoes, different vegetables, sweet potatoes and tomatoes. Nonetheless, these foods were eaten with some accompaniments which were mentioned by the participants, but they were excluded from the graphs because they were not produced from the participants' food

gardens. Most of the participants had their breakfast at home except for very few who had their breakfast at the garden.

Another finding was that the left-over porridge with a vegetable accompaniment was preferred for breakfast by most of the participants (male participants in particular) hence the appearance of vegetables during breakfast. It was also found that those who were producing sweet potatoes preferred to eat sweet potatoes with tea over bread and tea. From these results, it can be concluded that the participants were accessing and utilising food from their gardens. Snacks that were consumed after breakfast were also recorded as depicted in Figure 7.9.1B they included apples as the most preferred snack, followed by oranges, banana, watermelon and avocadoes. Surprisingly, there were few participants who mentioned porridge and Chinese cabbage which were equally reported as snacks. These snacks were predominantly consumed at home, followed by the garden with the exception of minor participants who had their snacks at the store and a few who had their snacks at the market.

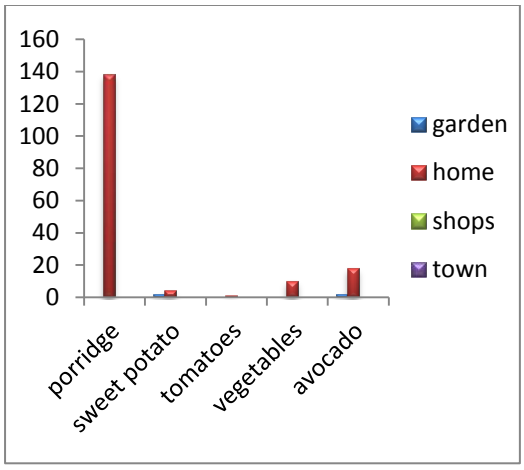

Figure 7.9.1A: Food eaten during breakfast at different places
Source of data: from the study

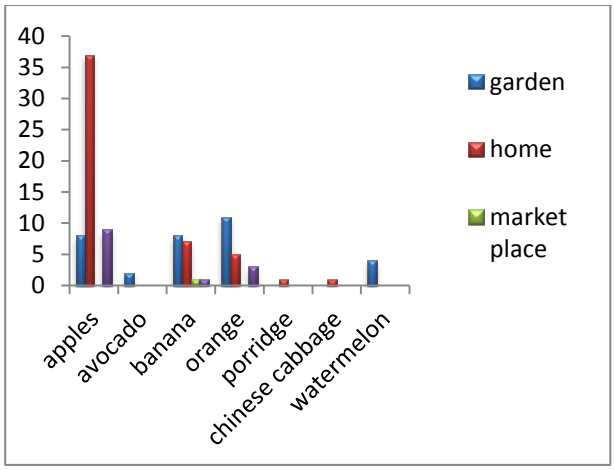

Figure 7.9.1B: Snack eaten during breakfast at different places
Source of data: from the study

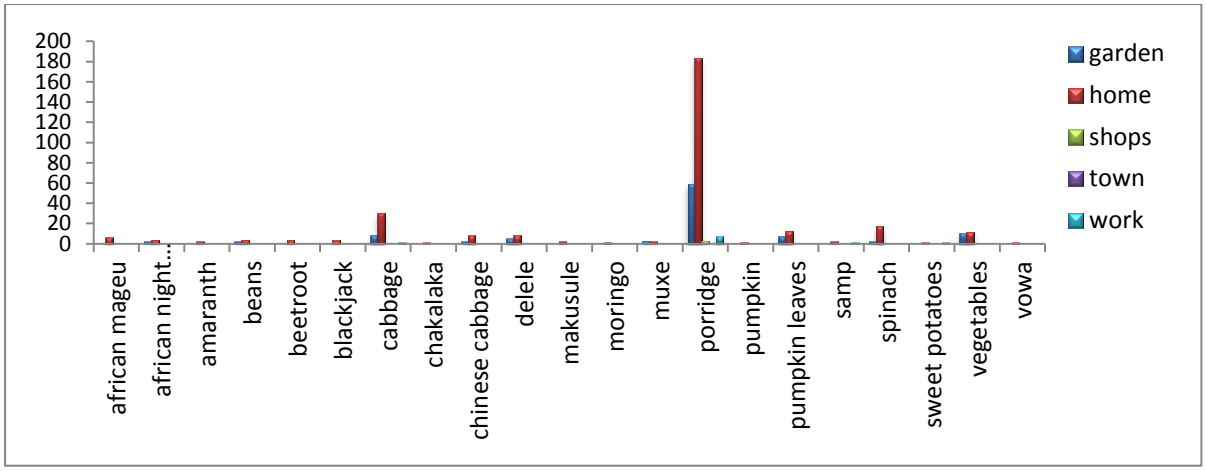

Figure 7.9.2 A: Food eaten during lunch different places
Source of data: from the study

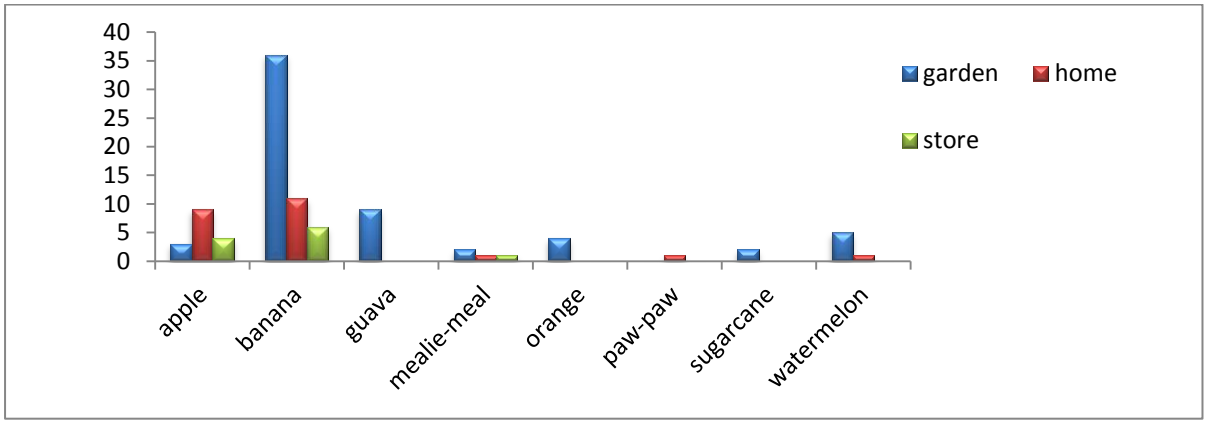

Figure 7.9.2B: Snacks eaten after lunch at different places
Source of data: from the study

Foods consumed by survey participants during lunch at different places are depicted in Figure 7.9.2A. As shown in Figure 7.9.2A, porridge which is the participants' staple food was consumed by more than half of the total participants (p = 52.2%), followed by various vegetables including cabbage, spinach, pumpkin leaves, Chinese cabbage, okra, blackjack, African night shade, amaranth, beans and dried vegetables (mukusule) to mention but a few (see Figure 7.9.2A). Commonly, these foods were consumed at home and some at the garden with only the minority who consumed their food at their workplaces. In Figure 7.6, it is indicated that 39.5% (n = 151) of the participants were utilizing indigenous vegetables, it was remarkable that the results from the 24-hour food recall also showed that participants consumed indigenous vegetables such as okra, blackjack, African night shade, amaranth, and cooked dried vegetables during lunch time. Additionally, participants consumed apples,

oranges, bananas, watermelons, guavas, sugarcane, and paw-paws as snacks after having had their lunch (see Figure 7.9.2B).

Supper and dinner were interchangeable in that the participants were reporting having eaten either supper or dinner and not both. The foods that the participants consumed during supper or dinner are shown in Figures 7.9.3A and 7.9.3C respectively and they include porridge, cabbage, Chinese cabbage, beans, spinach, pumpkin leaves, okra, blackjack, African night shade and amaranth. These were the garden products that were consumed by the participants at home and at the garden on the day before data collection. Moreover, apple, banana, grape, pear and oranges were identified as the snacks that were consumed by the participants during supper or dinner (see Figure 7.9.3B and 7.9.3D).

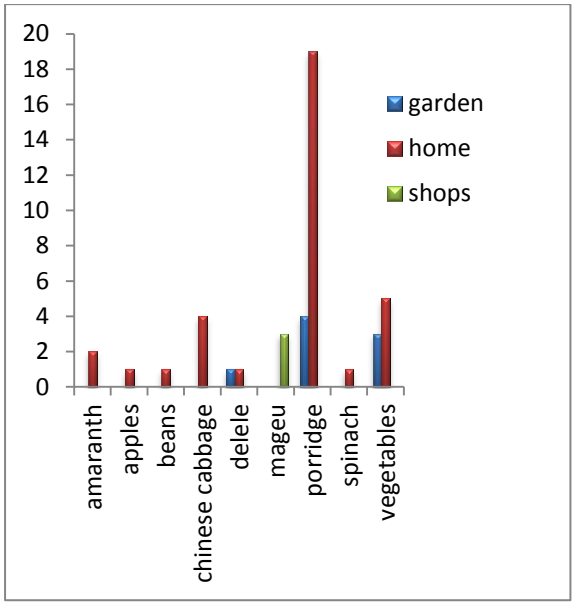

Figure 7.9.3B: Foods consumed after dinner at different places

Source of data: from the study

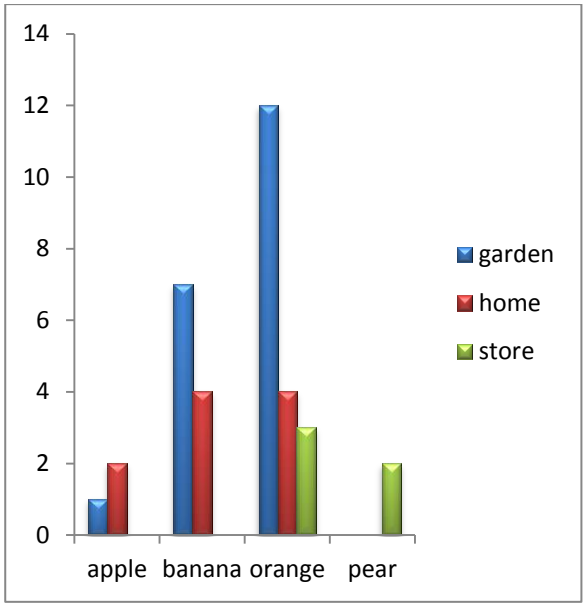

Figure 7.9.3A: Snacks consumed at dinner at different places

Source of data: from the study

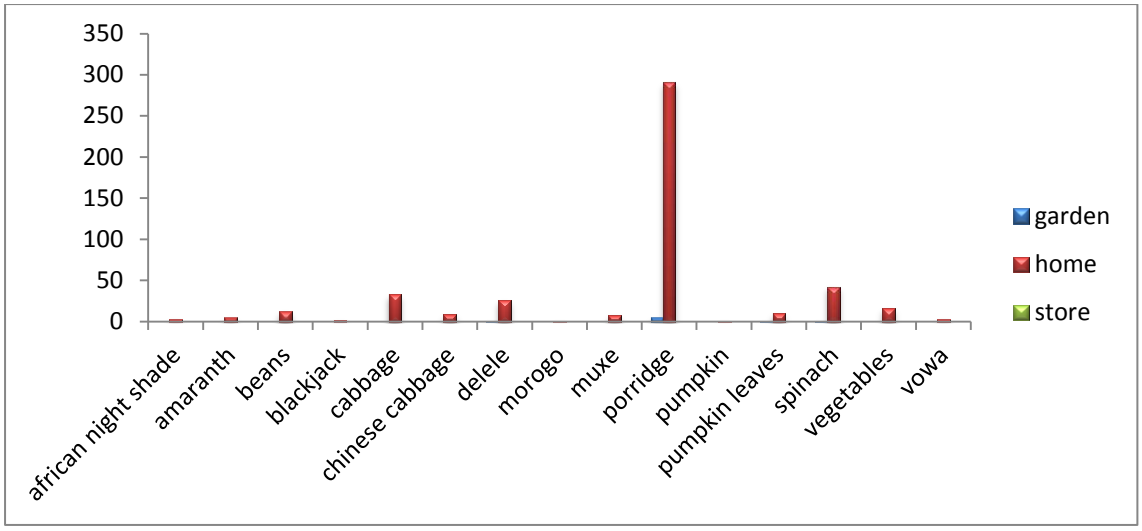

Figure 7.9.3C: Foods consumed during supper at different places
Source of data: from the study

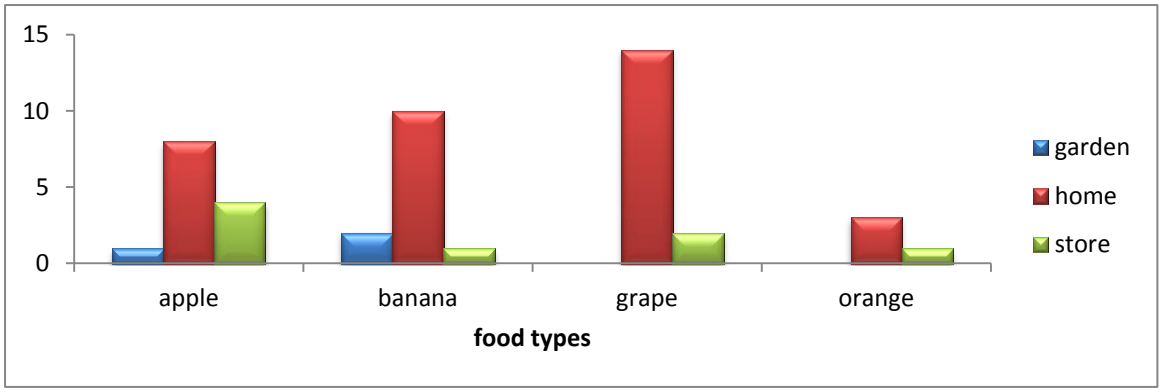

Figure 7.9.3D: Snacks consumed after supper at different places
Source of data: from the study

The 24-hour food recall results showed that participants only had three meals per day, they all had breakfast, lunch and either dinner or supper and some snacks in between the meals. It was realised that out of all the foods mentioned by the participants, some of the foods that were eaten from home and from the garden as snacks (such as apples, banana, watermelon and pears) were bought and not accessed from the participants' gardens. The researcher never observed these fruits from the participants' garden during the time of data collection.

It was also noted when data from the 24-hour food recall was being analysed that some participants never had snacks in between meals. Additionally, the researcher observed that some of the vegetables (such as cabbage) that were mentioned by some of the participants were not actually in their food gardens during the time of data collection. However the

researcher realised that these vegetables were cheaply bought from other gardeners or barter traded with what they didn't have. For instance, it was observed that the participants were freely allowing each other to harvest from the garden what they did not have and in return the other gardener would do the same. Another finding was that cabbage as an expensive and hard to manage vegetable, it was not available in some participants' food gardens.

Based on these results and in accordance with Carney *et al*., (2012); Fredman (2015) and Hanson (2013), it is without doubt that food gardens are the easiest way to ensure healthy diets that contain adequate nutrients. According to Swindale and Bilinsky (2005); FAO (2010), food security implies adding variety in the diet by eating food from different food groups, and this was ensured in this study through the utilisation of a variety of foods including those obtained from the food gardens. Overall, the results showed that food gardening played a vital role in providing food to the households belonging to participants considered in this study.

7.4. The results and discussions based on food frequency questionnaire

Utilisation of garden products was further established using a food frequency questionnaire. A food frequency questionnaire (FFQ) with a finite list of foods with response categories was used to estimate how frequently participants consumed certain foods during the past month from the date of data collection. According to Gibney *et al.*, (2013), dietary data from FFQ can be used to rank persons according to their intake of specific foods. The FFQ was useful to describe the participants' usual frequency of consuming specific food types.

Table 7.10 below gives a summary of the results from the FFQ illustrating the frequency with which various food garden produces were consumed by the survey participants. The table shows the frequencies of consumption of different foods by highest and lowest frequencies. As shown in Table 7.10, the most frequently consumed garden product was maize, which the majority indicated they ate for a frequency of 2 to 3 times per day, followed by tomatoes which the majority of survey participants revealed that they ate tomatoes for 5 to 6 times per week. Also, the table shows that cabbage, spinach, carrots and beetroot are equally consumed at a frequency of 2 to 4 times per week.

Table 7.11: Consumption of different food garden products by lowest and highest frequencies

Garden products	Never	Less than once per month	1-3 x per month	1 x per week	2-4 x per week	5-6x per week	1 x per day	2-3 x per day	4-5 x per day	6+ per day	Increase/ decrease
	1	2	3	4	5	6	7	8	9	10	I/D
Cabbage					X						I
Spinach					X						I
Carrots					X						I
Chinese cabbage	X										D
African night shade			X								D
Amaranth	X										D
Okra	X										D
Beetroot					X						I
Tomatoes						X					I
Sweet potatoes			X								D
Green Beans	X										D
Butternuts	X										D
Pumpkin	X										D
Pumpkin leaves				X							I
Dried beans	X										D
Maize								X			I
Pawpaw		X									D
Avocado		X									D
Blackjack	X										D
Onion						X					I

Source of data: from the study

Again Table 7.11 shows an increase and a decrease in the consumption of certain foods wherein, an increase in the consumption of maize which was predominantly a moderately and frequently consumed food garden product (8I) was illustrated, followed by onion and tomatoes (5I) and then cabbage, spinach, carrots and beetroot (5I). Furthermore, garden products like Chinese cabbage, African night shade, amaranth, okra, green beans, butternuts, pumpkin, dried beans and blackjack were reported among the never consumed food products by the participants and there was a decrease (1D) in the consumption thereof. These results are consistent with Table 7.5 which showed that Chinese cabbage, green beans, butternuts, pumpkin and indigenous vegetables were the least eaten foods. However the issue of seasonality also contributed to the utilisation of these foods, resulting in other foods not utilized because they were out of season.

Interestingly, the FFQ shows that beetroot and carrots were amongst the food which was frequently eaten which in fact contradict with the results in Table 6.2 which showed that beetroot was amongst the food that were accessed by the participants through purchasing. Again, in Table 6.3 just one participant reported having beetroot and three participants had reported having carrots in the garden. These results challenge the authenticity of the results from the FFQ as to whether the consumed foods were actually from the participants' gardens. It can thus be established that although the majority of participants were eating food from their gardens, the food frequency questionnaire results included foods that had been bought instead of being produced from the food gardens. As a result, these results shed light on the matrix of food garden crops that must be grown, harvested, processed and stored to ensure that they continue to be available, accessible and utilised by the household members. Overall, it can be concluded that these results reveal that food gardens were playing an essential role in food security.

The following graphs in Figure 7.10A to 7.10G represent the frequency of the consumption of maize, onions, tomatoes, beetroot, spinach, cabbage and carrots. These are the foods which were most frequently consumed by the survey participants according to the FFQ results.

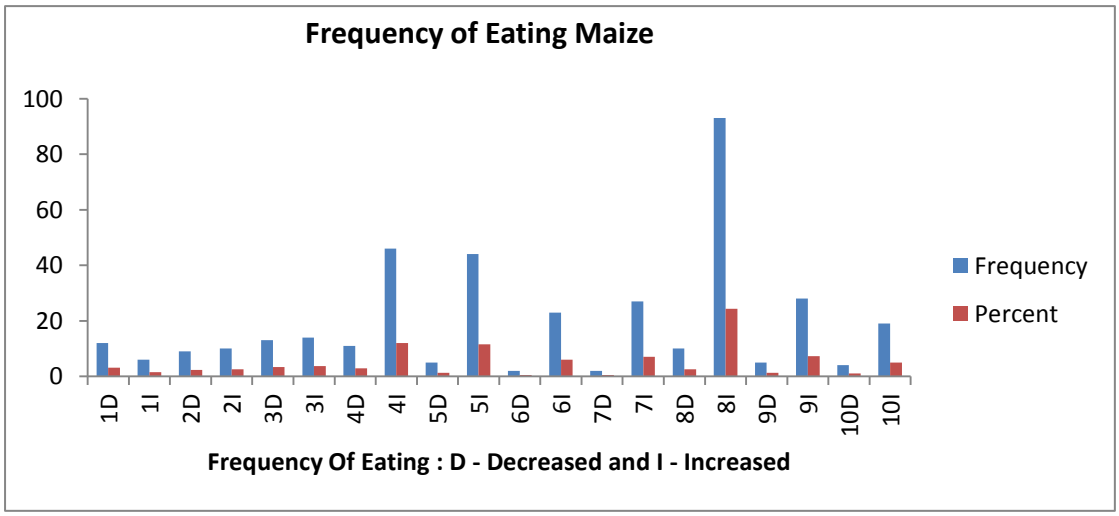

Figure 7.10A: Frequency of Eating Maize
Source of data: from the study

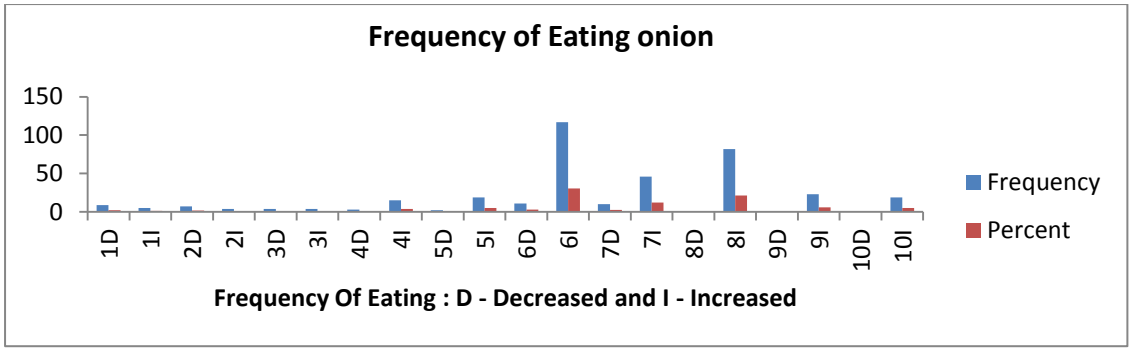

Figure 7.10B: Frequency of Eating Onion
Source of data: from the study

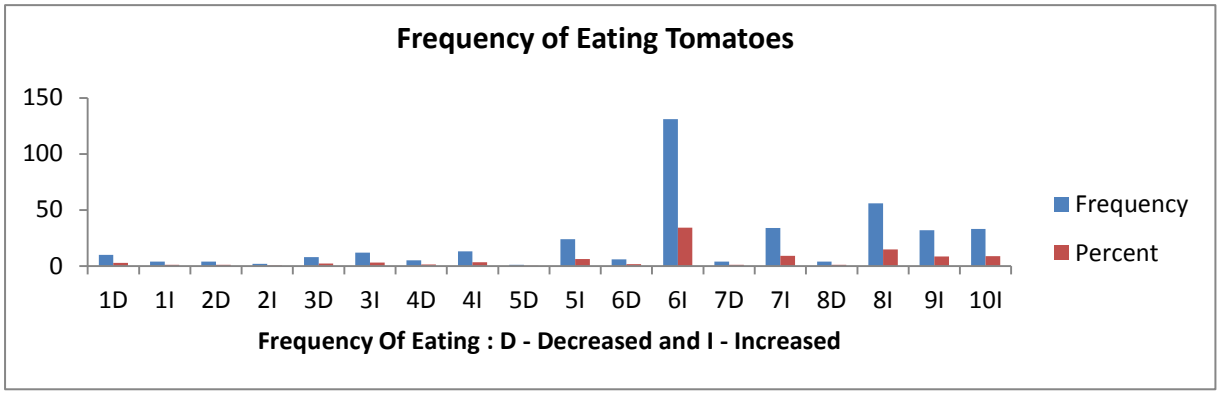

Figure 7.10C: Frequency of Eating Tomatoes
Source of data: from the study

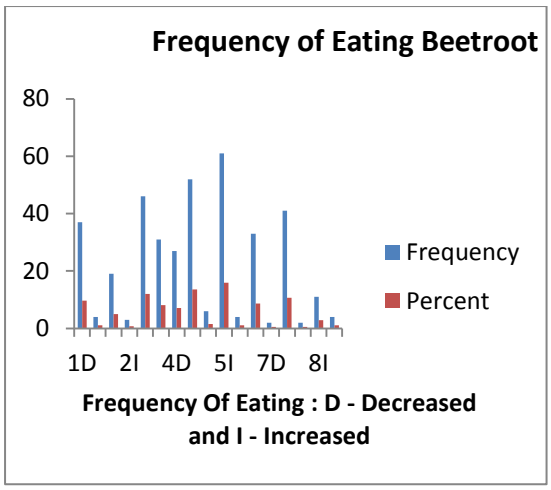

Figure 7.10E: Frequency of Eating Beetroot
Source of data: from the study

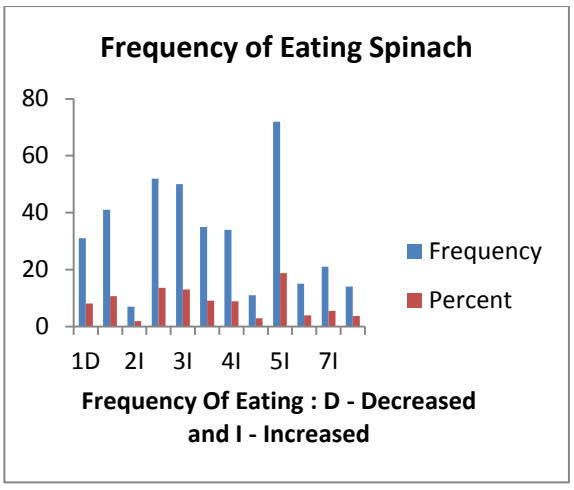

Figure 7.10D: Frequency of Eating Spinach
Source of data: from the study

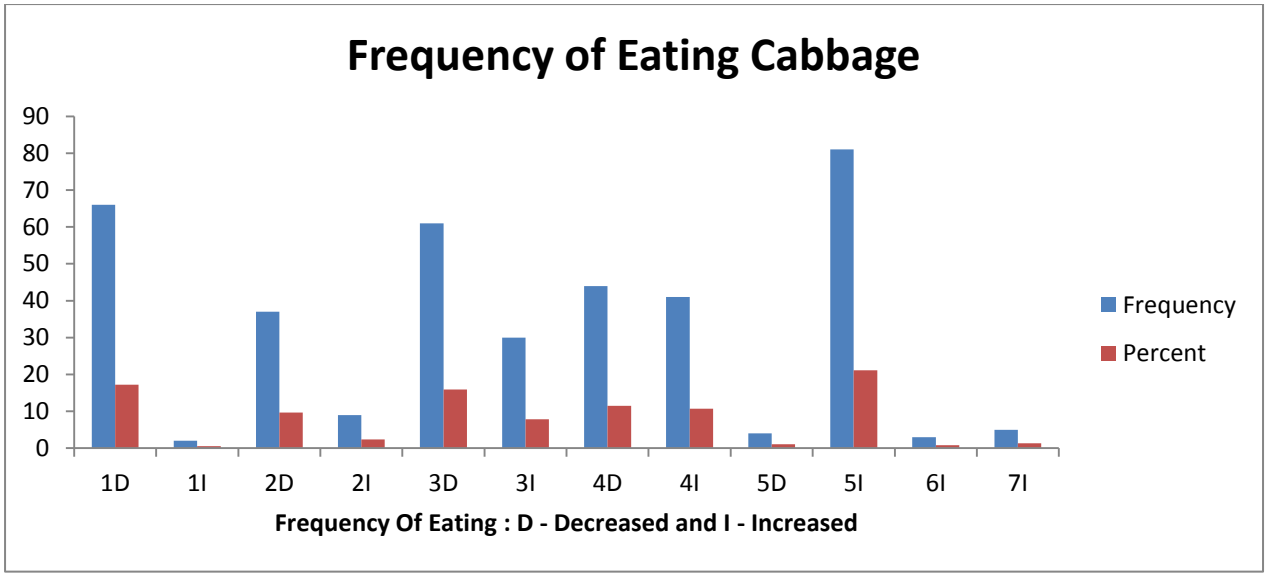

Figure 7.10F: Frequency of Eating Cabbage
Source of data: from the study

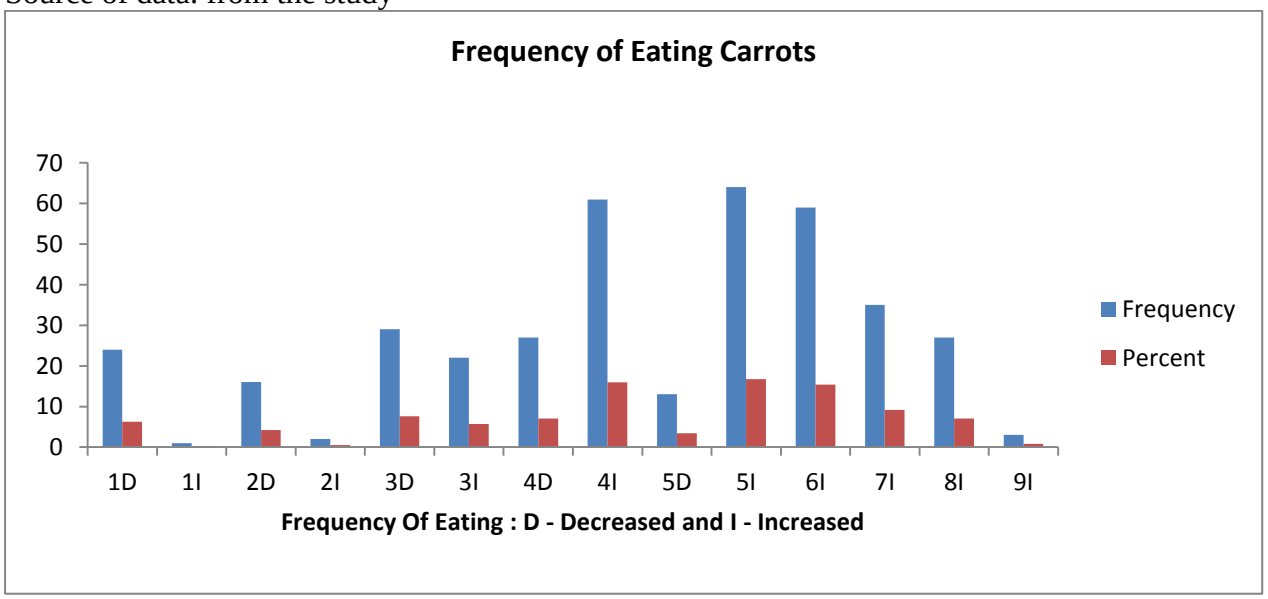

Figure 7.10G: Frequency of Eating Carrots
Source of data: from the study

Also see Addendum B which presents a detailed report of the results from the food frequency questionnaire. The remainders of all the graphs are those showing food products by lowest frequencies and they were not included in this section because they were found to be insignificant.

7.5. Conclusion

The majority 86.9% (n = 333) of the food gardeners, which is almost 9 out of 10 participants were cooking and serving vegetables from their gardens for the household members. The descriptive statistics showed that on average, households prepared and served vegetables 3 times per week (mean = 2.81, SD = 0.88). These results translate that almost every household which had a food garden was able to access vegetables to feed their families. It can therefore be concluded in this study that food produced from the gardens were frequently utilised which then contributed to frequency of vegetables consumption and ensuring food security in households. For constant utilisation of food, there ought to be stability on the supply of food. The role and contribution of food gardens to the stability of food at household level is presented in the following chapter.

CHAPTER 8

THE ROLE OF FOOD GARDENS TO FOOD STABILITY AT HOUSEHOLD LEVEL.

8.1. Introduction

The purpose of this chapter is to present results following an investigation on stability of food gardens in their capacities to provide sources of livelihoods to households on an annual basis. ***Food stability*** means that all individuals are being food secure at all the times (FAO, 2011; FAO, 2014), that is, when food is available, accessible and appropriately utilized by household members (Hanson, 2013). It is vital to have access to stable and sustainable food supplies for the establishment of food security at household level (FAO, 2010). Therefore, stability of home gardening activities is crucial for year-round availability and subsequently access to food in the household.

To understand the role of food gardens in providing stability to household food supply, participants were asked to respond to a series of questions which sought to establish whether or not food gardens provided food for the household, and whether food gardens provided food for the whole year including how they managed their gardens so that they continue to provide food at their households all-year round.

8.2. The role of food gardens to food stability at household level.

As shown on Figure 8.1 below, almost all (97%, n = 370) participants agreed that their gardens provided food for the household and 12.3% said they sometimes received their food from the garden while an insignificant proportion 1.0% said the garden did not provide food for the household.

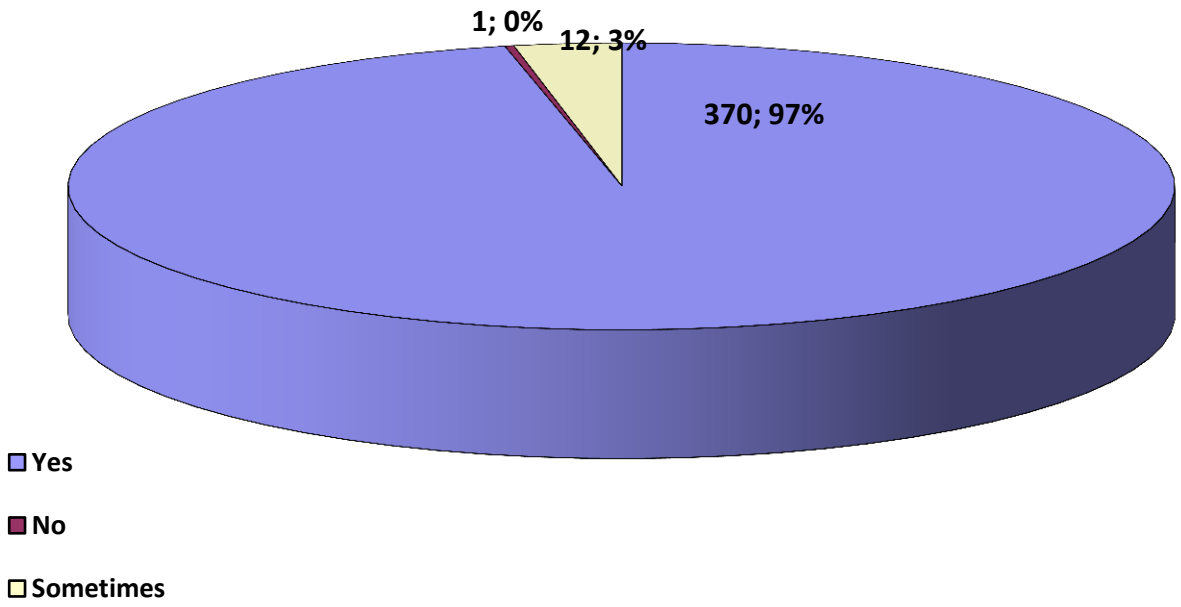

Figure 8.1: Does your garden provide food for the household?
Source of data: from the study

Whilst the results in Figure 8.1 above demonstrated how majority of the food gardeners agreed that their food gardens provided food for households, Table 1 demonstrates that food gardeners who acquired knowledge of food gardening from secondary school, or from other gardeners and from ABET school ought to be targeted with interventions to ensure that their food gardens are capacitated to provide food for the households. The Chi-squared test of association between "Does your garden provide food for the household?" and "Where did you learn how to do food gardening" was statistically significant (Chi-square = 16.597, $p < 0.05$). However, socio-demographic variables like age, gender, highest qualification level, experience in food gardening were shown to be statistically insignificant ($p > 0.05$). Table 8.1 presents the results from the cross-tabulations.

Table 8.1: Cross tabulation results for the questions "Does your garden provide food for the household?" and "Where food gardeners learned doing food gardening"

Where did you learn how to do food gardening	Does your garden provide food for the household?			Total	Value	df	p-value	Cramer's V
	yes	Sometimes	no					
At Secondary School	95	6	0	101	16.597	8	P < 0.05	0.214
Department of Agriculture and Extension Worker	52	0	0	52				
Learned from the gardeners	157	6	0	163				
ABET school	12	0	1	13				
Other	54	0	0	54				
Total	**370**	**12**	**1**	**383**				

Source of data: from the study

Stability is about being food secure at all the times. In this study food stability refers to an all-year-round supply of food from the home gardens. After establishing in Chapter 7 that the majority of households consumed food from their own gardens for more than 3 times per week, it became instructive for the researcher to investigate the potential of food gardens in their ability to provide vegetables to households for the whole year. Consequently, participants were asked to respond to the following question "Does food gardens provide vegetables for the whole year?" and the majority (n = 262; 68%), said "yes", 60 (16%) said their gardens provide them with food intermittently whilst 61 (16%) participants said their gardens were not able to provide food for the whole year (see Figure 8.2). Thus, nearly 7 in every 10 households had food gardens which were able to provide vegetables for the whole year. Moreover, the results of this study showed that a larger proportion of the participants would be in a better position to access food and thereby ensured household food stability.

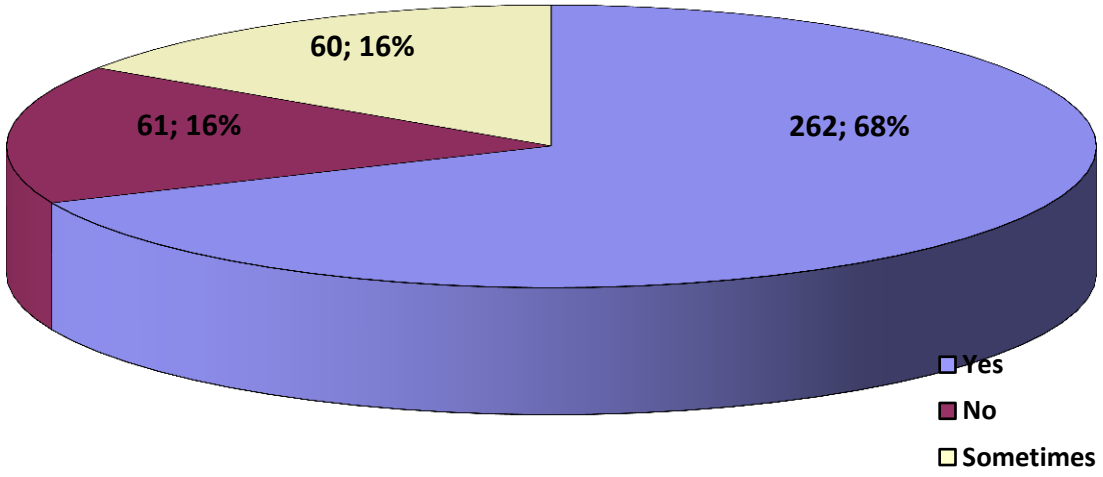

Figure 8.2: Does the food garden provide vegetables for the whole year?

Source of data: from the study

Using the information in Figure 8.2, we can deduce that a proportion (approximately 32%) of food gardeners in Thulamela municipality were most likely to experience food shortages at some times of the year. Table 8.2 below presents chi-squared tests for association results relating to the question "Does the food garden provide vegetables for the whole year?" and four socio- demographic variables (age, education, experience and institution of learning).

Table 8.2: Summary of cross-tabulations results for the questions "Does the food garden provide vegetables for the whole year?" and socio-demographic variables

	Does the food garden provide vegetables for the whole year?							
Age	**yes**	**no**	**sometimes**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
20-35 (Youth)	20	11	4	35	21.359	8	P<0.05	0.167
36-45 (Youth adult)	66	14	10	90				
46-55 (Adult)	79	10	11	100				
56-65 (Old age)	54	10	20	84				
66+ (Senior citizen)	43	16	15	74				
Total	**262**	**61**	**60**	**383**				
highest educational level	**yes**	**no**	**sometimes**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
No formal education	33	6	11	50	35.726	10	P<0.05	0.216
Grade 1-7	49	13	24	86				
Grade 8-11	42	19	15	76				

Grade 12	102	20	8	130				
ABET level 4	28	3	2	33				
Tertiary (University/Degree/Diploma)	8	0	0	8				
Total	**262**	**61**	**60**	**383**				
Where did you learn how to do food gardening	**yes**	**no**	**sometimes**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
At Secondary School and Extension Worker	73	20	8	101	58.967	8	P<0.05	0.277
Department of Agriculture	30	14	8	52				
Learned from the gardeners	101	20	42	163				
ABET school	5	7	1	13				
Other	53	0	1	54				
Total	**262**	**61**	**60**	**383**				
number of years you have been doing gardening	**yes**	**no**	**sometimes**	**Total**	**Value**	**df**	**p-value**	**Cramer's V**
9 years or less	146	22	10	178	43.861	4	P<0.05	0.241
10 - 29 years	56	24	36	116				
30 years and above	57	14	13	84				
Total	**259**	**60**	**59**	**378**				

Source of data: from the study

The results, as presented in Table 8.2 above, show how capacities of food gardens in providing food to households decreases with an increase in age and education. Further, the results show how capacities of food gardens to produce food all-year round depends on the type of institution where food gardeners learned food gardening. Existence of an association between these two variables means that food gardeners with secondary school are affected differently from how a food gardener with ABET school would be affected. The result would be important for informing the planning, design and implementation of intervention programs aimed at addressing food security challenges. In other words, properly designed intervention or support programs would need to take into account these identified socio-economic variables to ensure their implementation in a more efficient, effective, impactful and sustainable manner.

To build more understanding on stability of food gardens, participants were asked of how they were managing to produce food in their gardens all-year round. Table 8.3 summarises identified strategies for having food in the gardens all-year round.

Table 8.3: Strategies for having food in the garden all year round

Strategy	**Frequency**	**Percentage**
Working hard	3	1,03
Use of manure	8	2,75
Food preservation - drying and storing surplus food	12	4,12
Use of water harvesting technology to save water for future use	32	11,00
Farmer collaborations	40	13,75
Crop rotation (planting different consumable products at different times)	196	67,35
Total	**291**	**100,00**

Source of data: from the study

Table 8.3 presents a summary of the frequencies of the strategies employed by food gardeners to ensure all-year-round productivity of food gardens. Although some participants never responded to this question, it was considered important as it revealed that majority of the survey participants had strategies in place to keep their food gardens stable throughout the year. Amongst the strategies identified, crop rotation was indicated by the majority (p = 67.35%), followed by farmer collaboration (p = 13.75%), water saving technologies (p = 11.00%), food preservation (p = 4.12%), use of manure (p = 2.75%) and lastly, through hard-working (p = 1.03%).

The results obtained after performing Chi-squared tests for association between strategy (dependent variable) and the socio-economic variables (independent variables) shows a significant relationship between strategy and age (Chi-square = 59.689, df = 32, $p < 0.05$, Cramer's V=0.194), highest qualification level (Chi-square = 98.627, df = 40, $p < 0.05$, Cramer's V = 0.216), institution where food gardeners learned food gardening (Chi-square = 112.199, df = 32, $p < 0.05$, Cramer's V = 0.282) and the years of experience in food gardening (Chi-square = 73.159, df =16, $p < 0.05$, Cramer's V = 0.301). On the other hand, the tests for association between strategy and gender was shown to be statistically insignificant (Chi-square = 10.668, df = 8, p = 0.221, Cramer's V = 0.163).

These results may be used to suggest that different age groups employed different strategies in their endeavours to ensure that food gardens produced food for the whole year. This insight may be important for informing the manner in which strategic government support programs are planned, organised and implemented in a manner that is efficient, effective, impactful and sustainable. For instance, the fact that food gardeners of different ages employ different strategies, it would mean that whenever strategic meetings on food gardening are held, all age groups must be equally represented to ensure maximum sharing of strategic ideas on ensuring yearly availability of food products. Analogously, such strategic meetings must be planned carefully to ensure the participation of food gardeners who are equally represented in terms of their qualification level, the nature and type of institution where food gardeners learned food gardening as well as their experience in food gardening. It is also important to reiterate that, of all strategies highlighted by food gardeners, farmer collaboration, water harvesting technology, food preservation and crop rotation were the most commonly used strategies.

8.3. Conclusion

The results of this study showed that a larger proportion of the participants (n = 262; 68%), ensured food stability and would have been in a better position to access food for the whole year. This translate that nearly 7 in every 10 households had food gardens which were able to provide vegetables for the whole year. Food gardens played a vital role to regular intake of vegetables in households of the participants of this study. Stability seemed to be ensured as participants indicated frequently having vegetables in their diet. However approximately 32% of food gardeners in Thulamela municipality who participated in this study were most likely to experience food shortages at some times of the year. This was also accentuated by the focus groups which indicated that some households were unable to maintain their food gardens for the whole year, especially those who were growing seasonal crops.

Food gardens are anticipated not only to provide food for consumption to the household members but also to provide income needed to buy other necessities. The following chapter presents the results that seek to determine the contribution of food gardens to household income.

CHAPTER 9

ROLE AND CONTRIBUTION OF FOOD GARDENS TO HOUSEHOLD INCOME

9.1. Introduction

In this chapter, the results describing the contribution of food gardens to household income are presented. Thus, the following section provides summary of statistics describing the responses given to questions that relate to the role and contribution of food gardens to household income.

9.2. The role and contribution of food gardens to household income

One of the objectives of this study was to investigate the role and contribution of food gardens to household income. Household income is very important for everyone, not only to access food but also to buy other necessities such as clothes, appliances, furniture, utensils, to pay for electricity, to pay school fees and so forth (FAO, 2010). According to Adekunle *et al*., (2013) and CPFE (1991), food gardens can make economic contribution to households' well-being through saving money by providing food and through income from sales of garden produces which can be used to buy food and other items. Participants were asked to give their views based on the following statement, "Food gardens can be a source of additional income to the household". Figure 9.1 below shows that majority (97%) of the participants believes food gardens were a source of income to the households while the remaining small proportion (3%) believed food gardens were not a source of income to the households.

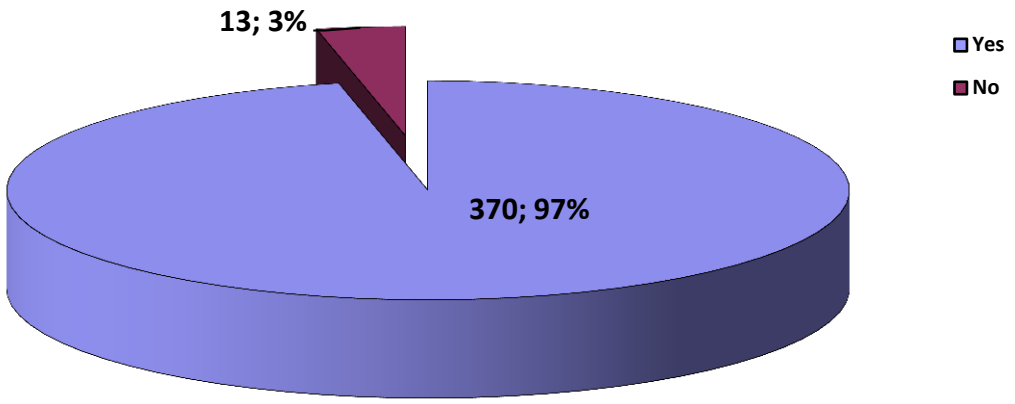

Figure 9.1: Food gardens can be a source of additional income to the households.
Source of data: from the study

Out of food gardeners who recognized food gardens as a source of additional income at household level, all participants agreed that they benefited from food gardening when they sold their food products for cash at the market and earn a living. This result concurred with Abdu-Raheem and Worth's (2011) postulation that small-holder agricultural production is a source of household supplementary income. Abdu-Raheem and Worth, (2011) further maintained that small-holder agricultural production in rural South Africa helped to reduce rural poverty and it is a source of household income accounting up to 40% of total household income.

These results are also consistent with Townsend *et al*.. (2013) and Njuguna (2013) who upheld that home gardening was an important source of income and was considered to be more effective in raising incomes for the poor households. Likewise Galhena *et al*., (2013) recommended that home gardens can contribute to income generation, in that the garden products can be sold to earn additional income and by encouraging savings through eating food from own gardens resulting in generating more disposable income in the household.

Post-establishing that food gardens were a source of additional incomes to households, with nearly every household having agreed, the researcher further asked the participants "How can food gardens be a source of income?" In their responses, participants consistently agreed that food gardens created incomes for gardeners when food gardens are operated as businesses which produce food in excess and sell the resulting surpluses at the market for cash. FAO (2010) and Abdu-Raheem and Worth (2011) postulated that food gardens can increase the

purchasing power by saving on food bills and income generated from sales of garden products can help limit household financial constraints.

In concurrence with FAO (2010) and Abdu-Raheem and Worth (2011), the participants revealed that the incomes they received from the sales of surpluses were used to settle household bills and to buy other food products which were not readily available from their food gardens (see Table 9.1).

Table 9.1: Raising income from food gardens

Ways of Generating Income	**Frequency**	**Percentage**
Agro-business (Cultivating large areas, produce more, sell surplus, generate income, make profit)	357	95.45
Payment of household bills and other food stuff (sell vegetables and the money pay utilities at home)	17	4.55
Total	**374**	**100.0**

Source of data: from the study

According to Lander (2013), food gardens can be the source of additional income through the sale of surplus products. To further support the view that food gardens were a source of additional income to their households, participants were asked to respond to the following question; "Do you sell some of the food from your garden?" As shown in Figure 9.2 below, majority (97%; n = 370) of the participants agreed that they sold some of the food from their food gardens while the remaining 3% (n = 11) of the participants said they did not.

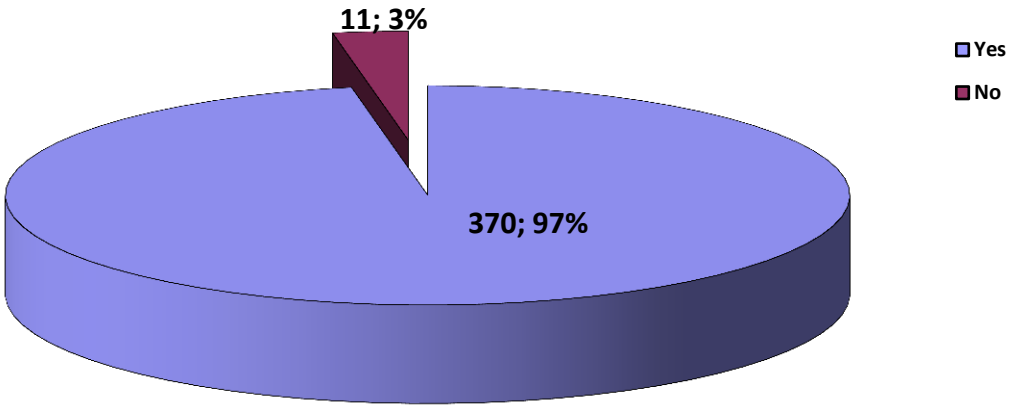

Figure 9.2: Do you sell some of your food from your garden?
Source of data: from the study

The results as depicted in Table 9.1 and Figure 9.2 concur with the findings from the focus group discussions which indicated that food gardens play a meaningful role in household income. Cross-tabulations were also employed to check whether an association existed between selling of food from the food gardens and the socio- demographic variables. A statistical significance was found between selling of food from food gardens and the institution where food gardeners had learned food gardening (Chi-square = 12.506, df = 4, $p < 0.05$, Cramers' V = 0.198). Since a significant number of the participants expressed that they sold some of the vegetables from their food gardens, the researcher found it sensible to ask on the frequency of vegetable selling per week by the food gardeners. As a result, participants were asked about how often they sold vegetables from their food gardens and Figure 9.3 below shows that 4 in every 10 households (43.90%) sold their vegetables on daily basis while 3 in every 10 households said that they sold their vegetables 3 times per week.

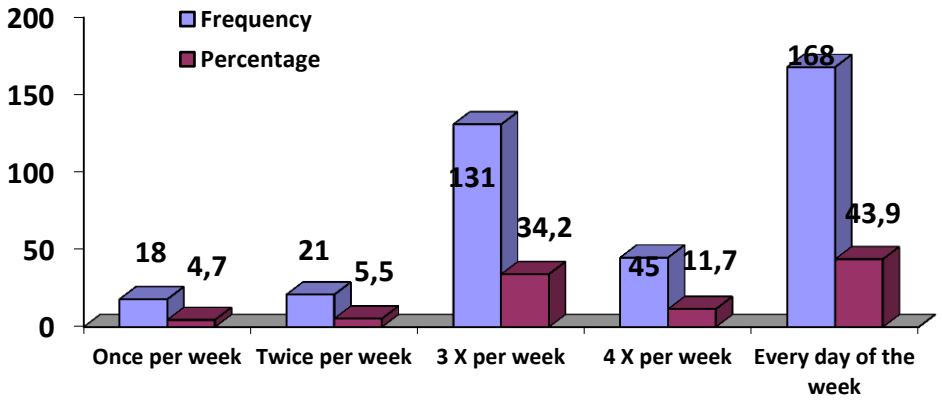

Figure 9.3: Frequency of selling vegetables
Source of data: from the study

The above results are of interest in that almost 9 in every 10 households sold their vegetables for a frequency of 3 or more times per week while only 1 in every 10 households sold vegetables for a frequency of 2 or less times per week. Cross tabulations showed that there was a statistically significant relationship between frequency of selling vegetables and the socio- demographic variables like highest educational level (Chi-square = 54.088, df = 20, $p< 0.05$, Cramer's V = 0.180), institution from where they learned food gardening (Chi-square = 50.605, df = 16, $p<0.05$, Cramers' V = 0.171), and experience in food gardening (Chi-square = 54.143, df = 8, $p<0.05$, Cramers' V = 0.269). Overall the mean frequency of selling vegetables was 4 times per week (mean = 3.85, SD = 1.184).

The researcher observed that participants were selling their garden products to the local people and people from the marketplaces. These people would come and buy straight from the garden for household consumption or for re-selling at marketplaces and at taxi ranks. Some of the participants such as those who were growing green beans were harvesting and selling to bigger markets. It was also observed that some participants were selling large amounts of garden products such as spinach, Chinese cabbage and African nightshade as well as maize, sweet corn, peanuts and sweet-potatoes to people who would in turn re-sell the produces to the market-based vendors and supermarkets. For those participants who were able to produce cabbage they were selling to vendors and supermarkets or supply their vegetables to those who provide schools for the school nutrition programme.

Having considered the frequencies of selling vegetables by gardeners, subsequently the researcher was compelled to investigate if the income received by food gardeners was significant to ease the burden of financial shortages at household level. According to FAO (2010) and Abdu-Raheem and Worth (2011), food gardens can help to limit household financial constraints. Consequently, the researcher investigated the contribution of food gardens to household income by asking participants if selling garden produces assisted in easing household financial constraints. Figure 9.4 below shows that 95% (n = 364) of the participants agreed that selling garden produces limited their household financial constraints while only 5% (n = 19) of the participants did not agree with the question. Thus, 9 in every 10 households believed that the income they received from selling food garden produces assisted them in limiting financial constraints experienced by the households.

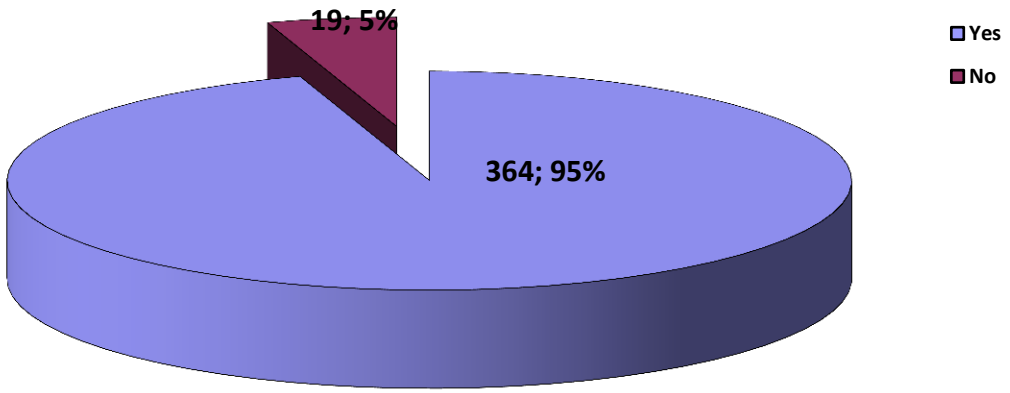

Figure 9.4: Can selling garden produces help to limit household financial constraints?
Source of data: from the study

Following the results on the contribution of food gardens in easing financial constraints at household level, the research study also sought to identify the ways in which home gardens could limit household financial constraints. The following ways were identified;

- **Extra Income**

  Money received from selling surpluses from the food gardens help household in raising income, earning extra money and investing. Townsend *et al.,* (2013) also alluded that agricultural development is perceived as a source of economic growth which can be more successful in increasing incomes among the poor households.

- **Saving money**

  Food gardens help people cut costs through spending less on food and thus saving money in the household.

- **Increased purchasing power**

  The finances saved from saving money that could have been spent on food create new demand for other products not produced in food gardens. The results in increased purchasing power can easily be linked to the cumulative role of food gardens to household income. In agreement with Baiphethi and Jacobs (2009) and Galhena *et al.,* (2013), it is thus believed in this study that the uptake of food gardens by the households could considerably minimize their dependence on purchasing food from the market and as a result release some income for other household responsibilities.

Table 9.2 below provides a summary of the ways in which food gardens can limit household financial burdens.

Table 9.2: Ways in which home gardens limit household financial constraints

Ways of Easing financial burdens	**Frequency**	**Percentage**
Supplying food products during harvesting time	3	0.8
Surpluses income encourage savings and investments	10	2.6
No longer having financial challenges	12	3.1
Selling to local people	21	5.5
Food costs minimization through spending less on food	102	26.6
Increased purchasing power from saving on food costs	220	57.4
Total	**383**	**100.0**

Source of data: from the study

The table above summarises the ways in which food gardens could potentially limit household financial constraints and indicate increased purchasing power as one of the main ways. Consequently, the researcher investigated the potential of food gardens in increasing the purchasing power of households. Participants were asked to give their views on the statement "Home gardens can increase the purchasing power of households". As shown in Figure 9.5 below, the majority of the participants (n = 305; 80%) agreed that home gardens increased the purchasing power of households, 61 (16%) participants believed that food gardens could "sometimes" increase the purchasing power of households while 17 (4%) participants reported that food gardens did not increase the purchasing power of their households. Therefore, the results show that for every 10 people who are into food gardening, 8 believed that home gardens increased the purchasing power of their households while nearly 2 had said "sometimes" food gardens increased the purchase power of households.

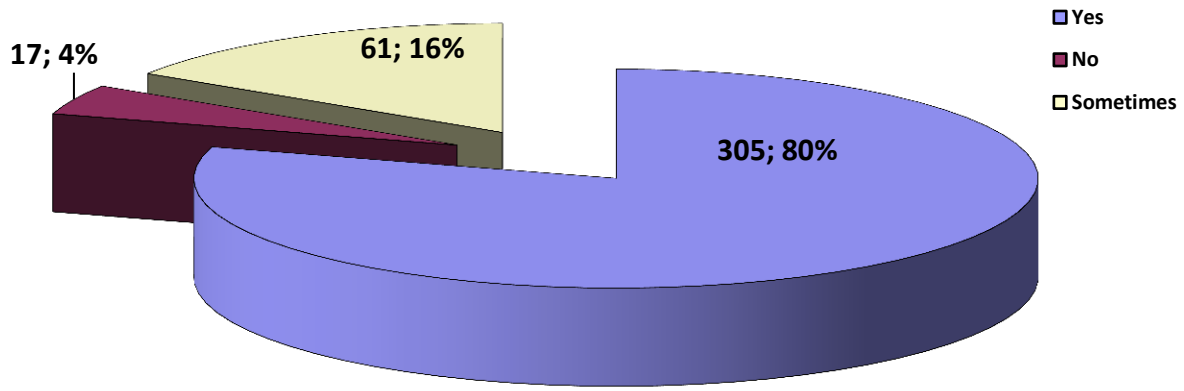

Figure 9.5: Home gardens can increase the purchasing power of households
Source of data: from the study

Overall, it can be concluded based on the results presented that food gardens contribute to income generation in many households of the participants considered in this study.

9.3. Household Income versus Socio- Demographic Variables: Tests for Association

In this section, we present summary of statistics describing how variables used to jointly measure the role and contribution of food gardens to household income are related with the socio-demographic variables. The table below presents the Chi-Squared test results for 3 household income related dependent variables and 5 socio-demographic independent variables (See Table 9.3).

Table 9.3: A summary of Chi-Squared Tests for association results

Variable	Age	Gender	Qualification level	Institution where food gardened was learned	Experience in food gardening
Food gardens can be a source of additional income to the household	x	X	x	Chi-Square = 9.578, df = 4, p < 0.05, Cramer's V = 0.170	X
Do you sell some of your food from your garden?	x	X	x	Chi-Square = 12.506, df = 4, p < 0.05, Cramer's V = 0.198	X
Can selling garden produce help to limit household financial constraints?	x	X	Chi-square = 16.964, df = 5, p < 0.05, Cramer's V = 0.224	Chi-Square = 20.550, df = 4, p < 0.05, Cramer's V = 0.221	X
Home gardens can increase the purchasing power of households	x	X	Chi-Square =36.248, df = 10, p < 0.05, Cramer's V = 0.244	Chi-Square =25.189, df = 8, p < 0.05, Cramer's V = 0.188	Chi-Square = 26.255, df = 4,p < 0.05, Cramer's V = 0.186

Source of data: from the study

Table 9.3 above presents results following performing cross-tabulations between "Food gardens can be a source of additional income to the household" as the dependent variable and socio-demographic variables (the independent variables). The findings reveal that a statistically significant relationship existed between the dependent variable and "institution where food gardeners learned food gardening" (Chi-Square = 9.578, df = 4, p < 0.05, Cramer's V = 0.170). These results show that the extent to which food gardens could provide additional sources of income to households (Yes, No) depended on where food gardeners had attained their knowledge of food gardening. Specifically, the results show that food gardeners who had learned food gardening from ABET school were against the view that food gardens provided an additional source of income to households, followed by food gardeners who were trained by the Department of Agriculture and Extension workers.

These results may be understood to suggest that food gardeners viewed the role of food gardens differently depending upon where the food gardeners would have acquired their knowledge of food gardening. Those who acquired the knowledge of food gardening through secondary schools and from other gardeners believed that food gardens could provide an additional source of income to households. These results may be used to recommend that government support initiatives to educate potential food gardeners about the roles and contributions of food gardens should be implemented through secondary schools as well as through other food gardeners. The same results and conclusions were also reached after performing the tests for association between "Do you sell some of your food from your garden?" dependent variable and the socio-demographic independent variables. The current results are also consistent with the prior expectations of the researcher considering the fact that these two questions "Do you sell some of your food from your garden?" and "Food gardens can be a source of additional income to the household" were related. As expected, a measure of agreement was also performed between the two questions and the result established a statistically significant relationship between them (Kappa Value = 0.681, T = 13.337, $p < 0.05$).

Test for association between "Can selling garden produce help to limit household financial constraints?" and qualification level and institution where food gardeners learned food gardening were also performed. The results show that the extent to which food gardens limited household financial constraints depends heavily on the qualifications of food gardeners and the institution where they learned food gardening. Further, tests of independence performed on the dependent variable versus the independent variables (qualification level and institution where food gardeners learned food gardening) revealed that food gardeners who had learned food gardening from secondary school and who had Grade 8-11 and Grade 12 as their highest qualification believed food gardens do not help limit household financial constraints (Chi-Square = 7.502, df = 3, $p < 0.1$).

More so, tests for association between "Home gardens can increase the purchasing power of households" and the socio-demographic variables were performed. The results showed that statistically significant relationship existed between the dependent variable and other socio-demographic variables such as highest qualification, institution where food gardeners learned food gardening as well as food gardeners' years of experience in food gardening. The results obtained post cross-tabulating the dependent variable and the three socio-demographic

independent variables showed that food gardeners who had learned food gardening at secondary school and whose highest qualification and experience in food gardening were Grade 8-11 and above 10 years respectively were in disbelief that food gardens possessed the potential to increase the purchasing power of households (Chi-Square = 8.460, df = 2, $p < 0.05$). Equally so, the results also proved that food gardeners who had learned food gardening through Department of Agriculture and other extension workers and whose highest qualification level and experience in food gardening were Grade 8 -11 and less than 9 years respectively did not believe that food gardens could potentially increase the purchasing power of their households. (Chi-Square = 7.000, df = 2, $p< 0.05$).

These results may be useful for ensuring that food gardeners are properly targeted when implementing interventions or other support group programs aimed at educating the food gardeners on the role and contributions the food gardens have on purchasing power of households. Table 9.4 below shows Chi-squared results depicting the socio-demographic variables whose relationship with variables "How can food gardens be a source of income?", "How often do you sell vegetables" and "Elaborate how home gardens can limit household financial constraints" are of statistical significance.

Table 9.4: Cross-tabulation results summarizing test for associations between variables

Variable	Age	Gender	Qualification level	Institution where food gardened was learned	Experience in food gardening
How can food gardens be a source of income?	Chi-Square = 47.105, df = 24, $p < 0.05$, Cramer's V = 0.167	X	Chi-Square = 56.734, df = 30, $p < 0.05$, Cramer's V = 0.169	Chi-Square = 45.018, df = 24, $p < 0.05$, Cramer's V = 0.187	Chi-Square = 61.893, df = 12, $p < 0.05$, Cramer's V = 0.274
How often do you sell vegetables	Chi-Square = 27.410, df = 16, $p < 0.05$, Cramer's V = 0.119	X	Chi-Square = 54.088, df = 20, $p < 0.05$, Cramer's V = 0.180	Chi-Square = 50.605, df = 16, $p < 0.05$, Cramer's V = 0.171	Chi-Square = 54.503, df = 8, $p < 0.05$, Cramer's V = 0.269
Elaborate how home gardens can limit household financial constraints	x	X	Chi-Square = 47.345, df = 30, $p < 0.05$, Cramer's V = 0.158	Chi-Square = 59.597, df = 24, $p < 0.05$, Cramer's V = 0.215	Chi-Square = 25.562, df = 12, $p < 0.05$, Cramer's V = 0.173

Source of data: from the study

The result in Table 9.4 above shows that the different ways by which food gardens can provide additional sources of income to households depends heavily on experience in food gardening of food gardeners who reported having learned food gardening at secondary school and whose highest qualification levels were Grade 8-11 (Chi-square = 17.104, df = 8, $p < 0.05$) and Grade 12 (Chi-square = 21.094, df = 10, $p < 0.05$). The results show that the different ways in which food gardens could become a source of additional income to households depended on experience of food gardeners who had acquired knowledge of food gardening from other food gardeners and whose highest level of qualification was ABET level 4 (Chi-square = 10.246, df = 4, $p < 0.05$). Similarly, the results shows that the different ways by which food gardens provides additional income to households depends on experience in food gardening of food gardeners whose knowledge of food gardening were acquired from other institutions and whose highest level of qualification were Grade 8 - 11 (Chi-square = 8.00, df = 1, $p < 0.05$) and Grade 8 - 12 respectively (Chi-square = 18.984, df = 8, $p < 0.05$).

Regarding how food gardens limit household financial constraints, the results presented in the table above shows that highest qualification level, institution where food gardeners learned food gardening and experience in food gardening significantly influenced the ways in which food gardens limited household financial constraints. The different ways in which home gardens could limit household financial constraints depends on experience in food gardening possessed by food gardeners who had acquired the knowledge of food gardening from other food gardeners and whose highest level of qualification is Grade 12 (Chi-Square = 11.143, df = 4, $p < 0.05$).

These results have an implication that food gardeners can easily be targeted with different intervention or support group programmes by their qualification level, institution where they learned food gardening and their associated level of experience in food gardening. Hence, these results may be important for ensuring that government policies to support the development of food gardeners should be informed by the education, experience and institute of learning of food gardeners in order for them to yield better results.

9.4. Conclusion

The majority (97%) of the participants believes food gardens were a source of additional incomes to households, with nearly every household having agreed that food gardens contribute in easing financial constraints at household level. Based on the results presented, it can be concluded that food gardens contributed to income generation in many households of the participants considered in this study. A significant number of the participants expressed that they were selling some of the vegetables from their food gardens. Overall the mean frequency of selling vegetables was 4 times per week (mean = 3.85, SD = 1.184). A statistically significant relationship existed between frequency of selling vegetables and the socio-demographic variables of the participants. Income generation through sales of vegetables have a positive impact in the economy as it increases the households buying power. The sales of home garden produce have economic benefits as it improves the financial status of families especially the resource poor families by providing additional income, while contributing to the development of communities in various socio-economic contexts.

The following chapter provides the results and discussion which emanated from the investigation on the role and contribution of food gardens to community development.

CHAPTER 10

ROLE AND CONTRIBUTION OF FOOD GARDENS TO COMMUNITY DEVELOPMENT

10.1. Introduction

In this chapter, the researcher presents the results following an investigation into the role and contribution of food gardens to community development. Community development is all about the wellbeing of the community and it entails a process whereby community members come together to take collective action and generate solutions to common problems. It is seen as emphasizing self-help, mutual support, the building of neighbourhood integration, the development of neighbourhood capacity for problem solving and self-representation and the promotion of collective action (Altman, Hart and Jacobs, 2009; Smith, 2019).

According to Herrman and Tsutsumi (2017), community wellbeing as described by the economic, social, environmental and cultural wellbeing often revolves from collective action being taken at the grassroots level. The results depicting the potential of food gardens to develop the community, creating employment, alleviating poverty and contributing to economic growth are presented.

10.2. The role and contribution of food gardens to community development

The contribution of food gardens to community development was investigated and food gardeners were asked if "food gardens can help to develop the community" so that the potential of food gardens in driving development in communities could be ascertained. The results revealed that majority of the participants (n = 349; 91%) believed that food gardens can help communities to develop, 29 (8%) participants believed food gardens "sometimes" helped in developing communities while 5 (1%) participants revealed that food gardens did not help in community development (see Figure 10.1). This means that 9 in every 10 food gardeners believed that food gardens can have an important role to play in enriching community development which is in line with Galhena *et al.,* (2013) who suggested that home gardens contribute to income generation, improved livelihoods and household

economic welfare as well as promoting entrepreneurship and rural development. According to Woods (2011), agriculture in its multi-functionality also supports rural settings by creating employment and contributing to the sustainability of households in rural areas.

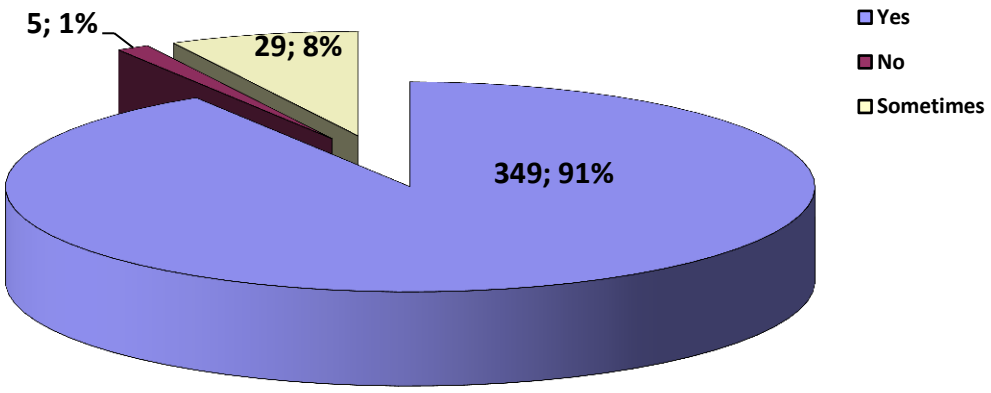

Figure 10.1: Food gardens can help to develop the community
Source of data: from the study

Table 10.1 below presents frequency table describing the frequencies of occurrence of several forms of development which can be realized by communities through successful and sustainable implementation of food gardens. Amongst others, job creation (limiting unemployment) was cited by the majority of the participants (52.7%; n = 202) as the way in which food gardens developed the community (see Table 10.1).

Table 10.1: Ways in which food gardens develop the community

Forms of Development	**Frequency**	**Percentage**
Skills development	19	5.0
Self-empowerment	30	7.8
Self-support and self-reliance	45	11.7
Improved standards of living	87	22.7
Job creation limiting unemployment	202	52.7
Total	**383**	**100.0**

Source of data: from the study

In addition to investigating how food gardens can help develop the community, food gardeners were also asked about whether they agreed food gardens could also reduce poverty. In agreement with Townsend *et al.,* (2013) who stated that agriculture can help reduce

poverty for 75% of the world's poor who live in rural areas and work mainly in farming, the results of this study as illustrated in Figure 10.2 below reports that an overwhelming majority (95%) of the participants believed that food gardens have a role to play in alleviation of poverty within the community.

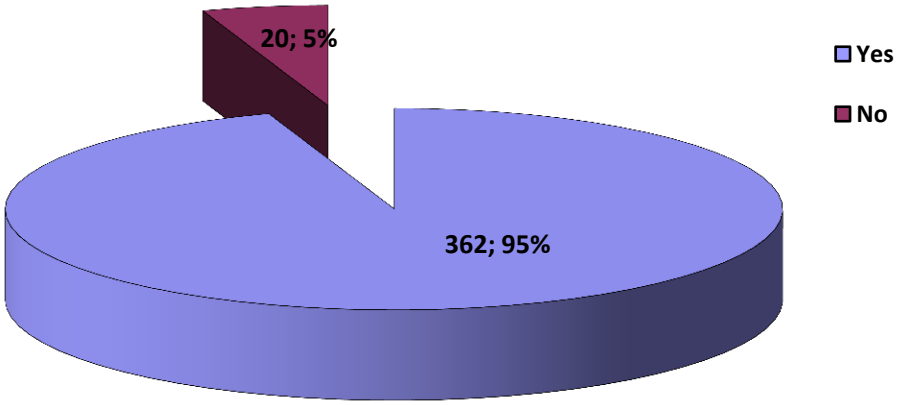

Figure 10.2: Food gardens can reduce poverty
Source of data: from the study

A huge proportion (95%; n = 362) of the participants indicated that food gardens reduced poverty by allowing participants to be self-employed, self-reliant and self-empowered, as through food gardens, gardeners could cease buying food produces from others. Moreover, participants also cited job creation, skills development, income generation and food production as some of the means through which food gardens reduce poverty in the community (see Table 10.2). This is in agreement with Townsend *et al.*, (2013); Lander (2013) and Woods (2011) in their postulation that small-holder agriculture can create employment, support self-empowerment and self-reliance and in the process builds a sense of achievement, self-worth and confidence.

Table 10.2: Ways in which food gardens reduce poverty

Poverty reduction ways	Frequency	Percentage
Economic growth (through food production)	8	2.1
Skills acquisition and self-reliance	28	7.3
Reduced expenditure on food	42	11.0
Use income received from selling produces to pay for other utilities such as electricity	42	11.0
Job creation (more people are employed during cultivation and harvesting)	68	17.8
Self-dependence (No more buying from other communities)	74	19.3
Self-employment	121	31.6
Total	**383**	**100.0**

Source of data: from the study

Further, the researcher assessed the role and contribution of food gardens to community development in the context of food gardens' capability to creating employment. Accordingly, the researcher asked the views of food gardeners on the role of food gardens in creating employment. Figure 10.3 presents the summary results of participants' responses to the question "Can food gardens create employment?"

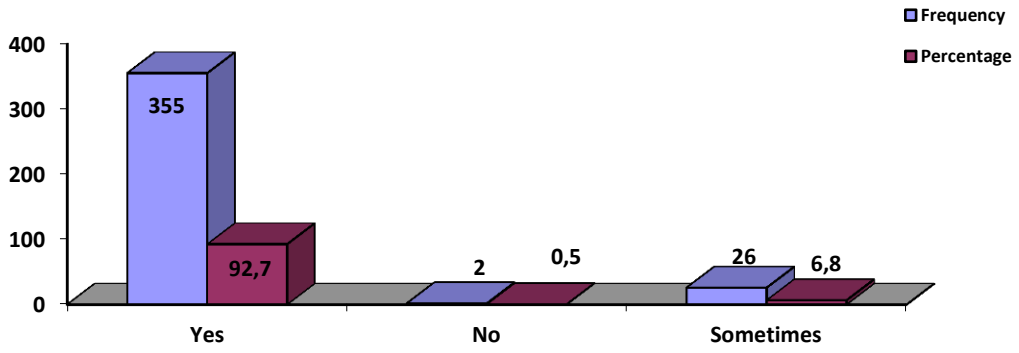

Figure 10.3: Can food gardens create employment
Source of data: from the study

As shown in Figure 10.3, a huge proportion (92.7%; n = 355) of the participants agreed that food gardens created employment, 6.8% of the participants agreed in part while the remaining 0.5% (n = 2) of the participants revealed that food gardens did not create employment. Townsend *et al.,* (2013); Lander (2013) and Woods (2011) also maintained the

notion that food gardens can create employment. Therefore, approximately 9 in every 10 food gardeners believed food gardens creates employment paving way for investigating whether food gardens support self-empowerment and self-reliance. As such, participants were paused with the statement "Food gardens support self-empowerment and self-reliance" and Figure 10.4 below reports that almost all of the participants 377 (98%) agreed that food gardens support self-empowerment and self-reliance while the remaining 6 (2%) participants revealed that they did not agree with the view that food gardens played a role to support self-empowerment and self-reliance.

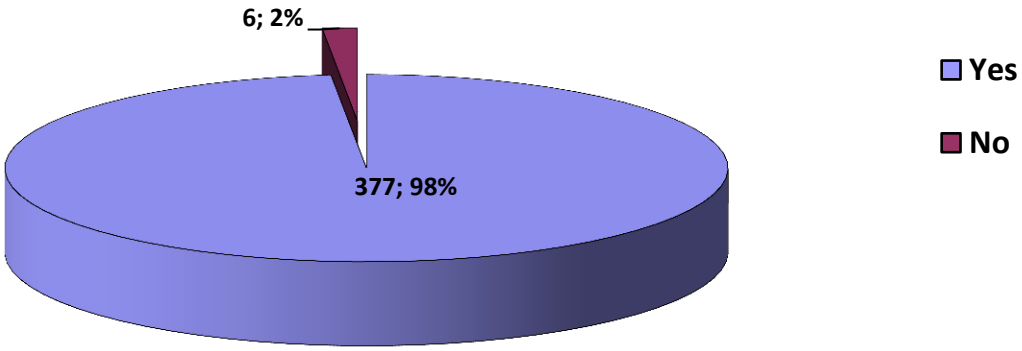

Figure 10.4: Food gardens support self-empowerment and self-reliance
Source of data: from the study

Some of the roles that food gardens play in supporting self-empowerment and self-reliance appears in Table 10.3 and they included promoting independence, employment creation, knowledge and skills acquisition, income generation and the potential for food gardens to breaking traditional barriers to self-reliance and independence which is also supported by Townsend *et al.,* (2013) and Lander (2013).

Table 10.3: Ways in which food gardens support self-empowerment and self-reliance

Reason	**Frequency**	**Percentage**
Promote independence and self-reliance	238	62.1
Create employment and empower community	85	22.2
Equipped with gardening skills	31	8.1
Generate income and develop the community	18	4.7
Improved food accessibility (Things that were unable to be reached are now reached and fulfilled)	5	1.3
Total	**383**	**100.0**

Source of data: from the study

Those who failed to agree with the view that food gardens supported self-empowerment and self-reliance indicated that food gardeners relied heavily on other gardeners which, in their view, defeated the whole idea of self-empowerment and self-reliance. However, this was considered to be insignificant since it was just a minority (2%; n = 6) of the participants in this study (see Figure 10.4).

According to Galhena *et al.*, (2013), the economic benefits of home gardens go beyond food and nutritional security and subsistence, especially for poorly-resourced families. Thus, as with Townsend *et al.*, (2013) food gardening in particular is herein perceived as a source of economic growth which can be more effective in raising incomes among the very poor households through the sale of food garden produces. Figure 10.5 below depict the ways in which food gardens contributed to economic growth to the participants of this study. The contributions of food gardens to economic growth were investigated and the following themes were identified; income generation, job creation and self-reliance.

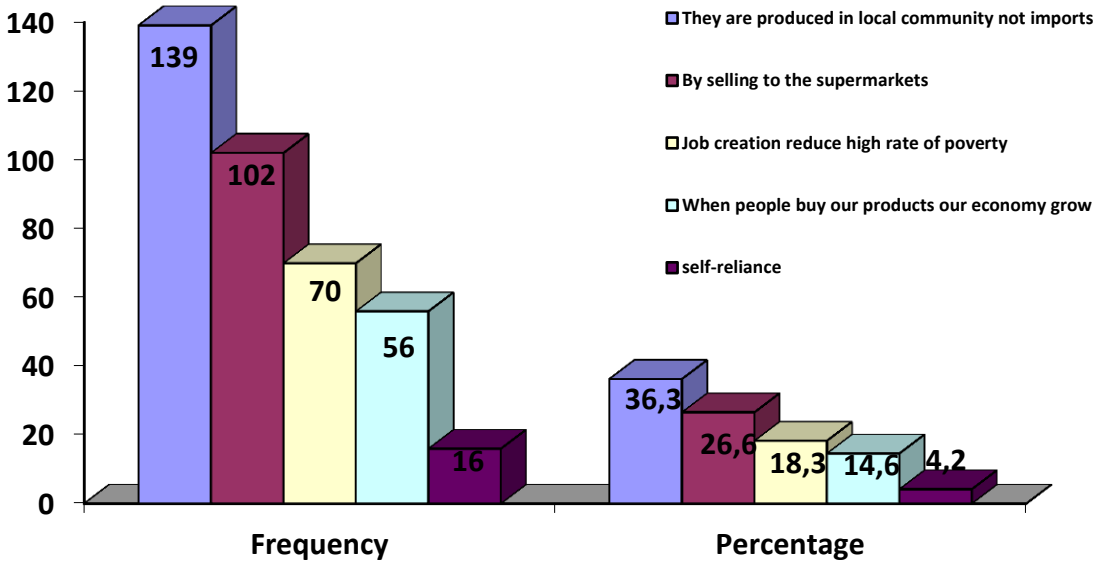

Figure 10.5: Ways in which food gardens contribute to economic growth
Source of data: from the study

Income Generation

- When food products produced from food gardens are sold to the market for cash, the community receives cash inflows which help in uplifting the economic status of the recipient communities.

Job creation

- The generation of self-employment that arise from running food gardens presents a major source of jobs to the economy. As a result, jobs that are created from those food gardens have become a major source of employment through self-employment and employing others.

Self-reliance

- As food gardeners, the participants were able to access and utilise food from their gardens, became hunger free and attain food security. Income generated through the sales of garden produces helped the food gardeners to ensure sustainable sources of livelihoods. As active economic players, the participants themselves became self-empowered, self-dependent and self-reliant. Hence, food gardens contribute to economic growth by creating favourable financial balances for food gardeners which in turn help to raise the standards of living for the social and economic good of their communities.

The participants also highlighted that food gardens contributed to economic growth when food produces for the economy are produced locally thereby reducing the amount spent on food imports.

The results from the analysis of observed data (collected through the observation sheet) on the role and contribution of food gardening on income generation and community development agreed with the opinion and views expressed by the food gardeners on income generation and community development (see Figure 10.6).

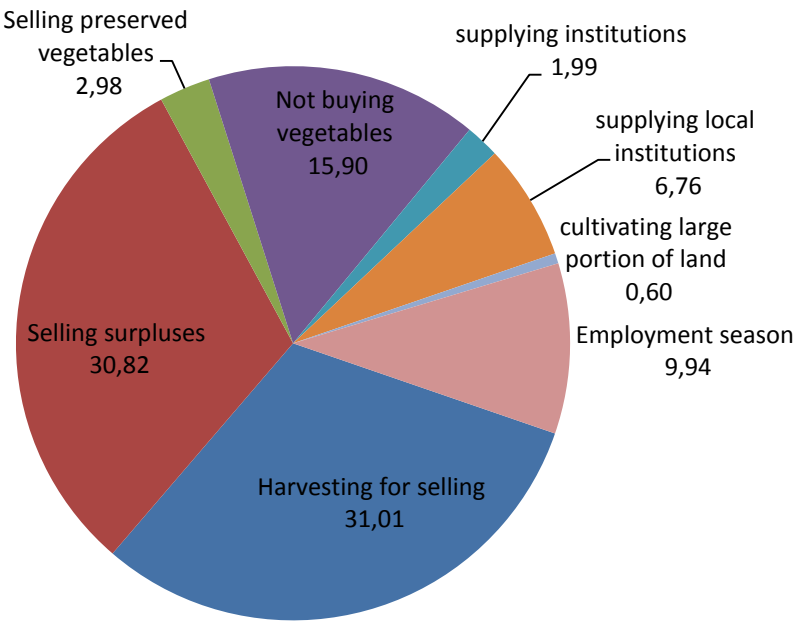

Figure 10.6: The role and contribution of food gardening on income generation and community development
Source of data: from the study

Figure 10.6 shows that harvesting for selling (31.01%), selling surpluses (30.82%), not buying vegetables (15.90%) and self-employment (9.94%) are the four major ways by which food gardens contribute to income generation and community development. Supplying to institutions which was mentioned by nearly 2% (1.99%) of the participants also means that food products were being sold to local markets or schools and even to big shops like Spar and Shoprite. The findings revealed that food gardens created employment for local people who got temporary work in the form of piece jobs which allowed them to earn incomes for their households use.

It was also observed during the time of data collection that temporarily employed people were paid either by giving them money or in kind through food parcels. For instance, during harvest time for maize and peanuts, if the hired person harvested twenty-five liters of maize or peanuts that person was given a five liter full of the same product. The focus group discussions also supported the idea that food gardens can contribute to community development by indicating that food gardens can create employment for oneself and for others and through the sales of garden produces it can promote economic growth. In light of the above, it can be inferred that food gardens enhance community development and as a

result, the world, South Africa and Limpopo Province, in particular, needs agriculture to contribute to a comprehensive economic development (Townsend *et al.,* 2013).

10.3. Community development Versus Socio-Demographic Variables

This section presents Chi-Squared test results showing how community development related dependent variables were associated with the socio-demographic independent variables (See Table 10.4). Specifically, the table presents Chi-Squared test for association results following cross-tabulations between the community development related dependent variables *(the ways through which food gardens develop community, reduce poverty, create employment and support self-empowerment and self-reliance***)** and 5 socio-demographic independent variables.

Table 10.4: Chi-Squared results summarizing tests for association between dependent and independent variables.

Variable	Age	Gender	Qualification level	Institution where food gardened was learned	Experience in food gardening
Food gardens can help to develop the community	**x**	**X**	Chi-Square = 22.394, df = 10, $p < 0.05$ Cramer's V = 0.167	Chi-Square = 28.202, df = 8, $p<0.05$, Cramer's V = 0.175	**x**
Food gardens can reduce poverty	**x**	**X**	Chi-Square = 19.187, df = 5, $p < 0.05$, Cramer's V = 0.184	Chi-Square = 14.644, df = 4, $p < 0.05$, Cramer's V = 0.163	**x**
Can food gardens create employment?	**x**	**X**	**x**	**x**	Chi-Square = 11.485, df = 4, $p < 0.022$, Cramer's V = 0.120
Food gardens support self-empowerment and self-reliance	**x**	**X**	**x**	**x**	**x**

Source of data: from the study

Table 10.4 above presents Chi-Squared test results showing the socio-demographic variables whose association with four proxy dependent variables for community development and economic growth were found to be statistically significant. The dependent variable measuring the extent to which food gardens could help develop the community was found to be statistically associated with the qualification level (Chi-Square = 22.394, df = 10, $p < 0.05$ Cramer's V = 0.167) and institution where food gardeners learned food gardening (Chi-Square = 28.202, df = 8, $p < 0.05$, Cramer's V = 0.175). However, when the dependent variable was jointly cross-tabulated with the two independent variables, the Chi-squared test results turned out to be statistically insignificant.

The Chi-Squared test for association between "food gardens can reduce poverty" variable and qualification level and institution where gardeners learned food gardening revealed that the decision regarding whether or not food gardens reduced poverty depended on where food gardeners acquired the knowledge of food gardening and the highest qualification level attained by the food gardeners. Therefore, the results revealed that food gardeners who acquired knowledge of food gardening through ABET level 4 and whose highest level of qualification was ABET level 4 did not support the view that food gardens reduced poverty. These results may be important for informing future studies, especially those that may be aimed at understanding why food gardeners who learned food gardening from ABET school with an ABET qualification would believe that food gardens do not reduce poverty.

The tests for association performed between "Can food gardens create employment?" and the socio-demographic variables showed that a statistically significant but weak relationship existed between the dependent variable and "experience in food gardening" (Chi-Square = 11.485, df = 4, $p<0.05$, Cramer's V = 0.120). A weak relationship suggests that the view by other food gardeners that food gardens did not create or sometimes created employment cannot be associated to different categories of experience possessed by food gardeners.

These results might be used to suggest that whenever there are intervention programs planned, for instance, those aimed at making food gardeners aware of the role and contribution of food gardens in creating employment, the interventions must equally target all food gardeners in all their respective, different categories of experience in food gardening (for example, less than 9 years, 10 - 29 years, 30 years and above). Table 10.5 below presents a summary of the results following cross-tabulating on ways through which food gardens

develop community, reduce poverty, create employment and support self-empowerment and self-reliance versus the socio-demographic independent variables.

Table 10.5: Test for association results

Variable	Age	Gender	Qualification level	Institution where food gardened was learned	Experience in food gardening
Explain how can food gardens develop the community	Chi-Square = 26.428, df =16,p<0.05, Cramer's V = 0.130	**X**	Chi-Square =61.009, df =20, p<0.05, Cramer's V = 0.192	Chi-Square=28.401, df =16, p<0.05, Cramer's V =0.139	Chi-Square =23.266, df =8, p<0.05, Cramer's V =0.174
If yes please explain how food gardens can reduce poverty	Chi-Square =36.892, df =24, p<0.05, Cramer's V = 0.143	**X**	Chi-Square = 50.42, df =30, p<0.05, Cramer's V = 0.150	Chi-Square = 49.263, df =24, p<0.05, Cramer's V = 0.176	Chi-Square = 35.088, df = 12, p<0.05, Cramer's V = 0.214
If Yes, please explain how food gardens support self-empowerment and self-reliance	Chi-Square =41.946, df =20, p<0.05, Cramer's V = 0.165	**X**	**X**	Chi-Square = 42.854, df =20, p<0.05, Cramer's V = 0.168	Chi-Square =38.613, df = 10, p<0.05, Cramer's V = 0.213
If No, explain why food gardens does not support self-empowerment and self-reliance	**X**	**X**	**X**	**X**	Chi-Square =7.606, df =2, p<0.022, Cramer's V = 0.123
How can food gardens contribute to economic growth	Chi-Square =31.461, df = 16, p<0.05, Cramer's V = 0.143	**X**	Chi-Square = 52.998, df = 20, p<0.05, Cramer's V = 0.170	Chi-Square = 40.152, df =16, p<0.05, Cramer's V = 0.145	Chi-Square =49.591, df =8, p<0.05, Cramer's V =0.252

Source of data: from the study

Table 10.5 above present results obtained after performing Chi-Squared test for association between "Ways by which food gardens develops community" and the socio-demographic variables. Tests for association results assist in building an understanding of how socio-demographic variables jointly affected the dependent variable. A very strong relationship was found between the "Ways by which food gardens develops community" variable and experience in food gardening possessed by Grade 8-11 qualified, secondary school educated food gardeners whose age ranged between 36 and 45 years old (Chi-Square = 14.421, df = 3, $p < 0.05$, Cramer's V = 1.000, $p < 0.05$). Specifically, food gardeners with less than 9 years of experience in food gardening believed that food gardens developed communities by creating employment which in turn helped limit unemployment. Further, food gardeners whose

experience ranged from 10 to 29 years believed that food gardens developed communities through creating avenues for self-dependence, self-empowerment and skills development.

In addition, Chi-Squared test for association confirmed the existence of a very strong relationship between "Ways by which food gardens developed communities" and experience in food gardening possessed by food gardeners who had learned food gardening at secondary school and whose highest qualification level and age group were Grade 8-11 and 46-55 years respectively (Chi-Square = 18.905, df = 6, $p < 0.05$, Cramer's V = 0.673, $p < 0.05$). These results can be used to infer that the different ways in which food gardens develops communities were dependent upon the experience of food gardeners in food gardening, whose knowledge in food gardening were from secondary school and whose highest level of qualification and age group were Grade 8-11 and 36 - 55 years respectively.

Chi-squared test for association between "Ways by which food gardens can reduce poverty" and the socio-demographic variables were performed and helped explain how socio-demographic variables jointly affected the dependent variable. The results show that a strong relationship exists between "Ways by which food gardens can reduce poverty" and experience in food gardening possessed by adult youths (36-45 years) who learned food gardening at secondary school and whose highest qualification level was Grade 8-11 (Chi-Square = 8.119, df = 3, $p < 0.05$, Cramer's V = 0.859, $p < 0.05$). Similarly, there existed a strong relationship between "Ways by which food gardens can reduce poverty" and experience in food gardening possessed by adult food gardeners (46 - 55 years) who learned food gardening at secondary school and whose highest qualification level was Grade 8-11 (Chi-Square = 29.308, df = 12, $p < 0.05$, Cramer's V = 0.856, $p < 0.05$).

These results shows that food gardens reduced poverty in different ways for adult youth with different levels of experience in food gardening. For instance, for both food gardeners aged between 36 - 55 years and whose level of experience in food gardening was less than 9 years, food gardens reduced poverty by creating jobs for youths who were employed to undertake the cultivation and harvesting of food gardens. On the other hand, for food gardeners (36-55 years), food gardens were shown to have alleviated poverty by reducing the cost of food at household level as well as by raising their household income levels.

The results presented in Table 10.5 above showed that a strong relationship existed between the "ways in which food gardens support self-empowerment and self-reliance" and experience in food gardening possessed by adult food gardeners (46 -55 years) whose knowledge of food gardening were acquired from secondary school (Chi-Square = 13.772, df = 6, $p < 0.05$, Cramer's V = 0.488, $p < 0.02$).

Further, Chi-Squared test for association results presented above revealed that a strong relationship existed between the "Ways by which food gardens contributed to economic growth" and experience in food gardening possessed by adult youth food gardeners who learned food gardening at school and whose highest level of qualification was Grade 12 (Chi-Square = 10.191, df = 3, $p < 0.05$, Cramer's V = 0.697, $p < 0.05$). For instance, only food gardeners who reported having less than 9 years of experience in food gardening believed that food gardens contributed to economic growth by promoting self-independence, self-support and self-reliance. In addition, adult youths who were food gardeners also believed that food gardens contributed to economic growth through equipping them with food gardening skills.

10.4. Conclusion

The households of Thulamela municipality who participated in this study established the role and contribution of food gardens to community development. The overwhelming majority of the participants perceived food gardening as a source of economic growth and they believed that food gardens have a role to play in alleviation of poverty within the community. Participants also revealed that food gardens reduced poverty by allowing participants to be self-employed, self-reliant, and self-empowered. Job creation (limiting unemployment), skills development, and income generation were identified as ways in which food gardens contributed to the local economy. It can thus be concluded that food gardens play a pivotal role in the development of communities. For food gardens to maintain sustainable community development, they ought to be unceasing.

The following chapter presents results and discussions on challenges to food gardening as well as the strategies to ensure sustainable year-round availability of food gardens.

CHAPTER 11

CHALLENGES TO FOOD GARDENING AND STRATEGIES FOR SUSTAINABLE YEAR-ROUND AVAILABILITY OF FOOD GARDENS

11.1. Introduction

One of the specific objectives formulated for this study was to investigate the challenges to food gardening and identify the strategies employed by the participants to ensure sustainable year-round availability of food gardens. According to Galhena *et al.,* (2013), community people face many challenges that inhibit home gardens and limit their production. Thus, this chapter presents the results describing the challenges that the food gardeners were facing that might have posed a setback to their gardening activities, and how the challenges had been dealt with as well as the strategies for sustainable year-round availability of food gardens.

11.2. Challenges to food gardening

To investigate the challenges to food gardening, participants were asked if they thought there were challenges that limited their production. Figure 11.1 below presents a bar chart describing the distribution of frequencies of the responses given by food gardeners when responding to the question "Are there any challenges that limit your production"**.** Almost every food gardener who participated in the survey (reported by 376 (98.2%) participants) agreed to having challenges that imposed limitations on food production while only a few of the participants (n = 7; 1.8%) indicated they were not experiencing any challenge.

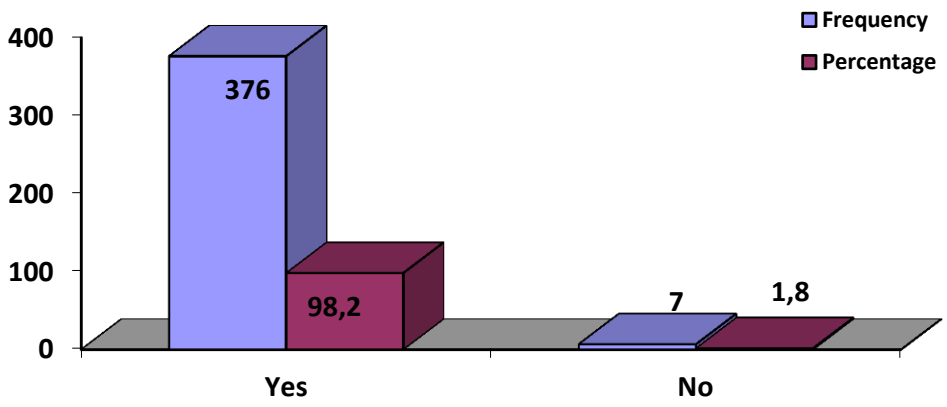

Figure 11.1: Are there any challenges that limit your production
Source of data: from the study

Post-establishing that almost all of the food gardeners were faced with challenges, survey participants were asked to indicate the types of challenges that they normally faced. Amongst the challenges faced by food gardeners, lack of seeds, equipment, water, land, gardening skills and training, no fence, inadequate market, expensive fertilisers, poor insect and pest control measures were very common. The results show that the number of participants who revealed that they were faced with no challenges was insignificant (n = 7 (1.8%)) while the majority of the food gardeners pointed out water shortages and other adverse weather conditions as one of their major problem reported by 26.9% of the participants (n = 103) (see Table 11.1).

Table 11.1: Challenges faced by food gardeners

Challenges	**Frequency**	**Percentage**
No fencing	10	2.6
There are no challenges	7	1.8
Inadequate markets to send products	24	6.3
Poor roads to transport surpluses to the markets	29	7.6
Insufficient land to produce more vegetables	30	7.8
Manure and fertilisers are expensive	31	8.1
Pest control measures	31	8.1
lack of equipment and seeds	32	8.4
Lack of skills and training	39	10.2
A combination of any of the challenges 1 to 10	47	12.3
Shortage of water and weather conditions	103	26.9
Total	**383**	**100.0**

Source of data: from the study

Figure 11.2 below shows the percentage frequencies of the constraints experienced by food gardeners. The challenges identified by food gardeners concurred with the constraints that they indicated meaning that lack of water, lack of equipment, lack of land, lack of gardening skills, poor insect and pest control and a combination of any of them were the major challenges faced by food gardeners. Although non-reported by many, lack of seeds and marketing strategies were some of the challenges faced by food gardeners in Thulamela municipality. These results agree with the observation made by Galhena *et al.,* (2013) who maintained that lack of fencing, pest control, lack of irrigation equipment, lack of planting materials and seeds, lack of gardening skills, inadequate land and poor management posed many challenges to home gardening and hence, inhibited food production. The results also concurred with Baht, Tlalang and Lombard (2019) who maintained that the high cost of water, water shortages, lack of agricultural land and inadequate production inputs were the main challenges that were hindering progress in homestead food production programme. Masekoameng and Maliwichi (2014) also propounded lack of land for production in the study that was done in Sekhukhune district in South Africa, wherein it was postulated that most of the households lacked land for the production of food.

According to Hanson (2013) and Dube *et al.,* (2013), even though households can have access to land without sufficient water to irrigate crops they cannot be productive and that can become a limitation to food supply and availability. Abdu-Raheem and Worth (2011) also alluded that if people are denied access to a piece of land, water or advice from government extension agents, food gardening as a strategy to help resolve the problem of food insecurity can be hampered. It can thus be concluded that these challenges that had since been a big limitation to food gardening, they persist as revealed by the findings reached by this study.

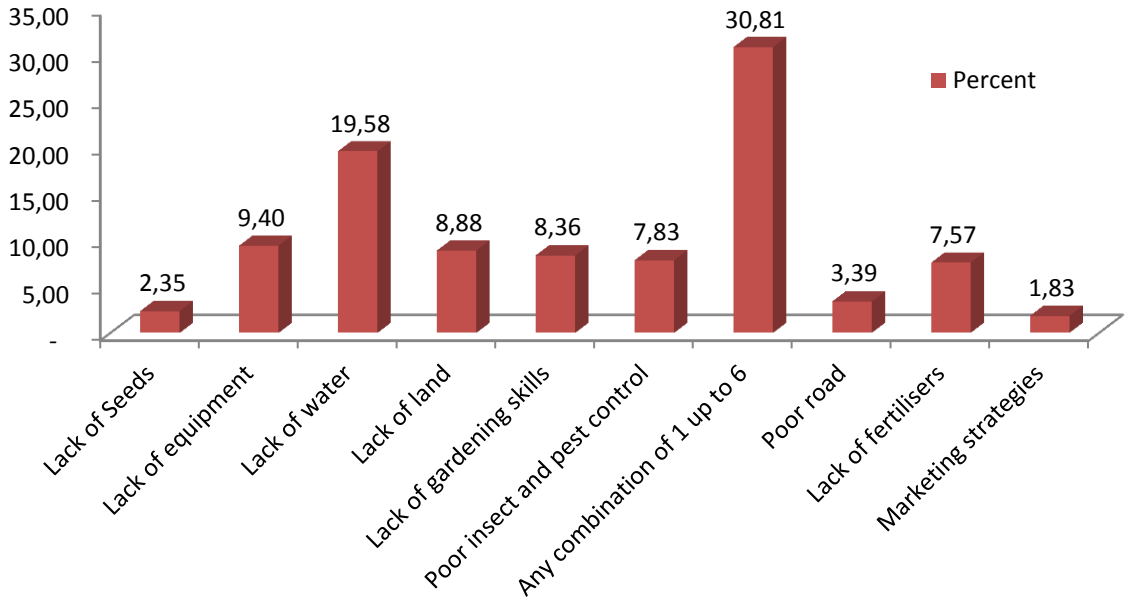

Figure 11.2: The constraints experienced by food gardeners
Source of data: from the study

In addition to asking food gardeners to indicate the challenges they faced while undertaking their food gardening activities, the researcher also observed these challenges, with lack of water, fertilizer, equipment and skills dominating the challenges bemoaned by food gardeners. Figure 11.3 gives a summary of the challenges observed by the researcher during data collection.

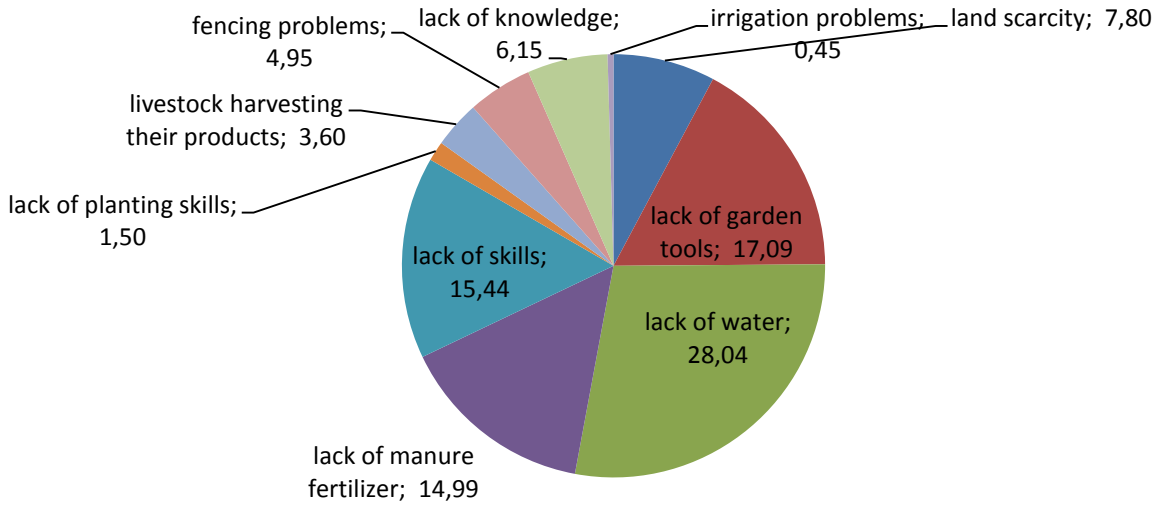

Figure 11.3: The challenges observed by the researcher during data collection
Source of data: from the study

It was also noted that majority of food gardeners undertook their food gardening activities during winter where they cultivated most of the vegetables such as Chinese cabbage, spinach, tomatoes, onion, green beans, African night shade as well as some cabbages, beetroot and carrots. Moreover, the researcher observed that most of the challenges were very pronounced during winter season. For instance, 28.04% of the participants were experiencing lack of water during winter season, while lack of garden tools, fertilizer and skills constituted 17.09%, 14.99% and 15.44% of all the challenges in that respective order. It is important to highlight that the researcher observed these challenges during the time of data collection.

These results were also supported by the views gathered from focus group discussions which indicated that food gardeners were faced with many challenges, some of which were similar to the ones reported by the survey participants themselves. Amongst the challenges mentioned by the focus groups were problems of water especially during winter, land shortages, pest control that is expensive, expensive planting materials including the price of seeds, fertilisers and hiring of tractors as well as lack of support by the extension workers. Another challenge that was mentioned by the focus groups which is in line with Breene (2016); Galhena *et al.,* (2013); Dube *et al.,* (2013), and Hanson (2013) was the issue of lack of advice and skills development as a result of weak support networks and lack of extension services. In accordance with Abdu-Raheem and Worth (2011)'s postulations, lack of product marketing strategies, skills and knowledge on how to improve product yield was also identified as challenges that the participants were faced with.

11.3. Cross-tabulations: Challenge-Related Versus Socio-Demographic Variables

In this section, the results obtained after performing tests for association between challenge-related dependent variables and the socio-demographic independent variables are reported. The results are presented in Table 11.2 below.

Table 11.2: Test for association results for challenge-related variables versus socio-economic variables

Variable	Age	Gender	Qualification level	Institution where food gardened was learned	Experience in food gardening
Are there any challenges that limit your production	**X**	**X**	**X**	Chi-Square =9.554, df = 4, p<0.05, Cramer's V = 0.177	**X**
What challenges are you faced with? Please elaborate…	Chi-Square =61.792, df =36, p<0.05, Cramer's V =0.190	**X**	Chi-Square =166.692, df = 45, p<0.05, Cramer's V = 0.319	Chi-Square = 171.952, df = 36, p<0.05, Cramer's V = 0.312	Chi-Square =67.794, df =18, p<0.05, Cramer's V = 0.299
Which of the following constraints affect you as food gardeners?	**X**	Chi-Square = 19.764, df =6, p<0.05, Cramer's V =0.223	Chi-Square =93.169,df=30, p<0.05, Cramer's V =0.218	Chi-Square = 72.201, df =24, p<0.05, Cramer's V =0.214	Chi-Square =50.526, df =12, p<0.05, Cramer's V = 0.259
How do you deal with these challenges?	Chi-Square =78.801, df =52, p<0.05, Cramer's V = 0.218	**X**	Chi-Square = 130.473, df = 65, p<0.05, Cramer's V = 0.254	Chi-Square = 95.479, df = 52, p<0.05, Cramer's V = 0.262	Chi-Square = 56.814, df =26, p<0.05, Cramer's V = 0.269

X means that the relationship was statistically insignificant
Source of data: from the study

Table 11.2 report the results obtained following performing tests for association between "Are there any challenges that limit your production?" variable and the socio- demographic independent variables. The results show that there was a relationship between dependent variable and the institution where food gardeners had acquired their knowledge of food gardening (Chi-Square = 9.554, df = 4, $p < 0.05$, Cramer's V = 0.177). It is also reported that food gardeners who learned food gardening from the Department of Agriculture and extension worker, other food gardeners and ABET school were entirely faced with challenges whilst food gardeners from secondary school and other institutions had some few food gardeners who were not faced with challenges.

The results from the table above show that the socio-demographic variables whose influence on the types of challenges commonly faced by food gardeners were statistically significant. The results reveal that there exist a very strong relationship between the types of challenges and experience in food gardening possessed by secondary school educated adult food gardeners (46 – 55 years) with Grade 8 - 11 qualification (Chi-Square = 20.962, df = 8, $p < 0.05$, Cramer's V = 0.724, $p < 0.05$). For this category of food gardeners, those with less than 9 years in food gardening experience were faced with the challenge of lack of skills and training whilst those with 10 - 29 years were faced with a challenge of having no fencing. This result can be useful for purposes of targeting initiatives meant to address the challenges faced by food gardeners such as lack of skills and training and non-fenced food gardens.

The results also revealed that there is a very strong relationship between the types of challenges faced by food gardeners and experience in food gardening possessed by secondary school educated, young adult food gardeners (36 – 45 years) with Grade 12 qualification (Chi-Square = 12.199, df = 5, $p < 0.05$, Cramer's V = 0.762, $p < 0.05$). Similarly, a very strong level of association was revealed between the challenges type and experience in food gardening possessed by secondary school educated, adult food gardeners with Grade 12 qualification (Chi-Square = 26.000, df = 8, $p < 0.05$, Cramer's V = 1.000, $p < 0.05$). For this group of food gardeners, especially those with less than 9 years of experience in food gardening, lack of land to produce more vegetables, shortage of water and bad weather conditions and lack of markets to sell their products were among common challenges they normally faced.

Further, the Chi-Squared test results revealed that a very strong relationship existed between the types of challenges and experience in food gardening possessed by Grade 8-11 qualification and old aged food gardeners (56 - 65 years) whose knowledge of food gardening was acquired from the Department of Agriculture and Extension Workers (Chi-Square = 4.000, df = 1, $p < 0.05$, Cramer's V = 1.000, $p < 0.05$). For this group of food gardeners, those with more than 30 years of experience were mainly faced with the challenge of water shortages and bad weather conditions.

Tests for association also revealed that there existed a very strong relationship between types of challenges and experience in food gardening possessed by Grade 1-7 qualified young adult food gardeners (36 – 45 years) with whose knowledge of food gardeners were learned from

other food gardeners (Chi-Square = 11.652, df = 5, $p < 0.05$, Cramer's V = 0.881, $p < 0.05$). For this group of food gardeners, the findings revealed that food gardeners with less than 9 years of experience in food gardening were mainly faced with challenges of poor roads which made it difficult for them to transport their food surpluses to the markets and land shortages which make it difficult for food gardeners to produce more vegetables. On the other hand, food gardeners with 10 – 29 years of experience in food gardening were faced with the challenge of practicing food gardening on non-fenced food gardens.

Similarly, a strong relationship was also established between the type of challenges and experience in food gardening possessed by old-aged food gardeners (56 - 65 years) with Grade 1 - 7 who learned food gardening through the help of other gardeners (Chi-Square = 21.644, df = 12, $p < 0.05$, Cramer's V = 0.798, $p < 0.05$). For this group, the results show that food gardeners with 10 – 29 years of experience in food gardening were mainly faced with the challenges of costly manure and fertilisers, shortage of water and bad weather conditions as well as having to practice food gardening on non-fenced food gardens. On the other hand, food gardeners who reported having 10 and above years of experience in food gardening were mainly faced with the challenge of lack of skills and training in food gardening. Overall the results shed the light that food gardeners in general remain with challenges that need to be dealt with in order to obtain good yield.

11.4. Dealing with challenges

It was deemed appropriate in this study for the researcher to consider how survey participants were dealing with the challenges they were subjected to. For the gardeners to sustain their gardens they had to find ways to deal with their challenges. As a result, food gardeners were asked about how they dealt with the challenges they faced during their food production. Table 11.3 gives a list of challenges and the proposed ways of dealing with them as gathered from the food gardeners.

Table 11.3: Dealing with the challenges

Challenge	Solutions
Poor insect and pest control	• Using pest control measures • Mixing crops, planting many crops at once in different rows
Lack of transport	• Working as a group and hire a truck instead of small cars to transport food produces.
Inadequate markets	• Selling to locals only
Lack of seeds	• storing seeds for future use
Poor road infrastructure	• Request help from the departments of roads and agriculture
Lack of equipment	• Hire equipment from other gardeners
Expensive fertiliser	• Using manure instead of fertilisers
Lack of land	• Renting land from other gardeners • Growing at roadside and riverbanks
Lack of skills	• Practicing as a group
Lack of water	• Saving water or relying on rain

Source of data: from the study

The researcher realised that participants were having strategies to deal with their challenges and they were doing something to help themselves instead of just folding their arms and wait for external assistance. By practicing these strategies, participants were able to sustain their gardens and continued to provide food for their households.

11.5. Strategies for sustainable year-round availability of food gardens

In this section, the researcher presents results following an investigation into strategies for ensuring sustainable year-round availability of food gardens. Attaining food security means that food is always available, accessible, and stable for households to utilise. According to Swindale and Bilinsky (2005), food security is achieved when sufficient quantities of appropriate and necessary types of food from domestic production are consistently available

to the individual. Food gardeners are faced with so many challenges, some of which are mentioned in section 11.2, which can be an obstacle to food security. If these challenges remain unattended and not dealt with, they can hinder the stability of food gardens and hence, the food availability at household level.

It was important in this study to investigate how participants were able to sustain their food gardens to ensure that they supply them with food throughout the year. Accordingly, participants were first asked if their food gardens were able to provide food for the whole year. The results, as represented in Figure 11.4 below, shows that 314 (81.98%) participants expressed confidence that their food gardens provided food for the whole year while the remaining 69 (18.01%) participants reported that their food gardens did not provide food for the whole year. Thus, nearly 2 in every 10 food gardens were found unable to provide food for the whole year.

This question has been asked while investigating access to food and stability of the food gardens in providing food to the households and the answers are dependable since they were approximately similar all the time. The percentage of the participants who negated this question was less than twenty percent (15,4%, 16% and 17.8% respectively) and it was therefore insignificant (see Figure 6.2 in chapter 6 and Figure 8.3 in chapter 8). Some of the reasons to support these findings (*participants whose gardens were not able to provide food for the whole year*) were linked to challenges identified earlier, such as water (that is, heavy dependence on rain water by the gardeners), lack of land, the subsistence nature of food gardeners (such as the inability of food gardeners to produce enough food to consume and sell) and the employment-mentality of the participants when food gardening is escalated to agro-business/agripreneurship (that is, when food gardening is taken as a form of employment in which one can survive on and provide for the family rather than for the provision of food).

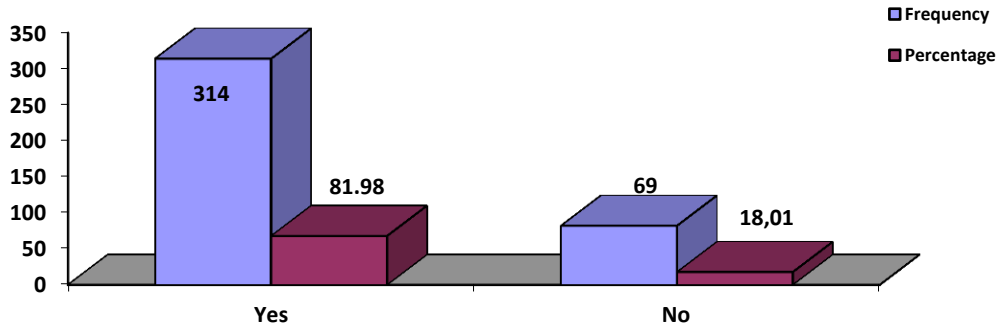

Figure 11.4: Do food gardens provide food for the whole year?
Source of data: from the study

After establishing that food gardens provided food for the whole year, food gardeners were asked about the strategies they used to ensure perennial availability of food gardens. Consequently, the table below shows that food gardeners believed crop rotation, planting of seasonal food, mixed crop farming, water harvesting, food preservation and maintaining good relationships with other gardeners might present good strategies for ensuring all year-round availability of food gardens. Table 11.4 presents a frequency table summarising the frequency occurrence for different strategies used by food gardeners to ensure all-year-round availability of food in food gardens.

Table 11.4: Frequency table summarizing the strategies for ensuring all year round availability of food gardens

Strategy	**Frequency**	**Percentage**
Working in partnership with other gardeners or farmer collaboration	53	13.83
Preservation of food surpluses, for example, sun drying the vegetables	18	4.69
Use of water harvesting technologies or water saving strategies.	44	11.48
Planting of seasonal crops	27	7.04
Mixed cropping (planting different types of crops)	28	7.31
Crop rotation	213	55.61
Total	**383**	**100.0**

Source of data: from the study

The paragraphs below further explores the identified strategies by giving detailed explanations on how food gardeners employed the strategies in ensuring that food gardens are sustainable and provide food to households for the whole year.

- **Farmer collaborations**

Collaboration or partnership entails working together with another person in order to achieve something. According to Abdu-Raheem and Worth (2011), farmer collaboration, especially for small-scale farmers, is an important consideration in sustainable food gardening initiatives since it calls for stronger collective actions which contribute in offering among others knowledge and skills of agricultural production systems. Working in partnership with other gardeners or farmer collaboration emerged earlier in chapter 8 (Table 8.4) as one of the strategies participants employed to realize stable food supply from the gardens all year round. In this section, 13.83% of total participants revealed that farmer collaboration was a good strategy which they used to ensure year-round availability of food gardens. The result is consistent with what was expounded earlier in chapter 8 wherein 13.75% of the participants indicated farmer collaboration as one of the strategies to ensure stability of food supply.

The researcher noted that some challenges faced by participants such as lack of gardening skills and knowledge, lack of equipment and support were addressed through collaboration. When food gardeners collaborate, they exchanged ideas, skills, knowledge and equipment necessary for running food gardens in a sustainable manner. This is consistent with Abdu-Raheem and Worth (2011) who commended that, participants should realise that food gardening as a strategy to help resolve the food insecurity crisis needs the participation and the working together of people in order to increase their agricultural production for their own advantage.

According to United State Department of Agriculture (USDA, 2020), sharing of resource such as skills, knowledge of agricultural practices, equipment, land, sales, marketing and distribution plans, business plans and business networks amongst others for mutual benefits is the main advantage of collaborative arrangements. When gardeners are collaborating, it allows them to pool resources and work together for their own benefit. This is a good practice that requires commitment, compromise, cooperation and trust (USDA, 2020). The researcher also observed the working together of the participants where they helped each other to market

their products through informing the potential buyers about the availability of the product in the fellow gardener's garden and through hiring the same vans or trucks to deliver their products to the market.

- **Water harvesting technology**

Water is a very essential resource and a necessity in food production without which production can diminish. In this study, lack of water has been pointed out as one of the main challenges that limits all-year round productivity of food gardens. This result concurs with the observations made by Musotsi, Sigot and Onyango (2008); FAO (2010) and Galhena *et al.,* (2013) who maintained that resources available for food production such as water was becoming scarce and costly, and its inaccessibility could be a major constraint to food security. However, technologies such as rainwater harvesting and water conservation practices can increase yield and reduce risk of crop failure (Baiphethi & Jacobs, 2009).

Accordingly, 11.48% of survey participants indicated that they deployed water-harvesting techniques, which allowed them to harvest and save water required for the production of vegetables for the entire year facilitated by irrigation. This result corresponds with Table 8.4 in chapter 8 wherein participants cited the use of water saving technology to save water for future use (cited by 11.00%)

From the researcher's observation, participants whose gardens were near or even not so near to the rivers were using water from the rivers to water their crops. The participants were using horse pipes to fetch water from the nearby river and store the water in big tanks or small dams next to their gardens, while some participants with backyard gardens were collecting rainwater from rooftops into storage drums or tanks. A tap was normally connected to the tank and channeled with a pipe to water
the crops. The participants who were collecting rainwater into drums were normally using buckets to carry water from the drums to water their crops. This system was very useful to those gardeners who relied on rainwater for their gardens. During the dry seasons with low rainfall, it was then that the stored water would be utilised by the gardeners to water their plants.

- **Crop rotation**

Planting different consumable products at different times has been another strategy used by the participants in this study to ensure all-year-round availability of food in their food gardens. Similar to the results illustrated in Table 8.4 where the majority (67.35) of the participants alluded to crop rotation as the strategy for year-round stability of food gardens, it has been mentioned by 55.61% of the participants. Another 7.04% mentioned planting seasonal foods which is considered similar to crop rotation. According to Spraque (2019), crop rotation is one of the most basic principles of vegetable production which involves moving the growing location of plant families in the garden each and every season. It helps to break the circle of diseases and improve soil health. The constant planting of the same crops all the time in every season deplete the soil of nutrients and allow weeds and insects to adapt and thrive thereby negatively affecting the yield of the products (Hamilton, 2017; Spraque, 2019).

In accordance with Hamilton (2017), crop rotation has viable advantages to the crops that are grown. It introduces new nutrients and reduces emissions, it prevents soil erosion, help to provide ground moisture and provide pest control. Crop rotation was also recommended during focus group discussions as a strategy that could help increase the yield of garden products. Through observations, the researcher noted that participants planted different crops according to the season in order to have food in their gardens all the time.

It was noted that crops such as maize, pumpkin, sweet potatoes, and peanuts were always grown in summer whereas crops such as Chinese cabbage, African nightshade, cabbage, green beans, tomatoes, onions, beetroot, and carrots were abundant in winter. The different crops planted in each season were also rotated depending on where they were planted the previous time. For instance, the same crop was not planted on the same area it was planted the previous planting season, the gardeners were alternating the areas or the ground where crops were being planted.

Another observation was that some participants were growing some crops such as spinach, maize and sweet potatoes all the seasons of the year, however after harvesting they were growing a different crop in that same area. Hence, crop rotation was indeed seen as a method that could improve stability of the garden products in that when more food is produced from

the food gardens, more food would be stored resulting in less food shortages at household levels.

- **Mixed cropping and intercropping**

Mixed cropping is a form of food gardening in which different kinds of crops are grown on a single piece of land (Abdu-Raheem & Worth, 2011). This process ensures that the amount of one type of nutrient does not get depleted thereby helping food gardeners to have good yields without using fertilisers. According to Abdu-Raheem and Worth (2011) and Freedman (2015), promotion of mixed cropping and intercropping strategies can help to maximize all-year-round availability of food gardens and increase crop yield. This study's findings reveal that mixed cropping and intercropping, as an integrated food security strategy, was used by 7.31% of the participants to ensure all-year-round availability of food from the food gardens.

Planting two or more crops together can benefit one or both plants. The companion plant may help to control weeds, insects, and pests or boost the growth of the plants. Both plants provide a service to another plant (Richford, 2016). For example, when pumpkin is grown together with corn, the pumpkin keep the soil moist and provide ground cover that blocks out weeds while the corn provide the stalk for the pumpkin to climb as well as providing shade from the sun for the pumpkin.

Through observation the researcher realised that corn and pumpkin were successfully grown together and yielding good results. This practice is in line with Spengler (2021) and Richford (2016) who maintained that pumpkin and corn can grow well together as companion plants. It was a common practice amongst the participants of planting these two crops together on the same bed. Usually, pumpkin leaves and flowers and sometimes unripe green pumpkin were harvested for household consumption or for sales at the marketplace long before the corn was ready for harvest and sometimes depending on the weather they would last until the corn is harvested. Another observation that was made by the researcher was the intercropping in alternating rows of corn and cowpea (*munawa*), spring onion alongside tomatoes as well as patches of carrots, green beans and beetroot were planted in an alternative fashion alongside each other.

Cowpea was never mentioned as one of the crops in the participants' gardens, however it was commonly planted alongside maize in many gardens. Cowpea leaves were widely utilised by the participants. Cowpea leaves were both cooked and consumed with porridge in their fresh state or else cooked, dried and stored for future use. The researcher observed that some participants were planting cowpea mainly for selling dried cooked leaves at the marketplaces.

- **Food preservation**

Food can be preserved to increase their stability. Food preservation extends food storage and shelf life. When food is in abundant and households cannot use it all, it is a good practice to preserve such food for future use, for instance, during the dry season households can use the preserved food and thus ensure food security. Dried vegetables in their natural or cooked state, as well as cooked and uncooked frozen vegetables, can be stored for longer periods to be used at a later stage when needed. In consistent with Table 8.4, which shows, that 4.12% of the participants were drying and storing surplus food, 4.69% of the surveyed participants recommended the use of food preservation methods such as drying and refrigeration to ensure sustainable and all-year round availability of food at households.

Participants revealed that, through food preservation, some of the garden produces could be accessed and utilised when they were out of season. These methods played in part to ensure all-year-round sustainability of food at the household levels. These results concurred with Abdu-Raheem and Worth (2011) and Freedman (2015) who maintained that home gardening as a food security strategy can be enhanced by promoting improved preservation and storage of fruits and vegetables to reduce wastes, post-harvest losses and effects of seasonality.

The observations deduced from the views gathered from focus group discussions indicated that households were preserving food surpluses from the food gardens when they could no longer use or sell the harvested produces. The focus group discussions agreed that preservation of vegetables was a good strategy to ensure the realization of food stability in households. Furthermore, the participants highlighted that those preserved (more especially dried) vegetables potentially helped households earn extra incomes through the sale of preserved foods.

According to Hill (2015) and FAO (2007), drying vegetables is the oldest method of preserving food. Drying or dehydration technique is a rather simple method of preserving food by exposing it to the sun, wind, smoky fire or using appropriate dryers to remove the water content contained in the food (FAO, 2007; Hill, 2015). Besides removing the water content, drying also prohibits the growth of microbes and enzymes and it limits chemical reactions. Vegetables are thus easily stored and managed; they could be consumed directly from the dried state or cooked and consumed as an accompaniment dish with porridge. The drying technique concentrate mineral salts and other components such as sugars as well as enhancing the vegetable flavours (FAO, 2007). The drying of vegetables by direct exposure to sunlight is still widely used in many regions with hot and dry climate. The vegetables are uniformly distributed on a tray and exposed to the sun until losing 50 to 70% of its moisture, or the vegetables can be dried in the shadow to avoid dryness and loss of characteristic aroma and flavour (FAO, 2007; Hill, 2015).

Through observations, the researcher noted that participants were sun-drying cooked vegetables (mukusule) such as pumpkin leaves and flowers, cowpea leaves, cabbage and Chinese cabbage. Some participants were even drying cut open ripe tomatoes and raw okra leaves. Maize, as a staple food for almost all the survey participants, was the most preserved and stored garden product and largely consumed with vegetables including dried cooked vegetables. These results demonstrate how the existence of food gardens has contributed to the stability of food supply at household level where the current study has been conducted in Thulamela municipality.

Further, the researcher investigated the sustainability of food gardens by seeking the participants to indicate whether food gardeners received support from the government and other support groups and/or organisations including the identification of the forms of support received by food gardeners. Consequently, food gardeners were asked the following question “Do you receive any form of support as gardeners?” The responses gathered from the survey participants are presented in Figure 11.5 below.

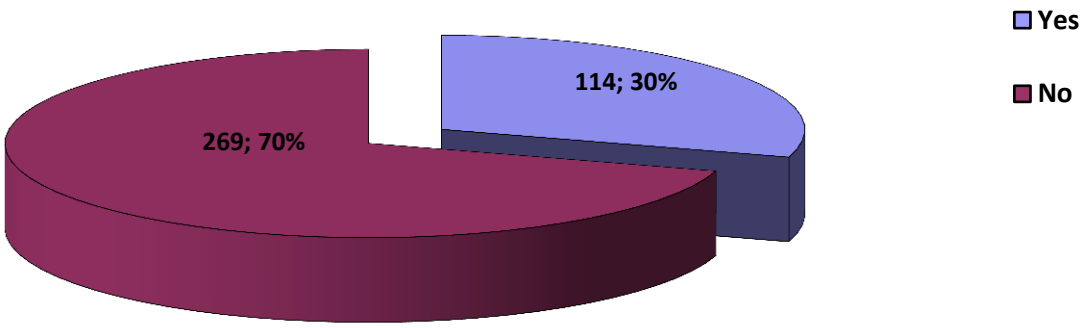

Figure 11.5: Do you receive any form of support as gardeners?
Source of data: from the study

This study maintained that if food gardeners could receive proper support in food gardening, they could gain skills and knowledge on how best they can cultivate their gardens for better yields and sustainability. Dube *et al.*, (2013) maintained that lack of extension services was one of the major constraints to food gardening which resulted in the lack of gardening and management skills of food gardens. As shown on Figure 11.5 above, the majority of the participants did not receive any form of support as gardeners, reported by 269 (70%) of the food gardeners while the remaining 114 (30%) of the participants indicated they received support from the government and support groups or institutions. From the results, it can be concluded that only 3 in every 10 participants received support from the Department of Agriculture and/or other support groups while the majority of the participants (7 in every 10) reported that they were not getting any form of support.

In spite of the fact that home gardening activities require less amount of agricultural knowledge, crops losses and other negative implications can be reduced when household members are empowered with better skills and knowledge (Abdu-Raheem & Worth, 2011). According to Abdu-Raheem and Worth (2011), support facility is needed to support the small-scale farmers for them to become more profitable.

The forms of support received by 30% of food gardeners included donations from the Department of Agriculture. The Department of Agriculture provided help to the gardeners by offering them free tractors and fertilisers. This practice agreed with Fahy, (2021) who maintained that government could play a key role in improving the food security of its citizens. Table 11.5 summarises the forms of support received by food gardeners and their associated frequencies.

Table 11.5: Forms of support received by food gardeners

Form of support	Frequency	Percentage
Equipment sharing by gardeners	5	9.1
Sharing water by gardeners	11	2.9
Skills and knowledge	17	4.4
Sharing new ideas on products, for example, how to plough and water them	22	5.7
Government donations, for example, tractors and manure	46	12.0

Source of data: from the study

One of the constraints that food gardeners identified within this study was lack of support from extension officers. Apart from quantifying the proportion of food gardeners who received support and identifying the forms of support received by food gardeners, the researcher also sought to establish if gardeners worked together and shared ideas on gardening activities. Consequently, participants were asked to give their views on the question "As gardeners do you work together and share ideas on gardening activities?" The results demonstrate that more than half, 55% (n = 209) of the participants agreed that they worked and shared ideas with other gardeners while the remaining 45% (n = 174) indicated they neither worked nor shared ideas on food gardening with other food gardeners (see Figure 11.6). Although some gardeners were not working in partnership, the findings of this study undeniably ratify that there was collaboration amongst food gardeners.

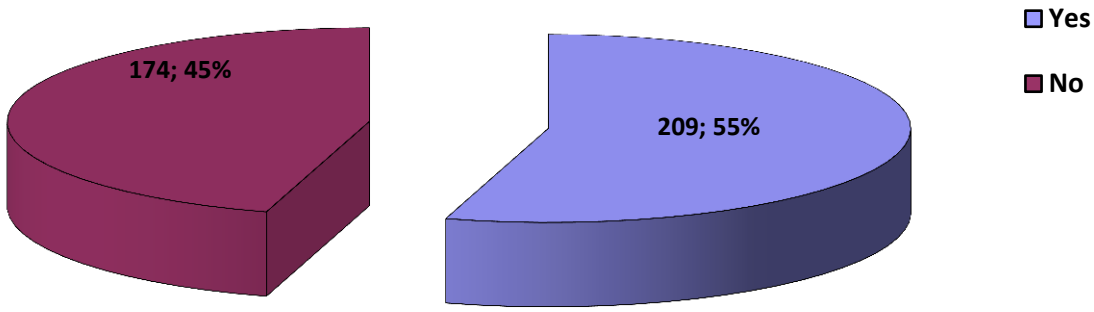

Figure 11.6: As gardeners do you work together and share ideas on gardening activities?
Source of data: from the study

Table 11.6 presents a list of ideas that were highlighted by gardeners together with their associated frequencies. It shows that the ideas likely to be shared by gardeners are closely linked to what food gardeners should do to produce more, to create jobs, sharing of inputs such as seeds, knowledge and skills (such as water retention, preservation methods and pests and insect control and marketing ideas (such as ways of creating demand for the produces, that is, building community market). On the other hand, mixed cropping, sharing of ideas on possible solutions to address land shortages and the types of fertilizers are amongst the list of least shared ideas amongst gardeners.

Table 11.6: List of ideas shared by gardeners on gardening activities

Ideas	Frequency	Percentage
Mixed cropping	3	0.8
Possible solutions to addressing land shortages	4	1.0
Manure types to apply and crop management	9	2.3
Creating community demand for produces	10	2.6
Insects and pests control	21	5.5
Water retention and preservation methods	24	6.3
Sharing seeds and different skills	35	9.1
Ideas for increasing productivity & Job creation	76	19.8

Source of data: from the study

This study's findings revealed that the ability of food gardeners to adjust to new agricultural technology was crucial to ensuring that gardening activities are matched with climate changes and other adverse weather conditions, which have shown to impact negatively on the productivity and efficiency including the sustainability of food gardens. Consequently, to ascertain how food gardeners in Thulamela municipality were able to integrate modern and traditional gardening activities, participants were asked to respond to the question "Do you mix modern gardening with traditional gardening activities?" Figure 11.7 shows that 64% (n = 244) of the total participants reported that they mixed modern gardening with traditional gardening activities while the remaining 36% (n = 139) indicated otherwise. Amongst the traditional gardening activities used includes the use of hoes for ploughing and the use of manure instead of modern fertilizers.

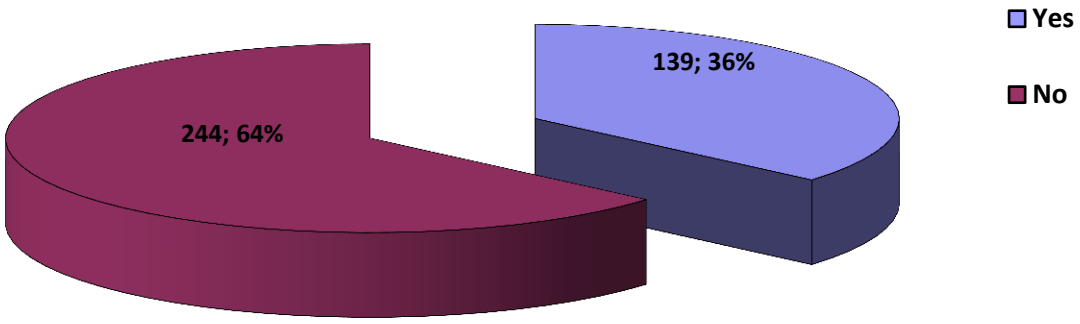

Figure 11.7: Do you mix modern gardening with traditional gardening activities?
Source of data: from the study

According to Abdu-Raheem and Worth (2011), it is of utmost importance to understand and build on indigenous knowledge and the traditional gardening methods as it will give more efficient understanding of the limitations that constrains gardening activities in the past. Additionally, Abdu-Raheem and Worth (2011) maintained that it is vital to build on the indigenous gardening skills within families especially with regard to the cultivation and use of indigenous plants and the traditional methods of conserving water and combating pests. According to Swiderska and Ryan (2020), modern food and farming practices degrade the natural resources such as water, soil and genetic resources required to sustain agricultural production. It has been argued that the use of natural plants as part of local production can help create more sustainable agriculture (Abdu-Raheem & Worth, 2011 and Freedman, 2015). According to Kamwendo and Kamwendo (2014) and Ponge (2013), indigenous knowledge can help to achieve food security at household level as well as to alleviate poverty if it is efficiently applied in agriculture and supported by applicable technology interventions that take into account peoples' circumstances.

In this study, those who agreed to mixing traditional and modern gardening activities related the integration of manure such as the compost with artificial fertilizers and the combined use of chemicals and traditional pest control measures such as soot and ashes to control pest and insects as reported by 24.0% of the total participants. Also, gardener who integrated modern and traditional gardening activities related to the use of hoes to plough/till the land as well as the hiring of tractors as reported by 2.4% of the total participants (N = 383). The practice of using indigenous gardening methods concurred with the citation by Ponge (2013) and Kamwendo and Kamwendo (2014) which indicated that understanding indigenous traditional

knowledge increase motivation and pride of using cultural practices to solve local problems with local resources.

In this study, participants were asked to give their views on the following question "Do you cultivate any indigenous plants in the gardens?". The results, as depicted in Figure 11.8 below, report that majority of food gardeners, 312 (81%) were not cultivating indigenous vegetables while the remaining 71 (19%) reported that they were cultivating indigenous plants in their gardens. The indigenous plants that were cultivated include pumpkin leaves, African nightshade, okra (mandande), maize and cowpea. The participants were either growing one type or a combination of two or more indigenous plants.

These results correspond with Freedman (2015) who postulated that transplanting readily available indigenous wild food plants into home gardens could increase the regular consumption of fresh fruit and vegetables. Apart from being a rich source of micronutrients, the domestication of wild food plants can potentially create income through sales of surplus food.

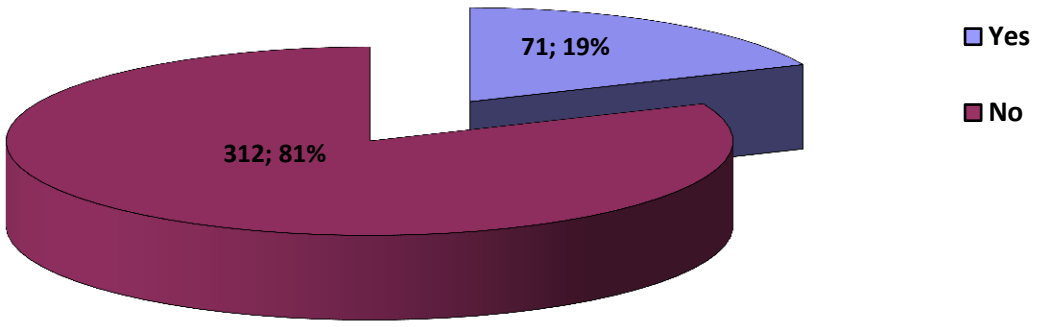

Figure 11.8: Do you cultivate any indigenous plants in the gardens?
Source of data: from the study

This section is concluded by presenting the statistics from an observation carried out on the strategies for sustainable all-year-round availability of food gardens. The observed strategies summarized very well the strategies articulated by the survey participants and mixed cropping represented one of the least observed strategies for sustaining food gardens. Accordingly, Figure 11.9 below depicts a summary of observed strategies mainly employed by food gardeners to ensure a sustainable all-year-round productivity of food gardens in Thulamela municipality. As shown in Figure 11.9, crop rotation, displayed by 45.73% was

the main strategy employed by food gardeners to ensure sustainable all-year-round availability of food gardens followed by water harvesting and saving technologies which was displayed by 29.20% while partnerships with other food gardeners was displayed by 25.07%.

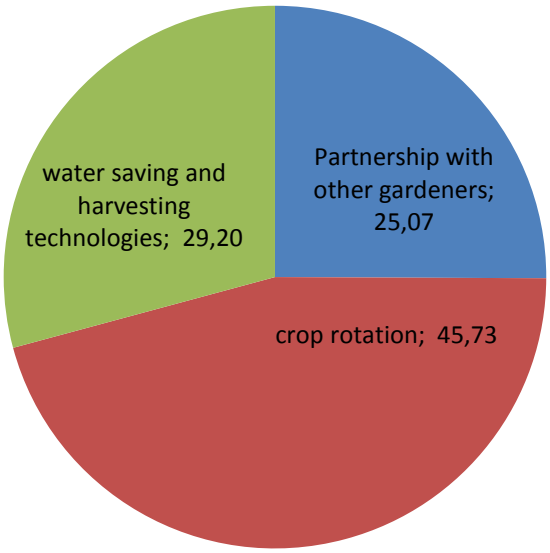

Figure 11.9: Strategies for sustainable all-year round productivity of food gardens.
Source of data: from the study

11.6. Strategies for all-year-round availability of food gardens versus socio-demographic variables.

This section presents the results obtained after performing tests for association between strategy related variables and the socio-demographic variables. Table 11.7 present results showing that the dependent variable ("Do food gardens provide food for the whole year?") was significantly associated with independent variables: age, institution where one learned food gardening and experience of food gardeners in food gardening. Also, the results revealed the existence of a very strong relationship between "Do food gardens provide food for the whole year?" variable and experience in food gardening possessed by young adult food gardeners (36 – 45 years) whose knowledge of food gardening were acquired at secondary school (Chi-Square = 8.104, df = 1, $p < 0.05$, Cramer's V = 0.506, $p < 0.05$).

Analogously, a very strong relationship is also reported for adult food gardeners (46 – 55 years) whose knowledge of food gardening were acquired at secondary school (Chi-Square =

10.915, df = 2, p < 0.05, Cramer's V = 0.667, p < 0.05). Further, a very strong relationship is also revealed for adult food gardeners (46 – 55 years) whose knowledge of food gardening were acquired from the Department of Agriculture and from extension workers (Chi-Square = 5.268, df = 1, p < 0.05, Cramer's V = 0.632, p < 0.05). Also, the results reveals the existence of a very strong relationship for senior citizen food gardeners (66+ years) who had learned about food gardening through other food gardeners (Chi-Square = 11.524, df = 2, p < 0.05, Cramer's V = 0.494, p < 0.05). Table 11.7 below presents the results in more detail.

Table 11.7: **Tests for association results for strategy–related variables and the socio-demographic variables**

Variable	Age	Gender	Qualification level	Institution where food gardened was learned	Experience in food gardening
Do food gardens provide food for the whole year?	Chi-Square = 16.844, df =4, p<0.05, Cramer's V = 0.220	**X**	**X**	Chi-Square =21.675, df =4, p<0.05, Cramer's V = 0.215	Chi-Square = 11.540, df =2, p<0.05, Cramer's V = 0.175
If food gardens do not provide food for the whole year, please explain why is that so	Chi-Square =25.826, df =12, p<0.05, Cramer's V = 0.160	**X**	**X**	Chi-Square = 43.449, df = 12, p<0.05, Cramer's V = 0.197	**X**
What strategies do you use to ensure year-round availability of food gardens?	Chi-Square = 64.847, df =28, p<0.05, Cramer's V = 0.206	**X**	Chi-Square = 88.994, df = 35, p<0.05,Cramer's V =0.208	Chi-Square = 79.059, df = 28, p<0.05, Cramer's V = 0.224	Chi-Square = 90.255, df = 14, p<0.05, Cramer's V = 0.326
Do you receive any form of support as gardeners?	Chi-Square = 14.252, df = 4, p<0.05, Cramer's V =	**X**	Chi-Square = 23.417, df =5, p<0.05, Cramer's V =0.233	Chi-Square = 47.711, df =4, p<0.05, Cramer's V = 0.353	Chi-Square = 8.503, df =2, p<0.05, Cramer's V =0.150

	0.193				
If yes, what form of support do you receive? Please elaborate	**X**	**X**	Chi-Square = 56.110, df = 25, p < 0.05, Cramer's V = 0.159	Chi-Square = 53.803, df =20, p<0.05, Cramer's V = 0.182	Chi-Square = 33.733, df =10, p<0.05, Cramer's V = 0.203
As gardeners do you work together and share ideas on gardening activities?	**X**	**X**	Chi-Square =28.099, df =5, p<0.05, Cramer's V = 0.253	Chi-Square = 36.946, df =4, p<0.05, Cramer's V = 0.305	Chi-square = 12.524, df = 2, p<0.05, Cramer's V = 0.182
If yes what are the ideas that you share? Please elaborate	Chi-Square = 47.747, df = 32, p < 0.05, Cramer's V = 0.173	**X**	Chi-Square = 83.063, df =40, p<0.05, Cramer's V = 0.209	Chi-Square=71.644, df =32, p<0.05, Cramer's V = 0.204	Chi-Square = 46.951, df =16, p<0.05, Cramer's V =0.236
Do you mix modern gardening with traditional gardening activities?	Chi-Square = 11.980, df = 4, p<0.05, Cramer's V = 0.177	Chi-Square = 9.359, df =1, p<0.05, Cramer's V = 0.156	Chi-Square = 14.710, df = 5, p<0.05, Cramer's V = 0.178	Chi-Square = 15.209, df = 4, p<0.05, Cramer's V = 0.199	Chi-Square =13.591, df = 2, p<0.05, Cramer's V = 0.188
If yes, please elaborate	Chi-Square =27.351, df = 8, p<0.05, Cramer's V = 0.182	**X**	**X**	Chi-Square = 31.068, df =8, p<0.05, Cramer's V = 0.246	Chi-Square = 21.654, df =4, p<0.05, Cramer's V = 0.169
Do you cultivate any indigenous plants in the gardens?	**X**	**X**	Chi-Square = 12.016, df =5, p<0.05, Cramer's V= 0.177	Chi-Square = 23.271, df =4, p<0.05, Cramer's V = 0.246	Chi-Square = 10.095, df =2, p<0.05, Cramer's V = 0.163
If yes, please specify	**X**	**X**	**X**	Chi-Square = 34.159, df = 16, p<0.05, Cramer's V = .139	Chi-Square = 26.466, df = 8, p<0.001, Cramer's V = .186

X means that the relationship was statistically insignificant
Source of data: from the study

The results presented in Table 11.7, revealed that there was a very strong relationship between the strategies used to ensure all-year round availability of food gardens, and experience in food gardening possessed by young adult food gardeners (36 - 45 years), with Grade 8 - 11 whose knowledge in food gardening were acquired at secondary school (Chi-Square = 8.119, df = 3, $p < 0.05$, Cramer's V = 0.859, $p < 0.05$). Similarly, a strong relationship was also evident for experienced adult food gardeners with Grade 8 - 11 whose knowledge of food gardening were acquired at secondary school (Chi-square = 26.000, df = 12, $p < 0.05$, Cramer's V = 0.806, $p < 0.05$).

Moreover, a very strong relationship was revealed between strategies used and experience in food gardening possessed by young adult food gardeners (36 - 45 years) with Grade 12 whose knowledge of food gardening was acquired at secondary school (Chi-square = 16.676, df = 7, $p < 0.05$, Cramer's V = 0.891, $p < 0.05$). From this result, it can be inferred that food gardeners whose highest qualification level was Grade 8 - 11 with less than 9 years of food gardening experience used water saving and harvesting technologies and good partnership with other gardeners as strategies for ensuring all-year-round availability of food from the food gardens. On the other hand, food gardeners whose level of experience in food gardening ranged between 10 and 39 years used crop rotation, mixed planting of different crop types, water saving and harvesting technologies and preservation of surplus vegetables as some of the methods they employed to ensure sustainable all-year-round availability of food from the food gardens.

Similarly, a very strong relationship was found between strategies used and the experience possessed by adult food gardeners (46 - 55 years) with Grade 12 whose knowledge of food gardening were acquired from secondary school (Chi-square = 22.100, df = 8, $p < 0.05$, Cramer's V = 0.922, $p < 0.05$). These results show that food gardeners with grade 12, whose level of experience in food gardening were less than 9 years used crop rotation, mixed planting of different crop types, water saving and harvesting technologies and surplus food preservation as some of the strategies they employed to ensure sustainable all-year-round availability of food from the food gardens. On the other hand, food gardeners with Grade 8-11 qualification, experience in food gardening ranging between 10 and 39 years used water saving and harvesting technologies and good partnership with other gardeners as strategies for ensuring all-year-round availability of food gardens. The results show that food gardeners with 30 and above years of experience in food gardening resorted to preservation of surplus

food or drying of vegetables as a strategy to ensure all-year round availability of food from the food gardens.

Finally, the results also reveal that there existed a very strong relationship between strategies used and experience in food gardening possessed by young adult food gardeners (36 - 45 years) with Grade 1-7 whose knowledge of food gardening were learned from other food gardeners (Chi-Square = 11.556, df = 4, $p < 0.05$, Cramer's V = 0.878, $p < 0.05$). This result shows that crop rotation was one strategy used by food gardeners with less than 9 years of experience in food gardening and whose knowledge of food gardening was from other food gardeners. Analogously, preservation of surplus food or drying of vegetables and planting of seasonal food were the main strategies used by food gardeners who acquired knowledge of food gardening from other food gardeners and had experience in food gardening ranging from 10 to 29 years.

11.7. Conclusion

The participants of this study indicated that they experienced challenges to food gardening but they had strategies to deal with their challenges. Through practicing those strategies, participants were able to sustain their gardens and continued to provide food for their households.

The following chapter presents the results from the chi-squared tests and logistic regression together with the framework for linking food security and food gardens.

CHAPTER 12

RESULTS FROM CHI-SQUARED TESTS AND LOGISTIC REGRESSION AND THE FRAMEWORK FOR LINKING FOOD SECURITY AND FOOD GARDENS

12.1. Introduction

This chapter is intended to discuss the results obtained from the chi-squared tests and logistic regression analysis. Furthermore, this chapter wrapped up by presenting a framework for linking food security and food gardening initiatives. The framework provides a comprehensive understanding of the role and contribution of food gardens to food security and community development.

12.2. Chi-Squared Tests and Logistic Regression

The researcher had investigated and identified variables that are significantly associated with four food security-related dependent variables as listed in the first row of the table as given in Addendum A, which presents crosstabs and Chi-squared tests. Similarly, the independent variables are also listed in the first column of the table in Addendum A. Specifically, the following three points summarizes what is actually undertaken in this section:

- Pearson Chi-squared test for association to identify factors that are significantly or insignificantly associated with food security variables.
- Table 12.1 present a summary of factors that were significantly associated with food security-related variables.
- The **p-value** is used to highlight factors that are significantly or insignificantly associated with food security related variables. A **p-value** less than 0.05 means that there is an association while the p-value greater than 0.05 means there is no association between the two variables.

For a complete presentation of results obtained from performing tests for association using the Chi-Squared statistical testing technique, refer to Addendum A that presents crosstabs and Chi-squared tests. However, variables that were shown to have a statistically significant relation with the **four** food security-related variables were considered for further analysis. In

addition, only the binary dependent variable was considered for further analysis using binary logistic linear regression model. The details of the dependent and independent variables considered in the logistic regression model are as follows.

The dependent variable (Y):

Do food gardens provide food for the whole year?

Independent variables (X's):

X1: Where did you learn how to do food gardening?
X1_1: Secondary Education Attained (1 – Yes, 0 – No)

X1_2: Trained by the Department of Agriculture (1 – Yes, 0 – No)

X1_3: Trained by the Extension Worker (1 – Yes, 0 – No)

X1_4: Learned from other gardeners (1 – Yes, 0 – No)

X1_5: ABET School (1 – Yes, 0 – No)

X1_6: Other (1 – Yes, 0 – No)

X2: Does food garden enhance household food availability? (1 – Yes, 0 – No)

X3: Do you think every household should have food gardens? (1 – Yes, 0 – No)

X4: Do household members like to eat these food? (1 – Yes, 0 – No)

X5: Food gardens can be a source of additional income to the household (1 – Yes, 0 – No)

X6: Do you cultivate any indigenous plants in the gardens? (1 – Yes, 0 – No)

Table 12.1: Identified variables of statistical significance to food security

Indicators	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
X1_1	3.317	1.067	9.661	1	**.002**	27.575	3.405	223.290
X1_2	3.432	1.117	9.441	1	**.002**	30.943	3.465	276.291
X1_3	-16.796	7566.892	.000	1	.998	.000	.000	.
X1_4	1.797	1.053	2.913	1	.088	6.032	.766	47.512
X1_5	3.054	1.256	5.912	1	**.015**	21.207	1.808	248.746
X2	19.666	4434.411	.000	1	.996	347454216.835	.000	.
X3	1.001	.644	2.418	1	.120	2.720	.771	9.603
X4	-.577	.333	2.999	1	.083	.561	.292	1.079
X5	-39.501	11961.144	.000	1	.997	.000	.000	.
X6	1.275	.395	10.404	1	**.001**	3.579	1.649	7.766
Constant	8.241	7566.893	.000	1	.999	3795.175		
Variable(s) entered on step 1: X1_1, X1_2, X1_3, X1_4, X1_5, X2, X3, X4, X5, X6								

Source of data: from the study

The coefficient of X1_1 is 3.317 which means that a unit increase in the number of food gardeners who are educated up to secondary level results in an increase in the log of the odds of food gardeners' ability to provide food for the whole year by 27.575 times. Similarly, the coefficient of X1_2 is 3.42 implies that 1 unit increase in X1_2 results in an increase in the log of the odds of Y by 30.943 times. From the table, only the effect of attaining secondary education ($p < 0.02$), training from the department of agriculture ($p<0.05$), training from Abet school ($p <0.05$) and cultivation of indigenous foods ($p<0.05$) are the only indicators which were found to be statistically significant.

12.2.1. The Hosmer-Lemeshow goodness-of-fit test

The Hosmer-Lemeshow goodness-of-fit test is used for testing the null hypothesis that there is no reason to doubt the adequacy or reliability of the fitted model

Table 12.2: Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig.
1	6.051	8	**0.641**

H0 (Null Hypothesis):

There is no reason to doubt the adequacy or reliability of the fitted model. Versus

H1 (Alternative Hypothesis): There is a reason to doubt the adequacy or reliability of the fitted model.

The rejection criterion dictates that the null hypothesis should be rejected if the p-value of the HL statistic is less than 0.05. In this study, the p-value of 0.641 presented above indicates no evidence of poor fit. Consequently, we have no reason to doubt the reliability of the fitted logistic regression model.

The next section presents the graphical methods employed in assessing the degree of reliability of the fitted binary logistic regression model. Consequently, magnitude of the area that lies under the ROC (Receiver Operating Characteristic) plot was measured and sensitivity/specificity plots were produced.

12.2.2. Magnitude of area that lies under the ROC curve

Figure 12.1 and Table 12.3 below shows the ROC plot and the magnitude of the area that lie under the ROC plot respectively. The area under the ROC curve is a measure of variation explained by the fitted logistic regression model. In our present study, the magnitude of the area was found to be 0.867 (95% CI: (0.826; 0.909) translating to approximately 87% of the total variation being explained by the logistic regression model, well-above the cut-off value of 50% as per null hypothesis.

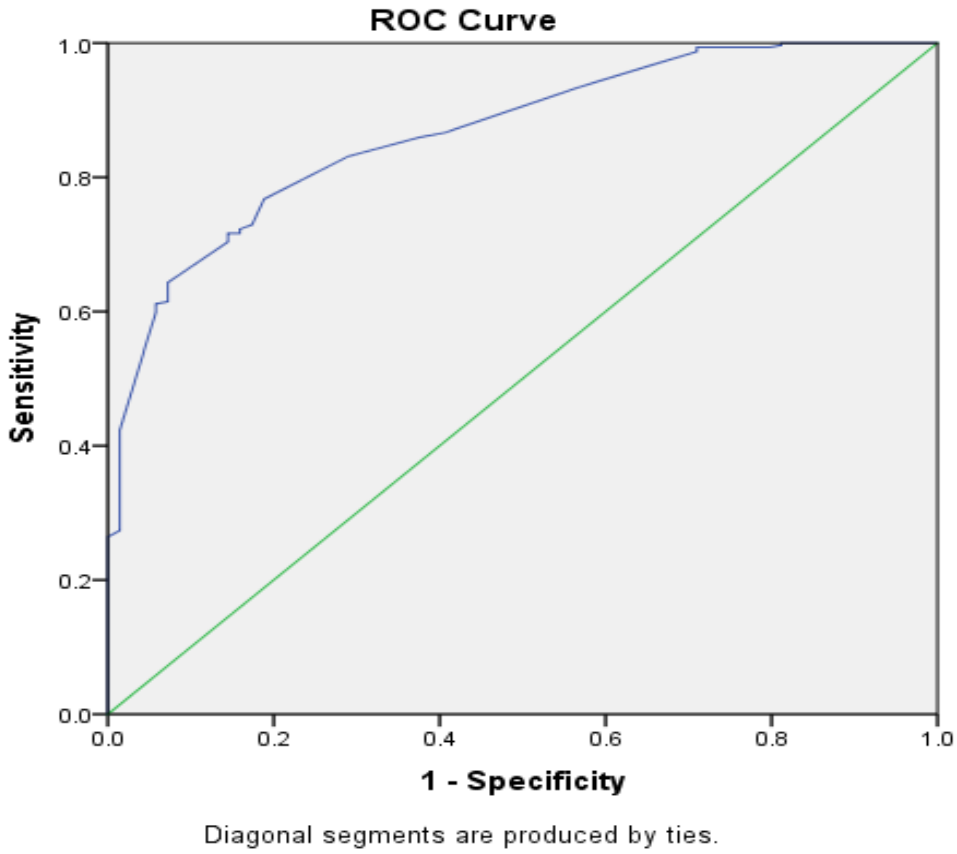

Figure 12.1: Receiver Operating Characteristic (ROC) Plot

Table 12.3: Area Under the Curve

Test Result Variable(s): Predicted probability				
Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
0.867	0.021	0.000	0.826	0.909
The test result variable(s): Predicted probability has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.				
a. Under the nonparametric assumption				
b. Null hypothesis: true area = 0.5				

12.2.3. Sensitivity and specificity plots

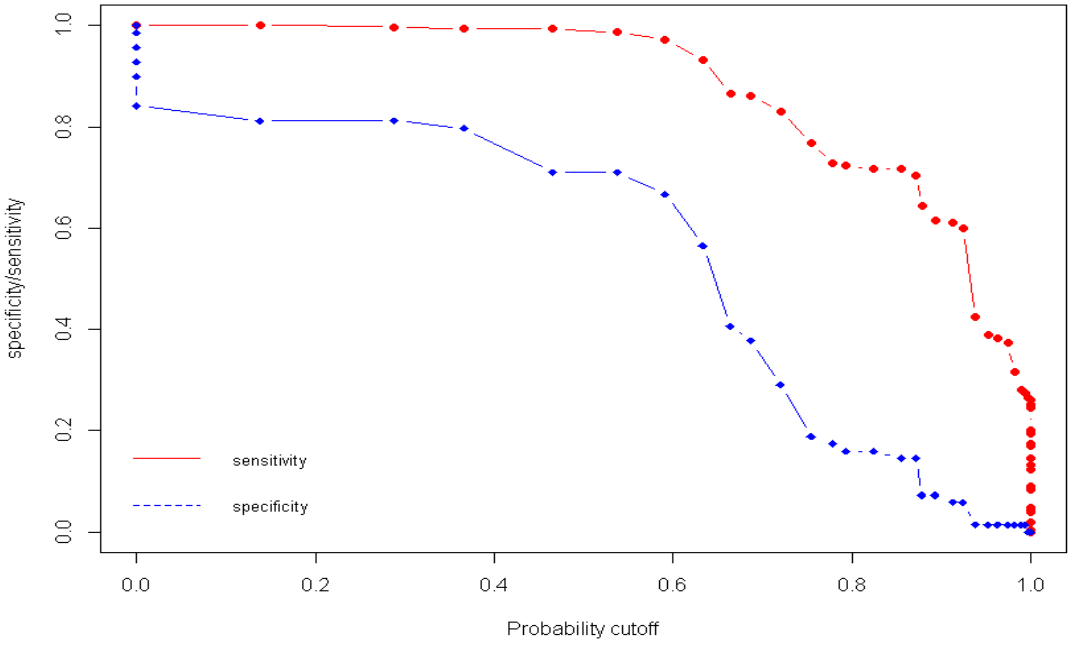

Figure 12.2: Plot of sensitivity/specificity values versus probability cut-off point
Source of data: from the study

12.2.4. The likelihood ratio test

Table 12.4 below presents the omnibus test results for testing the collective importance of the 11 predictor variables used to fit the logistic regression model to our research data. As shown in the table, the p-value is less that 0.05 which suggest that there is enough evidence to reject the null hypothesis which says that all parameter values for the predictor variables were indifferent from zero in favour of the alternative hypothesis which hypothesized that at least one of the parameters were different from 0.

Table 12.4: Omnibus Tests of Model Coefficients

		Chi-square	Df	p-value
Step 1	Step	121.276	10	.000
	Block	121.276	10	.000
	Model	121.276	10	.000

12.3. Conceptual Framework for linking food security and food gardens.

In this section, the researcher presents the conceptual framework (Figure 12.3) for this study. The framework has been developed mainly for linking food gardening initiatives and undertakings with food security, taking into account that the research findings established food gardening to be a very complex activity that require critical decision-making, problem solving, entrepreneurial and collaborative skills including unprecedented levels of awareness to climatic and technological changes. The framework demonstrates clearly how food security relates with food gardening activities taking into consideration the role and contribution of food gardens to food accessibility, availability, stability, utilisation, income generation and community development. Therefore, the framework is presented such that food gardening can be understood to function well when knowledge, skills and equipment for gardening are identified and made available. If households that practice food gardening could have the necessary resources such as water, land, seeds, equipment and receive extension services, it could strengthen their productivity and they would be able to produce more for their own consumption. This would in turn reduce the cost of buying food since they will be buying less from the market and they would be able to go commercial.

Similarly, challenges to food gardening should be identified and matched with the right solutions including water harvesting technologies, crop rotation, mixed cropping and intercropping as well as putting efforts together and work in partnership for the successful implementation of the food gardening activities. When food gardens flourishes there would be increased access to food, increased availability of food for households' utilisation, and ensured food stability at household levels and communities at large. Moreover, the framework clearly maps out the importance of successful harvesting of food products coupled with proper utilisation of garden produces, which consists of proper use, processing and storage of products in contributing to food security. When households are food secure, they leave with enough surpluses to reserve seeds for food gardening activities including the sale of surplus to generate income. The gardener becomes financially empowered; hence, self-empowerment, self-reliance and household levels advanced to effect community development in all its facets, for example, job creation, economic growth, efficient markets and striving livelihood relationships.

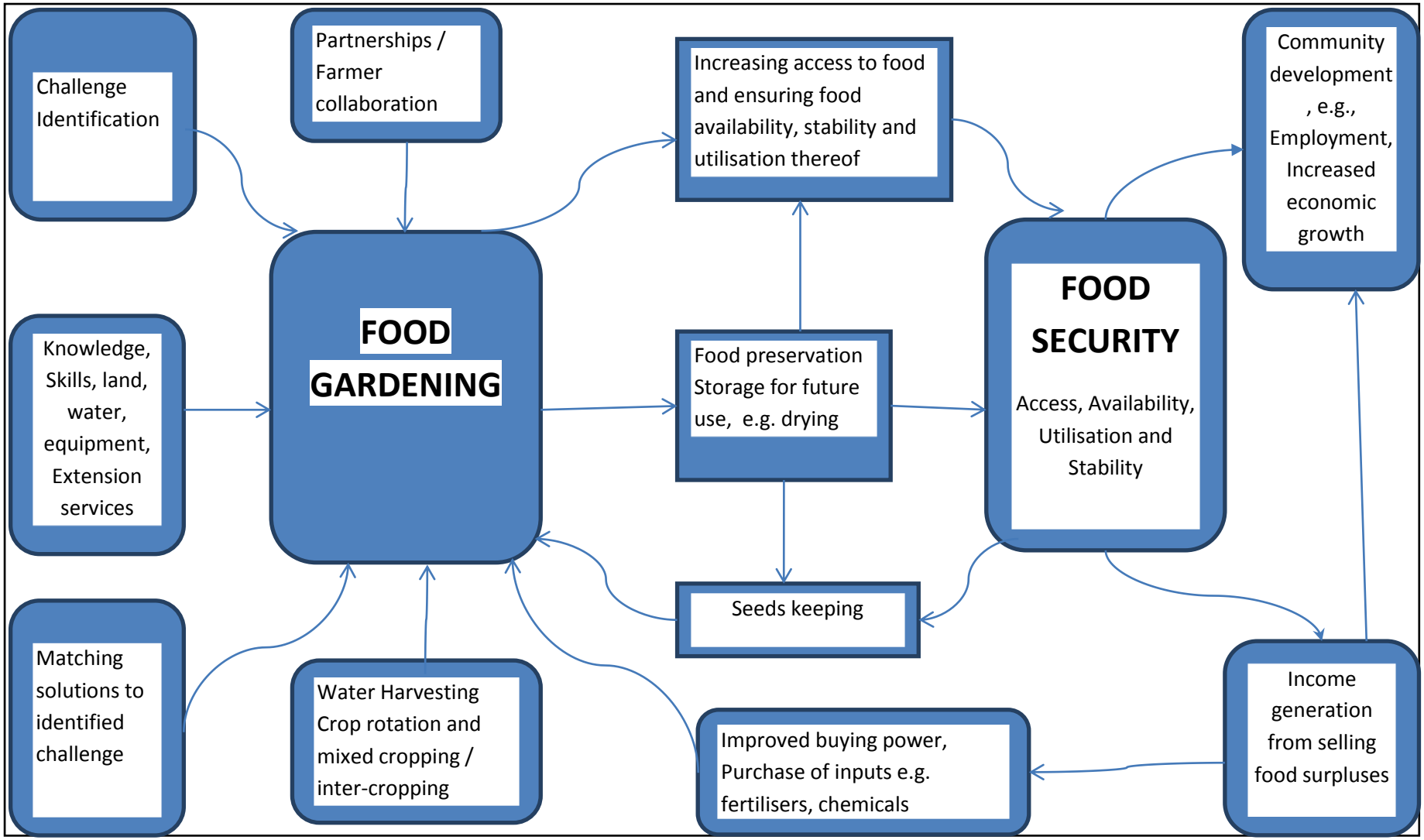

Figure 12.3: The conceptual framework for linking food garden to food security
Source of data: from the study

The main purpose of the framework is to elucidate the food gardening activities that contribute to food security and community development and to create an understanding on how food gardening can be linked to food security. The conceptual framework is in accordance with the results of this study, which highlighted that food gardening played a role and contributed to accessibility, availability, utilisation and stability of food and income generation. Through participating in food gardening, households can supplement their food basket, enhance household income and eventually achieve food security. Thus, the framework illustrates how food gardening is connected to food security and community development.

12.4. Conclusion

The purpose of this chapter was to analyse, present and visualize the research results with Chi-Squared tests and Logistic Regression wherein variables that showed to have a statistically significant relation with the food security-related variables were analysis.

The developed conceptual framework was discussed emphasising the link and the relationship that exist between food gardening, food security and community development.

The following chapter provides the concluding remarks, summary, implications and recommendations in terms of the research findings.

CHAPTER 13

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a summary of the research findings, explores the implications of the study, and suggests recommendations for future research areas.

13.1. Introduction

The purpose of this study was to investigate the role and contributions of food gardens to food security (availability, accessibility, utilisation and stability), income generation and community development for Thulamela municipality residents. Challenges to food gardening activities as well as strategies for achieving sustainable all-year round availability of food was also determined in this study. As a result, data was collected from 383 food gardeners from different households and other 82 persons who formed different focus groups in Thulamela municipality. Secondary data was collected from the participants and used to answer the key research questions of the study as outlined in Chapter 1. Descriptive statistics, tables, line and bar graphs as well as tests for associations were used to represent the role and contributions of food gardens to ensuring food security at household level.

13.2. Summary of the study

This study is comprised of thirteen chapters including the present chapter. The previous chapters are organised as follows: Chapter 1 presents the introduction to the study wherein the aim and objectives of the study are highlighted. Chapter 2 gives the review of literature related to the study while chapter three provides the methodology used for this study. The results of the study are presented in chapters four through to chapter twelve according to the objective they were addressing. The results chapters analysed, visualized, and presented the research findings through the use of descriptive statistics, frequency tables and graphs as methods for summarizing and describing the gathered research data.

Initially the results on participants' demographic information were presented, followed by the results on the role and contribution of food gardens in ensuring food availability, accessibility and how food gardeners

utilised their food gardens produces, including how stability of food from the food gardens was sustained. In addition, the role and contribution of food gardens to income generation and community development was investigated and results presented thereof. The challenges commonly faced by food gardeners were identified and lack of water, skills, and equipment were identified as some of the major challenges faced by food gardeners in Thulamela municipality. The strategies for achieving sustainable year-round availability of food gardens were investigated and the results are presented therein.

The results from the food frequency questionnaires and the 24-hour food recall were incorporated in which the most commonly consumed garden products were identified as maize (porridge), cabbage, spinach, pumpkin leaves, tomatoes, and Chinese cabbage. The places from which these food garden products were mainly consumed at were the home and the garden. Finally, the results from focus group discussions and observation sheets also shed light in answering the research questions on the role of food gardens to food security. The framework for linking food security and food gardening initiatives was developed and presented. The framework provides a comprehensive understanding of the role and contribution of food gardens to food security and community development.

13.3. Major research findings

This study is of great significance to Thulamela municipality and its people. It provide an understanding on how the people of Thulamela municipality involved in the study viewed the importance of food garden as they relate it with food security and improved livelihoods. The socio demographic profiles of participants in this study revealed that both men and women with men (56.6 %) in the majority were engaged in food gardening in Thulamela municipality. The essence of any research is to find more knowledge and add to the existing knowledge. Although in many prior studies that are similar to the present study women were viewed as the principal role players in food gardening and the wellbeing of their household in general, this study brought to light the perception that men are now more involved in food gardening and taking charge of the welfare of their families by providing food security. A diversity of people of different age groups ranging from 20 to above 65 years of age were into food gardening. The participants showed varied experiences, educational background and training in food gardening. Almost all the participants had some form of training in food gardening wherein 43% of the survey participants were trained by other gardeners.

The majority of the participants in this study could read and write, as only 13.1% of the participants had no formal education.

This study made an important contribution to the body of knowledge by analyzing through cross-tabulation the association between food security variables and the participants' socio-demographic profiles. Through these analysis the study discovered the impact that age, gender, experience and education and training have on food gardening and food security. Knowledge has been gathered in this study that socio-demographic profiles can have an influence on food gardening which could have an impact on food security, income generation and community development

The findings revealed that 99.7% of the participants had food gardens at their homes. In addition, the findings revealed that 43.9% of the food gardens were home or backyard gardens, which give the participants more time to spend in their gardens. From these food gardens various food crops, which included fruit and vegetables were grown and were providing food during winter and summer and thus ensuring availability of food at the participants' households. Moreover, 81.5% of the participants agreed that food gardens enhanced food availability at their households. As a result, it can be concluded in this study that food gardens were playing a pivotal role towards food security because the majority of participants had food available in their households from their food gardens.

Participants admitted to getting access to garden products that they used for consumption. Overall, participants believed that food gardens contributed to household food security by improving diet through direct access and availability of food for utilisation at home even without money. The food products from the gardens enable them to eat healthy and nutritious meals, hence improving their health without spending a lot of money. Furthermore, the results revealed that the participants were eating food they grew from their food gardens including indigenous vegetables. The findings further revealed that the participants found indigenous vegetables inexpensive compared to other types because they could easily grow depending on the season. The findings also revealed that 90.9% of the participants grow their food during winter and summer, which allowed them to access and make food available to their households throughout the year and thus ensuring food stability. However, 6% of the total participants revealed that they were at risk of running out of food and therefore, buying during winter and summer respectively.

Alongside access to garden products for the provision of nutritious food for consumption, the participants indicated that they were selling some of their garden produces. Through selling food from the gardens, the participants revealed that they got income that they used to buy other essential foodstuff to utilise such as btead, milk, oil, salt, meat and eggs. The study results also revealed that participants used the money that they got from selling the food from their gardens to buy uniforms and other casual clothes. Further, the findings revealed that most of the participants mainly grow a combination of several vegetables, which they used not only for consumption but also for selling. Through selling some of the vegetables, the participants could make income for their households and improve their living standards.

The findings further revealed that food gardens enabled many participants to support and provide for their families. More so, food gardens contributed much to poverty reduction and alleviation. The findings also revealed that 82.2% of the participants, which translate to 8 in every 10 people, thought that every household should have food gardens because they promote avenues for self-employment, self-reliance, and poverty reduction. The participants further reported that food gardens played major roles in community development, reducing and alleviating poverty as they highlighted that food gardens are an important source of money through income generation created from revenue inflows from selling surplus produces. The research findings also revealed that some of the participants were into food gardening just because of passion.

Although the study revealed the benefits of home gardens in ensuring food security, it also revealed major constraints to the productivity and sustainability of the food gardens. The participants of this study indicated that they were having challenges that imposed limitations on food production. Constraints such as lack of access to adequate land to establish a home garden along with lack of access to water, seeds and planting materials, lack of skills and knowledge on how to sustain their gardens, lack of access to the market as well as weak extension and advisory services were exposed in this study. However, it was important to realise that the food gardeners also had strategies to deal with their challenges. Strategies such as crop rotation, water-harvesting technologies, mixing crops and intercropping, farmer collaboration as well as food preservation were employed to ensure sustainable year-round availability of food from the gardens. Through practicing those strategies, participants were able to sustain their gardens and continued to provide food for their households.

13.4. Implications of the findings

The findings of this study can have wide implications with regards to directing agricultural policy formulation and the design and implementation of support programmes aimed at improving the role and contribution of food gardens in terms of (1) improving availability and accessibility to food at household level; (2) improved utilisation and stability of garden products in terms of ensuring proper use, processing and storage of food gardens' produces and; (3) creation of long-lasting and working solutions for addressing the challenges commonly faced by food gardeners.

The results from the analysis of data from this study provide the researcher with an opportunity to learn on the main types of food gardens in Thulamela municipality. For instance, the study reported that home/backyard garden, small patch of homestead land and field are the three main types of food gardens for Thulamela municipality residents. This finding can be used when designing support programmes for food gardeners or any other programme aimed at motivating potential food gardeners who may think they have inadequate land for them to start food gardening projects to actually engage into food gardening since there is evidence of people who are making it at the backyards of their houses.

Further, the study results have important implications in the design and implementation of programmes for ensuring the availability and accessibility of food both at household and community level. For instance, a revelation made by this study that some of the strategies used by food gardeners to ensure all-year round availability of food, presents valuable pieces of information which if shared appropriately with the community will facilitate the development of capacity building programmes (CBPs) for food gardeners. The successful implementation and delivery of such CBPs are important in terms of equipping food gardeners with the skills and knowledge required for running sustainable food gardens.

More so, the results of this study are also important with respect to one of the objective of this study, which relates to how households utilised food garden produces. For instance, the revelation that 86.9%, which is nearly 9 out of 10 households, cooked and served vegetables to household members shows the importance of having food gardens towards achieving food security. Another important implication of the findings relates to the role that the results can play in proffering solutions to some of the challenges that were identified by this study. One of the major achievements of this study was its ability to reveal the challenges that were faced by food gardeners. For instance, the study revealed that lack of water, fertiliser, equipment,

skills and knowledge are the top five challenges faced by food gardeners. If these challenges could be properly addressed, food gardeners would run sustainable and profitable food gardens. Thus, through the results of this study, a realisation was made as to what efforts should be made by responsible persons and institutions to ensure that food gardeners are sufficiently provided with the necessary resources to ensure their sustainability.

Home gardens' contribution to income generation, improved livelihoods as well as promoting entrepreneurship and community development that has been depicted in this study shed light to the kind of community based programmes that should be initiated that aims to uplift people's livelihoods and self-reliance. It is acclaimed that the strategies for sustainable year round availability of food gardens portrayed in this study be upheld everywhere when food gardeners are provided with support and extension advices.

13.5. Recommendations of the study

Findings of this study will be useful to government and non-governmental bodies involved in promoting food security in Thulamela municipality especially in the rural households as well as the province and the country at large. Recommendations that would help to improve the food security status and wellbeing of households are made in this study as follows.

a. Lack of land and water are challenges that hindered food gardening in the study area. Hence making land and water accessible could serve as an important incentive for food production. Through the results of this study, it is recommended that efforts should be made by responsible authorities to ensure that food gardeners are sufficiently provided with resources such as land and water. Having land for food production and water for irrigation will ensure that households will have food for consumption and thus ensuring household food security. Households could also generate income from the sales of own production and thus improve their livelihoods and their communities.

b. The level of education in the study area was low. The results showed that participants who had an education level lower than Grade 12 were more than those who had attained Grade 12 and higher. This might imply that the majority of the participants might not have a better chance to receive, understand and practice new information on food gardening. Hence it is recommended that

development efforts should be directed at providing equal access to affordable and quality education and training opportunities for both males and females in the study area.

c. The results revealed that food gardeners considered the role of food gardens differently depending upon, where they would have acquired their knowledge of food gardening, their education level, their age and experience in food gardening. These findings are understood to suggest that different intervention programmes that target food gardeners should take into consideration their qualification level, institution where they learned food gardening, the age group and their associated level of experience in food gardening. It is therefore recommended that government support initiatives to educate potential food gardeners about the roles and contributions of food gardens and government policies to support the development of food gardeners should be informed by the education, institute of learning age group and the experience in food gardening of food gardeners in order for them to yield better results.

d. The findings revealed that although the majority of the participants were not actually utilising indigenous vegetables, these vegetables can contribute to household food security by ensuring food availability. It was also revealed in this study that indigenous vegetables do not need much processes of maintaining. Thus, efforts aimed at promoting the consumption of indigenous food must also seek to ensure that the food remain in consistent supply for households to use them as much, while also developing methods of farming for ensuring that such food products can be easily grown.

e. It is also recommended in this study that the education system should also include indigenous knowledge systems which contributed to the food security of the households over the years. The education policy should be designed in such a way that food security aspects are part of the curriculum for learning.

f. The results of this study indicated that there is a need to increase participation in food gardening through the agricultural extension services. The government can provide extension officers to assist households in maintaining their home gardens more successfully. More relevant agricultural extension programmes that places households at the center of the development process should be promoted. Capacity building workshops are also recommended to train and equip the food gardeners

with the right skills and knowledge to ensure food gardens are run efficiently, effectively and sustainably.

g. Food gardening can generate income for the household. It is recommended in this study that household income can be improved by providing skills development programmes for households on how they can strengthen their productivity and go commercial and on how they can approach the market industry in order to generate income from their home gardening produces.

h. The government and non-governmental organisations should recognise the value and potential of food gardens in contributing to household food security and livelihoods and provide support such advisory services, access to new technologies as well as funding for rainwater harvesting systems for home gardens in order to enhance their productivity.

i. The developed framework for this study emphasised a link between food gardening and food security components such as availability, accessibility, utilisation and stability, and eventually income generation and community development. The framework also identifies challenges to food gardening and seek out matching solutions that would promote increased access to food and ensure food availability, utilisation and stability. Therefore, it is recommended that efforts to improve household food security should take into consideration the challenges that food gardeners are faced with. It is further recommended that government policies and agricultural extension services aimed to improve the productivity of food gardening should take into consideration the solutions that seem to have helped the food gardeners in this study to improve their food production to ensure sustainable household food security. Furthermore, it is recommended that the link between food gardening and food security should be further investigated and promoted in addressing the challenges to food security.

13.6. Future research

Despite a fair amount of research in the area of investigating the role and contribution of food gardens, comparatively little rigorous research has been undertaken in aspects relating to socio-economic contributions of food gardens of Thulamela municipality residents. To remedy the existing shortage of studies and researchers, the following areas are suggested to be investigated:

a. Studies that are aimed at gathering more empirical evidence on the value and importance of food gardens for the other districts in Limpopo since the structure, functions and contributions of food gardens can differ according to geographical locations.

b. Research studies directed at carrying out a cost-benefit analysis of food gardens to determine economic value to households and communities at large and derive viable economic models are also suggested.

c. The research results showed that the respondents have practiced different strategies to sustain their gardens and continued to produce food in their gardens for sales and consumption. Therefore, further research is required on how households ensure sustainable solutions to food security through practicing the food gardening strategies.

d. One of the objectives of this study was to develop a framework based on the results of the study. Therefore, a framework has been developed (Figure 8.3) which needs further research to test its reliability and validity.

13.7. Conclusion

The chapter has provided a concise summary of conclusions that could be made based on the findings of the study along with possible recommendations that are also based on the findings of the study. Based on the concluding remarks, the findings of this study confirm that though there might be challenges to food gardening, a well-designed food garden can be a good strategy to significantly increase the availability of and stable access to food for utilisation at household level. This study provides evidence that income generation through the sales of the garden produces can curb households' financial constraints. It has been demonstrated in this study that food gardening improved the financial status of the household and thus contributed to food availability and accessibility. It can therefore be concluded that food gardening is positively associated with food security. However, it was noted in this study that the issue of resources availability, gardening inputs, lack of proper knowledge and extension services on gardening has hindered the sustainability of some food gardens, and it requires immediate intervention. Through the results of this study it can be concluded that making use of home gardens can promote great improvement in food production and enhance food security. Yet it is strongly suggested in this study that follow-up research endeavours that addresses the sustainability of food gardens be undertaken.

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LIST OF ADDENDA

ADDENDUM A: RESULTS OBTAINED FROM CROSS-TAB ANALYSIS AND TESTS FOR ASSOCIATION

Variables		Does the food garden provide vegetables for the whole year? (Stability)	Do food gardens provide food for the whole year? (Availability)	Does the garden provide enough food for consumption all year-round? (Utilisation)	Does your garden provide food for the household? (Accessibility)
What is your age in years? Please indicate your date of birth	**Value**	21.359 [a]	18.532 [a]	40.754 [a]	12.957
	Df	8	4	8	8
	p-value	.006	.001	.000	.113
Please indicate your gender	**Value**	1.380 [a]	2.909 [a]	3.871 [a]	3.598
	Df	2	1	2	2
	p-value	.502	.088	.144	.166
What is your highest educational level?	**Value**	35.726 [a]	7.900 [a]	34.244 [a]	15.148
	Df	10	5	10	10
	p-value	.000	.162	.000	.127
Where did you learn how to do food gardening	**Value**	61.622 [a]	19.167 [a]	77.088 [a]	16.597
	Df	10	5	10	10
	p-value	.000	.002	.000	.084
Indicate the number of years you have been doing gardening	**Value**	49. 598 [a]	16.077 [a]	37.003 [a]	6.073
	Df	8	4	8	8
	p-value	.000	003	.000	.639

Do you have a food garden?	**Value**	5.397 [a]	.398	1.102[a]	.069
	Df	2	1	2	2
	p-value	.067	.528	.576	.966
If yes what is the reason for having a food garden?	**Value**	83.225	58.280	85.615	22.731
	Df	20	10	20	20
	p-value	.000	.000	.000	.302
What type of food is grown in the garden? Please name them	**Value**	39.610 [a]	35.909	32.465	14.348
	Df	14	7	14	14
	p-value	.000	.000	.003	.424
Does food garden enhance household food availability?	**Value**	33.617 [a]	19.152 [a]	35.153 [a]	5.434
	Df	2	1	2	2
	p-value	.000	.000	.000	.066
Do you think every household should have food gardens?	**Value**	28.324 [a]	10.360 [a]	24.764 [a]	5.180
	Df	2	1	2	2
	p-value	.000	001	.000	.075
If yes why do you think it's important for households to have food gardens?	**Value**	89.539 [a]	53.181	81.431	32.408
	Df	18	9	18	18
	p-value	.000	.000	.000	.020
At which time of the year do you grow food in the garden?	**Value**	65.215 [a]	57.105	38.773	9.477
	Df	4	2	4	4
	p-value	.000	.000	.000	.050
What type of food do you grow during that time	**Value**	45.376 [a]	27.891	40.955	25.801
	Df	22	11	22	22
	p-value	.002	.003	.008	.260
How do you get the food that you eat everyday?	**Value**	6,789 [a]	.067 [a]	6.577	2.159
	Df	4	2	4	4
	p-value	.147	.967	.160	.707
Which food do you often buy?	**Value**	11.187 [a]	10.347	15.293	15.361
	Df	22	11	22	22
	p-value	.972	.499	.849	.846
Which food do you get from	**Value**	75.161 [a]	27.758	72.176	22.922

your garden	**Df**	30	15	30	30
	p-value	.000	023	.000	.818
Which food from the garden do you commonly eat?	**Value**	55.932 [a]	20.194	51.063	13.451
	Df	26	13	26	26
	p-value	.001	.090	.002	.980
Why do you like to eat these foods?	**Value**	3.217 [a]	4.976 [a]	9.416 [a]	1.365
	Df	4	2	4	4
	p-value	.522	.083	.051	.850
Name the vegetables that you least eat	**Value**	82.236 [a]	61.933	57.393	39.741
	Df	26	13	26	26
	p-value	.000	.000	.000	.041
What is the reason for not eating these vegetables all the time?	**Value**	44.647 [a]	33.987	33.424 [a]	19.413
	Df	8	4	8	8
	p-value	.000	.000	.000	.013
Can food gardens enhance household access to better diets?	**Value**	12.283 [a]	3.092 [a]	13.917	9.024
	Df	4	2	4	4
	p-value	.015	.213	.008	.061
Are vegetables cooked and served for household members	**Value**	6.091 [a]	9.469	5.646	10.466
	Df	4	2	4	4
	p-value	.192	.009	.227	.033
How often are vegetables prepared and served to members of the family?	**Value**	43.732 [a]	11.364	42.104	15.493
	Df	8	4	8	8
	p-value	.000	.023	.000	.050
From where does the household get these vegetables?	**Value**	31.643 [a]	1.914 [a]	7.889 [a]	8.150
	Df	4	2	4	4
	p-value	.000	384	.095	.086
Do household members like to eat these foods?	**Value**	11.793 [a]	7.107	12.980	10.491
	Df	4	2	4	4
	p-value	.019	.029	.011	.033
Are there any indigenous foods that are served to family	**Value**	37.652 [a]	22.937 [a]	47.148 [a]	7.084
	Df	4	2	4	4

members?	**p-value**	.000	.000	.000	.132
What do you do with the surplus of garden products?	**Value**	49.545 [a]	22.707 [a]	57.927 [a]	6.295
	Df	6	3	6	6
	p-value	.000	.000	.000	.391
What benefits does food gardens have on your daily diet? Please explain	**Value**	31,399 [a]	5.371 [a]	36.756 [a]	6.879
	Df	8	4	8	8
	p-value	.000	.251	.000	.550
What role does food gardening play to household Food security? Please explain.	**Value**	17.498 [a]	4.406 [a]	21.073 [a]	13.571
	Df	8	4	8	8
	p-value	.025	.354	.007	.094
How often do you eat food from your own garden?	**Value**	55.788 [a]	9.257 [a]	41.194 [a]	12.069
	Df	8	4	8	8
	p-value	.000	.055	.000	.148
How do you manage to have food in the garden all year round? Please explain	**Value**	207.753 [a]	74.053	111.647	25.394
	Df	16	8	16	16
	p-value	.000	.000	.000	.063
Food gardens can be a source of additional income to the household	**Value**	71.034 [a]	61.238 [a]	23.197	13.565
	Df	2	1	2	2
	p-value	.000	.000	.000	.001
How can food gardens be a source of income (explain)	**Value**	98.625 [a]	50.122	59.733	13.784
	Df	12	6	12	12
	p-value	.000	.000	.000	.315
Do you sell some of your food from your garden?	**Value**	37.585 [a]	23.898 [a]	10.787	914
	Df	2	1	2	2
	p-value	.000	.000	.005	.633
How often do you sell vegetables?	**Value**	52.683 [a]	30.289 [a]	69.542 [a]	11.840
	Df	8	4	8	8
	p-value	.000	.000	.000	.158
Can selling garden produce help to limit household financial constraints?	**Value**	72.203 [a]	59.309 [a]	37.307 [a]	.352
	Df	2	1	2	2
	p-value	.000	.000	.000	.839

Elaborate how home gardens can limit household financial constraints	**Value**	74.902 [a]	37.238	47.754	13.414
	Df	12	6	12	12
	p-value	.000	.000	.000	.340
Home gardens can increase the purchasing power of households	**Value**	20.620 [a]	4.428 [a]	25.545 [a]	17.130
	Df	4	2	4	4
	p-value	.000	.109	.000	.002
Food gardens can help to develop the community	**Value**	11.363 [a]	2.664	9.301	.515
	Df	4	2	4	4
	p-value	.023	.264	.054	.972
Explain how food gardens can develop the community	**Value**	75.741 [a]	46.019 [a]	49.451 [a]	16.675
	Df	8	4	8	8
	p-value	.000	.000	.000	.034
Food gardens can reduce poverty	**Value**	7.676 [a]	2.420 [a]	.344 [a]	.313
	Df	2	1	2	2
	p-value	.022	.120	.842	.855
If yes please explain how	**Value**	58.057 [a]	43.175 [a]	69.159 [a]	18.243
	Df	12	6	12	12
	p-value	.000	.000	.000	.109
Can food gardens create employment?	**Value**	21.676 [a]	9.728	11.876	.321
	Df	4	2	4	4
	p-value	.000	.008	.018	.988
Food gardens support self-empowerment and self-reliance	**Value**	2,117 [a]	.008	2.031	.418
	Df	2	1	2	2
	p-value	.347	.930	362	.812
If Yes, please explain how	**Value**	12.078 [a]	5.910	20.879	18.038
	Df	10	5	10	10
	p-value	.280	.315	.022	.054
If No, explain why not	**Value**	2.340 [a]	2.001	.166	.348
	Df	2	1	2	2
	p-value	.310	.157	.920	.840
How can food gardens	**Value**	32.015 [a]	14.125 [a]	26.586 [a]	17.375

contribute to economic growth	**Df**	8	4	8	8
	p-value	.000	.007	.001	.026
Are there any challenge that limit your production	**Value**	.902 [a]	.067 [a]	2.750	.488
	Df	2	1	2	2
	p-value	.637	.796	.253	783
What challenges are you faced with? Please elaborate…	**Value**	105.305	41.190	48.360	15.041
	Df	18	9	18	18
	p-value	.000	.000	.000	.659
Which of the following constraints affect you as food gardeners?	**Value**	180.488	57.311	158.799	50.994
	Df	54	27	54	54
	p-value	.000	.001	.000	.591
How do you deal with these challenges? Please explain	**Value**	83.665	22.352	74.718	47.854
	Df	26	13	26	26
	p-value	.000	.050	.000	.006
If no, please explain why is that so	**Value**	114.355 [a]	197.559 [a]	54.606	31.040
	Df	6	3	6	6
	p-value	.000	.000	.000	000
What strategies do you use to ensure year-round availability of food gardens?	**Value**	102.280 [a]	75.691 [a]	76.988 [a]	27.399
	Df	14	7	14	14
	p-value	.000	.000	.000	.017
Do you receive any form of support as gardeners?	**Value**	28.236 [a]	.202	3.424 [a]	1.852
	Df	2	1	2	2
	p-value	.000	.653	.180	.396
If yes, what form of support do you receive? Please elaborate	**Value**	35.943	9.469	42.596	4.481
	Df	10	5	10	10
	p-value	.000	.092	.000	.923
As gardeners do you work together and share ideas on gardening activities?	**Value**	23.261 [a]	2.061	3.958 [a]	1.978
	Df	2	1	2	2
	p-value	.000	151	.138	.372
If yes what are the ideas that you share? Please elaborate	**Value**	52.509	14.643	12.876	18.203
	Df	16	8	16	16

	p-value	.000	.066	.682	.312
Do you mix modern gardening with traditional gardening activities?	**Value**	38.864 [a]	3.613	19.777 [a]	1.859
	Df	2	1	2	2
	p-value	.000	057	.000	.395
If yes, please elaborate	**Value**	14.329 [a]	.789	4.767	2.742
	Df	4	2	4	4
	p-value	.006	.674	.312	.602
Do you cultivate any indigenous plants in the gardens?	**Value**	43.724 [a]	7.888 [a]	10.444 [a]	6.693
	Df	2	1	2	2
	p-value	.000	.005	.005	.035
If yes, please specify	**Value**	85.770 [a]	15.414	25.503	7.152
	Df	8	4	8	8
	p-value	.000	.004	001	.520

ADDENDUM B: FREQUENCY OF EATING THE VEGETABLES

Eating Frequency	Cabbage	spinach	carrots	Chinese cabbage	African night shade	Amaranth	Delele	Beetroot	tomatoes	sweet potatoes	green beans	butternuts	pumpkin	pumpkin leaves	dried beans	maize	pawpaw	avocado	blackjack	onion
1D	66 (17, 23)	31 (8,0 9)	24 (6,2 7)	184 (48, 04)	90 (23, 5)	158 (41, 25)	92 (24, 02)	37 (9,6 6)	10 (2,6 1)	31 (8,0 9)	119 (31, 07)	84 (21, 93)	89 (23, 24)	70 (18, 28)	104 (27, 15)	12 (3,1 3)	65 (16, 97)	59 (15, 4)	194 (50, 65)	9 (2,3 5)
1I	2 (0,5 2)	-	1 (0,2 6)	11 (2,8 7)	7 (1,8 3)	9 (2,3 5)	7 (1,8 3)	4 (1,0 4)	4 (1,0 4)	2 (0,5 2)	11 (2,8 7)	6 (1,5 7)	5 (1,3 1)	6 (1,5 7)	12 (3,1 3)	6 (1,5 7)	7 (1,8 3)	4 (1,0 4)	17 (4,4 4)	5 (1,3 1)
2D	37 (9,6 6)	41 (10, 7)	16 (4,1 8)	13 (3,3 9)	37 (9,6 6)	50 (13, 05)	84 (21, 93)	19 (4,9 6)	4 (1,0 4)	52 (13, 58)	70 (18, 28)	57 (14, 88)	77 (20, 1)	56 (14, 62)	49 (12, 79)	9 (2,3 5)	91 (23, 76)	76 (19, 84)	46 (12, 01)	7 (1,8 3)
2I	9 (2,3 5)	7 (1,8 3)	2 (0,5 2)	2 (0,5 2)	3 (0,7 8)	6 (1,5 7)	9 (2,3 5)	3 (0,7 8)	2 (0,5 2)	13 (3,3 9)	12 (3,1 3)	15 (3,9 2)	23 (6,0 1)	11 (2,8 7)	12 (3,1 3)	10 (2,6 1)	17 (4,4 4)	9 (2,3 5)	2 (0,5 2)	4 (1,0 4)
3D	61 (15, 93)	52 (13, 58)	29 (7,5 7)	47 (12, 27)	94 (24, 54)	48 (12, 53)	38 (9,9 2)	46 (12, 01)	8 (2,0 9)	90 (23, 5)	51 (13, 32)	60 (15, 67)	55 (14, 36)	48 (12, 53)	75 (19, 58)	13 (3,3 9)	69 (18, 02)	57 (14, 88)	36 (9,4)	4 (1,0 4)
3I	30 (7,8 3)	50 (13, 05)	22 (5,7 4)	11 (2,8 7)	25 (6,5 3)	31 (8,0 9)	37 (9,6 6)	31 (8,0 9)	12 (3,1 3)	57 (14, 88)	46 (12, 01)	34 (8,8 8)	37 (9,6 6)	21 (5,4 8)	29 (7,5 7)	14 (3,6 6)	16 (4,1 8)	25 (6,5 3)	28 (7,3 1)	4 (1,0 4)
4D	44 (11, 49)	35 (9,1 4)	27 (7,0 5)	21 (5,4 8)	19 (4,9 6)	14 (3,6 6)	16 (4,1 8)	27 (7,0 5)	5 (1,3 1)	25 (6,5 3)	12 (3,1 3)	19 (4,9 6)	23 (6,0 1)	29 (7,5 7)	14 (3,6 6)	11 (2,8 7)	15 (3,9 2)	17 (4,4 4)	14 (3,6 6)	3 (0,7 8)
4I	41 (10, 7)	34 (8,8 8)	61 (15, 93)	13 (3,3 9)	29 (7,5 7)	43 (11, 23)	45 (11, 75)	52 (13, 58)	13 (3,3 9)	42 (10, 97)	25 (6,5 3)	39 (10, 18)	25 (6,5 3)	69 (18, 02)	39 (10, 18)	46 (12, 01)	20 (5,2 2)	20 (5,2 2)	15 (3,9 2)	15 (3,9 2)
5D	4 (1,0 4)	11 (2,8 7)	13 (3,3 9)	2 (0,5 2)	5 (1,3 1)	-	4 (1,0 4)	6 (1,5 7)	1 (0,2 6)	10 (2,6 1)	1 (0,2 6)	4 (1,0 4)	3 (0,7 8)	4 (1,0 4)	7 (1,8 3)	5 (1,3 1)	2 (0,5 2)	7 (1,8 3)	2 (0,5 2)	2 (0,5 2)
5I	81 (21, 15)	72 (18, 8)	64 (16, 71)	31 (8,0 9)	24 (6,2 7)	19 (4,9 6)	30 (7,8 3)	61 (15, 93)	24 (6,2 7)	18 (4,7)	21 (5,4 8)	18 (4,7)	23 (6,0 1)	40 (10, 44)	18 (4,7)	44 (11, 49)	28 (7,3 1)	18 (4,7)	12 (3,1 3)	19 (4,9 6)

6D	-	-	-	1 (0,26)	2 (0,52)	-	1 (0,26)	4 (1,04)	6 (1,57)	3 (0,78)	2 (0,52)	2 (0,52)	1 (0,26)	3 (0,78)	3 (0,78)	2 (0,52)	6 (1,57)	4 (1,04)	3 (0,78)	11 (2,87)
6I	15 (3,92)	15 (3,92)	59 (15,4)	8 (2,09)	5 (1,31)	2 (0,52)	12 (3,13)	33 (8,62)	131 (34,2)	17 (4,44)	5 (1,31)	27 (7,05)	10 (2,61)	21 (5,48)	13 (3,39)	23 (6,01)	14 (3,66)	17 (4,44)	4 (1,04)	117 (30,55)
7D	-	-	-	-	1 (0,26)	1 (0,26)	-	2 (0,52)	4 (1,04)	-	-	4 (1,04)	-	-	1 (0,26)	2 (0,52)	1 (0,26)	1 (0,26)	-	10 (2,61)
7I	21 (5,48)	21 (5,48)	35 (9,14)	9 (2,35)	10 (2,61)	-	7 (1,83)	41 (10,7)	34 (8,88)	10 (2,61)	3 (0,78)	11 (2,87)	7 (1,83)	4 (1,04)	2 (0,52)	27 (7,05)	14 (3,66)	20 (5,22)	4 (1,04)	46 (12,01)
8D	-	-	-	-	-	-	-	2 (0,52)	4 (1,04)	1 (0,26)	-	1 (0,26)	1 (0,26)	-	-	10 (2,61)	-	2 (0,52)	1 (0,26)	1 (0,26)
8I	14 (3,66)	14 (3,66)	27 (7,05)	21 (5,48)	22 (5,74)	1 (0,26)	-	11 (2,87)	56 (14,62)	6 (1,57)	5 (1,31)	1 (0,26)	2 (0,52)	-	4 (1,04)	93 (24,28)	11 (2,87)	34 (8,88)	4 (1,04)	82 (21,41)
9D	-	-	-	-	1 (0,26)	-	-	-	-	-	-	-	-	-	-	5 (1,31)	1 (0,26)	1 (0,26)	-	1 (0,26)
9I	-	-	3 (0,78)	9 (2,35)	9 (2,35)	1 (0,26)	-	4 (1,04)	32 (8,36)	3 (0,78)	-	1 (0,26)	-	-	-	28 (7,31)	3 (0,78)	12 (3,13)	1 (0,26)	23 (6,01)
10D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4 (1,04)	-	-	-	1 (0,26)
10I	-	-	-	-	-	-	1 (0,26)	-	33 (8,62)	3 (0,78)	-	-	2 (0,52)	1 (0,26)	1 (0,26)	19 (4,96)	3 (0,78)	-	-	19 (4,96)
Total	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)	383 (100)

ADDENDUM C: DATA COLLECTION INSTRUMENTS

C1. Observation sheet

To be observed				Season	
1. Food gardens **1.1. Type of food Garden**	**YES**	**NO**	**Other information (specify)**	**Summer**	**Winter**
- Home/backyard garden - Small patch of homestead land - Combined garden - Compound garden - Farmyard - Schoolyard - Road-side - Field - Edges of field					
1.2. Available and accessible garden products					
- Spinach - Sweet potatoes - Butternut - Carrots - Mango trees - Pawpaw trees - Chinese Cabbage - African night shade - Maize - Beans - Tomatoes - Cabbage - Pumpkin - Pumpkin leaves - Delele - Vowa (Amaranth) - Mushidzhi (Black Jack) - Muxe (African nightshade) - Beetroot - Avocadoes - Onions					
1.3. Utilisation garden products					
- Harvesting for use at home - Harvesting for sales - Harvesting for preservation future use - Harvesting for seeds keeping - Harvesting to exchange for other food or commodities with neighbours					
1.4. Challenges to food gardens					
- Land scarcity - Lack of resource such as:					

* garden tools * Water * Manure or fertilizers * Skills * Planting seeds - Livestock harvesting their products - Fencing problems - Lack of knowledge - Irrigation problem					
1.5. Income generation and Community development					
- Harvesting for selling - Selling surpluses - Selling preserved vegetables - Not buying vegetables - Supplying institutions - Supplying local community - Cultivating large portion of land - Self employed					
1.6. Strategies for sustainable year round availability of food gardens					
- Partnership with other gardeners - Mix cropping - Water saving and harvesting technologies					

C2. Questionnaire

FOR OFFICE USE

An investigation on the role of food gardens to food security and community development in Thulamela municipality

Date of Interview		V1
Respondent Number		V2

Part A: General Information

A.1 Background information on the gardeners

1. What is your age in years? Please indicate your date of birth?

D	M	Y	
			V3

2. Please indicate your gender?

Male	1	
Female	2	V4

3. What is your highest educational level?

No formal education	1	V5
Grade 1-7	2	
Grade 8-11	3	
GRADE 12	4	
Other: Specify……	5	

4. Where did you learn how to do food gardening

At secondary school	1	V6
Trained by the department of Agriculture	2	V7
Trained by the extension worker	3	V8
Learned from other gardeners	4	V9
Other, specify	5	V10

……	

5. Indicate the number of years you have been doing gardening

V11

PART B

B.1 The role of food gardens to food security

1. Do you have a food garden?

Yes	1
No	2

V12
V13

2. If yes what is the reason for having a food garden?

……

……

3. What type of food is grown in the garden? Please name them

……

……

AVAILABILITY

4. Does food garden enhance household food availability

Yes	1
No	2
Don't know	3

V14
V15
V16

5. Do you think every household should have food gardens

Yes	1
No	2

V17
V18

6. If yes why do you think it's important for households to have food gardens?

……

……

7. At which time of the year do you grow food in the garden

In summer	1
In winter	2
Summer and winter	3

V19
V20
V21

8. What type of food do you grow during that time

……

……

ACCESSES

9. How do you get the food that you eat everyday

Buy	1
From home garden	2
Buy & home garden	3

V22
V23
V24

10. Which food do you often buy

……

……

11. Which food do you get from your garden

……

……

12. Does the garden provide enough food all year- round?

Yes	1
No	2
Sometimes	3

V25
V26
V27

13. Can food gardens enhance household access to better diets

Yes	1
No	2
Don't know	3

V28
V29
V30

UTILISATION

14. Are vegetables cooked and served for household members

Yes	1
Sometimes	2
Never	3

V31
V32
V33

15. How often are vegetables prepared and served to members of the family?

Once per week	1
Twice per week	2
3 x per week	3
4x per week	4
Other: Specify ……	5

V34
V35
V36
V37
V38

16. From where does the household get these vegetables?

Buy	1
From home garden	2
Buy & home garden	3

V39
V40
V41

17. Which food from the garden do you commonly eat?

……
……

18. Why do you like to eat these foods

Easy to grow	1
Can be grown in all seasons	2
Other: Specify……..	3

V42
V43
V44

19. Name the vegetables that you least eat

.....
.....

20. What is the reason for not eating these vegetables all the time?

……

……

21. How often do you eat food from your own garden?

Once per week	1
Twice per week	2
3 x per week	3
4 x per week	4
Every day of the week	5

V45
V46
V47
V48
V49

22. Do household members like to eat these food?

Yes	1
Sometimes	2
Never	3

V50
V51
V52

23. Are there any indigenous foods that are served to family members?

Yes	1
Sometimes	2
Never	3

V53
V54
V55

24. If yes please specify……

……

25. What do you do with the surplus of garden products?

Sell	1
Cook and dry for future use	2
No surplus	3
Other: Specify. ……	4

V56
V57
V58
V59

26. What benefits does food gardens have on your daily diet? Please explain

……

……

27. What role does food gardening play to household Food security? Please explain.

……
……

STABILITY OF FOOD GARDENS

28. Does your garden provide food for the household?

Yes	1
No	2
Sometimes	3

V60
V61
V62

29. Does the food garden provide vegetables for the whole year?

Yes	1
No	2
Sometimes	3

V63
V64
V65

30. How do you manage to have food in the garden all year round? Please explain…

……
……

B.2. Contribution of food gardens to household income

1. Food gardens can be a source of additional income to the household

Yes	1
No	2

V66
V67

2. How can food gardens be a source of income (explain)

……
……

3. Do you sell some of your food from your garden?

Yes	1
No	2

V68
V69

4. How often do you sell vegetables

Once per week	1
Twice per week	2
3 x per week	3
4 x per week	4
Every day of the week	5

V70
V71
V72
V73
V74

5. Can selling garden produce help to limit household financial constraints?

Yes	1
No	2

V75
V76

6. Elaborate how home gardens can limit household financial constraints…

……
……

7. Home gardens can increase the purchasing power of households

Yes	1
No	2
Sometimes	3

V77
V78
V79

B.3. Contribution of food garden to community development

1. Food gardens can help to develop the community

Yes	1
No	2
Sometimes	3

V80
V81
V82

2. Explain how can food gardens develop the community

……
……

3. Food gardens can reduce poverty

Yes	1
No	2

V83
V84

4. If yes please explain how

……

……

5. Can food gardens create employment?

Yes	1
No	2
Sometimes	3

V85
V86
V87

6. Food gardens support self-empowerment and self-reliance

Yes	1
No	2

V88
V89

7. If Yes, please explain how

……

……

8. If No, explain why not

……

……

9. How can food gardens contribute to economic growth

……

……

B.4. Challenges to food gardens

1. Are there any challenge that limit your production

Yes	1
No	2

V90
V91

2. What challenges are you faced with? Please elaborate…

……
……

3. Which of the following constraints affect you as food gardeners?

Lack seeds	1	V92
Lack of equipment	2	V93
Lack of water	3	V94
Lack of land	4	V95
Lack of gardening skills	5	V96
Poor insect and pest control	6	V97
Other (specify)	7	

4. How do you deal with these challenges? Please explain…

……
……

B.5. Strategies for sustainable year round availability of food gardens

1. Do food gardens provide food for the whole year?

Yes	1	V98
No	2	V99

2. If no, please explain why is that so

……
……

3. What strategies do you use to ensure year-round availability of food gardens?

……
……

4. Do you receive any form of support as gardeners?

Yes	1	V100
No	2	V101

5. If yes, what form of support do you receive? Please elaborate

……
……

6. As gardeners do you work together and share ideas on gardening activities?

Yes	1

No	2

V102
V103

7. If yes what are the ideas that you share? Please elaborate

……

……

8. Do you mix modern gardening with traditional gardening activities?

Yes	1
No	2

V104
V105

9. If yes, please elaborate

10. Do you cultivate any indigenous plants in the gardens?

Yes	1
No	2

V106
V107

11. If yes, please specify

……

……

C3. Focus group checklist

NAME OF FOCUS GROUP:	
QUESTIONS:	**RESPONSES:**
What is the main source of food for the households?	
What ways do household use to access food on a daily basis?	
Does every household have a food garden? If no why not?	
If yes where is this garden situated?	
What is the main reason for having a food?	
Which foods are grown at home gardens and when are they grown?	
How often does household consume food from their own gardens?	
Do the gardens provide food all year-round? If no Explain Why	
If no which are the times when food availability is limited?	
What can be done to ensure stability of the food gardens?	
Can food gardens increase household food access? Elaborate	
Are foods from the gardens helping to support household dietary needs?	
Do these gardens produce enough food for everyday consumption?	
What strategies are used to ensure all year-round food availability?	
Can food gardens contribute to food security at household level?	
Are households producing enough to eat and sell?	
Which food do they sell and are they making any profit?	
Can food gardens play a meaningful role in household income?	
Can food gardens contribute to community development?	
What challenges are households faced with regarding food gardening?	
How can the challenges to food gardening be addressed?	
Are food gardeners getting any help of some sort?	
If yes who provide such help	

C4. 24 hour food recall questionnaire

Here you will be asked about the types of food that you or anyone in your household ate yesterday during the day and the night. Please list all the food that was eaten in the last 24 hours.

Time Consumed	**Foods consumed**	**Place where food was consumed**
Breakfast		
Snack		
Lunch		
Snack		
Dinner		
Snack		
Super		
Snack		

C5. Non-quantitative food frequency questionnaire

For each food listed, please **tick (✓)** the box indicating how often on average you have used the specified food during the last month. If the intake of a particular food has increased or decreased during the past six months, indicate this in the last columns by writing the letter **I** for increased or **D** for decreased intake of a particular food.

HOW OFTEN IN THE PAST MONTH DID YOU EAT THE FOLLOWING?	**Never**	**Less than once per month**	**1-3x per month**	**1 per week**	**2-4x per week**	**5-6x per week**	**1x per day**	**2-3x per day**	**4-5x per day**	**6+ per day**	**Increased/ Decreased**	***FOR OFFICE USE***
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**I / D**	**CODES**
A Cabbage												
B Spinach												
C Carrots												
D Chinese Cabbage												
E African night shade												
F Amaranth												
G Delele												
H Beetroot												
I Tomatoes												
J Sweet potatoes												
K Green beans												
L Butternut												
M Pumpkin												
N Pumpkin leaves												
O Dried Beans												
P Maize												
Q Pawpaw												
R Avocado												
S Blackjack												
T Onion												

ADDENDUM D: PARTICIPANT INFORMATION SHEET

Ethics clearance reference number:

Research permission reference number:

November 2016

Title: **AN INVESTIGATION ON THE ROLE OF FOOD GARDENS TO FOOD SECURITY AND COMMUNITY DEVELOPMENT IN THULAMELA MUNICIPALITY**

Dear Prospective Participant

My name is Pfanani Charlotte Kwinda and I am doing research with Dr M.R. Masekoameng my supervisor and Prof. F N. Mudau my co-supervisor in the Department of Agriculture and Animal Health towards a PhD degree at the University of South Africa. We are inviting you to participate in a study entitled **An investigation on the role of food gardens to food security and community development in Thulamela municipality**.

WHAT IS THE PURPOSE OF THE STUDY?

I am conducting this research to investigate the role of food gardens to food security and community development in Thulamela municipality, Limpopo Province in South Africa. This study is expected to collect important information that could be useful to the community as well as government and non-governmental organizations involved in promoting food security and development of communities. The findings of the study will help to develop a framework that will outline how food gardens can be linked to food security and the development of rural communities and expand the participation of the communities for sustainable community-driven food security programmes. The framework might benefit policy makers in encouraging and supporting food production activities in rural communities, thereby creating job opportunities and alleviating hunger.

WHY AM I BEING INVITED TO PARTICIPATE?

You are considered to be the suitable participant for this study since you are practically involved in running a vegetable production garden. I was permitted by the Limpopo Department of Agriculture and Rural Development, the Tribal Authority and civic associations, Thulamela Municipality, Provincial Department of Agriculture Research Directorate and the Department of Agriculture extension section to conduct this research. There are a total of 479 participants made of one individual from 383 different households and 96 others who will form different focus groups who will take part in this study.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

The study involves interview questionnaires which will include questions on the participant's characteristics as well as questions to measure the role of food gardens to food security (availability, accessibility, utilisation and stability); role of food gardens to household income; role of food gardens to community development; challenges to food gardening and strategies for year-round availability of food gardens. A food frequency questionnaire with a list of different foods will measure how frequently certain vegetables have been consumed. You will also be required to give a 24 hour food recall. All these activities will last between 35 and 45 minutes. For the focus groups a checklist with key question regarding food gardening and its role to food security and household income generation will be used. The researcher will also use audio/video taping to capture the focus group discussions. Focus group discussions will last for an hour. You will not be asked to provide your name or any form of identification and before participating in the study you will be required to sign the informed consent form.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participating in this study is voluntary and you are under no obligation to consent to participation. There is no penalty or loss of benefit for non-participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

The study will benefit the participants and the community at large through its recommendations and suggestions. Recommendations based on the research findings would be made available to different stakeholders such as households, extension workers, rural development practitioners, food security specialist, government and training institutions and non-governmental officials involved with food security for their consideration. The findings of the study will help to develop a framework that will outline how food gardens can be linked to food security and the development of rural communities and expand the participation of the communities for sustainable community-driven food security programmes. Therefore the benefits will be extended to the wider community.

The developed framework might benefit policy makers in that they can use it to encourage and support food production activities with reference to food gardens around rural communities, thereby alleviating hunger and creating job opportunities. Moreover the framework may include corrective measures for the challenges that will be identified in order to strengthen the good food gardening practices in future. I hope that the findings of this study will help the people to narrow the gap of food insecurity and hunger that still exist in our communities.

ARE THEIR ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

There are no foreseeable negative consequences or any physical risk for participating in the study. No sensitive or emotional questions will be asked and your participation in the study will not jeopardize your vegetable garden.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

You have the right to insist that your name will not be recorder anywhere and that no one, apart from the researcher and identified members of the research team, will know about your involvement in this research. Your name will not be recorded anywhere and no one will be able to connect you to the answers you give. Your answers will be given a code number or a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings.

Your answers may be reviewed by people responsible for making sure that research is done properly, including the transcriber, external coder, and members of the Research Ethics Review Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records. You are also informed that the anonymous data may be used for other purposes, such as a research report, journal articles and/or conference proceedings. Privacy will be protected in any publication of the information. The thesis will be submitted for publication; however individual participants will not be identifiable as only codes will be used.

A focus group is an organised discussion structured in a flexible way of between 6 and 12 participants. It is composed of homogeneous members of the target group and it provides the opportunity for all the respondents to participate and give their opinions. While every effort will be made by the researcher to ensure that you will not be connected to the information that you share during the focus group, I cannot guarantee that other participants in the focus group will treat information confidentially. I shall, however, encourage all participants to do so. For this reason I advise you not to disclose personally sensitive information in the focus group.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet in the Department of Agriculture and Animal Health at the University of South Africa in Florida Science Campus for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. Hard copies will be shredded and/or electronic copies will be permanently deleted from the hard drive of the computer through the use of a relevant software programme.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

Participation in this study is voluntary, therefore no form of remuneration will be offered for taking part in this study.

HAS THE STUDY RECEIVED ETHICS APPROVAL

This study has received written approval from the Research Ethics Review Committee of the College of Agriculture and Environmental Sciences, UNISA. A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact Mrs Pfanani Charlotte Kwinda on 0848118947 or at ckwinda@yahoo.com. The findings are accessible for a period of five years. Should you require any further information or want to contact the researcher about any aspect of this study, please contact Dr. Mosima Masekoameng, Tel: (011) 471 3102 fax (011) 471 2260 or e-mail at masekmr@unisa.ac.za

Should you have concerns about the way in which the research has been conducted, you may contact Dr. Mosima Masekoameng, Tel: (011) 471 3102 fax (011) 471 2260 or e-mail at masekmr@unisa.ac.za or Prof. F.N. Mudau on (011) 471 2949 or e-mail at mudaufn@unisa.ac.za. Contact the research ethics chairperson of the College of Agriculture and Environmental Sciences Ethics Committee, Prof. E.L. Kempen on (011) 471 2241 or email at kempeel@unisa.ac.za if you have any ethical concerns.

Thank you for taking time to read this information sheet and for participating in this study.

Thank you.

……..

Pfanani Charlotte Kwinda

ADDENDUM E: CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the <insert specific data collection method>.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname…… (please print)

Participant Signature……...Date……

Researcher's Name & Surname……(please print)

Researcher's signature……..Date……

ADDENDUM F: REQUEST FOR PERMISSION TO CONDUCT A RESEARCH

Enquiry: Kwinda P.C.
Contacts: 0848118947
: ckwinda@yahoo.com

P.O. Box 534
MAKONDE
0984
5 December 2016

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT AREAS UNDER YOUR TERRITORY

Title: **AN INVESTIGATION ON THE ROLE OF FOOD GARDENS TO FOOD SECURITY AND COMMUNITY DEVELOPMENT IN THULAMELA MUNICIPALITY**

Dear Sir/Madam

I Pfanani Charlotte Kwinda am doing a research with Dr M.R. Masekoameng my supervisor and Prof. F N. Mudau my co-supervisor in the Department of Agriculture and Animal Health towards a PhD degree at the University of South Africa. We are inviting you to participate in a study entitled **an investigation on the role of food gardens to food security and community development in Thulamela municipality**.

The aim of the study is to investigate the role of food gardens to household food security and development of communities in Thulamela municipality.

The study involves a sample of 479 participants comprised of 383 individuals from households in different Thulamela municipality areas who are practically involved in food gardening and 96 individuals who are members of focus groups. Data will be gathered from these participants using instruments such as interview questionnaires, food frequency questionnaire, 24 hour food recall, observations and focus group discussions. Participation in this study is voluntary and the participants will be required to sign the informed consent form. Confidentiality and anonymity will be ensured in the study by the researcher and the information will only be used for the stated purpose of the research.

The study will benefit the participants and the community at large through its recommendations and suggestions to government and non-governmental officials involved with food security to ensure sustainable community-driven food security programmes. This might help to encourage, support and strengthen food production activities particularly in rural communities, thereby creating job opportunities and alleviating hunger. I hope that the findings of this study will help the people to narrow the gap of food insecurity and hunger that still exist in our communities.

There are no foreseeable negative consequences or any potential risk for participating in the study. No sensitive or emotional questions will be asked and participation in the study will not jeopardize the existing vegetable garden.

The results of the study will be disseminated through a thank you letter to participants, research summary document, community meetings, workshops, seminars and conference presentations. The findings of the study will also be published in relevant journals, newsletters and the websites so that it will be accessible to many audiences. Recommendations based on the research findings would be made available to you for your consideration.

Yours sincerely

.....

Pfanani Charlotte Kwinda

ADDENDUM G: PERMISSION LETTERS TO CONDUCT A RESEARCH

Private Bag X5066
Thohoyandou
0950
Limpopo Province
Tel: 015 962 7500
Fax: 015 962 4020

THULAMELA MUNICIPALITY

Enquiries: Tshiila N.M

Tel: 015 962 7526

Date: 08/12/2016

TO WHOM IT MAY CONCERN

The above matter has reference

This letter serves to confirm that Pfananani Charlotte Kwinda has been given permission by Thulamela Municipality to conduct research on THE ROLE OF FOOD GARDENS TO FOOD SECURITY AND COMMUNITY DEVELOPMENT IN THULAMELA MUNICIPALITY.

As the municipality we are realizing that the investigation will benefit our communities in strengthening the sustainability of community driven food security programmes hence creating jobs opportunities and alleviating poverty.

Kindly regards

Municipal Manager

Maluleke H.E

29788

MPHAPHULI TRADITIONAL COUNCIL

P.O. Box 59
Sibasa
0970

Enq. Manyananya N.E
Cell No. 076 2031851

Pfanani Charlotte Kwinda
Dept. of Agriculture and animal Health

RE: REQUEST TO CONDUCT RESEARCH IN AREAS UNDER MPHAPHULI TRADITIONAL COUNCIL.

1. The above matter refers.
2. Our office has received your request to conduct a research on the role of food gardens to food security and Community Development in our villages.
3. Permission is hereby granted that you proceed with the research.
4. Traditional leaders have already been informed about this programme, and a list of villages is herewith attached.
5. Hoping you will find this in order.

Yours Faithfully

Chairperson :
Full Name : RAMUKUMBA N.A
Councillor :
Full Name :
Snr. Admin :
Full Name : N.E

DEPARTMENT OF CO-OPERATIVE GOVERNANCE, HUMAN SETTLEMENTS & TRADITIONAL AFFAIRS
MPHAPHULI TRADITIONAL COUNCIL
08 DEC 2016
BOX 59 SIBASA
0970
VHEMBE DISTRICT SUPPOPT CENTRE

TSHIVHASE TRADITIONAL COUNCIL

Inq : Singo A
Cell : 083 3742 037
Cell : 076 044 2247

CONTACT DETAILS
Postal Address: P. O. Box 1093, VHUFULI, 0971
Email Address : asingo95@gmail.com
Fax : 086 5391 437

TO WHOM IT MAY CONCERN.

PERMISSION GRANTED TO KWINDA P.C TO CONDUCT A RESEEARCH UNDER TSHIVHASE AREA OF JURISDICTION.

The above matter refers.

Tshivhase Traditional council is hereby granteing a permission to conduct a research at Tshivhase Areas of Jurisdiction.

Kindly receive this information for your further attention.

Your co-operation will be highly appreciated.

Yours in service

Singo Azwindini
Secretary of Tshivhase Traditional Council

DEPARTMENT OF CO-OPERATIVE GOVERNANCE, HUMAN SETTLEMENTS & TRADITIONAL AFFAIRS
TSHIVHASE
TRADITIONAL COUNCIL
08 DEC 2016
BOX 1999 THOHOYANDOU
0950
VHEMBE DISTRICT SUPPORT CENTRE

ADDENDUM H: ETHICS APPROVAL LETTER

COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

HEALTH RESEARCH ETHICS COMMITTEE

CAES RESEARCH ETHICS PROGRESS AND MONITORING REPORT 2017

This document refers to the report required as indicated in the initial Ethics approval document that was forwarded to you. A date on which the progress report should be submitted is indicated on the E thics approval document. Please refer back to your original approval.

If you have any questions about or require assistance with the completion of this form, please contact your supervis or (master's or doctoral students), or Ethics Administrator of the College of Agriculture and Environmental Sciences (Ms Marthie van Wyk) at vwykmj@unisa.ac.za

IMPORTANT: **GUIDELINES FOR COMPLETING PROGRESS REPORT**			
Ethics approval is valid for one year only. A progress report is an application for renewal of ethics approval and must be submitted annually, well before the ethics approval expiry date, so that the progress report can be reviewed and the project re-approved prior to the expiry date. No research may continue without this process and re-approval.			
This is not a new application			
The progress report should provide information about the progress of the project (including any challenges or problems encountered, stumbling blocks that occurred which could not be foreseen which might have caused delays in the project, events that happened during the execution of the project that the researcher is unsure in terms of how to proceed, any concerns that the researcher might feel necessary to divulge because of the ethical implication of the event and other information related to the project.			
The report will serve before the CAES Ethics committee at the first available meeting after submission.			
APPLICATION NUMBER	**2017/CAES/013**	**Date of this report**	**29/01/2018**
Report submitted by		**Kwinda PC**	
Title of the research project: An investigation on the role of food gardens to food security and com munity development in Thulamela municipality			
Please tick the relevant report category			
Report of on-going project	X	Report of completed/terminated project	

REPORT

A. Status of the data collection phase of the project:

Please select the most appropriate option and indicate the relevant date	
	Date (Month & Year)
Data collection was completed on	2017/12/20
Data collection is ongoing until	
Data collection commenced, but was prematurely terminated on …	
Data collection never started and the project was terminated on …	
Provide the reason/s for project termination if c) and d) applies to this report:	

B. Research procedures as per the approved project proposal:

	Yes	No
Was all relevant permission as required by the CAES Ethics committee obtained and submitted to the CAES Ethics committee?	X	
Have the research procedures been implemented in accordance with the approved proposal?	X	
If NO, have any changes and/or amendments that have an impact on the risk profile of the research participants been submitted for ethics approval?		
If NO, provide the details of the variations/amendments and the reason/s why this has not been submitted for research ethics approval:		

C. Recruitment of research participants:

How many research participants have been recruited/enrolled in the period since the last progress report?	479
Indicate any ethical difficulties that have been encountered to obtain consent from potential research participants:	

D. Withdrawal of consent:

	Yes	No
Have any of the research participants (including a parent or legal guardian in the case of minors) withdrawn their consent during the implementation of this proposal?		X
If YES, provide the details of the number of participants, their reason(s) for withdrawal (if known) and any action taken by the researcher/s:		

E. Unexpected ethical issue management:

	Yes	No
Did any of the research participants experience serious adverse events (SAE) or other harms during the report period? Note that the occurrence of any serious ***adverse events should always be immediately reported to the Research Ethics*** *Committee; formal reporting of SAEs should not be delayed until submission of the annual progress report.*		X
If YES, provide the details (date, event and outcome) and the action taken by the researcher/s:		
If YES, indicate how and when the Research Ethics Committee was notified of the serious adverse events:		

F. Research participant complaints:

	Yes	No
Did any of the research participants lodge complaints with the researcher about any ethics-related aspect of the project?		X
If YES, provide the details (date, complaint and outcome) and the action taken by the researcher/s:		

G. Other ethical issues:

	Yes	No
Did any new Intellectual Property (IP) considerations arise during the current report period?		X
If YES, has a formal IP agreement been submitted to the office of the Innovation Manager?		
Have any research participants been withdrawn from the project by the researcher / supervisor/s?		X
Are there any other ethical issues (e.g. breaches of anonymity or confidentiality; loss of data through theft or computer failures) that you would like to bring to the attention of the Research Ethics Committee?		X
If YES to any of the above issues, please provide details:		

Signature of researcher Date. 29/01/2018

Signature of supervisor Date