Exploring household food security in the Viljoenskroon area

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OPSOMMING

Verlaagde voedselsekerheid is 'n probleem wat talle individue in ontwikkelende lande, soos Suid-Afrika, beïnvloed. Literatuur dui daarop dat daar nie baie inligting beskikbaar is aangaande voedselonsekere huishoudings in Suid-Afrika nie, maar dat talle huishoudings wel voedselonskerheid ondervind. Verskeie faktore beïnvloed voedselonsekerheid en huishoudings in informele nedersettings toon dikwels hoë risiko's ten opsigte daarvan. Die gebrek aan voldoende hulpbronne is ‘n faktor wat voedselonsekerheidverhoog en moet aangespreek word. Tot die kennis van die outeur, is die invloed wat verskeie faktore op voedselsekerheid het in 'n informele nedersetting moeilik bekombaar. Dus, het hierdie studie beoog om huishoudelike voedselsekerheid in 'n informele nedersetting te verken, asook faktore wat moontlik ‘n negatiewe invloed op volhoubare voedselsekerheid kan hê.

Volgens literatuur, bestaan die pilare van voedselsekerheid uit die volgende: voedselbeskikbaarheid, toeganklikheid en benutting. Laasgenoemde kan óf bydra tot 'n afname in huishoudelike voedselsekerheid óf die bevordering daarvan. Sosio-demografiese faktore soos inkomste, huishoudelike grootte en vlak van opleiding is ook geïdentifiseer as faktore wat huishoudelike voedselsekerheid kan beïnvloed. Op grond van hierdie inligting, is sosio-demografiese aspekte ingesluit as deel van die teoretiese raamwerk. Voedselbenutting as ‘n pilaar van voedselsekerheid, is in hierdie studie gebruik om te bepaal, of die kennis en voorgestelde implementering daarvan, effektief is en of dit wel tot voedselsekerheid bydra. Dus is die invloed van voedselverwante kennis op voedselsekerheid, saam met die verhoudings tussen verskillende sosio-demografieseinligting en voedselsekerheid in hierdie studie bestudeer. Die bevindinge verkry in hierdie studie, kan gebruik word om aanbevelings rakend die verbetering van voedselsekerheid in huishoudings te maak.

'n Kwantitatiewe navorsingsbenadering is gevlog in hierdie studie. As deel van ‘n nie-waarskynlikheidsteekproefneming, is vraelyste gebruik en deur middel van onderhoude voltooi. Hierdie vraelyste hetinligting van 103 respondente by die Nutrifeeds produksie en verspreidingfasiliteit in die Viljoenskroon area verkry. Inligting wat gebruik is vir die ontwikkeling van dié vraelys, is gelei deur inligting uit bestaande vraelyste en ander voedselsekerheidopnames. Alle vraelyste is volledig voltooi en die data is deur Statistiese Konsultasiedienste van die Noordwes Universiteit, Potchefstroom ontleed. Die ontleding is met behulp van SPSS (Statistical Package for Social Sciences) uitgevoer. Daar is bevind dat

die meerderheid van die respondente en hul huishoudings het óf ‘n risiko geloop van voedselonsekerheid óf het wel voedselonsekerheid beleef. Hierdie onsekerheid was tydelike van aard, maar wel herhalend en was gewoonlik as gevolg van 'n gebrek aan voldoende finansiële hulpbronne.

Die resultate het aangedui dat die meederheid van die respondente, kennis ten opsigte van voedselverwante aspekte gehad het. Daar is ook gevind dat meeste van die respondente aangedui het dat voedselverwante aspekte soos, voedselhantering effektief geïmplementeer word. Hierdie kennis was met betrekking tot die benutting van voedsel; voorbereiding, higiëne en berging.

Daar is bevind dat meer as twee derdes van die respondente in hierdie studie ‘n risiko vanvoedselonsekerheid gehad het of wel voedselonseker was. Hierdie resultaat stel dus voor dat daar ‘n behoefte is vir voedselonsekerheid om aangespreek te word in hierdie area. Volgens die resultate wat in hierdie studie verkry is, kan verlaagde voedselsekerheid in die Rammulotsi informele nedersetting erken word. Volgens die bevindinge van hierdie studie sal die navorser poog om aanbevelings te maak aan plaaslike besighede, plaaslike regering en klinieke ten opsigte van die bevordering van voedselsekerheid in hierdie gebied. Die aanbevelings sluit in: die bevordering van kennis ten opsigte van verhoogde toegang en benutting van voedselprodukte in hierdie gemeenskap,om sodoende die status van huishoudelike voedselsekerheid te verbeter.

SUMMARY

Decreased food security is a major issue which influences numerous individuals in developing countries such as South Africa. Literature suggests that although detailed information is not available about the exact amount of food insecure households in South Africa, food insecurity does exist. Multiple factors influence decreased food security and households in informal settlements often portray high risks to decreased food security due to a lack of adequate resources to ensure sustainable food security. However, to the authors' knowledge limited information is available regarding the specific state of household food security in informal settlements in South Africa. Information regarding the influences various factors have on food security in an informal settlement is also limited. Therefore this study aimed to explore household food security in an informal settlement including the factors that could possibly contribute to food insecurity.

According to literature, the pillars of food security consist of food availability, accessibility and utilisation and can contribute to a decrease in household food security or the enhancement thereof. In addition, socio-demographical factors such as income, household size and level of education can influence household food security. Based on this information, the pillars of food security and socio-demographical aspects of a household were used as possible factors that influence food security and were included as part of the theoretical framework. Utilisation as part of the food security pillars was closely explored to determine if the knowledge and suggested implementation thereof was effective and contributing to household food security. The influence of knowledge of basic food related aspects on food security were therefore determined in this, combined with the relationships between various socio-demographics and food security. Furthermore, through these findings recommendations were made on how food security can be enhanced in the households of the identified informal settlement.

A quantitative research approach was used in this study. As part of non-probability sampling interviewer administered questionnaires were presented to 103 respondents at Nutrifeeds production and distribution facility in the Viljoenskroon area. Existing questionnaires and surveys relevant to this study subject were consulted to develop the questionnaire which explored demographics, food production and knowledge of food handling, utilisation, storage practices, and food security. All questionnaires were completed and the data was analysed by Statistical Consultation Services at the North-West University, Potchefstroom, using the Statistical Program for Social Sciences (SPSS). The results indicated that the majority of

respondents possessed knowledge regarding food handling practices. Knowledge of food related aspects were indicated to be implemented accordingly, by most respondents with regard to food utilisation (preparation, hygiene and storage). It was determined that the more than two thirds of the respondents and their households were at risk of food insecurity or food insecure suggesting that a need exists for food insecurity to be addressed in this informal settlement.

According to the results that were obtained in this study, food insecurity in the Viljoenskroon area, Rammulotsi informal settlement can be acknowledged. Additionally, the findings enabled the researcher to make recommendations to local businesses, clinics and local authorities regarding the enhancement of household food security in the area. The recommendations include the enhancement of knowledge regarding food related aspects, food production opportunities, food access and utilisation in the community as a means to improve the status of household food security in this informal settlement.

KEY WORDS

Food handling

Food related knowledge

Food security

Food security enhancement initiatives

Informal settlement

Participation

Pillars of food security

TABLE OF CONTENTS

LIST OF ADDENDA

LIST OF ABBREVIATIONS

CAADP - THE COMPREHENSIVE AFRICA AGRICULTURE DEVELOPMENT PROGRAMME

DAFF - DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES

DOA - DEPARTMENT OF AGRICULTURE

FAO - FOOD AND AGRICULTURAL ORGANISATION

GHS - GENERAL HOUSEHOLD SURVEY

HDA - HOUSEING DEVELOPMENT AGENCY

IES - INCOME AND EXPENDITURE SURVEY

IFSS - INTERGRATED FOOD SECURITY STRATEGY

LSM - LIVING STANDARDS MEASUREMENT

MDG - MILLENIUM DEVELOPMENT GOALS

NGO- NON-GOVERNMENTAL ORGANISATION

NSNP - NATIONAL SCHOOLING NUTRITION PROGRAM

PHSA - PROVINCIAL HEALTH SERVICES AUTHORITY

SA - SOUTH AFRICA

SCS - STATISTICAL CONSULTATION SERVICES

SPSS - STATISTICAL PACKAGE FOR SOCIAL SCIENCES

RERC - RESEARCH ETHICS REGULATORY COMMITTEE

LIST OF TABLES

CHAPTER 1: INTRODUCTION

CHAPTER 4: RESULTS AND DISCUSSION

CHAPTER 7: RESEARCH ARTICLE

ADDENDUM C: ADDITIONAL RESULTS TABLES

LIST OF FIGURES

CHAPTER 2: LITERATURE REVIEW

CHAPTER 4: RESULTS AND DISCUSSION

CHAPTER 6: RESEARCH ARTICLE

CHAPTER 1: INTRODUCTION

1.1 Background and motivation

1.1.1 Food security in South Africa

South Africa, a part of Sub-Saharan Africa, is identified as a food secure nation according to current Millennium Development Goals (MDG) reports (United Nations, 2011). However, ominous statistics regarding individual households identified that food insecurity do indeed exist in South Africa at household level (Altman *et al*., 2009b:7; Faber *et al*., 2011:22). The prevalence of food insecurity in South Africa may be a consequence of the increase in the global demand for food as well as the inability of the government to meet those demands through current agricultural production (Thornton *et al*., 2011:118). With this increase in food supply demands and the global economic recession, food prices escalate, ultimately affecting food availability, accessibility and stability, thereby creating food insecurity in vulnerable communities (Jacobs, 2011:646).

1.1.1.1 The prevalence of food insecurity in informal settlements

Vulnerable communities are often financially unstable, educationally deprived and more prone to be affected by economic instability and as a result poverty and food insecurity prevail (HDA, 2012:43). These communities are usually presented in informal settlements, as these settlements are established by individuals and communities with similar socio-economic and demographic disadvantages (Oldewage-Theron *et al.,* 2006:796). Households from informal settlements are assumed to have higher unemployment rates, lower average incomes and lower educational levels, in comparison with households not living in informal settlements (Joubert, 2010:105). Individuals residing in informal settlements are often obligated to identify and implement appropriate coping strategies to deal with difficulties such as household food insecurity brought about by socio-economic challenges (Oldewage-Theron *et al*., 2006:796). Prohibiting food insecurity may seem straightforward; however, with limited financial resources and knowledge of food, insecurity has proved to be complex and have presented diverse challenges (Altman *et al*., 2009b:7). As households situated in informal settlements have less access to education, it is suggested that individuals, who have received little or no education, often do not possess adequate knowledge about food safety handling and production practices (Zezza *et al*., 2007:33) which might further contribute to the prevalence of food insecurity. A lack of food-related knowledge exacerbates the risk of poorly produced, prepared and consumed food as well as illnesses and death

(Terpstra *et al*., 2005:527). Any implemented safety practices are therefore believed to be the consequence of personal knowledge gained from previous generations over numerous years, either through self-edification or as part of specific cultural practices (Gundu, 2009:1; Unusan, 2007:46). Previous research indicated that certain individuals, especially those from informal settlements, did not possess a clear understanding of food handling and were unsure of possible food hazards, which suggests that a gap in food safety knowledge indeed exists (Wilson *et al*., 2008:164; Terpstra *et al*., 2005:532). Moreover, prohibiting food insecurity has become a problem that few households are able to overcome successfully (Thornton *et al*., 2011:119).

1.1.2 The pillars of food security

The pillars of food security comprise food availability, access and utilisation, and further include supplementary components such as distribution, income, food safety and food knowledge. Food availability, access and utilisation are intertwined and interdependent so as to ensure food security. These pillars may also be identified as the key aspects of food security (Kalpana Sastry *et al*., 2011:392). Therefore, if food is not readily available or accessible to all individuals and safe to utilise, the pillars of food security are not functioning correctly; hence, the possible existence of household food insecurity. For example, in South Africa the most severe cases of inadequate food access were indicated in the Free-State Province with 33,5 % of households revealing inadequate access to food (Stats SA, 2010a:6), in the Rammulotsi/Viljoenskroon area, suggesting that perhaps food access in the area may be inadequate and a possibility of food insecurity may exist. Identifying possible food insecurity and providing recommendations for improvements that could be made with regard to the pillars of food security furnishes the central motivation for this study. Identifying and improving food security pillars which contributed to food insecurity, may assist in enhancing the access and utilisation of adequate quantities and quality of available food in communities (Burlingame & Dernini, 2011:2285) such as Viljoenskroon and specifically in Rammulotsi.

1.1.3 The effects of food production on household food security

For a period, a growing demand for convenience and processed foods resulted in individuals from informal settlements decreasing their self-production and increasing their reliance on marketplace purchases (Jacobs, 2011:646). However, as global food prices drastically escalated, multiple households experienced difficulty maintaining their food security through sole reliance on market purchases (Jacobs, 2011:642). Through implementing their own

food production initiatives, such as vegetable gardens, households from informal settlements are turning to self-production as an important method of addressing food insecurity (Funk & Brown, 2009:271). Therefore, individuals need to find methods of combining market purchases, self-sufficient food production and effective storage methods so that they each complement the other to collectively combat food security (FAO & UNESCO, 2003:29).

Self-subsistence food production activities (through which households produce their own food sources) will enhance local food security, dietary multiplicity and self-sufficiency (Baiphethi & Jacobs 2009:459; Faber *et al*., 2011:23). Self-produced food products will not only serve as a main dietary source, but will also supplement food sources obtained through market purchases. Faber *et al*. (2011:27) mention that adequate storage of these food sources will minimise food losses. Reducing food losses in combination with self-production may ultimately assist individuals in informal communities financially by saving them money (Aliber & Hart, 2009:450). Effective storage may also contribute by stabilising food supplies on a household level (Thamaga-Chitja *et al*., 2004:8). Therefore, reviewing the aforementioned, local food insecurity may be eliminated through the implementation of small scale community or self-subsistence food production and effective storage methods. Though the aforesaid self-subsistence agricultural activities may alleviate food insecurity, they are occasionally suspended or discontinued as initiative objectives are no longer reachable (Baiphethi & Jacobs, 2009:471).

1.1.4 Socio-demographical factors that affect food security

Socio-demographic influences include characteristics such as age, income and level of education (Zain & Naing, 2002:411). The lack of continuous support and involvement of households or community members due to these factors, contribute to failed food security enhancement initiatives (Baiphethi & Jacobs, 2009:471; Kekana, 2006:12). It is essential to understand and determine how demographic factors contribute to independent household food security. A lack of financial resources in growing households influences adequate access to various resources such as education and food, and contributes to insufficient utilisation of these resources and possibly food insecurity (Joubert, 2010:105). Therefore, this study further aims to explore the relationship between education, income and food knowledge.

1.1.5 The education of people regarding food knowledge and food security

Knowledge of food refers to specific knowledge regarding food components and the nutritional potential thereof (Njokwe & Mudhara, 2007:39). Food handling, which is a significant element of food safety, represents the manner in which food is used, during harvesting, preparation, consumption or storage. Research indicates that regulations regarding food preparation, handling and the storage of food sources in the home environment do not exist (Unusan, 2007:46). The lack of regulations in the home regarding food preparation, handling and storage is perhaps due to the fact that it cannot be controlled, but it is rather guided through the use of specific guidelines. Nauta *et al*. (2008:180) mention that suitable food storage in a household is a significant food handling practice that effectively determines food safety. Terpstra *et al*. (2005:527) suggest that consumers are the main contributors of poor food safety practices. Therefore, as food safety directly affects food security, it seems advantageous for the well-being of individuals to rectify existing food-related safety issues in households from informal settlements. Therefore, households or individuals attempting to successfully self-administer food production activities, should be supported with knowledge regarding food safety, handling and production practices (Drimie & Ruysenaar, 2010:319; Gundu, 2009:1). Acquiring food-related knowledge may present challenges, as it is suggested that food safety is directly affected by an individual's level of education (Gundu, 2009:2; Unusan, 2007:46).

The Department of Education in association with the National Schooling Nutrition Program (NSNP) have enforced sustainable food practices since 2004 so as to increase food-related knowledge in schools within informal settlements, thereby enhancing learner awareness of self-subsistence food production, nutrition, safety, and storage practices as part of daily educational activities. These programmes aim to encourage learners to apply their acquired skills in the implementation of homestead projects (Faber *et al*., 2011:26). Although a number of educational initiatives, such as those of the NSNP currently, aim to improve food-related knowledge, they are not driven beyond the schooling system. Moreover, there have been minimal attempts to promote educational knowledge of non-scholars and senior citizens in informal communities regarding the pillars of food security (Gundu, 2009:3). Additionally, it is unclear to what extent learners are able to exploit their acquired knowledge and skills as provided by these NSNP initiatives (McGarry & Shackleton, 2009:20). The active need for food associated knowledge is perhaps necessary to address food insecurity and assist in resolving local household food insecurity. This study aims to determine the status of food knowledge and investigate the general procedures of food handling and production practices.

1.1.6 Conclusion

It is evident that the status of food security in South African households is a great concern. Food insecurity needs to be addressed effectively in order to prohibit additional or prolonged food insecurity in vulnerable households. Therefore, this study explored the pillars of food security as well as supplementary components which are believed to influence food security. Furthermore, food insecurity and vulnerabilities in an informal settlement were explored to establish whether improvements are possible. This study further aims to offer suitable solutions or improvements to food-related problems and food insecurity in an informal settlement, using the resources at hand. Providing a platform for addressing food insecurity in informal settlements will contribute to ensuring that South Africa truly becomes a food secure nation.

1.2 Problem statement

Food security or a lack thereof has become a highly publicised topic in recent years. Food security is often confined to an overall assessment of the ability of a country to provide enough food per capita. However, the ability of a household or individual to adequately capitalise on available food resources has been disregarded, resulting in increasing numbers of households lacking food security. Therefore, food security is no longer a matter which can only be globally contextualised as communities and households in many countries, including South Africa, are food insecure. When available food sources are not constantly accessible and safe to utilise, household food security is jeopardised. Food availability, access and utilisation are the pillars on which food security is based, and these need to be present on household level to ensure sustainable food security. The pillars of food security are often negatively affected by supplementary factors such as socio-demographical factors, including household size, income and education. With specific focus on informal establishments in South Africa, the absence of adequate knowledge and income is a clear impediment as so many individuals are not part of a schooling environment and are therefore unemployed. As many South Africans do not have sufficient or the required educational and financial support, a need for food knowledge, handling (hygiene and storage) and production could be anticipated. Inadequate financial and educational resources as well as growing households may limit access and utilisation to these resources and contribute to food insecurity in communities such as informal settlements. Leaving supplementary factors of food insecurity unattended, may further exacerbate the struggle against poverty and food insecurity amongst households in informal settlements. Identifying and making recommendations to address weaknesses in the pillars of food security may assist in decreasing the vulnerabilities of food insecurity in informal settlements.

1.3 Aim and objectives

1.1.1 Aim

The aim of this study was to explore the status of household food security in an informal settlement by investigating different factors that contribute to food usage such as handling, production and storage practices to provide recommendations for the enhancement of household food security.

1.1.2 Objectives

- Explore food utilisation in the households of the identified population;
- Explore food knowledge, practices and general procedures of food handling;
- Explore food security in households of the identified population;
- Explore the relationship between demographic characteristics and food security
- Provide recommendations for the enhancement of household food security in the identified population.

1.4 Structure of the dissertation

Chapter 1 is an introductory chapter which includes the background and motivation, problem statement, aims and objectives of this study. In Chapter 2, a detailed literature review is furnished. Chapter 3 presents a comprehensive methodology that provides information on the methods used in the study as well as the validity, reliability, and the ethical aspects and considerations of the study. In Chapter 4 the results obtained through this study are presented with a detailed discussion thereof. A concluding discussion, comprising a conclusion, recommendations, implications and limitations of the study are furnished in Chapter 5. Chapter 6 lists all the references used throughout the study. A research article is included in Chapter 7 which is constructed according to the authors' guidelines specified by the *Food Security Journal* and consists of an abstract, keywords, a concise background and motivation, in addition to a literature review, summarised methodology, results and discussion, conclusion and acknowledgments. Additional information and documentation are provided in the addenda. Addendum A contains the cover letter which was presented during the collection of data. Addendum B presents the complete questionnaire that was employed in this study. Detailed supplementary results tables are included in Addendum C, while Addendum D comprises a document describing the Archive Policy of the North West University (NWU). Addendum E provides the specified authors' guidelines for the *Food Security Journal.*

1.5 Contributions

This aims and objectives of this study were accomplished through the partnership of various researchers. Throughout the duration of this study, the researchers each fulfilled an important role which contributed to the successful completion of the study. In Table 1.1 a summary is provided to indicate the role each researcher played.

Table 1.1 Summary of authors' contributions to the study

Name	Contribution
Miss F. Jordaan	Researcher, compiled the literature review, designed the questionnaire, captured the data, performed a statistical analysis and interpretation of the data and the final compilation of the dissertation
Dr H. de Beer	Study leader and co-author of this research study and article. Assisted by obtaining the necessary resources to fund the research and ethical clearance to commence the study. Provided ongoing supervision and advice to the author.
Mrs M. du Preez	Co-supervisor and co-author of this study. Provided ongoing co-supervision to the first author.
Mrs N. van der Colff	Co-supervisor and co-author of this study. Provided ongoing co-supervision to the first author.

I declare that as co-author I approve the aforementioned as an accurate representation of my contributions to this study. Additionally, I hereby give consent that my contributions may be published as part of the Masters dissertation of Miss F. Jordaan.

_____	_____
Miss F. Jordaan	Dr. H. de Beer
_____	_____
Mrs M. du Preez	Mrs N. van der Colff

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

South Africa (SA) has the ability to meet the national demand for sufficient food production; however, several households lack access to enough food to sustain their individual well-being. Food security can be described as being multifaceted, as it consists of various concepts and determinants including those that fall into the environmental, social and economic spheres (Arshad & Shafqat, 2012:137). To clarify the concepts of food security as well as the determinants of food security Ericksen (2007:1) uses the term food systems which additionally combine the pillars of food security. The Food and Agricultural Organization (FAO) suggests that food security is based on pillars or consists of dimensions (FAO, 2006:1). Although the term to describe the foundation on which food security is based differs, Erickson's food systems and the pillars suggested by the FAO are similar in content. Each bases the notions of food security on three main concepts: food availability, accessibility and utilisation. An additional concept is often but not always included as a fourth pillar namely, stability. For the purpose of this study, the pillars and dimensions of food security will be used as a concept rather than food systems.

Food security affects vast amounts of countries, households and individuals around the world. The FAO describes food security as the state which exists when sufficient, safe and nutritional food sources are available and accessible to support economic well-being of consumers (FAO, 2009:8). Food sources must be freely available in sufficient quantities to meet the dietary needs of all individuals. Food security is affected by economic difficulties such as, price inflation of food and oil as a global source of energy. Additionally, lower agricultural production caused by environmental disasters are a direct outcome of economic imbalances and may be viewed as stressors which influence food security (Du Toit, 2011:1; Maxwell *et al*., 2010:92). Urban poor and rural households in developing countries such as South Africa are especially likely to experience the effects of economic crises in the most negative manner (Oldewage-Theron *et al*., 2006:796). A decrease in employment and income opportunities, combined with increasing commodity prices lead to increased vulnerability amongst poor and food insecure individuals (FAO, 2009:10).

In 2012, research indicated that approximately 870 million people in the world were food insecure of which the vast majority, 852 million (or 15 % of the world's population) originated from developing countries (FAO, 2012:2). The effects of price hikes and economic shocks

and the inability of developing countries to counter the problems that these hikes and shocks initiate, exacerbates such vulnerability and food insecurity (Oldewage-Theron *et al*., 2006:796). A report presented by The World Bank in 1986, divided food insecurity into two universal groups, namely chronic and transitory food insecurity. The report classifies *chronic* food insecurity as a continuous inability to produce or purchase food sources, whereas *transitory* food insecurity suggests momentary declines in food access (The World Bank, 1986:1; FAO, 2008a:1). To combat household food insecurity, it is essential to firstly identify the causes of the insecurity, where after affirmative action can be determined. Categorising food insecurity as chronic or transitory may be an appropriate method to determine the cause of food insecurity (FAO, 2006:1) in countries such as South Africa. Failure to identify and provide suitable solutions to improve, stabilise and sustain food security, will result in an increase in the number of food insecure individuals as populations continue to grow.

In e light of the above, this chapter considers relevant literature on food security, the pillars on which food security is based and the situation within South Africa. Categorical differentiation of food insecurity, the influences of socio-demographic factors and the food pillars of food security are discussed. The implementation of and participation in food security enhancement initiatives are explored in addition to the identification of the benefits of these initiatives.

2.2 Food security

2.2.1 Food security in South Africa

South Africa (SA) is regarded to be a food secure country, an accomplishment for developing countries, which are renowned for their significant struggles with food insecurity (FAO, 2012:2). However, research has indicated that numerous peoplein low income households within informal settlements of South Africa are not food secure (Altman *et al*., 2009b:7). The FAO (2012:47) released statistics that indicated that in 2012 less than5% of South Africans were undernourished and food insecure. Although this figure appears to be low; with a total population of 51,7 millionin 2011 (Stats SA, 2012a:14), it may be suggested that approximately 2,6 millionindividuals were undernourished and food insecure. The Millennium Development Goals (MDG) 2011 report indicates that although progress has been made towards better food security, hunger remains an issue in many households in South Africa.

A nation may be defined as being food secure, but if some of the collections of individual households are food insecure, it may be incorrect to assume that a nation is indeed food secure (Pinstrup-Anderson, 2009:5). If food security refers to sufficient food production to meet national demands, SA may be food secure. However, if it refers to self-sufficiency of individuals' and households' access to enough food to sustain energy and dietary requirements, then a re-evaluation of the definition of food security and the extent to which it is implemented should be investigated (Pinstrup-Anderson, 2009:6). SA is an example of a country where the definition, in conjunction with measurements of food security has gone astray (Aliber & Hart, 2009:448; Jacobs, 2009:411).

Food security has been a global issue for the past several years, with SA highlighting the issue in 1994. In Section 26 and 27 of the South African Constitutional law, the basic principles of food security state that, each individual is entitled to adequate access of available, safe and sufficient sources of food and water on a national as well as household level (Du Toit, 2011:1; Pinstrup-Anderson, 2009:5). The principles of food security and the priority thereof emphasised by the constitution, have required the development and implementation of policies and programmes by the Department of Agriculture, Forestry and Fisheries (DAFF). The policies formed part of South Africa's millennium development goals and required focus on the enhancement of agricultural opportunities within South Africa with the purpose of enabling individuals to fulfil their basic needs with regard to food (Du Toit, 2011:1). The DAFF initiated policies were designed with the aim of positively contributing towards food security.

The Department of Agriculture DOA (2002:5) reported that on-going household food insecurity and the disappointing results of previously implemented food security programmes, led to the introduction and the development of the Integrated Food Security Strategy (IFSS). This strategy combines various food security programmes, based on addressing the pillars of food security – availability, access and utilisation. The food security status of households in SA demands that all aspects which may contribute to food insecurity, such as education, unemployment and income be addressed to inhibit increases in food insecurity and the severity thereof. The aim of the IFSS in South Africa, similar to those of all food security enhancing initiatives, is to ascertain food security through adhering to and addressing the aspects which contribute to food security. It includes the improvement of financial resources and access to employment to food insecure individuals, the enhancement of safe and nutritious food attainment, converting short term relief strategies to long term sustainable solutions and constant observations and evaluations of food security.

A distinctive characteristic of the IFSS is the focus it places on regional, and specifically household, food security. The focus is in agreement with the definition of household food security which states that when the concepts availability, access and utilisation of food security are focused on local levels, that is, the food security status of individual households, are of main concern, rather than the nation as a whole (FAO, 2009:8). The unsatisfactory state of household food security (Altman *et al.,* 2009b:7), highlights the importance of strategies such as the IFSS, which are specifically directed to measuring and addressing household food insecurity.

Research suggests that the exact numbers of food insecure households in South Africa are not clear(Altman *et al*., 2009b:7; Faber *et al*., 2011). The lack of food security measurements may be due to the intensity of the scope of food security and the lack of available standardised measuring instruments. This is consistent with the findings of Altman *et al*. (2009a:346) and Altman *et al.* (2009b:7) which revealed that SA experiences difficulties in acquiring food security measurements and developing target specific remedial action. The inability to accurately measure food security contributes to the lack of data regarding specific numbers of food insecure households in SA. Consequently, the necessity to support policies such as the IFSS was introduced by the SA government in order to measure and minimise the vulnerability associated with decreased food security. Labadarios *et al*. (2009:16) however, provides food security measurement guidelines,that measure hunger or ‘‘risks’’ of decreased food security and confirms hunger or decreased household food security. The food security guidelines additionally measure severity of decreased food security and the periodicity thereof.

In addition to accurately measuring and categorising household food security, it should be determined whether policies in SA are adjustable. Adjustability of household food security policies will accommodate the necessary changes brought forward by supplementary factors such as socio-demographics, insufficient staple food production and rising oil and food prices (Du Toit, 2011:11; Jacobs, 2009:413). When households are influenced by inadequate food production as well as rising oil and food prices, they are more than likely to become vulnerable to food insecurity. Research indicates a correlation between an increase in household vulnerability to food insecurity and the rise in food prices (Drimie & Casale, 2009:28). Koch (2011:1) states that food security in SA is a matter that is unlikely to be highlighted on an international front as SA contains the basics needed to ensure a food secure nation. Therefore, the food insecurity and vulnerabilities that do exist in SA as mentioned previously are likely to be left unattended. Koch (2011:1) continues by suggesting

that although the IFSS is a theoretically sound strategy (based on the four pillars of food security), it is not implemented properly and will not adequately serve in addressing food insecurity in South Africa. Hence food insecurity remains a problem at household level as availability, access and utilisation and the stability of these pillars cannot be ensured. These components of food security form part of the four pillars and are discussed in detail in section 2.3.

2.3 The pillars of food security

Food pillars, which are key determinants of food security, consist of three dimensions or pillars (Arshad & Shafqat, 2012:140; Barret, *et al*., 2010:825; Kalpana Sastry *et al*., 2011:392), and for the purpose of this study availability, access and utilisation of food will be discussed. These pillars of food security need to function accordingly and simultaneously as each pillar is dependent on the success of the other. In this study, stability is incorporated as a fourth pillar of food security and will be discussed as a necessary component to ensure sustainable food security (Figure 2.1).

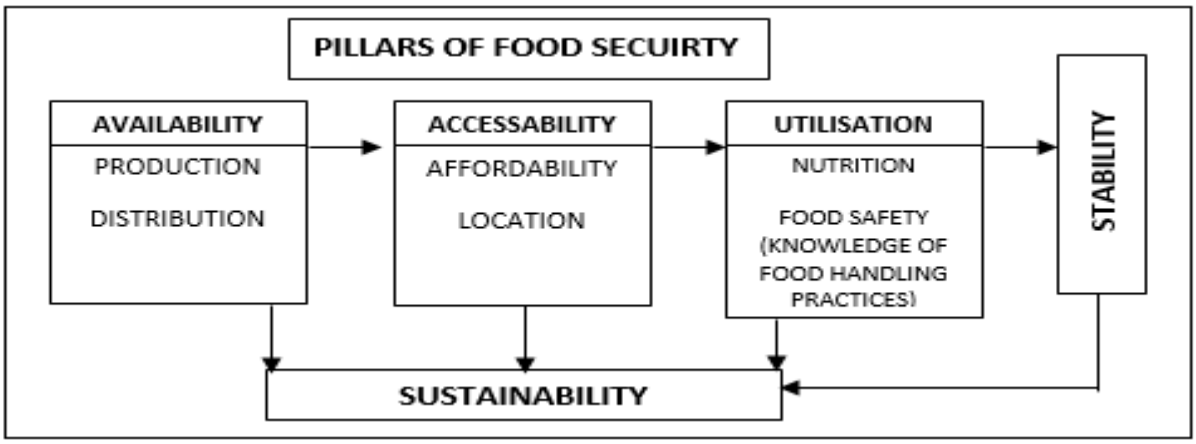

Figure 2.1 The pillars of food security – modified from theoretical framework (adapted from FAO/FIVIMS, 2008:1).

Food availability, access and consumption are considered to be sufficient components to ensure food security if developed and managed correctly (Kalpana Sastry *et al*., 2011:392). Household food security and the policies associated therewith focus on the relationship between food availability and access as well as food access and utilisation. It was proposed that each of the individual components (excluding supplementary factors) is dependent on the other to achieve the desired outcome, in this case, food security (Diskin, 1995:31). The

simultaneous implementation of these are important as each pillar cannot individually ensure food security due to supplementary factors such as income, knowledge, production and distribution which directly influence each pillar of food security (Diskin, 1995). Although food may be available, a lack of income results in some households not being able to access food, which contributes to food insecurity. Income is a prime example of such a supplementary factor, as a lack thereof will limit access, and consequently, utilisation and food security (when considering the correlation and dependency between the components) (FFPP, 2007:2). In developing countries such as South Africa where underprivileged households exist, food utilisation is regarded as an obstacle due to poor access rather than inadequate food availability (WFP, 2005:2). Additionally, the food security pillars are dynamic as they are influenced by various factors such as increasing population demands, food production, markets and consumption, in addition to the overall state of the food economy (FAO 2006:3; FAO 2011:1).

Food security and household well-being are affected by the failure or success of the food pillars, as food security is based on the pillars of food security(Kalpana Sastry *et al*., 2011:392). Folke (2006:253) highlights the importance of developing the pillars of food security, which are relevant on household level and which are adaptable and sustainable and less susceptible to failure. Gregory *et al.* (2005:2144) stated that vulnerability to food insecurity can be minimised by improving aspects of the pillars and the pillars themselves. In support of the changes, Gregory *et al.* (2005:2144) mention increasing national and subsistence food production, improving distribution and enhancing the overall access to food.

Narrowing the concept of food security from global to local levels is viewed as an advancement, as it retains specific focus on household food security (Hinrichs, 2003:33). Local and communal food security additionally compels attention to safeguarding maintainable food production, distribution and consumption within individual households (Jarosz, 2008:232). The relevance of the food security, and the influence of the pillars on food security in informal settlements are discussed below.

2.3.1 Food availability

Food availability encompasses the notion that national and local food sources are of a diverse nature and readily available to all individuals (Drimie *et al*., 2009:246). Food production, supply and distribution as components of the food system are key determinants of food availability (Jacobs, 2009:414). Food availability also includes food resource supply

on a national, regional, local and household level and availability on a household level is said to be marginally dependent on subsistence food production (Diskin, 1995:4). Subsistence food production is a method implemented by individuals or households where own food supplies are produced on a small scale. Subsistence food production is identified as an appropriate manner in which food availability, diversity and food security can be enhanced on local levels as well as on the household level (Drimie *et al*., 2009:245; Yu Yang & Hanson, 2009:635). In an effort to enhance the food security and poverty status within the country, the South African government has acknowledged the prominence of subsistence food production (Baiphethi & Jacobs, 2009:474).

Contradicting the positive influences of household or subsistence food production on enhanced availability of food, Drimie *et al*. (2009:249), suggest that although it is useful, neither household, nor national food production is solely the most effective manner to increase food availability on a household level. Diskin (1995:8) implies that food imports together with national and subsistence food production may rather be a more effective manner to increase food availability. Moreover, national and household food production cannot be relied on to fully improve food access. This contradicting opinion may be attributed to the alterations which have occurred in the measurement of food security. Webb *et al*. (2006:1405) describe the alterations as simply no longer acknowledging that food production and food availability are definite and the sole determinants of food access on a household level. Availability on a household level is described as often being hindered by agricultural production failures (FANTA & WFP, 2007:4).

Diskin (1995:31) stipulates that although there are definite relations between food security, availability, access and utilisation, it cannot indefinitely be presumed that higher national and household food production alone will lead to sustainable food security. He continues by referring to intertwined relations of food security and its components that need to be investigated. Food availability on national or local level is proposed to be irrelevant if access by households is limited due to restricted resources, unemployment and poverty (Pinstrup-Anderson, 2009:5; Li & Yu, 2010:392) which are present in informal settlements (Sverdlik, 2011:123; Victor, 2009:2). When considering the information provided it is clear that food availability and the components associated therewith are not the sole causes of food insecurity.

2.3.1.1 Household food production

National food production involves a country's capability to produce sufficient food to serve its population. Large scale agricultural production and export provides a variety of food sources to ensure that sufficient foodstuff is available per capita. The aim of national production is merely to deliver sufficient amounts of food; the nutritional diversity of food produced on a national level, however, is irrelevant (Pinstrup-Anderson, 2009:5) in the case of household food production.

Household food production or urban agriculture consists of small scale activities which encompass production of livestock and crops in nearby surroundings. Established on public or privately owned, vacant land, field or tree crops are produced in larger areas, including plots, roadsides and riverbanks. Where space is limited, some individuals within the informal settlements utilise several small available areas around the dwelling to produce additional food sources (Crush *et al*., 2011:288; Crush *et al*., 2010:7). Household food production in poor communities such as informal settlements, exist by acquiring land by means of illegal occupation, and user rights. Individuals from low-income households are seldom privileged with adequate land for successful agricultural activities, herewith enhancing food production away from the initial dwelling in the nearest vacant land, also referred to as 'open space' or 'off plot' production (Drechsel *et al*., 2006:3)

The lack of household food production within underprivileged communities such as informal settlements may be ascribed to continuous economic instabilities, food inflation and population growth. Household food production may improve the lives of individuals overwhelmed by poverty, food insecurity and unemployment (Crush *et al*., 2011:288; Crush *et al.,* 2010:10). The Comprehensive Africa Agriculture Development Programme (CAADP) proposes that through the prompt enhancement of household food production and self-subsistence, livelihoods and food security could be addressed effectively (African Union & Nepad, 2003:15) as encouraged by the Food Security Framework. Effective agricultural production on national and household level is vital to alleviating food insecurity and poverty in households in informal settlements. Through the implementationof the IFSS, it is anticipated that access to food production opportunities could increase and that the actual utilisation of these opportunities would contribute to household food production or self-sufficiency in South Africa (DOA, 2002:6).

Subsistence production assists urban and rural households by alleviating food insecurity, improving nutritional intake, improving living standards and minimising the reliance on

market purchases (Baiphethi & Jacobs, 2009:459; Crush & Frayne, 2010:6; Du Toit, 2011:11). As a further contribution, Baker (2008:3) suggests that although subsistence farming only provides minor relief it could enhance household food and income sources. Household food production is also indicated to offer insight into future programme development aimed at improving food security (Drimie *et al*., 2009:248; Hallberg, 2009:2).

2.3.1.2 Food distribution

Food distribution in the context of food security, is the allocation of food to regions where individuals and households do not have sufficient food to meet their nutritional needs or the resources to acquire it (Ericksen, 2007:6). The lack of adequate distribution to households and individuals is identified as a fundamental issue, contributing to increasing food shortages FAO (2012:20). Through adequate and effective food production and food distribution, governments are aiming to reduce food insecurity on a national and household level (Del Ninno *et al*., 2007:414). Improving the distribution and ultimate access to food sources has become equally important to food production in the contest of preventing and alleviating food insecurity and securing international sustainability (Foresight, 2011:26). Governments expect to not only increase household food production, but also the trade and distribution of food sources on a household level through strategies such as the IFSS (DOA, 2002:6). Other government tactics to alleviate food shortages include the intensification of national food supply distribution (Del Ninno *et al*., 2007:414).

Evidently, an important part of food security is to recognise the importance of food distribution in addition to the shortcomings that inadequate distribution has on household access to food (Altman *et al*., 2009a:345). When systems for effective food distribution are not implemented correctly, consequent difficulties with accessibility and availability are experienced. The functionality of food markets and the distribution of available food sources, rather than the total national agricultural production, influences household access to satisfactory quantities of food (Altman *et al*., 2009a:346, Du Toit, 2011:8). It is clear that food production, distribution and the fair allocation of available food sources is a vital component of ensuring sustainable food access and ultimately, also food security on household and national levels (Ericksen, 2007:3).

Inadequate food distribution may contribute to the occurrence or prevention of food security; however, it is not the only distributional component that plays an integral role in this matter. Land distribution or the lack thereof has also been mentioned to influence subsistence food production and availability, ultimately affecting food insecurity (Valente, 2009:1541).

Although this may form an important aspect of food security, this study focuses on the distribution of food, rather than land distribution and its impact on food security which may be adopted for future investigation.

2.3.2 Food access

Food access refers to the ability to obtain sustainable amounts of food on a national and household level (Du Toit, 2011:2; Ringstrom & Born, 2011:2). The World Health Organization (WHO) and the Food and Agricultural Organization (FAO) state that all individuals have the right to access food that is considered to be healthy and safe. Despite the right to food access, households from some communities are still struggling to access sustainable amounts of nutritious and safe food sources (Schumacher *et al.,* 2011:125). In South Africa, the 2009 General Household Survey (GHS) estimated that 20 % of households had insufficient access to food and some had serious inadequate access to food sources (Stats SA, 2010a:6).

Research indicates that availability and production of food do play an important role, although the lack of financial resources in rural and urban households to access food present a much larger obstacle (FFPP, 2007:2), which may pose a negative effect on the health status of many low income individuals (Schumacher *et al*., 2011:131). The health related risks accompanied by the lack of nutritious food, may result in obesity and in some cases malnourishment which undermines individuals' well-being. As an individuals' well-being is said to depend on their food security status, it is essential to address the outcomes of insufficient food access. Therefore, improving local food security and household well-being is dependent on enhancing access to food sources which are nutritious and affordable (Hodgson, 2012:6). In addition, Ringstrom and Born (2011:5) mention that economic development in communities will also improve through improved food access.

2.3.3 Food utilisation

In terms of food security, however, food utilisation is described as the ability to utilise food sources so that it may enhance well-being and productivity (Swindale & Bilinsky, 2006:1).The use of food sources by individuals is regarded as food utilisation. Numerous factors such as the quality of food, nutritional knowledge of individuals, safety and storage of food products, health status of an individual, as well as food preparation methods, all determine and influence food utilisation (IFRC, 2006:7; FANTA & WFP, 2007:4; Schmidhuber & Tubiello, 2007:19703).

The FAO, (2008b:7) suggests that food security is not only affected by the quantity of food that is utilised, but also the quality thereof. Food quality has an influence on the well-being of all individuals. As individual well-being is an objective of food security, it is important to identify and address factors, such as poor food quality, handling and hygiene which could threaten sustained well-being. Food consumption is of little importance if it cannot be accomplished with unequivocal food safety. Although utilisation is an important part of food security, limited information is available regarding the use of food at household level, especially in informal settlements (Montani & Omwega, 2002:6).

Due to the relationship between food availability, access and utilisation, it is important to emphasise that utilisation is directly affected by insufficient available food sources and access to available food is restricted. Furthermore, if food safety influences food security and inadequate food knowledge influences food safety, food cannot be utilised safely and food insecurity may occur (FAO, 1996:4). It has been acknowledged in this literature study that households from informal settlements often do not have the availability of, or adequate access to, food sources and lack crucial food knowledge; therefore utilisation may be jeopardised.

2.3.3.1 Knowledge of food safety practices

When food is available, accessible and utilised accordingly, without being harmful or causing illness to the consumer, food safety is considered to exist (FAO, 1996:4). Research indicates that consumers, on the household level, are the poorest implementers of food safety practices (Terpstra, 2005:527) and are not adequately educated to effectively implement food safety practices (Kang *et al*., 2010:535). It is suggested that consumers possess less than adequate knowledge regarding food handling, storage and safety practices (Terpstra, 2005:532; CSPI, 2005:8). A study conducted by Sanlier (2009:541) also discovered that consumers do not possess satisfactory knowledge regarding food practices such as handling, preparation storage. In addition, knowledge regarding food products, preparation and storage methods are indicated to influence food safety in households (Unusan, 2007:46). Sanlier and Konakioglu (2012:474) and Unusan (2007:46) mention that as there are no guidelines regarding food preparation, storage or handling for consumers on a household level, existing education regarding food aspects determines food safety in the household. Knowledge and education of handling, storage and preparation of food are critical as they influence food safety and habitually, food utilisation (Hallberg, 2009:7; Taylor & Batz, 2008:41; Wenhold *et al*., 2012:8).

2.3.4 Stability

Stability in this study refers to the ability of the food pillars to remain effective despite economic, socio-demographic changes and challenges. Economic changes to ensure food security for the African continent by 2050 will require broad and integrated yet local context-specific institutional and policy responses (Thornton *et al*., 2011:131). The authors continue by stressing the importance of the compliancy and stability of the pillars to prevent food insecurity for increasing populations in Africa through the use of integrated policies. Thornton *et al.* (2011:127) mention that the adaptability of the food security pillars becomes increasingly complicated as it consists of components which stretch beyond the concept of successful food production as a single essential component.

The evaluation and measurement of food pillar adaptability to additional key components, which for example, include food distribution, storage and utilisation, are essential, as the efficiency of the food pillars directly affect food security (Thornton *et al*., 2011:131). Sustainable food security is reliant on the constant development of combined components. These components include local food production and consumption of households residing in urban and perhaps rural environments (Burlingame & Dernini, 2011:2286). Collaboration of private and governmental information and resources are needed and will contribute towards developing flexible and sustainable systems (Eakin & Lemos, 2006:11). Complementing the aforementioned components to be addressed with regard to better food security, Simmons (2009:9) mentions the following four aspects that need improvement to enhance household food security: food affordability, food supply, food safety and sustainability.

The notion of food security servicing a profit, as so often is the case within the global sense of food security, must be substituted for a system that has the ability to ensure sufficient food for all individuals to ensure the actual enhancement of household food security (Jacobs, 2011:649). When the pillars of food security are managed independently within households in communities, they create an opportunity for inexpensive food source supplies that are sustainable (Environmental commons, 2008:1). With all the feasible outcomes and contributions of adequately managed local food security pillars, it may be suggested that food security sustainability in informal settlements such as the one explored within this study, is possible.

2.4 Socio-demographic influences on food security

The four main pillars of food security have been discussed, but are not the only aspects that influence food security. Socio-demographic factors constitute additional factors which contribute to food security by influencing the pillars thereof. Socio-demographics are a combination of sociological and demographic influences and includeaspects such as race, gender, income, level of education and household size (Zain & Naing, 2002:411). For this study only household size, income and level of education are relevant and are discussed.

2.4.1 Household size

Household refers to a single or group of individuals residing together whereasthe size of the household provides an indication of the number of individuals in the household (Stats SA, 2012a:79). Omotesho *et al.* (2007:574) found that food security is often determined by the size of a household and that a negative relationship exists between larger households and food security (Bashir *et al*., 2012:2; Bonti-Ankomah, 2001:5). (This is due to higher expenditure not necessarily supported by adequate income. In South Africa, the average household consists of approximately five individuals, where households larger than five individuals might be vulnerable to food insecurity (Bonti-Ankomah, 2001:16). The 2011 Census however, indicates that the average household size in South Africa has decreased to 3.6. The informal settlement relevant in this study is situated in the Free-State, where the average household size for the province is 3.3, the second lowest average household size within South Africa (Stats SA, 2012a:56). The Housing Development Agency (HDA) released a report wherein it is suggested that the average size of households within the informal settlements that they investigated is between 3.3 and 3.8 persons, depending on the type of dwelling (HDA, 2012:35).

2.4.2 Household income

Household income obtained by household members include amongst others, loans, salaries, grants, and pension's. As indicated previously, a lack of income significantly influences food security by prohibiting adequate access and utilisation of food sources (Hallberg, 2009:5), and the inability to access and utilise food according to ones needs, suggests that food insecurity exists. In the review of PHSA (2007:7), the relationship between food security and the level of income are discussed. A higher income enhances food security whereas a lower income is believed to encourage food insecurity, which is a direct outcome of poverty and lack of financial resources (Rosen & Shapouri, 2001:1).

Ericksen (2007:4) adds that in addition to affecting access to food, income is a direct determinant of food utilisation and food security. Therefore, the challenges that low-income households face with regard to inadequate access to food is a matter worth considering when developing initiatives and programmes for improving food security (PHSA, 2007:9). A lack of financial resources is believed to be more dominant in developing countries and in low income communities, especially informal settlements, where food security is a direct outcome of poverty (De Marco & Thorburn 2009:2104; Hallberg 2009:2; Rosen & Shapouri 2001:1).

Unemployment is proposed to be the most direct influence of low income and poverty in households and a significant contributor to food insecurity (Du Toit, 2011:3). Low-income individuals are mentioned to have inadequate access to sustainable amounts of food and more so to healthy food, due to the higher prices of these products (FFPP, 2007:2). Households within low income categories are afforded fewer opportunities to access a variety of food sources (NACO, 2009:1), and poverty amongst households in informal settlement groups is likely to exacerbate food insecurity (Rosen & Shapouri, 2001:2).

Research indicates that inadequate distribution and a lack of sufficient income is a contributor to the inability of households to access available food. Hallberg (2009:1), mentions that the efforts made to improve food insecurity, which is often brought forth by a lack of access to dietary sources, have focusedon unsatisfactory income and the distribution of food. According to the 2010/2011 Income and Expenditure Survey (IES), the average household income for black African households was R 69 632 per year (Stats SA, 2012b:12). Black Africans form up to 76% of the South African population; however, they earn only 44.6 % of the total annual household income. According to the income deciles in South Africa, this population falls within the lower to medium income groups(Stats SA, 2012::65). This study investigated household income and the possibility that it influences the availability, access and utilisation of food.

2.4.3 Level of education

Within informal establishments, the lack of education is a clear obstacle as numerous individuals are not part of an educational environment (Unusan, 2007:50). With referral to the influence of knowledge on food utilisation, people's level education is believed to affect their food security status (Unusan, 2007:46; Gundu, 2009:2). Age is closely associated with an individual's level of education and knowledge and is indicated to indirectly influence food

security. Children are indicated to be more vulnerable to food insecurity due to a lack of knowledge and access in comparison to older individuals . Baiphethi and Jacobs (2009:471) specify that insufficient education not only influences utilisation, it also prohibits households from engaging in own food production activities, due to unsatisfactory knowledge. A lack of adequate education leads to higher unemployment rates and lower paying jobs, which affects the income status of households (Stats SA, 2010b:10). The occurrence of insufficient education is a characteristic of low income areas and informal settlements and is therefore relevant to this study. The absence of education and knowledge ultimately influences a household's ability to optimally produce, access and utilise food sources. Utilisation and access are pillars of food security and key factors in establishing individual well-being (Kalpana Sastry *et al*., 2011:392). When utilisation and well-being are not optimal, food insecurity exists. If inadequate education leads to food insecurity, it may be reasonable to suggest that the number of undereducated individuals should be significantly decreased (Unusan, 2007:50).

2.5 Participation in food security enhancement initiatives

When individuals or households within a community initiate activities to overcome communal problems such as food security, citizen participation transpires. Activities in which citizens are involved can be described as being either citizen initiated or government initiated activities. Alternatively, programmes and activities are often implemented by Non-Governmental organisations (NGOs). However, as the involvement of NGOs in areas of need often require participants to sacrifice time or financial resources, individuals in poor communities struggle to participate due to a lack of either finances or time (Beard, 2005:25).

Effective development within vulnerable communities cannot occur if active participation is not consistent (Zadeh & Ahmad, 2010:13). Bowen (2007:66) and Gaventa and Valderrama, (1999:2) adds, that programmes aimed at alleviating poverty and perhaps food insecurity (considering the close relationship between poverty and food insecurity) require active participation and describe citizen participation in various programmes as an opportunity to enhance the programmes and ensure sustainability for future activities. According to Wallerstein (cited by Moriarty *et al*., 2007), active participation in programmes and activities may assist in promoting individual skills, knowledge and quality of life. Additionally, participation of households in food security programmes provide insight into the level of food insecurity amongst low income households which can then be utilised to enhance current or future activities by addressing household needs (Nord *et al.,* 2010:34).

Although the mentioned programmes are generally representative of the programmes and activities implemented in communities of need, the same level of participation and benefits may be relevant to programmes specifically aimed at improving household food security in the same communities. If implementing such household food security programmes is not possible, perhaps it is necessary to explore methods through which households can improve their food security status themselves. Using the resources accessible to them, households in informal settlements could improve their food security status.

2.6 The benefits of food security improvement initiatives in informal settlements

Charles *et al*. (2010:812) suggest that improving local and community food security may be an effective method to increase subsistence food production, storage, distribution and access components. However, the authors additionally mention that although improving local and communal food security may be useful, challenges would arise as the pillars of food security would need to be altered simultaneously. Local food security is a resource, which plays an integral part in the well-being of all individuals as it influences the access and consumption of food sources, which is a necessity to all. Local food security focuses on reviving household food security through promoting small-scale food production and consumption for subsistence (Bendfeldt *et al*., 2011:4).

The support of local and communal food security has increased due to the ongoing global demand for sustainable food (Rhoades & Guenin, 2009:6). Local and communal food security offers perspective on the improvement of food security in urban and rural neighbourhoods (University of Michigan, 2009:22) as in informal settlements in South Africa. Differentiating between community and global food security is carried out in order to indicate the variance in focus and objectives between them. In addition, this provides insight into the relevance of local and communal food security in the process to address household food insecurity. Global food security refers to the ability of country to ensure that enough food sources are available per capita (Pinstrup-Anderson, 2009:5), whereas local and household food security is characterised by two components (Rhoades & Guenin, 2009:6):

- Food security in a community – Communal or household ability to provide sustainable resources daily, or in time of crises.
- Self-resilience – Public capability to adhere to dietary needs, in the hope of improving sustainability.

The pillars of food security, as indicated in this literature study, negatively influence food security in households if not managed and implemented effectively. In addition to the pillars, socio-demographic factors such as income and level of education also contribute to food insecurity within informal settlement households (HDA, 2012:43). Through the use of resources which are available, food insecurity can be addressed accordingly and the following benefits may be achieved:

- Enhanced nutritional knowledge
- Effective food production activities (self-subsistent food production)
- Improved food preparation skills and knowledge
- Improved food storage methods and hygiene practices
- Enhanced, access, availability and consumption.

If access, availability and consumption can be enhanced through addressing the factors that negatively influence them, vulnerabilities and food insecurity within informal settlement households may drastically improve.

2.7 Theoretical framework of food security

With the aim of understanding food security, how various factors influence the status of food security and the benefits of improved food security, a theoretical framework (Figure 2.2) has been assembled based on the literature. The theoretical framework is a comprehensive presentation which incorporates food security components such as the pillars of food security (FAO/FIVIMS, 2008:1; Stamoulis & Zezza, 2003:8) and additional supportive elements identified in the literature.

Food security is a state which exists when all individuals have continuous adequate access to available food sources which are nutritionally safe to utilise (FAO, 2009:8). Food security is based on four dimensions which are identified as food security pillars (figure 2.2). These pillars consist of food availability, access, utilisation and stability, with sustainability as the desired outcome of effective food security pillars (FAO, 2006:1). For food security to be achieved these pillars need to function effectively as individual components as well as collectively. When the pillars of food security do not exist or are not effective, households become vulnerable or susceptible to food insecurity (Arshad & Shafqat, 2012:140; Barret, *et al*., 2010:825).

Food security and the effectiveness of the pillars can be influenced by supplementary factors such as socio-demographics (figure 2.2). Income, household size and education (Zain & Naing, 2002:411), to name a few, contribute to the vulnerabilities of food insecurity by affecting the availability, accessibility and utilisation of food sources on the household level. Vulnerability to food insecurity that is not addressed leads to the introduction of food insecurity on the household level.

To address vulnerabilities and the existence of diminished food security situations in households, the severity of the problem needs to be determined. In figure 2.2 food insecurity can be categorised as being *chronic* and *transitory* as a method to determine the severity of food insecurity (The World Bank, 1986:1; FAO, 2008a:1). The source of the insecurity, whether it is a demographic, environmental or political factor, can be identified by a government, an NGO, a community or the household itself in order to initiate the development of suitable plans for preventative or corrective action.

Preventative or corrective measures regarding food security aim to decrease the vulnerability and existing food insecurity within communities or households by addressing or eliminating the source of the insecurity. Through development and effective implementation of livelihood strategies, food security polices and activities, preventative and corrective action can be applied. For enhanced and sustainable food security in households, continuous involvement is needed, not only from a government or NGOs, but additionally from communities and households (Zadeh & Ahmad, 2010:13). Identification and implementation of activities and strategies by organisations to enhance food security are as essential as the participation of vulnerable or food insecure communities and households. Strategies, activities and policies are ineffective without suitable implementation and participation (Bowen, 2007:66).

The theoretical framework (Figure 2) proposes that when multiple factors are combined and work against one another, vulnerabilities increase and household food security becomes jeopardised. However, with prolonged action, the following benefits may be achieved:

- Enhanced nutritional knowledge
- Effective food production activities (self-subsistent food production).
- Improved food preparation skills and knowledge
- Improved food storage methods and hygiene practices
- Enhanced, access, availability and consumption.

The benefits accumulated from actively implementing and participating in strategies could assist by contributing to the enhancement and sustainability of food security in households (Nord *et al.,* 2010:34).

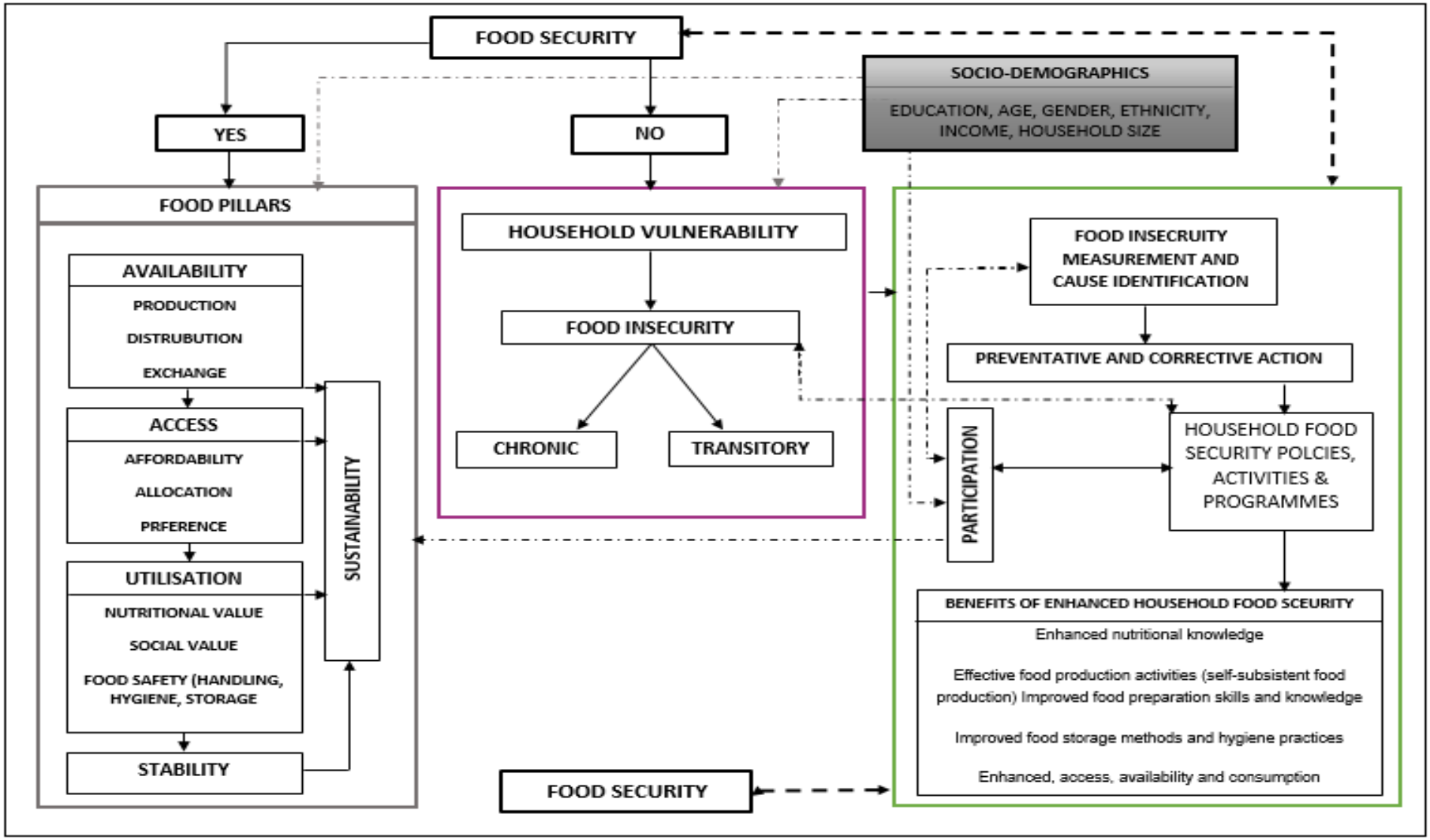

Figure 2.2 Theoretical framework of household food security (Adapted from FAO/FIVIMS, 2008:1; Stamoulis & Zezza 2003:8)

2.8 Conclusion

Food security is a state which exists when all individuals have continuous access to available nutritional food sources which are safe to utilise (FAO, 2009:8). Food insecurity occurs when any of the pillars (availability, accessibility and utilisation) does not exist. Food insecurity is associated with developing countries, characterised by severe poverty and inequalities (FAO, 2012:2). Lack of adequate food availability, accessibility and utilisation and the inability to stabilise the pillars of food security constantly increase food insecurity in developing countries such as South Africa. To be food secure, countries should not solely focus on producing enough food sources for its population, but ensure that available food sources can be accessed and safely utilised by all. Sustainable household food security is a necessity to ensure individual well-being (Kalpana Sastry *et al*., 2011:392).

The literature can be used to describe the unacceptable state of food security in South Africa, as many households are regarded to be food insecure (Altman *et al*., 2009b:7; Faber *et al*., 2011:22). These insecurity are due to the instability of the food security pillars and the contribution of supplementary factors such as socio-demographics which actively lead to vulnerabilities (Zain & Naing, 2002:411). It is suggested that many South African households struggle to recover from the implications brought forth by various factors, increasing their vulnerability to food insecurity (Drimie & Casale, 2009:32).

A report provided by Statistics South Africa reveals that although the availability and utilisation of food in South Africa may contribute to diminished household food security, the most influential factor is a lack of adequate food access (Stats SA, 2010a:6). Access amongst black households in South Africa is regarded to be the most significant problem as the majority of these households are underprivileged and food insecure. Additionally, access to various components such as income, education, food production opportunities and skills are limited in these households, which ultimately contributes to the lack of accessibility to food. However, as all the pillars of food security may contribute in some way to food insecurity, it is necessary to address the pillars and supplementary factors individually and collectively (Arshad & Shafqat, 2012:140; Barret, *et al*., 2010:825). Improved policies and programmes focused specifically on household food security in South Africa is needed in order to address the current deteriorating situation (PHSA, 2007:9). As food security is a phenomenon which is not only present in South Africa, but also most developing countries (FAO, 2012:2), collaboration between various parties is necessary. Collaboration could

provide additional insight and information which could prove useful in understanding and addressing food security.

Altman *et al*. (2009:25) highlight the importance of developing a method through which the food security of South African households can be monitored. Additionally the researchers suggest that localised enquiry regarding household food security in South Africa is needed to determine the origins and consequences of household food insecurity. A theoretical framework (Figure 2) such as the one presented in this study can be applied in order to gain information and insight into the status of food security in informal settlements and assist in comprehending current and possible future situations. Exploring household food security may contribute to addressing the said problem by advancing future research on the subject matter. Additionally, increased research of household food security may assist the development and implementation of activities, strategies or policies needed to prevent imminent, as well as alleviate existing, food insecurity. The well-being of individuals and households as a priority for developing countries and ensuring that the pillars of food security function correctly may be essential in achieving national prosperity. Recommendations regarding corrective action could be made to organisations to encourage the process of ensuring sustainable food security on the household level.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The purpose of this study was to determine the status of household food security and to provide recommendations for enhancing food security. The study was conducted among individuals in Rammulotsi, a low-income informal settlement within the urban area of Viljoenskroon. This chapter provides insight into the research, sampling, collection and analysis methods and the appropriateness of these methods to the study. An in-depth description and analysis of the geographical profile and population are also provided.

3.2 Research design

The researchers recognised that a quantitative approach was best suited to this specific investigation. The aim of this investigation was to ultimately explore the associations between the identified variables (Ivankova *et al*., 2010:257) such as food security, socio-demographics and food utilisation. The investigation included the use of numerical data and statistics and was conducted systematically and objectively (Pietersen & Maree 2010a:186).

The approach of this investigation wasquantitative in nature, and an exploratory approach was followed as the focus fell on the exploration of a fairly unknown topic so as to obtain information regarding a situation within the identified community (Blaikie, 2004:73), in this case of Rammulotsi, near Viljoenskroon. Additionally, this exploration may serve as a basis for further inquiry (; Fouché, 2005:272; Jansen, 2010:11) to address food insecurity on a household level within informal settlements in South Africa. A survey, the most common non-experimental design was utilised to obtain data of a quantitative nature and to fulfil the objectives of this study.

3.3 Sampling

3.3.1 Population and study location

Respondents for this study consisted of individuals residing in informal settlements in the urban Viljoenskroon/Rammulotsi area of the Free-State Province and were employed at Nutrifeeds, a production facility on the outskirts of Viljoenskroon. A test sample was drawn from the population of individuals. This particular population was chosen as they were easily accessible at their place of employment. The sample population were furthermore low-

income (R 1 363 – R 6 322) earning individuals, who were more prone to food insecurity (Joubert, 2010:105) and therefore suitable participants in this study. The majority of the population were Black, Sesotho men due to the environment in which the population was identified. Various women were included in the sample but most were unavailable at the time that the study took place. The sample included individuals whom were responsible for preparing at least one meal per day.

3.3.2 Sample and Sample size

A non-probability, convenience sampling method was usedas respondents were easily accessible and met the requirements of this study (Maree & Pietersen, 2010c:177; Blaikie, 2009:179). As part of the inclusion criteria for this study, the individuals in this sample had to be older than 18 years (as they were able to participate in research without consent from another individual). The individuals also had to be employed and reside in the Viljoenskroon /Rammulotsi area of the Free-State Province at the time that the research took place. The sample was therefore drawn from individuals employed at Nutrifeeds, Viljoenskroon, and low-income (R1 363 – R 6 322) earning individuals. Ethnicity, gender and level of education were not defined as part of the inclusion criteria therefore the sample included individuals of any ethnicity or gender and were representative of any level of education.

An original sample of 189 respondents was determined, however due to their varying time shifts only 103 respondents were available. The available respondents were safely and easily accessible throughout the study. This assisted in obtaining the necessary data in the most effective time frame possible. This specific sample also provided access to individuals currently employed at Nutrifeeds and residing in the Viljoenskroon/Rammulotsi area. Although it is assumed females are the main preparers of food in the home, the male respondents of this study work within a food preparation (animal feed) environment, which require similar hygienic practices and have previously been responsible for food preparation in their household. Some respondents additionally live alone, making them the main preparers of food and therefore individuals who require adequate food knowledge. The sample size was acknowledged to be appropriate by the Statistical Consultation Services (SCS).

3.4 Data collection

3.4.1 Date collection procedure

For the purpose of this study, interviewer administered questionnaires were used as the method of data collection, (Blaikie, 2009:205). This collection method accommodates longer questionnaires, provides higher response rates and allows the researcher to assist with questions which were unclear to the respondents (Maree & Pietersen, 2010c:158). To ensure the consistency of the data collected, the questionnaires were developed in advance as suggested by (Nieuwenhuis, 2010:87) and were specific to the objectives of the study.

The questionnaire for this study was designed by the researchers and experts in the field of study from the Consumer Science subject groupand Health Sciencesdepartment of the North-West University, Potchefstroom campus. Information from existing questionnaires and surveys from similar fields of study were obtained and adapted according to the objectives of this study. Questionnaires and surveys employed for the development of this questionnaire include - the General Household Survey (GHS) and Income and Expenditure Survey (IES) (Stats SA, 2010a; Stats SA, 2012b). The questionnaires in this study addressed the following aspects:

- Section A: Food production and consumption
- Section B: Food preparation, production, handling, utilisation
- Section C: Food storage
- Section D: Food security.
- Section E: Food knowledge
- Section F: General demographics
- Section G: Living environment
- Section H: Household income and food expenditure

Prior to the main data collection process, a small scale pilot test was performed. The pilot test was conducted on the Potchefstroom campus of the North-West University where a smaller group, representative of the target population, was approached in a similar setting to where the study was conducted. The purpose of this pilot test was to enhance the reliability of the questionnaire, to obtain information and test strategies (Thabane *et al*., 2010:2). The pilot test provided additional support in assessing statistical and analytical procedures for the

main study. This ultimately assisted in improving the quality and efficiency of the larger study. In addition, any limitations identified during the pilot test could be addressed prior to the main study (Altman *et al*., 2006:1). During the pilot test the developed questions used in the interviewer administered questionnaires for the main study were tested. This test was undertaken in order to ensure that the questionnaire was the best-suited method for data collection. The pilot test was further performed to identify any problems with the questionnaire (Delport & Roestenburg, 2011:195). In addition, implementing a pilot test assisted in establishing whether all the questions were fully comprehensible to all the identified respondents and to ensure that the necessary information would be acquired. During the pilot test, technical and language problems were identified which were corrected by a language editor. Correspondence from the respondents' union representative confirmed that all respondents could fully comprehend English and Afrikaans, regardless that most were Sesotho speaking.

For the main data collection, a group of respondents were identified and the necessary information was obtained through questionnaires. The questionnaire consisted of closed questions, each with a compiled set of fixed answers. Closed questions were well suited for this study as considerable amounts of information were required from the respondents (Delport & Roestenburg, 2011:198). The questionnaire included biographical, multiple choice and follow-up questions. Respondents were interviewed separately and a questionnaire took approximately 20 minutes to complete. During the completion of the questionnaires, respondents were offered refreshments on a daily basis as a form of appreciation for their participation in the study (Gomm, 2008:142).

3.5 Data analysis

The data collected for this study were statistically analysed for interpretation. The analysis was performed at the North-West University through the statistical programs namely Statistical Packages for Social Sciences (SPSS) and with the assistance of the Statistical Consultation Services (SCS). This provided the researcher with the necessary data through which conclusions, meanings and implications could be drawn to answer the research question. Descriptive statistics such as frequencies, means and standard deviations were used to analyse the data, which was then interpreted through tabulation and graphical illustrations. Inferential statistics were applied in order to form appropriate conclusions. Correlation coefficients were investigated to ultimately determine the linear associations between two or more significant variables (Pietersen & Maree, 2010b: 215). These

correlations were documented on diagrams to illustrate whether the relationships are positive or negative and in fact linear. The correlation coefficients were represented by *r* (rs) as suggested by Pietersen & Maree (2010c:237). During the analysis, *p*-values were presented to indicate statistical significance (sig. 2 tailed). The direction and strength of the correlations (*r*) can be categorised as 0.1=small, 0.3=medium, 0.5=large; however, only correlations with an *r*-value ≥ 0.3 were reported. Correlations coefficients were rounded off to one decimal place. Guidelines provided by Labadarios *et al*. (2009:16) were used to determine if households were at risk of hunger or indeed hungry and food insecure.

3.6 Ethical aspects

Ethical approval for this study was acquired from the Research Ethics Regulatory Committee (RERC) of the North-West University and the School of Physiology, Nutrition and Consumer Sciences, Potchefstroom campus. A proposal document was provided to the union representative (Mr. S. Matsopole) of the employees at Nutrifeeds, who granted permission to conduct the study with the identified sample. All respondents' participation was voluntary, suggesting that individuals were not compelled to participate in the research. Respondents were requested to complete consent documentation preceding their involvement in the study. A detailed description of the study and the purpose thereof was communicated to respondents before the study commenced as suggested by Henn *et al*. (2006:71) and respondents had the option to withdraw from the study at any given stage. Withdrawal from the study did not require the respondent to complete the questionnaire or participate in any further activities related to the research.

Questionnaires were accompanied by a cover letter which specified the personal particulars of the researcher, purpose of the research and the duration of the study. The cover letter also provided the respondent with the methods that were used to ensure anonymity and confidentiality. In cases where any information was provided by the respondent, which could identify him/her, it was not made available to any persons who were not directly involved in the study, so as to guarantee confidentiality (Delport, 2005:170). This study did not require respondents to provide their personal particulars with regard to the questionnaires, rather each respondent was assigned a random code so as to ensure continuous anonymity. Data were stored appropriately by the researcher and after completion of the study the questionnaires were entrusted to the North-West University, Potchefstroom, to be placed in safekeeping for a period of five years. After this period they will be destroyed according to the correct procedures prescribed by the North-West University. This study aimed to support

the respondents of this study in a professional manner. Data collection occurred non-invasively and proceeded without disrupting the day-to-day activities of participants. After the recommendations were provided by this study they were disseminated and made available to be implemented in informal settlements in South-Africa.

3.7 Validity and reliability

To guarantee the internal or face validity of the instrument, the questionnaires employed in this study were developed and reviewed by experts in the field of study , in order to confirm that it was able to measure what it was intended to (Maree & Van der Westhuizen, 2010:37). Denscombe (2010:143) proposes that validity and reliability coherently impact the accuracy of an investigation; therefore, for validity to be accurate reliability must be established. When the reliability of a study is high, it suggests that future research may produce the same results through the same projected research process (Pietersen & Maree, 2010b:215; Denscombe, 2010:144). To ensure the reliability of thisof the data , the researchers interacted objectively without manipulating the data. Data obtained were stored correctly to ensure that the necessary information was not lost. To ensure the internal reliability of the measuring instrument for this study, Cronbach's alpha coefficient (α) was used. The alpha coefficient provided an indication of the internal consistency based on inter-item correlations (Pietersen & Maree, 2010b:216). A coefficient close to one represented a high internal reliability, whereas a coefficient closer to zero is indicative of a low internal reliability. Reliability coefficients for the questionnaire were determined at 0.7 and 0.9. These coefficients suggest low or high internal reliability as items in this questionnaire were closely correlated (Pietersen & Maree, 2010b:216). An appointed statistician from SCS assisted with data analysis and acknowledged all the statistical processes implemented in this study to be correct and appropriate.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Demographic information of respondents

Demographic information was analysed in order to determine specific characteristics of the study sample. The sample consisted of 103 respondents. The majority of respondents (99%) were male, from the black population group (95%) and were between 25-54 years of age. The average household size to which these respondents belong to was four individuals. A detailed demographical profile can be seen in Table 4.1. The results indicated that 98% of the respondents had attended school, with 80 respondents that attended secondary school, but only 36 completed Grade 12. Sesotho was indicated to be the most common home language spoken amongst the sample (77.7%), while 12 of the respondents spoke isiXhosa which corresponds to the language distribution of the Free-State province (Stats SA, 2012:23). Figure 4.1 provides a graphical illustration of the total monthly household income distribution across the population and the income deciles income decile (stats sa, 2012:65)). the income decile can be grouped together and provide an indication of lower income (1-4), middle income decile (5-7) and high income (8-10) decile groups (Stats SA, 2011:39).

The majority monthly income is mainly distributed between R 1 929 – R 6 321, representing 78.6% of the respondents or n = 81 of the households (Figure 4.1). Of the aforementioned households, 82% earned between R 2 258 and R 6 321. These households can be categorised in lower income deciles, (Stats SA, 2011) consistent with that of the average black household in South Africa (Stats SA, 2012b:12). When considering the income ranges of all the respondents' households, the sample could be categorised in income deciles 1 to 10, as 22 households earned less and 14 households earned more than the income amounts of the majority of respondents.

Table 4.1 Demographical characteristics (n=103)

Demographics	n	%
Race		
White	1	1.0
Black	98	95.1
Coloured	4	3.9
Age		
18-24	4	3.9
25-34	38	36.9
35-44	24	23.3
45-54	26	25.2
55-64	10	9.7
65+	1	1.0
Gender		
Male	102	99.0
Female	1	1.0
Household income		
< R 1 363	2	1.9
R 1 364 – R 1 928	6	5.8
R 1 929 – R 2 257	14	13.6
R 2 258 – R3 137	22	21.4
R 3 138 – R 4 164	22	21.4
R 4 165 – R 6 3 21	23	22.3
R 6 322 – R 9 319	9	8.7
R 9 320 – R 13 209	1	1.0
R 13 210 – R 17 987	2	1.9
R 17 988 – R 26 705	2	1.9
Level of education		
None	2	1.9
Primary School	21	20.4
Secondary School	44	42.7
Grade 12	36	35.0
Language		
Setswana	3	2.9
isiXhosa	12	11.7
isiZulu	3	2.9
Sesotho	80	77.7
isiNdebele	1	1.0
Afrikaans	4	3.9

n = number of respondents that answered each question

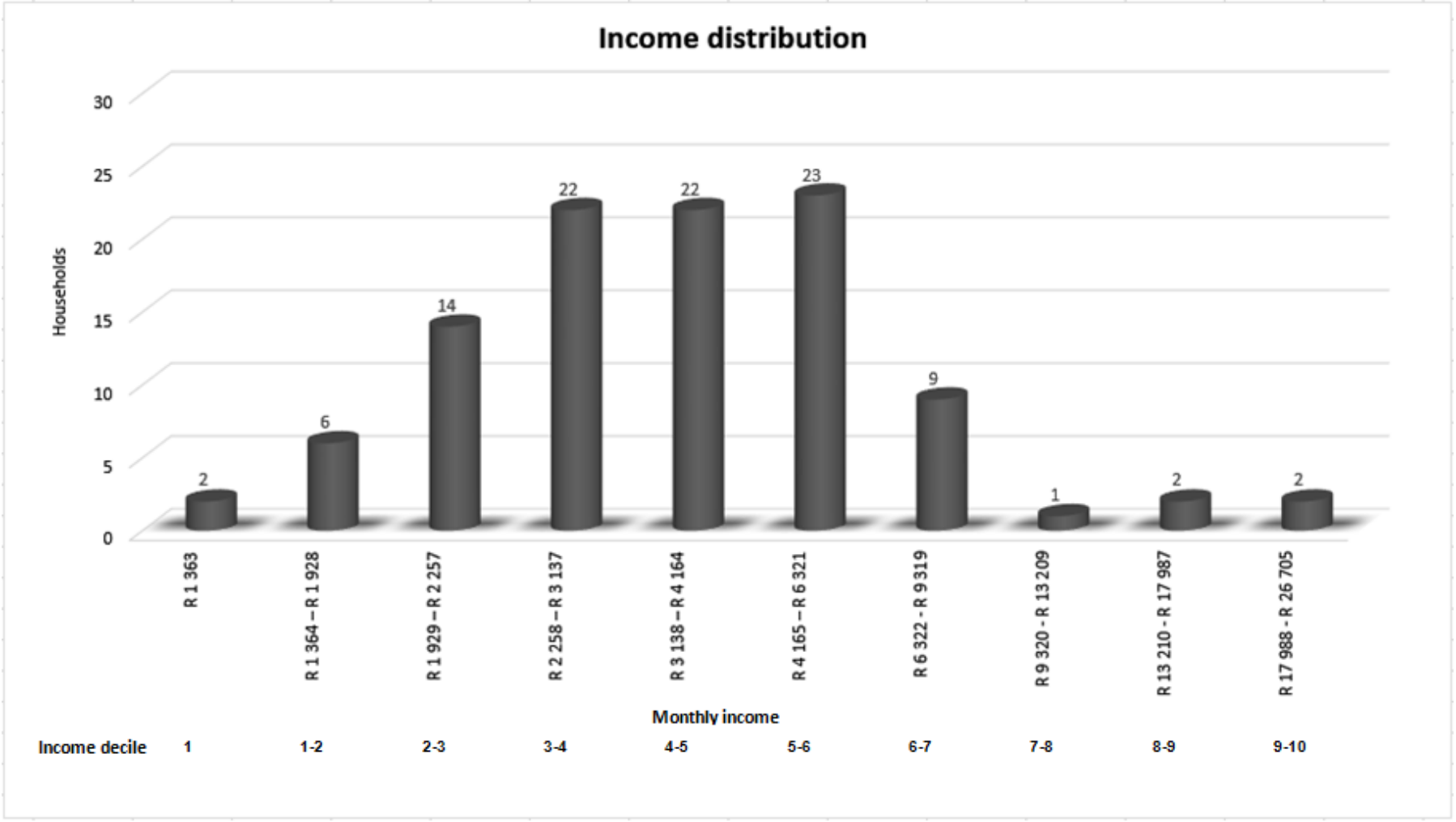

Figure 4.1 Monthly household income distribution and associated income deciles

4.2 Household food production activities

Household food production assists households by alleviating food insecurity, through improving nutritional intake, living standards, minimising the reliance on market purchases and making food available and easily accessible Baiphethi & Jacobs, (2009:459); Crush & Frayne, (2010:6) and Du Toit, (2011:11). Part of this study was to determine whether the respondents produced food sources for the household by means of vegetable gardens or keeping livestock, to enhance their food intake, dietary needs and income. Table 4.2 summarises the presence of vegetable gardens and livestock, including the purpose of use.

Table 4.2 Respondents implementation and utilisation of households' vegetable gardens and livestock (n=103)

Food production activities	**Yes**		**No**	
Indication frequency	**n**	**%**	**n**	**%**
Vegetable gardens	38	36.9	65	63.1
Livestock	24	23.3	79	76,7
Food utilisation	**Vegetable garden (n=38)**		**Livestock (n=24)**	
Household consumption	38	100.0	24	100.0
Give away to family/friends	30	78.9	16	66.7
Preserving for future	16	42.1	13	54.2
Selling	8	21.1	6	25.0

* Where (n=38) and (n=24): The question was only relevant to respondents that indicated ("yes") to having vegetable gardens and/or livestock. N=62

The results indicated that 36.9% (n=38) of the respondents had vegetable gardens and 23.3% (n=24) respondents possessed livestock that was used for household consumption. The majority of these respondents additionally supplied food products to family or friends (78.9% of vegetable produce) while some preserved the vegetables (42.1%) and meat (54.2%) for future use. A few respondents used the food to generate income by selling the vegetables (21.1%) or meat (25.0%). The results clearly indicate that only a few households implement vegetable gardens and own livestock as a method of enhancing availability and

access to food sources through alleviating financial strain. Implementing household food production activities clearly contributes to enhanced food source varieties and additional household income. This coincides with (Baiphethi & Jacobs, 2009:459; Crush & Frayne, 2010:6; Du Toit, 2011:11) who indicate that household food production increases nutritional availability and decreases the dependence on market purchases. Baker (2008:3) mentioned that household food production contributes to household income opportunities.

4.3 Household food consumption patterns

To explore household food consumption a variety of food products from different food groups were presented to the respondents. Vorster et al., (2001:3) indicate that a variety of food products should be consumed daily. In Figure 4.2 the distribution of the recommended daily consumption of food groups as specified by the South African food-based dietary guidelines are presented. The number of recommended portions per food group is used in Figure 4.2 to indicate to what extent each food group should be represented in the diet, daily.

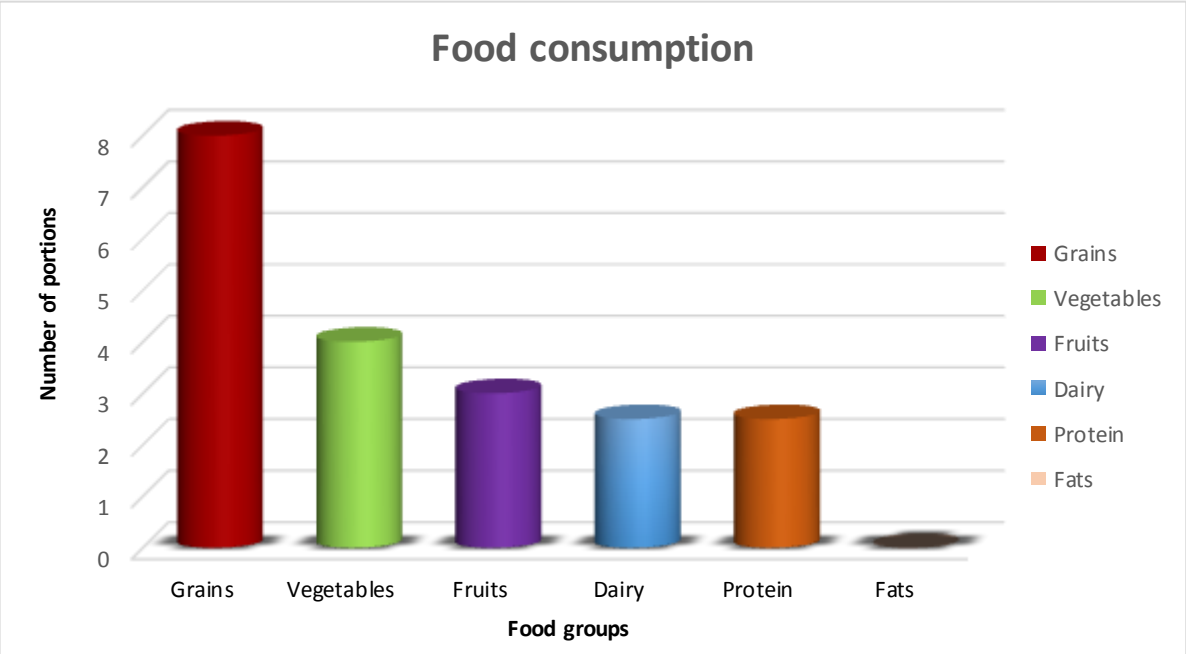

Figure 4.2 Recommended daily consumption distribution of food groups based on the South African Food-Based Dietary guidelines (Vorster et al., 2001:17; Love & Sayed, 2001:24; Scholtz et al., 2001:39 and Wolmarans & Oosthuizen, 2001;4)

Figure 4.2 presents the general dietary guidelines that recommend portions of each food group as it should be consumed daily. Grains form the biggest part of the daily diet and 7-8

portions should be eaten per day as grains are the main contributor of energy in the diet (Vorster & Nell, 2001:17). Plenty of vegetables and fruit (5-7 portions) should be eaten on a daily basis to provide nutritional elements to the body in order to keep it healthy (Love & Sayed, 2001:24). Dairy and protein products should be eaten each day (2-3 portions) as they provide essential nutrients to the body (Scholtz *et al*., 2001:39). Fats, especially saturated fatty acids, should be consumed sparingly (Wolmarans & Oosthuizen, 2001:48). The daily consumption of the variety of food products in the household of this study are presented in Figure 4.3. This was done to explore which food sources are consumed daily within the households of this study. Only the food products in each food group that were consumed daily by most households are represented. A detailed representation of the food consumption patterns can be seen in Addendum C.

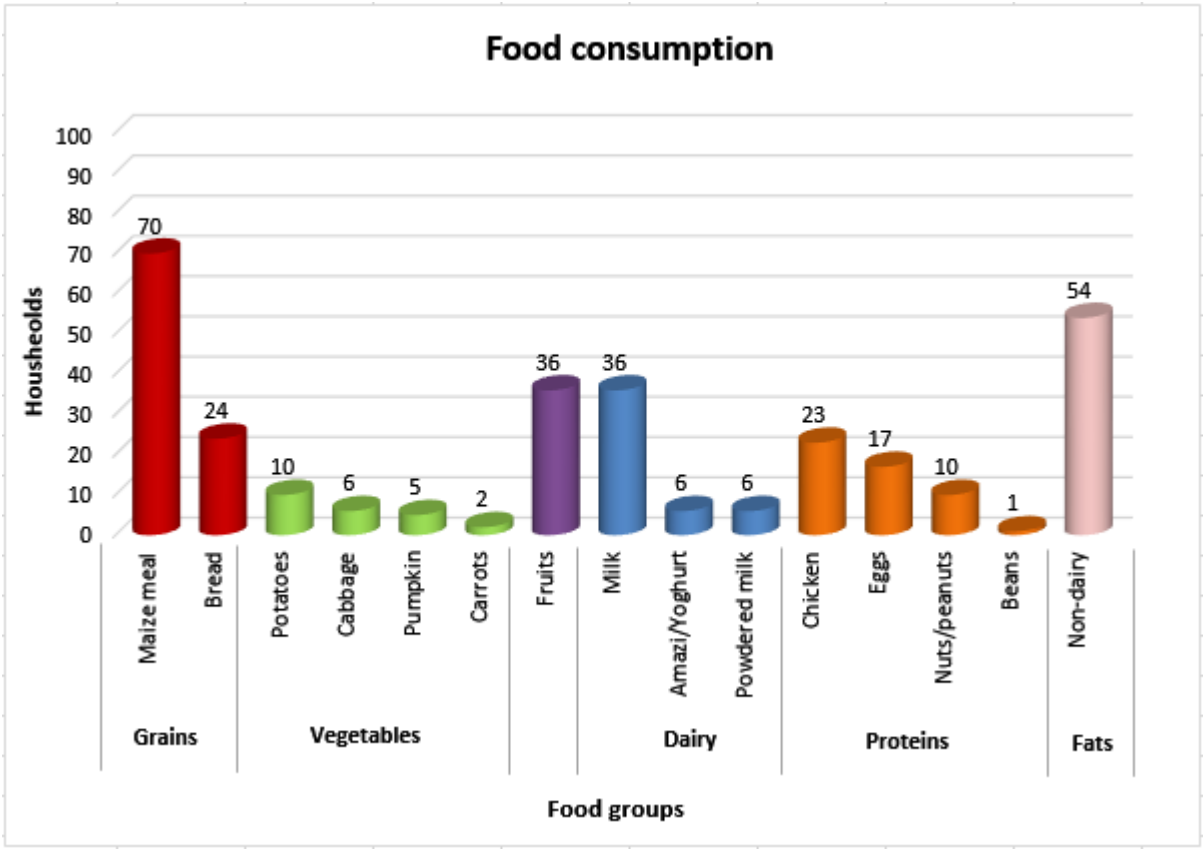

Figure 4.3 Summary of distribution the daily consumption of various food products

Food consumption was only explored based on the regularity of consumption; quantities of the food products consumed were not included. Additionally, the data in Figure 4.3 are not necessarily representative of the same households nor does it provide substantial information to determine whether the households represented in this study enjoy balanced diets. This figure only provides information on the variety of food products which were

consumed daily by most households. Grains such as maize meal and bread were consumed daily by n=70 and n=24 households respectively. Only a few households consumed vegetable products (potatoes, cabbage, pumpkin and carrots) daily, while some of the other households indicated consumption of these and other vegetable products between once to six times per week. Potatoes, pumpkin and cabbage were the most popular vegetable products. Fruits and milk were indicated to be consumed daily by only 36 of the households. Protein products such as chicken and eggs were enjoyed by a few households. Cremora (a non-dairy creamer) was used by 54 households daily and was grouped as a fat due to the high percentage fat content (based on nutritional information of the product).

During the completion of question 2, many respondents mentioned that limited financial resources prohibited access to adequate protein and vegetable products. This is consistent with literature which suggests that decreased intake of these nutritional products are due to lack in availability and unaffordability (Love & Sayed, 2001:24). It should be acknowledged that although the products in each food group are consumed daily it does not suggest that there is an adequate variety of food products in the diet. For example, households that only eat eggs do not enjoy a variety of protein products. A comparison of the food groups based on appropriateness of daily consumption amongst the respondents could not be done as the purpose of the questionnaire was to explore the types of food products rather than the quantities consumed. As such it was difficult to accurately determine whether the households represented in this study had balanced diets. Future research therefore needs to investigate consumption quantities in addition to variety to form a clear understanding about food consumption in households. Additional information regarding the food consumption of all products is provided in addendum C.

Correlations were applied to determine if knowledge regarding a well-balanced diet and the amounts of fruits and vegetables needed per day had any significance on the frequency and types of food products consumed. There were, however, no significant correlations between this specific knowledge and food consumption. This suggests that basic knowledge of food groups was not enough to ensure variety in consumption patterns.

4.4 Respondents' knowledge regarding food and related safety and hygiene practices

According to the literature, knowledge of food and related handling practices may enhance utilisation of food (Hallberg, 2009:7; Taylor & Batz, 2008:41; Wenhold *et al*., 2012:8). The

summary of the results regarding food knowledge are presented in Table 4.3 and will be discussed.

Table 4.3 Summary of respondents' knowledge of food, food related hygiene and storage practices (n=103)

Knowledge of food related aspects	n	%
A well balanced diet consists of	69	67.0
Are the following safe to eat	68-84	66.0-81.6
Can food cause illness when	73-99	70.9-96.1
Is the food preparation surface clean when	62-95	60.2– 2.2
Hygiene practices		
Are hands washed before food preparation	100	97.1
How are hands cleaned	88	85.4
Where is food prepared	82	79.6
Is the preparation surface washed (before, during, after food preparation)	92-100	89.3-97.1
Storage practices		
Dry products	65	63.1
Cooked left-over food	76	73.8
Raw meat	94	91.3

n = number (or range) of respondents that selected the appropriate option in each section

The results revealed that many respondents were informed about well-balanced diets as 67.0% indicated that a variety of food groups should be consumed daily. However, they were not informed regarding consumption specifics. However, only seven of the 103 respondents could correctly identify how many fruits and vegetables should be consumed daily. Questions regarding food safety and hygiene were answered correctly by the majority of the respondents, indicating that these respondents were familiar with basic food safety in the home. With regard to question 18 70.9% - 96.1% of the respondents knew under which harmful conditions food could cause illness while for question 21, 66.0% - 81.6% of the respondents knew if particular food sources were safe to eat. However, not everyone was sure that undercooked chicken or pork may pose a risk. It was further found that some respondents indicated that in addition to the proposed correct cleaning method, other

methods are also correct, thus indicating that between 2.2% - 60.2% of the respondents were not sure of the actual correct method. The adequacy of these respondents' knowledge regarding preparation surfaces is therefore questionable. These results are similar to the findings of CSPI, (2005:8) and Terpstra *et al*. (2005:532) who suggest that consumers do not possess adequate knowledge regarding food safety and hygiene.

4.4.1 Household hygiene practices

Adequate hygiene and storage practices with regard to food are necessary to ensure optimal food consumption, shelf life and safety of food products. Information was gained with regard to the respondents' knowledge of food related hygiene and safety aspects. Respondents only provided indications of the hygiene and storage practices applied within the home. The true implementation thereof was not investigated or verified. Household hygiene practices are represented in Table 4.3.

Various hygiene options were provided to the respondents as a method to explore their proposed hygienic practices before, during and after food preparation. Included are the methods of washing hands and cleaning the food preparation surfaces. Biran *et al*. (2012:3) signify the importance of washing hands before handling food and cleaning food preparation surfaces (before, during and after use) to prevent contamination and improve food hygiene. The majority (100) of the respondents indicated that they knew their hands had to be washed before food preparation while (88) respondents indicated that soap and water was used to wash their hands before and after food preparation. Furthermore, 82 respondents indicated that a cutting board was used to prepare food, while an average of 96 respondents indicated that their food preparation surfaces were cleaned before and after use and in-between preparing meat and vegetables respectively (Table 4.2). This suggests that these respondents possibly knew the importance of using a clean surface to prepare food.

The cleaning of the preparation surface in-between the use of meat and vegetable products proposes that the respondents might possibly be aware of cross-contamination. However, this assumption was not formally tested. The results suggest that the food hygiene practices indicated to be used in the household were appropriate amongst most of the sample. This contradicts with the findings of Kang *et al*. (2010:535) which suggest that although knowledge of food safety and hygiene is adequate, it is not always implemented accordingly. There was however, 13 respondents that indicated that the appropriate hygiene practices were not used in their household. Although it was not confirmed, the respondents that did

not apply the correct hygiene practices were perhaps not aware of the importance thereof or did not have the necessary resources to do so. Considering the contribution adequate hygiene practices have on food hygiene and consumption, and the implementation of hygiene practices by the respondents in this study, it can be assumed that food products will be safe to eat. This is based on the findings that food was handled and stored correctly and not contaminated before preparation. Food storage contributes to the safety of food and safe consumption of food products (Biran *et al*., 2012:3; Unusan, 2007:45). As part of food safety, the respondents' knowledge regarding different storage methods were used as a means to explore food safety practices. Table 4.3 provides information regarding the suggested storage practices of food products before and after use applied in the respondents' household.

Most of the respondents indicated that acceptable storage methods were used for dry (n=65), left-over food (n=76) and raw meat products (n=94). There were, however, a few respondents that indicated alternative methods were used in their households to store dry (n=5) and cooked left-over food (n=21) products. These methods included storing left-over products in the microwave or oven and dry products under the bed in a container. These respondents may possibly not have been aware of the appropriate methods to store food or did not have the necessary household equipment to do so; however this was not tested and confirmed. Using methods which are not usually recommended for storage may possibly contribute to increased chances of contamination and consumption safety risks especially in cooked food (Biran *et al*., 2012:40). Unsuitable methods to store food which ensue higher safety risks coincides with the findings of Terpstra *et al*. (2005:527), which suggests that consumers do not implement the necessary food safety precautions. Respondents who did not use a refrigerator or freezer to preserve their raw meat products indicated that meat was bought with the intent of immediate use. Appropriate food safety practices are necessary to ensure that food products can be optimally utilised (Taylor & Batz, 2008:41); (Wenhold *et al*. 2012:8), as food utilisation influences food security (Kalpana Sastry *et al*., 2011:392).

4.5 The relationship between respondents' level of education and food knowledge

To determine if higher levels of education had a significant effect on the respondents' food knowledge, correlations between the respondents' level of education and basic food knowledge were done. A correlation between level of education (variable 1) and knowledge of food related aspects (variable 2) were calculated. A statistical and practical significant relationship ($p \leq 0{,}003$; $r=0.3$) existed between knowledge and respondents' level of

education. This indicates that as the respondents' level of education increased, their knowledge of basic food related aspects also tended to increase. This finding can be supported by Unusan, (2007:46) and Gundu, (2009:2) who reported that an individual's knowledge of basic food related aspects is directly affected by their level of education. Following the exploration of the respondents' knowledge of food related aspects this study explored the medium through which respondents obtained their food related knowledge (Table 4.4).

Table 4.4 Medium through which knowledge regarding food related aspects was obtained (n=103)

Where did the respondent receive information regarding food production, handling and utilisation	n	%
School/academic institution	65	63.1
Parents	55	53.4
Radio/TV/magazines/newspapers	37	35.9
Doctor/Clinic	35	34.0
Work	12	11.7
Friends	9	8.7
Does not get information regarding food	2	1.9

n = respondents that answered 'yes' to each option

When exploring the medium through which information was optioned, the respondents were required to indicate all the mediums that were relevant to them. In terms of the different mediums of obtaining food knowledge, some respondents indicated more than one medium. The majority of the respondents obtained food related knowledge either from school or an academic institution (63.1%) parents (53.4%) and to a lesser extent from radio/ television or printed media (35.9%) and the doctors or clinics (34%) they visited (Table 4.4). It is thus important that any educational information must be communicated through various mediums to ensure that the message will reach communities. Educating individuals within informal communities accordingly with regard to nutritional information and all aspects of food and home-grown food activities, may well increase food security (Smith & Miller, 2011:493).

4.6 Household food security

To explore food security amongst the respondents and their households, a range of food security questions were asked, through which it could be determined whether the households were at risk of food insecurity. Food insecurity in this study was measured using an array of food security questions (nine) and guidelines. Labadarios *et al*. (2009:16) refer to "hunger questions" which were asked to respondents, and the number of positive answers indicate the severity of food insecurity. Any households that indicate the presence of one to four of the conditions were regarded to be at risk of food insecurity. Additionally, if five or more affirmative answers were provided, these households were suggested to be hungry or food insecure. Table 4.5 provides information regarding incidence and severity of food security amongst the respondents and their households.

Table 4.5 Household food security questions and occurrence indicators (n=103)

Food insecurity	Occurrence indicator					
	Ever in the past		Previous month*		Five or more days in previous month*	
	N	%	n	%	n	%
Households with and without children	**103**					
Does the respondent's household ever run out of money to buy food	71	68.9	58	81.7	23	39.7
Does the respondent ever cut the size of the households meals	66	64.1	58	87.9	38	65.5
Does the respondent ever eat less because there is not enough money for food	58	56.3	48	82.8	29	60.4
Households with children	**89**					
Does the respondent's children ever eat less than they feel they should	37	35.9	34	91.9	22	64.7
Does the respondent ever rely on limited quantities of food to feed children	54	52.4	44	81.5	29	65.9
Does the respondent's children ever say they are hungry because there is not enough food	34	33	29	85.3	17	58.6
Does the respondent's children ever skip meals because there is not enough food	24	23.3	22	91.7	16	72.7
Does the respondent's children go to bed hungry	17	16.5	16	94.1	9	56.3
Do you ever eat less so that your child will have enough to eat	56	54.4	44	78.6	24	54.5

n = number of respondents that gave affirmative answers to each question

* = frequencies based on the affirmative answers form previous occurrence indicator

Decreased food security occurs when an increase in hunger is regularly identified. Therefore, it was explored if hunger occurred occasionally in the past 30 days or more in order to determine the severity of the food insecurity. Respondents were first asked to indicate if they had children. In table 4.5 it is indicated that the majority (86.4%) of the respondents have children and these respondents (n=89) were then asked to answer the additional child related food security questions, presented in the above table. Figure 4.4 provides an illustration of the distribution of affirmative answers to conditions associated with food security relevant to all respondents in this study.

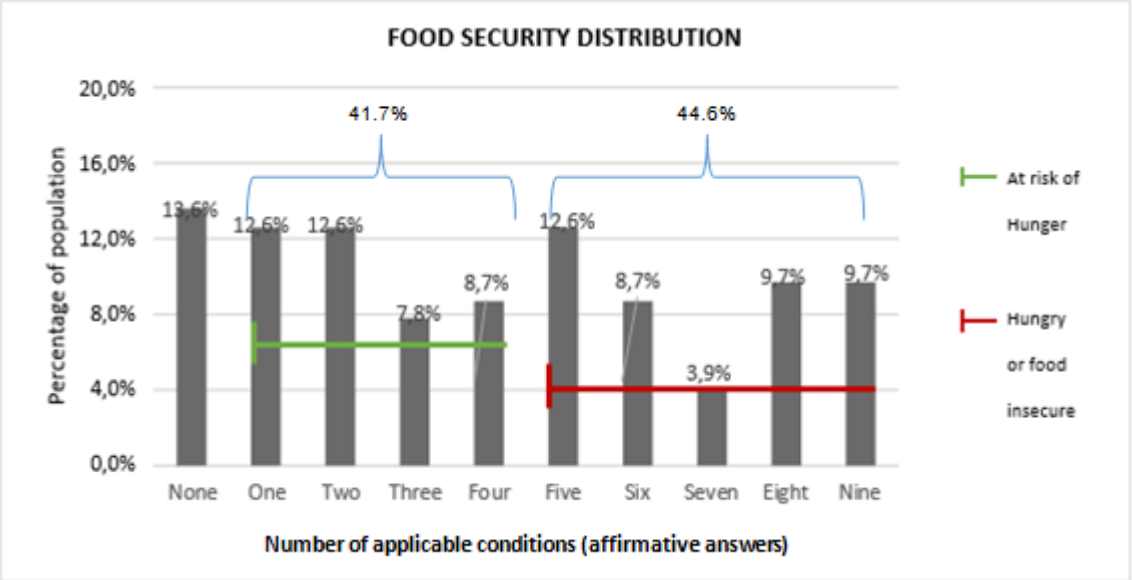

Figure 4.4 Overall distribution of food insecurity

In Figure 4.4 the results indicated that only 13.6% of the households were not at risk of food insecurity, while one and two were relevant to only 12.6% of the households respectively. For 7.8% of the households three affirmative answers were identified, whereas 8.7% indicated four hunger questions to be relevant. These households were likely to have food insecurity risks according to the guidelines mentioned previously. Five affirmative answers were presented for 12.6% of the respondents and six conditions by 8.7% of the respondents. Eight and nine affirmative answers were provided for 9.7% of the households' respectively.

If the food security guidelines were considered, 41.7% of the households in this study were at risk of possible hunger and 44.6% considered hungry or food insecure (Figure 4.4). These percentages include households with and without children. This suggests that food insecurity influence not only adults but also the children in these households. This distribution signifies

that for most of the respondents food security risks and hunger were affirmative, confirming that household food insecurity may exist in some areas in South Africa as mentioned in research by (Altman *et al*., 2009:7 & Faber *et al*., 2011:22).

Using the guidelines of Labadarios *et al.* (2009:16), the regularity of occurrence of decreased household food insecurity was further explored. The respondents were asked to indicate if the food insecurity indicator occurred within the previous month and if it occurred five or more days within that same month. Overall it was determined that if the respondent answered 'yes' to the main question ('*has it ever happened*'), the majority of those respondents also answered 'yes' to the first follow-up question ('*did it happen in the previous month*'). The majority (78.6% - 94.1)% of the respondents who answered 'yes' to the first follow-up question, also provided affirmative answers to the second follow up question ('*did it happen 5 or more days in the previous month'*). This was true for all main questions except in the case of *('does the household ever run out of money to buy food'*). Based on the aboveresults, food insecurity is a problem within this informal settlement as more households represented in this study are food insecure than households ''at risk of food insecurity''. It also suggests that households at risk of food insecurity are vulnerable of becoming food insecure if the risk is not addressed.

Further, to gain insight into the households that were identified to have decreased food security, information gained from the questionnaire such as their average household sizes, monthly household income based on income decile categories, the monthly household food expenditure and level of education were compared and presented in Table 4.5. The range of monthly food expenditure of the households in each income decile group was used in Table 4.6. This was done as exact expenditure amounts were not available, suggesting that food expenditure was not necessarily the highest or lowest amount within the range provided. The respondents' level of education in Table 4.5 indicates all the levels represented within each income group. No food insecure households were found in income decile group 7 or higher, this may be due to higher household income and larger food expenditure possibilities.

The average household size for all households that were identified to have decreased food security was four to six individuals. These household sizes are above the average household size of 3.3 for the Free-State province (Stats SA, 2012:56). More dependants in a household may compromise food security as Bashir *et al*. (2012:2) mentions that larger households negatively influence food security.

Based on the levels of education amongst the respondents in food insecure households, there was no distinctive pattern suggesting that higher educational level were connected to higher income. The lowest income groups had higher educational levels than the food insecure group with the highest income. Surprisingly, results regarding monthly household income indicated that higher income does not necessarily support food security (Table 4.5).

From Table 4.6 it is clear that food insecure households earned less than the suggested average monthly income of the black South Africans (Stats SA, 2012:12), and are in the low to medium income category. PHSA (2007:7) mention that there is a relevant relationship between food security and income including that lower incomes are believed to be related to decreased food security. It was found that although monthly income increased, the number of affirmative answers to food insecurity remained the same. This proposes that despite larger income, food insecurity prevailed at the same level as households with lower household income. In Table 4.5 it can be seen that food expenditure ranged from extremely low to high (based on monthly income). When compared to the average sizes of the household and that these households are food insecure, R 100 may not be sufficient to provide adequate food sources for these households.

Table 4.6 Household size, monthly income and monthly food expenditure of households with decreased food security (n=46)

Monthly household income	n	Monthly household food expenditure	Average household size	Level of education	Average number of affirmative food insecurity answers
<R 1 363	2	100-1000	4	Primary & Grade 12	7
R 1 364 – R 1 928	3	501-1000	6	Primary & Some secondary	8
R 1 929 – R 2 257	9	100-1000	4	Primary - Grade 12	7
R 2 258 – R 3 137	9	100-3000	4	Primary - Grade 12	7
R 3 138 – R 4 164	11	501-2500	5	Primary - Grade 12	7
R 4 165 – R 6 321	11	501-2000	5	Some secondary & Grade 12	7
R 6 322 - R 9 319	1	1501-2000	4	Some secondary	6

n = number of food insecure households in each income group

In Figure 4.5 monthly income expenditure of the food insecure households is presented. It indicates the food insecure households' monthly expenditure distribution.

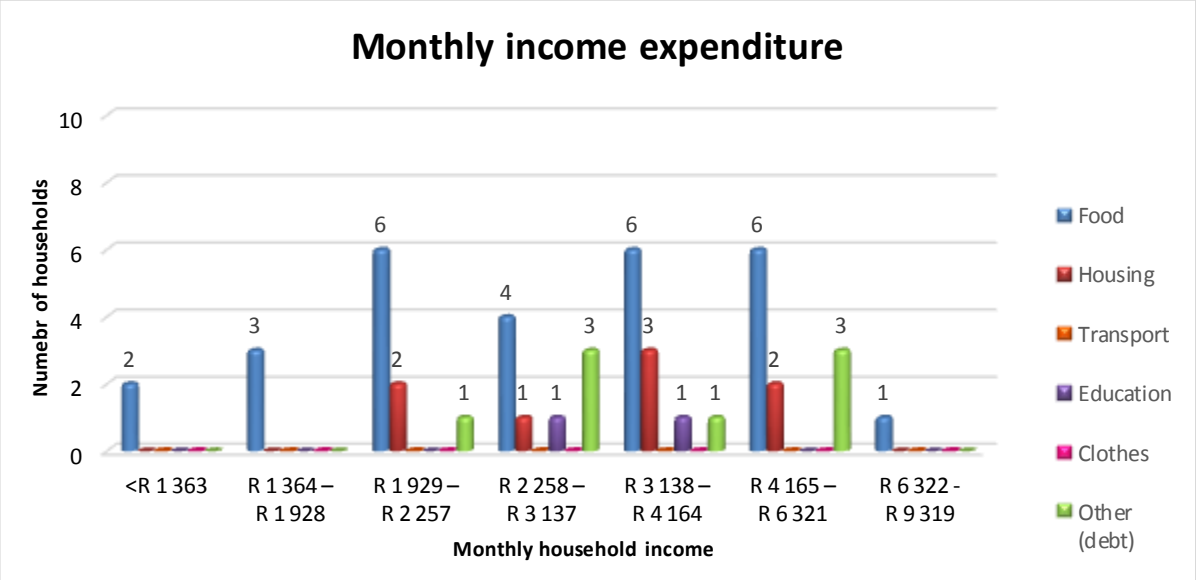

Figure 4.5 Monthly income expenditure of food insecure households

It was found that the majority of food insecure households within each income group spent most of their monthly income on food (Figure 4.5). This is consistent with the Income and Expenditure survey who suggest that income amongst lower income deciles spend most income on food than any other expenditure (Stats SA, 2012b:65). However, income decile 5 and 6 are suggested to spend more money on housing than food, which contradicts the findings in Figure 4.5. In this study, some households spent considerably more money on food sources per month. However, these households were also insecure (Table 4.6). This may possibly be because purchased food products were not optimally used or not used sparingly to last the entire month or insufficient amounts of products could have been bought at higher prices. Some food insecure households spent most of their financial resources on housing (rent, appliances and furniture), education and debt. This may suggest that these households had other expenditure responsibilities which restricted the amount of money which could be used for food, therefore, possibly contributing towards the food insecurity of these households.

4.7 The relationship between food insecurity, level of education, knowledge, income and household size

As the food security amongst the respondents' households were explored, it was necessary to determine if there were any apparent causes of, or relationships between socio-demographical factors in Table 4.7 and food insecurity. Correlations were therefore explored between the respondents' level of education, household income and household size. Additionally, food knowledge was also correlated with food insecurity. Food knowledge was included as it was previously determined that a relationship exists between the respondents' level of education and their food knowledge. The questionnaire ultimately explored the existence of food insecurity and therefore all correlations are based on the increase or decrease of food insecurity. The findings are presented in Table 4.7.

Table 4.7 Spearman's correlation coefficient: The influence of level of education food knowledge, income and household size on food security (n=103)

Food insecurity		**Correlation coefficient (r)**	**p-value**
Spearman's rho	Food Security	1,000	-
	Level of education	-0.1	0,206
	Food knowledge	-0.3	0,008
	Income	-0.2	0,168
	Household size	0.1	0,410
Food Knowledge		**Correlation coefficient (r)**	**p-value**
Spearman's rho	Level of education	0.3	0,003

Statistical significant difference: p≤0.05

Effect size (r): 0.1=small; 0.3=medium; 0.5=large

A practical significant, negative correlation (p≤0,008; r= -0.3) was found between respondents' food related knowledge and food insecurity with a medium effect size which. This correlation and effect size suggests that as the food knowledge of the respondents increased, household food insecurity decreased. This may be due to better understanding and implementation of food storage, hygiene and safety practices, possibly increasing the

shelf life and consumption possibilities of available food products and ultimately food security. This finding is consistent with that of Hallberg (2009:7) that suggested improved knowledge of food utilisation, lead to improved food security. Enhanced food knowledge is however not the only factor to decrease household food insecurity as it was determined that the majority of the respondents in this study had adequate knowledge, yet many households were food insecure. No significant correlations were found between the respondents' level of education, the monthly household income or household size. A significant relationship ($p \leq 0.003$; $r=0.3$) was also found between the respondents level of education and their food knowledge. It can be assumed that respondents with a higher level of education had better food knowledge.

CHAPTER 5: CONCLUDING DISCUSSION

5.1 Introduction

The growing population in South Africa has led to the steady increase in food supply demand. However, population growth is accompanied by the inability to provide sufficient income opportunities which inhibits access to various resources including financial and educational. Informal settlements are developed on the outskirts of urban areas and are characterised by lacking infrastructure, poverty and decreased household food security. Financial resources are the main method of accessing food supply, therefore a lack in income contributes significantly to decreased access to available food products within informal settlements. The increase in informal settlements in South Africa and the risks of decreased household food security associated with these settlements should be researched as methods to enhance food security could prove vital. This study therefore aimed to explore the status of household food security in an informal settlement within South Africa through recognising aspects such as – food production and utilisation, income, education and food knowledge. The relationships between these aspects and food security may enhance the understanding of the individual and collective influences food production and utilisation, income, education and food knowledge have on food security. Using the knowledge gained, valuable recommendations can be made regarding the enhancement of household food security in an informal settlement.

This chapter provides a summary of the study findings. General conclusions will be drawn in this chapter as the results have been discussed previously in chapter 4. Recommendations based on the findings will be made and to be used by local employers, doctors/clinics and government. These recommendations will consist of possible methods to enhance household food security in the Viljoenskroon area, Rammulotsi informal settlement. The implications and limitations of the study will also be presented in this chapter.

5.2 Conclusion

The majority of respondents were male, primarily black (95%) and most were between 25 and 54 years of age. All the respondents in this study were involved with food preparation (animal feed) and were therefore relevant to this study. Furthermore, 98% of the respondents attended a schooling institution, with 42.7% of respondents that attended secondary school, and only 35% that completed grade 12. This result suggests that most

65% of respondents did not complete grade 12 and possibly did not gain certain information or knowledge regarding food related aspects accompanied by completing secondary school. The average household size in this study was four individuals, which is larger than the average Free-State household size of 3.3 members. Households with more dependants such as those in this study were at risks of decreased food security, especially the 44 households with low monthly income.

The study explored household food production and the utilisation of food products obtained from own food production activities. Thirty-eight households produced their own food sources through vegetable gardens and 24 households kept animals for consumption purposes. These households had increased availability and access to additional food sources, which complimented food products already obtained through market purchases. This was mainly due to limited space and secondly to a lack in financial resources as indicated by 43 and 17 of the respondents respectively. This proposes that even if the respondents were interested in household food production they would not be able to, unless additional financial resources and space could be obtained to do so.

Food consumption was explored and it was found that on a daily basis, a variety of food products as recommended by the South African food-based dietary guideline were not represented by all households. Maize meal and bread, frequent affordable staple products were mainly consumed by the respondents, perhaps as these products are readily available foods and cheaper. Vegetables were not frequently represented in the diet by the majority of the households, although potatoes, cabbage, pumpkin and carrots were vegetables consumed daily by onlya few households. It was indicated that some of the remaining households consumed these and other vegetable products once to five times per week. Fruits and milk were indicated to be consumed daily by 36 of the households. Protein products such as chicken and eggs were consumed daily by a few households, while other protein products such as meat (lamb and beef) were consumed weekly or seldom. Products such as lentils which are rich in protein, were scarcely consumed by respondents. Though it was not confirmed, perhaps the lack of high protein plant products in the diet was due to unfamiliarity or a lack of knowledge regarding the nutritional value thereof. The lack of variety in the diet may be due to insufficient knowledge regarding food consumption options or perhaps as many respondents suggested a lack of financial resources. It can be assumed that as many households do not consume the variety of food products that are needed to

sustain well-being, which is an indicator of food security these households are at risk of experiencing decreased food security.

The results indicated that 67% of respondents were aware of a well-balanced diet as they indicated that a variety of food products should be consumed daily. It was however found that most respondents were not informed regarding daily consumption quantities as seven of the 103 respondents could correctly identify the daily recommended servings of fruits and vegetables. Respondents from 36 households reported that they consumed fruit on a daily basis. The lack of knowledge regarding the daily recommended fruit portions could perhaps revealed an absence of fruit, though this was not confirmed. Many (73-99) respondents knew under which conditions foodborne illness could be caused, while 68-84 respondents were aware that particular food sources were not safe to eat. It was further found that some respondents though not many, indicated in addition to the proposed correct cleaning method, other “incorrect” methods such with only a dry or damp cloth also to be appropriate for cleaning the food preparation surface. This result proposes that 8 to41 of the respondents were perhaps not exactly sure of the actual correct cleaning method. It can thus be said that their knowledge regarding preparation surfaces are questionable. The findings can possibly suggest that consumers do not truly possess adequate knowledge regarding food safety and hygiene.

The hygienic practices before, during (in-between) and after food preparation of the respondents were explored. Although 97% of the respondents indicated that they do wash their hands before food preparation, only 85% of the 100 respondents who washed their hands, indicated to use soap and water. The remaining 12 respondents used alternative methods to clean their hands, suggesting their hands were possibly not cleaned effectively before handling food, therefore enhancing the risk of potential food contamination. The 79.6% respondents that indicated to use a cutting board to prepare food and the 89.3% respondents that washed the preparation surface before, during and after food preparation suggest that these respondents were perhaps aware of food safety risks such as cross-contamination, accompanied with food preparation. These aspects are especially important to prevent cross contamination of susceptible foods such as chicken. Respondents that did not apply the correct hygiene practices were perhaps not informed of the importance thereof or did not have the necessary resources to do so, though this was not confirmed.

Dry, cooked left-over food and raw meat products, were indicated to be stored appropriately by 65, 76 and 94 of the respondents respectively. This result may suggest that the respondents that indicated to use appropriate storage practices were possibly informed about safe storage of various food products. The 5 to 21 respondents that indicted alternative methods such as a microwave or oven to store cooked left-over food and storing dry products on the floor under the bed, were perhaps not informed regarding safe storage practices or did not have the necessary resources to do so. These respondents were also exposed to greater food contamination risks due to the use of inappropriate methods to store various food products though the frequency and extend of left-over foods were not determined. If the risk of contamination of dry, cooked left-over and raw products were higher in some households, these food products may be wasted, decreasing the amount of food available for consumption and increasing the risk of decreased food security. Appropriate food safety practices are necessary to ensure that food products can be optimally utilised as inadequate food utilisation compromises food security.

A significant relationship ($p \leq 0{,}003$; $r=0.3$) was found between the respondents level of education and their knowledge of food and related hygiene and safety practices. This suggests that individuals with higher levels of education tended to be more informed about a well-balanced diet, foods which could cause illness and are not safe to eat and hygiene practices regarding the food preparation surface. There was also a significant correlation between food knowledge and food insecurity ($p \leq 0{,}008$; $r= -0.3$) which proposed that increased knowledge tended to be associated with decreased food insecurity amongst the study sample. This may be due to a better understanding of food storage, hygiene and safety practices, which possibly contributes to food security as food products have extended shelf life and consumption possibilities of the food products in the households are greater. There were however, households at risk of decreased food security and households that were food insecure despite increased knowledge. This proposes that although knowledge regarding food related aspects exists, the lack in application thereof can also possibly influence food security. It was found that the proposed food hygiene and storage practices were appropriate amongst most households but that some households were perhaps not aware of the importance of these practices or did not have necessary resources to apply them. As many households were insecure, it can be assumed that inappropriate hygiene and storage may have influenced food security, but this was not confirmed. It must additionally be noted that as the population consisted mainly of men, these individuals were not necessarily the main food prepares in the home, which may contribute to the lack of knowledge regarding food.

It was determined that 41.7% of the households in this study were at risk of decreased food security and 44.6% (46 households) were food insecure. Households that were food insecure were mainly in the low-income category (income decile 1-4), however food insecurity were also found in some of the medium income groups (income decile 5-7). Food security is often characteristic of low monthly income, but in this study despite being in the medium income category, food insecurity still existed amongst some households. This suggests that for these specific households higher income did not ensure food security. The average household sizes of food insecure households may have been a contributing factor as more dependants in the household require more food sources and therefore more income. In income decile 1-2 the average household size was 6 individuals, almost twice as many as the average household size of 3.3 in the Free-State.

Households in income decile categories 1, 2 and 6 indicated to spend most of their money on food, yet they remained food insecure. This is different from income decile groups 3-5 where some households spent more money on other expenditures such as housing, education and debt which could have contributed to food insecurity due to budgeting problems. The food insecure household in income decile 6 earned more than other food insecure household but also experience food insecurity. This proposing that perhaps food was not used accordingly throughout the month or that money was not used optimally when buying food, (less food at higher prices). Hence, it can be assumed that it was not the lack of income amongst these respondents and their households that influenced food security, but rather the manner in which the financial resources were used. If inadequate funds are allocated for food sources then households will not have enough food to accommodate their daily dietary needs and these households may become at risk of decreased food security. This assumption was however not confirmed and should be acknowledged as topic for further research. The results revealed that socio-demographics such as age, income and household size for this sample, did not affect food security. Therefore, although food insecure households had larger average household sizes, some had lower levels of education and lower monthly household income; it did not influence food security in their households.

Many respondents in this study did not participate in community projects in their area and some indicated that no projects were implemented. This suggests that no significant food security initiatives or programmes are being implemented in the Viljoenskroon/Rammulotsi area. This aspect can be seen as a limitation in a community because projects and

information sessions may be beneficial to promote respondents' understanding of aspects promoting food security. The results suggested that the implementation of, and participation in food security community projects in the area was limited and should be improved. The state of household food security in this study was not ideal, as the majority (89 households) represented in this study were at risk of hunger or actually food insecure. Though the food insecure households found in this study are few, it confirms that food insecurity exists on household level in South Africa. When considering that access to available food is a basic right, it is unimaginable that there are indeed households who do not have enough food to sustain their well-being. As one food insecure household is one to many, a desperate need exists to address food insecurity so that all individuals can enjoy their basic right to food and that no individual will go hungry.

5.3 Recommendations

In this study decreased household food security was identified in households presented by respondents from an informal settlement. In light of this a need for intervention to improve and prevent food insecurity exists so that South Africa can truly be defined a food secure nation. Based on the findings in this study a few recommendations can be made to enhance food security in an informal settlement.

As many households did not use vegetable gardens or keep livestock, the availability and access to additional food sources through household food production remains limited. Household food production restrictions should be addressed so that contributions to improve food security can be made. Local government should implement more programmes or initiatives which encourage the implementation of household food production, such as vegetable gardens. Investment in initiatives which continuously assist households to implement vegetable gardens using the resources available to them, as a means enhance household food availability and access should be made by local government and organisations. As space is a problem for some households in the Rammulotsi informal settlement, households should be informed about how vegetables can be grown on a small scale using various simple yet effective methods such as tyres, pots or bottles around and in the house. This is a temporary solution, but it will encourage households to get involved in own food production activities. Available space in nearby surroundings should be allocated for households to implement vegetable gardens and to keep livestock as a larger, long-term solution. Alternatively, to improve food availability and access, local government should develop large vegetable gardens in allocated communal grounds where households can

work and contribute to the success of the gardens and in exchange receive products from the vegetable gardens they help maintain. Information about how to use seeds from vegetable and fruit products in the household to grow new food sources should be provided.

In an attempt to distribute information and improve knowledge regarding food production, utilisation and food security, local government and employers can implement simple yet effective, methods through which households and employees can receive this information. Local government and employers should focus on distributing information about which fruits and vegetables can be grown in the area of this informal settlement, how to effectively grow and maintain a vegetable garden, and the benefits of household food production on food consumption. Employers should allocate funds and time through which they can educate their employees about food production and motivate the implementation of vegetable gardens at home. Additionally, funds should be allocated by local government to communities and households through which resources like seeds and fertiliser can be distributed to households for the use of vegetable gardens. Additionally, as an increase in income may be difficult, improved and alternative methods of access to a variety of food products needs to be investigated. Through household food production additional income can be obtained, and food availability and access may be improved which in turn can assist reducing vulnerability to decreased food security in these households.

As a variety of food products were not present in the diets of the respondents in this study a need exists for improved dietary diversity through enhanced knowledge of food sources and the various nutritional contributions these food products offer. As part of joint initiative local authorities, employers and clinics should consider displaying posters with information regarding food and dietary guidelines as a means to distribute and improve food knowledge. Pre-developed posters are already available, but need to be utilised in such a way that all members of the public, employed or not have access to this information.

For households with limited financial resources and educational experience who need added nutritional diversity, compiling various food packages could assist as a temporary method through which dietary diversity can be improved. These packages should not be provided as food aid, but should be available to buy, by employees and members of the public. Food packages can be used as another method of enhancing access and utilisation of healthy food sources and promoting dietary variety in households. These food packages should consist of different sizes to accommodate various household sizes and contain a variety of

food products representative of a balanced diet. The packages should additionally, be sufficient for a month and be but vary in size and food products that are affordable to all employees and the members of the public regardless of their income. This may assist households in allocating sufficient funds for food and educate them about a variety of food sources which can be obtained through the funds they have available to them and hopefully improve household food consumption. Food packages should be provided as a provisional dietary enhancement method, until sustainable methods are provided to households living in this informal settlement and they are able to provide nutritional food sources for themselves through vegetable gardens.

Many respondents mentioned that they lacked sufficient financial resources to obtain sufficient and nutritious food products, therefore employers can provide practical information such as budgeting through the implementation of regular workshops which will assist households to plan and use their income effectively. The main focus must firstly be to allocate money for essential basic items such as food and housing that will enhance food security. Food hygiene and storage practices were indicated by several respondents not to be appropriate amongst their households, proposing that a need for improved knowledge does exist in this area. To further improve knowledge of food consumption, including food hygiene and safety practices, information sessions can be organised by the employers, local government and organisations to provided employees and households with basic information regarding food utilisation and may include the current existing information posters regarding: adequate food consumption practices (through the use of food-based dietary guidelines); hygiene practices before, during and after food preparation (how to clean hands and preparation surfaces effectively). In addition information on alternative food sources and varieties, preparation practices and correct storage practices in the household. If food is utilised effectively and consumed in a manner that is safe and contributes to the dietary requirements of an individual, well-being could improve. If employees are healthy, they are more likely to contribute physically and mentally in the workplace, which is beneficial for employers. Additionally, if unemployed individuals are healthy it becomes more likely that they will be able to search for employment opportunities and engage in activities which could provide income.

It may not always be practical for clinics or employers to provide information sessions however, alternative methods such as information distribution through visual media can be used. Various pamphlets regarding information mentioned in the pamphlets and workshops

about should be distributed to employees and members of the public. The development of these educational pamphlets can be sponsored by local authorities as a method to contribute to improved food security. Posters should also provide information, with visual examples for members of the public who are not employed or illiterate. Visual examples of food products (which represent a balanced diet) that can be bought using limited financial resources should be presented as a manner to inform individuals about the utilisation possibilities, regardless of limited funds.

The work environment and clinics provide easy access to this kind of information and is a cost effective method which could contribute significantly to food security. Distributing pamphlets with all the above information could increase the amount of individuals that receive information as this information can be passed on from individual to individual. Using the work environment and clinics as sources to distribute information could be very effective as these sources are more likely to be trusted. If food security is enhanced through the improvement of food knowledge and utilisation then employers themselves may benefit, as an individuals' well-being improves so do their ability to perform. Maximum employee input may lead to increased business outputs and increased profits. As the educational system was identified as an appropriate method of distributing information, government should continue to implement in addition to improve the information regarding food production and utilisation provided in schools for future generations.

5.4 Implications

Methods of improving household food security must be explored and supported by local employers, clinics and government. When households have adequate access to available food sources and possess the knowledge needed to effectively utilise food products, their food security status may increase. Improved food security conditions in households may contribute to higher individual living standards. Employees who are food secure could achieve better work performance, as they are able to sustain the nutritional diets needed for a healthy lifestyle. As the respondents in this study work in an environment which requires long periods of physical activity, healthy diets may increase the ability to work effectively and decrease illness. As household food security is a large scale problem and priority of the South African government, inputs from local governments, businesses and clinics may contribute significantly due to the vast array of resources these organisations possess. Addressing food security on household level may additionally improve the condition of community well-being and in the long term national welfare.

5.5 Limitations

As this study was quantitative in nature, it did not obtain the opinions, expectations or needs of the population regarding food security. Due to the use of non-probability sampling which provided a relatively small sample and the use of an informal settlement in an urban area, the findings of the study cannot be generalised to areas with the same characteristics within South Africa. Therefore, future studies on this topic may need to identify a larger sample with the use of probability sampling and broaden the sample to include informal settlements from various provinces. A qualitative research approach may provide additional information regarding the needs and expectations of the population with regard to food security and enhancement initiatives. For safety reasons data collection could not take place within the informal settlements, therefore a member of the household served as representative. The environment in which the study was conducted possibly prohibited in obtaining all the potential information regarding household food security and food consumption. Data collection in future studies could furthermore be conducted with entire households rather than representatives and should include the main food preparers in the home.

CHAPTER 6: STUDY REFERENCES

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CHAPTER 7: RESEARCH ARTICLE

(To be submitted to the *Food Security Journal*: Science and Education Publications)

Title: Exploring household food security amongst employees living in an informal settlement.

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ABSTRACT

South Africa is regarded as a food secure nation. However, literature suggests that food insecurity do exist on household level. The findings in this study suggest many households are at risk of food insecurity with even more households identified to be hungry or food insecure. As food security is influenced by various factors such as socio-demographics, the relationships between food security, education, income and basic food knowledge was investigated in this study. The utilisation of food sources is a determinant factor of food security and limited research of food utilisation within households is available. Therefore this study aimed to explore household food security within an informal settlement in the Free-State province, South Africa. The study was exploratory in nature and therefore a survey approach was used to collect data through questionnaires and structured interviews. The respondents for this study were recruited at an animal production and distribution facility and were residing in an informal settlement in the Free-State province, South Africa. A non-probability sampling method was used through which a total of 103 interviewer administered questionnaires were collected from individuals older than 18 years over a period of two months. On average the respondents displayed adequate food knowledge (food handling and safety practices). A practically significant relationship was found between the respondents' knowledge and their level of education respondents' household size and food security. Lastly, the findings of the present study were used to make a recommendation to local employers, doctors, clinics, governments and non-government organisations on how to improve knowledge regarding food related aspects and the implementation thereof with the aim of improving food security.

KEY WORDS

Food knowledge

Food security

Food security pillars

Informal settlement

Food utilisation

1. INTRODUCTION

Food security is a state which exists when all individuals have continuous access to available food sources which are nutritious and safe to utilise [1]. Food security can be described as a complex construct, as it consists of various concepts and – environmental, social and economic determinants [2]. To clarify food security and the determinants of food security the Food and Agricultural Organization (FAO) uses the term pillars or dimensions [3] which describes the foundations on which food security is built and how these pillars influence sustainable food security.

There are many factors and components which could lead to food security risks and food insecurity. These factors range from lower agricultural outputs, and economic imbalances which augments the vulnerability of the consumer to food insecurity [4,5,6]. With the current increase in food supply demands and the recent global economic recession, food prices continue to escalate, ultimately affecting food availability, accessibility (pillars of food security) and stability, creating food insecurity within vulnerable communities, especially in South Africa [7]. Additionally, decreases in employment and income opportunities, further lead to increased vulnerability amongst poor and food insecure individuals [8].

Worldwide 870 million people are food insecure, of which 852 million reside in developing countries [9]. Food insecurity is proposed to be a characteristic amongst poor urban and rural communities [10] such as informal settlements. Therefore in light of the aforementioned, this study aims to explore household food security in an urban area amongst households residing in an informal settlement, in South Africa, which is classified as a developing country. Furthermore, this study will aim to provide recommendations based on the findings to enhance food security within an informal settlement.

2. FOOD SECURITY IN SOUTH AFRICAN INFORMAL SETTLEMENTS

Food security in South Africa has been an important subject since 1994, and although the Millennium Development Goals report that progress has been made towards improved food security in South Africa, many households remain food insecure [11]. Information provided by the Food and Agricultural Organization (FAO) suggest that approximately five percent or 2 588 528 of South Africans remain food insecure [9]. The exact amount of food insecure households in South Africa is not clear and only estimations are provided, as measuring instruments are not well developed and defined [12,13]. Furthermore, little research on food security has been

conducted specifically on households in informal settlements to fully determine the extent of household food insecurity in these areas. Regardless of vague figures of household food insecurity, many programmes and policies have been implemented in South Africa to enhance food security. Household food insecurity are often identified in informal settlements, as these households have socio-economic and demographic disadvantages [10]. Households within informal settlements are often characterised by high unemployment rates, low income and education levels and decreased food security [14]. Households in South Africa at risk of or currently being food insecure, struggle to improve this state, as knowledge regarding food security and the resources needed to address food insecurity are limited [12].

In South Africa the Department of Agriculture, Forestry and Fisheries (DAFF) implemented policies with the aim of providing individuals with agricultural opportunities to enhance food security [15]. Another viable strategy included the Integrated Food Security Strategy (IFSS) which aimed to focus on the enhancement of the food security pillars – *food availability, accessibility, and utilisation* - and household food security [8]. These policies and strategies are only two of many attempts to improve decreased food security and sustain household food security in South Africa. A decrease in household food security is a result of many contributing factors, such as rises in food and oil prices, and insufficient food production [16]. These are only a few contributing factors, as food security is said to be influenced by many additional components such as those encompassed in the pillars of food security.

3. THE PILLARS OF FOOD SECURITY

Food security has previously been identified in this study as a state which exists when available food sources are continually accessible and safe to utilise by all individuals [17]. Using this definition, three main food security pillars or dimensions were identified as the foundation on which food security exists [18]. The three main pillars include food availability, food accessibility and food utilisation. A fourth pillar, stability, is often included, and described as necessary to ensure the sustainability of food security [2].

Household food security is suggested to be dependent on the success and failure or stability of the three food security pillars [19]. The existence and enhancement of food availability, accessibility and utilisation on community and household level is regarded as a necessity to ensure food security [20]. Furthermore, [21] mention that existing vulnerabilities and risks of household food insecurity can be improved and possible food insecurity can be prevented through the enhancement of the food security pillars.

3.1 Food availability

Food availability is the first pillar of food security and is based on the capability of a nation or household to produce adequate food sources which are readily available [22]. The availability of food sources is dependent on food production and adequate distribution [7]. Food production can be on a national or household level, otherwise known as subsistence food production. Subsistence production involves producing food sources on a small-scale, typically on a household level. Baiphethi and Jacobs (2010); Crush and Frayne (2010); Du Toit, (2011) [23,24,15] mention that subsistence food production contributes to food availability, nutritional intake, decreased market purchases and possibly additional income suggested by [25]. Subsistence food production is said to be an important and possibly effective manner through which food security can be enhanced on household level. It is however advised that although subsistence food production may enhance food availability and contribute positively to food security, it is not sufficient as a single component to ensure sustainable household food security [22]. Therefore it can be suggested that improving both food availability and food access may be more effective.

3.2 Food access

Food access on household level refers to the capabilities of households to obtain available food sources needed to adhere to nutritional requirements of the household [15,26]. Adequate food access is suggested to contribute to enhanced food security [27]. Though access to adequate amounts of food is a basic human right, it is revealed that various South African households continue to battle accessing suitable amounts of food sources [28]. A survey conducted in South Africa in 2010, found that 20% of households had inadequate access to food sources which increased their vulnerability to food insecurity [29]. Sufficient food access is dependent on the allocation of available food sources to populated areas, the affordability of these food sources and the preferences of the consumers. The affordability of food sources plays an important part in food access, as food sources are not obtainable if households do not have enough financial resources to afford those sources [30]. Food security is negatively influenced when food access is not optimal [31] as the health status of the consumer becomes compromised and nutritional demands are not met [28]. Food availability and accessibility need to be accompanied by adequate utilisation to ensure sustainable food security as these three pillars need to function simultaneously [32].

3.3 Food utilisation

Food utilisation in terms of food security is described as the ability to use food sources so that it may enhance well-being and productivity. This includes the safety of food sources, nutritional value of the food products and the social value these products add to the household [33]. It is suggested that although utilisation influences food security, little is known about how food is utilised in South African households, especially in informal settlements [34]. Food security is said not to be only influenced by quantity but also the quality of food sources and how they are used [1].

Food security not only exists when food sources are available and accessible but also when these food sources are safe to consume without causing illness to the consumer [35]. Terpstra *et al*. (2005) [36], mentions that although the quality and safety of food are important contributors to adequate food utilisation, consumers on household level are poor implementers of food safety practices. This may be due to a lack of knowledge regarding food safety and quality according to [37]. This is confirmed by [38] who suggests that consumers do not have satisfactory knowledge regarding safe food practices during preparation and storage. According to research, no food preparation and storage guidelines are available at household level to contribute to adequate safety practices [39,40]. The possible inadequate utilisation of food sources due to the lack of food safety knowledge and education may contribute to the decrease of household food security [41,42].

4 THE INFLUENCE OF SOCIO-DEMOGRAPHICS ON FOOD SECURITY

Socio-demographics are a combination of sociological and demographical aspects and include: race, age, gender, level of education, income and household size [43]. Levels of education, income and household size are considered as key concepts, as these are determining factors in the uprising of informal settlements and form a pertinent part of additional influences on food security.

4.1 Level of education

Education within informal settlements is an obstacle, as many individuals are not part of the educational system [40]. In South Africa a study conducted in informal settlements found that 7% of adults had no schooling and 12% of children aged 5-18 did not attend a schooling institution [44]. Due to the lack of sufficient education, it is proposed that an individual's level of education influences their state of food security [45]. Research suggests

further that insufficient education contributes to a decrease in food security as it prohibits the effective utilisation of food sources and prohibits the engagement in subsistence production [23] which lowers the availability of food. Additionally, the lack of education contributes to higher unemployment rates and therefore household income [46] and ultimately also food accessibility as food products can't be afforded. If food availability, accessibility and utilisation influence food security [2] and an individual's level of education influences food availability, accessibility and utilisation, the level of education surely influences food security. Therefore, to improve food security it can be postulated that the number of uneducated individuals should decrease [40] in the near future. This study will therefore explore the level of education in an informal settlement, including whether their level of education influences their knowledge of food practices and if this has an influence on food security. This will be done as part of an exploration of additional factors that influence food security together with the influence of socio-demographic factors.

4.2 Household income

Household income was previously mentioned to influence food security through prohibiting access to food sources due to a lack of sufficient funds [47]. This is confirmed by [48] who suggests that food insecurity is a direct outcome of a lack of financial resources and poverty. Additionally, a lack of financial resources is believed to be more severe in developing countries, especially in informal settlements [48]. De Marco and Thorburn (2009) [49], also confirm that low-income households such as those associated with informal settlements are more vulnerable to food insecurity. A recent Income and Expenditure survey conducted in South Africa, indicates that black households earned an average annual income of only R 69 632 [50], putting these households in the low-income category, [14] suggests that these households from informal settlements have low average incomes. The assumed ethnicity of the households represented in this study are black, therefore the proposed average income in this informal settlement will be explored to determine if a relationship exist between income and food security.

4.3 Household size

Food security is often influenced by the size of a household [51]. Research indicates that as households increase in size, a decrease in food security follows [52]. This negative relationship may be due to larger households often suffering from poverty as expenditures are not supported by the monthly household income [53]. The

average household size in South Africa according to the 2011 census was calculated at 3.6, with the average household size in the Free-State province being 3.3 [29]. Additionally, a study conducted on informal settlements suggests an average household size of 3.3-3.8 persons [44]. Bonti-Ankomah, (2001) [53], mentions that households larger than five individuals might be vulnerable to food insecurity. As the household size in the Free-State province is significantly lower, it would be assumed that there would be assumed relationship between the household sizes of the respondents in the Rammulotsi informal settlement and food security. Nevertheless, this study explored the relationship between household size and food security amongst households in an informal settlement.

5 METHODOLOGY

5.1 Research design

An exploratory, quantitative research approach was followed in this study**.** Using a non-experimental design, a survey approach was used to obtain the necessary data and answer the objectives of this study. Non-experimental designs are common in quantitative research [54]. This investigation was suitable to explore a fairly unknown topic such as food insecurity within the identified community [55].

5.2 Sample

Using non-probability sampling, respondents for this study were identified at an animal production and distribution facility in the Viljoenskroon area, in the Free-State province. The respondents were representatives of low-income individuals residing in an informal settlement, employed and over the age of 18 years to participate in the study. A much larger sample was predicted, however, due to time restrictions, safety precautions and work schedule considerations of the respondents, a smaller sample (N=103) was eventually identified.

5.3 Data collection

Interviewer administered questionnaires were used to obtain data. The respondents were interviewed at their current place of employment with prior consent from the employer, union representative and respondents. No fieldworkers were used during the data collection process to ensure interview consistency of the fieldworkers.

The respondents were individually interviewed by the researcher to ensure that any uncertainty (if any) regarding the questions could be clarified [56]. On average the interviews lasted approximately 20 minutes. The respondents in this study were representatives of their households and all 103 questionnaires were completed and found suitable to be analysed.

The questionnaire consisted of eight sections, each exploring various aspects such as; information regarding food preparation practices within the household, storage practices of food products, food security amongst the identified respondents and their households, knowledge of basic food related aspects, demographics, living environment and income information and the expenditure patterns of the respondent's household. Only closed ended questions were used. However, any additional remarks that were made by the respondents regarding the questions were noted. The questionnaire was presented in English and Afrikaans as these were the preferred languages of the respondents. This study was approved by the Research Ethics Regulatory Committee (RERC) of the North-West University, Potchefstroom Campus. Ethics no. NWU-00040-13-A1.

5.4 Data analysis

Data analysis was conducted by Statistical Consultation Services (SCS) of the North-West University, Potchefstroom Campus. Descriptive statistics such as frequencies, means and standard deviations were used to analyse the data. Tables and figures were used to represent the analysed data. Correlation coefficients were used to explore the relationships among two or more identified variables [57] such as income and food security. The correlation coefficients were represented by *r* as suggested by [57]. The results include p-values which represent statistical significance where correlation strength (*r*) was measured using the following values 0.1=small, 0.3=medium, 0.5=large, however only correlation coefficients (r) with a medium effect size or larger, were reported. Correlation coefficients were rounded off to one decimal place. Guidelines by [58] were used to determine the risks of hunger and household food insecurity.

5.5 Validity and reliability of the data

Internal validity of the measuring instrument was guaranteed as the questionnaire was developed and reviewed by skilled professionals [54]. Provisional questionnaires were also submitted for review to ensure the content validity of the questionnaire [57]. Additionally, grouping of scale items in the measuring instrument conducted

ensured face validity. The researchers interacted objectively without manipulating the data, therefore enhancing the reliability of the data. A small-scale pilot test was conducted with the questionnaire to ensure comprehensibility and suitability for the main data collection process. Internal reliability and consistency of the measuring instrument was confirmed using Cronbach's alpha coefficient (α) [57]. Reliability consistencies for the questionnaire were determined at: 0.7 and 0.9. These coefficients suggest high internal reliability as items in this questionnaire were closely correlated [57].

6 RESULTS AND DISCUSSION

6.1 Demographic characteristics of respondents

The respondents of this study consisted of 99% male and 1% female persons due to the environment in which the study was conducted. Although it is assumed females are the main preparers of food in the home, the male respondents of this study work within a food preparation (animal feed) environment, which require similar hygienic practices and they have previously been responsible for food preparation in their own household as well. Some respondents live alone, making them the main preparers of food and therefore individuals who require adequate food knowledge.

The respondents were primarily (95.1%) black and most (85.4%) between the ages of 25-54 years of age. The results revealed that 98.1% of the respondents obtained some form of formal education, with 20.4% only finishing primary school, 42.7% completing secondary school and 35% completing matric. The home language amongst the majority of the respondents was Sesotho (77.7%). 11.1% of the respondents spoke isiXhosa and the remainder of the respondents spoke Setswana, isiZulu, isiNdebele or Afrikaans. This corresponds with demographical information which suggests that Sesotho is the home language within the Free-State province [29]. The total monthly household income of respondents varied between <R 1 363 and R 26 705, with 65% of the respondents' households earning between R 2 258 and R 6 3 21 and falling within Living Standards Measurement (income decile) categories 3 to 5 [50]. However when considering the income ranges of all the respondents' households, the sample could therefore be categorised in (income decile) categories 1 to 10 [50]. The remaining 35% of the sample earned either less or more than the income amount mentioned above.

6.2 Respondents' knowledge of food related aspects

To understand the utilisation of food sources, respondents' knowledge regarding food related aspects were explored in addition to food hygiene and safety practices. The summary of the findings are presented in Table 1 and will be referred to throughout the remainder of this section. Table 1 includes the averages of the respondents who answered correctly in each section - Knowledge (food hygiene and safety/storage).

Table 1 Summary of data obtained from food related knowledge, implementation practices and correlations

Food related aspects	**n/average**	**%**	
Basic knowledge of food related questions			
Food hygiene	80	77.4	-
Food safety	85	82.7	-
Food hygiene and storage practices			-
Food hygiene practices (before, during and after food preparation)	91	87.9	-
Food safety through storage	78	76.1	-
Correlations between socio-demographics and food security	**n**	**Correlation coefficient (r)**	**p-value**
Level of education	103	-0.1	0,206
Food knowledge	103	-0.3	0,008
Income	103	-0.2	0,168
Household size	103	0.1	0,410

n = average of respondents that selected the appropriate option/answer for each section
* = only one answer from this section was used to portray knowledge
Statistical significant difference: $p \leq 0.05$
Effect size (r): 0.1=small; 0.3=medium; 0.5=large

In Table 1, the average of various questions used to determine the respondents' knowledge of basic food related aspects are presented. The questions regarding food safety and hygiene were answered correctly by the majority 77.4% and 82.7% of the respondents respectively. These results indicate that most of the respondents' had knowledge regarding food safety and hygiene practices, as all of the respondents answered half to more than half of the questions correctly. It was however found that (39.8%) of the respondents indicated that incorrect

cleaning or hygiene methods were used. This result confirms the findings of [36], which suggest that consumers do not possess adequate knowledge regarding food safety and food hygiene. It was also found in this study that 67% of the respondents knew what a well-balanced diet consisted of while only 6.8% of the respondents had knowledge as to how many fruits and vegetables are recommended daily.

6.3 Respondents' food related hygiene practices

As information was gained with regard to the respondents' knowledge of food related hygiene and safety aspects, their food hygiene practices were also explored during various stages of food preparation. Each respondent at some time or another was responsible for food preparation within the household. In Table 1 food hygiene practices of these respondents are presented. Various hygiene options were provided to the respondents as a method to explore their hygienic practices before, during (in-between) and after food preparation. This included the methods of washing hands and cleaning the food preparation surfaces. The majority (87.9%) of the respondents indicated the appropriate methods were used to wash their hands before and after food preparation and indicated to clean their food preparation surfaces when required. The cleaning of the preparation surface in-between the use of meat and vegetable products proposes that the respondents might possibly have been aware of cross-contamination. However, this assumption was not formally tested. The results suggest that food hygiene practices were appropriate amongst most of the sample. This contradicts the findings of [37], which suggest that although knowledge of food safety and hygiene is adequate, it is not always implemented accordingly. There were, however, a few respondents who did not implement the appropriate hygiene practices.

6.4 Respondents' basic food related safety practices

The implementation of storage practices regarding various food products were used as an indication of food safety practices. This was done as storage influences the safety of consumption of food products [40]. Table 1 provides information on how the respondents stored food products. An average is provided to represent all the correct options identified with regard to the method of storage of various food products. Most of the respondents (76.1%) indicated that the appropriate storage methods were used for dry and left-over food and raw meat products. These results propose that most of the respondents identified the appropriate methods to store various food products. There were however, a few respondents who indicated that inappropriate methods were used in their households to store dry and cooked leftover food products. Using inappropriate methods not normally

recommended for storage may possibly contribute to increased chances of contamination and consumption safety risks. Respondents who did not use a refrigerator or freezer to preserve their raw meat products suggested that all raw meat products were bought with the intent of immediate use. Appropriate food safety practices are necessary to ensure that food products can be optimally utilised [41,42], as food utilisation influences food security [19].

6.5 Medium through which respondents obtained their food related knowledge

Previously, it was determined that respondents' knowledge of food utilisation influenced food insecurity within their households. The medium through which food knowledge was obtained was explored to determine whether this medium itself was effective and if it could be supported by other available mediums. Table 2 presents the mediums though which respondents obtained knowledge regarding effective food utilisation.

Table 2 Respondents medium through which knowledge regarding food related aspects was obtained (n=103)

Where did the respondent receive information regarding food production, handling and utilisation	n	Frequency %
School/academic institution	65	63.1
Parents	55	53.4
Radio/TV/magazines/newspapers	37	35.9
Doctor/Clinic	35	34
Work	12	11.7
Friends	9	8.7
Does not get information regarding food	2	1.9

n = respondents that selected each option

In Table 2, various mediums to which the respondents possibly had access and through which knowledge regarding food utilisation could have been provided are presented. The results indicate that knowledge regarding food utilisation was mostly obtained from an academic institution (63.1%). This implies that the schooling

system may be a suitable medium to disseminate information regarding food utilisation, as confirmed by [10]. Information and knowledge was also passed down to many respondents (53.4%) by their parents. All other mediums provided knowledge regarding food utilisation. However, these mediums were not equal contributors in this study when compared to the two mediums mentioned above. If all the mediums mentioned in Table 2 provided adequate information regarding food utilisation, it may contribute to increased knowledge regarding food utilisation amongst the respondents in the area explored in this study.

6.6 Respondents' household food security

Household food security was explored using a survey with nine main and two follow-up questions associated with food insecurity. Respondents were asked to answer yes or no to the questions as an indication of whether the questions regarding food insecurity were applicable to their household. The regularity in the occurrence of affirmative answers given was also explored. The following results were obtained and presented in Table 3.

In Table 3 it is indicated that 86.4% of the respondents have children. These respondents were asked to answer additional questions. Food security in this study was measured using an array of food security questions (nine) and measured using the guidelines suggested by [58]. In the guidelines the questions asked in this study are referred to as hunger questions, which determine hunger and therefore food insecurity. The first set (three questions) were representative of the entire population, whereas the second set (six questions) were only representative of the respondents that had children in their household, as indicated in Table 3. It was found that 39.8% or 41 of the 103 respondents gave affirmative answers to the first set of questions (all three questions). Figure 1 provides the distribution of affirmative answers for all the questions associated with decreased food security relevant to the respondents in this study.

Table 3 Food security questions and occurrence indicators

Food insecurity questions	Occurrence indicator					
	Ever in the past		Previous month*		Five or more days in previous month*	
	n	Frequency %	n	Frequency %	n	Frequency %
Households with and without children	**103**					
Does the respondent's household ever run out of money to buy food	71	68.9	58	81.7	23	39.7
Does the respondent ever cut the size of the households meals	66	64.1	58	87.9	38	65.5
Does the respondent ever eat less because there is not enough money for food	58	56.3	48	82.8	29	60.4
Households with children	**89**					
Does the respondent's children ever eat less than they feel they should	37	35.9	34	91.9	22	64.7
Does the respondent ever rely on limited quantities of food to feed children	54	52.4	44	81.5	29	65.9
Does the respondent's children ever say they are hungry because there is not enough food	34	33	29	85.3	17	58.6
Does the respondent's children ever skip meals because there is not enough food	24	23.3	22	91.7	16	72.7
Does the respondent's children go to bed hungry	17	16.5	16	94.1	9	56.3
Do you ever eat less so that your child will have enough to eat	56	54.4	44	78.6	24	54.5

n = number of respondents that gave affirmative answers to each question

*= frequencies based on the affirmative answers form previous occurrence indicator

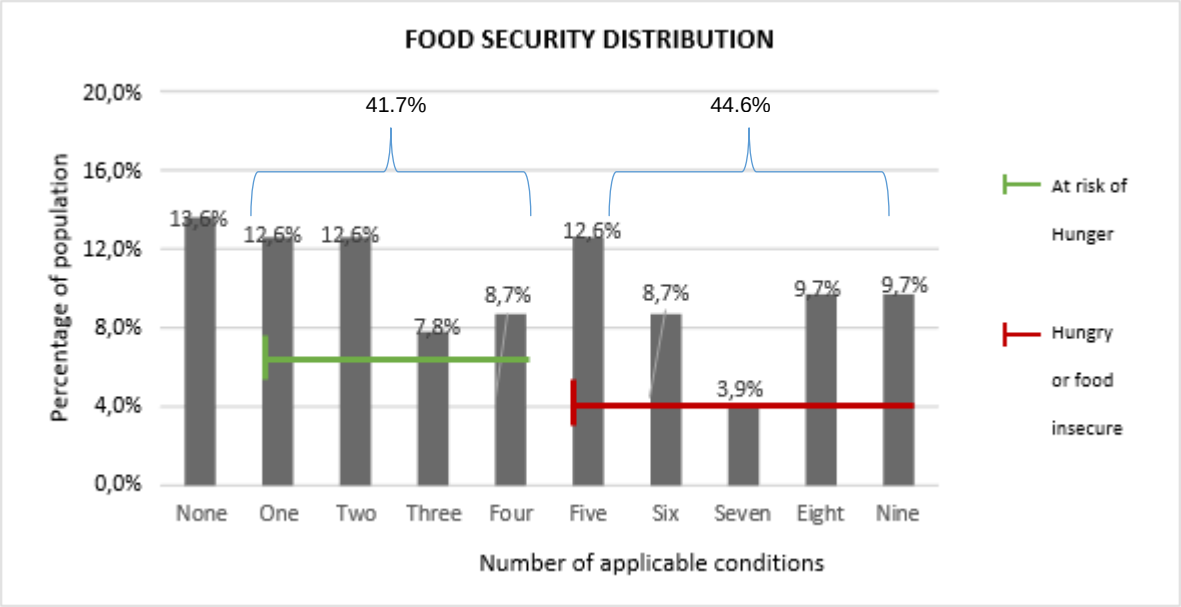

Figure 1 Overall distribution of decreased food security

Using the guidelines of [58], Figure 1 represents the total percentage of households at risk of food insecurity and households which are assumed to be hungry and food insecure. One to four affirmative answers to the main questions provided an indication of households at risk of food insecurity. Therefore, 41.7% of the households represented in study were at risk of hunger and food insecurity. Five or more affirmative answers provided an indication that hunger affected all individuals of the households. It also reveals that children in the household are affected by hunger on at least two occasions. Regarding this information, 44.6% of the households that were represented in this study were hungry and food insecure.

The regularity of occurrence and severity of decreased household food security were explored through the use of the follow-up questions. The respondents were asked to indicate if it occurred within the previous month and thereafter if it occurred five or more days within that same month. Overall it was determined that if an affirmative answer was given for the main question (has it ever happened), the majority of individuals also gave affirmative answers to the first follow-up question (did it happen in the previous month). The majority of the respondents who answered the first follow-up question additionally provided affirmative answers to the second follow up question (did it happen 5 or more days in the previous month). This was true for all main questions except in the case of (‘*does the household ever run out of money to buy food’*). Based on the above findings, food insecurity is a problem within this informal settlement as more households represented in this study are food insecure than households “at risk of food insecurity”. It also suggests that households at risk of food insecurity are vulnerable of becoming food insecure if the risks are not addressed.

6.7 The relationship between respondents' socio-demographics and food security

As the food security amongst the respondents' households were explored, it was necessary to determine if there were any apparent causes of, or relationships between, social-demographical factors and food insecurity. Correlations were therefore explored between the respondents' level of education, household income and household size. Additionally, food knowledge was also correlated with food security. The correlation was included as it was determined that a relationship exist between the respondents' level of education and their food knowledge. The findings are presented in Table 1.

Only one significant correlation ($p \leq 0{,}008$; $r = -0.3$) between the respondents' knowledge of food related aspects and food insecurity was found. The correlation was negative, implying that an increase in the respondents' knowledge of food related aspects had a tendency to decrease food insecurity amongst the households. This result may be ascribed to the better understanding and implementation of food hygiene, food safety and food storage practices, which enhances the potential to adequately consume available food sources within the household. The relationship between food knowledge and food insecurity is consistent with the suggestion of [47] that better knowledge of food utilisation contributes to decreased food insecurity. Enhanced food knowledge is however, not sufficient to decrease household food insecurity as it was determined that the majority of the respondents in this study had adequate knowledge, yet many households were food insecure. No significant correlations were found between the respondents' level of education ($p \leq 0{,}206$; $r = -0.1$), household income ($p \leq 0{,}168$; $r = -0.2$), household size ($p \leq 0{,}410$; $r = 0.1$) and food insecurity. To gain insight into the households that were identified to have decreased food security, their characteristics were explored and are presented in Table 4. Ranges are provided for income and expenditure, as exact amounts were not available, suggesting that food expenditure was not necessarily the highest or lowest amount within the range provided. The respondents' level of education in Table 4 indicates all the levels represented within each income group. No food insecure households were found in the higher income group (income decile 7-10), this may be due to higher household income and larger food expenditure possibilities.

The average household size for food insecure households was four to six individuals. These household sizes are above the average household size of 3.3 for the Free-State province [50]. These larger households are a contributing factor to their decreased food security as [52] suggest that larger households negatively influence food security. There was no distinctive pattern between lower and higher educational levels and higher income.

Additionally it was found that higher income in this study did not necessarily contribute to food security (Table 4).

Most low to medium income food insecure households earned less than the suggested average monthly income of the black South Africans [50]. PHSA, (2007) [57], mention that there is a relevant relationship between food security and income including that lower incomes are believed to be related to decreased food security. It was found that although monthly income increased the number of affirmative answers to food insecurity remained the same. In Table 4 it can be seen that food expenditure amongst food insecure ranged from extremely low to high (based on monthly income).

Table 4 Household size, monthly income and monthly food expenditure of households with decreased food security (n=46)

Monthly household income	n	Monthly household food expenditure	Average household size	Level of education	Average number of affirmative food insecurity answers
<R 1 363	2	100-1000	4	Primary & Grade 12	7
R 1 364 – R 1 928	3	501-1000	6	Primary & Some secondary	8
R 1 929 – R 2 257	9	100-1000	4	Primary - grade 12	7
R 2 258 – R 3 137	9	100-3000	4	Primary - grade 12	7
R 3 138 – R 4 164	11	501-2500	5	Primary - grade 12	7
R 4 165 – R 6 321	11	501-2000	5	Some secondary & Grade 12	7
R 6 322 - R 9 319	1	1501-2000	4	Some secondary	6

n = number of food insecure households in each income group

When the average household sizes are considered, food expenditure amongst some households may not be sufficient to provide the necessary food sources to adhere to dietary needs Figure 2 provides information regarding the monthly income expenditure of the food insecure households.

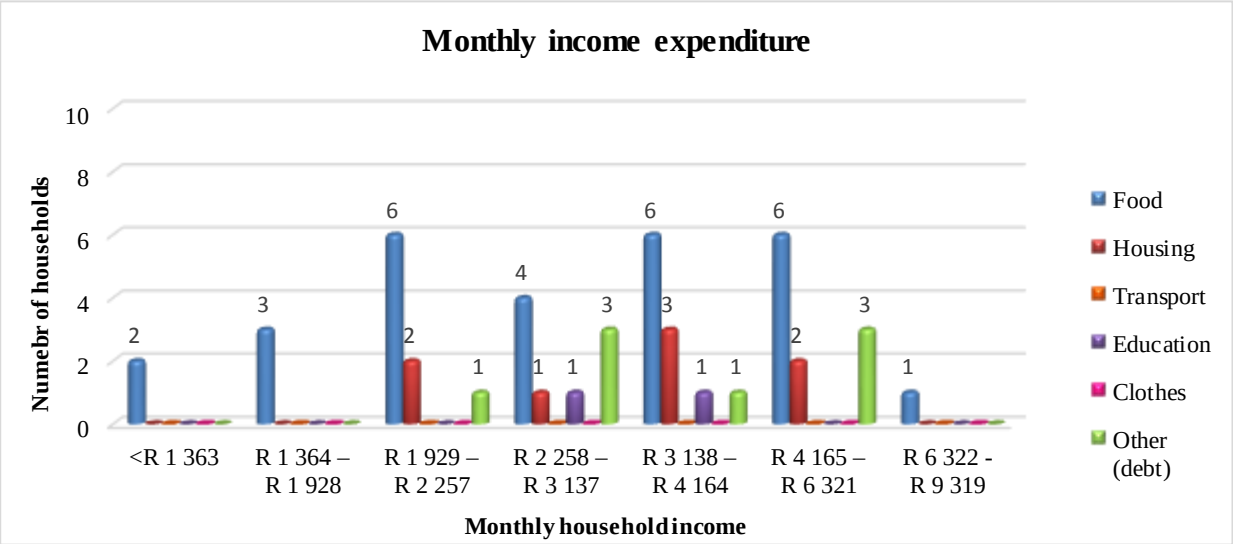

Figure 2 Monthly income expenditure of food insecure households

Most food insecure households in each income category spent most of their income on food (Figure 2). This is consistent with the Income and Expenditure survey which suggests that amongst income decile categories 2–4, more money is spent on food than any other expenditure [50]. However, income decile 5 and 6 are suggested to spend more money on housing than food, which contradicts the findings in Figure 2. Although some households spent a considerably larger amount of income on food, these households were also food insecure (Table 4). This may suggest that the food sources bought each month are not sufficient to provide the household with enough food for the entire month. More money was spent on financial debt and housing amongst some food insecure households. This proposes that, these households had additional expenditure responsibilities which restricted the amount of money which could be used for food, therefore, possibly contributing towards the food insecurity of these households.

7 Conclusion

In this study it was found that most respondents' overall knowledge of food related hygiene and safety practices was adequate. The implementation of knowledge regarding food related hygiene and safety practices was found

to be acceptable amongst the respondents, with a few individuals not implementing these practices accordingly. The state of household food security in this study was not ideal, as the majority of households represented in this study were at risk of hunger or actually food insecure. Therefore, as decreased household food security was identified in an in formal settlement in this study, future research regarding this subject should be considered. In light of this there exists a need for intervention to improve and prevent food insecurity so that South Africa can truly be defined a food secure nation.

Despite significant relationships being determined between socio-demographical characteristics and food security in previous studies, no similar relationships were determined using this sample, therefore it can be assumed that the respondents' level of education, their household income and household size may not influence food insecurity identified in the present study. However, the findings did suggest that the food insecurity in this study tended to be influenced by the respondents' knowledge of food utilisation practices such as hygiene and safety. Although the overall knowledge amongst the respondents was adequate, it was still determined that lower food knowledge contributed to food insecurity amongst the population. It therefore seems crucial to enhance the knowledge of these individuals as it could possibly be a significant contribution to improved food security in this informal settlement.

Food based knowledge was mainly obtained though the educational system and passed down from family members. This suggests that information provided by schools is a significant medium through which knowledge can be obtained and passed on to other individuals. There are nonetheless, additional sources which could be implemented more effectively to distribute information regarding basic food practices and contribute to enhanced household food security. It would therefore seem beneficial to identify sources such as doctors/clinics and work environments and use these sources as methods to increase information dissemination regarding food utilisation to enhance food security.

Based on the findings in this study a few recommendations can be made to enhance food security in an informal settlement. In an attempt to distribute information and improve knowledge regarding food utilisation and food security, employers can implement simple yet effective methods through which employees can receive this information.

Informative sessions with employees regarding food utilisation should include: Hygiene practices before, during and after food preparation (how to clean hands and preparation surfaces effectively); information on how to store various food products effectively and provide alternative solutions if households do not have the necessary

equipment to store their food products. As many respondents mentioned their lack of adequate income to obtain sufficient and nutritious food products, employers should provide practical information such as budgeting which will assist households to utilise their incomes effectively. The main focus should be allocating money for food to enhance food security, rather than using their income to encourage debt for unnecessary household items as common with income decile groups 5 and 6.

As part of a joint initiative local government, employers and doctors/clinics should consider compiling various food packages which can be bought by the public or employees as another method of enhancing access and utilisation of healthy food sources. These food packages should consist of different sizes to accommodate various household sizes and contain food products representative of a balanced diet. The packages should additionally, be sufficient for a month and be affordable to all their various employees and the members of the public. This may assist households in allocating sufficient funds for food and educate them about various food sources which can be obtained through the funds they have available.

It may not always be practical for doctors/clinics or employers to provide information sessions to the public. However, alternative methods such as information distribution through visual media can be used. Various posters regarding information about food utilisation are available and should be displayed throughout the work environment for all employees and in clinics for the public to observe. Posters should also provide information regarding effective hygiene and storage practices, with visual examples that can enable unemployed members of the public who might also be illiterate to understand them. Examples of food products (which represent a balanced diet) that can be bought using limited financial resources should be presented as a method to inform individuals about the utilisation possibilities, regardless of limited funds. The work environment and doctors/clinics provide easy access to this kind of information and is a cost effective method which could contribute significantly to food security.

Distributing pamphlets with all the above information could increase the amount of individuals that receive information as this information can be passed on from individual to individual. Using the work environment and doctors/clinics as sources to distribute information could be very effective as these sources are more likely to be trusted. If food security is enhanced through the improvement of food knowledge and utilisation then employers themselves may benefit, since as an individual's wellbeing improves so does their ability to perform. Maximum employee input may lead to increased business outputs and increased profits.

Due to the size of this sample and the methods used to obtain the sample, the information obtained may have been limited. Additionally, as this study was conducted on respondents whom reside in an informal settlement and are employed, the results cannot be generalised to all informal settlements within South Africa. Future studies would benefit from larger samples and perhaps a widened target population to increase the possibilities of generalising the results. Though no questionnaires were incomplete, additional languages representative of the population could be included to shorten the time needed to complete the questionnaire.

8 Acknowledgements

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Addendum A: Cover Letter

QUESTIONNAIRE REGARDING ASPECTS OF HOUSEHOLD FOOD SECURITY

VRAELYS AANGAANDE ASPEKTE VAN HUISHOUDELIKE VOEDSELSEKURITEIT

THE AIM AND NATURE OF THE RESEARCH STUDY/ *DOELWIT EN AARD VAN DIE NAVORSINGSSTUDIE*

Optimum utilisation of food, basic food knowledge and correct food handling practices are important to enhance household food security. Handling during food preparation, storage, and hand washing practices play an important role to ensure food safety. The questionnaire will consist of questions regarding food utilisation and knowledge, food security and demographic information. After data analysis, informational material will be presented to respondents to improve their household food security status.

Optimale benutting van voedsel, basiese voedselkennis en korrekte voedselhanteringspraktyke is belangrik om voedselsekuriteit in die huishouding te verbeter. Voedselhantering gedurende voorbereiding, opberging en handewasprosedures, speel 'n belangrike rol om voedselveiligheid te verseker. Die vraelys sal uit vrae aangaande voedselbenutting, kennis, voedselsekuriteit en demografiese inligting bestaan. Na data analise sal inligtingsmateriaal aan die respondente bekend gemaak word om hul huishoudelike voedselsekuriteit status te verbeter.

RESEARCH PROCEDURE / *NAVORSINGSPROSEDURE*

1) You are requested to participate in the questionnaire that will be completed by the researcher.
2) The questionnaire will take approximately 20 minutes to complete.
3) All data gathered during this study will be handled and stored confidentially and only the members of the research team will have access to the data. Data published in the thesis or journals will not contain any information which may result in the identification of respondents.
4) **Your anonymity will be assured at all times.** We however request your personnel number to label the questionnaire and to ensure traceability for follow-up procedures.

5) It is possible that you may not derive any benefit personally from your participation in the study, although the knowledge gained by means of the study may benefit other persons or communities.

6) By agreeing to take part in the study, you are also giving consent that data gathered be used by the researchers for scientific purposes as they see fit. Confidentiality will further be assured as your name will not be recorded.

1) U word versoek om die vraelys te voltooi deur die vrae te beantwoord wat deur die navorser gevra word

2) Die vraelys sal ongeveer 20 minute neem om te voltooi.

3) Alle data wat gedurende hierdie studie ingesamel word, sal deurentyd vertroulik hanteer word en slegs lede van die navorsingspan sal toegang tot die data hê. Enige data wat in tesisse of joernale gepubliseer word, sal geen inligting bevat wat tot die herkenning van enige respondent kan lei nie.

*4) **U anoniemiteit sal deurentyd verseker word**. Ons versoek wel u personeelnommer sodat die vraelyste genommer kan word en om te verseker dat u vir opvolgprosedures opgespoor kan word indien nodig.*

5) Dit is moontlik dat u geen persoonlike baat mag vind na u deelname aan die studie nie, maar ander individue en gemeenskappe mag moontlik voordeel trek uit die kennis wat deur hierdie studie verkry sal word.

6) Deur in te stem om aan die studie deel te neem, gee u ook toestemming dat enige inligting wat in die studie verkry word deur die navorsers, volgens hulle oordeel, vir wetenskaplike doeleindes gebruik kan word. Vertroulikheid word verder verseker deurdat u naam nêrens verskyn nie.

POSSIBLE BENEFITS OF THE STUDY / *MOONTLIKE VOORDELE VAN DIE STUDIE*

The present study shall provide knowledge regarding household food utilisation, food handling practices and food security status. The knowledge gained will then be utilised to introduce educational information based on areas with shortcomings in food knowledge, handling and storage practices. The aim is to enhance household food security by optimal utilisation of available resources. Optimum utilisation of food, basic food knowledge and correct food handling practices are important to enhance food security. Food handling during preparation, storage, and hand washing practices play an important role to ensure

food safety. The questionnaire will consist of questions regarding the food utilisation and knowledge, food security and demographic information. Results will be used to improve problem areas. Feedback will be presented to the concerned parties at the end of the study.

Die huidige studie sal kennis aangaande huishoudelike voedselbenutting, voedselhanteringpraktyke en voedselsekuriteit verskaf. Die kennis verkry vanuit die studie sal gebruik word om opvoedkundige inligting aangaande voedselkennis, hantering en bergingspraktyke, bekend te stel. Die doelwit is om huishoudelike voedselsekuriteit te verbeter deur optimale benutting van beskikbare bronne. Optimale benutting van voedsel, basiese voedselkennis en die korrekte voedselhanteringspraktyke is belangrik om voedselsekuriteit te verbeter. Voedselhantering gedurende voorbereiding, berging en die was van hande, speel 'n belangrike rol om voedselveiligheid te verseker. Die vraelys bestaan uit vrae aangaande die voedselbenutting, voedselkennis, voedselsekuriteit en demografiese inligting. Resultate sal gebruik word om probleemareas te verbeter. Terugvoer sal aan die betrokke partye na afloop van die studie voorgestel word.

INFORMATION / *INLIGTING*

Should you require more information, please do not hesitate to contact Flipsje Jordaan, (Master's Degree student) at 21088616@nwu.ac.za or Dr. Hanli de Beer (study leader) at 018 299 2483.

Indien u enige verdere inligting benodig, moet asseblief nie huiwer om (Meestersgraad student) Flipsje Jordaan *te kontak by* 21088616@nwu.ac.za *of Dr. Hanli de Beer (studieleier) by 0182992483*.

WITHDRAWAL OF PARTICIPATION / *ONTTREKKING VAN DEELNAME*

Participation in the study is completely voluntary and you have the right to withdraw from the study at any given time, should you wish to do so. However, you are kindly requested not to withdraw from the study without careful consideration.

Deelname aan die studie is heeltemal vrywillig en u het die reg om ter eniger tyd van die studie te onttrek. Ons rig egter 'n versoek aan u dat u nie van die studie ontrek sonder sorgvuldige oorweging nie.

DECLARATION OF CONSENT / *TOESTEMMINGSVERKLARING*

I declare that I willingly participate in this study by completing the questionnaire. The purpose of this research study was explained to me and I declare that I fully understand the content thereof. I was given the opportunity (if so preferred) to discuss any aspects of the study with the researcher and hereby voluntary agree to participate in the study. I would hereby like to exempt the University or any employee or any student of the University from any liability which I might incur during this study.

I furthermore waive my right to institute any claims whatsoever against the University which may arise during the study or the conduct of any person involved in the study, except for claims arising from proven negligent conduct of the University or its employees or students.

Ek verklaar dat ek vrywilliglik deelneem aan die studie deur die vraelys te voltooi. Die doel van die navorsingstudie was aan my verduidelik en ek verklaar dat ek die inhoud ten volle verstaan. Ek was die geleentheid gegun (indien verkies) om enige aspekte van die studie met die navorser te bespreek en hiermee stem ek vrywilliglik in om aan die studie deel te neem. Hiermee stel ek die universiteit of enige werknemer of student van die universiteit, vry van enige aanspreeklikheid wat gepaard gaan met deelname aan die studie. Ek verbeur die reg om enige eise teen die universiteit of individue betrokke by die studie in te stel, wat gedurende die loop van die studie mag voorkom behalwe in die geval van bewese nalatige optrede deur die universiteit of hul werknemers en studente.

Signature of the respondent:_____

Signed at_____on this _____day of _____2012.

*Handtekening van die deelnemer*_____

Geteken te _____ op hierdie_____ dag van_____2012.

Staff number / *Personeelnommer:* _____

Addendum B: Questionnaire

a) What is your highest level of education? (*Wat is u hoogste vlak van opleiding?*)

None , did not have the opportunity to attend school *(Geen, het nie die geleentheid gehad om skool by te woon nie)*	1
Primary School *(Laerskool)*	2
Secondary school (Gr. 8 to Gr. 11) *(Hoërskool – (Gr. 8 tot Gr. 11)*	3
Matric / (Grade 12) *(Matriek / Graad 12)*	4
Tertiary education/ training / *(Tersiêre onderig /opleiding)*	5
Diploma	6

b) What is your race? *(Wat is u ras?)*

White	*(Blank)*	1
Black	*(Swart)*	2
Asian	*(Indiër)*	3
Coloured	*(Kleurling)*	4
Other	*(Ander)*	5

c) Do you have any health related conditions e.g. Diabetics

(Het u enige gesondheidsverwante toestande bv. Diabetes)

Yes / *Ja*	1
No / *Nee*	2
If yes, specify / *Indien ja, spesifiseer*_____	

Section A	**FOOD PRODUCTION AND CONSUMPTION** *(Tick the best option)*
Afdeling A	**VOEDSELPRODUKSIE EN -VERBRUIK** *(Merk die beste opsie)*

1. Do you have a vegetable garden?

(Het u 'n groentetuin?)

Yes (*Ja*)	1
No (*Nee*)	2

NOTE: If yes, go to question1.1. If no, go to question1.2

(NOTA: Indien ja, gaan na vraag 1.1. Indien nee, gaan na vraag 1.2)

1.1 If yes, what do you use your vegetables for? *(Indien 'Ja', waarvoor gebruik u die groente?)*	**YES/***JA*	**NO/***NEE*
1.1.1 Household consumption (*Huishoudelike gebruik*)		
1.1.2 Selling (*Verkoop*)		
1.1.3 Preserving for the future (*Preserveer vir die toekoms*)		
1.1.4 Give away to family/friends (*Skenk aan familie/ vriende*)		

1.2 If 'No', why do you not have a vegetable garden? *(Indien 'Nee', hoekom het u nie 'n groentetuin nie?)*	
1.2.1 Not enough money (*Nie genoeg geld nie*)	
1.2.2 Not enough time (*Nie genoeg tyd nie*)	
1.2.3 Not enough space (*Nie genoeg plek nie*)	
1.2.4 Buy all vegetables (*Koop alle groente*)	
1.2.5 Not interested in a vegetable garden (*Stel nie belang in 'n groentetuin nie*)	

1.3 Would you like to have a vegetable garden?

(*Sal u daarvan hou om 'n groentetuin te hê?)*

Yes (*Ja)*	1
No (*Nee*)	2

1.4 Do you keep any animals for food purposes e.g. Chickens, sheep, pigs, cattle etc?

(Hou u enige diere aan vir kos doeleindes bv. Hoenders, skape, varke, beeste ens?)

Yes *(Ja)*	1
No (*Nee*)	2

NOTE: If yes, go to question 1.5. If no, go to question 2.

Indien ja, gaan na vraag 1.5. Indien nee, gaan na vraag 2.

1.5 If yes, what do you use your animals for? *(Indien 'Ja', waarvoor gebruik u die diere?)*	**YES***/JA*	**NO***/NEE*
1.5.1 Food for the household (*Kos vir die huishouding*)		
1.5.2 Selling (*Verkoop*)		
1.5.3 Preserving for the future (*Preserveer vir die toekoms*)		
1.5.4 Give away to family/friends (*Skenk aan familie/ vriende*)		
1.5.5 Other *(Ander)*_____		

2. How often do you eat the following food products?

(*Hoe gereeld eet u die volgende kosprodukte?*)

*(**Tick one block only for every question**)* *(Merk slegs een blokkie vir elke vraag)*	**Never / Very seldom**	**1 day/week**	**2 – 4 days / week**	**More than 4 days/week**	**1 x/day**	**More than once a day**
2.1 **Starch** ***(Stysel)***						
2.1.1 Bread (*Brood*)	1	2	3	4	5	6

2.1.2 Potatoes (*Aartappels)*	1	2	3	4	5	6
2.1.3 Maize Meal (*Mieliemeel*)	1	2	3	4	5	6
2.1.4 Sorghum/ Maltabella	1	2	3	4	5	6
2.1.5 Samp *(Stampmielies*)	1	2	3	4	5	6
2.1.6 Rice (*Rys*)	1	2	3	4	5	6
2.1.7 Vetkoek	1	2	3	4	5	6
2.1.8 Instant breakfast cereal: Corn flakes / Weet-Bix (*Ontbytgraan-vlokkies: Corn flakes / Weet-Bix*)	1	2	3	4	5	6
2.1.9 ProNutro	1	2	3	4	5	6
2.1.9 Other *(Ander)*_____	1	2	3	4	5	6
Vegetables *(Groente)*						
2.2.1 Morogo: green leafy vegetables (*Marog: groen blaargroente*)	1	2	3	4	5	6
2.2.2 Sweet corn (*Suikermielies*)	1	2	3	4	5	6
2.2.3 Carrots (*Wortels*)	1	2	3	4	5	6
2.2.4 Sweet Potatoes (P*atats*)	1	2	3	4	5	6
2.2.5 Pumpkin (*Pampoen*)	1	2	3	4	5	6
2.2.6 Cabbage *(Kool)*	1	2	3	4	5	6
2.2.7 Green beans, peas (*Groenbone, ertjies*)	1	2	3	4	5	6
2.2.8 Other *(Ander)*_____	1	2	3	4	5	6
2.3 Fruit *(Vrugte)*	1	2	3	4	5	6
Dairy *(Suiwel)*						
2.4.1 Milk (*Melk*)	1	2	3	4	5	6
2.4.2 Inkomaas/ Amazi/ Yoghurt (*Inkomaas/ Amazi/ Jogurt*)	1	2	3	4	5	6
2.4.3 Powdered milk: *Nespray, Elite*	1	2	3	4	5	6

(*Poeiermelk: Nespray, Elite*)						
2.4.5 Other *(Ander)*_____	1	2	3	4	5	6
Non-dairy creamer (Nie-suiwel veromer)						
2.4.6 Powdered coffee creamer: Cremora (*Koffieverromer: Cremora*)	1	2	3	4	5	6
Meat *(Vleis)*						
2.5.1 Chicken (*Hoender*)	1	2	3	4	5	6
2.5.2 Pilchards: Lucky star *(Pilchards sardyne: Lucky star)*	1	2	3	4	5	6
2.5.3 Fish *(Vis)*						
2.5.4 Liver *(Lewer)*	1	2	3	4	5	6
2.5.5 Bully beef *(Boeliebief)*	1	2	3	4	5	6
2.5.6 Beef stew (Gestoofde beesvleis)	1	2	3	4	5	6
2.5.7 Beef mince (*Maalvleis*)	1	2	3	4	5	6
2.5.8 Pork (Vark)						
2.5.8 Eggs (*Eiers*)	1	2	3	4	5	6
2.5.7 Other *(Ander)*_____	1	2	3	4	5	6
Plant proteins *(Plantaardige proteïene)*						
2.6.1 Beans: red, white, black (*Bone: rooi, wit, swart*)	1	2	3	4	5	6
2.6.2 Lentils (*Lensies*)	1	2	3	4	5	6
2.6.3 Chick peas (*Keker-ertjies*)	1	2	3	4	5	6
2.6.4 Nuts, Peanuts (*Neute, Grondboontjies*)	1	2	3	4	5	6

3. Where do you buy food? (*Waar koop u kos?)*	**YES/**JA	**NO/**NEE
3.1 Spaza Shop		
3.2 Street Vendor *(Straatverkoper)*		
3.3 Supermarket *(Supermark)*		
3.4 Other, specify *(Ander, spesifiseer)*		

Section B FOOD PREPARATION

Afdeling B VOEDSELVOORBEREIDING

4. (Tick one block only for every question) *(Merk een blokkie vir elke vraag)*	**Myself** *(Ekself)*	**Someone else** *(Iemand anders)*	**Me and someone else** *(Ek en iemand anders)*	**Notes** *(Notas)*
4.1 Who is mainly responsible for making food in your house? (*Wie is hoofsaaklik verantwoordelik om kos te maak in u huis?)*	1	2	3	
4.2 Who decides what food to buy for the household? (*Wie besluit watter kos vir die huishouding gekoop moet word?)*	1	2	3	
4.3 Who decides how much money is spent on food? (*Wie besluit hoeveel geld op kos spandeer word?)*	1	2	3	

5. Who is the head of the household? (*Wie is die hoof van die huishouding?*)

Specify *(Spesifiseer)*_____

6. Do you use the following to cook food? *(Gebruik u die volgende om kos gaar te maak?)*	**YES/***JA*	**NO/***NEE*
6.1 Fire *(Vuur)*		
6.2 Paraffin *(Paraffien)*		
6.3 Electricity *(Elektrisiteit)*		
6.4 Gas		
6.5 Other *(Ander)*		

7. Do you wash your hands before you prepare food?

(Was u hande voor u kos voorberei?)

Yes (*Ja*)	1
No (*Nee*)	2

NOTE: If yes, go to question 8. If no, go to question 9.

Indien ja, gaan na vraag 8. Indien nee, gaan na vraag 9.

8. How do you clean your hands before preparing food?

(Hoe maak u hande skoon voordat kos voorberei word?)

Wipe them with a wet dishcloth or -towel *(Vee met 'n nat waslap /handdoek af)*	1
Wipe them on my clothes *(Vee aan my klere af)*	2
Rinse them under running water *(Spoel onder lopende water af)*	3
Wash them with soap and warm running water *(Was met seep en warm, lopende water)*	4
Not sure *(Nie seker nie)*	5

9. Where do you prepare food…?

(Waarop berei u kos voor…?)

On a table/ counter **without** a cutting board *(Op 'n tafel/ rak **sonder** 'n snyplank)*	1
On the table/ counter with a cutting board *(Op 'n tafel/ rak met 'n snyplank)*	2

10. Do you use the following equipment in your house? *(Gebruik u die volgende apparate in die huis?)*	**YES/**JA	**NO/**NEE
10.1 Refrigerator *(Yskas)*		
10.2 Freezer *(Vrieskas)*		
10.3 Pots / pans *(Potte / panne)*		
10.4 Kettle *(Ketel)*		
10.5 Cooking utensils other than knives, spoons and forks (e.g. peeler/ whisk etc.) *(Kook apparate anders as messe, lepels, vurke (bv skiller/ eierklitser ens.)*		
10.6 Electric appliances etc: toaster, mixer *(Elektriese toestelle ens: broodrooster, klitser)*		
10.7 Stove *(Stoof)*		
10.8 Microwave *(Mikrogolf)*		
10.9 Table *(Tafel)*		
10.10 Electrical frying pan *(Elektriesebraaipan)*		

Section C **FOOD STORAGE** (Tick the best option for questions 11 - 13)

Afdeling C **VOEDSELOPBERGING** *(Merk die beste opsie vir vraag 11-13)*

11. Where do you store dry food products: Maize, rice, etc?

(Waar stoor u droë kosprodukte: Meel, rys, ens)?

In a container on the floor (*In 'n houer op die vloer*)	1
In a cupboard separate from cleaning products (e.g Sunlight, Omo, Handy Andy, Surf) (*In 'n aparte kas weg van skoonmaakmiddels bv. Sunlight, Omo, Handy Andy, Surf*)	2
In a cupboard with cleaning products (*In 'n kas saam met skoonmaakmiddels*)	3
In the refrigerator (*In die yskas*)	4
Other (*Ander*)	5

12. How do you keep cooked left-over food for later use?

(Hoe stoor u gaar oorskietkos vir latere gebruik?)

Covered with plastic/ a lid inside the fridge / freezer (*Bedek met plastiek / 'n deksel in die yskas / vrieskas*)	1
Uncovered but inside a cupboard (*Oop, maar binne in 'n kas*)	2
Open on the shelf (*Oop op 'n rak*)	3
In a container on the floor (*In 'n houer op die vloer*)	4
Other (*Ander*)	5

13. How do you store raw meat (chicken, beef, pork, and fish?)

(Hoe stoor u rou vleis: hoender, bees, vark, vis?)

Covered with plastic/ a lid inside the fridge/freezer (*Bedek met plastiek/ 'n deksel in die yskas/vrieskas*)	1
Uncovered but inside a cupboard (*Oop, maar binne in 'n kas*)	2
Open on the shelf(*Oop op 'n rak*)	3
In a container on the floor (*In 'n houer op die vloer*)	4
Other (*Ander*)	5

Section D **FOOD SECURITY** **Afdeling D** **VOEDSELSEKURITEIT**		
	YES/JA	**NO/**NEE
14**. Are you single with no children?***(Is u enkellopend met geen kinders?)*		
14.1 Does your household ever run out of money to buy food? *(Het u huishouding ooit te min geld om kos te koop?)* 1a. Has it happened in the past 30 days? (*Het dit in die afgelope 30 dae gebeur?)* 1b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		
14.2 Do you ever rely on a limited quantity of food to feed your children because you are running out of money? *(Maak u ooit staat op 'n beperkte hoeveelheid kos om u kinders te voed, omdat u te min geld het?)* 2a. Has it happened in the past 30 days? (*Het dit in die afgelope 30 dae gebeur?)* 2b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		
14.3 Do you ever cut the size of your household's meals because there is not enough food in the house? *(Verminder u ooit die grootte van u huishouding se maaltye omdat daar nie genoeg kos in die huis is nie?)* 3a. Has it happened in the past 30 days? *(Het dit in die afgelope 30 dae gebeur?)* 3b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		
14.4 Do you ever eat less than you should because there is not enough money for food? *(Eet u ooit minder as wat u moet, omdat daar nie genoeg geld vir kos is*		

nie?) 4a. Has it happened in the past 30 days? *(Het dit in die afgelope 30 dae gebeur?)* 4b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		
14.5 Do your children ever eat less than you feel they should because there is not enough money for food? *(Eet u kinders ooit minder as wat u voel hul moet, omdat daar nie genoeg geld vir kos is nie?)* 5a. Has it happened in the past 30 days? *(Het dit in die afgelope 30 dae gebeur?)* 5b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		
14.6 Do your children ever say they are hungry because there is not enough food in the house? *(Sê u kinders ooit dat hulle honger is, omdat daar nie genoeg kos in die huis is nie?)* 6a. Has it happened in the past 30 days? *(Het dit in die afgelope 30 dae gebeur?)* 6b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		
14.7 Do your children ever skip meals because there is not enough food in the house? *(Slaan u kinders ooit maaltye oor, omdat daar nie genoeg kos in die huis is nie?)* 7a. Has it happened in the past 30 days? *(Het dit in die afgelope 30 dae gebeur?)* 7b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		

14.8 Do any of your children ever go to bed hungry because there is not enough money to buy food? (*Gaan enige van u kinders honger bed toe, omdat daar nie genoeg geld is om kos te koop nie?)*		
8a. Has it happened in the past 30 days? *(Het dit in die afgelope 30 dae gebeur?)*		
8b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		
14.9 Do you ever eat less so that your children will have enough to eat? *(Eet u ooit minder sodat u kinders genoeg sal hê om te eet?)*		
9a. Has it happened in the past 30 days? *(Het dit in die afgelope 30 dae gebeur?)*		
9b. Has it happened 5 or more days in the past 30 days? *(Het dit al 5 of meer dae in die afgelope 30 dae gebeur?)*		

15. How many meals do you eat per day? (*Hoeveel maaltye eet u per dag?)*

0	1	2	3	>3
1	2	3	4	5

15.1 What time do you eat your first meal of the day?

(Hoe laat eet u die eerste maaltyd van die dag?)

_____

15.2 If you do not eat breakfast at the "normal time" (6-10 am), why not? *(Indien u nie "normale tyd" (6-10vm) ontbyt eet nie, hoekom nie?)*	
16.2.1 There is not enough time *(Daar was nie genoeg tyd nie)*	1
16.2.2 There is no food in the house *(Daar is nie kos in die huis nie)*	2
16.2.3 I am not hungry in the morning *(Ek is nie honger in die oggend nie)*	3

Section E	**FOOD KNOWLEDGE** *(Tick the best option for questions 16 – 22)*
Afdeling E	**VOEDSELKENNIS** *(Merk die beste opsie vir vrae 16-22)*

16. A well-balanced diet consists of:

(*'n Gesonde dieet bestaan uit):*

Different kinds of fruits, vegetables, meat, milk and grains (*Verskillende soorte vrugte, groente, vleis, melk en grane)*	1
More meat than fruits and vegetables (*Meer vleis as vrugte en groente*)	2
Fried food products (*Gebraaide kosprodukte*)	3
More sugar than fruits and vegetables (*Meer suiker as vrugte en groente*)	4
All of the above statements are correct (*Al die bogenoemde stellings is korrek*)	5

17. How many servings of fruit and vegetables are good to eat each day?

(Hoeveel porsies vrugte en groente is goed om te eet elke dag?)

1-2 fruit(s) and/or vegetable(s) a day (*1-2 vrug(te) en/of groente per dag*)	1
3-4 fruits and/or vegetables a day (*3-4 vrugte en/of groente per dag*)	2
5 or more fruits and/or vegetables a day (*5 of meer vrugte en/of groente per dag*)	3
There is no need to eat fruits and vegetables daily (*Dit is nie nodig dat vrugte en groente daagliks geëet word nie)*	4

18. Is the following food safe to eat? (*Is die volgende kos veilig om te eet?*)	**YES/**JA	**NO/**NEE
18.1 Chicken / Fish reheated more than 3 times (*Hoender / Vis meer as 3 keer herverhit)*		
18.2 Swollen can of tuna *(Opgeblaaste blik tuna)*		
18.3 Bread covered mostly with green spots (mould) *(Brood meestal bedek met groen kolle – muf)*		
18.4 Pilchards left uncovered in the sun for a day		

(Onbedekte pilchards/ sardyne gelos in die son vir 'n dag)		
19. When cutting raw meat the surface/cutting board is clean if..... *Wanneer rou vleis gesny word is die oppervlak/snyplank skoon as...*	**YES/**JA	**NO/**NEE
19.1 Cleaned with a dry cloth *(Skoongemaak met droë lap)*		
19.2 Cleaned with warm water *(Skoongemaak met warm water)*		
19.3 Cleaned with soap and water *(Skoongemaak met seep en water)*		
19.4 Cleaned with a damp cloth *(Skoongemaak met 'n klam lap)*		

20. Do you wash the cutting board/surface in the following situations? *(Was u die snyplank/oppervlak in die volgende situasies?)*	**YES/**JA	**NO/**NEE
20.1 Before making food? *(Voordat kos gemaak word?)*		
20.2 After making food? *(Nadat kos gemaak is?)*		
20.3 In-between making meat and fresh salad or fruit salad? (*Tussen die maak van vleis vars slaai of vrugteslaai?)*		
20.4 I never wash the cutting board/surface? *(Ek was nooit die snyplank/oppervlak nie?)*		
20.5 Before and after making food? (*Voor en nadat kos gemaak word?)*		

21. When can food make you sick? *(Wanneer kan kos u siek maak?)*	**YES/**JA	**NO/**NEE
21.1 When chicken or pork is undercooked? *(Wanneer hoender of vark halfgaar is?)*		
21.2 When hands are not washed before eating cooked food? *(Wanneer hande nie gewas word voor gaar kos geëet word nie?)*		
21.3 When there is a lot of flies on the food? *(Wanneer daar baie vlieë op die kos is?)*		
21.4 When uncovered pilchards are left in warm conditions for a long period of time? *(Wanneer onbedekte pilchards/sardyne vir 'n lang tydperk*		

in warm toestande gelos word?)		
21.5 When fruit and vegetables are not washed *(Wanneer vrugte en groente nie gewas word nie?)*		

22. Where did you learn the most about food handling?

(Waar het u die meeste oor koshantering geleer?)

22.1 School / Academic institution *(Skool / Akademiese instansie)*	1
22.2 Friends *(Vriende)*	2
22.3 Parents *(Ouers)*	3
22.4 Radio/ TV/ Magazines/ Newspapers/ Internet *(Radio/ TV/ Tydskrifte/ Koerante/ Internet)*	4
22.5 Work *(Werk)*	5
22.6 Doctor / Clinic *(Dokter / Kliniek)*	6
22.7 I do not get information about food *(Ek kry nie inligting oor kos nie)*	7
22.8 Other *(Ander)*_____	8

Section F	**DEMOGRAPHIC INFORMATION**
Afdeling F	**DEMOGRAFIESE INLIGTING**

23. Gender (*Geslag)*

Male (*Manlik*)	1
Female (*Vroulik*)	2

24. Age *(Ouderdom)*

18-24	25-34	35-44	45-54	55-64	65 +
1	2	3	4	5	6

25. Home language *(Huistaal)*	**YES/**JA	**NO/**NEE
25.1 Setswana		

25.2 IsiXhosa		
25.3 Sepedi		
25.4 isiZulu		
25.5 Sesotho		
25.6 Tshivenda		
25.7 isiNdebele		
25.9 Xitsonga		
25.10 siSwati		
25.11 English		
25.12 Afrikaans		

26. Do you participate in government community projects/ activities in your area? E.g. vegetable gardens in the community/ schools

(Neem u deel aan regerings gemeenskapsprojekte / aktiwiteite in u omgewing? Bv. groentetuine in die gemeenskap/ skole)

Yes (*Ja*)	1
No (*Nee*)	2

NOTE: If no, go to question 28 / *NOTA: Indien nee, gaan na vraag 28*

27. If you answered 'YES' please specify how often

(Indien 'Ja', spesifiseer hoe gereeld)

Weekly (*Weekliks*)	1
Once a month (*Eenkeer 'n maand*)	2
Once in 3 months (*Eenkeer in 3 maande*)	3
Once in 6 months (*Eenkeer in 6 maande*)	4
Once a year (*Eenkeer 'n jaar*)	5
There are no community projects in our area *(Daar is geen gemeenskapsprojekte in ons omgewing nie)*	6

Section G LIVING ENVIRONMENT **Afdeling G LEEFOMGEWING**

28. What type of house do you live in?

(In watter tipe huis woon u?)

House built with bricks: permanent structure *(Huis gebou met bakstene: permanente struktuur*)	1
Permanent structure as part of a complex: flat (*Permanente struktuur as deel van 'n kompleks: woonstel*)	2
Semi-permanent structure - House made from building materials other than bricks: corrugated iron / wood *(Semi-permanente struktuur - Huis gebou van materiale anders as bakstene: sinkplaat / hout*)	3

29. Is there a kitchen in your house?

(Is daar 'n kombuis in u huis?)

Yes (*Ja)*	1
No (*Nee*)	2

29.1 Is the kitchen a separate room in the house?

(Is die kombuis 'n aparte vertrek in die huis?)

Yes *(Ja*)	1
No (*Nee*)	2

30. Where do you get water from?

(*Waar kry u water vandaan?)*

Tap in the house (*Kraanwater in die huis*)	1
Tap outside the house: in yard (*Kraanwater buite die huis: in erf*)	2
Borehole (*Boorgat)*	3
Spring / river / dam water (*Spruitjie / rivier / dam water*)	4
Fetch water from elsewhere_____ (*Kry water op 'n ander plek*) _____	5

31. Do you have access to waste removal facilities?

(Het u toegang tot vullisverwyderingsfasiliteite?)

Yes *(Ja)*	1
No (*Nee*)	2

32. How many people live in your house?

(Hoeveel mense woon in u huis?)

1	2	3	4	5	6	7	8	9	>9
1	2	3	4	5	6	7	8	9	10

32.1 Specify the role of each person in your household

(Spesifiseer die rol van elke persoon in u huishouding)

1	*6*
2	*7*
3	*8*
4	*9*
5	*10*

Section H	**INCOME & FOOD EXPENDITURE**
Afdeling H	**INKOMSTE & VOEDSELUITGAWES**

33. Do the following members of the household contribute to the total household income? (Dra die volgende *lede van die huishouding by tot die totale huishoudelike inkomste?)*	**YES/**JA	**NO/**NEE
33.1 Mother (*Ma*)		
33.2 Father (*Pa*)		
33.3 Son (*Seun*)		

33.4 Daughter (*Dogter)*		
33.5 Grandparents (*Oupa/ Ouma*)		
33.6 Uncle/ Aunt (*Oom/ Tannie*)		
33.7 Fiancée (*Verloofde*)		
33.8 Friend (*Vriend*)		
33.9 Other (*Ander*)		
33.10 Only myself *(Net ek*)		

34. What is the total income of the household PER MONTH? [Tick only one]

(Wat is die totale inkomste van die huishouding PER MAAND?) [Merk slegs een]

< R 1 363	1
R 1 364 - R 1 928	2
R 1 929 - R 2 257	3
R 2 258 - R 3 137	4
R 3 138 - R 4 164	5
R 4 165 - R 6 321	6
R 6 322 – R 9 319	7
R 9 320 - R 13 209	8
R 13 210 - R 17 987	9
R 17 988 - R 26 705	10
R 26 706 - R 32 521	11
>R 32 522	12

35. How often do you do grocery shopping for food? *[Tick only one]*

(Hoe gereeld doen u kosinkopies?) [*Merk slegs een*]

35.1 Every day (*Elke dag)*	
35.2 Once a week (*Eenkeer 'n week*)	

35.3 Once a month (*Eenkeer 'n maand*)	
35.4 More than once a month (Meer as eenkeer n maand)	
35.5 Other, specify (*Ander, spesifiseer*) _____	

36. How much money is spent on food PER MONTH, by the household? [*Tick only one]*

(Hoeveel geld word aan kos, PER MAAND,spandeer, deur die huishouding?) [Merk slegs een]

R 100 – R 500	1
R 501 – R 1000	2
R 1001 – R 1500	3
R 1501 – R 2000	4
R 2001 – R 2500	5
R 2501 – R 3000	6
> R 3000	7
Do not know *(Ek weet nie)*	8

37. On which one of the following do you MAINLY spend your income?

(Op watter een van die volgende spandeer u die MEESTE van u inkomste?)

Food *(Kos)*	1
Clothes *(Klere)*	2
Housing/ household aspects e.g. Rent, furniture, appliances *(Behuising/huishoudelike aspekte bv. Huurgeld, meubels, toestelle)*	3
Transport *(Vervoer)*	4
School-/ University fees *(Skoolfonds/ Universiteitsgelde)*	5
Other *(Ander)*	6

Thank you for your willingness to participate in this research study. It is highly appreciated!

(Dankie vir u bereidwilligheid om aan die navorsingstudie deel te neem. Dit word opreg waardeer)

Addendum C: Additional results tables

Table 2 Detailed information of the respondents' food consumption patterns (n=103)

	Never / Very seldom		1 day/week		2 – 4 days / week		More than 4 days/week		1 x/day		More than once a day	
Food Product	n	%	n	%	n	%	n	%	n	%	n	%
Grains												
Bread	11	10.7	28	27.2	38	36.9	1	1.0	24	23.3	1	1.0
Maize Meal	3	2.9	7	6.8	11	10.7	4	3.9	70	68	8	7.8
Sorghum/ Maltabella	73	70.9	12	11.7	12	11.7	0	0.0	6	5.8	0	0
Samp	68	66	21	20.4	14	13.6	0	0.0	0	0	0	0
Rice	28	27.2	53	51.5	17	16.5	2	1.9	2	1.9	1	1.0
Vetkoek	65	63.1	18	17.5	11	10.7	3	2.9	4	3.9	1	1.0
Instant breakfast cereal: corn flakes / Wheat-Bix	66	64.1	6	5.8	8	7.8	1	1.0	21	20.4	1	1.0
ProNutro	87	84.5	8	7.8	2	1.9	1	1.0	5	4.9	0	0
Vegetables												
Morogo: green leafy vegetables	26	25.2	20	19.4	53	51.5	1	1.0	2	1.9	1	1.0
Potatoes	8	7.8	26	25.2	54	52.4	5	4.9	10	9.7	0	0
Corn	91	88.3	8	7.8	3	2.9	0	0	1	1.0	0	0
Carrots	38	36.9	43	41.7	18	17.5	1	1.0	2	1.9	1	1.0
Sweet Potatoes	67	65.0	25	24.3	9	8.7	1	1.0	1	1.0	0	0
Pumpkin	15	14.6	63	61.2	17	16.5	3	2.9	5	4.9	0	0

Cabbage	29	28.2	44	42.7	21	20.4	1	1.0	6	5.8	2	1.9
Green beans, peas	48	46.6	33	32.0	17	16.5	4	3.9	1	1.0	0	0
Fruits	17	16.5	21	20.4	26	25.2	1	1.0	36	35.0	2	1.9
Dairy												
Fresh Milk	13	12.6	12	11.7	28	27.2	3	2.9	36	35.0	11	10.7
Inkomaas/ Amazi/ yoghut	35	34.0	30	39.1	31	30.1	1	1.0	6	5.8	0	0
Powdered milk / Nespray, Elite	93	90.3	3	2.9	1	1.0	0	0	6	5.8	0	0
Non-dairy creamer												
Powdered coffee creamer: Cremora	31	30.1	1	1.0	9	8.7	1	1.0	54	52.4	7	6.8
Animal proteins												
Chicken	8	7.8	14	13.6	50	48.5	4	3.9	23	22.3	4	3.9
Pilchards: Lucky star	62	60.2	21	20.4	18	17.5	0	0	1	1.0	1	1.0
Fish	81	78.6	12	11.7	9	8.7	0	0	0	0	1	1.0
Liver	62	60.2	21	20.4	20	19.4	0	0	0	0	0	0
Bully beef	81	78.6	13	12.6	8	7.8	0	0	0	0	1	1.0
Beef stew	63	61.2	24	23.3	16	15.5	0	0	0	0	0	0
Beef mince	61	59.3	23	22.3	17	16.5	1	1.0	1	1.0	0	0
Pork	67	65.0	19	18.4	15	14.6	0	0	2	1.9	0	0
Eggs	22	21.4	18	17.5	42	40.8	1	1.0	17	16.5	3	2.9
Plant proteins												
Beans: red, white, black	48	46.6	39	37.9	13	12.6	1	1.0	1	1.0	1	1.0
Lentils	98	95.1	4	3.9	1	1.0	0	0	0	0	0	0
Chick peas	99	96.1	3	2.9	1	1.0	0	0	0	0	0	0
Nuts, Peanuts	27	26.2	29	28.2	32	31.1	4	3.9	10	9.7	1	1.0

Addendum D: NWU Archive Policy

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
INSTITUTIONAL OFFICE

Records Management Policy

Reference number	2P/2.11
Accountable executive manager	Institutional Registrar
Policy owner	Manager: Records Management and Administration
Responsible division	Records Management and Administration
Status	Approved
Approved by	Council
Date of approval	20 November 2009
Amendments	This policy replaces the policy as first approved by Council on 22 September 2006.
Date of amendments	2009
Review date	November 2010
Procedures in terms of this policy	Yes – reference numbers 2Pr/2.11.2A, 2Pr/2.11.2B and 2Pr/2.11.3 available at https://intranet.nwu.ac.za/opencms/export/intranet/html/en/fileplan/Rekordbestuursprogram/index.html
Web address of this policy	http://www.nwu.ac.za/gov_man/policy/index.html
Address on the policy data base	Amanda van der Merwe(10935746) R:\2. Management\2.1.3 Policy development and review\2.1.3.2 Review\Database\Policy documents\2P-2.11-records management_e.docx

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
INSTITUTIONAL OFFICE

Records Management Policy

1 Preamble

As a pre-eminent university in Africa, driven by the pursuit of knowledge and innovation, with a unique institutional culture based upon the values the University espouses, the North-West University has adopted this Records Management Policy on 20 November 2009 to become operational on 1 January 2010.

This policy replaces the Records Management Policy adopted by Council on 22 September 2006.

2 Policy statement

It is the policy of the North-West University to manage its records in an accountable, effective and efficient manner through the implementation of a records management programme that takes into account related objectives such as orderly classification of records, retention and disposal, accessibility, security and confidentiality, training and performance and quality management.

The North-West University is dependent on its records as its corporate memory to operate efficiently, consistently and productively and to account for its actions. This policy defines a structure for the North-West University to ensure that official records are identified and maintained and that they are managed and controlled effectively and at best value, commensurate with the NWU's vision, values and mission as well as legal, operational and information requirements.

It is furthermore the policy of the NWU to comply with the Promotion of Access to Information Act (No 2 of 2000) (PAIA) and the broad principles of records management that are required by the National Archives and Records Service Act (No 43 of 1996), the International Standard for Records Management (ISO15489) and the South African National Standard for Records Management (SANS 15489) together with the Constitution of the Republic of South Africa and other applicable legislation.

3 Definitions

3.1 Records

At the NWU records refer to anything that is produced due to the undertaking of a business activity or legislative requirement, and is evidence of the fact that a process or procedure took place in support of the activity or requirement.

This policy relates to all operational and archival records to include, but not limited to:

- Administrative records (including records on the activities and processes of governance, management, human resources, finances, facilities, branding, marketing and communication, student administration, systems and affairs, teaching-learning, research and implementation of expertise)
- Records other than administrative records such as microfilm, audio-visual (such as CD's and DVD's), paper (photo's, maps, charts), and electronic (e.g. computerised financial, human resource and student systems).
- Records in all electronic formats (including websites, e-mail, etc).
- Records in the Archives of the NWU managed under the Archives and Museums Policy.

3.2 Archives

Archives are either the records/collections housed (according to archival practices and principles) in one of the official NWU Archives or refer to the official Archive buildings situated on the three campuses of the NWU and under the control of the institutional and campus archivists or archive managers.

3.3 Disposal

Disposal refers to the action when a record identified in the NWU file plan as an official NWU record, is either destroyed (according to the set procedure) or archived at one of the official NWU Archives (according to the set procedure) after the expiry of the retention period indicated in the NWU file plan and disposal schedule.

3.4 Retention

Retention refers to the period an official NWU record has administrative or operational value to the NWU and should be kept in safe and secure custody in records storage areas or the network drive or approved electronic system by the relevant record owner until a disposal action is undertaken.

3.5 NWU File plan and disposal schedule

The NWU file plan and disposal schedule is a pre-determined and logical structure into which official NWU records are arranged and stored according to subjects in order to facilitate efficient retrieval and disposal of records. The file plan contains the reference number, subject description and disposal instruction of files/folders held in an office and assigns responsibility for the record to a responsible office/person. The disposal instructions in the NWU file plan and disposal schedule grants a standing disposal authority for all the records mentioned therein.

3.6 NWU Records management programme

The NWU records management programme is the systematic and consistent control of all NWU records as identified in the NWU file plan and disposal schedule throughout their lifecycles and includes the sub programmes related to identification, classification, disposal, maintenance, risk management, compliance monitoring, quality and performance management, training, etc.

3.7 Records storage areas for hard copy records

Records storage areas refer to areas/rooms in buildings designated for the safe and secure storage of official NWU records for the duration of the retention period and until a disposal action is undertaken.

4 Rules and procedures

These rules and procedures are applicable to both paper-based, micrographic, audio-visual and electronic records.

4.1 Council is responsible for the existence and monitoring/review of a Records Management Policy. Institutional Management, in particular the Vice-Chancellor (as chief information officer according to PAIA) with powers of delegation to the Institutional Registrar, has overall responsibility for ensuring that records are managed responsibly within the NWU.

The Records Management and Administration department under leadership of the Institutional Registrar is responsible for instituting, implementing, facilitating and coordinating a records management programme at the NWU. The Manager: Records Management and Administration is also the records manager of the NWU.

Campus Registrars, through the records management representatives on the campuses, as well as all line managers on the campuses and in the Institutional Office are responsible for ensuring that the records management policy is implemented in their individual areas of responsibility.

It is the responsibility of all staff and student leadership to ensure that they keep appropriate records (as defined by the NWU file plan) of their work at the NWU and manage those records in keeping with this policy.

4.2 All records created during execution of the NWU's activities and processes (paper based, electronic, micrographic and audio-visual) are the property of the NWU, and must be managed in accordance with this policy.

4.3 All records must be classified and filed according to a classification and filing system known as the NWU file plan and disposal schedule managed by the Records Management and Administration department. This classification system may not be revised or added to without the approval of Records Management and Administration. The NWU file plan and disposal schedule will be updated annually or as required by the record owners.

4.4 No records may be disposed of without adherence to the disposal instructions in the NWU file plan and disposal schedule. Disposal of records must take place according to the disposal instructions in the NWU file plan by the indicated record owner to ensure records and the information within them can be efficiently retrieved by those with a legitimate right of access thereto, for as long as the records are held by the university. These disposal instructions were compiled in accordance with statutory requirements and the operational needs of the department/faculty. The procedure for the disposal of records must be followed.

4.5 The disposal actions undertaken will be documented in the transfer lists of the Archives, or the destruction register held by the Records Management and Administration department.

4.6 All records should be kept in safe and secure custody (either in records storage areas in case of hard copy records or on the network drive or approved electronic systems in case of electronic records)

according to prescribed procedures and guidelines provided by the Records Management and Administration department and Information Technology Central.

4.7 Generic and specific training in records management as well as records management awareness campaigns will be presented at regular intervals. Identified staff should attend training in records management as provided by the Records Management and Administration department.

4.8 In order to ensure compliance with this policy, the Records Management and Administration department will undertake sporadic compliance audits and record owners are obliged to partake in these audits.

4.9 Annual performance and quality management of the records management programme will transpire to ensure the quality and integrity of the programme and to monitor the application of records management procedures against agreed indicators and to take action to improve records management standards as necessary.

4.10 An electronic records management programme with complete records management capabilities will be implemented with the assistance and support of Information Technology Central.

Current details: Amanda van der Merwe(10935746) R:\2. Management\2.1.3 Policy development and review\2.1.3.2 Review\Database\Policy documents\2P-2.11-records management_a.docx
14 June 2010

Addendum E: Authors' guidelines for research article

For Authors

Why publish with SciEP?

Science and Education publishing (SciEP) is an ideal outlet for the publication of your significant research findings. SciEP's main goal is to increase the importance of science worldwide, to give all researchers equal opportunity to share ideas, develop their career and for their work to have impact around the world.

Publication of your significant research findings in Journals of SciEP will enable your research to reach the widest available audience in your field of expertise. Your published papers will be available online with Open Access Policy and will be available for immediate citation.

Open Access – All the journals in SciEP are free from all access barriers, allowing for the widest possible global dissemination of your work, leading to more citations.

Online Submission System – An efficient, easy, and user friendly online submission system reduces the overall time from submission to publication.

Rapid Publication – Online submission, rapid peer review and production make the process of publishing your article simple and efficient.

Peer-reviewed – All SciEP journals have a high standard of peer review.

Extensive Indexing – All articles published in SciEP journals are included in some major bibliographic databases so that your work can be found easily and cited by researchers around the world.

Plagiarism Policy

Whether intentional or not, plagiarism is a serious violation. Plagiarism is the copying of ideas, text, data and other creative work (e.g. tables, figures and graphs) and presenting it as original research without proper citation. We define plagiarism as a case in which a paper reproduces another work with at least 25% similarity and without citation.

If evidence of plagiarism is found before/after acceptance or after publication of the paper, the author will be offered a chance for rebuttal. If the arguments are not found to be satisfactory, the manuscript will be retracted and the author sanctioned from publishing papers for a period to be determined by the responsible Editor(s).

Instructions to Authors

Online submission of manuscript is now mandatory for all types of paper.
Please prepare your manuscript following the instructions for authors given below before submitting it online at http://www.sciepub.com/author. If submission is completed successfully, a paper ID will be allocated to you and an e-mail acknowledgement will follow. All subsequent correspondence should be sent to the Assistant Editor, David Rain, at editor@sciepub.com.

Required files
Manuscripts must be in Microsoft Word format only.

Preparation of Manuscripts
Manuscripts should be in English and written in a concise, straightforward style. Authors not fluent in English are advised to have their manuscript checked by a colleague with a good command of the language. The manuscript should present scientific findings which are essentially new and which have not been published or submitted for publication elsewhere. Review papers are also welcomed.

1. Format:
Prior to submission, authors who believe their manuscript would benefit from professional editing are encouraged to use language-editing and copyediting services. Obtaining this service is the responsibility of the author, and should be done before initial submission. A template (download) is available to guide authors in the preparation of the manuscript.

2. Length:
Although there is no page limit for a Regular Paper, it is strongly suggested that a complete manuscript be no less than 5 pages and no more than 25 pages (10 pt, double-spaced, including figures, tables, and references).

3. Sections of Manuscript:
Articles should be organized into the following sections:
Reviews and Mini-reviews
Article Title, Authors' names and institutional affiliations, Abstract and Keywords, Introduction, Main text (divided into subheadings), Conclusions, Acknowledgements (if any), Statement of Competing Interests, List of Abbreviations (if any), References.
Research Articles
Article Title, Authors' names and institutional affiliations, Abstract and Keywords, Introduction, Materials and Methods, Results, Discussion, Conclusions, Acknowledgements (if any), Statement of Competing Interests, List of Abbreviations(if any), References

3.1. Title (20 words or less)
The title should accurately, clearly, and concisely reflect the emphasis and content of the paper. The title must be brief and grammatically correct. Titles do not normally include numbers, acronyms, abbreviations or punctuation. They should include sufficient detail for indexing purposes but be general enough for readers outside the field to appreciate what the paper is about. The title should be no more than 20 words in length.

3.2. Authors' names and institutional affiliations
This should include the full author names (with no titles or qualifications), institutional addresses (Department, Institute, City, Post/Zip code, Country), and email addresses for all authors. Authors and affiliations must be linked using superscript numerals. The corresponding author should also be indicated.

3.3. Abstract and Keywords
The abstract should be comprehensive but concise consisting of no more than 300 words and should be structured to give a brief introduction to the study, main findings of the study, conclusions drawn from the study and their significance. Do not include references, headings and non-standard abbreviation. While the abstract is conceptually divided into three sections

(Background, Methodology/Principal Findings, and Conclusions/Significance), please do not apply these distinct headings to the abstract within the article file. Please do not include any citations and avoid specialist abbreviations. Also provide 5-7 carefully chosen keywords.

3.4. Introduction

Here authors should make a case for the study, providing a brief literature survey (avoid citing literature older than ten years, unless absolutely necessary) and background to the study, the hypothesis and the significance of the presented research.

3.5. Materials and Methods

Experimental procedures should be given in sufficient detail to allow these to be replicated by other researchers. The source of the various reagents and materials used in the study should be given, where possible.

3.6. Results

The results section should provide details of all of the experiments that are required to support the conclusions of the paper. There is no specific word limit for this section, but details of experiments that are peripheral to the main thrust of the article and that detract from the focus of the article should not be included. The section may be divided into subsections, each with a concise subheading. Large datasets, including raw data, should be submitted as supporting files; these are published online alongside the accepted article. We advise that the results section be written in past tense.

3.7. Discussion

This section should present comprehensive analysis of the results in the light of any previous research. Discussion may also be combined with results.

3.8. Conclusions

Conclusion section should bring out the significance of your research paper, show how you've brought closure to the research problem, and point out remaining gaps in knowledge by suggesting issues for further research.

3.9. Acknowledgements

The authors should first acknowledge the source of funding for the research presented in their article followed by any personal credits.

3.10. Statement of Competing Interests

Include an explicit disclosure of any competing interests (financial or others) that may have influenced the study or the conclusions drawn from the study. If none, state 'the authors have no competing interests'.

3.11. List of Abbreviations

Define all non-standard abbreviations in parenthesis on their first appearance in the text as well as provide a list. Standard abbreviations need not to be included in the list.

3.12. References

The reference list appears at the end of your paper. It provides the information necessary for a reader to locate and retrieve any source you cite in the body of the paper. Each source you cite in the paper (with the exception of personal communications) must appear in your reference list; likewise, each entry in the reference list must be cited in your text. Only

published or accepted manuscript should be included in the reference list. Papers that have been submitted but not yet accepted should not be cited. Limited citation of unpublished work should be included in the body of the text only as “unpublished data”.

Citation

As you write your report, you will cite your references. A citation to a reference in the body of the text is indicated by a bracketed number corresponding to the reference number in the References section. Example: During high stress periods, individuals should focus on the situation-specific tasks rather than rely on general knowledge structures. [1]

Reference Formats

GENERAL INSTRUCTIONS

A complete reference should contain the name(s) of the author(s) and/or editor(s), the title of the article, the name of the book or conference proceedings where appropriate, and bibliographic information about the article such as the name of the publisher, the city of publication, and the page numbers. The basic concept is that the reference should be sufficiently complete so that the reader could readily find the reference and can judge the authority and objectivity of the reference.

All author names appear as Last name, Initials. For example, if Kirsten Patrick is the primary author and Alice M. Agogino is the second author, the correct appearance of the author names would be: Patrick, K., and Agogino, A.M.

Books

Standard format

Authors, *Title*(in italics), Publisher, City of Publication, Year of Publication, page numbers(if appropriate).

Example：

1. Fogg, B.J, *Persuasive technology: using computers to change what we think and do*, Morgan Kaufmann Publishers,
Boston, 2003, 30-35.

Journal articles

Standard format

Authors, “Title of the article,”*Journal name*(in italics), Volume (Issue), Pages, Month Year.

Example：

Hirsh, H., Coen, M.H., Mozer, M.C., Hasha, R. and Flanagan, J.L, “Room service, AI-style,” IEEE *intelligent systems*,
14 (2). 8-19. Jul.2002.

Conference Proceedings

Standard format

Authors, “Title of the article,” in *Title of conference*(in italics),Publisher, Pages.

Example：

Leclercq, P. and Heylighen, “A. 5,8 Analogies per hour: A designer's view on analogical reasoning,” in
7th International Conference on Artificial Intelligence in Design, Kluwer Academic Publishers, 285-303.

E-Books

Standard format

Authors, *Title of E-book*(in italics),Publisher, Date of original publication.
[Format] Available: Source.

Example：

T. Eckes, *The Developmental Social Psychology of Gender*, Lawrence Erlbaum, 2000.
[E-book] Available: netLibrary e-book.

E-journal
Standard format
Authors, "Title of Article," *Title of Journal*(in italics), Volume (Issue), pages, month year. [Format] Available: Database Name (if appropriate), article number (if given), internet address. [Accessed date of access].
Example：
A. Altun, "Understanding hypertext in the context of reading on the web: Language learners' experience,"
Current Issues in Education, 6(12), July 2003. [Online].
[Online]. Available: http://cie.ed.asu.edu/volume6/number12/. [Accessed Dec. 2, 2004].

3.13. Tables
The table title should be concise, no more than one sentence. The rest of the table legend and any footnotes should be placed below the table. Footnotes can be used to explain abbreviations.
Tables must be cell-based, such as would be produced in a spreadsheet program or in Microsoft Word. Do not provide tables as graphic objects. Tables must be no larger than one printed page (7inches x 9.5inches). Larger tables can be published as online supporting information. Bold and italics formatting will be preserved in the published version; however, more extensive formatting will be lost. Do not include color, shading, lines, rules, text boxes, tabs, returns, or pictures within the table.
All tables must be numbered consecutively (in Arabic numbers). Table headings should be placed (centered) above the table. Place tables as close as possible to where they are mentioned in the main text. All Tables should be referred to in the text as Table 1, Table 2, etc.

3.14. Figures
Figures should be as small and simple as is compatible with clarity. The goal is for figures to be comprehensible to readers in other or related disciplines, and to assist their understanding of the paper. Unnecessary figures and parts (panels) of figures should be avoided: data presented in small tables or histograms, for instance, can generally be stated briefly in the text instead. Avoid unnecessary complexity, coloring and excessive detail.
All illustrations should be original drawings or photographic prints of originals. Photographs should be glossy prints. Photocopies are often not good enough and should be avoided. All illustrations must be numbered consecutively, as Fig. 1, Fig. 2. Center figure captions beneath the figure. Do not assemble figures at the back of your article, but place them as close as possible to where they are mentioned in the main text. No part of a figure should go beyond the typing area.

3.15. Figure Legends
The aim of the figure legend should be to describe the key messages of the figure, but the figure should also be discussed in the text. Each legend should have a concise title of no more than 15 words. The legend itself should be succinct, while still explaining all symbols and abbreviations. Avoid lengthy descriptions of methods.

3.15. Equations
Number equations consecutively. Equation numbers, within parentheses, are to position flush right, as in Eq. (1) or equation (1), using a right tab stop.

$$y = f(x) \quad (1)$$

Note that the formula is centered using a center tab stop. Be sure that the symbols in your formula have been defined before or immediately following the equation. Use “Eq. (1)” or “equation (1)”, not “(1)”, in the sentences.
Notation. Notation must be legible, clear, compact, and consistent with standard usage. In general, acronyms should be defined at first use.
Variables and Vectors. Set single-letter variables in italics (e.g. m). Set vectors in boldface (e.g. E). Derivative "d," abbreviations, and multi-letter identifiers should be set in roman (plain) type (e.g. cos, ∫...dx).

4. Submission self-checklist
Before submitting your manuscript online, please check that all style and format requirements have been carefully followed.
» English spelling and punctuations are used throughout the paper.
» The paper is original, not submitted anywhere else.
» The length of the paper is commensurate with content.
» The title and headings are brief and catchy.
» Names and affiliations (including postal codes) of all authors are correct and complete.
» Figures are of sufficient quality for printing, with clear resolution of detail.
» Abstract and keywords are provided.
» All table captions and figure legends are provided.
» Tables/Figures are properly placed and numbered with brief titles/ captions.
» References are in standard style.

Publishing process

The following sections summarize the journals' publishing processes and describe how manuscript are handled from submission to publication. At all stages of the process, you can access the online submission system and find the status of your manuscript.

1) Author submits a manuscript

2) Journal editor screens manuscript
Within one week of being submitted, each journal paper undergoes a preliminary review by the journal editor. The journal editor decides among three options for routing the paper:
The journal editor decides among three options for routing the paper:
Send out for review.
The manuscript meets the basic requirements of SciEP. At least two reviewers will be located by the journal editor, who will send each reviewer a copy of the paper.

Return for revision If your manuscript has not passed the preliminary review, the review comment will be returned to you for revision.

Rejection without peer review While manuscript have to go through the peer review process in order to be published, they can be rejected without peer review. For high-impact, general science journals, the majority of submitted papers may be rejected in this manner. While this may appear surprising or disturbing, it is essential to understand the underlying reasons and the inevitability of this undesired aspect of the research publication process.

There could be many reasons for rejection without review:

1. Content of the article is not within the scope of the journal.
2. Non-conformity with journal style, format or guidelines.
3. Duplication or large overlap with existing work or apparent plagiarism.
4. Results are not novel or significant enough; lead to only an incremental advance in field.
5. Article is too specialized/in-depth or superficial.
6. Limited interest to journal target audience.
7. Poor quality of research.
8. Results or interpretation are too preliminary or speculative.
9. Lack of clarity/conciseness in presentation.

3) Manuscript is peer reviewed

4) Journal editor/editorial board decides whether to publish

Once peer review has been completed, the original author(s) of the article will modify their submission in line with the reviewers' comments, and this is repeated until the editor is satisfied.

Review Decisions by Reviewers and Editors:

1. Accept in present form

The reviewer will decide that the manuscript is ready for publication in its present form when at least two reviewers are in agreement. The associate editor will sum up the results of the review and report them to the chief editors. The secretary will then send an acceptance letter to the author on behalf of the chief editors. The paper will be moved to final editing for online publication.

2. Revision Required

The reviewer will decide that the paper is not ready for publication and needs revision when at least two reviewers are in agreement. The associate editor will send the reviewers' comments to the author for revision. The author should include with his(her) resubmitted version a new cover letter that includes a point-by-point response to the reviewers' and editors' comments, including an explanation of how you have altered your manuscript in response to these, and an estimation of the length of the revised version with figures/tables.

3. Declined final

The reviewers will decide that the paper is inappropriate for publication when at least two reviewers are in agreement. No revisions will be requested for further consideration. The paper may not be resubmitted without substantial revision.

5) Copy Editing and Typesetting

Copy editing seeks to ensure that an article conforms to the journal's house style, that all of the referencing and labelling is correct, and that there are no spelling or grammatical errors. Typesetting deals with the appearance of the article — layouts, fonts, headings etc., both for print and online publication.

Copy editing and typesetting are carried out by copyeditors (also called subeditors), who refine it so that the text and figures are readable and clear to those outside the immediate field; choose keywords to maximize visibility in online searches as well as suitable for indexing services; and ensure that the papers conform to house style. The copyeditors are happy to give advice to authors whose native language is not English, and will edit those papers with special care.

6) Proof Reading
The typeset first proofs are sent to the author electronically as a PDF. Corrections to the proofs should be minor – authors should not rewrite or make substantial additions.

7) Printing
The final text and cover proofs will undergo a thorough editorial review before they are accepted and sent to print. All papers are published in the print edition and, in PDF and HTML format, in the online edition of the journal, in full.