FACTORS AFFECTING THE FOOD SECURITY STATUS AND PARTICIPATION IN FOOD SECURITY INTERVENTION PROGRAMMES IN MAPHUMULO

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DEDICATION

This dissertation is dedicated to my late parents, Marriet and Kilborn Ngema.

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To my supervisor, Dr Melusi Sibanda, thank you for playing such an important role as a supervisor: your expertise in this field has been a wealth of knowledge in this study. I appreciate all the time you have invested in my study. To my co-supervisor Dr Lovemore Musemwa, thank you for dedicating your time in assisting me in this journey.

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ORIGINALITY DECLARATION

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I acknowledge that I have read and understood the University's policies and rules applicable to postgraduate research, and I certify that I have, to the best of my knowledge and belief, complied with their requirements.

In particular, I confirm that I obtained an ethical clearance certificate for my research (Certificate Number UZREC (171110-030 PGM 2015/207) and that I have complied with the conditions set out in that certificate.

I further certify that this research dissertation is original, and that the material has not been published elsewhere, or submitted, either in whole or in part, for a degree at this or any other university. I declare that this research dissertation is, save for the supervisory guidance received, the product of my own work and effort.

I have, to the best of my knowledge and belief, complied with the University's Plagiarism Policy and acknowledged all sources of information in line with normal academic conventions. I have subjected the document to the University's text-matching and/or similarity-checking procedures.

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As the research supervisor, I agree to the submission of this thesis for examination.
Signed…… Date:…….
Name: Dr M. Sibanda

As the research co-supervisor, I agree to the submission of this thesis for examination.
Signed…… Date:……..….
Name: Dr L. Musemwa

PUBLICATION IN PREPARATION

1. Determinants of the food security status of households and their participation in food security intervention programmes in Maphumulo Local Municipality in the ILembe District of KwaZulu- Natal. To be submitted to an accredited journal.

ABSTRACT

This study assessed the factors affecting the food security status and participation in food security intervention programmes in Maphumulo. A number of food security intervention programmes were introduced in KZN Province to ensure food security. However, household food security status remains a concern in South Africa and there is noted a lack of participation in the intervention programmes. Using a proportional stratified sampling procedure the study sampled 495 respondents (330 "One Home One Garden" programme beneficiaries and 165 non-participating households) in Maphumulo . To estimate a household's food security, the Household Dietary Diversity Score (HDDS) and Household Food Consumption Score (HFCS) measures were employed. Food consumption pattern were characterized by a low average HDDS of 3.1 in "One Home One Garden" group and 3.67 in non- participating households. However, the majority (65%) of the "One Home One Garden" participating households had an acceptable (≥35) HFCS whilst the majority (54%) of non–participating households had a borderline (21.5 to 35) HFCS. A Binary Logistic madelbinary logistic model was employed in two instances: firstly to identify the factors influencing the food security status and secondly to determine participation in government food security intervention programmes. In the first instance, 5 out of 13 variables were significant. Age, household, household farming experience and household receiving extension support were found to have a positive influence on the food security status of the household while household size and access to credit had a negative influence. In the second instance, 6 variables of the 14 were found to be significant. Household size, household income and household food security status had a positive influence on the household's participation in government food security intervention programmes while age, educational level parameters and farm size had a negative influence. The majority (71%) of the respondents were totally dissatisfied with government intervention programmes such as the mechanization support and quality of government support received. The study therefore proposes the following recommendations aimed at enhancing level of participation and the food security status of households participating in food security intiatiatives: the government should support households by making available improved inputs such as hybrid seeds that gives farmers better high yields, and marketeable and high quality output which

fetch better prices in the market. High returns stimulate participation in food security programmes.

Keywords: Binary Logistic Regression Model, Household Dietary Diversity Score (HDDS), Household Food Consumption Score (HFCS), Household Food Security Status, Maphumulo Local Municipality, Participation.

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LIST OF ACRONYMS

ABET	Adult Based Education and training
ANC	African National Congress
CASP	Comprehensive Agricultural Support Programme
DAFF	Department of Agriculture Forestry and Fisheries
DARD	Department of Agriculture and Rural Development
DoA	Department of Agriculture
DAEA	Department of Agriculture and Environmental Affairs
FAO	Food and Agriculture Organization
HDDS	Household Dietary Diversity Score
HFCS	Household Food Consumption Frequency Score
HSRC	Human Science Research Council
IDPs	Integrated Development Plans
IFSS	Integrated Food Security Strategy
IFPRI	International Food Policy Research Institute
KZN	KwaZulu-Natal
MAFISA	Micro Agricultural Finance Schemes of South Africa
NDA	National Department of Agriculture
RDP	Reconstruction and Development programme
SPSS	Statistical Package for Social Science
USDA	United state Department of Agriculture
VVOB	Flemish Association for Development Cooperation and Technical Assistance
WFP	World Food Programme

CHAPTER 1: INTRODUCTION

1.1 Background of the study

The specific objectives of the study were to investigate the food security status of households in Maphumulo that participated in the "One Home One Garden" programme and that of the non-participating households and to assess the factors influencing the participation in government food security intervention programmes in Maphumulo Local Municipality.

According to Mwaniki (2013), sustaining food availability at all times remain a problem, not only for the developing countries, but also for the developed nations. Balancing the diet remains the best way to provide nutritious diets to any population. The Human Science Research Council (HSRC) (2013a) pointed out that achieving food security requires that there are sufficient quantities of appropriate food at all times. In addition, individuals need to have adequate incomes or other resources to purchase or exchange for food; need to ensure that food is properly processed and stored; individuals need to have rigorous knowledge of nutrition and childcare that they put to good use and have access to adequate health and sanitation services. As a result of the widespread inactive growth, low productivity levels, failed marketing, and agricultural practices that destroy the environment, a number of agriculture intervention programmes have been introduced by governments in Africa to remedy the situation (Salama, Kamara & Brixiova, 2010).South Africa is regarded as food secure nation, either in term of producing enough staple food or having the ability to import food overseas when needed in order to meet the nutritional requirement for its nation (Food and Agriculture Organization (FAO), (2008). Hart (2009) supported the argument that although South Africa appears to be food secure at national level, at households level it becomes a critical challenge for some.

According to Johnson (2011) the South African government is mobilising traditional leaders and local municipalities to provide land and assistance to engage in food production at a local level. The Department of Agriculture, Forestry and Fisheries (DAFF) (2013a) and Hart (2009) claim that the Department of Agriculture, Forestry and Fisheries has promoted the development of agricultural projects as ways of creating jobs and to generate household income. Machethe (2004) found that South Africa has a higher level of unemployment, and is battling to achieve food security and alleviate poverty. Thus, it is important that food

insecurity is critically attended to. There is a direct need to ensure that these programmes do not end up as needless government programmes but as plans that deliver measurable sustainable results that improve rural people's livelihoods.

Johnson (2011) mentioned that a number of food security intervention programmes have been implemented in the KwaZulu-Natal (KZN) Province as intervention programmes. These include the Comprehensive Agricultural Support Programme (CASP), One Home One Garden, Livestock Programme, Mechanization Programme, Mushroom Programme, Women, Youth and People with Disabilities, Indigenous Nguni Livestock Programme, Rural Development Programme, Impact Partnership and Land Care Projects.

The interventions of government continue to support rural farmers with garden inputs including infrastructure support, training and mentoring. For example, households were provided with seeds to ensure an increase in household production through the "One Home One Garden" campaign that has aimed at encouraging households' gardens throughout the province. According to Mafunda (2011), the mechanisation programmes were also introduced to complement other food security intervention programmes.

For the aim of this study, particular focus was on the "One Home One Garden" food security intervention programme. The reason for choosing this programme is that the government is uncertain about the impact it will have on the food security status of rural households, not only in Maphumulo Local Municipality, but in the entire province. The programme was introduced to promote a culture of producing vegetables for household consumption and to enhance food security at a household level, so the study will assess the perception of participants on this kind of food security intervention programme. Again, because not much has been researched regarding the impact of food security intervention programmes in Maphumulo Local Municipality, this study will be documented and used as a reference for future intervention programmes.

1.2 Problem statement

A number of food security intervention programmes were introduced in KZN Province to ensure food security. However, household food security status remains a concern in South Africa and there is noted a lack of participation in the intervention programmes within

communities. Gwala (2013), indicated that the "One Home One Garden" programme was implemented at a budget of R93.5 million but despite these interventions, poverty levels are still very high. According to Statistics South Africa (2011), approximately 4,75 million households in South Africa were living below the poverty line. Aliber and Hart (2009) found that there is considerable movement into and out of agriculture, suggesting that many households treat agriculture as a sort of residual activity from which they can seek benefit when it suits them, but abandon when it is inconvenient. Nevertheless, there is not consensus in literature on the factors which affect household participation in food security programmes. This highlights a gap in literature that this study is trying to fill, such as: to clarify the current situation that is undesirable, second to draw attention to policy, theory and practice that would have prevented the current undesirable situation and the third part where the gap has been highlighted.

Moreover, Altman and Ngandu (2010) dicovered that in South Africa, factors such as extensive unemployment; low wage levels relative to the cost of living; and the number of dependants in each household all contribute to food insecurity. Sekhampe (2013) agreed that South Africa still has approximately fourteen million people who are vulnerable to food insecurity. Furthermore, Altman *et al.* (2009) stated that KwaZulu-Natal has been hardest-hit by high levels of unemployment and that household food insecurity levels in communities that benefited from the interventions is still a common feature. According to Statistics South Africa (2011), many South African households are unable to purchase food, primarily because their purchasing power is limited by a scarcity of income generation opportunities which is especially the case in rural areas. Stats SA (2016) revealed that the unemployment rate in South Africa went up to 27.1 percent in the third quarter of 2016 from 26.6 percent in the previous period: the highest it has been since 2004. According to the Maphumulo Integrated Development Plan (IDP) (2013/14), unemployment remains high and measures need to be put in place to eliminate over-dependency on government projects. The main objectives of these intervention programmes were to improve household food security, and create job opportunities. There is also limited information regarding the impact of food security intervention programmes in KZN. It was noted that a number of factors affect food availability at household level, and a number of scholars are not in consensus about the impact of these factors on household food security status. This highlights the necessity to conduct such a study and identify the factors which determine the food security status as well

as the likely causes of low rate in food security intervention programmes, especially in South Africa.

1.3 Aim and objectives of the study

The aim of the study is to determine the factors affecting both the food security status and participation in food security intervention programmes with a particular focus on the "One Home One Garden" programme beneficiaries and non-beneficaries in Maphumulo Local Municipality of ILembe District in the KwaZulu-Natal Province of South Africa.

The specific objectives were:

1) To investigate the food security status of households in Maphumulo that participated in the "One Home One Garden" programme.
2) To determine the factors influencing the food security status of households in Maphumulo Local Municipality.
3) To determine the factors influencing the participation in government food security intervention programmes in Maphumulo Local Municipality.
4) To investigate rural households' perceptions on their satisfaction with how the government introduced the food security intervention programme in Maphumulo Local Municipality.

1.4 Research hypothesis

The following hypotheses have been formulated:

1) Beneficiaries of the food security programme "One Home One Garden" are food secure.
2) Socio-economic factors such as household income, farming experience, farm sizes, access to credit, access to extension services and access to home gardens influence rural households' food security status.
3) Socio-economic factors such as household income, farming experience, farm sizes, access to credit, access to extension services influence households' participation in government food security intervention programmes.
4) Rural households of Maphumulo Local Municipality are satisfied with how government introduced the food security intervention programme.

1.5 Significance of the study

The study formulates recommendations that can help in designing food security programmes for rural communities in developing countries. The evaluation of current programmes assist in finding reasons that contribute to the success or failure of the programmes in achieving the set objectives of the both National and Provincial Governments and Local Municipalities. The study provides useful information that can be used in formulating policies that may enhance household food security status of the rural poor. In addition, the study will contribute to literature on factors influencing food security for South African rural households as well as the factors that influence participation in such intervention programmes.

1.6 Delimitations of the study

The study was based on the factors affecting food security status and participation in food security intervention programmes of the "One Home One Garden" programme and those that did not participate in any food security intervention programme in Maphumulo Local Municipality of ILembe District of KwaZulu Natal Province. The study did not investigate other intervention programmes such as mechanisation, massification, livestock, land care, mushroom programmes because an analysis of all the programmes in a single study would have been difficult to achieve with the limited resourses that were available.

1.7 Organisation of the dissertation

The dissertation is organised as follows:

Chapter 1 presents a background of the study, problem statement, aims and objective of the study, research hypothesis, significance of the study, delimitations of the study and organization of the dissertation.

Chapter 2 presents a review of available literature on the factors affecting the food security status of households and their participation in government intervention programmes.

Chapter 3 presents and describes the research methodology applied in the study. The chapter describes the selection of the study areas; the research design; the theoretical framework of both food security and participation; the sampling method employed data collection; and methods of data analysis.

Chapter 4 presents and discusses the descriptive results of the study.

Chapter 5 presents and discusses the empirical results on the factors affecting the food security status of households and their participation in government intervention programmes based on the binary logistic regression modelling.

Chapter 6 is the final chapter and provides the summary, conclusions and recommendations of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on the factors affecting the food security status of households and their participation in food security intervention programmes. It starts by providing an overview of the household food security in rural households in developing countries. This is meant to introduce the reader to the food security discourse. The chapter then narrows to factors affecting the food security status of households. In addition, the background is given of government food security programmes and factors which ultimately affect participation of households in such programmes. According to literature, a variety of factors such as age, gender and household size have an influence on households' decisions to participate in government food security programmes or projects as a whole.

2.2 An overview of the food security status of households in developing countries

In developing countries, especially those in sub-Saharan Africa, food security has been a challenge for a number of governments (FAO, 2014). A number of studies such as Kabui (2012), FAO (2014) and DAFF (2013a) conducted research based on the household food security and the impact it has on people's lives. According to Zakari, *et al.* (2014), sustaining food security at national level as well as household level is the biggest problem in number of developing countries. Often this is a result of the lack of the directorate of food security programmes from a number of government organisations, which results in unproductive programmes and the failure in terms of poverty alleviation (National Department of Agriculture (NDA), (2002)

According to Rose (2008), the rural poor support themselves with a number of activities that boost their financial status such as short term crops, vegetable production, horticulture, livestock production, rural local employment. All of these activities contribute to a household's income and identifies the type and scope of intervention that might be needed when disaster occurs. A study by Masuku (2013) confirmed that rural agriculture is regarded as an anchor for improved income that needs to be taken seriously in the drive to alleviate poverty in rural communities and that this should be coupled with better infrastructural support. Similarly, Cruz (2010) and Valdés, *et al*. (2010) found that the majority (more than 80%) of the smallholder farming households are in state of being food insecure and rely on

land as their primary source for rural livelihoods. Yet, the World Bank (2006) claimed that three out of four poor people living in rural areas depend on agriculture for their livelihoods, either directly or indirectly. Such views from different organs and scholars point to a dire situation in terms of food security, especially in developing countries.

2.3 Factors affecting the food security status of households in rural areas

Factors affecting the food security status of households that will be discussed include among others age; gender; education levels; household income; family sizes; employment status; access to credit; access to extension and participation in government food security intervention programmes.

2.3.1 Age

According to Dlova, Fraser and Belete (2004) age is one of the factors that could prevent farming households from reaching their goals. Because younger people may be better adopters of new methods in farming than older people, age is expected to have a positive effect on sustained household food availability. On the contrary, Bembridge (1984) indicated that as people get older, they may be more willing to take risk. However, they work fewer hours and this is likely to affect their food security status. Younger farmers are expected to work on a more acreage as they are stronger than older farmers.

As the farmers get older the farm output decreases (Bembridge, 1984). This could be the reason why farming activity needs a strong healthy person and older farmers are not easily willing to change to new farming practices that may increase farm output. (Elias *et al.*, 2013). On the other hand, Arene and Anyaeji (2010) disagree, as they believe that older farmers are more food secure than younger farmers. However, there is a debate on the effect of age on household food availability. This therefore implies that the age of the household head can have either a negative or a positive effect on household food security status.

2.3.2 Gender

World Bank (2006) found that maintaining food security is a serious problem facing rural households, especially women-led households due to low yields in short crops production, planting season and supply as well as price fluctuations. The United Nations Food and Agriculture Organization (FAO) (2012a) agrees that the heads of female-headed households

have the demand of more activities they have to carry out. This results in a shortage of time and energy for farm labour or activities that will boost a households finance status.

The Food and Agriculture Organization (2013) also identified that one of the ways that the gender issue can be expressed in the food security status of a household is in the change from women -coordination to men- coordination activities as one moves from smallholder farming to commercial farming. Gladwin *et al.* (2001)177-201 supported this statement as follows:

"the current thinking about food security, that it is an issue of household income and poverty, and not just inadequate aggregate food production, challenges programmes which encourage women to just grow more food crops to improve food security… what is needed, as a general rule, are interventions to increase women's incomes and help make their livelihoods more sustainable."

Elias *et al. (*2013) found that if men and women have more equal participation in agriculture, production may be enhanced and thus food security status may improve. Hence male-headed households are assumed to succeed in crop production than women-headed households. This is likely because are responsible for fewer household chores than women. The responsibility for other chores, means that women have less time available to devote to farm labour. Female- headed household may therefore still experience shortages in food availabilityeven if participation in food security programmes increases agricultural production.

2.3.3 Family size

Dlova *et al.* (2004) noted that the bigger households are more prone to food insecurity than those that are smaller. One reason for this may be that because there are more family members, more income is required than in smaller households. Altman *et al. (*2009) agree that it is assumed that a larger household coupled with the need for more food should motivate farmers to be more willing to participate in farming to ensure food availability for their household members. However, farming relies on the ability of people to carry out farming activities. Etwire *et al.* (2013) found that a farmer with a large household size could easily participate in an agricultural project while delegating other important activities to other household members and vice versa. In addition, each adult household member could be a source of information or the beneficiary of an agricultural project. Hence, as the household

size increases, the likelihood of coming into contact with an agricultural project also increases, thereby increasing agricultural productivity and reducing household food insecurity.

2.3.4 Household income

According to The Human Sciences Research Council (HSRC) (2013) many poor South Africans depending on their household's financial status to get food. However, the high level of unemployment in South Africa means that sustaining food availability difficult. Aliber (2009) pointed out that making food available for the household and the buying power of the household sometimes do not align because the latter may vary over time. Jacobs (2009) agrees that the household food security status of a household depends substantially on household income and asset (wealth) status. Financially unstable households experience food shortages more often than financial stable households. Food demand becomes a lifestyle for poor households, resulting in them being sensitive to high food prices. According to Statistics South Africa (2011), many South African households are unable to purchase food, primarily because their purchasing power is restricted by the scarcity of income generating opportunities, especially in rural areas. The Department of International Development (DFID) (2015) stated that the availability of food around the world is not a problem. However, almost a billion people suffer food shortages everyday and a further billion suffer from malnutrition and not get sufficient vitamins and minerals for a healthy and productive life. This highlights the importance of promoting programmes that will capacitate smallholder farmers with knowledge on food and nutrition. Furthermore, Machethe (2004) noted that the money that is generated out of farming boosts a household's financial status which implies that agriculture should be kept as a main source of income, even when the household's financial status is supported by resources from other sectors.

2.3.5 Unemployment status

Altman and Ngandu (2010) mentioned South Africahas a high level of unemployment. The cost of living is increasing and this is coupled with larger household size which contributes to levels of household food insecurity. Furthermore, Altman *et al.* (2009) stated that KwaZulu-Natal is the province that has been hardest-hit by high levels of unemployment. Similar views were echoed by Aliber and Hart (2009), who mentioned that the unemployment rate has been assumed to be addressed but this has not had an impact on the alleviation of income poverty. Unemploymentlevels therefore remain a challenge to the government. A study by Musemwa

et al. (2013) in the Eastern Cape showed that employment opportunities were minimal and that people in rural areas relied on government grants as souce of livehoods. This combination of factors makes it difficult for people living in rural areas to be food secure.

2.3.6 Access to credit

Rural households require access to adequate credit, but in most cases they do not qualify for credit because they do not hve collateral security. Access to financial support is usually an important aspect of a rural household, as the rate of unemployment is high and they do not have the cash means of financing their projects. (Mthembu, 2009). Kuwornu *et al.* (2012) found that production credit (seeds, fertilizers and chemicals) could boost the production and improve food availability if credit assistance is obtained on time.

Masuku (2013) noted that rural households do not access financial support due to their lack of knowledge pertaining to lending criteria and this shortage of finance is a symptom of poverty. For rural households to participate activily in community development and upliftment, it is important for their households members to have access to resources.

In a study carried out by the HSRC (2004) it was found that rendering financial support to a rural community could be part of a plan that would increase food production as well as household food security. In line with this development, the Department of Agriculture came up with a new programme called Micro Agricultural Finance Schemes of South Africa (MAFISA), which was directed to a reasonable financial institution market. According to Mahlangu (2006), it was planned that MAFISA would be a joint venture consisting of public, private, and civil society organisations that would provide credit support to farmers agri-businesses and rural communities. However, the programme did not meet its goals due to the fact that its credit failed to reach down to the rural market. The government became impatient when investigating the failure of access for poor rural communities and the programme was stopped.

2.3.7 Extension support

Extension can increase yield by accelerating technology transfer by upgrading the farmer's skills and knowledge based on acceptable farm management practices. (Feder, Murgai, and Quizon, 2004). Elias *et al.* (2013) noted that the extension services provided better technologies, more awareness campaign, better skills and knowledge coupled with revised

information, and provided training based using demonstrations and lecture methods which would ultimately increase agricultural productivity and thereby, also the household's food availability. Feder, Murgai, & Quizon (2004) noted that extension services can act as a bridge between government and the community by transferring new technology that would need urgent adoption by the community such as water harvesting.

2.3.8 Agricultural potential

There is a shortage of a fertile arable land in South Africa which reduces the ability to increase agricultural output. (National Department of Agriculture (NDA), 2012). According to Cargills Incorporate (2014) urgent attention needs to be paid to food security demand around the world in the form of target crops that withstand environmental conditions of an area and farmers planting the right crops for their local climate and soils. High-yield agriculture allows farmers to utilise land to the maximum thus stimulating continuous household food availability. National Department of Agriculture (2012) stated that the greatest challenge is a shortage of water and uneven rainfall distribution. Around 1.3-million hectares depend on irrigation schemes and around 50% of South African's water is utilised for farming. (DAFF, 2012). With the demand on farming to maximise the production per unit of land, it is important to highlight the importance of protecting our natural resource for future generation (HSRC, 2004).

2.3.9 Participation in government food security intervention programmes

Mjonono *et al.* (2009) pointed out that many poor households reside in rural areas under tribal authorities, and since the minority of poor households reside in rural areas it is more likely that these areas will have food insecure households. If this is the case, it is assumed that farming will intervene in promoting farming business. Cargills Incorporate (2014) agree that to sustain food availability at all times, farmers need to be successful at all levels of production. Mwale *et al. (*2012) concur with this statement by noting that a number of farmig projects have been developed as part of intervention programmes for improving job opportunities and to increase income levels. These projects included short crops, vegetable production and smallstock. Furthermore, Cargills Incorporate (2014) mentioned that rendering support to rural farmers is vital in ensuring enough food for entire family at all times as well as preventing households from being undernourished fromeating poor quality food.

2.3.10 Influence of education on food security status of households

The influence of education on food security has been an issue of much discussion amongst scholars. The reason being that literate people are expected to be better able to monitor their food security status than the illiterate people. Food and Agriculture Organization (2005: 14) claimed, "lack of education leads to poor productivity, unemployability, and low earning capacity, leading directly to poverty and hunger". Dlova *et al.* (2004) found that more educated farmers are assumed to be more successful and their food security status is therefore sustained. Food and Agriculture Organization (2005:14) highlighted the strong relationship between food insecurity and lack of education. Food insecurity can cause many problems for children, amongst which is their lack of concentration at school, which then affects their academic performance (World Food Programme (WFP), 2006). In addition, FAO (2005) pointed out that food insecurity can result in low school enrolment and poor attendance in addition to limiting the concentration span and performance in school. Figure 2.1 shows the direct and indirect influences of education to food security status of farming households.

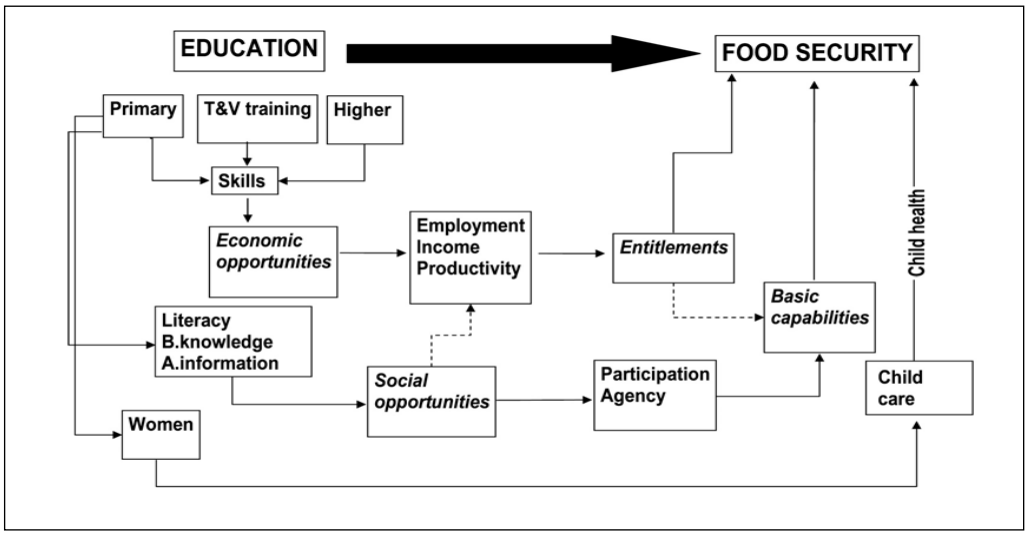

Figure 2.1: Influence of education on food security status of households

De Muro and Burchi (2007: 7)

2.3.11 Influence of infrastructure on agricultural development and food security status of households

Barrios (2008) described rural infrastructure such as roads as an important asset to the rural households because it improves the communication levels, promotes easy transportation of inputs production and makes transportation more accesible for both community and produce. Poor infrastructure is detrimental to economic productivity and it hinders access to markets. Jari (2009) stated that poor quality roads, which are often unaccessable during rainy days, have a negative impact on the transportation of the produce. If roads are in a poor state, reaching the market becomes a problem, resulting farmers having to hold onto their harvest and foring them to sell lower grade produce. The travelling time on poor roads is long, implying that it will be difficult to sell fresh produce within the required time limit. This results in a loss in quality of fresh produce and a reduction in the amount of estimated income to be generated out of fresh produce sales. It also gives rural vegetable producers a bad reputation which severely demotivates smallholder farmers to produce for markets. Household food security status obviously becomes affected by such circumstances. Barrios (2008) commented that potemtial spin-offs of well-developed roads system could accelerate the development of community health centres, the growth of agricultural hubs for agricultural commodities and access to all development organisations. Thus, infrastructure is a critical component influencing the food security status of households.

2.3.12 Influence of food storage on food security status of households

The Department of Agriculture Forestry and Fisheries (2010) pointed out that great losses can be experienced if the conditions of storage are not good enough to protect the food product from spoilage. Mtshali (2002) agreed that if the conditions are not good, the quality and quantity of food is negatively affected. Storage infrastructure is necessary for preserving the agricultural produce from the harvesting period to the rest of the year. Therefore, poorly managed storage facilities have a negative impact on householod food security status and food security cannot be guaranteed even when production is good.

2.3.13 Influence of government policies on food security status of households

Cargills Incorporate (2014) noted that major developmental support by government and non-government organisations is necessary to improve food availability globally, and this in turn promotes household food security. According to Flemish Association for Development Cooperation and Technical Assistance (2005) development agencies sometime make

assumptions that rural people are not able to identify their real need in terms of which policies should cater for the minority and be included in the planning and decision making stage. Mwaniki (2013) concurred that the problem begins when the attention is directed towards the implementation of policies, strategic plans and institutions objectives and all these become a priority above the real needs of the rural people.

Cargills Incorporate (2014) added to this notion by noting that financial support and care in the following key areas is needed: transportation, distribution, storage, and energy infrastructure; agricultural research and development; agricultural science, extension, education, and promotion of best practices and governance around legal and business structures to stimulate private sector investment. Furthermore, FAO (2007) agreed that the main goal of farming projects is to allow the policy makers to access the relevant information and develop farming incentives with both an acceptable investment risk and sustainability that boosts household food security status.

2.3.14 Impact of irrigation system on food security status of households

Masuku (2013) mentioned that irrigation is an important socio-economic tool with the positive potentil to reduce food insecurity. However poor rural people with limited resources remain unable to instal irrigation schemes as preventive means or defensive measures for food security. On the other hand, Hussain and Hanjra (2004) pointed out that irrigation boosted the rural households because of improved intensive production, improved agricultural outputs and a reduction in crop failures. Moreover, an irrigation system empowers farming households to plant in greater variety of produce and to then be in a position to move from smallholder farming to commercial farming.

2.3.15 Impact of climate change on household food security

Madzwamuse (2010) noted that South Africa is particularly sensitive to climate change due to its reliance on climate-sensitive economic sectors, its high levels of poverty and the inter-related effects of HIV/AIDS. Furthermore, FAO (2008) mentioned that climate change had an effect on all four levels of food security: food availability, food accessibility, food utilisation and food systems stability. The effects of climate change on farming activities has been revealed to be mot damaging to low-input farming systems in developing countries in

Africa (Rosenzweig & Parry, 1994; Reilly & Schimmelpfennig,1999; Kates, 2000; McGuigan et al., 2002).

Rosenzweig, *et al.* (1993) mentioned that in some places, there is a fluctuation of heat units and an increase in rainfall distribution whilst in others there is a decline in rainfall distribution. Schneider (1989) noted that heavy coastal rains encourage soil erosion causing a reduction of land available for farming. In addition, climate change results in low-yields if a coping strategy is not put into place. (El-Shaer *et al.*, 1997, Kurukulasuriya & Rosenthal, 2003). In conclusion, climate change will affect food security through its negative impact on food systems all levels of nation (FAO, 2008).

2.3.16 Impact of livestock production on household food security

According to Swanepoel *et al.* (2009) livestock is major contributor to household food security, and is a main source of livelihood for nearly 1 billion rural poor people in developing countries. Gebrehiwot (2008) mentioned that rural households that are engaged in smallstock farming keep livestock to assist with cash during the time of need for food and other household items. According to Swanepoel *et al.* (2009) livestock rearing is a coping strategy during droughts when households anticipate failures in crop yields or other income streams. Gebrehiwot (2008) mentioned that in some cases, livestock farming is regarded as a family investment that complements the income generated from crop sales.

2.4 Implications of food insecurity on rural households

Altman and Hart (2009) pointed out that climate change as areult of increased global warming has influenced the entire world's household food insecurity. This undoubtedly has affected a number of households, especially the poor or disenfranchised in the developing world. Kabui (2012) mentioned that world household food insecurity has also increased worldwide poverty with a global hunger index of 15.1% being recorded in 2010. The most severley affected are the children. During early childhood, undernourishment is likely to limit a child's physical growth and also affect the basic learning capacities of a child. The negative effects of food insecurity in this stage are visible during the school-age phase (World Food Programme (WFP), 2006).

The effect of hunger on a society comes in many forms. Food and Agriculture Organization (2004) noted that the concerns here are the after-effects of the high costs of rectifying the damage it causes. These include the challenges of reducing health hazards by providing costly medical treatment to reduce the problems related to the pregnancies and deliveries of anaemic, underweight mothers and the severe and frequent illnesses of children whose lives are threatened by malaria, pneumonia, diarrhoea or measles because their bodies and immune systems have been weakened by hunger.

On the other hand, Helen (2002) noted that food security in fact sustains the government of any given country and produces good citizens, while food insecurity results in ill-health and an unhealthy lifestyle for both children and adults.

2.5 Participation in government food security intervention programmes

Aliber and Hart (2009) mentioned that a number of rural households adopted agriculture when their living conditions became challenging but then abandoned agri-business when they felt its served no pupose. According to Nxumalo and Oladele (2013) without participation there would be no development programme. According to HSRC (2013b) it is assumed that 2.5 to 3 million rural people are engaged in subsistence farming in South Africa. Regardless of the dedication of rural farmers in sustaining food availability, its contribution is so small that it is barely noticeable. This could be due to various reasons such as a lack of farming inputs such as seeds and fertiliser. Despite this, farming households are regarded as those that receive more nutrients.

Farid *et al.* (2009) define participation as playing a role or taking part in an activity usually with others. Nxumalo and Oladele (2013) mentioned that participation also refers to the involvement of individuals and groups in the development processes with the aim of ensuring self-reliance and a better standard of living. Farmers' participation in agricultural projects can either be nominal, consultative, action-oriented or collegial. The important relationship between farmers' participation in agricultural projects and economic development cannot be over emphasised.

2.6 Factors affecting participation in government intervention programmes

The adoption of a new technology by rural households while involved in agri-business is influenced by a number of factors such as the household's dermographics and socio-economic factors.

2.6.1 Age

Etwire *et al.* (2013) noted that a younger farmer is more likely to participate in an agricultural project because younger farmers are usually innovative and they like to explore new things. Food and Agriculture Organization (2012a) argued that older farmers are usually more experienced so they may have either experienced or observed the benefits of participating in an agricultural project. On the contrary, Etwire *et al.* (2013) found that older farmers might not be resource-constrained enough to participate in an agricultural project. Several authors have noted a positive relationship between age and participation in agricultural projects (Nnadi & Akwiwu, 2008; Farid *et al.*, 2009; Nxumalo & Oladele, 2013). Yet, Oladejo *et al.* (2011) did not observe any significant relationship between age and participation in agricultural projects.

2.6.2 Gender

According to Dlova *et al.* (2004), males are believed to be better able to withstand the heavy duties of farming practices. Women on the other hand have improved in farming and they are being recognised as important farmers and livestock herders. This is due to the fact that rural households are becoming dedicated to agri-business and the types of farming that target women. Female farmers usually have better social networks and may therefore be more likely to have links with an agricultural project. On the other hand, male farmers usually have more access to and control over resources. Males are also usually the decision makers in the community and are therefore well placed to participate in agricultural projects. Nxumalo and Oladele (2013) observed that male farmers tend to like to adopt new technology. However, Nnadi and Akwiwu (2008) did not find any significant relationship between gender and farmers' participation in an agricultural project. Their effort as commodity producers is often hindered by land scarcity, access to credit, access to extension, distance to market and benefits from agricultural research and development. Kahn *et al.* (2012) observed that as a woman's age increases, she becomes physically weaker and therefore her ability to participate in an agricultural project diminishes.

2.6.3 Education

According to Nnadi and Akwiwu (2008), educated farmers are more eager to be involved in farming projects in order to demonstrate what they have learned in formal schooling. Farid *et al.* (2009) and Kahn *et al.* (2012), however, noted a negative relationship between education and women engaged in farming projects. Yet, Oladejo *et al.* (2011) and, Nxumalo and Oladele (2013) did not observe any significant relationship between education and the decision to participate in an agricultural projects.

2.6.4 Household experience in farming

Kuwornu *et al*. (2011) noted that household experience in farming is regarded as the period the rural farmer has been involved in farming. An experienced household is more likely to have farming experience based on knowledge and skills in agri-business which minimises negative effects on his or her food availability. An experienced farmer is regarded as a farmer that has knowledge in the use insecticides, pesticides and disease and fungus control management as well as good knowledge of local climate conditions. Studies have revealed a positive relationship between farming experience and food security status (e.g., Feleke *et al.,* 2003, Oluyole *et al.,* 2009). Altman, Hart and Jacobs (2009) noted that in South Africa there was an increase in the number of black households engaged in agriculture practices between 2001 and 2004 and a slight decrease after that. Mwaniki (2003) agrees that when its comes to experienced participants different results are gathered and it is noted that groups behaviour differs: some are prosperous and some are unsuccessful. Altman, Hart and Jacobs (2009) noted that the effect of farming experience on participation differs, sometimes it might be positive or negative. The justification of this comment is that new technology might be exciting in the beginning and might succeed, but thereafter it becomes less exciting as the farmers grow older and become less strong.

2.6.5 Farm sizes

According to Etwire (2013), the relationship between farm size and a farmer's decision to become involved in an agricultural project is expected to be positive. Farm size may be a proxy for level of commercialization. Farmers who decide to cultivate an additional hectare of land are usually moving away from subsistence production and are therefore eager to be involved in an agricultural project in order to obtain access to inputs, technology and output market. Farid *et al.* (2009) reported a negative relationship between land holdings and women's participation in agricultural activities. Nxumalo and Oladele (2013) did not find any

significant relationship between farm size and participation in an agricultural project. In South Africa, the smallholder farmers in the Eastern Cape region are engaging their farming activities on relatively small pieces of land because they do not have access to land ownership. This therefore hinders them from participating in government supported agricultural projects (Jari, 2009).

2.6.6 Household perceptions on the intervention programmes

According to Iqbal (2007), most agricultural projects fail because when projects are designed, the farmers or local ethics, culture and socio-economic characteristics are not taken into consideration. Outside agents are not always able to develop and recommend appropriate technologies that are compatible with the target group. StatsSA's general household survey indicates that most households favour the quality of support, while 26% of smallholder farmers expressed a need for greater capacity (Zokwana, 2014). In these cases, participation in previous intervention programmes could influence the participation of household in new intervention methods, depending on the household's satisfaction with previous programmes.

2.6.7 Satisfaction with previous government agricultural programmes

Kirsten *et al.* (2006) mentioned that various intervention programmes has been carried out in South Africa. For example in the Eastern Cape Province, the Green Revolution was made up of two main parts: the Siyazondla Homestead Food Production Programme and the Siyakhula (small-scale) and the Massive Food Production Programme. Under the Green Revolution prospective, farmers were supplied with fencing, stock, water dams, boreholes deep tanks tractors and other implements, irrigation schemes and human resource development. These were paid for mainly with grants from the national government. Etwire *et al.* (2013) argued that the programmes had been constrained by insufficient and/or poor quality farm inputs, such as selected seeds, and services like credit and training. As a result, the observed overall farm productivity is only about 50% of the target set by the extension programme. Abdu-Reheem and Worth (2013) noted that misunderstanding and a lack of clarity on the new technology brought in by the extension officers, resulted in poor adoption of the technology and affected the progress in government food security interventions. For a government to design proper packages that suit rural household, it should be able to assess why farmers accept a technology. That information will guide government in designing technology that

will meet rural households' needs and stimulate the adoption of the new methods simultaneously (Windle & Rolfe, 2005).

2.6.8 Extension support services

Anaeto *et al.* (2012) described the role of extension officers, especially in terms of farmers' education as being crucial for the social and economic development of a nation. These officers provide guidance to farmers in making them aware of the problems and help farmers to improve their own opinion on farming and decision making skills. The duty of an extension officer therefore comes with important responsibilities: transferring information; and liaising between the government and farming households (Zokwana, 2014). Upgrading all agri-business levels of farming is the only way to alleviate of poverty (World Food Programme (WFP), 2008). Much has been said and written about the fact that meeting goals of maximised agricultural production in rural households will not be achieved if the development and dissemination of new agricultural technology is not put into place (Asfaw *et al*., 2012).

2.7 Chapter summary

This chapter reviewed available literature on the factors affecting the food security status of households and their participation in food security intervention programmes. From the reviewed literature, it is evident that household food insecurity is a serious problem, especially in developing countries and keeping household food secure at all times remains a problem for both the developed and under developed world. For this study, it is essential to estimate household food security, to accomplish household food dietary diversification and to identify various factors that influence participation in food security intervention programmes. The reviewed literature noted that more needs to be accomplished in order to achieve household food security in South Africa. The next chapter provides the research methodology that the study employed in achieving its objectives.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used in the study. The chapter presents the study area, and explains the nature of geographic aspects and the climatic conditions. In addition, the socio-economic status of the study areas households is examined to identify some of the issues that are affecting the households in the study area. The chapter proceeds by giving the measurement of variables, theoretical framework, the population and sample size of the area. A sampling procedure is then provided to explain how the respondents were included in the study. In addition, the variables of interest as shaped by the literature are then given in detail. The research instrument that was used is explained as well. The chapter proceeds by giving an overview of how the data was collected from the respondents, and how it was captured and analysed using statistical packages. The last section of the chapter is devoted to explaining how ethical considerations were upheld throughout the study. More so, how the principles of conducting ethical study were observed.

3.2 Selection of the study area

The study was carried out in the Maphumulo Local Municipality of iLembe District in KwaZulu-Natal Province of South Africa. The study area was selected because it is falls within the government's priority food security pilot project. Ilembe District Municipality has 4 local municipalities which are KwaDukuza, Mandeni, Maphumulo and Ndwendwe. Maphumulo Local Municipality consists of 11 wards but only three wards were selected for this study. The chosen wards were Wards 3, 6 and 10. These wards were selected because of their different agricultural potential and also due to the fact that the previously indicated food security programme "One Home One Garden" had already been widely implemented in these wards. Ward 6 represents a low agricultural potential area, Ward 3 a restricted agricultural potential area and Ward 10 a high agricultural potential area (*See figure 3.1*).

From each ward, 3 sub-wards were purposively selected. The sub-wards for ward 3 included Mabhobhane, Mambulu, Mangongo, Masiwela and Mpise. Sub-wards for ward 6 included Entubeni, Mbitane, Sabuyaze, Sihlushwaneni, and uMpumulo. Sub-wards for ward 10 included KwaNdaba, Ntombiyahlunina, Nyamazane, Okhalweni and Tshobho. In total 9 sub-wards were selected for the study. These areas have a reasonable road network and were conveniently reachable in terms of accessing research respondents.

3.3 Description of the study areas

Maphumulo Local Municipality is an administrative area in the iLembe District. Maphumulo is an isiZulu name meaning "place of rest." This local municipality is predominantly rural, comprising mostly tribal land, which is administered by the Ingonyama Trust on behalf of local communities. The Maphumulo Local Municipality is classified as a Category B Municipality in terms of the Municipal Structures, 1998 (Act No. 117 of 1998) and comprises 11 wards (Munerha & Chili, 2011). The total area of Maphumulo is 894 km² (Department of Agriculture and Environmental Affairs (DAEA), 2013).

Figure 3.1: Maphumulo Municipality Map

Google Maps (2016)

3.3.1 Geophysical aspects

This section describes the geophysical aspects of the study areas. These include the topography, climate, vegetation, soils and land use of Maphumulo Local Municipality in general.

3.3.1.1 Topography

The topography of Maphumulo Local Municipality includes of rugged terrain with deeply incised valleys (Munerha & Chili, 2011). This terrain makes it difficult for farmers to implement a number of agricultural projects due to the steepness in certain areas. Furthermore, farmers require large pieces of land for farming. On the other hand, parts with valleys give farmers an opportunity to access water from bigger rivers such as UMvoti River and UThukela River, which has been a water source during the drought season (Enterprise iLembe, 2013). The rugged terrain in some areas is alsomade up of steep slopes and occasional broad valley systems some of which have significant wetlands that serve the purpose of providing water within the communities of Maphumulo (DAEA, 2013).

3.3.1.2 Climate

The climate in Maphumulo Local Municipality is generally favourable for most agricultural practices. The low incidence of frost and the relatively high rainfall creates an environment favourable for crop production. Furthermore, the rainfall of Maphumulo Local Municipality ranges from 644 to 1 280 mm in summer and it differs according to the type of vegetation (Enterprise ILembe, 2013. The mean annual temperature is 18.4˚C. Summers are warm to hot and winters mild. Moderate frosts are experienced occasionally Maphumulo Local Municipality IDP, 2013/2014). Occasional droughts are a climatic hazard. The mean annual temperature is 17.9˚C and light frost is recorded occasionally (IDP, 2009/10).

3.3.1.3 Vegetation

The following vegetation types occur in Maphumulo Local Municipality: Eastern Valley Bushveld; KwaZulu-Natal Coastal Belt; KwaZulu-Natal Hinterland Thornveld; KwaZulu-Natal Sandstone Sourveld; Midlands mist-belt; and Ngongoni Veld (DAEA, 2013).

According to DAEA (2013), the KwaZulu-Natal Hinterland Thornveld occurs in Wards 2, 3, 5, 6, and 11. The KwaZulu-Natal Sandstone Sourveld occurs in Wards 2, 5, 6, 10 and 11.

The Ngongoni Veld occurs in Wards 3, 4, 5, 6, 7, 8, 9, 10 and 11. This type of vegetation is an ideal for sheep, cattle and goat farming.

3.3.2 Socio-economic status

This section briefly describes the socio-economic status of Maphumulo Local Municipality in general. These include population distribution, unemployment, education, infrastructure, and economic activities.

3.3.2.1 Population and unemployment

According to Census (2011) in 2011 the population was recorded at 96 724 people. The municipal population is largely composed of youth, which at 55%, is a significant proportion of the total population. The unemployment rate has declined. In 2011 it was recorded to be 49% compared to 76% in 2001 (Maphumulo Local Municipality IDP, 2013/14). Several factors could have influenced this change such as migration of people out of the area in pursuit of better economic opportunities in areas such as Stanger and Durban. Census (2011) mentioned that unemployment still remains high and measures need to be put in place to eliminate the dependency on government programmes (Maphumulo Local Municipality IDP, 2013/14).

3.3.2.2 Education

According to the information received from the Department of Education's Maphumulo District Office, the local municipality has 74 primary schools, 36 secondary schools and 40 Adult Based Education Training (ABET) centres. Schools in Maphumulo Local Municipality are dispersed and are often difficult to access due to the rugged terrain, poor roads, and dangerous river courses. There are no tertiary education facilities in the municipality which is reflected by the low proportion of the population with a tertiary qualification (0.4%) (Enterprise iLembe, 2013). These low levels of education are a major constraint for future development as in relation to agricultural activities, one should be able to adopt and understand innovations brought to community by various departments. These records impede improvement in the standard of living as there are limited employment opportunities in the municipality. The high percentage of people with low levels of education is likely to affect household income and result in household food insecurity (IDP, 2009/10).

3.3.2.3 Infrastructure

Maphumulo Local Municipality has been faced with the challenges of building access roads to all of its outlying areas. As a result, the municipality has sourced funds and constructed community roads, which has improved easy access of markets for farmers residing in remote rural areas of municipality. The renovated community halls have provided the farmers with an opportunity to work in a conducive environment. The municipality has also succeeded in sourcing funds that will assist in the electrification of certain areas in Maphumulo. They are also trying to source funds to deal with the backlog of electricity in the area. The electrification will assist in most of the agricultural projects, especially Agri Hubs and will ensure that harvested crops can be safely stored and refrigerated before selling. One of the challenges in the area is adequate water supply (Maphumulo Local Municipality IDP, 2013/14). This challenge is being addressed by the installation of water pipes that run through Maphumulo. As the province is experiencing a severe drought, the installation of water does not cover agricultural activities (irrigation schemes) for the moment as there is shortage of water even in the bigger rivers like uThukela and uMvoti.

3.3.2.4 Economic activities

Maphumulo has a natural environment that has the potential to contribute to economic development through tourism promotion and development. The town of Maphumulo is the centre of formal activities and provides support services and facilities to its hinterland. Cultivated land is dominated by subsistence agriculture with the main crops being sugar cane, maize, sorghum, and vegetables. From a spatial development perspective, the town of Maphumulo is the primary development node and the socio-economic situation of the area has seen reduction in the number of the unemployed individuals. The natural environment such as the hot springs at Kwashushu, and the historical mountains of Inyamazane and Sabuyaze have the potential to contribute to economic development through tourism promotion and development.

3.3.2.5. Agricultural potential

Maphumulo generally has a low agricultural potential although there are areas with high agricultural potential. Approximately 50% of the area is only suitable for grazing and 11% is wholly unsuitable for agricultural activities (Ilembe, Environmental Management Framework (EMF), 2012). Enterprise Ilembe (2013) found that land of good agricultural potential in the Maphumulo Local Municipality consists of approximately 8690 ha which is approximately

10% of the total land area of the municipality. However, the soils appear to be largely prone to erosion and this would require intensive land-care practices (Enterprise iLembe, 2013). Poor land-care is likely to result in severe erosion, land degradation, and the consequent reduction of the productivity potential of land in the municipality. According to KZNDARD (2012) Lime is not encountered regularly in any part of the landscape. The Maphumulo soils formation sandy, loamy and silt soils which has different agricultural potential (KZNDARD, 2012). These types of soils are highly erodible with excessive drainage and highly infiltration rots. In addition, they require a high level of management under production and can respond well (Maphumulo Local Municipality IDP, 2013/14). In some parts of Maphumulo there are shallow and deep soils of the Oakleaf form (KZNDARD, 2012). According to Steenekamp, (2013) these type of soils are shallow to deep (400-1200 mm), brown to dark brown, structured, calcareous, clay loam to clay soils on flat drainage zones and incised riverbeds (footslopes and valley bottoms, 2-10% slopes); with moderate to high erodibility. The agricultural potential is therefore between low and very low.

3.4 Research design

This section describes the research design that was adopted in this study. The sub-section will present and describe the following: research approach, survey processes, units of analysis, sampling procedures and sample sizes.

3.4.1 Quantitative approach

The research design is a descriptive approach that encompasses quantitative research methods (Scrimshaw, 1990). De Vos (2002) stated that a researcher could use a descriptive design combined with quantitative methods and in this study the researcher decided to use only quantitative data on household demographics; socio-economic characteristics of households; perceptions of government food security programmes; and information on the food security status of the households. Furthermore, Creswell (1994) stated that the descriptive method of research is to gather information about the present existing condition. The researcher used the descriptive approach because it is describing rather than judging or interpreting the situation. The researcher used this method to make rational and sound conclusions and recommendations for the study. The study was carried out in three phases; the inception, orientation and a survey.

3.4.2 Inception phase

Permission was obtained from the respective authorities (for instance from district officials).

3.4.3 The orientation stage

The orientation stage involved a visit to the study areas. During this phase informal discussions were held with the study participants. During this phase, the researcher explained the main objectives of the research project to the village leaders and the agricultural extension officials. The aim of this phase was to familiarise the research study areas, to preliminarily interact with the participants and to identify key issues (Lategan, 2003). Permission to conduct the research was sought from the community leadership during the orientation period.

3.4.4 The survey

The third stage was the actual survey whereby the participants were interviewed and the set of questions on a questionnaire form were answered by participants. Research assistants completed this task on the following timeline: in Ward 10, participants were interviewed on the 9th & 10th of November 2015, in Ward 3 there were interviewed on the 11th and 12th of November 2015 while in Ward 6 they were interviewed on the 13th of November 2015. A questionnaire was designed as an instrument for primary data collection and the questions included in the questionnaire related to the research questions highlighted in Chapter 1. The researcher used a questionnaire because many food security studies use this data collection tool. The questionnaire was designed to collect quantitative data. The basic objective of a questionnaire is to obtain facts and opinions about a phenomenon from people who are informed on the particular issue (Strydom *et al.,* 2005). Details of the data collection instrument are explained in *Section 3.4.8.*

3.5 Measurement of variables (data)

Several variables were used in establishing household food security and participation in food security intervention programmes in Maphumulo Local Munipality. These are explained in the sections that follow.

3.5.1 Dependent variable

The dependent variable/s in this study were the household food security status (household dietary diversity and consumption approach) for the second objective and the participation in government intervention programmes for the third objective (*see Section 3.11*).

3.5.2 Independent variables

The independent variables for the study were guided by literature and included the following: age, marital status, gender, household size, farm size, farm land size, employment satus, household income, access to extension services, access to credit, education, household's experience in farming, livestock farming, government support, infrastructural support (irrigation scheme/water sources) household perception on the food security intervention programmes, household food security status, satisfaction with previous government agricultural programmes and participation in other intervention programmes. These independent variables are further explained in the sections that follow.

3.5.2.1 Explanatory variables used in the binary logistic model and their expected outcomes

This section sets out the explanatory variables that were used in the binary logistic model (further discussed in *section 3.5.2.2*) as factors influencing the households' food security status and factors influencing a household's decision whether to participate or not to participate in other government intervention programmes and their expected outcomes respectively. Table 3.1 shows the explanatory variables used in the binary logistic model on factors influencing the household's food security status and their expected outcomes.

Age

Age was measured as a continuous variable (actual years) of the respondent. Age in this study was Hypothesised to have a negative effect on the food security status of a household. According to Dlova, Fraser and Belete (2004) age is one of the factors that can have a negative effect on the success of the farm. Dlova *et al.* (2004) also postulated that younger farmers are early adopters of new technology which may thus improve food security.

Table 3.1: Explanatory variables used in the binary logistic model on factors influencing the households' food security status and their expected outcomes.

Explanatory Variable	Variable description	Type of measure	Expected outcome (+/-)
Age	Age of respondent	Actual number of years	-
Gender	Gender of respondent	Dummy (1=male, 0 = female)	+/-
Education	Highest education level of respondent	Categorical; 1=No formal education, 2=primary, 3=secondary, and 4=tertiary	+
Employment status	Employment status	Dummy (1=employed, 0=unemployed)	+/-
Household income	Household income	Continous	+
Household experience in farming	Farming experience	Continous	+/-
Marital status	Marital status	Catergorical; 1=Single, 2=married & 3=divorced	+
Family sizes	Household/family size	Continous	+
Access to credit	Whether the household has access to credit or not	Dummy (1=yes, 0 = no)	+
Farm size	Size of the farm	Continous	+
Receiving extension support	Whether the household received extension support services or not	Dummy (1=yes, 0 = no)	+
Practise livestock farming	Whether household practise livestock farming or not??	?Dummy (1=yes, 0=no)	+
Infrastructural support	Whether household receive this type of support or not	Dummy coded (Yes=1, 0 =Otherwise)	+

Author (2016)

Gender

Gender was measured as a dummy variable (male was coded with 1 and female coded with 0). Gender was Hypothesised to have either a negative or positive effect on the food security status of a household. Elias *et al. (*2013) pointed out that if both men and women have more equal participation in agriculture, production may be enhanced and thus the food security status.

Education

Education was measured categorically (no formal education was coded with a numeric value 1, primary education was coded with 2, secondary education was coded with as 3 and tertiary education coded as 4). Education was Hypothesised to have positive effect on the food security status of the household. According to Nnadi and Akwiwu (2008) an educated farmer is emore likely to be engaged in agricultural projects in order to put into practice the knowledge he/she may have acquired in school.

Employment status

Employment status was measured as a dummy variable (being employed was coded with a numeric value 1 and being unemployed coded with 0). This variable was Hypothesised to have a positive effect on the food security status of a household because if someone is employed, they are more likely to be food secure than an unemployed person.

Household income

Household income was measured as a continuous variable. Household income was Hypothesised to have a positive effect on the food security status of a household because household food security depends substantially on household income and asset (wealth) status. Jacobs (2009) agreed that the food security status of a household depended substantially on household income and asset (wealth) status. A financialyl unstable household experiences food shortage more frequently than a financially stable household. Food demand consumes a great deal of a poor household's budget, resulting in a household being sensitive to high food prices.

Household experience in farming

Household experience in farming was measured as continuous variable. Household experience in farming was hypothesised to have positive or negative effect on food security Kuwornu *et al*. (2011) noted that household experience in farming is regarded as the period the rural farmer has been involved in farming. An experienced household is more likely to have farming experience based on knowledge and skills in agribusiness thus minimise the negative effect on his or her food availability.

Marital Status

Marital status was measured catergorically (single was coded with a numeric value 1, married was coded with 2 & divorced was coded with 3. Marital status was Hypothesised to have positive effect on the food security status of the household. Etwire (2013) noted that the reason for a higher percentage of married respondents is because most rural people, especially women get married at an early age and then stay at home to look after the children or engage in agricultural activities to increase food availability in the household while men often migrate to urban areas in search of employment.

Family sizes

Family size was measured as continuous variable. Family size was Hypothesised to have positive effect on food security because a large family household can easily participate in an agricultural project while delegating other important activities to other household members (Etwire *et al.* 2013).

Access to credit

Access to credit was measured as a dummy variable (Access to credit was coded with a numeric value 1 and no access to credit coded with 0). Access to credit was hypothesised to have a positive effect on food security because, when obtained on time, production credit could increase the chances of household to acquire productive resources (seeds, fertilizers, pesticides and others) which will boost production and improve the food situation in the household (Kuwornu *et al.,* 2012).

Farm size

Farm size was measured as continuous variable. Farm size was Hypothesised to have a positive effect on food security because access to land is a key strategy to reducing rural poverty and ensuring food security.

Receiving extension support

Receiving extension support was measured as dummy variable (if the household received extension support was coded with a numeric value 1 and if otherwise coded with 0). Receiving extension support was Hypothesised to have a positive effect on the food security status of a household because the role of extension officers becomes significant in fully disseminating information between the government and farming households and thus resulting in improved food security status of households (Abdu-Raheem & Worth, 2011).

Practise livestock farming

The practise of livestock farming was measured using the dummy variable (Yes coded with 1 and No coded with 0). Gebrehiwot (2008) mentioned that rural households that are engaged in smallstock farming keep livestock to assist with accessing cash during times of need for food and other household items.

Infrastructural support (irrigation scheme/water sources)

Irrigation support was measured by using the dummy variable (receiving irrigation support was coded with a numeric value 1 and if otherwise coded with 0). Farmers on the irrigation schemes have a higher probability of being food secure than dryland farmers. Irrigation reduces the risk of crop failure and the increment in yields can be substantial if properly managed (Sikwela, 2008).

3.5.2.2 Explanatory variables used in the binary logistic model (factors influencing the participation in other food security intervention programmes) and their expected outcomes

Table 3.2 shows the explanatory variables used in the binary logistic model on factors influencing the households' participation in government intervention programmes and their priori expectations.

Table 3.2: Explanatory variables of the binary model on factors influencing the participation in other food security intervention programmes and their expected outcomes

Variable	Variable description	Type of measure	Expected outcome (+/-)
Dependent Participation	Participation in food security intervention programmes	Dummy (1= Yes, 0 =otherwise)	
Explanatory			
Age	Age of the respondent	Actual number of years	-
Gender	Gender of the respondent	Dummy (1=male, 0 = female)	+/-
Education	Highest education level of the respondent	Categorical; (0= non formal education, 1= primary, 2= secondary and 3 =tertiary)	+
Marital status	Marital status	Categorical; 1=single, 2=married & 3=divorced	+/-
Household experience in farming	Farming experience	Continuous	+/-
Household size	Household/family size	Continuous	+
Access to credit	Whether the household has access to credit or not	Dummy (1=yes, 0 = no)	+
Farm size	Size of the farm	Continuous	+
Access to extension	Whether the household has access to extension	Dummy (1=yes, 0 = no)	+

	services or not		
Government support	Whether the farmer receives farm inputs from the government	Dummy (1=yes, 0 = no)	+
Employment status	Employment status of the household head	Dummy (1=employed, 0 = unemployed)	+
Infrastructural support (irrigation scheme/water sources)	Type of support in terms of water sources or equipment for irrigation	Dummy coded (Yes=1, 0 =Otherwise)	+
Household perceptions on the food security intervention programmes	Whether the household perceived the programme to be good or poor.	Dummy coded (good=1, poor=0)	+
Household food security status	Whether the household is food secure or food insecure	Dummy (1=households food secure, o=food)insecure	+

Author (2015)

Age

Age was measured as a continuous variable (actual number of years) of the respondent. Food and Agriculture Organization (2012a) mentioned that older farmers are usually more experienced and endowed, hence they may have either experienced or observed the benefits of participating in agricultural projects. According to Dlova, Fraser and Belete (2004) age is one of the factors that can have a negative effect on success of the farm. Dlova *et al.* (2004) noted that younger farmers are early adopters of new technology due to their willingness to explore modern methods.

Gender

Gender was measured as a dummy variable (male coded with a numeric value 1 and female coded with 0). Gender was Hypothesised to have either a negative or positive effect on participation by households in food security programmes. Oladejo *et al.* (2011) did not, however, observe any significant relationship between age and participation in agricultural projects. Nxumalo and Oladele (2013) observed that male farmers are more likely to participate in agricultural projects than female farmers. However, Nnadi and Akwiwu (2008)

did not find any significant relationship between gender and farmer participation in agricultural projects.

Education

Education was measured categorically (no formal education was coded with a numeric value 1, primary education coded with 2, secondary education coded with 3 and tertiary education coded with 4). Education was Hypothesised to have a positive effect on participation by households in food security programmes. Education is expected to positively influence a household's ability to source and decipher information, including information on available agricultural projects and the benefits of participating in such projects. According to Nnadi and Akwiwu (2008), the level of education (years of schooling) affects the use of information efficiently and can influence the participation in intervention programmes (Dlova *et al.*, 2004). According to Nnadi and Akwiwu (2008) educated farming households are more likely to participate in agricultural projects in order to put into practice the knowledge they may have acquired in school.

Marital status

Marital status was measured as a categorical variable (single coded a numeric value 1, married coded with 2 and divorced coded with 3) . Marital status was Hypothesised to either have a positive or a negative effect on the participation in food security intervention programmes. Etwire *et al.* (2013) found that a married farmer may have access to information and resources from the spouse and may therefore be more likely to participate in an agricultural project compared to a farmer who is not married. Nnadi and Akwiwu (2008) noted that marriage increases a farmer's concern for the household's welfare and food security. This is therefore likely to have a positive effect on their decision to participate in an agricultural project. However, Oladejo *et al.* (2011) found a negative relationship between marriage and a farmers' participation in agricultural projects.

Household experience in farming

Household experience in farming was measured as continuous variable. This variable was Hypothesised to either have a positive or a negative effect on the participation in food security intervention programmes. Altman, Hart and Jacobs (2009) mentioned that the effect of farming experience on participating in intervention programmes could be either positive or

negative. Generally, it would appear that up to a certain number of years, farming experience would have a positive effect but after that, the effect may become negative possibly due to old age.

Access to credit

Access to credit was measured as a dummy variable (access to credit coded with a numeric value 1 and otherwise coded with 0). Access to credit was Hypothesised to have a positive effect on the participation in food security intervention programmes because, when obtained on time, production credit could increase chances of a household acquiring productive resources (seeds, fertilizers, pesticides and others) which will boost production and improve the food situation in the household (Kuwornu *et al.*, 2012). Access to credit is expected to have a positive influence on the decision to participate in an agricultural project (Etwire *et al.* 2013). However, Oladejo *et al.* (2011) did not find any significant relationship between access to credit and participation in agricultural projects.

Farm size

Farm size was measured as continuous variable (actual size of the land) of the respondents. The relationship between farm size and the farmer's decision to participate in an agricultural project is expected to be positive. According to Etwire *et al.* (2011) farm size may be a proxy for level of commercialisation, hence farmers who decide to cultivate an additional hectare of land are usually moving away from subsistence production and are therefore more likely to participate in an agricultural project in order to have access to inputs, technology and output market.

Receiving extension support services

Access to extension services was measured as dummy variable (Yes coded with a numeric value 1 and all other answer with 0). Access to extension services was Hypothesised to have a positive effect on the participation in food security intervention programmes because the role of extension becomes very significant in fully disseminating information between the government and farming households, thus resulting in improved food security status of households (Abdu-Raheem & Worth, 2011). Most projects collaborate with the agricultural extension services to identify farmers and to participate in their projects, thus, the likelihood

of a farmer being informed and primed to participate in a project increases if they make use of extension support services.

Family size

Family size was measured as a continuous variable. This variable was Hypothesisedto have a positive effect on the participation in food security intervention programmes. Altman *et al (*2009) stated that a bigger household size is associated with an increased demand for food, thus encouraging engagement in subsistence production as a way of feeding a larger group of dependents. Furthermore, a large family household can easily participate in an agricultural project while delegating other important household activities to other family members (Etwire *et al.*, 2013).

Government support

This variable was captured in a dummy format. Where a farmer received any form of government support, this was coded with a numeric value 1 and all other answers were coded with 0. Government support can be in any form of funding or input support which includes seeds, machinery and anything else that contributes to improving output at farm level. The expected outcome is that farmers who received any form of government support are expected to participate in food security programmes and are more likely to be food secure. This statement was supported by Cargills Incorporate (2014) which found that providing support to farming households is essential to help them to fulfill their expanding role in feeding the hungry and fighting malnutrition.

Employment status

Employment status was measured as a dummy variable. (If the the household head was employed, this was coded with numeric value of 1 and all other answers were coded with 0). It was Hypothesised that employment (or lack thereof) has negative or positive effects on participation food security. For example, if someone is employed they may not have spare time to attend food security intervention programmes whilst those who are unemployed have a lot of time so they are capable of attending the food security intervention programmes. However, Kakumba and Nsingo (2008) stated that the weak financial position of local communities not only reduces the capacity of communities to participate in development projects, but also affects the whole process of rural development.

Infrastructural support (irrigation scheme/water sources)

Infrastructural support was measured as dummy variable (if the respondent was receiving infrastructural support in terms of access to irrigation scheme, this was coded with a numeric value 1 and if otherwise coded with 0). Infrastructural support was Hypothesised Hypothesised to have a positive effect on the participation in food security intervention programmes. According to Machethe *et al.* (2004) observation from some of the irrigation schemes leads to the conclusion that, given access to support services and well-functioning irrigation schemes providing reliable supply of irrigation, farming households and rural people are keen to participate. In well-functioning irrigation, it is unlikely that land will be left idle and farmer absenteeism is rare.

Household perceptions on the food security intervention programmes

Household perception on the food security intervention programme was measured as a dummy variable (if the household perceived the programme to be good coded with a numeric value 1 and if poor coded with 0). Household's perception on the programme was Hypothesised to have either a negative or a positive effect on the participation in food security intervention programmes. Participation of a household in new intervention methods may depend on the household's satisfaction with previous programmes (Zokwana, 2014).

Household food security status

Household food security status was measured as a dummy variable (if the household was food secure, it was coded with 1 numeric value and if food insecure was coded with 0). Households food security status was Hypothesised to have a positive effect on the participation in food security intervention programme. Pimentel *et al.* (1993) pointed out that agriculture is important for food security in two ways: it produces the food that people eat and it provides the primary source of livelihood for 36 percent of the world's total workforce.

3.6 Theoretical framework

A theoretical framework is a model that hold or support a theory of a research study. This section presents the theoretical framework underpining this study and is divided into two sections. The first section covers the theoretical framework on food security under which the study is considered and the second part presents the concept of participation.

3.6.1 Food security theoretical framework

The following food security theoretical framework was used in the presentation of three frameworks for the analysis of food security.

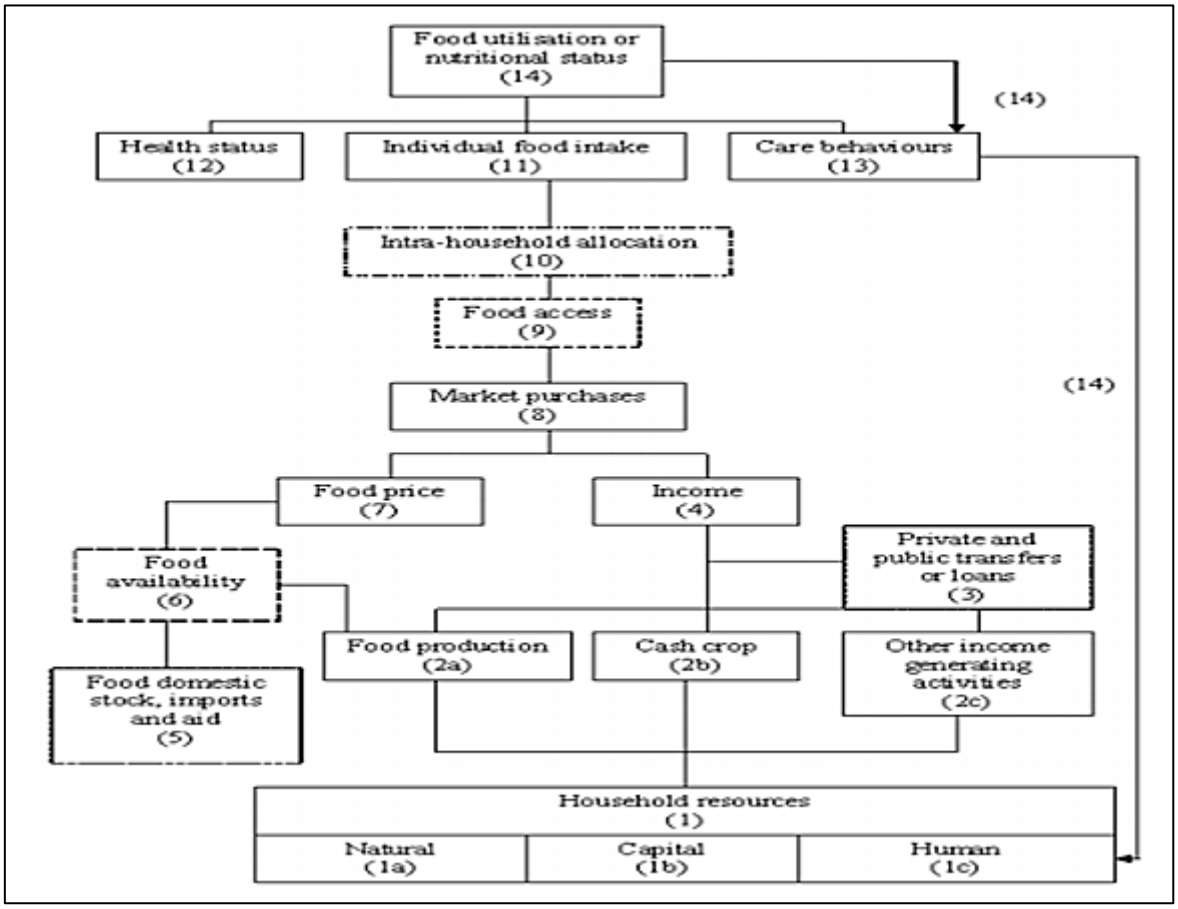

Figure:3.2 Food security conceptual framework

Anonymous (undated)

Figure 3.2 shows link between the three basic concepts of food security that is food availability, access and utilization. Food access within the household affect individual food consumption pattern which affect health status. This could affecting labour productivity and the potential for the household to earn income. According to this framework, development project aimed at enhancing food security can be classified as interventions designed to improve the level of household food security. Therefore for this study this theory was ideal for guidance and assistance in collection relevant data and for the analysis. In addition Islam *et al.* (2016) noted that the balance between food demand and food supply does not mean that all households in the nation are food secure because for an individual to be food secure there

should be a consistency in food intake which solely rely on individual specific needs and preferences.

3.6.2 The concept of participation

Fhika (2015) noted that theories are formulated to explain, to predict, and to understand phenomena. In many cases, a theory is adopted to challenge and to extend existing knowledge within the limits of critical bounding assumptions, and defines the concept that give clarity on the research problem under study. The study was reinforced by the Game Theory of Participation which highlights the common deed behind individual decision-making in a communal exploit, causative to the shared good (Dorsner, 2004). Since this study is concerned with the participation of rural population in the process of development planning in rural areas in Maphumulo, the researcher used the Game Theory of particcipation to help in understanding how participation or non-participation in rural development projects occurs, with particular reference to the rural population of Maphumulo.

Lack of access to credit prevents poor households in developing countries from diversifying into income generated activities that could safeguard them against unforeseen shocks & seasonality, leaving them vulnerable to limitations. More over, participating in food security programme increases calories availability at both intensive and extensive margins. Furthermore, participation initially has either no effect on food security or may actually worsen it, before improving it in the longer run. Although, Islam (2016) noted that participation in a programme increases calories availability at the both intensive and extensive margins.

3.7 Study population

The study targeted both households that had participated in the "One Home One Garden" intervention programme in Maphumulo Local Municipality and the non-participating households. According to Maphumulo Agricultural local office's distribution list for 2014/2015, there were 750 beneficiaries of the "One Home One Garden" initiative in the study areas.

3.8 Sampling procedures

Sampling is described as a process, which involves a selection from a population, or interest groups that will lead one to form generalisation about the results where the sample was taken (Creswell, 1994). To ensure equal representation, the researcher used proportionate stratified sampling this was from the ***combined*** homogenous population of 1125 farming households in the study area. The researcher classified the respondents into "One Home, One Garden" participants (330) and non-participants in food security intervention programmes (165) .

3.8.1 Proportionally stratified random sampling

Proportionally stratified which is classified as a probability sampling procedure and the advantage is that stratified sampling permits the researcher to identify sub-groups within a population and create a sample which mirrors these sub-groups. Such a sample is more representative of the population across these sub-groups (Yount, 2006). The researcher acknowledges the use of probability sampling method as to measure variables and generalise findings obtained from a representative sample from the total population. The study population was clearly defined according to age, sex, marital status, size of the household and other variables.

3.8.2 Sample size

Since the particular focus of the study was on the "One Home, One Garden" beneficiaries and non-participants, the targeted number of "One Home One Garden" participants was 330 and the targeted number for non-participants was 165. To estimate an appropriate or required sample size, the researcher used a 5% margin of error and a confidence level of 95% which is the accepted standard in quantitative research (Schrijver, 2013). An online sample size calculator/ resource was used. This sample size resource is available on: https://www.checkmarket.com/2013/02/how-to-estimate-your-population-and-survey-sample-size/. Using this sample size calculator, the required sample size for the "One Home One Garden" participants was 330 participants (110 households from each ward) which can be deemed a representative sample taken from a total population of 750 households that participated in the "One Home One garden" initiative. For non-participants, the researcher managed to get 165 respondents. The total sample size (number of resopents) in this study was therefore 495.

3.9 Research instrument

This section presents information pertaining the research instrument that was used in capturing data from the respondents.

3.9.1 Questionnaire

A questionnaire is a primary tool in collecting necessary information from the respondents in a survey. By making the right choices on the type of survey questions, the researcher is able to extract data that is related to the purpose or goal of the survey. Generally, there are four types of questions: closed-ended questions, open-ended questions, matrix questions and contingency questions. This study employed mostly closed-ended questions. Closed-ended questions limit the answers of the respondents to the answer options provided on the questionnaire. This has the advantage that they are time-efficient; responses are easy to code and interpret and therefore this type of question is ideal for quantitative type of research (Sincero, 2012).

However, these types of questions may influence respondents to choose a response that does not exactly reflect their answer. To deal with the problem, the researcher also used open-ended questions. Open-ended questions have no predefined options or categories included. Here the participants are free to supply their own answers. The advantage is that participants can respond to the questions exactly how they would like to answer them and the researcher can investigate the meaning of the responses (Rodriguez, 2007). However, open-ended questions have the disadvantage of being time-consuming and responses can be difficult to code and interpret. In addition to the above, matrix questions, closed-ended type of questions and contingency questions were used.

Contingency questions are questions answered only when the respondent provides a particular response to a question prior to them. Asking these questions effectively avoids asking people questions that are not applicable to them. The questionnaires were translated to isiZulu because the respondents are Zulu speaking people.

3.10 Data collection

The training of research assistants is important to standardise data collection to minimise variations in data collection procedures that may bias the results (Mugenda & Mugenda, 2003). Four research assistants were trained to help collect data from the 3 wards of the study

area. Each research assistant was assigned a sub-location (the researcher conducted the study in Maphumulo Local Municipality). The researcher trained the research assistants by engaging them in rehearsal sessions on question asking, probing skills and translating questions into IsiZulu. The researcher engaged the research assistants on research etiquette such as introducing themselves to the respondents and clarifying the purpose of the study to respondents to create a good rapport before embarking on the actual study. The research assistants were also trained on how to summarise lengthy responses into short summaries to avoid information overload and to ensure that the responses fitted in the response spaces in the questionnaire. More over, during data collection, the researcher employed participant observation, where the researcher made full and accurate notes of what went on. These notes included both empirical observations and interpretations of them.

Secondary sources or analyses were used as data collection methods in this study to collect preliminary data from the books, journals and other available documents from the internet and the library. This assisted the researcher to gain a clear background on the issues of food security in rural areas and helped the researcher to formulate relevant interview questions and questionnaire.

Questionnaires were conducted at household level according to the wards and the dates scheduled for data collection as mentioned earlier. The question sessions lasted between 15 minutes to 1 hour and six focus groups were organised with at least one community leader present for each ward. It is best to see that there is a community leader present or a person with authority to ask for permission and their involvement (Yangon & Myanmar, 2005). The previously mentioned Izinduna were present at the venues to represent their tribal authority during data collection.

Quantitative data was collected using a pre-tested questionnaire which included household characteristics such as demographics (sex, age, education, marital status); farm specific characteristics (number and class of livestock, crops grown and hectorage); food and non-food expenditure; 24 hour recall food security questions; extension support; employment; income; agricultural activities; and factors affecting the food security status and participation in intervention programmes.

The questionnaires were interviewer-administered to alleviate the problem of misinterpretations or misunderstandings of words or questions. Structured interviews standardise the order in which questions are asked, so the questions are always answered within the same context (Kvale, 1996).

3.10.1 Household Dietary Diversity Score (HDDS)

Obtaining detailed data on household food access or individual dietary intake can be time consuming and expensive, and requires a high level of technical skill both in data collection and analysis (Rodriguez, 2007). This type of method enabled the researcher to obtain the viable information based on the nutritional quality of an individual's diet, Household dietary diversity is the number of different food groups consumed over a given reference period and questions on dietary diversity can be asked at the household or individual level, making it possible to examine food security at the household and intra-household levels. Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods, and is a proxy for nutrient adequacy of the diet of individuals (FAO, 2012).

The dietary diversity questionnaire represents a rapid, user-friendly, and easily administered low-cost assessment tool (Grobler, 2013). Scoring and analysis of the information collected with the questionnaire is straightforward. The indicators of household food insecurity here are dietary diversity, food frequency and food sources (Grobler, 2013).

In the study the information concerning the type of foods consumed among the households within a 24-hour recall were collected. This assisted the researcher to determine household dietary diversity. This information was collected from the person who is responsible for household food preparation. Thereafter food items were grouped into food groups. Household food consumption patterns were influenced by household income; availability of foods at household level; type of crops cultivated; agricultural potential status of the land; sizes of households farmlands; and foods preferences (Agriculture and Consumer Protection, 2010).

The household dietary diversity score (HDDS) is used as a proxy measure of the socio-economic level of the household and the scoring is based on 12 food groups (Swindale & Bilinsky, 2006). An increase in the average number of different food groups consumed provides a quantifiable measure of improved household food access (Swindale & Bilinsky, 2006). In general, any increase in household dietary diversity reflects an improvement in the

household's diet. This information was obtained by asking questions on food groups consumed at household level. In order to use this indicator to assess improvements in food security in a performance-reporting context, the changes in HDDS was compared to some meaningful target level of diversity.

First, the HDDS variable was calculated for each household. Tabulation of the HDDS was done by hand or with the aid of computer software such as a database or spreadsheet. Dietary Diversity Scores were calculated by summing the number of food groups consumed in the household or by the individual respondent over the 24 hrs recall period (FAO, 2012b). The value of this variable ranged from 0 to 12. For the total number of food groups consumed by members of the household, values for example of different food groups were assigned letters from A through L and coded either "0" or "1." The HDDS for each household is then the sum of food group values (equation 1):

$$HDDS = (A + B + C + D + E + F + G + H + I + J + K + L) \quad (1)$$

According to Rajendran (2012), there are no established cut-off points in terms of the number of food groups which indicate adequate or inadequate dietary diversity for the HDDS. It is therefore recommended to use the mean score or distribution of scores for analytical purpose and to set the programme targets. If income data are available, the sample could be divided into three income groups (tercile of income), and the average dietary diversity calculated for the richest income tercile. The average HDDS in the richest 33 percent of households can then serve as a guide for setting the target level of HDDS (Swindale & Bilinsky, 2006). The average HDDS Indicator was calculated for the sample population as follows (equation 2):

$$\text{Average HDDS} = \frac{A + B + C + D + E + F + G + H + I + J + K + L}{\text{Number of Households}} \quad (2)$$

The dietary diversity score however does not indicate the quantity of food consumed. Diet varies across seasons and some foods may be available in large quantities and at low cost for short periods. An increase in the average number of different food groups consumed provided a quantifiable measure of improved household food access as already discussed. Therefore, households which fell above the target HDDS level were treated as food secure and those that

fell below the target HDDS level were treated as food insecure. A household's food security status was then assigned a value; one or zero, where one (1) represents being food secure and zero (0) represents being food insecure.

3.10.2 Households Food Consumption Score (HFCS)

The Household Food Consumption Score (HFCS) is a frequency-weighted HDDS (IFPRI, 2008). The HFCS can be said to be an indicator of dietary and frequency of consumption, and is calculated using the frequency of consumption of 8 different food groups (United States Agency for International Development (USAID), 2015). The HFCS was used because it captures both dietary diversity and food frequency. Household Food Consumption Score is measured using a standard 7 day food data set and by classifying food items into food groups then summing the consumption frequencies of food items within the same group (any consumption frequency greater than 7 is recoded as 7, and multiplying the value obtained for each food group by its weight). Thus, a typical formula for calculating HFCS is shown on equation (3):

HFCS = (starches*2)+ (pulses*3)+ vegetables + fruit + (meat*4)+ (dairy*4)+ (fats*.5)+ (sugar*.5) (3)

Then the weighted food group scores are added together, and finally the variable HFCS from a continuous variable are coded into a categorical variable for the food consumption groups using appropriate thresholds as follows: 0 - 21 (poor), 21.5 - 35 (borderline) and above 35 (acceptable) (FAO, 2011).

3.11 Data analysis

After collecting the data, raw data was captured and encoded in the form of spreadsheets in Microsoft Excel and exported to Statistical Package for the Social Science (SPSS) version 2.3 software for analysis.

For Objective 1, a Household Dietary Diversity Score (HDDS) and Households Food Consumption Score (HFCS) were used to assess the food security status of the interviewed households.

For Objectives 2 and 3, a binary logistic regression model was employed to determine the factors affecting a household's food security status and the factors affecting a household's participation in government food security intervention programmes in the study areas respectively.

For Objective 4, a ranking scale measure was applied to investigate rural households' perceptions of their satisfaction with how the government introduces the food security intervention programmes in Maphumulo Local Municipality. Descriptive statistics; frequencies and percentages were used in this analysis.

3.11.1 Binary logistic regression models

A binary logistic regression model was used to determine the factors that influence a household's food security status, as well as, the factors influencing a household's participation in government food security intervention programmes. The binary logistic specification is suited to models where the endogenous variable is dichotomous. The binary logistic regression model was run in two instances; 1) to determine the factors influencing the food security status of a household and 2) to determine the factors influencing households' participation in government food security intervention programmes.

The food security status of a household was proxied by the Household Dietary Diversity Score (HDDS), where households were classified into food secure (assigned a numeric value 1) and food insecure (assigned a numeric value 0). The HDDS was used due to its design that reflects the dietary diversity, on average and among all members.Participation was measured by whether a household participated in a government intervention programmes where a household participating was assigned a numeric value of 1 and a household not participating was assigned a numeric value of 0. The selection of variables likely to influence a household's food security status and participating in government food security intervention programmes relies on previous studies by Stewart *et al.* (2004), McCracken and Brandt (1987) and Redman (1980). The binary logistic regression then provides a model for observing the probability of a household being food secure or food insecure as well as the probability of a household participating in government food security intervention programmes or not.

Prob (Food Security Status) = a dichotomous dependent variable (coded with 1 if food secure, 0 otherwise) (model 1)

Prob (Participate in government food security intervention programmes) = a dichotomous dependent variable (coded with 1 if household participates, 0 otherwise) (model 2)
The binary regression model is specified as follows (equation 4):

$$Z_{i=}\, \beta_{\mu+\Sigma(}\beta_{iXki)} \qquad (4)$$

X_i represents the set of parameters that influence the food security status (model 1) and participation in government food security interventions (model 1) of the *i*th household. Z_i is the probability of participating in government food security intervention programmes (model 2) and β_0 is the intercept term, β_1, $\beta 2$, $\beta 3$,…,β_i are the coefficients associated with each explanatory variable, X_1, X_2, X_3,…,X_{ki}.

$$\mathrm{P}i = \frac{e^{zi}}{1+ e^{zi}} \qquad (5)$$

Where; P_i denotes the probability of the *i*th household food security status (model 1) and participation in government food security intervention programmes (model 2) and $(1 - P_i)$ is the probability that the household is not food secure (model 1) and the probability that the household does not participate in government food security intervention programmes (model 2). The odds ($Y = 1$ versus $Y = 0$) were used to define the ratio of the probability that a household is food secure (P_i) to the probability of not being food secure $(1 - P_i)$ (model 1) and that a household participates in food security programmes (P_i) to the probability of not being participating $(1 - P_i)$ (model 2), namely odds = $P_i/ (1 - P_i)$. Using the natural log, we get the prediction equation as:

$$\mathrm{L}i = \mathrm{In}\,(\frac{\mathrm{P}i}{1 - Pi}) = Zi \qquad (6)$$

Whereby the value of:

$$\mathrm{P}i = \left(\frac{1}{1 + e^{-zi}}\right) \qquad (7)$$

The value of Z*i* is also referred to as the log of the odds ratio in favour of a household being food secure (model 1) and participating in government food security intervention programmes (model 2) and is presented by the following regression equation:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots\ldots \beta_n X_n + \mu_i \qquad (8)$$

Where

Where Z_i = Food security status (1, if household is food secure; 0, if household is food insecure) (model 1)

Z_i = Participation in government food security intervention programmes (1, if household participates; 0, if household does not participate) (model 2)

β_0 is the vector of unknown parameters (intercept); and μi is the error term.

3.11.2 Likert scale measure

For assessing the rural households' perceptions of their satisfaction with how the government introduces the food security interventions programmes in Maphumulo Local Municipality, a Likert scale measure was used. Households were asked to indicate their perceptions on satisfaction with how the government introduced the food security interventions programmes in Maphumulo Local Municipality by ranking or rating their satisfaction as follows: 1 - if very dissatisfied; 2 - if dissatisfied; 3 - if moderately satisfied (indifferent); 4 - if satisfied; 5 - if very satisfied.

3.12 Ethical considerations

Although the study does not fall into any category that requires special ethical obligations, the researcher considered the standard research ethics as follows:

3.12.1 Informed consent

Informed consent is when a researcher or an investigator seeks agreement to conduct a study on a certain object. In this case it was the researcher seeking agreement from the respondents (farmers) to conduct a survey about the study. The researcher provided sufficient information

to allow participants to decide whether or not they want to take part in the research study. The consent form was signed by participants to give clear evidence of their willingness to participate.

3.12.2 Confidentiality

The respondents were informed of the (confidentiality clause) a part of an agreement in which the researcher and respondents involved in the study agreed not to give particular information to other people or parties. This was fully explained to them and they were told that participation is voluntary and that they could withdraw from the research if they wished to at any time.

3.12.3 Privacy and anonymity

Privacy is an important aspect in research. The respondents were informed that the collected data would be used for this study in particular and their names or information would not identify respondents in any publications or presentations.

3.12.4 Acknowledging and referencing sources

The researcher avoided plagiarism by acknowledging the ideas, designs and writings that are not original. The researcher referenced the work accurately according to the Harvard Referencing style.

3.12.5 Honesty

Presenting factual information when conducting a study is one of the most important ethical obligations which validate the study findings. As a result, the researcher needs to be honest when presenting the findings of the study. The researcher avoided fabrication and lying about research data, and the results were kept original.

3.12.6 Authorities

The researcher explained to the Traditional Authorities, government departments through Operation Sukuma Sakhe and local municipality the purpose and the importance of the research, and why their areas were selected as the study choice and the researcher looked for the authority to conduct the research from local community.

3.13 Chapter summary

The chapter presented and described the selection of the study sites and the research methodology employed for the study. The study was carried out in Maphumulo Local Municipality in ILembe District of KwaZulu Natal. The study design was more of a quantitative nature and it enabled the researcher to investigate household food production, household food consumption patterns, and household food sources. A proportional random sampling method was used in acquiring information from a sample of 495 farming households (participants of the "One Home One Garden" initiative and non-participating households). Respondents of the study were household heads and principal caregivers of the households. A binary logistic regression model was used for empirical analysis. Lastly, the study described the ethical procedures which were followed in recruiting the respondents. The next chapter provides the descriptive results and discussions on the household demographics and information on variables that influence the food security status and participation in food security intervention programmes.

CHAPTER 4: DESCRIPTIVE RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents and discusses the descriptive results of the study. Firstly, the chapter begins by describing the household demographics. The focus is then shifted to household food production; household food consumption patterns; household sources of food, household food security status; and socio-economic factors influencing the household food security status. These sections will give a deeper understanding of household food consumption and security, as well as the type of food groups preferred by the respondents.

Based on the results, the respondents in the study area engaged in farming which makes the data collected for descriptive analyses interesting, on the basis that most of the households are aware of food security issues. Furthermore, an analysis of the HDDS and HFCS are given in this chapter. These calculations were useful in estimating both the food consumption and the food security status of households in the study areas. Lastly, the chapter concludes by giving an overview of the various challenges and coping strategies which farming households experience on a daily basis in trying to deal with food insecurity issues. In general, the study targeted 495 respondents (330 participants and 165 non-participants of the "One Home One Garden" project. The response rate was representative of the target population, and enough to conduct the analysis. The following section presents the household demographic information of the respondents

4.2 Household demographic information

The demographic characteristics of the study presented in this section include factors like age, gender, highest education level, marital status, employment status and household sizes.

4.2.1 Age of respondents

Table 4.1 shows the age of the respondents. Age was considered an important factor because it can influence a household's food security status and participation in intervention programmes.

Table 4.1: Distribution of the "One Home One Gardern" participants & non-participating households by their age cohorts

Age (years)	"One Home One Gardern" Paricipants		Non- participants	
	Frequency	Pecentage (%)	Frequency	Percentage (%)
20-35	34	10.30	10	6.06
36-45	42	12.72	22	13.34
46-55	75	22.73	49	29.69
56- 65	69	20.91	54	32.73
66-75	90	27.28	24	14.54
>76	20	6.06	6	3.64
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The results in this study show that in households who participated in the "One Home One Garden" food security intervention programme the highest percentage (about 27%) were headed by persons in the age range between 66-75 years. Amongst the households that had not participated in the programme, the highest percentage (about 33%) were headed by persons in the age range between 56-65 years. A lower proportion (about 10%) of those who participated in the food security intervention programme were younger headed (20-35 years old) households and (about 6%) of non-participants respondents were in this same band. A study conducted by Arene and Anyaeji (2010) found that older headed households were more likely to be food secure than the younger headed households. These results also suggest that there may be increased likelihood of older headed households participating in food security intervention programmes. However, only about 6% of the "One Home One Garden" participants were above the age of 76 years, while non-participants had 3% of household heads that were above 76 years. This age group is regarded as old, weak and not fit enough to perform agricultural activities that need younger and energetic people. During interview it was noted that younger household members believe in migrating to urban areas in search for job opportunities and very few remained in Maphumulo and participated in agricultural activities. Kahn *et al.* (2012) observed that as a person's age increases, they become physically weaker and therefore the ability to participate in agricultural projects diminishes as well. The overall results from both groups show that the younger household members are not

eager to participate in farming activities. One reason might be that they do not consider farming as a business but rather as something for older people to do to keep busy.

4.2.2 Gender of respondents

Table 4.2 shows the gender of respondents. Gender was considered important because it is a factor that can influence a household's food security status and participation in intervention programmes.

Table 4.2: Gender distribution of the "One Home One Gardern" participants & non-participants households

Gender	"One Home One Gardern" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Male	35	10.61	21	12.73
Female	295	89.39	144	87.27
Total	**330**	**100**	**165**	**100**

Survey data (2015)

In this study, there were more (about 89% for "One Home One Garden" participants and 87% for non-participants) female respondents than males who only accounted for about 11% and 12 % for the respective groups in the sample. The results from both groups had very similar percentages, with men being lesser participants in food security intervention programmes. It can be construed that this might have been influenced by the fact that males migrate to towns and cities to seek employment, leaving behind their wives, mothers, sisters and children in female-headed households. This finding is also in line with DAFF (2013a) who noted that women made up the majority (57%) of the total population in Maphumulo Local Municipality. Moreover, females actively participate in agricultural activities more than males. Gladwin *et al.* (2001) pointed out that special intervention programmes target women in trying to make their livelihoods more sustainable. In this case, rural women are the custodians of the farming business as they are responsible for food preparation as well ensuring food availability at all times.

4.2.3 Highest education levels of respondents

Table 4.3 shows the highest educational levels of respondents. This was considered because it is a factor that can influence a household's food security status and participation in intervention programmes.

Table 4.3: Education level of the "One Home One Gardern" participants & non-participating households

Level of education	"One Home One Garden" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
None	16	4.86	21	12.73
Primary	50	15.15	47	28.48
Secondary	178	53.93	89	53.94
Tertiary	86	26.06	8	4.85
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The respondents were of diverse levels of education. In the "One Home One Garden" group, about 96% of the respondents were educated and only about 4% had no education. In the no-participants group about 87% were educated and only about 13% had no education. Dlova *et al.* (2004) found that the higher the level of education, the more successful the farming households were. The results from both groups reveal that the respondents were literate and thus it can be inferred that they are able to utilise the information passed on them efficiently. According to Shaikh (2007), educated individuals have the capacity to process and apply the information passed on to them. Therefore, the literacy level of the respondents may increase the likelihood of their willingness to participate in the intervention programme and they are more likely to achieve an increase in their household food production, thereby improving the likelihood of them being food secure.

4.2.4 Marital status of respondents

Table 4.4 shows the marital status of the respondents. Marital status of the respondents was considered because it is a factor that can influence a household's food security status and participation in intervention programmes.

Table 4.4: Marital status of the "One Home One Gardern" participants & nNon-partcipating households

Marital status	"One Home One Gardern" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Single	154	46.66	74	44.84
Married	168	50.91	88	53.34
Divorced	8	2.43	3	1.82
Total	**330**	**100**	**165**	**100**

Survey data (2015)

Married respondents accounted for a higher percentage (51%) of the "One Home One Garden" participants group and about 53% from non- participant group. These married people were more likely to be primary care givers according to the information that was received from the respondents, and so they were responsible for food preparation for all household members. Those that were single accounted for about 47% of the "One Home One Garden" participants and 45% of the non-participants. Those that were divorced were the smallest group at 2% of the "One Home One Garden" participants only 1% of the non-participants. The results in both groups revealed that approximately half of each group was married. During the interview it was noted that in rural areas it is shame for men not to be married and have a normal family and it is a customary Zulu belief that only when a man is married, is his title changed from a being a boy to becoming a man. Yet, Etwire (2013) claims that the reason for a higher percentage of married respondents is because most of rural people, especially women get married at an early age. They then stay at home to look after the children or engage in agricultural activities to increase food availability in the household while men migrate to urban areas in search of employment.

4.2.5 Employment status of the respondents

Figure 4.1 shows the employment status of respondents. Employment status was considered important because it is a factor that can influence a household's food security status and participation in intervention programmes.

The results show that there is high rate of unemployment, the majority of the "One Home One Garden" participants (93%) and about 96% of the non-participants in Maphumulo

community were unemployed. Those with temporary jobs accounted for about 7% of the "One Home One Garden" participants and 4% of the non-participants in the sample. None of the participants were permanently employed. The results reveal that because of the high-unemployment levels of the respondents, there should be other ways of generating income in order to maintain household food security.

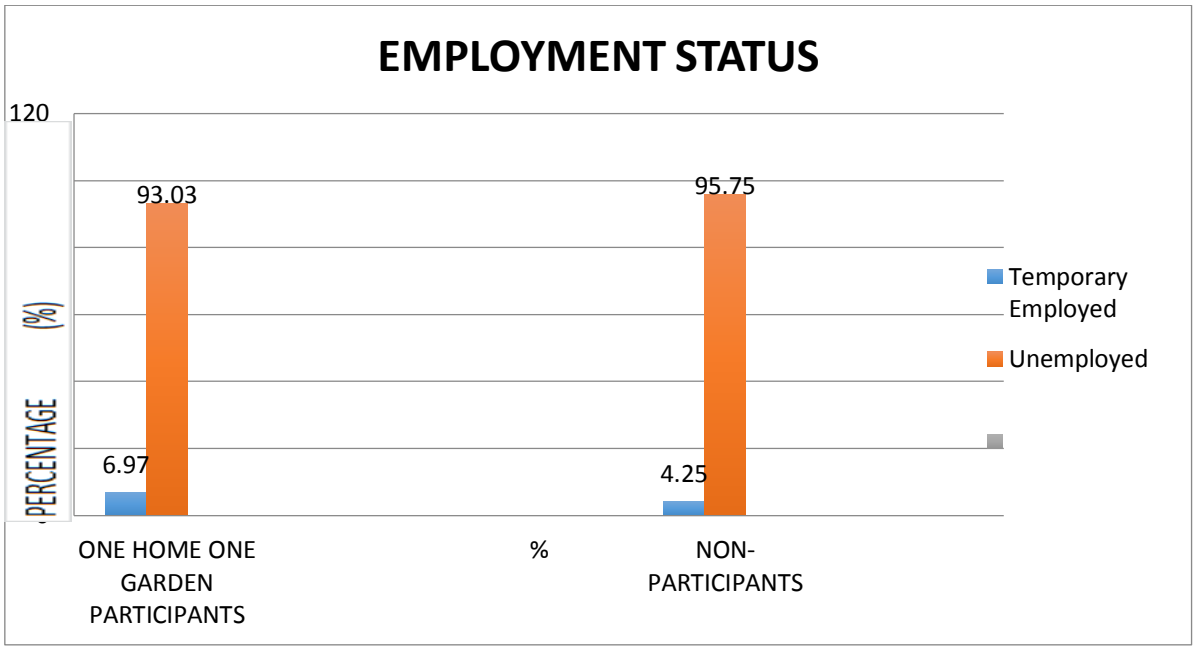

Figure 4.1: Employment status of the "One Home One Gardern" participants & non-paticipating households

Survey data (2015)

It is more likely that, households in both groups have enough time to participate in intervention programmes and boost their household food security status. According to Statistics South Africa (2011) many South African households are unable to purchase food primarily because their purchasing power is limited by the scarcity of income generation opportunities. This is especially true in rural areas such as in Maphumulo Local Municipality. Furthermore, the study revealed that no matter how much the government tries to introduce food security intervention programmes, rural people remain largely unemployed and this is shown by the similarity of unemployment results in both groups.

4.2.6 Household size

The sizes of respondents' households are presented in Table 4.5. The results show that the households in the area were large, ranging between 5 and 20 members. Household groups

with between 6 and 12 members represented the highest percentages in both the "One Home One Garden" participants and non-participant groups (about 35% and 51% respectively). Larger households ranging from 17 to 20 members accounted for 22% of the "One Home One Garden" participants and 13% of the non-participants. Qualitative data from the respondents pointed to a lack of financial freedom being the reason for so many members of families staying in one single housing unit. These households included grandchildren, parents, and other extended family members. Respondents with household sizes below 5 members accounted for the lowest proportion of respondents (about 17% for the "One Home One Garden" participants and about 11% for non-participants). An interrogation on why most household sizes were large revealed that most families use a lot of labour in farming. As a result, since most of the respondents were not working, they were expected to help out in the fields, although it was noted only that older household members were interested in engaging in agricultural activities.

Table 4.5: Household size of the "One Home One Gardern" participants & non-participating households

Household size	**"One Home One Gardern" Participants**		**Non-participants**	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
<5	55	16.67	18	10.91
6-12	114	34.55	84	50.91
13-16	87	26.36	41	24.84
17-20	74	22.42	22	13.34
Total	**330**	**100**	**165**	**100**

Survey data (2015)

lt is more likely that households with more members rely on farm produce to keep their members food secure, therefore constant food availability motivates them to participate in intervention programmes. Altman *et al. (*2009*)* agreed that an increased household size and the associated demand for more food encourages engagement in subsistence production as a way of feeding a larger group of dependents.

4.3 Household food production

To establish the households' production levels, respondents were asked to give information on farming experience, household farm sizes, size of farmlands, major challenges in crop production and agricultural potential of the study areas.

4.3.1 Household experience in farming

Table 4.6 shows the household level farming experience of respondents. Household experience in farming was considered important because it is a factor that can reveal the years of respondent's participation in farming as well as the level of knowledge and skills the respondent has.

Table 4.6: Household farming experience of the "One Home One Gardern" participants & non-participating households

Experience in farming (years)	"One Home One Gardern" Participants		Non-participants	
	Frequency	Percentage (%)	Frequency	Percentage (%)
0-5	34	10.30	13	7.87
6-10	65	19.69	29	17.57
11-20	174	52.72	86	52.13
>21	57	17.27	37	22.43
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The results show that about 53% for the "One Home One Garden" participants and 52% for non-participants respondents have 11 to 20 years' experience in farming. This suggests that these respondents have enough experience in agricultural production. Only about 10% of the "One Home One Garden" participants and about 7% of the non-participants have less than 5 years of experience in farming. About 17% of the "One Home One Garden" participants and about 22% of the non-participants of respondents had over 21 years of farming experience. Farmers with more farming experience are more likely to apply the skills and knowledge to improve their agricultural productivity and thus improve the food security status of their households. Altman *et al.* (2009) mentioned that the effect of farming experience on participating in intervention programmes may be either positive or negative. Generally, it

would appear that up to a certain number of years, farming experience would have a positive effect whilst after that, the effect may become negative probably due diminishing energy and interest associated with old age. In this study half of the respondents from each group had between 11 and 20 years of farming experience which is adequate for effective agricultural management.

4.3.2 Size of farmland

The respondents were asked to indicate the sizes of their farms (Size in ha of the entire household land holding) and the results are presented in Table 4.7.

Table 4.7: Size of farmland of the "One Home One Gardern" participants & non-participating households

Sizes of farmland (Ha)	**"One Home One Gardern" Participants**		**Non-participants**	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
< 5	189	57.28	91	55.15
6 to 10	112	33.93	54	32.73
11 to 15	23	6.97	16	9.69
>16	6	1.82	4	2.43
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The results reveal that the majority (about 57% of the "One Home One Garden" participants and 55% of non-participants) possessed less than 5 hectares of farmland. The results suggest that the respondents have a problem of scarcity of land to practice agricultural activities. This likely to affect the production level of the households. The results reveal that about 34% of the "One Home One Garden" participants and 33% of non-participants owned 6 to 10 hectares of farmland. A farm this size can be efficient if utilised properly to ensure household food security. Very few, about 2% of the "One Home One Garden" participants and about

2% of non-participants owned more than 16 hectares of land. This size farm has the advantage of farming practices being utilised to the maximum.

Respondents mentioned that if they had enough land, they would be able to increase production to a larger scale, enabling them to shift from smallholder farming to commercial farming. It was also noted by respondents that the farmland was used for building houses, crop cultivation and veld pastures for livestock grazing which results to a limited farming area. They also said that the hilly landscape was a challenge. These findings are in agreement with a study by Jayne *et al.* (2005) who noted that access to land is a key strategy to ensure food security. Moreover, Thwala (2003) also noted that access to land allows rural dwellers to put their labour to productive use in farming activities while providing a supplementary source of livelihood for rural workers and the poor people who live in urban areas.

4.3.3 Size of the household farmland under cultivation

The respondents were asked to give the information about the size of their farmland size (Size of household land under cultivation) and Table 4.8 presents the results.

Table 4.8: Size of household farmland for respondents **under cultivation**

Farmland under cultivation (Ha)	**"One Home One Gardern" Participants**		**Non-participants**	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
<1	116	35.15	33	20
2 to 5	204	61.81	108	65.45
6 to 10	10	3.04	24	14.55
Total	**330**	**100**	**165**	**100**

Survey data (2015)

Under subsistence agriculture, the holding size is expected to play a significant role in influencing the households' food security status. In this study about 35% of "One Home One Garden" participants and 20% of the non-participants had 1 hectare of land or less under cultivation. According to the respondents, the size of the land that is available for agricultural practice was not enough to plant a variety of crops or to follow a production plan. Although

respondents from both groups noted that the size of the land might not be a problem but the challenge is that of the hilly landscape which limits the maximum utilisation of available land and mechanisation assistance. On the other hand, the majority (about 62% of the "One Home One Garden" participants and about 66% of the non-participants) of respondents had between 2 and 5 hectares under cultivation, while 3% of the "One Home One Garden" participants and 15% of the non-participants had 6 to 10 hectares under cultivation. However, because the province was hard hit by drought in 2014 and 2015, it was revealed that, because they rely on rainfall for all agricultural activities, the respondents did not want to cultivate vast farmlands which they were not able to irrigate.

4.3.4 Type of crops cultivated and estimated yields

The respondents were asked to state which type of crops they usually cultivated during the planting season and the estimated yields of these crops.

Table 4.9 shows the responses received from the respondents.

Table 4.9: Types of crops cultivated by the "One Home One Gardern" participants & non-participating households

Crops				"One Home One Garden" Participants		Non-participants	
	Planting season	**Estimated yield range (bags, bunches & boxes)**	**Mean Price per Unit (ZAR)**	**Frequency**	**(%)**	**Frequency**	**%**
Cabbage	Both seasons (winter and summer)	10 heads-400 heads	5	83	25.15	8	4.85
Spinach	Both seasons (winter and summer)	50-500 bunches/ household	5	219	66.36	9	5.45
Onions	Both seasons (winter and summer)	(10-180 bags/ household	25	120	36.36	4	2.43

Carrot	Both seasons (winter and summer)	5-150 bags/ household	25	145	43.93	2	1.22
Beetroot	Both seasons (winter and summer)	5-20 bags/ household	15	80	24.24	3	1.82
Tomato	Both seasons (winter and summer)	5-20 boxes/ household	25	50	15.15	2	1.22
Butternut	Summer	20-400 bags/ household	40	167	50.60	4	2.43
Maize	Summer	25-40 bags/ household	40	294	89.08	155	93.94
Bean	Both seasons (winter and summer)	1-5 bags/ households	120	324	98.18	160	96.96
Potato	Both seasons (winter and summer)	5-200 bags/ household	35	310	56.66	92	55.75
Sweet potato	Both seasons (winter and summer)	5-30 bags/ households	100	188	53.93	126	76.36
Amadumbe	Summer	5-100 bags/ household	100	167	50.60	131	79.39

Survey data (2015)

The findings indicate that beans were the most common crop cultivated by both groups of respondents (about 98% of "One Home One Garden" participants and 97% of and non-participants respectively). The reason given for this was that beans fetched the highest market price compared to other crops and could be used in many different dishes such as samp with beans, beans curry with rice/stiff pap and steamed bread. According to Rose (2008) the production of the staple food crops contribute to household food availability. The findings of

the study reveal that about 89% of the "One Home One Garden" participants and about 94% of non-participants cultivated maize, which also served as a staple food. Furthermore, as crops, beans and maize are more tolerant to the environmental conditions of the study area. Cargills Incorporate (2014) stated that the critical response to food security challenges around the world is to grow crops which are best suited to the local conditions of the area, in other words, farmers planting the right crops for their local climate and soils. Figure 4.2 shows non-participants of the "One Home One Garden" programme gathering beans and maize after a harvest.

Figure 4.2: Farming household gathering beans and maize after production
Survey data (2015)

On the other hand, respondents mentioned that butternuts generate more income compared to other crops or vegetables because of the low production costs and the high market price they have. Similarly, only the "One Home One Garden" participants mentioned that spinach was harvested throughout the year, at the same time generating a stable income for the farming households. However, the respondents mentioned that yields were low due to drought that hit the KwaZulu Natal Province in the 2014/2015 period. Nonetheless, the support with seed hampers from DAFF encouraged them to engage in vegetable production. StatsSA's General Household survey indicated that most households appreciate the quality of support they receive (Zokwana, 2014).

4.3.5 Purpose of growing crops

The respondents were asked to state the purpose of growing, Table 4.10 shows the results from respondents.

Table 4.10: Purpose of growing crops by the "One Home One Gardern" participants & non-participating households

Purpose of growing crops	**"One Home One Gardern" Participants**		**Non-participants**	
	Frequency	**Percentages (%)**	**Frequency**	**Percentages (%)**
Selling	6	1.82	0	0
Consumption	219	66.36	153	92.73
Both consumption & selling	105	31.82	12	7.27
Total	**330**	**100%**	**165**	**100**

Survey data (2015)

The majority (about 66 % of "One Home One Garden" participants and about 93% of non-participants) of the respondents were growing crops for household consumption only. About 32% of "One Home One Garden" participants and about 7% of non-participants were growing crops for both consumption and selling. However, it was noted that about 2% of the "One Home One Garden" participants and no non-participants amongst the respondents were growing crops exclusively for selling. The selling of crops can be a means of supplementing or generating household income. Masuku (2013) supported this when he noted that in rural areas agriculture is a major source of income and it needs to be taken as the amicable strategy to alleviate food insecurity in most rural areas. Therefore, a viable option for many

respondents is to produce crops for both consumption and for selling. This in turn may improve the household's food security, and income generation.

4.4 Major challenges in crop production

The questions pertaining the major challenges faced by households in crop production was also considered to be part of this study and the results are shown in Table 4.11.

Table 4.11: Challenges in crop production faced by the "One Home One Gardern" participants & non-participating households

Item	"One home one garden" participants		Non-participants	
	Frequency	%	Frequency	%
Labour	93	28.18	41	24.84
Inputs supply	291	88.18	131	79.39
High cost of supply	165	50	149	90.30
Shortage of equipment	316	95.75	162	98.18
Shortage of land	306	92.72	139	84.24
Late planting	258	78.18	23	13.93
Pests & Diseases	220	66.66	76	46.06
Non existent markets	78	23.63	29	17.57
Low temperature	12	3.63	5	3.03
Shortage of water sources	287	86.96	154	93.33
Theft	55	16.66	7	4.24
Lack of capital	23	6.97	163	98.78
Lack of proper infrastructure	232	70.30	160	96.96
Lack of skills	5	1.51	19	11.51
Distance to market	145	43.93	4	2.42

Survey data (2015)

The results show that the major problem faced by respondents was the shortage of proper equipment, as indicated by about 96% of the "One Home One Garden" respondents and

about 98% of non-participants. In both groups the respondents mentioned that equipment such as planters, ploughs, discs, boom sprayers, and tractors were expensive to own or hire. A shortage of proper equipment has a negative impact on the food security status of the households because it affects the production process. It was also noted that a major problem for about 99% of the non-participant respondents was a lack of capital. Kuwornu *et al.* (2012) pointed out that production credit, when obtained on time could increase the chances of household to acquire productive resources (tractors, seeds, fertilisers, pesticides and others) which will boost production and improve the food situation in a household.

Furthermore, the results show that about 92% of "One Home One Garden" participants and 84% of non-participants were facing a challenge with land ownership. Land shortage has the potential to affect the ability of respondents to produce at a higher level, and may result in low food availability to the household. The National Department of Agriculture (2012) noted that unused land of good potential is very scarce in South Africa, and there is a limit to the horizontal expansion of agricultural production. This means that productive land is hard to find. Similarly, "One Home One Garden" respondents faced challenges with inputs as mentioned by about 88% of the sample while 79% of non-participants also mentioned it. The shortage of input for agricultural activities hinders progress in farming.

The respondents mentioned that there are no input suppliers in Maphumulo Local Municipality and they have to travel about 45 to 65 km to Stanger for purchasing inputs. This finding is supported by a study conducted by Etwire *et al.* (2013) who stated that agricultural programmes have been constrained by insufficient and/or poor quality farm inputs such as selected seeds, and services like credit and training. As a result, the achieved overall farm productivity diminishes by about half of the desired target of household food security. The findings reveal that water scarcity was also a major obstacle for about 87% of "One Home One Garden" participants and about 93% of non-participants. Scarcity of water resources affects crops severely by causing stunted growth, poor germination, poor yield and low grade produce. This situation has a negative impact in the food security status of the farming households, since a number of the respondents said they were facing a decline in yields. However, apart from this challenge, it was noted that extension services played a role in distributing inputs to "One Home One Garden" farming households in the study areas as

shown on Figure 4.3. and it was noted that non-participants had never received any support from extension services.

Figure 4.3: Handing over of inputs to farming households by extension officers
Survey data (2015)

Late planting was highlighted as a problem because it affects growth of the crop as some get stunted and produce less, and some do not grow at all if planted late or not during its planting season. This problem of late planting as noted by respondents is caused by the delays in seed/inputs distribution from the Department of Agriculture. In general, it is always assumed that to be fully engaged in farming activities, households should firstly understand that farming is a risky business, therefore one needs to understand the main problems in production of any commodity before one is fully engaged in farming. From that perspective, the researcher realised that it is important to understand the main problems the respondents experience in crop/vegetable production in Maphumulo Local Municipality. Mthembu (2009) noted that rural households require access to adequate credit, but it is always a fact that they do not qualify to get credits as the majority of them do not have formal employment, and therefore, may not have sufficient income to finance their projects.

The results also show that the majority (about 70%) of the One Home One Garden respondents and 97% of non-participants had a problem of poor infrastructure such as fencing which results in fields being unprotected from livestock and thieves which leaves them with low grade produce that do not meet market standard even if they meet the criteria but the distance is long and transportation to the market becomes too expensive. Jari (2009) agrees

that poor conditions for example of roads, which are often blocked during rainy season, have an adverse effect on the transportation of the produce. If roads are in bad condition, travelling time is long, implying that it will be difficult to sell fresh produce within the required time limit.

4.5 Livestock production and food security status of households

The respondents were asked if they do keep livestock and also to mention the type of livestock they keep, the results are shown in Figure 4.4.

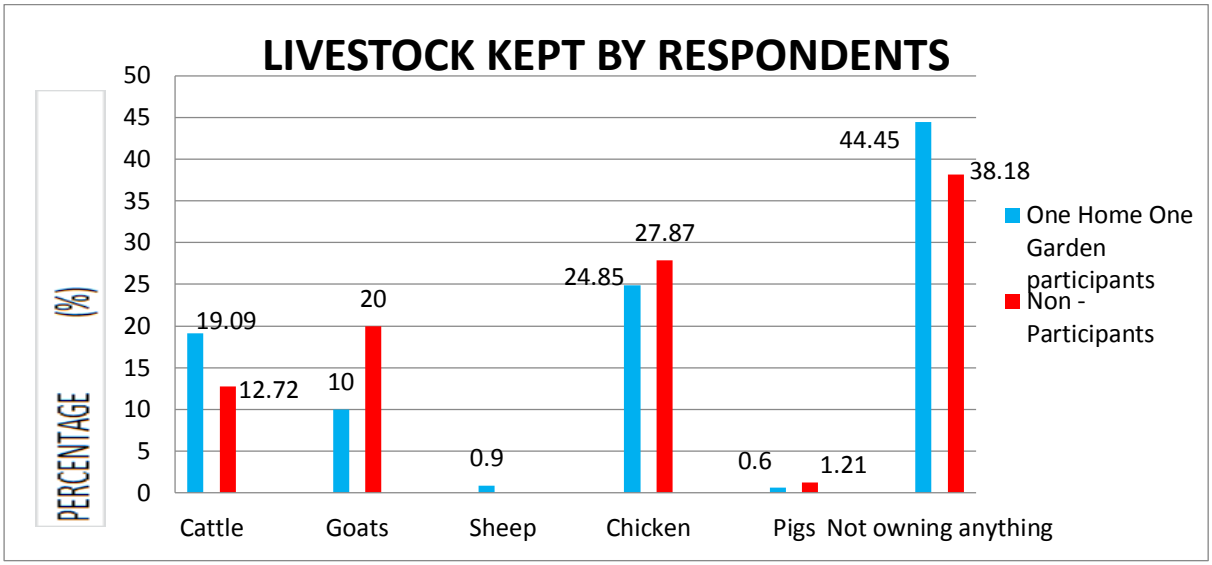

Figure 4.4: Livestock kept by the "One Home One Gardern" participants & non-participating households
Survey data (2015)

The results show that the majority about 56% ("One Home One Garden" participants) and about 62% (non-participants) of the respondents owned livestock (which included cattle, goats, sheep, chicken and pigs). Greater numbers of these about 25% ("One Home One Garden" participants) and 28% (non-participants) owned chickens and cattle; about 19% "One Home One Garden" participants and 13% non-participants. About 10% of the "One Home One Garden" participants owned goats about 20% non-participants respectively. Yet, 45% "One Home One Garden" participants and about 38% of non-participants did not own livestock. Etwire (2013) mentioned that livestock rearing is mostly not on a commercial basis but as a source of family savings. This conclusion was applicable to the respondents, who stated that they own livestock as a form of family investments, than any incoming generating

assets. Therefore, since livestock is usually used for farming, one would expect that households in the study area would be partly food secure. Livestock can be used as a source of food as well, and selling livestock which brings income to be able to purchase food stuffs as well.

4.6 Perceptions on the agricultural potential of Maphumulo land by respondents

The questions pertaining to the perceptions of respondents on the agricultural potential of the land were asked and the results are presented in Table 4.12.

Table 4.12: Perceptions on agricultural potential of land owned by the "One Home One Gardern" participants & non-participating households

Potential status	"One Home One Gardern" Participants		Non-participants	
	Frequency	Percentage (%)	Frequency	Percentage (%)
High	113	34.24	64	38.79
Medium	118	35.75	65	39.39
Low	99	30	36	21.82
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The results show that about 35% ("One Home One Garden" participants) and 39% (non-participants) of the respondents believed that their soils are of medium potential that can suit most agricultural practices. Similarly, about 34% ("One Home One Garden" participants) and about 39% (non-participants) of the respondents indicated that the soils were of a high potential in the study areas. Enterprise Ilembe (2013) claimed that the climate of Maphumulo Local Municipality is generally favourable for most agricultural practices, the incident of low frost and relatively high rainfall creates an environment favourable for crop production. Only about 30% ("One Home One Garden" participants) and 21% (non-participants) were respondents that fill their soil were of low potential. Findings of this study indicated that commodities such as maize, potatoes, vegetables, amadumbes and sweet potatoes result in high yields, although the challenge was water scarcity.

Water availability is low because there are no larger rivers. Furthermore, respondents experienced a problem with pests, diseases, weeds and moderate frost. Participants residing near the Thugela River pointed that the river makes it easy for them to have a continuous agricultural period even during drought seasons.4.7 Socio–economic characteristics of the households

This section presents the results on the socio–economic status of households, which includes sources of livehoods, level of income, credit support, extension support, infrastructural support and primary sources for foods.

4.7.1 Sources of livelihoods

Sources of livelihood were considered to have an effect on food security status of the households, therefore respondents were asked to state the sources of their livelihood and the results are as follows in Table 4.13

Table 4.13: Sources of livelihoods for the "One Home One Gardern" participants & non-participating households

Source of livelihood	"One Home One Gardern" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Agriculture	286	86.66	91	55.15
Casual labour	21	6.37	11	6.66
Grants	23	6.97	63	38.18
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The findings indicate that the majority about 87% ("One Home One Garden" participants) and only 55% (non-participants) of the respondents are engaged in agriculture for their livelihoods, much of the food consumed at Maphumulo Local Municipality is from the farm. This is in line with the findings of Rose (2008), which revealed that most poor households in developing countries support themselves with a portfolio of economic activities, such as; production of staple food crops, production of cash crops, small livestock, fruit trees, farm or non-farm employment, fishing or hunting and artisanal sales.

The study results reveal that around 6 to 7% ("One Home One Garden" participants) and 38% (non-participants) of the respondents receive grants, and are casually employed. It was strange to note that no single interviewed respondent had formal employment. Nevertheless, a number of surveys that were conducted by Stat SA (2011) revealed that employment shortage is a big issue in South Africa. Therefore, Maphumulo Local Municipality communities are a testimony to this claim.

4.7.2 Primary sources for food procurement

According to FAO (2015), it is advisable to know the primary sources of food procurement in order to have an estimate of how much food is consumed by household. The primary sources for obtaining food by respondents in the study areas are presented in Table 4.14.

Table 4.14: Primary source of food procurement for the "One Home One Gardern" participants & non-participating households

Primary source of obtaining food	**"One Home One Gardern" Participants**		**Non-participants**	
	Frequency	**(%)**	**Frequency**	**(%)**
Own agricultural production, gathering, hunting and fishing	56	16.96	9	5.45
Purchased	21	6.36	6	3.63
Own agricultural production and purchased	99	30	18	10.90
Own agricultural production, purchased & borrowed	12	3.64	10	6.06
Grant and own agricultural production	142	43.04	122	73.93
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The respondents were asked questions based on the primary source of food; the results show that the greater proportions about 43% ("One Home One Garden" participants) and about 74% (non-participants) of the respondents obtained food through grants and from own agricultural production. A further understanding to this issue revealed that the grants were in the form of old age grants, and child support grants. A study by Musemwa *et al.* (2013) in the Eastern Cape Province showed that employment opportunities are minimal and people in

pastoral places rely on government grants and remittances for a living and this therefore, makes it difficult for people living in rural areas to be food secure. Yet, 30% ("One Home One Garden" participants) and 10% (non-participants) of the respondents purchased food and relied on their own agricultural production. Although, Statistics South Africa (2011) reveal that many South African households are unable to purchase food primarily because their purchasing power is limited by a scarcity of income generation opportunities, especially in rural areas. These results are supported by FAO (2007) that there are few households in developing countries where gardens act as a major source of food to meet household consumption requirements.

Lastly, only a smaller proportion (4%) of the "One Home One Garden" participants and about 6% (non-participants) of the respondents depended on their own agricultural production, purchased food and borrowed finance. Generally, the results in both groups show that, own agricultural production and grants are the main primary sources of obtaining food in Maphumulo rural community. Therefore, it shows that the source of livelihoods in the study areas is based on agricultural activities for food availability and the need for continuous production stimulates participation in agricultural activities so as food security intervention programmes.

4.7.3 Level of income by households

The level of income by households was considered and the results were categories into low, medium, and high income categories. Categorizing respondents' by income levels was useful when measuring and setting a meaningful target level of the dietary diversity score of the households. The results on the level of income by households are presented in Table 4.15.

The results based on the data collected on household income levels were categorized into low, medium, and high-income categories. Households with low income (R500 - R2000) accounted for greater proportions, at about 58% ("One Home One Garden" participants) and 44% (non-participants) of the sample, which shows that most of respondents had a low level of income. Furthermore the non-participants had more households that ranges between R2001 – R4000 income at 42% when compared to one home one garden participants at about 25% and only 14% of non-participants range between R4001-R7000 which is regarded as high income and one home one garden participants had about 17% of those earning higher income.

Table 4.15: Level of income by the "One Home One Gardern" participants & non-participating households

Level of Income	"One Home One Gardern" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
R500 - R2000 (Low)	192	58.18	72	43.64
R2001 - R4000 (Medium)	83	25.15	70	42.43
R4001 - R7000 (High)	55	16.66	23	13.93
Total	**330**	**100**	**165**	**100**

Survey data (2015)

To justify the difference in percentage it was noted that, participants of one home one garden had a variety of fresh produce to sell which gives them an opportunity to generate more income, yet non-participants concentrate mostly in selling short crops for complimenting grants which serve as a households income. Jacobs (2009) points out that the household food security status depends substantially on a household's income and asset (wealth) status. In this case, there were few households with a high-income level suggesting that many households in the study area are more likely to be food insecure. Kakumba and Nsingo (2008) also asserted that a weak financial position of local communities also reduces the capacity of communities to participate into development projects.

4.7.4 Credit Support

The status of credit support of the households was assessed from the respondents, and the results are presented in Table 4.16. The respondents were asked if they had access to credit, a small proportion (about 7% of the "One Home One Garden" participants) stated that they receive credit support and the majority (about 93%) did not receive credit support. It was disappointing that non-participants did not receive any credit assistance and they noted that the farming production process is too costly thus results to minimum utilisation of land and affect continuous households food availability.

Table 4.16: Credit support status of the "One Home One Gardern" participants & Non-participating households.

Credit support	"One Home One Gardern" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Yes	23	6.97	0	0
No	307	93.03	165	100
Total	**330**	**100**	**165**	**100**

Survey data (2015)

It was also noted in "One Home One Garden" participants that the respondents were not provided with credit support from any financial institutions which is more likely to affect their production and hence the food security status of their households. Credit support has been highlighted as an important aspect in food security throughout literature. In one instance, Masuku (2013) claimed that households in rural areas cannot access credit due to; illiteracy, lack of information, and lending processes. Lack of capital is a feature of poverty and the poor generally lack both savings and borrowing opportunities. Thus, possible hindering efforts of improving security for a number of households. This finding suggests that the lack of access to credit may discourage farmers to participate in intervention programmes due to shortage of production inputs.

4.7.5 Extension Support

The question pertaining the extension support was regarded as a factor that can influence a household's food security status and participation in intervention programmes. The results are shown in Table 4.17. The results show that extension support provided by the Department of Agriculture was high as indicated by the majority (about 85%) of the "One Home One Garden" participants. About 11% of the respondents denied receiving extension support. Although non-participants deny receiving any assistance from Department of Agriculture, some respondents mentioned in passing that they received assistance in the control of rabies and dipping of their cattle and it was nothing formal.

Table 4.17: Extension support received by the "One Home One Gardern" participants & Non-participating households.

Extension support	"One Home One Gardern" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Yes	281	85.15	0	0
No	38	11.5	165	100
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The high percentage of the "One Home One Garden" participants/ respondents that indicated that they receive extension support shows that information pertaining to agricultural activities reaches most households participants involved in government food security intervention programmes. In contrast, non-participants respondents were not receiving any extension support and it was noted that they were missing the opportunity for free services rendered by Extension services of which is not recommended in the study area. Abdu-Raheem and Worth (2011) stressed that the role of extension becomes very significant in fully disseminating information between the government and farming households.

Moreover, Birkhaeuser *et al.* (1991) mentioned that the receipt of extension services provides farmers with information about cropping practices and managerial skills, optimal input use and high yield varieties. As a result, farmers are expected to be aware and vigilant to any situations that may affect their yields. Consequently, having an impact in their food security as well. Training and skills transfer by extension officers are part of the "One House One Garden" food security intervention programme. Extension support will also encourage households to partake in intervention programmes that seek to help households address their food insecurities.

4.7.6 Infrastructural support (irrigation and fencing)

The respondents were asked if they received any infrastructural support and the results are shown in Table 4.18.

Table 4.18: Infrastructural support reived by the "One Home One Gardern" participants & non-participating households.

Access to infrastructure (Yes/No)		"One Home One Gardern" Participants		Non-participants	
		Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Irrigation scheme	Yes	111	33.64	0	0
	No	219	66.36	165	100
Total		**330**	**100**	**165**	**100**
Fencing	Yes	109	33.31	7	4.25
	No	221	66.69	158	95.75
Total		**330**	**100**	**165**	**100**

Survey data (2015)

The results show that the majority (about 66%) of the "One Home One Garden" participants indicated that they do not receive the irrigation support from the government. Non-participants denied receiving any infrasrtuctural support Similarly, about 67% of the "One Home One Garden" participants also indicated that they do not have fencing infrastructure for their farms. For the non-participants respondents, although they denied irrigation support , 4% stated that they had fencing infrastructure, but they mentioned that it had been financed from their pockets and not through a government programme. Irrigation is one of the major challenges facing a number of farming households due to the huge capital outlay needed to kick start it. They also mentioned that protected water sources are scarce in Maphumulo and they were experiencing a shortage of water for irrigation. In light of this, they may be reluctant to engage in agricultural activities if they do not have enough water for irrigation. Masuku (2013) indicated that an irrigation system empowers farming households to adopt more diversified cropping patterns and to change from low-value subsistence production to high-value market-oriented production. Furthermore, respondents pointed out that a lack of or inadequte fencing also discouraged them from participating because livestock roam around the fields and destroy their crops. The similarities on the results in terms of irrigation and fencing infrastructure are because the households are facing a number of challenges in terms of farm inputs and household food production. The problem of poor fencing infrastructure also results in fields being unprotected from thieves. On a positive note, Masuku (2013) mentioned that improved rural infrastructure and support services sustains food security and also contributes to the improvement in the living conditions of rural households.

4.8 Food security status of sampled households

The food security status of the households was assessed by computing the HDDS and the HFCS measures.

4.8.1 Household Dietary Diversity Score (HDDS) for sampled households

Household dietary diversity is the number of different food groups consumed over a 24 hour period. In this study 12 food groups proposed by FAO (2006) were adopted. Each type of meal was recorded according to its class based on 12 food groups: cereals, roots and tubers, vegetables, fruits, meat, poultry and offal, eggs, fish and seafood, pulses, legumes and nuts, milk and milk products, oil and fats, sugar and honey and miscellaneous. The HDDS results were further separated into 3 dietary classes; lowest diversity (3 or less foods groups), medium diversity (between 4 and 5 food groups), and high diversity (6 or more food groups). Table 4.9 illustrates the various food groups used to compute the HDDS.

4.8.2: Total food groups consumed

In order to get a deeper insight into the food groups according to the HDDS, an estimated calculation of the number of respondents falling in of the 3 dietary classes/ groups was computed. The HDDS results are shown in Figure 4.5.

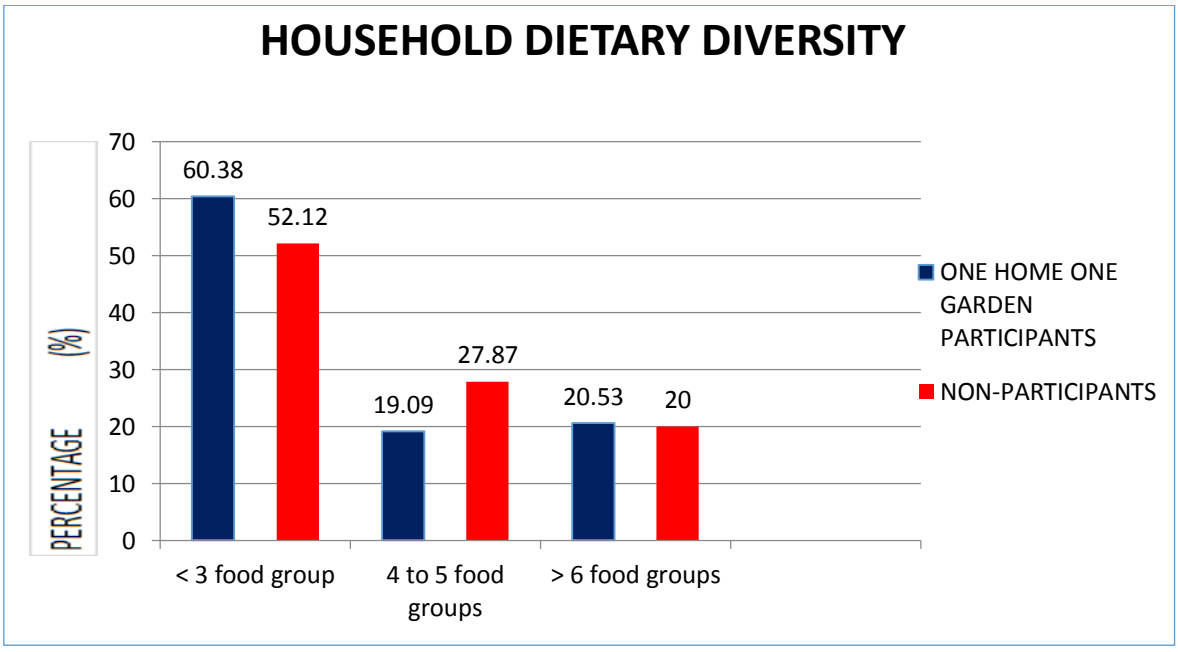

Figure 4.5: Household Dietary Diversity Scores
Survey data (2015)

According to the results in Figure 4.5, about 60% of households that participated in the "One Home One Garden" initiative fell in the lower dietary diversity group while non participants in that food security status group accounted for 52% of the sample. It was concluded that the cause for the higher percentage of lower dietary diversity in "One Home One Garden" respondents is that household dietary diversification depends on the caregiver's choice of menu for the particular households on that particular day. Furthermore, the respondents noted that it did not matter what was available in the garden, the choice of meal was based more what the household's food preferences. These differ from household to household. These results are supported by FAO (2007) which found that there are few households in developing countries where gardens act as a major source of food to meet household consumption requirements. Furthermore, FAO (2007) agreed by noting that in developing countries, gardens are major sources of food in meeting households' food consumption requirements. Yet, in this study the "One Home One Garden" respondents noted that sometimes they get tired of eating what is in the garden everyday while the non-participants were able to grow whatever they needed and they grew more of the short season crops such as beans, maize, potatoes, sweet potatoes and amadumbes. These vegetable are not included in the seed packs in the "One Home One Garden" programme so this limits the variety produce that they cultivate. This flaw reveals that extension agents need to provide training on food and nutrition to cover issues on the importance of a varied and balanced diet. Rose (2008) agreed with the finding that the production of the staple food crops contributes to household food availability. The results also reveal that about 19% of the "One Home One Garden" participants had a lower percentage of respondents who consumed 4-5 groups compared to about 28% of the non-participant respondents who fell under the medium dietary diversity group., About 21% of the "One Home One Garden" participants and 20% of the non-participants fell in in the high dietary diversity group which had a slight difference in dietary diversification food. In other words, most households were consuming 3 food groups namely cereals, milk and pulses. The households that consumed 3 food groups were regarded as food insecure, households that consumed between 4 and 5 food groups were regarded as moderately food secure and those that consumed six or more food groups were regarded as food secure households. Moreover, in both groups more than a half of respondents fell below the mean level and were regarded as food insecure households. The likelihood of this group being food insecure is very high. The average mean group for this study was 3, therefore

households which fell above the mean HDDS level were regarded as food secure and those that fell below the mean HDDS level were regarded as food insecure. The United States Agency for International Development (USAIDS) (2015) stated that the HDDS only gives an indication of food groups consumed by households in the last 24 hours, so it should not be used as a nutrition indicator but rather an indicator of food access. In that case, another measure was employed to supplement the HDDS *(Section 4.8.1*).

4.8.3 The Type of Food Consumed by the household members

A 7 day frequency food consumption calculation was done using 8 food groups. Respondents were asked how many times their households had consumed the food groups in the previous 7 days and their responses are shown in Table 4.19.

Table 4.19: 7 day frequency food consumption by the "One Home One Gardern" participants & non- participating households.

Food type	**Percentage (%) of food consumption by the "One Home One Garden" participants**	**Percentage (%) of food consumption by non-participants**
Maize meal	82.3	92.5
Beans	71.5	89.6
Onion	23.1	7.5
Red meat	35.2	25.7
Poultry meat	41.	39.9
Fish	16.9	8.11
Rice	69.5	59.03
Cabbage	38.9	2.9
Fruits	19.0	3.5
Eggs	44.2	38.7
Spinach	11.1	2.12
Potatoes	62.7	52.1
Sweet potatoes	9.4	11.0
Amadumbes	13.2	21.9
Milk	60.8	44.5
Butternut	3.5	4.15
Carrots	2.9	2.19
Fats oils	61.9	51.10
Sugar	60.1	50.00
Average HDDS	3.1	3.67

Survey Data (2015)

The majority (about 82% of the "One Home One Garden" participants and 92% of the non-participants) of the households had consumed maize during the previous week. The reason for that was that maize is the main ingredient in maize meal that is used for porridge preparation and pap, which is a common cultural staple food. Similarly, about 72% of the "One Home One Garden" participants and 89% of the non-participants had consumed beans in the previous 7 days. Rice was consumed by about 70% of the "One Home One Garden" participants and about 60% of the non-participants. The most usual response received from the respondents was that beans were eaten as a complimentary product with rice/ mealie meal/steamed bread. Beans are easily stored for future consumption and can also to be used as a seed in next growing season.

Furthermore, in both groups potatoes, sugar, milk and oils were some of the food items falling into the high consumption bandwidth. The lower dietary level and the limited access to other food groups is further evidence that only a few households are truly food secure. Qualitative data indicated that most households usually eat what is available, what they grow in their gardens or farms, and what is affordable at any point in time. Furthermore, they identified maize meal and beans as a staple meal, which directly coincides with the study findings. In summary, qualitative data on food consumptions revealed that it is quite difficult for the respondents to achieve a satisfactory level of household dietary diversity.

4.8.4 Households Food Consumption Score (HFCS)

The results indicate that the overall HFCS score of 3.1 for the "One Home One Garden" participants and 3.67 for the non-participants indicates a lower dietary diversity in their access to food. The findings reveal that the majority (65%) of the "One Home One Garden" participating households had an acceptable (≥35) HFCS whilst, the majority (54%) of non–participating households had a borderline (21.5 to 35) HFCS. The overall household consumption score was slightly higher in non-participants groups. This might be due to the fact that non-participants greater quantities of maize and beans which are easily storable and have a long shelflife by their nature compared to fresh vegetables that are mostly grown by the "One Home One Garden" participants. The results in Table 4.20 based on the HCFS show that about 65% of the "One Home One Garden" participants have an adequate dietary level of food consumption whilst only 35% of the non-participants could say the same. About 33% of the "One Home One Garden" participants were at the borderline level, while 54% of the non-

participants were also at this level. About 2% of the "One Home One Garden" participants and 11% of the non-participants fell within the poor food consumption category.

Overall, the results suggests that the "One Home One Garden" participants were better off than non-participants in their dietary levels of food consumption. This was concluded through consideration of the last score category of "acceptable (≥35)" which 65% of the "One Home One Garden" participants and 33% of the non-participants scored. The qualitative data indicates that starchy food such as rice and mealie meal were seen as desirable, although cost prohibitive. According to FAO (2010), there is an upward consumption trend in world cereals. Therefore, this supports the results of the study.

Table 4.20: Household Food Consumption Scores for Participating & non-participating households

Household Food Consumption Score category	**"One Home One Garden" Participants**		**Non-participants**	
	Frequency	**(%)**	**Frequency**	**(%)**
Poor (0 to ≤ 21)	5	1.5	18	10.90
Borderline (21.5 to 35)	110	33.3	89	53.93
Acceptable (≥35)	215	65.2	58	35.15
Total number of households	**330**	**100**	**165**	**100**

Survey Data (2015)

4.8.5 Household food consumption

The principal giver in the household was asked to respond to questions concerning the main sources of the household food.

4.8.5.1 Meal consumption pattern by Participating &non-participating households

The results on the main meal consumed by household are shown in Figure 4.6.

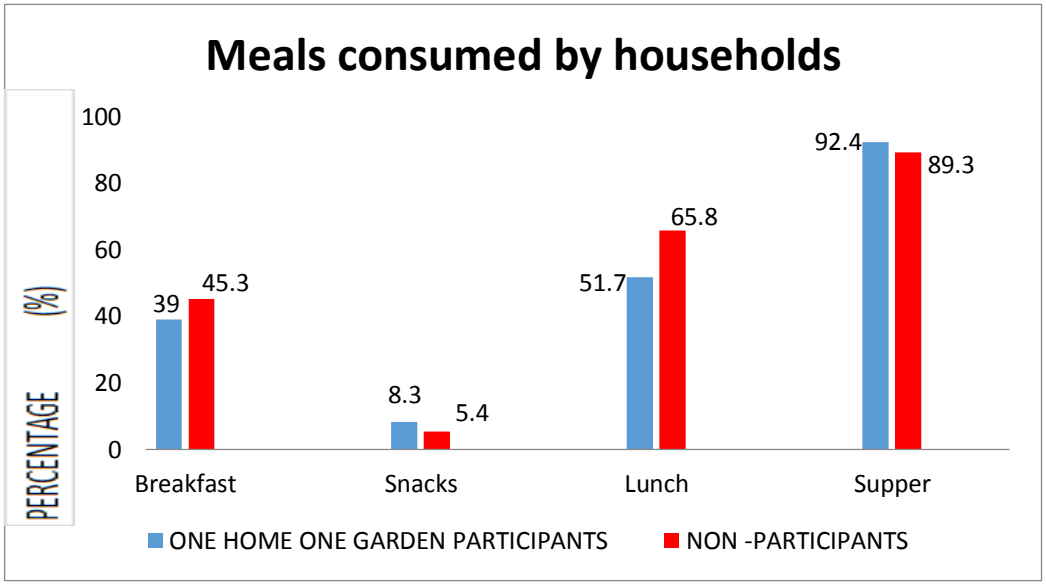

Figure 4.6: Meals consumed by Participating & non-participating households

Survey Data (2015)

The results show that the majority (about 92% of the "One Home One Garden" participants and 89% of the non-participants) of households consume meals at supper time. Qualitative data indicated that most household were occupied during the day, and as a result they only manage to make a meal during suppertime. However, 52% of the "One Home One Garden" participants and 66% of the non-participants said that they had a meal at lunchtime. These respondents pointed out that they usually finish their agricultural activities around 12 pm, so it is only after this that they are able to prepare meals for the household members. Lastly, 39% of the "One Home One Garden" participants and 45% of the non- participants stated that they made a breakfast meal before going to work. They said that agricultural activities require one to rise early to avoid the high temperatures of the day. Nutritional experts regard breakfast as the most important meal of the day and they state that people who skip breakfast are likely to have problems with concentration, metabolism and weight (World Food Programme (WFP), 2006).

4.8.5.2 Food consumed at breakfast

The results based on food consumed at breakfast are shown in Table 4.21.

Table 4.21**: Food consumed at breakfast by the "One Home One Gardern" participants & non- participating households**

Foods	**"One Home One Garden" Participants**		**Non-participants**	
	Frequency	**(%)**	**Frequency**	**(%)**
Porridge	46	13.93	34	20.60
Morvite	23	6.96	9	5.45
Cornflakes	12	3.63	5	3.03
Bread with margarine/eggs	39	11.81	14	8.48
Tea	4	1.21	8	4.84
Other foods (last night left overs)	5	1.51	5	3.03
None	201	60.90	90	54.55
Total	**330**	**100%**	**165**	**100**

Survey data (2015)

The results show that at breakfast time, porridge is consumed more frequently than any food: by about 14% of the "One Home One Garden" participants and 21% of the non-participants. About 12% of the "One Home One Garden" respondents and about 8% of the non-participants had bread with margarine. It was noted that Morvite (an instant porridge-like commercial cereal) was consumed by about 7% of the "One Home One Garden" respondents and 5% of non-participants. In both groups cornflakes were consumed by about 3% of respondents. The rest of respondents consumed the previous night's leftovers. One reason why cornflakes was less commonly consumed compared to other foods was the issue of availability and affordability. A number of respondents stated that the money it took to buy 500 grams of cornflakes was equivalent to buying a kilogram of Morvite. Therefore, it was better to save by buying cheap food. Perhaps the issue of affordability was having a negative impact on household food security, since families could manage to eat porridge frequently.

4.8.5.3 Food consumed at lunch by households

The information pertaining food consumed at lunch by households was collected and it is presented in Table 4.22. During lunchtime, about 17% of the "One Home One Garden" respondents and about 19% of non-participants consumed bread and tea/cool drinks for lunch while about 12% of the "One Home One Garden" participants and 11% of the non-participants said they consumed chicken curry with stiff pap.

Table 4.22: Food consumed at lunch by the "One Home One Gardern" participants & non-participating households

Lunch	"One Home One Garden" Participants		Non-participants	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Chicken curry with stiff pap	39	11.81	18	10.90
Chicken and rice	9	2.72	14	8.48
Red meat and rice	22	6.66	9	5.45
Bread and tea/cool drinks	55	16.66	32	19.39
Beans and pap/rice	18	5.45	15	9.09
Red meat and stiff pap	11	3.33	8	4.84
Stiff pap and vegetables/herbs	9	2.72	12	7.27
None	167	50.60	56	34.4
Total	**330**	**100**	**165**	**100**

Survey data (2015)

Qualitative results received from the respondents state that rice, bread and pap were the most common form of starch foods consumed during lunchtime. These were complemented with beans, meat and vegetables. In terms of food group, at least three food groups, namely cereals, pulses and vegetables dominated lunch meals due to their affordability and accessibility. Food groups such as meat and fruits were not prominent as they were seen as expensive. Other motivations for eating more cereals and pulses were that children would be at school so there was no need to cook a full meal. Respondents also mentioned that during the day some of household members become fully engaged in household activities and or agricultural activities and do not stop for a meal break. Therefore, this type of consumption pattern was a reflection of food insecure households, who prefer eating what is available at a point in time.

4.8.5.4 Meals consumed at supper by Participating & non-participating households

Food consumed at supper by households is presented in Table 4.23. A question was posed to the respondents in order to try to ascertain what type of food they ate at supper.

Table 4.23: Food consumed at supper by the "One Home One Gardern" participants & non-participating households

Supper	"One Home One Garden" Participants		Non-participants	
	Frequency	%	Frequency	%
Rice & beans	43	13.03	21	12.72
Rice & fish	24	7.27	10	6.06
Rice & chicken	25	7.57	19	11.51
Rice & red meat	18	5.45	11	6.66
Rice & vegetables	21	6.36	5	3.03
Stiff pap & beans	57	17.27	26	15.75
Stiff pap & fish	22	6.66	6	3.63
Stiff pap & chicken	12	3.63	8	4.84
Stiff pap & red meat	26	7.87	19	11.51
Samp & beans	17	5.15	14	8.48
Stiff pap & vegetables(cabbage/herbs)	40	12.12	8	4.84
None	25	7.57	18	10.90
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The results show that the majority of about 17% of the "One Home One Garden" participants consumed stiff pap and beans while about 13% of them participants consumed rice and beans. An almost identical proportion (about 16%) of non-participants consumed stiff pap and beans and 13% of non-participants consumed rice and bean respectively. The reason the respondents gave for their choices was that they grew beans, so it they were easily accessible to a number of households and cheap. Furthermore, this finding is confirmed by the results in Table 4.9 which revealed that beans are one of the most commonly cultivated leguminosae crop in the study area. Other supper food combinations included pap/rice with chicken, and cabbage/herbs with pap. The results reveal that household members consumed more legumes and starch at supper, and the preparation include fats/oils and onions. Looking at the preparation method, four food groups are covered in one meal. This partly shows that food security was a major problem for a number of households since at most, only a few food groups were consumed.

4.9 Household food security challenges

The results on the household food security challenges are shown in Table 4.24. Assessing the magnitude of a household food security challenges entails measuring the frequencies of the strategy by ascribing weights, summing up the weights and then putting the result as a score

(Maxwell *et al.*, 2008). In this study the weights that were assigned were 0, 1, 2 and 3, which were as follows (never=0, rarely=1, sometimes=2 and/or often=3). The weights were multiplied by the percentages of their frequencies, and then summed up to get scores of main household food security challenges.

Table 4.24: Household Food security challenges experienced by participants & non-participants

Households food security challenges		**Relative Frequency %**				**Total weight**
		Never	**Rarely (once-twice)**	**Sometimes (3-10 times)**	**Often (more than 10 times)**	
Fear food will run out-due to shortage of resources or money	*One home one garden participant*	26.06	33.94	26.36	13.64	127.58
	Non-participants	9.69	32.72	29.69	27.87	175.71
Not able to eat kind of food you preferred-due to shortage of resources or money	*One home one garden participants*	0	27.87	20.32	51.81	223.94
	Non-participants	0	26.66	31.51	41.81	215.11
Have to eat limited food-due to shortage of resources or money	*One home one garden participants*	0	55.15	30.60	14.25	159.1
	Non-participants	3.03	42.60	30.30	22.55	170.65
Have to eat some food you really do not like-due to shortage of resources or money	*One home one garden participants*	0	49.69	40	10.31	160.62
	Non-participants	9.69	20	43.03	27.27	187.81

Survey data (2015)

These findings indicate that the major household food security challenge for both groups was that households' members were not easily able to eat any kind of food preferred due to the shortage of resources or money (with a weighted score of 223.94 for "One Home One Garden" and 215.11 for Non-participating group). The second main household food security challenge was that households had to eat some food they really did not like due to shortage of resources or money (with a weighted score of 160.62 for the "One Home One Garden" and 187.81 and 160.62 for the non-participating group). The findings indicate that Maphumulo households are facing a number of challenges that hinder the continuous availability of food at all times. The latter could be linked to the 2014/15 drought that the entire country has experienced. Rural poor households' food security is more sensitive to weather conditions as they depended solely on their own agricultural production and the limited funds from social grant for their livelihood (Table 4.13 & Table 4.14).

Based on the results, it was clear that most of the household members experience problems with food availability and diversity, which is likely to be related to food insecurity. Mwaniki (2013) pointed that dietary diversification remains the best way to provide sustainable and nutritious diets to any population. It is possible to alleviate malnutrition by using the right mix of food from that which is locally produced, and the probability of so doing is increased with an increase in locally produced foods.

4.10 Causes of Households low food consumption

The information based on the causes of households' low food consumption was noted and is presented in Table 4.25.

4.10.1 Reasons for not eating the kinds of food household want

The question based on the reasons for low consumption of food by households were asked and it was the follow-up question from responses obtained in table 4.24 (Not able to eat kind of food preferred-due to shortage of resources or money) and results herein are presented in Table 4.25. The findings indicate that the majority of respondents (about 87% of participants and 68% of non- participants) stated that their main reason for not eating the kind of food preferrred was the shortage of money to buy food.

Table 4.25: Causes of a household low food consumption experienced by participants & non-participants

If enough food, but not the kinds you want. somewhat are the reasons?		**Frequency**	**Percentage(%)**
Not enough money for food	*One home one garden participant*	*286*	*86.88*
	Non-participants	113	68.48
Too hard to get to the store	*One home one garden participants*	*0*	*0*
	Non-participants	0	0
On a diet	*One home one garden participants*	*0*	*0*
	Non-participants	0	0
Kind of food we want not available	*One home one garden participants*	44	*13.33*
	Non-participants	52	31.51
Good quality food not available	*One home one garden participants*	0	0
	Non-participants	0	0

Survey data (2015)

In this study it was noted that due to drought and its effect on production, the price of produce in market had risen to levels which were unaffordable for many consumers. This was therefore the main reason why the households were not able to eat kind of food they preferred. In this study none of the respondents in either of the groups were on diet or could not manage to go to the shop and none noted that good quality food was not available.

According to Statistics South Africa (2011) many South African households are unable to purchase food primarily because their purchasing power is limited by the scarcity of income generation opportunities. This is especially true in rural areas such as in Maphumulo Local Municipality. The second reason was the scarcity of the kind of food they want (mentioned by 13% of the participants and 32% of the non-participants. Furthermore, even if the households had money to buy food, the unavailability of variety of produce prevented them from getting what they wanted.

4.11 Participation in food security intervention programmes

Most of the respondents in this study were beneficiaries of the "One Home One Garden" intervention programme whilst others were from the non-participants group/strata. The "One Home One Garden" participants were asked to indicate if they also participated in other government intervention programmes such as the mechanisation programme. The assumption was that if a household participated in more than one intervention, they would be more likely to address the problems of food insecurities that they may be faced with. Mjonono *et al.* (2009) mentioned that crop production alone was not sufficient to improve the food security situation of households. Wild foods and vegetables, and non-farm activities also played a significant role in determining household food security. Table 4.26 shows the proportions of the "One Home One Garden" participating households that participated in other intervention programmes.

Table 4.26: The proportions of the "one home one garden"households participated in intervention programmes

Participation in other intervention programmes	**"One Home One Garden" Participants**		**Non-participants**	
	Frequency	**(%)**	**Frequency**	**(%)**
Yes	76	23	0	0
No	254	77	165	100
Total	**330**	**100**	**165**	**100**

Survey data (2015)

The results reveal that a small proportion (23%) of the "One Home One Garden" participants also participated in other intervention programmes, while the majority (77%) did not participate in other food security intervention programmes. The respondents stated that

sometimes they did not participate in other intervention programmes because of shortage of land or shortage of water needed for the programmes, especially in livestock production programmes. Etwire *et al.* (2013) stated that the lack of participation hinders progress in agricultural programmes and they claimed that in order to enhance the performance of the agricultural sector and more specifically the performance of agricultural projects, there is a the need to identify factors which limit farmer's participation in agricultural projects. Similarly, Davids, Maphunge and Theron (2005) agreed that community participation in various programmes gives people an opportunity to determine their own destination in terms of their needs and resources.

4.10.1 Perceived satisfaction by the "One Home One Garden" participants on the government intervention programmes

The "One Home One Garden" participant households were asked to indicate their perceived satisfaction with the government intervention programmes with regard to the food security status of their households. Households were therefore asked to rank their level of satisfaction using a Likert scale measure of 1 to 5 as follows: if totally dissatisfied (1); if a little satisfied (2), if moderately satisfied (3), if satisfied (4) and if highly satisfied (5). The results are shown in table 4.27. The findings indicated that the majority of 71 participants (50%) were totally dissatisfied with the level of the mechanisation support and the quality of government support received respectively. Significant proportions of the respondents also expressed total dissatisfaction with the quality of inputs they received (about 41%); the produce harvested (yield) (about 37%) and on the productivity of their farmlands (about 47%). Nonetheless, about 25 of the respondents (11%) indicated that they were satisfied with the prices they received for their agricultural produce and on the produce harvested (yield) respectively. Overall, it can be concluded that the majority of the respondents were moderately satisfied to totally dissatisfied on a number of issues including those mentioned above.

Table 4.27: Perceived satisfaction by the "One Home One Garden" participants on the government intervention programmes

Perceptions on government intervention programmes	Relative Frequency (%)					Total Percentage (%)
	Totally dissatisfied (1)	Little satisfied (2)	Moderately satisfied (3)	Satisfied (4)	Highly satisfied (5)	
Quality of government support received	50.06	22.42	14.24	5.46	1.82	100
Quality of inputs received (seeds and garden tools)	40.62	24.84	12.12	14.55	7.87	100
Satisfaction on the level of mechanization support	71.22	9.39	6.36	7.87	5.16	100
Satisfaction on the produce harvested (yield)	37.27	27.87	12.13	9.39	13.33	100
Satisfaction on the price received from the agricultural produce	21.51	22.13	19.69	24.85	11.82	100
Satisfaction on the productivity of the farm land	47.27	14.86	11.52	16.96	9.39	100

Survey data (2015)

4.11 Chapter summary

This chapter presented and discussed the descriptive results on the household demographic characteristics, household food production, household food consumption patterns, household sources of food, estimated household food security status (using the HDDS and HFCS

measures), and socio-economic factors influencing the household food security status and the participation in food security intervention programmes. According to the descriptive study findings, it was noted that most households consumed at least 3 food groups. On average about 60% of "One Home One Garden" participants consumed 3 food groups and non-participants who consumed 3 food groups were lesser at about 52% lower than beneficiaries of "One Home One Garden" initiative. These results were justified by the fact that it does not matter what is in the garden, a household's menu choice depends on the household's food preference which may not necessarily translate into a balanced diet. Furthermore, there was low dietary diversity, suggesting that these households were more likely to be food insecure. Maize, beans and butternut were some of the dominant crops, which were cultivated by both "One Home One Garden" participants and non-participants in the study areas. This type of produce therefore served as the major food sources. The HFCS results of the non-participants (3.67) indicated that they were slightly better off than the "One Home One Garden" participants at about (3.1). This indicates that a number of households were food insecure due to the fact that most of households consumed only 3 out of 8 food groups on a daily basis.
The HFCS category results reveal that there were more of the "One Home One Garden" participants who scored in the category of "acceptable (≥35)" which was 65% and non participants were more in the borderline category at about 54%.

In terms of the food security challenge, both groups ("One Home One Garden" participants and non-participants) experienced a number of challenges. The major challenge for both groups was that household members were not able to eat any kind of food preferred due to the shortage of resources or money. Furthermore, during the data collection, the majority of the respondents noted that they ate small portions of food due to the shortage of money and the lack of a variety of fresh produce. It was noted that drought had had very negative effects on production levels which had resulted in households being food insecure. With regard to participation in food security intervention programmes in the study areas, some of the respondents were the beneficiaries of the "One Home One Garden" initiative. Non-participants in this programme were deliberately included in the study to draw comparisons between the two groups. The majority of "One Home One Garden" participants indicated that they had only participated in this programme (with a few participating in other programmes) due to issues of land and inputs shortages with the non-participants not being part of any food security intervention programmes. In terms of the food security challenge, both groups ("One

Home One Garden" participants and non-participants) experienced a number of challenges. The major challenge for both groups was that household members were not able to eat any kind of food preferred due to the shortage of resources or money. Furthermore, during the data collection, the majority of the respondents noted that they ate small portions of food due to the shortage of money and the lack of a variety of fresh produce. It was noted that drought had had very negative effects on production levels which had resulted in households being food insecure. With regard to participation in food security intervention programmes in the study areas, some of the respondents were the beneficiaries of the "One Home One Garden" initiative. Non-participants in this programme were deliberately included in the study to draw comparisons between the two groups. The majority of "One Home One Garden" participants indicated that they had only participated in this programme (with a few participating in other programmes) due to issues of land and inputs shortages with the non-participants not being part of any food security intervention programmes. Notable the majority of the one home one garden respondents perceived the food security programmes as helpful and boosting their food security at household level, even during drought disaster. Overall, it can be concluded that the majority of "One Home One Garden" respondents were moderately satisfied to totally dissatisfied with a number of issues pertaining the programme.

The following chapter presents and discusses the empirical results of the study on the factors influencing the food security status of households and their participation in government food security intervention programmes.

CHAPTER 5: EMPIRICAL RESULTS AND DISCUSSIONS

5.1 Introduction

Following on from the descriptive results in Chapter 4, this chapter presents and discusses the empirical results of the study. The Binary Logistic Model was used to determine the factors that influence the households' food security status and their participation in government food security intervention programmes. In order to demonstrate that the model is robust and measures what it intends, the chapter begins by explaining the model fit. In addition, the omnibus of tests that were conducted is also explained in detailed to highlight the significance of adding more variables to the model. A Binary Logistic Model is one in which the probability of a dichotomous outcome is related to a set of explanatory variables in this statistical technique. Katwijuke (2005) noted that this model is a statistical tool used to determine the influence of independent variables on dependent variables. Of the same view, Hosmer and Lemeshow (2000) pointed that the binary logistic regression model is the preferred model to use to describe the relationship between an outcome (response) and a set of predictor variables. The model can be used to predict a dependent variable based on continuous and categorical independent variables. Hence, Rabe-Hesketh and Everett (2006) note that the model can be used to determine variables explained by the independent variables.

As discussed in the research methodology in Chapter 3, a Binary Logistic Model was run twice: firstly to determine the factors influencing the food security status of households that were beneficiaries of the "One Home One Garden" programme and for the non-participant households and secondly to determine the factors which influence the sampled households' participation in food security intervention programmes. In the first instance (determining the factors influencing the food security status of households – Model 1), the Binary Logistic Model was fitted with 13 variables, and only 5 variables were found to be statistical significant in influencing the household food security status of households. Three variables (age, household farming experience and access to extension) were found to be positive and significantly related to the household food security status of the "One Home One Garden" participants. Two independent variables (access to credit and household size) negatively influenced the household food security status for this strata. Surprisingly, for the non-participants strata no variable was found to be significant. In the analysis of the combined

sample ("One Home One Garden" participants and non-participants), three variables (household size, household farming experience and extension access) were significant and positively related to the household food security status of the households. In the second instance (determining the factors influencing the participation in government food security intervention programmes – Model 2), the Binary Logistic Model was fitted with 14 variables. Only 6 variables were found to be statistical significant in influencing participation in government food security intervention programmes by households. Three variables (household size, household income and household food security status) were found to be positive and significantly related to household participation in government food security intervention programmes, while three independent variables (age, educational level and farm size) negatively influenced the household participation in government food security intervention programmes.

5.2 Factors influencing the food security status of sampled households

Thirteen explanatory variables were included in the Binary Logistic Model to produce the factors influencing food security status by sampled households. These variables included gender, age, household size, household farming experience, marital status, education level, employment status, household income, access to credit, extension access, farm size, practice livestock farming, infrastructural support (fencing and irrigation scheme support).

5.2.1 Results on the factors influencing the food security status of sampled households

This section presents the results of the binary logistic model that was used to determine the factors influencing the food security status of sampled households in Maphumulo Local Municipality.

5.2.2 Model Fit (model 1)

Firstly, model fit tests were conducted to assess the robustness of the model. The likelihood ratio, omnibus tests of the model – chi-square statistic and the Hosmer and Lemeshow test statistic were used to test the goodness-of-fit or predictive efficiency of the model (Table 5.1). The model explained about 45% (Pseudo R2) for participants in the "One Home One Garden" , 41% (Pseudo R2) for non-participants and 10% (Pseudo R2) for the combined analysis of the variance in households on factors influencing the food security status of the

sampled households. The Hosmer and Lemeshow Test is the most robust test of the model fit. Unlike the most *p- values* we want p=>0.05 to indicate a good fit to the data. As shown in Table 5.1 the *p*-value=0.984, *p*-=0.682, *p*-value=0.719 is over 0.05 suggesting that there is no difference between the observed and the predicted model values of the dependent variable. The -2 log likelihood (deviance) has a chi-squared distribution. The -2 log likelihood is a measure of how well the model explains variations in the outcome of interest. The *p* value for the model in Table 5.1 is less than p = 0.05, hence it can be concluded that the addition of the variables is statistically significant.

Table 5.1: Binary logistic model results on the factors influencing the food security status of sampled households

Binary Logistic Estimates (Model 1) (STATA 11 OUTPUT)															
	"One Home One Gardern" Participants analysis					Non-participants Analysis					Combined analysis (Participants & Non-participants)				
Variables	**B**	**Std. Err. B (Std. Err. Exp(β))**	**Z**	**P>|z|**	**Exp(β)**	**B**	**Std. Err. β (Std. Err. Exp(β))**	**Z**	**P>|z|**	**Exp(β)**	**B**	**Std. Err. B (Std. Err. Exp(β))**	**z**	**P>|z|**	**Exp(β)**
Constant	2.0997	1.3035	1.61	0.107		1.7873	1.1342	1.58	0.115		0.2843	0.7326	0.39	0.698	
Gender_Female	-0.2883	0.4315 (0.3234)	-0.67	0.504	0.7495273	-0.3462	0.4317 (0.3054)	-0.80	0.423	0.7073054	-0.3293	0.2941 (0.2115)	-1.12	0.263	0.7194003
Age	0.0193	0.0099 (0.0101)	1.94	0.053	1.019538**	-0.0208	0.0141 (0.0138)	-1.47	0.141	0.9793998	.0058107	0.0078 (0.0079)	0.74	0.462	1.005828
Household size	-0.0494	0.0328 (0.0312)	-1.50	0.133	0.9517741	-0.0319	0.0381 (0.0369)	-0.84	0.403	0.9685596	-0.0390	0.0239 (0.0230)	-1.63	0.104	0.9616945*
Household farming experience	0.0351	0.0179 (0.0186)	1.95	0.051	1.035795**	0.0115	0.0241 (0.0243)	0.48	0.631	1.011628	0.0248	0.0138 (0.0142)	1.79	0.073	1.025171*
Marital status															
Single	-0.2880	0.2936 (0.2201)	-0.98	0.327	0.7497287	-0.1778	0.3483 (0.2915)	-0.51	0.610	0.8370861	-0.2331	0.2161 (0.1712)	-1.08	0.281	0.7920066
Dirvorced	-0.0171	0.8330 (0.8188)	-0.02	0.984	0.9830412	0.8471	1.3274 (3.0967)	0.64	0.523	2.33289	0.3381	0.7201 (1.0099)	0.47	0.639	1.402357
Educational level															
Primary	-1.3013	1.1082 (0.3016)	-1.17	0.240	0.2721777	-0.3312	0.5652 (0.4058)	-0.59	0.558	0.717999	-0.4752	0.4482 (0.2786)	-1.06	0.289	0.6217324
Secondary	-1.2675	1.0667 (0.3003)	-1.19	0.235	0.2815132	0.1600	0.5188 (0.6089)	0.31	0.758	1.173594	-0.2109	0.4164 (0.3372)	-0.51	0.613	0.8098333
Tertiary	-1.4428	1.0810 (0.2554)	-1.33	0.182	0.236259	-0.2557	0.8958 (0.6936)	-0.29	0.775	0.7743241	-0.4632	0.4771 (0.3002)	-0.97	0.332	0.6292479
Employment status	.	.	.	.	.	-0.1421	0.8551 (0.7417)	-0.17	0.868	0.8674807	0.0110	0.8214 (0.8305)	0.01	0.989	1.011106
Household income	-0.0000	0.0000 (0.0000)	-0.41	0.682	0.9999652	-0.0001	0.0001 (0.0001)	-1.12	0.264	0.9998781	-0.0000	0.0000 (0.0000)	-0.99	0.323	0.9999367
Access to credit	-0.5003	0.3081 (0.1868)	-1.62	0.104	0.6063028*	.	.	.	.	.	-0.2873	0.2970 (0.2228)	-0.97	0.333	0.7502609
Extension access	.	.	.	.	.	.	.	.	.	.	1.5859	0.8407 (4.1058)	1.89	0.059	4.883753*
Farm size	0.0016	0.0435 (0.0436)	0.04	0.969	1.001699	0.0196	0.0380 (0.0388)	0.52	0.605	1.019858	0.0063	0.0282 (0.0283)	0.23	0.821	1.006386
Practise livestock	0.1047	0.2908	0.36	0.719	1.110414	-	0.3415 (0.2443)	-0.98	0.327	0.7155548	-0.1217	0.2160 (0.1912)	-	0.573	0.8853847

farming		(0.3229)				0.3346							0.56		
Infrastructural support (Irrigation scheme)	0.1634	0.3093 (0.3642)	0.53	0.597	1.17754	.	.	.	.	.	0.1294	0.2996 (0.3410)	0.43	0.666	1.138241
Number of observations	330					165					495				
Log likelihood	-160.15691					-109.53918					-275.23639				
LR chi2(14)	15.42					9.36					63.31				
Prob > chi2	0.3499					0.7450					0.0000				
Pseudo R2	0.0459					0.0410					0.1032				

Significant at 10%*; 5%** & 1 %*** significance level **Computer outputs (2015)**

N/B: (.) omitted because of collinearity and redundancy

The results from a Binary Logistic Model (Table 5.1) indicate that only 5 variables of the 13 that were tested were significant in influencing a household's food security status in the study areas. These variables include age, household size, household farming experience, access to credit and extension access. Three of the 13 variables were omitted due to the redundancy (employment status, access to credit and infrastructural support for the non-participants group/strata). Further explanations of the statistical significance of the variables are given in the next sections.

The variable **Age** was only significant for the "One Home One Garden" participants' analysis and was found to be positively influencing the household food security status of households. It was statistically significant at 5% significance level with a p-value = 0.053 ; with a beta coefficient (β =0.0193) and an odds ratio (Exp(β) = 1.019538) which means the model predicts that for every one-unit increase in age, the chances of a "One Home One Garden" participating household being food secure is 1.019538 times more likely while holding all other independent variables constant.

This finding is in contrast with the prior expectation that as age increases, the household would become less food secure. However, there is a logical explanation for the finding. Hofferth (2003) stated that older household heads tend to have better economy of the farm household, because older people have relatively more farming experience. In addition, older households might be in possession of implements and farming resources which are likely to boost their agricultural productivity thus in turn likely to be more food secure.

The variable **Household size** was only significant for the combined analysis and was found to be have a negative influence on the household food security status of households. It was statistically significant at 10% significance level with p-value = 0.104; a beta coefficient (`β=-0.0390) and an odds ratio(Exp((β) = 0.9616945). The model predicts that an increase in household size reduces the chances of a household being food secure. The finding of this study is supported by a number of authors such as Olayemi (2012) that large family has a negative impact on household's food security. Maxwell (1996) noted that large family size has significant relationship with much greater risk of poverty. Obamiro *et al* (2003) reported that an increase in household size would likely being prone to food insecurity. Referring to the information in Table 4.5, the majority of people in Maphumulo Local Municipality have

larger family sizes, and are more likely to be food insecure due to the greater demand for food by a larger family.

The variable household farming experience **Household farming experience-** was found to be significant for the "One Home One Garden" participants and for the combined analysis ("One Home One Garden" participants & non-participants). The variable was found positively influence the household food security status. It was statistically significant at 5% significance level with p = >0.051 for the "One Home One Garden" participants analysis; with a beta coefficient (β = 0.0351) and an odds-ratio (Exp(β) = 1.035795). The model predicts that for every one unit increase in the farming experience, the chances of a "One Home One Garden" participating household being food secure is 1.035795 times more likely. This variable, household farming experience is statistically significant at 10% significance level with p = >0.073 for the combined analysis ("One Home One Garden" participants & non-participants); with a beta coefficient (β = 0.0248) and an odds-ratio (Exp(β) = 1.025171). This means that for every one unit increase in the farming experience (combined analysis), the chances of a household being food secure is 1.025171 times more likely while holding all other independent variables constant.

The findings suggest that as farming households gain more farming experience, they are more likely to use the farming knowledge to their advantage in terms of increasing productivity. This applied to both groups of respondents ("One Home One Garden" participants and non-participants). With the advantage of experience and ability, the respondents are able to have a coping strategy during food shortages and be more likely to be food secure. According to Kuwornu *et al*. (2011) an experienced household head is expected to have more insight and the ability to diversify his or her production to minimise the risk of food shortages. It was noted that respondents from both groups had years of farming experience. About 53% of the "One Home One Garden" respondents and 52% of non-participants respondents had between 11-20 years farming experience. In the study area respondents that have more farming experience are more likely to apply these skills and knowledge to improve their agricultural productivity and, as a result, the food security status of their households.

The variable Access to credit was only significant for the "One Home One Garden" participants analysis and was found to negatively influence the household food security status

of households. It was statistically significant at 10% significance level with a p-value = 0.104 ; with a beta coefficient (β = - 0.5003) and an odds ratio ((Exp(β) = 0.6063028) which means the model predicts that as household receives credit support, the likelihood of a "One Home One Garden" participating household being food secure is less likely while holding all other independent variables constant. Throughout literature credit support has been highlighted as an important aspect of food security. In one instance, Masuku (2013) claimed that households in rural areas cannot access credit due to illiteracy; lack of information; and the stringnent lending processes.

This finding is in contrast with the initial or expected results and other studies that ound that access to credit was likely to be positively related to the food security status of households. This finding can be explained by the fact that respondents in this study (both the "One Home One Garden" beneficiaries and non-participants) were not supported with credit support from any financial institutions. They were more likely to depend on the informal credit sector within the community. When the programme members borrow from the informal sector, the negative correlation is lower calorie and protein intake which arises when the households have to repay the loan (at exhorbitant rates). It could also be the fact that the loan was not enough in the first place to guarantee the intended investment and therefore households end up lowering their food consumption to make up for shortfalls (Diagne, 1998).

The variable **Access to extension** was only significant for the combined analysis and was found to positively influence the household food security status of households. It was statistically significant at 5% significance level with a p-value = 0.0.059 ; with a beta coefficient (β = 1.5859) and an odds ratio ((Exp(β) = 4.883753). This means that for an improvement in household access to extension, the model predicts that as household receives extension support, the chances of a household being food secure improves by 4.883753 times. In the study area the extension support plays a vital role in changing agricultural practices by transferring agricultural technology based on skills and knowledge through training and farm visits, demonstrations, trials, farmer's days and ward shows. Birkhaeuser *et al.* (1991) mentioned that the receipt of extension services provides farmers with information about cropping practices and managerial skills, optimal input use and high yield varieties. In the study area the households that received extension support were more likely to be food secure due to the fact that farmers were empowered in good agricultural practices that emphasised protection of land from degradation and methods of increasing yields.

5.3 Factors influencing participation in government food security intervention programmes by sampled households

Fourteen explanatory variables were included in the Binary Logistic Model to elicit the factors influencing participation in government food security intervention programmes by sampled households. Only 10 of the variables were computed. The variables of marital status, employment status, extension access and infrastructural support (Irrigation scheme) were excluded/omitted because of co-linearity and redundancy. The variable that were included were age of respondent; gender of respondent; highest education level of the respondent; family size; employment status of the respondent; marital status of the respondent and socio-economic factors that included household farming experience; farm size; output (yield); household access to credit; household access to extension and type of government support.

5.3.1 Results on the factors influencing participation in government food security intervention programmes by sampled households

This section presents the results of the binary logistic model that was used to determine the factors influencing participation in government food security intervention programmes in Maphumulo Local Municipality.

5.3.2 Model Fit (model 2)

The likelihood ratio, omnibus tests of the model, chi-square statistic and the Hosmer and Lemeshow test statistic were used to test the goodness-of-fit or predictive efficiency of the model (Table 5.2). The model explained about 81% (Nagelkerke R2) of the variance in households' participation in food security intervention programmes by sampled households and correctly classified about 89.7% of cases. The number of observations was 495, the restricted Log likelihood value was 199.432 and Cox & Snell was 58.1%. The Hosmer and Lemeshow Test is the most robust test for the model fit. Unlike the most *p- values* we want p=>0.05 to indicate a good fit to the data. As shown in Table 5.2 the *p-value* is over 0.05 suggests that there is no difference between the observed and the predicted model values of the dependent variable.

Table 5.2: Binary logistic model results on the factors influencing participation in government food security intervention programmes of sampled households

Binary Logistic Estimates (Model 2) (SPSS 21 OUTPUT)					
Variables	**B**	**Std. Err.**	**Wald**	**Sig.**	**Exp(β)**
Constant	3.570	1.119	10.172	0.001	35.523
Gender_Female	0.259	0.508	0.260	0.610	1.296
Age	-0.076	0.017	20.009	0.000	0.927***
Household size	0.113	0.043	6.843	0.009	1.112**
Household farming experience	-0.007	0.025	0.082	0.775	0.993
Marital status					
Single	.	.	.	.	.
Dirvorced	.	.	.	.	.
Educational level			22.131	0.000	
Never went to School	-3.330	0.976	11.648	0.001	0.036***
Primary	-2.448	0.603	16.512	0.000	0.086***
Secondary	-2.158	0.528	16.680	0.000	0.116***
Employment status	.	.	.	.	.
Household income	0.000	0.000	3.051	0.081	1.000***
Access to credit	22.929	2618.887	0.000	0.993	9075827801.946
Extension access	.	.	.	.	.
Farm size	-0.100	0.060	2.814	0.093	0.905*
Satisfaction on government support	21.625	2417.311	0.000	0.993	2463227094.728
Infrastructural support (Irrigation scheme)	.	.	.	.	.
Household food security status	1.622	0.405	16.005	0.000	5.063***
Number of observations	495				
-2 Log likelihood	199.432[a]				
Omnibus Test	430.717 (0.000)				
Hosmer and Lemeshow Test	5.614 (0.690)				
Cox & Snell R Square	0.581				
Nagelkerke R Square	0.807				
Overall Model Prediction	89.7				

Significant at 10%*; 5%** & 1 %*** significance level **Computer outputs (2015)**

N/B: (.) omitted because of collinearity and redundancy

The results from a Binary Logistic Model (Table 5.2) indicates that only 6 variables of the 14 tested were significant in influencing the household's participation in government food security intervention programmes in the study areas. The significant variables were age, household size, educational level, household income, farm size and household food security status. Further explanations on the statistical significance of the variables are given in the next sections.

The variable **Age** was found to negatively influence the households' participation in government food security intervention programmes. It was statistically significant at 10% significance level with p = 0.000 ; beta coefficient (β = -0.076) with the odds ratio (Exp(β) = 0.927). Several studies have observed a positive relationship between age and participation in agricultural projects (Nnadi & Akwiwu, 2008; Farid *et al.*, 2009; Nxumalo & Oladele, 2013). The positive correlation was expected between age and participation in food security intervention programmes as supported by FAO (2003) who found that younger farmers tended to be more willing to participate and adopt than their older counterparts. However, the regression results from this study show a negative relationship between age and participation in government food security intervention programmes. This means that the likelihood of a household participating in a food security intervention programme decreases with an increase in age of the household head. To justify this, the descriptive results in this study show that only about 6% of the "One Home One Garden" participants were above the age of 76 years, while only 3% of non-participantsfell in that age group. This age group is regarded as old, weak and not fit enough to withstand agricultural activities that need younger and energetic people. Furthermore, Kahn *et al.* (2012) observed that as a person's age increases, they becomes physically weak and therefore the ability to participate in an agricultural projects diminishes as well.

The variable **Household size** was a positive influence on the household's participation in government food security intervention programmes. It was statistically significant at 5% significance level with p = 0.009 ; beta coefficient (β = 0.113) with the odds ratio (Exp(β) =1.112). The model predicts that as household size increases, for every unit increase, the chances of a household participating in food security intervention programmes are 1.112 times more likely while holding all other independent variables constant. This finding is in line with the prior expectation. Paddy (2003) found that an increased family size is likely to be associated with an increase in household food consumption because being a large sized household means many mouths to feed and more demand for food to meet the family's needs. The great demand for food associated with larger families is therefpre more likely to encourage farmers to participate in food security intervention programmes in order to meet the family's food requirements. Moreover, Etwire *et al.* (2013) mentioned that a large family household can easily participate in an agricultural project as it can delegate other important

activities to other household members and the ease of availabity of labour from the family members.

The variable **Educational level** was measured categorically (with no formal schooling coded with (1), primary education coded with (2), secondary education coded with (3) and tertiary education coded with (4) and used as a reference category). Dlova *et al.* (2004) noted that the level of education affects the use of information efficiently and can influence participation in intervention programmes. The results show that a household head with no formal schooling (education) or a lower educational attainment is linked with a reduced likelihood of household participating in government food security intervention programmes by 0.964 times (no formal schooling), by 0.914 times (primary education) and by 0.884 (secondary education) compared to one with higher educational attainment (tertiary level). The reduced participation likelihood on the education level parameters suggests that those households with less educated heads are less likely to participate in government food security intervention programmes. This finding is in agreement with Nnadi and Akwiwu (2008) that the level of education (years of schooling) affects the use of information efficiently and can influence the participation in intervention programmes.

The variable **Household income** was found to be have a positive influence on the household's participation in government food security intervention programmes. It is statistically significant at 10% significance level with $p = 0.081$; beta coefficient ($\beta = 0.000$) with the odds ratio (($Exp(\beta) = 1.000$) which means that for every one-unit increase in the household's income, the model predicts an increase in the log-odds of the household's participation in food security programmes by the same ratio. This finding is in agreement with the prior expectation and also supported by Kakumba and Nsingo (2008) who also asserted that the weak financial position of households in communities also reduces their capacity to participate in development projects. Therefore, it can be asserted that an improvement in household income can motivate farmers to participate in government food security intervention programmes.

The variable **Farm size** was found to have a negative influence on the household's participation in government food security intervention programmes. It is statistically significant at 10% significance level with $p = 0.093$; beta coefficient ($\beta = -0.100$) with the

odds ratio (Exp(β) = 0.905). The regression model shows a negative relationship between farm size and the likelihood that the farmer will decide to participate in food security intervention programmes. This means that an additional unit in the size of the farm while holding all the other factors constant, reduces the likelihood of a household head participating in a food security intervention programmes by 0.093 times. This finding is in contrast with the prior expectations. In this study the respondents pointed out that due to the scarcity of land that is suitable for carrying- out the farming activities, they are less willing to participate in food security intervention programmes that require a large piece of land. The National Department of Agriculture (2012) noted that unused land of good potential is very scarce in South Africa, and there is a limit to the horizontal expansion of agricultural production. This means that productive land is scarce to find and therefore the issue of land scarcity results in negative participation levels of rural households in food security intervention programmes.

The variable **Household's food security status** was found to positively influence the household's participation in food security intervention programmes. It is statistically significant at 1% significance level with p = 0.000 ; beta coefficient (β = 1.622) with the odds ratio (Exp (β) = 5.063). This means an improvement in a household's food security status of the household we expect an increased likelihood of a household participating in food security intervention programmes by 5.063 times. In this study it was noted that it is the responsibility of a household's head to sustain the household's food security status. This then encourages farmers to participate in government food security programmes as a means of increasing the probability of food availability at household level. Kuwornu (2011) noted that farming households are the most affected in terms of food insecurity and poverty, especially the smallholder farming households though the rest of the population depends on their production.

5.4 Chapter summary

This chapter presented the empirical results on the factors influencing the food security status of households that were beneficiaries of the "One Home One Garden" programme as well as non-participants and the factors influencing the participation in government food security intervention programmes in the study areas of Maphumulo Local Municipality. The Binary

Logistic Regression Model was run in two instances (in the first instance to determine the factors influencing the food security status of the "One Home One Garden" beneficiaries and secondly to determine the factors influencing the participation in government food security intervention programmes). In the first model, the results from a Binary Logistic Model (Table 5.1) indicate that only 5 variables of the 13 tested were significant in influencing a household's food security status in the study area. These variables include age, household size, household farming experience, access to credit and extension access. The age, household farming experience and access to extension were found to be positive in influencing the food security status of the household and household size and access to credit were found to be negative in influencing the food security status of the household. Three of the 13 variables were omitted due to redundancy (employment status, access to credit and infrastructural support for the non-participants group/strata). In the second model (Table 5.2) only 6 variables of the 14 tested were significant in influencing a household's participation in government food security intervention programmes in the study area. The variables that were found to significantly influence participation included age, household size, educational level, household income, farm size and household food security. The household size, household income and household food security status were found to be positively correlated with participation in government food security intervention programmes. In contrast, three out of the 13 variables, namely age, educational level of househol head and farm size were found to be negatively correlated with households' participation in government food security intervention programmes. Three variables were omitted from Model 2 because of the redundancy. These included marital status, employment status, access to extension and infrastructural support. The following chapter presents the summary, conclusions and recommendations based on the study's findings.

CHAPTER 6: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the summary, conclusions and recommendations for the study. It starts by giving a summary of the findings and how the research objectives were answered. Secondly, conclusions are drawn from those findings in order to identify areas of interest or conflict within the literature that was reviewed in Chapter Two. Lastly, it provides recommendations based on the findings of the study.

6.2 Summary of the findings

The study was conducted in Maphumulo in the KwaZulu Natal Province, South Africa. The main aim of the study was to identify the factors which influenced household food security status as well as factors that affected households' participation in government food security intervention programmes. The data was gathered in November 2015 by means of a questionnaires. Data was recorded and analysed in a SPSS Software.

In addressing Objective one which was "Investigating the food security status of households in Maphumulo Local Municipality that participated in the "One Home One Garden" programme as well as non-participating households", the HDDS and HFCS tools were adopted to estimate the food security status of households. The HDDS results showed that the majority (about 61%) of the "One Home One Garden" beneficiaries and 52% of the non-participant households experienced low dietary diversity. This suggests that households in the area were food insecure. Moreover, the food groups that were most commonly consumed were cereals, milk and pulses. The HFCS results of the "One Home One Garden" beneficiaries showed an average score of 3.1 and non-participants showed an average score of 3.67 indicating that in both groups the households consumed only 3 of the 8 food groups indicatin a lower dietary diversity in their access to food. The majority (82% and 92% respectively) from both groups of respondents predominantly consumed maize in the form of maize meal during the week prior to data collection. It was noted that only a few (2%) of "One Home One Garden" beneficiaries fell within the poor consumption category while a slightly larger proportion (about 11%) of the non-participating housheuls fell in this category. Of the non-participants, 35% had an adequate dietary level of food consumption

About 33% of the "One Home One Garden" participants were considered borderline levels, while 54% of the non-participants scored borderline. In the category of "acceptable (≥35)", 65% of the "One Home One Garden" participants and 35% of the non-participants fell within ths category. The qualitative data indicate that starchy food, such as rice and mealie meal were seen as desirable, although cost prohibitive. The Household Food Consumption Score results show that participants' diet do have variety of vegetables and food is more likely to be available. However, the results show that the choice of the menu and food preferences affect households' dietary diversity since they have vegetables available in their home garden for them to diversify their diet.

A Binary Logistic Model was run in two instances. In the first instance (Model 1), the results from a Binary Logistic Model indicate that only 5 variables of the 13 tested were significant in influencing a household's food security status in the study area. These variables include age, household size, household farming experience, access to credit and extension access. The variables that were found to positively influence participation in government food security intervention programmes were age (in "One Home One Garden" group), household farming experience (in both "One Home One Garden" group and combined group) and access to extension (in a combined group). Household size (in combined group) and access to credit (in "One Home One Garden group") negatively influenced the participation in government food security intervention programmes. Four (employment status, marital status, access to extension and infrastructural support for the non-participants group/strata) of the 13 variables were omitted due to redundancy. The results met the prior expectations of the variables.

In addressing Objective 3 which was "To determine the factors influencing the participation in government food security intervention programmes in Maphumulo Local Municipality", the results from a second run of the Binary Logistic Model (Model 2) revealed that only 6 variables of the 14 tested were significant in influencing household's participation in government food security intervention programmes in the study areas. These variables included age, household size, educational level, household income, farm size and household food security. The variables that were found to positively influence participation in government food security intervention programmes were household size, household income

and the household food security status. On the other hand, the variables age, educational level parameters and farm size were found to be have a negative influence on household's participation in government food security intervention programmes in the study area. Three variables (marital status, employment status, access to extension and infrastructural support) were omitted from Model 2 because of redundancy.

In addressing Objective 4 which was "To investigate rural households' perceptions of their satisfaction with how the government introduced the food security intervention programme in Maphumulo Local Municipality", the results from the "One Home One Garden" participants indicated that the majority (about 71%) of the respondents were totally dissatisfied with the level of the mechanization support and the quality of government support received respectively. About 41% and 37% (participants and non-participants respectively) of the respondents also expressed total dissatisfaction with the quality of inputs they received and the produce harvested (yield) respectively. Nonetheless, about 25% and 9% of the respondents indicated that they were satisfied with the prices they received from their agricultural produce and with the produce harvested (yield) respectively. Overall, it can be concluded that the majority of the "One Home One Garden" participants were moderately satisfied to totally dissatisfied on how the government had introduced the food security intervention programme.

6.3 Conclusion

This study assessed the factors affecting household food security status and participation in food security intervention programmes in Maphumulo Local Municipality in the ILembe District of KwaZulu-Natal (KZN). To ensure households' food security, the South African government has introduced a number of household food security intervention programmes. In this study the focus was on the "One Home One Garden" programme when determining the level of participation in government food security intervention programmes.The results reveal that the status of food production was lower due to the severe drought that hit the KwaZulu Natal Province in the 2014/2015 period. This has exposed the majority of the households to food insecurity. It was noted that the households depended primarily on their own agriculture production and on social grants as a source of household food. This means that their own agricultural production and grants play an important role in household food

availability because there are limited employment opportunities in the area. As revealed by the low average HDDS, it is clear that households in Maphumulo Local Municipality face a number of food security challenges. These include consuming food that is not preferred by household members as well as consuming limited quantities of food due to the shortage of money or resources. Severe drough has had a negative effect on level of production resulting in household food insecurity. Household dietary diversity was affected by the age of the household head, household size, farming experience, and access to credit and extension services. Partcipation in government food security programmes was affected by the age and educational level of household head, household size, income, farm size and household food security status. The government should therefore design food security programmes that have high returns as this will encourage the participation of younger farmers in food security programmes and reduce their migration to urban areas. Large families should be motivated to diversify in order to increase their food supply base.

6.4 Recommendations

Several recommendations for dealing with household food insecurity in Maphumulo local municipality are proposed herein. They focus on the various means of improving household production, improving household food consumption patterns, reducing household food insecurity and stimulating household participation in government food security intervention programmes.

The findings reveal that farming households in Maphumulo were charecterised by older farmers because younger household members generally tend to migrate to urban areas. In this study age was therefore found to be statistically significant. As a result, it is recommended that the government design food security programmes that have high returns as this will improve the participation of younger farmers in food security programmes and eliminate their migration to urban areas. Programmes like Youth in Agriculture and Rural development should be introduced with an aim of familiarizing youth with such opportunity. If this strategy succeeds, the programme will be sustained by both young and strong farmers and older farmers who are experienced in farming. This will help to alleviate household food insecurity. Farming experience was also found to be statistically significant. The findings suggest that as farming households gain more farming experience, they are more likely to use

this farming knowledge to their advantage in terms of increasing productivity. Although lack of financial support from government demotivate farmers to use those farming skills. It is therefore recommended that the Department of Agriculture and Rural Development design more of programmes with sufficient funding that will enable farmers to grow in Agri-business from subsistence farming to commercial farming. It is therefore recommended that older farmers and younger farmers should be encouraged to participate in all food security intervention programmes as an ideal of complementing each other with different levels of knowledge in farming business.

In the Maphumulo Local Municipality there are larger family sizes, and these are more likely to be food insecure due to the greater demand for food for a larger family. The recommendation here is that households with more members should be motivated to become engaged in a number of food security intervention programmes so that their production levels and income will be generated from different sources and the household food availability will be sustained in a long run.

It was noted that Maphumulo households were in a weak financial position which resulted in their poor participation in government food security intervention programmes. They noted that the production process is too costly, and theirfailure to access the inputs they need, discourages them from participating. It is recommended that government should support households by making improved inputs such as hybrid seeds available that give farmers better yields and more marketeable and higher quality output. This produce will fetch better prices in the market and the resultant high returns will stimulate continuous participation. Educational level was also found to be statistically significant in this study and it was noted that those households with less educated heads are less likely to participate in government food security intervention programmes. It is therefore recommended that farmers should be capacitated in all areas of the farming business by making access to new technology that upgrade skills and knowledge of farmers more easily available. Extension services should therefore make themselves aware of the educational status of each and every group of farmers. The extension services personnel are the ones who interact with farmers on a daily basis and assist in ensuring that the new technology is well-designed, suitable and able to be understood by all farmers, regardless of their level of education

It was noted that farm size was also a factor that affected household participation in government food security intervention programme. In this study the respondents pointed out that if they had enough land, they would be able to increase production to a larger scale. This would allow them to shift from smallholder farming to commercial farming. However, because of the shortage of land, they are not able to participate in food security intervention programmes that require large scale farming. The recommendation here is that local authorities (in this case, the Ingonyama Trust) should assist in identifying the vacant arable land within the Maphumulo Local Municipality that could be used for farming. Rural households would then be more willing to participate in farming and sustain a continuous food availability. Household income was found to be significant in influencing household participation in government food security intervention programmes. It was noted that the weak financial position of households in the community reduces their capacity to participate in development projects. Therefore, it can be asserted that well-designed programmes with great turnovers would be an advantage that could motivate farmers to participate in government food security intervention programmes.

In terms of their lack of access to credit, the descriptive results showed that the Maphumulo households could not access credit support from any financial institutions and they noted that the farming production process was costly. This results in the minimum utilisation of land which inturn affects continuous households food availability and lower food consumption by households. It is therefore recommended that the government create credit support policies that are suitable for and accessible to poor rural households of Maphumulo Local Municipality. This will ensure a willingness to participate, maximised food production and sustained household food security. Lack of extension support was also found to be significant in this study, some of the respondents stressed that the services offered by extension services were not accessible and were not enough for them. As a result, if these services can be transformed to be more accessible to everyone and also fit in the study area requirements. This will ultimately improve their farming knowledge, increase production and embrace household food security.

6.5 Future research direction

Based on the findings of the study on factors affecting food security status and participation in government food security intervention programmes in Maphumulo Local Municipality in Ilembe District of KwaZulu-Natal, future research should aim to explore the type of commodities that favour the environmental conditions of the study area and increase food production and sustain households food security. Similarly, a study could be done covering a wider geographical region in three district of KZN (Ilembe District, Umkhanyakude District and Ugu District) while assessing the impact of government programmes on food security. A comparative study in relation to food security could be done covering all food security intervention programmes such as mechanization, land care, livestock programmes and cluster programmes in the study area.

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APPENDIX 1: INFORMED CONSENT

My name is Primrose Zamangema Ngema and I am a post graduate student at the University of Zululand. I am doing a research project based on the factors affecting the food security status and participation in food security intervention programmes in Maphumulo Local Municipality in the ILembe District of KwaZulu Natal. I need your assistance in getting the information for this research project.

The project will be explained to you with the aim of making you to understand clearly what will be done and what will be expected from you so that you can decide if you want to participate in this project. Participation is voluntary and should you decide to participate, you may withdraw at any stage during this project.

WHAT IS THIS PROJECT?

The information on project is:

- The purpose of the research project is to collect information on the food security status based on food security intervention programmes in the rural communities of Maphumulo in KZN and the participation in Government food security intervention programmes.
- The factors that affect the participation in food security programmes
- The information collected will be used to expand knowledge on government food security intervention programmes and the findings, recommendations will be used by government and other institutions in the promotion of food security in rural areas.

WHY IS THIS PROJECT IMPORTANT ?

This project is relevant because it will assist Maphumulo Local Municipality with the knowledge pertaining the food security interventions programmes that are proposed and implemented by government and the results and recommendations will be used to stimulate the participation of Maphumulo Local Municipality in government food security interventions.

PROCEDURE

The project will take 15 minutes to 1 hour over a period of four weeks. The participants will be requested to complete questionnaires. For the focus groups, officials will be requested to undergo the process of answering the interview questions.

WHAT DO WE EXPECT FROM YOU?

- You will be asked to sign a consent form to participate in the project.
- We will ask you a number of questions and would like you to respond with honesty.

If you have any questions about the project, please do not hesitate to ask me at any time.
Thank you.

…….

Primrose Zamangema Ngema
Project Leader
Mobile number: 083 358 4059
Tel: 032 481 2008

INFORMED CONSENT

I, the undersigned, …….....(NAME) (ID NUMBER : optional …… ……) of …… (Physical address).

I have read the details of the project, or have listened to the oral explanation thereof, and declare that I understand it. I have had the opportunity to discuss relevant aspects with the researcher and declare that I voluntarily participate in the project. I hereby give consent to participate in the project.

Signature of the participant ……
Signed at …… on ……..
Witness
Name …….. Name …….
Signature…… Signature ……
Signed at …….. Signed at…….
Contact telephone number ……

APPENDIX 2: QUESTIONNAIRE

University Of Zululand, Faculty of Science and Agriculture, Department of Agriculture, Kwazulu-Natal

Questionnaire on Household Food Security Interventions

Factors affecting food security status and participation in food security Intervention programmes in Maphumulo Local Municipality in the ILembe District of KwaZulu Natal.

Please mark the correct answer with an X or Tick (✓) the correct answer, fill in the blank spaces or number in the appropriate boxes. Example; Gender of respondent; (Male=1; Female= 2): X

Name of enumerator_____

DATE_____

(A) DEMOGRAPHIC AND PERSONAL CHARACTERISTICS

1) Name of village.....

2) Gender of Respondent =Male=1; Female is= 2

3) Age of Respondent_____

4) Marital status (fill in the box) _____

Scale; Married=1; single=2; Divorced=3; Widowed/widower=4

5) What is your highest level of education? (Mark with an X Tick (✓))

None	Primary	secondary	Tertiary
1	2	3	4

6) What is your employment status? (Mark with an X or a Tick (✓)

Unemployed	Employed (Temporary)	Employed (permanent)
1	2	3

7) Indicate the composition and number of your household members living with you:

Male <12	Female<12	Male between 12 and 18	Female between 12 and 18	Male >18	Female>18
1=	2=	3=	4=	5=	6=

(B) SOCIO-ECONOMIC CHARACTERISTICS

8) Indicate the relative contribution of the following sources to your total income: (Total=100%) V8

Sources of Income	Amount (R)	Relative contribution (%)
1. Non agricultural Formal employment		
2. Casual labour		
3. Self employed		
4. Grant		
5. Sell of agricultural crops		
6.Sell of livestock		
Total		

9) Do you have access to credit?

YES	NO
1=	2=

10) Do you receive Extension support?

YES	NO
1=	2=

V10

11) Sizes of your household's farms

Size of farm land in ha V11 ☐

Size of arable land in ha V12 ☐

12) Which Agricultural activities do you practice? (Mark appropriate answer with an X)

Livestock	Crop	Vegetables	None
1	2	3	4

13) Which type of livestock species do you keep and how many? (Mark with an X)

Class	Cattle	Goats	Sheep	Chicken	Pigs	Other(specify)
Number						

☐

15) Which crops and vegetables did you grow last season? (Rank 1 as the most commonly grow crop/vegetable)

				Purpose of production	
Crop/Vegetable	Rank	Area (LXW)	Harvested	Consumption	Sale

16) What do you consider to be the main problem in crop and vegetable production? (Rank 1 as the most important problem)

Problem	Rank	Problem	Rank
Labour		Low temperatures	
Input supply		Low rainfall	
High cost of inputs		Hail storm	
Lack of equipment		Lack of water sources	
High temperature		Theft	
Snow		Lack of capital	
Land shortage		No proper structure (no fence)	
Late planting		Lack of skills	
No markets		Pests	
Other (specify)			

17) What is an agricultural potential status of the farm land? (Mark with an X Tick (✓)

Low	Medium	High
1	2	3

(C) GOVERNMENT INTERVENTION STRATEGIES

18) Have you received government support in the last 5 years?

YES	NO
1=	2=

19(a) If yes, what kind of support? Please mark with an X or Tick (✓)Type of support

Non agricultural	
If receiving non-agricultural support, state or indicate the type of non-agricultural support 1) 2) 3) 4) 5)	
Agricultural crops (seed scoops/packs, communal gardens, mushroom project)	
Agricultural livestock (Nguni project, poultry, goat and piggery)	
Mechanization support	
Other agricultural support, Specify 1) 2) 3)	

19b) Have you received infrastructural support?

Ward 10/6/3		Frequency	Percentage
Irrigation	No		
	Yes		
Fencing	No		
	Yes		
Roads	No		
	Yes		

20) Please rate your satisfaction with Government support (mark with an X or Tick (✓) the correct answer)

	Totally dissatisfied	A little dissatisfied	Moderately satisfied	Satisfied	Highly satisfied
	1	2	3	4	5
Quality of the government support					
Quality of the inputs(seeds, garden tools, mechanization					
Quantity of the produce harvested					
The price you get from agricultural produce					
The productivity of your farm land					

D. FOOD SECURITY CHECKLIST

21) If you answer YES to the following questions, How often did this happen?

0= Never; 1 = Rarely (once or twice in the past four weeks); 2 = Sometimes (three to ten times in the past four weeks); 3= Often (more than ten times in the past four weeks)

a. Did you worry that your household would not have enough food?	
b. Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	
c. Did you or any household member have to eat a limited variety of foods due to a lack of resources?	
d. Did you or any household member have to eat some foods that you really did not want because of a lack of resources to obtain other types of food?	

22(A) If your household SOMETIMES or OFTEN does not have enough to eat what are the REASONS you don't always have enough to eat? Mark with X or Tick (✓)

(i) Not enough money for food ☐

(ii) Too hard to get to the store ☐

(iii) On a diet ☐

(iv) No working stove available. ☐

(vi) Not able to cook or eat because of health problems ☐

22(B) If your household does have ENOUGH food, but NOT THE KIND OF FOOD YOU WANT, what are the reasons why you don't always have the kinds of food you want or need?

Mark with X or Tick (✓)

(i) Not enough money for food ☐

(ii) Too hard to get to the store ☐

(iii) On a diet. ☐

(iv) Kinds of food we want not available ☐

(vi) Good quality food not available ☐

The following question are the statements that people have made about their food situation. Please mark with an X or Tick (✓) whether the statement was often, sometimes, or never true in the last 12 months.

23 "I get worried whether our food would run out before we got money to buy more."

In your household, how often has this happenend in the last 12 months?

(i) Often ☐

(ii) Sometimes

(iii) Or never true for you in the last 12 months?

24) "The food that we bought just didn't last, and we didn't have money to get more."

In your household, how often has this happenend in the last 12 months?

(i) Often ☐

(ii) Sometimes ☐

(iii) Or never true for you in the last 12 months?

25) “We couldn’t afford to eat balanced meals.”

In your household, how often has this happenend in the last 12 months?

(i) Often ☐

(ii) Sometimes ☐

(iii) Never ☐

26) “We relied on only a few kinds of low-cost food to feed the children because we were running out of money to buy food.”

In your household, how often has this happenend in the last 12 months?

(i) Often ☐

(ii) Sometimes ☐

(iii) Never ☐

27) “We couldn’t feed the children a balanced meal because we couldn’t afford that.”

In your household, how often has this happenend in the last 12 months?

(i) Often? ☐

(ii) Sometimes ☐

(iii) Or never true for you in the last 12 months? ☐

28) “The children were not eating enough because we just couldn’t afford enough food.”

In your household, how often has this happenend in the last 12 months?

(i) Often ☐

(ii) Sometimes ☐

(iii) Or never true for you in the last 12 months? ☐

29) In the last 12 months, did *you or other adults* in your household ever *cut the size of your meals or skip meals* because there wasn't enough money for food?(Please mark with an X or Tick (✓))

YES	NO
1=	2=

☐

30(A) If YES, how often did this happen?

(i) Almost every month. ☐

(ii) Some months but not every month. ☐

(iii) or in only one or two months? ☐

31) In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

YES	NO
1=	2=

☐

32) In the last 12 months, were you ever *hungry but didn't eat* because you couldn't afford enough food?

☐

YES	NO
1=	2=

33) Sometimes people lose weight because they don't have enough to eat. In the last 12 months, did you *lose weight* because there wasn't enough food?

YES	NO
1=	2=

☐

34) In the last 12 months, did *you or other adults* in your household ever *not eat for a whole day* because there wasn't enough money for food?

YES	NO
1=	2=

☐

35) How often did this happen?

(i) Almost every month ☐

(ii) Some months but not every month. ☐

(iii) or in only one or two months? ☐

36) In the last 12 months, did you ever cut the size of any of the children's meals because there wasn't enough money for food?

YES	NO
1=	2=

☐

37) In the last 12 months, did any of the children ever skip meals because there wasn't enough money for food?

YES	NO
1=	2=

38 (A) How often did this happen?

(i) Almost every month.

(ii) Some months but not every month.

(iii) or in only one or two months.

39) In the last 12 months, were the children ever hungry but you just couldn't afford more food?

YES	NO
1=	2=

40) In the last 12 months, did any of the children ever not eat for a whole day because there wasn't enough money for food?

YES	NO
1=	2=

41) 7 Day Food Frequency and Main Food Sources

(i) How many times does your household consume the following foods?

(i) What are the sources of these foods, and does the household get enough of it?

Food type	FREQUENCE OF CONSUMPTION PER WEEK						Main source of food (1-7)	Enough 1-YES 2= NO
	None	Once	Twice	3 Times	4Times	5 & more times		
1.Maize								
2.Soghum								
3.Rice								
4.Wheat								
5.Poatoest								
6.Sweet 7.potatoes								
8.Honey/ sugar								
9.Fats/oils								
10.Carbohydrates								
11.Milk								
12.Red meat								
13.Poultry meat								
14.Fish								
15.Eggs								
16.Beans, green beans								
17.Nuts								
18. Other								

proteins (specify)								
19. Spinach								
20. Cabbage								
21. Carrots								
22. beetroots								
23. Other vegetables (specify)								
24. Mango								
25.Paw paw								
26.Banana								
27.Oranges								
28.Guava								
29.avocado								
30.Other fruits (specify)								

42)

24 HOUR DIETARY RECALL FOR DIETARY DIVERSITY

MEAL	Age group	Household member's codes	Dish	Ingredients	Adequate	
					Yes (1)	No (2)
BRE	UNDER 5 YRS	1.				
		2.				
		3.				
		4.				

A K F A S T	5 -18 YRS	5.				
		6.				
		7.				
		8.				
		9.				
	OVER 18 YRS	10.				
		11.				
		12.				
		13.				
		14.				
S N A C K	UNDER 5 YRS	1.				
		2.				
		3.				
		4.				
	5-18 YRS	5.				
		6.				
		7.				
		8.				
		9.				
	OVER 18 YRS	10				
		11.				
		12.				
		13.				
		14.				
L U N C H	UNDER 5 YRS	1.				
		2.				
		3.				
		4.				
	5-18 YRS	5.				
		6.				

		7.				
		8.				
		9.				
		10.				
		11.				
		12.				
	OVER 18 YRS	13.				
		14				
S	UNDER 5 YRS	1.				
N		2.				
A		3.				
C		4.				
K		5.				
		6.				
		7.				
	5-18 YRS	8.				
		9				
		10.				
		11.				
	OVER 18 YRS	12.				
		13.				
		14.				
S	UNDER 5 YRS	1.				
U		2.				
P		3.				
P		4.				
E		5.				
R		6.				
	5-18 YRS	7.				
		8.				
		9.				
	OVER 18 YRS	10.				

		11.				
		12.				
		13.				
		14.				

THANK YOU!!

APPENDIX 2: ETHICAL CLEARANCE CERTIFICATE

UNIVERSITY OF ZULULAND
RESEARCH ETHICS COMMITTEE
(Reg No: UZREC 171110-030)

RESEARCH & INNOVATION
Website: http://www.unizulu.ac.za
Private Bag X1001
KwaDlangezwa 3886
Tel: 035 902 6887
Fax: 035 902 6222
Email: ManqeleS@unizulu.ac.za

ETHICAL CLEARANCE CERTIFICATE

Certificate Number	**UZREC 171110-030 PGM 2015/207**							
Project Title	**Factors affecting the food security status and participation in food security intervention programmes in Maphumulo communities in the iLembe District of Kwa-Zulu Natal**							
Principal Researcher/ Investigator	ZP Ngema							
Supervisor and Co-supervisor	Dr. M Sibanda			Dr. L Musemwa				
Department	Agriculture							
Nature of Project	Honours/4th Year		Master's	x	Doctoral		Departmental	

The University of Zululand's Research Ethics Committee (UZREC) hereby gives ethical approval in respect of the undertakings contained in the above-mentioned project proposal and the documents listed on page 2 of this Certificate.

Special conditions: (1) The Principal Researcher must report to the UZREC in the prescribed format, where applicable, annually and at the end of the project, in respect of ethical compliance.
(2) Documents marked "To be submitted" (see page 2) must be presented for ethical clearance before any data collection can commence.

The Researcher may therefore commence with the research as from the date of this Certificate, using the reference number indicated above, but may not conduct any data collection using research instruments that are yet to be approved.

Please note that the UZREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the documents that were presented to the UZREC
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

Classification:

Data collection	Animals	Human Health	Children	Vulnerable pp.	Other
X					

Low Risk	Medium Risk	High Risk
	X	

The table below indicates which documents the UZREC considered in granting this Certificate and which documents, if any, still require ethical clearance. (Please note that this is not a closed list and should new instruments be developed, these would require approval.)

Documents	Considered	To be submitted	Not required
Faculty Research Ethics Committee recommendation	X		
Animal Research Ethics Committee recommendation			X
Health Research Ethics Committee recommendation			X
Ethical clearance application form	X		
Project registration proposal	X		
Informed consent from participants			X
Informed consent from parent/guardian	X		
Permission for access to sites/information/participants	X		
Permission to use documents/copyright clearance			X
Data collection/survey instrument/questionnaire	X		
Data collection instrument in appropriate language		Only if necessary	
Other data collection instruments		Only if used	

The UZREC retains the right to

- Withdraw or amend this Certificate if
  - Any unethical principles or practices are revealed or suspected
  - Relevant information has been withheld or misrepresented
  - Regulatory changes of whatsoever nature so require
  - The conditions contained in this Certificate have not been adhered to

- Request access to any information or data at any time during the course or after completion of the project

The UZREC wishes the researcher well in conducting the research.

Professor Nokuthula Kunene
Chairperson: University Research Ethics Committee
30 November 2015

CHAIRPERSON
UNIVERSITY OF ZULULAND RESEARCH
ETHICS COMMITTEE (UZREC)
REG NO: UZREC 171110-30

30 -11- 2015

RESEARCH & INNOVATION OFFICE

ZP Ngema - PGM 2015/207

UNIVERSITY OF ZULULAND
HIGHER DEGREES COMMITTEE

RESEARCH & INNOVATION
Website: http://www.unizulu.ac.za
Private Bag X1001
KwaDlangezwa 3886
Tel: 035 902 6887
Fax: 035 902 6222
Email: ManqeleS@unizulu.ac.za

Confirmation of Project Registration

Registration Number	S517/15						
Project Title	Factors Affecting The Food Security Status and Participation in Food Security Intervention Programme in Maphumulo communities in the Ilembe District of KwaZulu-Natal.						
Principal Researcher/ Investigator	Ngema ZP						
Student number	201330459						
Supervisor and Co-supervisor	Dr M Sibanda						
Department	Agriculture						
Nature of Project	Honours/4th Year		Master's	x	Doctoral		Other	

Dear Student

I have the pleasure of informing you that the Higher Degrees Committee, at its meeting held on20 July 2015, approved your research proposal.

Please note: Your proposal can now be considered for ethical clearance after which you can apply for research funding. Kindly provide this letter with your ethical clearance certificate when submitting your final thesis for external examination.

Yours sincerely,

Mr. Siyanda Manqele
Post-graduate Studies
21 June 2016

UNIVERSITY OF ZULULAND
RESEARCH & INNOVATION OFFICE
21 JUN 2016
POSTGRADUATE STUDIES
RECEIVED: