Exploring household food security in the Vaalharts area

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But Jesus beheld them, and said unto them, 'With men this is impossible; but with God all things are possible' Matthew 19:26

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OPSOMMING

Inleiding: Voedselsekerheid binne huishoudings is noodsaaklik want dit stel verbruikers in staat om ‘n gesonde en produktiewe lewe te lei. Bepalende faktore vir huishoudings om as voedselseker geklassifiseer te word, is die beskikbaarheid, toeganklikheid en gebruik van voedsel op 'n volhoubare wyse omdat voedsel beskikbaarheid en toeganklikheid alleen nie genoeg is vir huishoudings om voedselseker te wees nie. Die gebruiksaspek van voedsel rakende voedselsekuriteit, wat insluit voedsel verbruik, voedselkennis en voedsel hantering moet ook in ag geneem word want dit bepaal die hoeveelheid, gehalte en veiligheid van voedsel. Hoë persentasies van gemeenskappe in die Noord-Kaap provinsie van Suid-Afrika het onvoldoende toegang tot voedsel, is werkloos, het ’n lae opvoedingspeil, en leef onder die broodlyn. Al hierdie aspekte dra tot voedselonsekere huishoudings by. Daar was op ‘n spesifieke gemeenskap binne die Noord-Kaap besluit om navorsing te doen rakende hulle voedselsekerheid status, naamlik die Vaalharts Besproeïngskema (VB). Die VB was genader omdat hulle aangedui het dat hul ‘n behoefte het om bewus gemaak te word van higiëne en die verbruik van voldoende en verskeidenheid voedsel. ***Doelwit:*** Die doel van die studie was om werknemers van die VB se voedselsekerheidstatus te verken. Die fokus van die studie was dus op verbruikers wat ‘n stabiele inkomste verdien. Toegang tot voedsel en die gebruik van voedsel is fundamentele aspekte wat huishoudelike voedselsekerheid bepaal en daarom word selfproduksie-aktiwiteite, voedselkennis en verbruik van voedsel ondersoek. ***Metodologie:*** ’n Kwantitatiewe metode was gebruik om die studiepopulasie se voedselsekerheid status te ondersoek deur middel van ’n doelgerigte steekproef en onderhoudvoerende beheerde vraelyste (n=162). Die studie was uitgevoer op die perseel van die VB oor 'n tydperk van drie weke. Data-analise was deur Statistiese Konsultasiediens van die Noordwes-Universiteit met die Statistiese Program vir Sosiale Wetenskappe (SPSS) uitgevoer. ***Resultate:*** Ongeveer een derde (29.6 %) van die respondente se huishoudings was as voedselseker geklassifiseer terwyl bykans die helfte (48.8%) van die huishoudings in hierdie studie ’n risiko gehad het om voedselonseker te wees en 21.6% van huishoudings voedselonseker was. Slegs 'n paar respondente was betrokke by selfproduksie-aktiwiteite met die beperkte beskikbaarheid van ruimte as die grootste probleem. Goeie basiese voedselkennis was geïdentifiseer onder respondente, en voedselseker respondente het ’n beter voedselkennis as voedselonseker respondente gehad. Voedselonseker respondente het ’n beperkte verskeidenheid voedsel verbruik wat meestal bestaan het uit mieliepap, hoender en melk. Daar was ‘n tendens onder die risiko tot voedselonsekerheidgroep respondente om ’n groter verskeidenheid van proteïenryke voedselprodukte wat ook duurder is te verbruik. Oor die algemeen het respondente wat voedselseker was ’n groter verskeidenheid voedselgroepe verbruik. Daar was ook ’n bykomende probleem geïdentifiseer. Respondente wat ‘n risiko gely het om voedselonseker te wees asook

voedselonseker respondente het óf nie hul inkomste effektief gebruik nie óf nie hulpbronne soos voedsel wat hul aankoop optimaal gebruik nie. ***Gevolgtrekking:*** Alhoewel al die respondente werknemers was wat maandeliks 'n inkomste verdien het, was slegs 'n klein persentasie voedselseker. Volgens die studie se resultate het basiese voedselkennis, voedsel verbruikspraktyke en inkomste 'n invloed op die algehele voedselsekerheidstatus van die verbruikers gehad. Hierdie aspekte wat 'n invloed op die verbruikers se voedselsekerheidstatus het, moet veral aangespreek word onder respondente wat moontlik in die risiko groep val of reeds voedselonsekerheid ervaar, deur middel van voedselverwante gesondheidsorginligting. Voedselverwante gesondheidsorginligting moet deur verskeie kanale (skole, klinieke, kerke) aan gemeenskappe beskikbaar gestel word om sodoende verbruikers bewus te maak van aspekte wat hulle voedselsekerheidstatus negatief kan beïnvloed asook hoe om hul voedselsekerheid status te verbeter.

Sleutelwoorde: Voedselsekerheidstatus, voedselkennis, voedselverbruik, voedselhantering, voedselveiligheid

SUMMARY

Introduction: Food security is essential amongst households as it enables consumers to live a healthy and productive life. Determining factors for households to be classified as food secure is the availability, accessibility and utilisation of food in a sustainable manner as food availability and accessibility alone are not enough for households to be food secure. The food utilisation aspect of food security, which includes the type of food consumed, food knowledge and food handling practices, should therefore also be considered as it determines the quantity, quality and safety of food. High percentages of the population in the Northern Cape province of South Africa has inadequate access to food, is unemployed, poorly educated, and living below the poverty line. All these aspects contribute to food insecure households. A specific community within the Northern Cape was chosen to do research regarding households' food security status, namely the employees of the Vaalharts Irrigation Scheme (VIS). The VIS was approached as consumers at the Vaalharts region indicated a need to improve their awareness regarding hygiene and the consumption of adequate and a variety of food. ***Objective:*** The aim of the study was to explore employees of the VIS' food security status. The focus of the study was therefore on consumers who earn a stable income. As food access and utilisation are fundamental aspects in determining household food security, self-production activities, food knowledge, and consumption were investigated. ***Methodology:*** A quantitative method was used to explore the study population's food security status with the use of a purposive sample and interviewer-administered questionnaires (n=162). The study was conducted at the premises of VIS over a period of three weeks. Data analysis was performed by Statistical Consultation Services of the North-West University using the Statistical Program for Social Sciences. ***Results:*** Nearly one third (29.6%) of respondents' households were classified as food secure while almost half (48.8%) of households were at risk of being food insecure and 21.6% were food insecure. Only a few respondents were engaged in self-production activities with limited space being the main problem. Good basic food knowledge was identified amongst respondents and food secure respondents had better food knowledge than food insecure respondents. Food insecure respondents mainly consumed monotonous diets consisting of maize meal, chicken and milk. There was a tendency that at risk respondents consumed a larger variety of food high in protein which is also more expensive. Overall food secure respondents consumed a larger variety of food groups. There was an additional problem identified. Respondents at risk as well as food insecure respondents either do not use their income effectively or do not use resources bought, such as food optimally. ***Conclusions:*** Although all of the respondents were employed, and earned an income, only a small percentage were food secure. According to the findings, basic food knowledge, food consumption practices and income have an influence on respondents' food security status. These aspects which had an influence on respondents' food

security status should be addressed especially amongst at risk and food insecure respondents through food related healthcare information. Food related healthcare information should be made available to the community via several sources (schools, clinics, churches) to improve consumers' awareness regarding aspects which negatively influence their food security status as well as how to improve it.

Key words: Food security, food knowledge, food consumption, food handling, food safety

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CONCEPT CLARIFICATION

Rural: a rural community is characterised by an area or "small town which local economy largely entails agricultural activities" (DoNT, 2011:193) with "few urban amenities and formal economic activities" (Gordon *et al*., 2007:4). Rural areas further consist of a "small population, clustered or dispersed" (DoNT, 2011:193; Gordon *et al*., 2007:4). The Phokwane Local Municipality consists of four small towns: Hartswater, Jan Kempdorp, Pampierstad and Ganspan (FBDM, 2012:24) surrounded by agricultural land (UE, 2004:22). The main economic sector is crop production and some livestock farming (FBDM, 2012:24). The Phokwane Local Municipality could therefore be classified as a rural area. This statement is also supported by Smook (2008:3).

Vaalharts Irrigation Scheme: the Vaalharts Irrigation Scheme (VIS) is an important source of water supporting agricultural activities, creating employment opportunities and contributing to national food security (Verwey & Vermeulen, 2011:155). The VIS covers the whole area from Jan Kempdorp in the Northern Cape to Taung in North West (Verwey & Vermeulen, 2011:157). Although the VIS is extended over both provinces, the study only focused on the Northern Cape, as the majority (31 732 ha) of the VIS is situated in the Northern Cape (Verwey & Vermeulen, 2011:155).

Food security: is the "*physical, social and economic access to sufficient, safe and nutritious food by all household members at all times to meet their dietary and food preference needs for an active and healthy life*" (DoA, 2002:15).

Food insecurity: The state of being without reliable access to a sufficient quantity of affordable, nutritious food (Oxford advanced learner's dictionary, 2011:259).

CHAPTER 1: INTRODUCTION

1.1 Background and motivation

Food security largely depends on the "physical, social and economic access to sufficient, safe and nutritious food at all times to meet consumers' dietary and food preferences for an active and healthy life" (DoA, 2002:15). Globally countries' food security status are negatively affected (FAO, 2006:2) by increased hunger rates (FAO, 2008:6). Hunger is the most severe form of food insecurity (Gettel, 2010:1). Approximately 925 million people in the world were food insecure in 2010 (FAO, 2010b:4) and 805 million undernourished during 2012 to 2014 (FAO *et al*., 2014:8). South Africa is classified as a food secure (Springhall, 2012:25), middle-income country (Altman *et al.*, 2009:7). However, the country still experiences food insecurity on household level (Springhall, 2012:25). Households' food insecurity status might further increase with the high unemployment rates in the country (Altman *et al.*, 2009:7; Stats SA, 2013b:xiii).

The Northern Cape also has high unemployment rates (Stats SA, 2012f:xvi; Stats SA, 2013b:xvi), poverty (Pauw, 2005:7), hunger (46.8%) (Stats SA, 2014b:32) and low education levels (Stats SA, 2012a:14). About a third (31.4%) of households in the Northern Cape province relies on social grants as the main source of income (Stats SA, 2014a:57). The Phokwane Local Municipality, located in the Northern Cape, also has high unemployment rates (37.7%) (Stats SA, 2012a:84), and low education levels (Stats SA, 2012a:76). This might be the consequences of consumers' low functional literacy rates as only 21.9% of the population have graduated from high school and 6.6% have a tertiary qualification (Stats SA, 2012a:76). Consumers' high unemployment rates might contribute to their low income earning capacity, as the median monthly income is only R2 100 (Stats SA, 2010:4). A needs analysis was conducted by Coetzee (2011) in the Vaalharts region, which forms part of the currently known Phokwane Local Municipality in the Northern Cape. Results indicated that consumers have a need to improve their awareness regarding hygiene and the consumption of adequate and diverse food (Coetzee, 2011:23). The Vaalharts Irrigation Scheme (VIS) has identified a need to support employees' well-being. Consumers also experience constraints to food access due to poverty (Coetzee, 2011:22). This study thus focussed on the household food security status of the employees of the VIS by exploring households' self-production activities, food consumption practices and food knowledge regarding food handling practices. Once the above factors influencing food security have been analysed at the VIS, government institutions and non-governmental organisations can co-operative plan effective strategies and appropriate measures to address all causes of household food insecurity.

Food security, on national and household level, is a complex concept with many aspects, (Renzaho & Mellor, 2010:2) which include sustainable availability, accessibility, and utilisation of food throughout the year (UNDP, 2012:9). Food availability in the field, at markets or through self-production (vegetable production and animal rearing) enhances consumers' access to food and contributes to an improved food security status (Renzaho & Mellor, 2010:4, 5). Self-production is an important supplement for hunger reduction and enables consumers to sell some of their produce to earn an income (Hallberg, 2009:14). This might in turn increase their purchasing power and food accessibility through markets (USAID *et al*., 2007:4). On the other hand, self-production activities are restricted due to the seasonality of food crops and limited availability of natural resources such as water, soil (UNDP, 2012:25; Viljoen, 2009:92) and land (FAO, 2011a:15). This force households to depend more on markets (USAID *et al*., 2007:4), transport and purchasing power (Agarwal, 2011:15) in order to have access to food at all times. As fuel prices increase (FAO, 2013a:3) consumers might experience difficulties to have sufficient access to food through markets due to increased transport cost. However, only little is known regarding the self-production activities amongst the employees of the VIS.

Appropriate food utilisation practices, which include basic food knowledge and the consumption of nutritious food which is safely handled and stored, are also necessary for a household to be food secure (Rivera & Qamar, 2003:31; USAID *et al*., 2007:4). Food knowledge enables consumers to make healthy food choices (FAO, 2013b:49) and to handle food in such a way that it is safe for human consumption (Langiano *et al*., 2012:49). All aspects associated with food consumption and food handling is thus related to food knowledge. Developing countries often have inadequate access to safe and nutritious food due to insufficient knowledge regarding safe preparation and storage of food (Valsamis *et al*., 2009:150). Unsafe food handling practices usually occur within domestic kitchens as it is a multi-functional setting which is used for a variety of food and other activities (Redmond & Griffith, 2009:69). Food which was handled unsafely often cause foodborne illnesses (FAO, 2013a:3). Additionally, consumers are unable to absorb nutrients optimally (UNDP, 2012:89) and therefore require more food to meet the nutritional demand (De Muro & Burchi, 2007:5). Lifeplan®, a development programme which strives to improve consumers' overall well-being through education regarding, amongst others, the consumption of a balanced diet and personal hygiene, was introduced to the employees of the VIS (Kruger, 2012). As food knowledge plays an important part in the way food is utilised, food insecure communities' food knowledge should be evaluated and educational programmes can be implemented on a regular basis.

Food consumption practices have a significant effect on consumers' food security status as it contributes to their development, growth and protection against chronic diseases (UNDP, 2012:9, 10). Food consumption practices are influenced by available resources such as income

(FAO, 2013b:49) and are often closely connected to households' food security status (Omonona & Agoi, 2007:404). Food insecure and low income households' diets are often monotonous and consist mainly of cereals and grains (Shisana *et al*., 2013:169, 170) with a low variety of fruits, vegetables and foods high in animal protein (FAO, 2008:29). Consequently, consumers consume an insufficient amount of nutrients (FAO, 2008:29). The affordability of cereals and grains (Vorster, 2013:S33) relative to its satiety value (FAO, 2008:29) might be the consequence of this phenomenon amongst low income households. Adequate food consumption practices are of special importance for the respondents of the present study as all of them are employed and as such, need to be productive.

In some households resources are not optimally used but as expected, food secure households are normally in the middle to upper income groups while food insecure households are usually in the lower income group (Omonona & Agoi, 2007:404). Nevertheless, according to Nord and Brent (2002:8) some food insecure households are also part of the middle to upper income group. This indicates that some consumers do not use their income effectively. Consumers with a lower socio-economic status might purchase more expensive foods rather than higher quality food as it makes them feel as if they belong to a higher socio-economic class (Mbhenyane *et al*., 2008:220). Some households also spend a large amount of their income on paying off debt each month (NCR, 2012:45) which leaves them with only a small amount of income left to purchase food. The different commodities on which consumers spend their income should thus be investigated. Furthermore training/ educational programmes which improve consumers' skills that is used on a daily basis such as budgeting should be more intensely focused on to ensure that consumers use their money effectively.

1.2 Problem statement

Food insecurity is a global phenomenon which is also prevalent in South Africa. There is enough food available in South Africa, but not all citizens have access to food on household level. Different amenities which contribute to food insecurity could be perceived in the Northern Cape and Phokwane Local Municipality as poverty, unemployment and inadequate food access commonly occur amongst these communities. Sustainable access and utilisation of available food are necessary to be food secure. Self-production might therefore contribute to an improved food security status amongst households, but is often restricted by the seasonality of crops and limited availability of land. This forces consumers that live in rural areas to depend more on purchasing power and transport, which is often expensive in order to reach markets. Sufficient food utilisation practices, which include food knowledge, consumption, and handling of safe and nutritious food, are another important aspect of food security. Insufficient knowledge often leads to unsafe food preparation and storage practices which may cause foodborne illnesses.

Consequently consumers' ability to absorb nutrients decrease and they need more food to be food secure. Some consumers can also not afford to purchase a variety of food which further decreases their nutrient consumption. Diets consisting of a low variety of food, mainly cereals and grains, might negatively affect consumers' food security status and productivity. Food consumption practices might be positively influenced by optimal usage of resources such as income. Mismanagement of income, for example consumers purchasing expensive food with a low nutrient value or using most of their income to pay off debt every month is a concern. Additionally, consumers have less money available to purchase a variety of food for a healthy diet and are more prone to be food insecure.

1.3 Aim

The aim of the study was to explore the food security status of the employees of the VIS. Therefore the study focused on consumers who earn a monthly income. As food access, availability and utilisation are important aspects of household food security, self-production activities, food knowledge and consumption practices were investigated.

1.4 Objectives

The objectives of the study were to:

- Determine households' food availability and access through self-production,
- Determine if respondents have basic food knowledge regarding food usage and hygiene practices,
- Explore households' food consumption practices,
- Determine households' food security status, and
- Recommend appropriate practices to use resources optimally.

1.5 Demarcation of the study population

The inclusion criteria for the present study required that consumers had to be employees of the VIS and be 18 years or older. The employees of the VIS were the target population in the present study, as the North-West University of the Potchefstroom Campus is involved in an umbrella project, the Water Innovation Network (WIN) project, conducted at the VIS. One of the aspects addressed by the WIN project is consumers' food security status. Literature also indicated that consumers of the Vaalharts region, which include the employees of the VIS, do not have sufficient access to food. Furthermore, it was indicated that consumers in the

Vaalharts region have a need to improve their awareness regarding hygiene and the consumption of adequate and a variety of food (Coetzee, 2011:23). These needs direct to a certain extent the study's objectives.

1.6 Method of investigation

A quantitative exploratory research approach in the form of a survey was followed and data were collected through interviewer-administered questionnaires at the premises of the VIS. Purposive sampling was used in the present study. The employees of the VIS were specifically chosen as they indicated a need to be more aware of hygiene and the consumption of adequate and a variety of food. One hundred and sixty two respondents participated in the study.

1.7 Conceptual framework

Individual aspects of food security applicable to this study were explained through a conceptual frame (Figure 1.1) adapted from the Food Insecurity, Vulnerability Information and Mapping Systems Initiative (FIVIMS) conceptual model (Verduijn, 2005:11).

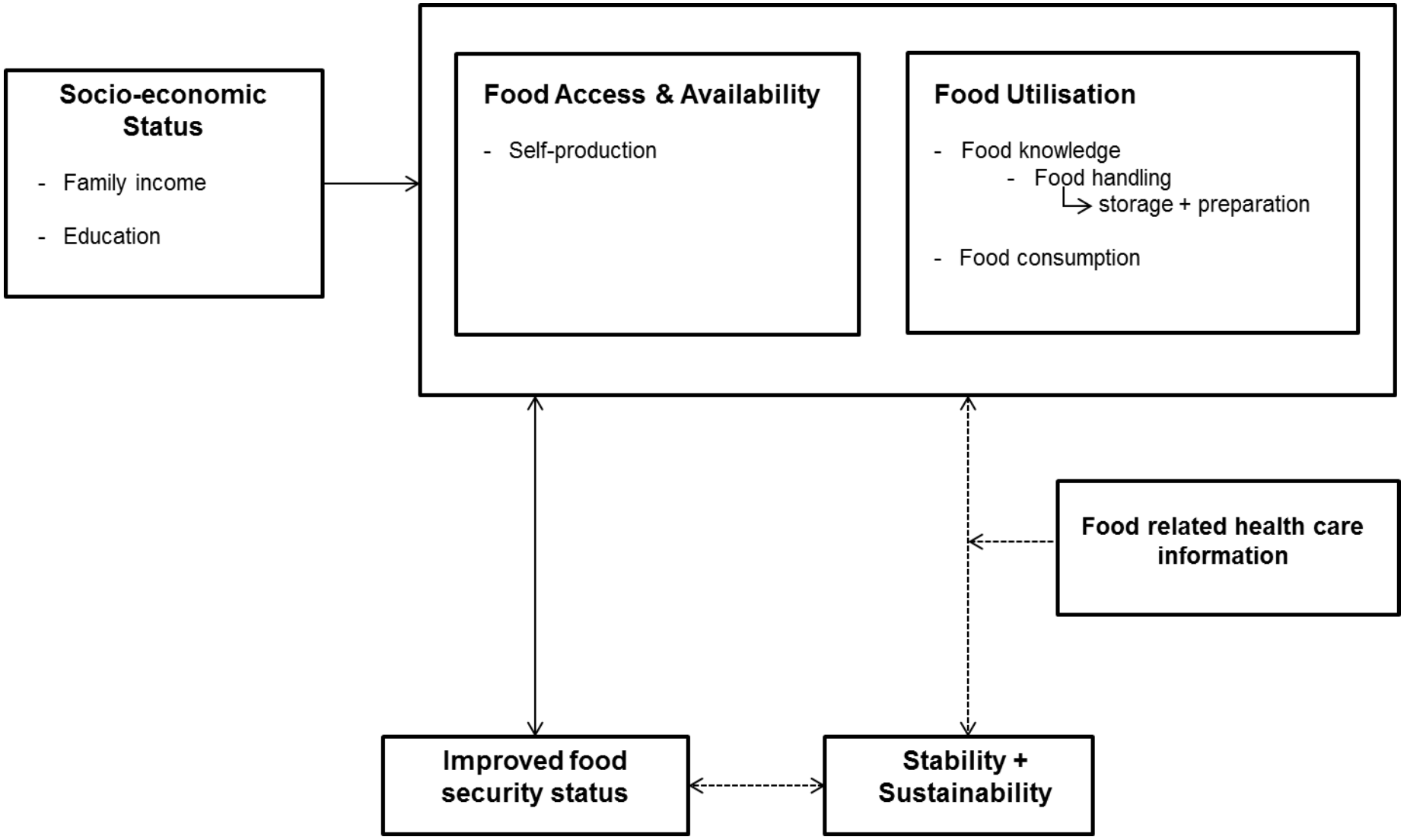

Figure 1.1 **Conceptual frame adapted from the Food Insecurity, Vulnerability Information and Mapping Systems Initiative (Verduijn, 2005:11)**

Household food security can be regarded as households' ability to obtain access to an adequate amount of safe and nutritious food at all times (DoA, 2002:15). Food availability, access and utilisation therefore plays an important role in households' food security status. Food made available through self-production (vegetable cultivation or animal rearing) is a cost effective medium, as less money is needed to purchase food from markets (Reddy & Moletsane, 2009:13). Only a limited amount of food products could be produced effectively at household level due to limited availability of land or space (FAO, 2011a:15). Consequently consumers have restricted food access and availability which might result in the consumption of unsafe food (FAO, 2013a:3). The food utilisation aspect of food security is therefore important. Proper food utilisation practices could be ensured when consumers have sufficient food knowledge regarding food handling practices and consume food which is safely handled and stored (Rivera & Qamar, 2003:31; USAID *et al*., 2007:4). The consumption of safe and nutritious food is important as it determines consumers' nutrition status (Steyn & Ochse, 2013:S13) and productivity level (FAO, 2012b:50). Although households have sufficient access to food as well as the ability to adequately utilise available food they could only be regarded as food secure if all three aspects of food security are stable throughout the year (Hanson, 2013:6).

All three aspects of food security; food availability, accessibility, and utilisation are aslo influenced by the socio-economic status of households which include factors such as family income and access to education (Omonona & Agoi, 2007:404). Consumers with a high socio-economic status have sufficient purchasing power to ensure adequate food access to safe and nutritious food throughout the year (FAO, 2008:29). These consumers also have better access to education (Compton *et al*., 2010:36) which positively contributes to their self-production activities, food knowledge and food consumption practices. Consequently consumers' food availability, accessibility, and utilisation improve which also enhance the overall food security status of households.

1.8 Structure of dissertation

The dissertation consists of seven chapters. In chapter one, the introductory chapter, a brief background and motivation, problem statement, aim and objectives, demarcation of the study and method of investigation are presented. Chapter 2 comprises of an in-depth literature review on the field of study. Chapter 3 consists of a thorough research methodology. Chapter 4 entails the results and discussions of the research. The limitations, future recommendation and conclusion of the study are included in Chapter 5. Chapter 6 contains the references of the study. Chapter 7 is presented in article format according to the guidelines of the Journal of Human Ecology. An abstract, introduction, methodology, results, discussion and conclusion are included in this chapter. Appendices are included as supporting information to the chapters.

Appendix A consists of the researcher's notes which entails additional information to the literature review. Appendix B contains the cover letter and letter of consent to participate in the study and the complete questionnaire. Appendix C includes additional results of the study, and Appendix D provides the guidelines of the Journal of Human Ecology as used by the author.

1.9 Authors' contribution

The study was conducted with the collaboration of several researchers. The contribution of each researcher is mentioned in the table below:

Table 1.1 Summary of authors' contributions to the study

Name	Contribution
Dorette van Wyk	First author, responsible for literature research, data collection, analysis and interpretation as well as the preparation of this dissertation.
Dr de Beer	Study leader and co-author of the study. Supervised the activities of the first author for the duration of the research.
Mrs Louise Wyma	Co-supervisor and co-author of the study. Co-supervised the activities of the first author for the duration of the research.

The following is a statement from the co-authors confirming their individual roles in the study.

I declare that my role in the study, as indicated above is representative of my actual contribution and that I hereby give my consent that it may be published as the Masters' dissertation of Miss D Van Wyk.

Dr. H. de Beer _____ Mrs L. Wyma _____

Miss D. van Wyk _____

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Globally, countries' hunger rates increase (FAO, 2008:6) which negatively affects their food security status (FAO, 2006:2). The concept of food security is complex with several facets (Renzaho & Mellor, 2010:2). To be food secure households need to have "physical, social and economic access to sufficient, safe and nutritious food at all times to meet households' dietary and food preferences for an active and healthy life" (DoA, 2002:15). A country can only be classified as food secure if all three aspects (food availability, accessibility and utilisation) of food security are sustainably addressed (UNDP, 2012:6). Consumers with a low food security status who suffer from severe hunger or are malnourished have a lower development, growth and productivity rate (UNDP, 2012:9, 10). These consumers are also more vulnerable to foodborne illnesses as they consume a lower quality and quantity of food (FAO, 2013a:3).

Food security also depends on food that is available through markets and self-production (vegetable production and animal rearing) as it improves consumers' food access (Renzaho & Mellor, 2010:4, 5). Not all food can be produced effectively at household level due to the seasonality of products (UNDP, 2012:25) and consumers not having the necessary space, land or time (FAO, 2011a:15). Consumers' food access, which entails access to markets, purchasing power, and intra-household food distribution, are therefore important factors contributing to households' food security status (Renzaho & Mellor, 2010:5). However, households' food security status does not only depend on the availability and access of food but is also determined by their food utilisation practices (Renzaho & Mellor, 2010:5). Households' food utilisation practices play an important role in the safety and quality of food consumed (USAID *et al*., 2007:4). Food utilisation refers to consumers' consumption and handling of safe and nutritious food which depends largely on household members' food knowledge (Rivera & Qamar, 2003:31; USAID *et al*., 2007:4). For the purpose of this study, food knowledge refers to consumers' ability to make nutritional choices (FAO, 2013b:49) and handle food in such a way that it is safe for human consumption (Langiano *et al*., 2012:49). Food availability, accessibility and utilisation also need to be carried out in a sustainable way before households can be classified as food secure (UNDP, 2012:9). The sustainability aspect of food security entitles consumers' continuous access to available food even through an economic and climate crisis or seasonal food insecurity periods (FAO, 2006:1). This study will only focus on food security on household level and aims to provide a better understanding of households' food security status and factors directly contributing to the status.

2.2 Food security

Globally, more than 800 million people were food insecure in 2010 (FAO, 2010b:4) and undernourished in the period 2012 to 2014 (FAO *et al*., 2014:8). The United Nations initiated the Millennium Development Goals (MDG's) which will attempt to reduce global hunger, poverty, illiteracy and diseases by 2015. Even if the MDG's are reached in 2015, a great proportion of people living in developing countries will still suffer from hunger (FAO, 2011b:4) as the number of undernourished consumers in sub-Saharan Africa is rising (FAO, 2012b:9).

South Africa is a newly industrialised country (Nielsen, 2011:12) but has many characteristics of a developing country as it is a middle-income country with inequality between low and high income groups, poverty (Altman *et al.*, 2009:7) and under-nutrition (Altman *et al.*, 2009:13). Research reported that South Africa's food security status is declining as only 45.6% of households are food secure (Shisana *et al*., 2013:145). South Africa's food security status is adversely affected by direct influential aspects such as the wage increase of 52% for farm workers (South Africa, 2012:3; South Africa, 2013:4), labour strikes resulting in a lack of incomes for households, and the slow economic recovery after the recession (OECD, 2013:11). Indirect aspects which influence South Africa's food security status is for example the food security crisis experienced in the United States of America (USA) (Springhall, 2012:26) and global growing population numbers. There is an increase in the global demand for food but governments are unable to meet those demands through their current agricultural activities (Thornton *et al*., 2011:118). As the food supply demand increase, food prices escalate. The maize meal prices have increased with an estimated 37.14% between 2011 and 2012 (Thabethe *et al*., 2012:3; Thabethe *et al*., 2013:5) and with another 40.37% between 2013 and 2014 (Thabethe *et al*., 2014:2). As maize meal is South Africa's staple (DoH & UNICEF, 2008:4) food, this increase in food prices might negatively affect South Africa's food security status due to consumers who have difficulty accessing adequate quantities of food in a stable manner (Jacobs, 2011:646). Three different food security groups could be identified. The food secure group entails households who have access to sufficient, safe, and nutritious food to maintain a healthy and active life (DoA, 2002:15). These households have a low risk of being food insecure (IPC Global Partners, 2008:19). Households who are at risk of being food insecure have marginal food access with recurrent high risk of being food insecure due to hazard events and high vulnerability. Food insecure households have severe lack of food access and food availability with excess mortality, and very high malnutrition rates (IPC Global Partners, 2008:19, Hjelm & Dasori, 2012: 9).

The main food procurement problem in South Africa is consumers' inadequate food access and not the availability of food (Koch, 2011:3, 20). South Africa produces enough food to ensure

local demands and even export food products to other countries however, its citizens do not have sufficient food access at household level (Springhall, 2012:25). The Constitution of South Africa indicated that everyone has the right to sufficient food (South Africa, 1996:1255). Studies conducted in South Africa identified household food access problems amongst more than a third of consumers in the Northern Cape province (Stats SA, 2014a:58). The Northern Cape is also known for its high levels of unemployment (Stats SA, 2013b:xvi; Stats SA, 2012f:xvi) and poverty rates (Pauw, 2005:7) which is identified as risk factors for not having sufficient access to food (FAO, 2012b:15). Therefore it is necessary to research and improve aspects that may contribute to a food secure country, as in the case of this study, by focussing more specifically on the Northern Cape.

2.2.1 Factors influencing household food security: Maslow's hierarchy

Food security and all the different aspects that influence it can be explained with the use of Maslow's hierarchy theory of motivation. Sufficient food access and safety are described by Maslow's hierarchy as basic needs (Maslow, 1943:372, 376). The third need of Maslow's hierarchy is a need to belong somewhere or to be part of something (Rousseau, 2007a:168). Cultural values enhance the feeling of belonging (James, 2004:360) and could be obtained by certain people when they consume food unique to their specific culture. Maslow's higher order needs, such as prestige and status, can be acquired through the amount and type of food they consume. Consumers consuming a larger variety of food high in fat and depending less on traditional food often have a higher social status (Mbhenyane *et al*., 2008:220). Self-actualisation is the last need which consumers experience if all their other needs are fulfilled (Rousseau, 2007a:169). Africans' needs are not necessarily in the same order than those indicated by Maslow but are influenced by a collectivistic orientation. Africans' need for acceptance in a community is often more important than their individual or self-actualisation needs (Coetzee, 2011:5, Gambrel & Cianci, 2003:147). This might contribute to consumers rather consuming food which makes them feel accepted than food that is healthy. In a study conducted by Viljoen (2009:121) consumers indicated that it is important for them to consume the same type of food than that of professional people and they will purchase these food types even though they do not have enough money. As fast foods are associated with a higher economic and social status (Mbhenyane *et al*., 2008:220) it might also increase the feeling of acceptance in the community. These practices often result in consumers suffering from health problems due to the high fat content in diets (Mbhenyane *et al*., 2008:206). The amount of nutrients consumed is also limited due to an increased intake of fast foods and might in turn negatively influence consumers' food security status (Steyn & Ochse, 2013:S13).

2.2.2 Factors influencing household food security: socio-economic status

Households' socio-economic status is another determining factor of their food security status (Omonona & Agoi, 2007:403). Renzaho and Mellor (2010:5) have identified internal (household characteristics) and external (escalating food prices) factors influencing all three aspects of food security: food availability, accessibility and utilisation. The internal and external factors were discussed in literature review as part of consumers' socio-economic status.

Socio-economic status includes family's income, access to education and occupation status (Schiffman & Kanuk, 2010:344) which might either improve or reduce households' food security status (Omonona & Agoi, 2007:403). Family income is influenced by households' characteristics such as household size (Stats SA, 2012e:180), gender (Stats SA, 2010:4) and age (Omonona & Agoi, 2007:404). Low-income households often consist of one income earner and many dependents (Stats SA, 2012c:5) who cannot take part in daily activities to earn an income due to their age. This situation might worsen with larger households (Omonona & Agoi, 2007:404). Larger households consisting of an increased number of children (Shariff & Khor, 2008:31) and pensioner heads (Babatunde *et al*., 2007:356) negatively affect households' food security status, as there is a larger dependency ratio (Omonona & Agoi, 2007:404) with limited amount of food available per capita (Sekhampu, 2013:151). On the other hand, South Africa's social grants schemes, such as child support and old-age pension (SASSA, 2013) often causes households to depend on these grants as their main income (Stats SA, 2014a:57). Gender also contributes to household income as men frequently earn a larger income than women (Stats SA, 2010:4), due to women often having lower literacy rates (Mwaniki, 2006:10). In male headed households the male's approval is also needed to access resources such as food (Mwangome, 2010:170) and they are often the regulator of household finances (Burns & Keswell, 2006:17). This might negatively affect households' food security status as men are less likely to spend money on food, education or health than women (Lacroix, 2011:18). Consequently other household members have insufficient access to their basic needs.

Stable income and purchasing power also play an important role in households' food access and their food security status (Mwaniki, 2006:3; FAO, 2008:29; Earl, 2011:44). High unemployment rates, such as those experienced in the Phokwane Local Municipality (Stats SA, 2012a:84), might contribute to an unstable household income. As food prices are rising, such households might experience difficulties to be food secure (Thabethe *et al*., 2012:6). The cost of the food basket[1] (Appendix A), based on basic foods consumed per month, has increased with more than 14% between 2011 and 2012 (Thabethe *et al*., 2012:6), and with a further 9.7% between February 2012 and February 2014 (Thabethe *et al*., 2013:9; Thabethe *et al*., 2014:5). This might result in low-income households sacrificing food or purchasing food of poor quality

and low diversity at a lower price (FAO, 2008:29). On the other hand, households receiving a higher income are often more prone to purchase processed food high in fat (Kearney, 2010:2802). Consequently an increase in income alone is not enough to improve the quality of food being consumed, indicating that food knowledge might be more valuable.

Households' income indirectly influence consumers' employment status (FAO, 2005:14), as an increase in income improves their access to education and healthcare services (Compton *et al*., 2010:36). Consumers' education and health status increases their productivity, earning capacity and ability to be employed on a fulltime basis (FAO, 2005:14, 17).

Education influences several facets of food security, as it develops and enhances consumers' knowledge, skills and improves critical thinking. Additionally, consumers will be able to make informed decisions (OECD, 2009:3) regarding food. Education also has a direct effect on life quality and the country's economy (Stats SA, 2012b:30). Low levels of education are associated with hunger as consumers are less likely to be employed or earn a smaller income (FAO, 2005:14) which influences their access to food (Agarwal, 2011:15).

Many South Africans have not had prior opportunities to complete school, or education was not seen as a necessity (Gardiner, 2008:25). Children are also often taken out of school and employed in income-generating activities to increase households' access to food (Compton *et al*., 2010:29). As more than a third (36%) of consumers in the Phokwane Local Municipality either did not attend school or did not complete primary school (Stats SA, 2012a:76) it can be assumed that they may be functionally illiterate. A functional literate person is someone "who can meaningful acquire and use reading and writing (also for numeracy purposes) in everyday life, as a tool for self-expression, information, communication, lifelong learning, work and civic participation, and as a means to improve one's life and to contribute to family, community and national transformation and development" (Torres *et al*., 2005:2). Consumers with a low literacy level are less knowledgeable on aspects of a balanced diet (UNDP, 2012:89) and more prone to be engaged in unhygienic practices (Phaswana-Mafuya & Shukla, 2005:25). Poor food utilisation practices are also often due to a poor understanding of the association between food consumption and health (FAO, 1997). Education regarding available food, access to food and optimal utilisation of food might therefore significantly contribute to households' food security status.

2.3 Availability of food

Food available in the field, through self-production (home grown products and animal rearing), or obtained from markets determine the type of food being consumed in households (Viljoen, 2009:92). Self-production may be an effective way to support food in households (Hallberg,

2009:14) as it improve the availability of food (Renzaho & Mellor, 2010:4) and reduce food expenditure (Reddy & Moletsane, 2009:13). Additionally consumers' nutritional status also improves as self-produced food is fresh (Earl, 2011:66) and gives consumers access to a wider variety of food at a lower cost (Zezza & Tasciotti, 2008:4). Friends and family also benefit from self-produce as it is often received as a gift (Hallberg, 2009:17). Food production further enhances purchasing power when earning an income by selling self-produced products (Zezza & Tasciotti, 2008:4).

Not all food can be produced effectively at household level. Consumers involved in self-production or gathering food in the field are often constrained by natural resources such as seasons, climate, soil and water (UNDP, 2012:25; Viljoen, 2009:92). Poor households mainly dependant on self-produce are mostly affected by hunger during winter and early spring since food supplies cannot be supplemented with own produce (Coutsoudis *et al*., 2000:11). Furthermore, self-production activities are often inhibited by time restrictions and labour (FAO, 2011a:15). Although food production is reckoned as an important component for households to be food secure (USAID *et al*., 2007:4), consumers could never be absolutely certain about their yield at the end of the season due to the above mentioned factors. Access to food through markets (USAID *et al*., 2007:4), transport and purchasing power (Agarwal, 2011:15) are therefore essential.

2.4 Food access

Nearly all households rely on food purchases (Altman *et al*., 2009:26; Mbhenyane *et al*., 2008:202). Access to markets and purchasing power is essential to support household food security (Agarwal, 2011:15; USAID *et al*., 2007:4). Rural consumers' access to markets are often restricted by insufficient infrastructure, lack of transport, distances to supermarkets (Coveney & O'Dwyer, 2009:49, 50) and increased fuel prices (FAO, 2013a:3). Consequently, consumers are forced to purchase food at informal traders such as spaza shops or street vendors which are easily accessible. Informal traders might negatively influence consumers food consumption patterns as they often sell only a limited variety of food (Roos *et al*., 2013:199) with higher unit prices (Klemz, 2006:597). Informal traders sell food at higher prices as they purchase food from the same supermarket as consumers of the village would have but with an increased profit margin (D'Haese & Van Huylenbroeck, 2005:108). The high food prices decrease consumers' food choices and the frequency of food being purchased (Viljoen, 2009:94). Illiteracy, on the other hand, might contribute to consumers purchasing popular product brand names (Wyma *et al*., 2012:436) which are more expensive than unfamiliar private label brand names (Beneke, 2010:211) as they experience difficulties to read and interpret the

language used on labelling but are acquainted with the specific logo and quality of the product (Viswanathan *et al*., 2005:21).

Food traditions, taboos and stigmas also affect individual consumers' access to sufficient quality and quantity of food (UNDP, 2012:15, 89) at household level. In some cultures the household head or income-earning household members are normally served first. Larger food portions are saved for older men which are a sign of respect and ensure that their energy needs are met as they are often engaged in income earning activities (Akerele, 2011:550). This leaves mothers and children vulnerable as they receive a much smaller portion of food relative to their nutritional needs (Akerele, 2011:548, 549). Consumers with insufficient food access might also be more prone to consume unsafe food (FAO, 2013a:3) which increases the risk to be affected by foodborne illnesses. Improved knowledge regarding the consumption of nutrient dense food as well as the safe handling and storage of food (Rivera & Qamar, 2003:31) might increase consumers' access to safe and nutritious food which will ultimately improve their food secure status (USAID *et al*., 2007:4).

2.5 Food utilisation

Consumers cannot be regarded as food secure if they do not know how to utilise food properly (UNDP, 2012:36). Food utilisation is determined by the safety, quality and quantity of food consumed in a household (USAID *et al.,* 2007:4). These aspects depend largely on consumers' knowledge regarding nutrition and food handling that includes consumption (USAID *et al.*, 2007:4), preparation and storage practices (Rivera & Qamar, 2003:31). The availability of sanitation and health care, as well as clean water are also required to ensure correct food utilisation practices (USAID *et al*., 2007:4). For the purpose of this study, the researcher only focused on consumers' food consumption practices and their food knowledge regarding food handling.

2.5.1 Food knowledge

Food knowledge plays an important role in consumers' food choices. Some consumers have insufficient knowledge regarding healthy food choices or do not know to which extent each food choice contributes to their overall health (Kruger & Gericke, 2002:222). Expanding food knowledge enables consumers to choose food according to nutrition principles (Rivera & Qamar, 2003:31).

Frequent incidences and reports made globally as well as in South Africa regarding food poisoning cases (NDoH, 2011:5) indicate that consumers do not know how to handle food safely (Valsamis *et al*., 2009:150). Foods from street vendors are also often associated with

public health risks (Nyenje *et al*., 2012:2612). In addition, individuals have a responsibility to ensure that the food they purchase is safe, and that requires food knowledge. Foodborne pathogens cannot be detected with the human eye (HITM, 2006:1, 6) which contributes to the importance of sufficient knowledge regarding food handling, preparation and storage (Unusan, 2007:46). Insufficient food practices concerning food handling, preparation and storage can cause foodborne illnesses such as Listeriosis and Staphylococcus infections (PNW, 2009:4). Sufficient food storage practices are also of special importance in the Northern Cape which is known for its hot conditions (Verwey & Vermeulen, 2011:157). Food which is held for too long between 4˚C and 60˚C contribute to pathogen growth and increase the chance of food poisoning (CDC, 2009:4). Knowledge regarding the consequences of applying insufficient food practices might be just as important as applying safe food handling practices. Not knowing the severity and risks caused by foodborne illnesses decrease consumers' willingness to take steps that will reduce food safety risks (Munro *et al*., 2012:38). Additionally, improving consumers' food knowledge might increase the quality of food consumed as consumers make healthier food choices (Valsamis *et al*., 2009:153) which might ultimately influence their food security status positively.

Cultural knowledge might also contribute to consumers' food knowledge as it forms the basis of decision-making to agriculture, health care, food preparation, education, natural resource management, economics, governance, and security (Gundu, 2009:1). Transferring cultural knowledge may either have a positive or negative influence on consumers' food consumption practices. Cultural knowledge enables consumers to obtain food knowledge already from a young age as it is transferred spontaniously from parents to children. Children accept the knowledge, whether it is sufficient or insufficient, and later transfer it to their children (Aygen, 2012:10; Jevšnik *et al*., 2008:741). On the other hand, acculturation influences cultural knowledge being transferred. This phenomenon could be perceived amongst citizens of South Africa as their traditional beliefs and values have changed when they were exposed to other culture's beliefs and values (Rousseau, 2007b:48). Acculturation often leads to westernisation (Mbhenyane *et al*., 2008:203) which has adverse consequences on consumers' health due to the high fat and low cereals and grains intake (Mbhenyane *et al*., 2008:205, 206). Westernisation frequently occurs amongst more educated consumers who are less prone to maintain cultural practices and do not prepare traditional meals anymore (Viljoen, 2009:120). This might be the outcome of modernisation, exposure to other cultures and convenience (Viljoen, 2009:119 - 121).

2.5.2 Food consumption practices

The traditional rural diet consist of food which is low in fat and high in unrefined carbohydrates, fruits and vegetables which primarily comprise of maize meal with marogo and/or pumpkin (Pretorius & Sliwa, 2011:183) with legume consumption depending on availability (Pretorius & Sliwa, 2011:183). The current rural African diet in South Africa varies from the traditional rural diet. This diet consists mainly of purchased food as droughts and other limitations often caused that self-production is insufficient for own consumption (Viljoen, 2009:93). The current rural African diet in South Africa is mainly high in carbohydrates and fibre but is low in animal protein (Steyn & Nel, 2006:31). Self-production, wild plants and insects form only a small part of consumers' diet (Mbhenyane, 2008:202). Therefore diets depend more on household income. Households with a lower income consume monotonous diets that consist mainly of cereals and grains with a low variety of fruits, vegetables and foods high in animal protein, which negatively affect their nutrient intake (FAO, 2008:29).

Regular food consumption contributes to the amount of energy available for daily activity (Earl, 2011:54). Irregular meals occur due to unavailability of food (Renzaho & Mellor, 2010:2), insufficient funds (FAO, 2008:29) and time restrictions (Puoane *et al.,* 2005:10). Consumers skipping breakfast consequently eat too late which lead to overeating (Puoane *et al.,* 2005:10). Viljoen (2009:109) reported on a study that South Africa's black population mainly consumed three meals a day and concluded that it might positively affected their energy levels.

2.5.2.1 Foods mainly consumed by South Africans

Diets consisting of a low variety of food negatively affect consumers' nutrient intake and increase the prevalence of malnutrition (Steyn & Ochse, 2013:S13). Consumers' dietary variety could be determined by the amount of food groups (cereals and grains, fruits and vegetables, dairy, meat and meat alternatives as well as fats and sugars) consumed (Kennedy *et al*., 2013:25). South Africans' diet was further discussed according to the food based dietary guidelines which somewhat corresponds to the food groups

2.5.2.2 Food based dietary guidelines

i. Make starchy foods part of most meals

Rural black South Africans are mainly exposed to monotonous diets with little variety (Earl, 2011:45). These consumers depend largely on cereals and grains, such as bread and maize meal (Steyn & Nel, 2006:48; Viljoen, 2009:118). The high cereals and grains intakes might be due to the convenient aspect as it is readily available (Viljoen, 2009:118) at an affordable price (FAO, 2008:29). Consumers only need R11 a day to feed a household of six members maize

meal three times a day (Schönfeldt *et al*., 2013:233). Carbohydrates such as cereals and grains are an essential source of food energy in communities which are affected by poverty and food insecurity (Vorster, 2013:S33). Improving the variety of unrefined carbohydrates in consumers' diets is important as it serves as protection against chronic lifestyle-associated diseases (Duffield & Till, 2007:108).

ii. Eat plenty of vegetables and fruits every day

Fruits and vegetables are often seen as a luxury (Drewnowski & Specter, 2004:13) as it is expensive food products (FAO, 2008:29). Consequently these food products are less frequently consumed amongst consumers. According to Viljoen (2009:111, 116), consumers consume more expensive food only on special occasions, such as Sundays during which a variety of three or more vegetables are usually consumed. There are a few other factors which might also contribute to the limited intake of vegetables amongst consumers. A lower percentage of rural consumers have acces to storage facilities such as refrigerators (Stats SA, 2014a:55) which is necessary to keep fruits and vegetables fresh. Insufficient time available and effort to prepare vegetables (Pollard, 2009:359) such as peeling, cutting and cooking might further inhibit vegetable consumption. Some consumers also need to travel long distances on a regular basis to obtain fresh produce (Coveney & O'Dwyer, 2009:46) which might be limited due to escalated fuel cost (FAO, 2013a:3). A vegetable garden will provide direct access to vegetables (Viljoen, 2009:113) but consumers' do not always have sufficient space to grow a vegetable garden. In such circumstances consumers can either preserve vegetables in bottles or purchase canned vegetables. Although processed food such as canned vegetables are not as healthy as fresh vegetables, canned vegetables could be stored for a long period of time which improves vegetable availability and accessibility throughout the year.

iii. Have milk, maas or yoghurt every day

Milk is one of the top five food products consumed by South Africans (Steyn & Nel, 2006:48) and is often enjoyed with maize meal (Viljoen, 2009:112). Sour milk or *maas* (fermented milk) is another popular dairy product especially in African cultures (Vorster *et al*., 2013:S59). This might be the result of consumers not having storage facilities such as refrigerators to store fresh milk. The affordability of dairy products, cultural practices, traditions, religions (Scholtz *et al*., 2001:S42) and lactose intolerance, which is common amongst Africans, frequently constraint dairy consumption (Vorster *et al*., 2013:S61). This might lead to an increase in the consumption of non-dairy coffee creamer. Non-dairy coffee creamer is a convenient milk alternative as no refrigerator is needed (Walsh *et al*., 2003:94) to keep it fresh but nutritionally it cannot replace milk. Replacing milk with non-dairy coffee creamers increase the amount of saturated fatty acids

(Katsri *et al*., 2014:76) in consumers' diets and negatively influence their cholesterol levels and chronic diseases (PCRM, 2010:2).

iv. "Eat dry beans, split peas, lentils and soya regularly" and "Fish, chicken, lean meat or eggs can be eaten daily"

Foods from animal origin are the best source of high-quality protein containing all the essential amino acids (Brown, 2011:50). On the other hand, animal protein is an expensive food source (Schönfeldt & Hall, 2012:15), especially red meat. Food insecure households will benefit from food sources of animal origin such as offal products (Viljoen, 2009:115), eggs, and canned pilchards, which is a high quality protein food source but comparatively cheaper (Scholtz *et al*., 2001:S44, S45). However, the "ideal" diet consists mainly of plants which are accompanied by animal protein food sources to enhance dietary diversity and to ensure sufficient nutrient intakes (Scholtz *et al*., 2001:S46). Plant protein is low in fat and salt (UAF, 2012:4) and has important health attributes, such as the reduction of heart diseases, blood pressure levels, and hypertension (Craig & Mangels, 2009:1267). According to Burger and Ware (2012) a large percentage of the employees of the VIS are vulnerable to hypertension, which made plant protein a necessity for their diet. Although plant protein rich food sources are still popular amongst rural consumers (Steyn & Nel, 2006:31) an increase in consumers' animal protein intake and decrease in their plant protein intake could be detected (Vorster & Bourne, 2008:237).

Plant protein is often identified as "poor man's food". This stigma might have been formed as plant protein is eaten more regularly by rural consumers while animal protein is more frequently consumed by urban consumers (Steyn & Nel, 2006:31). Plant protein is also more accessible and affordable (UAF, 2012:4) as it is available in the field (Viljoen, 2009:93). Furthermore plant protein does not need to be stored in a refrigerator before cooking. Dry beans and soy beans could potentially act as a substitute for animal protein rich food sources (Venter *et al*., 2013:S37) and could be incorporated in a variety of meals. Dry beans, lentils and chick peas could be used in soups, stews, samp, rice or *sheba* (a traditional dish which consist of tomatoes, onions and vegetables), while canned beans such as baked beans are convenient and easy to use.

v. Use fats and sugar sparingly

Fats and oils are used daily in cooking practices and are found in several food products, especially those of animal origin (Wolmarans & Oosthuizen, 2001:S48). Oil is frequently used as a food preparation method as it takes less time than to boil food (Brown, 2011:467). Fat gives unique characteristics to food such as tenderness, texture and flavour and contributes to a

satiety feeling since it takes longer to digest than proteins and carbohydrates (Brown, 2011:457). Regardless of all the good attributes of fat, diets high in fat cause health problems (Mbhenyane *et al*., 2008:206). The consumption of high fat diets is often due to insufficient food knowledge regarding what constitutes a healthy diet (Puoane & Tsolekile, 2008:10). Consumers with a low socio-economic status are also more prone to purchase food high in fat, salt and sugar than food high in fibre (Turrell & Kavanagh, 2005:281) which is most probably due to the flavour and feeling of satiety (Brown, 2011:457).

2.6 Stability and sustainability

The inability of developing countries to be food secure in a sustainable way remains a concerning aspect as it negatively affect the economy and human development of countries (IFPRI, 2002:9). Households are only sustainable if they remain food secure regardless of environmental changes such as periods with sudden shocks (e.g. an economic or climatic crisis) and seasonal food insecurity in the community (FAO, 2006:1). Constant development of all three components of food security (availability, access and utilisation) is necessary to ensure stability amongst the components as well as a sustainable food security status amongst households (Hanson, 2013:6).

Sustainable use of natural resources such as water and soil is important as it have an effect on the amount of food available (Hanson, 2013:8). Since households cannot necessarily afford labour, household members' productivity is also an essential influencing factor regarding food availability (Feighery *et al*., 2011:11). Rural youth migrating to cities searching for employment opportunities (FAO, 2014:2) are therefore concerning as households' productivity levels are negatively affected due to the lower number of household members. Additionally, more attention should be paid to programmes which are engaged in providing agricultural training to the youth of a community in order to prevent migration. The youth are also more productive than the elderly, and might have a larger impact on the food security status of future households. On the other hand, households cannot rely entirely on the availability of food through self-production as unexpected circumstances such as drought or floods often occur (UNDP, 2012:25). To ensure that households have a stable food security status, consumers should also participate in income earning activities which improves their access to food (FAO, 2013b:49) through markets.

Sustainable access to food can be maintained by education opportunities, income generating projects and secure employment as education improves consumers' ability to be employed (FAO, 2005:14). Income generating projects and employment opportunities improve the quality and quantity of food which consumers have access to (FAO, 2012a:7) as consumers receive an income on a monthly basis.

Another factor influencing the sustainability of households' food security status is their food utilisation. A consensus position on the definition of sustainable diets was reached by participants at the international symposium on "Biodiversity and Sustainable Diets: United against Hunger" in 2010: "Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to a healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources" (FAO, 2010a:10). It is clear that sustainable diets have an important influence on consumers' nutrition status. Members of the same household often suffer from both under- and over-nutrition which negatively affect the productivity of the members. Additionally, household members supply less food due to their lower productivity rates and are consequently less likely to be food secure (IFPRI, 2002:11). More money should then also be spent on healthcare while less money is available for food (IFPRI, 2002:11).

Households' food security status is difficult to measure as food security is a complex concept with several facets (Renzaho & Mellor, 2010:2). Labadarios' hunger scale are an effective measurement instrument for measuring households' food security status as it is sensitive to identify chronic under-nutrition among families (Labadarios *et al.,* 2009:15). The type of questions in the hunger scale could be identified as questions regarding 1) insufficient quality which is determined by food availability and access and 2) insufficient food intake and its physical consequences which determine households' food utilisation (Coates *et al*., 2007:6). Furthermore, each question in the hunger scale have three dimensions which determines the frequency of households, especially households with children, being affected by food shortages, perceived food insufficiency or altered food intake due to constraints on resources (Labadarios *et al.,* 2009:15). Equal attention should therefore be given to all of the above, food availability, access and utilisation, in a sustainable manner to ensure stability amongst households' food security status. Food related healthcare programmes can be used to ensure that consumers' skills and knowledge regarding food availability, access and utilisation are constantly improved.

2.7 Food related healthcare information

Give a hungry man a fish and he will be hungry again the next day. Teach a hungry man to fish and he will have the ability to eat again the next day. This well-known saying emphasise the importance of programmes through which consumers could obtain information and improve their knowledge to ensure sustainable development (UNESCO, 2012:3). Food related healthcare information in the present study refers to governmental and non-governmental organisations that use mass media and programmes as a medium to improve consumers' food knowledge.

Consumers who did not have the opportunity to attend or complete school could be educated through other means. Mass media such as radios, posters or flyers are effective ways to reach consumers. Radios are widely available, even in poor rural households, and posters and flyers could be distributed at healthcare facilities such as clinics. Several posters regarding food related healthcare are developed by the Department of Health and World Health Organization (WHO). These posters improve consumers' awareness associated with safe and nutritious food as it provides basic guidelines regarding a balanced diet and safe food handling practices. These guidelines include aspects such as personal hygiene, the use of clean water and the type of food necessary for a balanced and healthy diet (WHO, 2010). Posters and flyers that consist mostly of pictures might be an effective medium used to improve low literate consumers' knowledge (Viswanathan & Gau, 2005:193). Governmental and non-governmental organisations need to ensure that literate as well as illiterate consumers could benefit from posters, flyers and programmes distributed amongst communities.

More than a third (36.5%) of consumers in the Phokwane Local Municipality either did not attend school or did not complete primary school (Stats SA, 2012a:76). Primary education (which enables consumers to learn basic skills regarding reading and writing) makes it easier for consumers to effectively use messages regarding sanitation, health and food utilisation obtained from the media (De Muro & Burchi, 2007:5). Available information is of little value if consumers do not have the skills to utilise the information. Basic education programmes such as ABET (Adult Basic Education and Training) might be an effective medium used to improve consumers' literacy levels and their ability to utilise information effectively (WCG, 2013).

2.8 The importance of a food secure community

A food secure community has a better development, growth and productivity rate (UNDP, 2012:9, 10) than those who suffer from severe hunger or are malnourished. Additionally the country's economic growth also benefits (Labadarios *et al*., 2009:15). Higher rates of foodborne illnesses might occur amongst food insecure consumers as they do not consume enough food to protect them against diseases (FAO, 2008:31). A lower health status results in economic losses amongst families and lower school attendance (Trench *et al*., 2012:93). Households suffer from economic losses as they have a lower productivity rate and consequently earn a lower income or no income at all. This result in fewer children who are enrolled in school and subsequently do not have the opportunity to learn some skills which are necessary to be employed on a fulltime basis (FAO, 2005:14, 17) and ensure a stable income. Consumers' low educational levels may further negatively influence the family's health (FAO, 2005:14) as they did not have a chance to improve their knowledge regarding food handling and consumption. Consequently a vicious cycle begins as consumers again do not have sufficient access to food

and is more prone to consume unsafe food (FAO, 2013a:3) or monotonous diets (Coates *et al*., 2007:19) which further lower their food security status. This cycle can only be broken by improving their food availability, access and utilisation practices. Improving food security on household level may contribute to the community's well-being and in the long-term national welfare.

2.9 Conclusion

Food insecurity and undernourishment is a global phenomenon also perceived in sub-Saharan Africa. Although South Africa is regarded as food secure on national level, it is not necessarily the case on household level. Households are affected by food insecurity due to high unemployment and poverty rates, low education levels and escalated food prices. Traits of food insecurity are also prevalent in the Phokwane Local Municipality as it is known for its high levels of unemployment and uneducated citizens. Sustainable availability, accessibility, and utilisation of food are determining aspects of a food secure country and household.

The study mainly focused on the food utilisation aspect of food security which includes the knowledge, handling and consumption of food. Improving consumers' food knowledge is an important driver altering consumers' behaviour and improving their food choices. Food knowledge is especially important amongst rural Africans as they consume monotonous diets consisting mostly of cereals and grains while vegetables are only included occasionally. Insufficient food availability and accessibility might contribute to consumers consuming monotonous diets. Food cannot always be effectively produced on household level due to limited land available and it is often too expensive which restrict low-income households' food access. Although consumers might have sufficient access to available food, the maximum amount of nutrients could only be absorbed from safe food. Safe food handling and storage practices are essential in the Northern Cape as this province is known for its high temperatures which create favourable conditions for food decay. Safe food handling includes practices regarding preparation and storage of food in a safe manner. Improving consumers' knowledge regarding the risks involved when applying insufficient handling food practices might also be necessary to enhance their willingness to handle food safely. Food related healthcare information might be an effective medium which can be used to make consumers aware of inappropriate food consumption and food handling practices. Ideally healthcare information might contribute to consumers sustainably accessing and utilising available food.

CHAPTER 3: METHODOLOGY

3.1 Introduction

A detailed description of the study's methodology process is provided in this chapter. It begins with an explanation of the quantitative research approach and design which is followed by a description of the environment where the study was conducted and respondents that were used. Thereafter the development of the questionnaire, data collection and analysis were specified. Lastly, a description of the validity and reliability of data obtained were depicted as well as all ethical aspects which were needed to be considered.

3.2 Research strategy

A quantitative non-experimental exploratory research approach was chosen which made it possible to collect numerical data and stay objective during the study (Fouché & Delport, 2011:63). According to Fouché and De Vos (2011:95) an exploratory design is suitable to gain insight into an under-researched problem such as food security amongst the employees of the Vaalharts Irrigation Scheme (VIS) for the first time. A survey which is appropriate for exploratory research (Babbie & Mouton, 2011:232) was used to collect data by means of questionnaires.

3.3 Study population and environment

The study was conducted with all 162 employees of the VIS, in collaboration and with permission of management at the premises of the VIS ensuring minimal disruption for respondents. The whole study population are thus employed and receive an income. It was essential that respondents were comfortable and relaxed in the study location to ensure effective participation during completion of questionnaires (Eriksson & Kovalainen, 2008:183). A specific room was allocated for the interviewer-administred proses.

The VIS is situated between the Vaal and the Harts rivers on the border of the North West and Northern Cape provinces (Van Vuuren, 2010:21) and is under the authority of Phokwane Local Municipality in the Northern Cape province. The VIS includes the area from Jan Kempdorp in the Northern Cape to Taung in North West province (Verwey & Vermeulen, 2011:157). Although the VIS is situated in both provinces, the study only focused on the Northern Cape as the majority (31 732 ha) of the irrigation scheme is situated in the Northern Cape (Verwey & Vermeulen, 2011:155). It is a rural area (Smook, 2008:3) dominated by agricultural crop production as main income sector (FBDM, 2012:24) with the VIS as an important contributor towards the food security status of the Northern Cape (Maisela, 2007:31).

The Northern Cape has low employment levels (Stats SA, 2012f:xvi; Stats SA, 2013b:xvi) which could also be perceived at the Phokwane Local Municipality. The Phokwane Local Municipality is a rural area with unemployment rate of 37.7% (Stats SA, 2012a:84) and low education level (Stats SA, 2012a:76). The population of the Phokwane Local Municipality are not necessarily functional literate since less than a quarter of the population have achieved grade 12 (Stats SA, 2012a:76). To be functional literate, a person needs to be engaged "in meaningful acquisition, development and use of reading and writing (also for numeracy purposes) in everyday life, as a tool for self-expression, information, communication, lifelong learning, work and civic participation, and as a means to improve one's life and to contribute to family, community and national transformation and development" (Torres *et al*., 2005:2).

In a previous study conducted at the Vaalharts region consumers indicated a need to improve their awareness regarding hygiene and the consumption of adequate and a variety of food (Coetzee, 2011:23). It could thus be speculated that the employees of the VIS are also affected by the difficulties experienced in the Phokwane Local Municipality and the Northern Cape which might negatively influence their household food security status.

3.4 Sampling

A non-probability purposive sample was used where 100% (all 162 employees of the VIS) of the population was included in the present study (one respondent was on sick leave). This sampling method was used since respondents' needs in the present study correspond with the objectives of the study (Strydom, 2011b:232). For instance, literature indicated that respondents have a need to improve their awareness regarding hygiene and the consumption of adequate and variety of food (Coetzee, 2011:23). Other characteristics of the community, such as poverty (Pauw, 2005:7), as indicated above, might also have negative effects on their food security status. Furthermore, the North-West University of the Potchefstroom Campus took part in the Water Innovation Network (WIN) project, which is conducted at the VIS. One of the aspects addressed by the WIN project is consumers' food security status. The only inclusion criteria were that respondents needed to be employees of the VIS.

3.5 Development of the measuring instrument

A questionnaire was used to collect quantitative data. At first the premises of the VIS where data had been collected were visited to make observations regarding the surroundings (May, 2011:106). Standardised questionnaires, which were already tested and used in previous studies, were used in the present study. Questionnaires designed by Hillers *et al*. (2002); Labadarios *et al.* (2009); Maunder (2000); Mofokeng (2013); Radimer *et al.* (1990) and Whati *et al*. (2005) were used. Only small parts of these questionnaires and not the whole questionnaire

were included in the questionnaire of the present study. The questionnaires designed by Hillers *et al*. (2002) and Radimer *et al.* (1990) were the only two questionnaires which were not developed for a South African population. Furthermore, all the questionnaires mentioned before were not necessarily used amongst low literate consumers and questions were not used in the same combination as in the questionnaire of the present study. This made it necessary to conduct a pre-test to determine the reliability and effectiveness of the questionnaire on low literate South African consumers. After the pre-test was completed amongst consumers with more or less the same characteristics than respondents of the present study, adaptions were made by using words that is easily comprehensible.

3.5.1 Type of questions used

Close-ended and fixed-response questions were used in the questionnaire (Appendix B). Close-ended questions enabled the respondent to select one or more than one of the predetermined responses (Delport & Roestenburg, 2011:198). The fixed-response questions were easily administered (Malhotra & Birks, 2007:266) which was ideal for the study population as they have diverse educational levels (Stats SA, 2012a:76). These questions also contributed to a smaller variety of answers which simplify analysis and interpretation (Malhotra & Birks, 2007:266). If respondents made remarks in some cases, fieldworkers took note of it. Ordinary and unambiguous words which respondents understood were used in the questionnaire (Malhotra, 2009:342, 343). This ensured that all respondents interpreted the questions correctly and answered the questions accordingly.

3.5.2 Different sections of the questionnaire

The questionnaire comprised of eight sections:

Section A

Questions regarding the production of vegetable gardens and the use of vegetables produced were obtained from Mofokeng (2013) in the present study. Questions concerning food obtained from animals were based on Mofokeng (2013) vegetable production questions.

The frequency of food consumption questions were used from the Maunder (2000) quantitative food frequency survey. This questionnaire was developed to determine the frequency of food consumed as well as the portion size of food consumed. For the purpose of the present study, only food frequency questions of the questionnaire were used. Respondents had six options to choose from, for example: “Never/Very Seldom”, “Once a week”, “Two to four days a week”, “More than four days a week”, “Once per day” and “More than once per day”. The specific food products used in the questionnaire were from the existing questionnaires and unfamiliar

products were replaced by South African alternatives (Maunder, 2000). Respondents of the pre-test also gave an indication of food other than those mentioned in the questionnaire which they consume.

Section B and C

Food preparation questions were obtained from Hillers *et al*. (2002) and Mofokeng (2013). Mofokeng (2013) determined aspects such as which person is responsible for food preparation, the type of energy used to cook food and equipment available to prepare food. Hillers *et al*. (2002) determined all aspects regarding respondents' hand washing practices.

Storage practices were determined by a questionnaire developed by Whati *et al.* (2005). Consumers' storage practices regarding raw meat, cooked left-over food and dry food products were determined in this section.

Section D

Food security questions from the Labadarios *et al*. (2009) and Radimer *et al.* (1990) questionnaires were included. The food security section of the questionnaire was based on the Community Childhood Hunger Identification Project which developed indicators to assess hunger (Radimer *et al*., 1990:1547). Nine questions with two sub-questions for each of the nine questions were used to determine the food security status in each household (Labadarios *et al.*, 2009:15). For example:

- *Does your household ever run out of money to buy food?*
    - *Has it happened in the past 30 days?*
    - *Has it happened 5 or more days in the past 30 days?*

Negative answer (No) to all nine questions in the questionnaire indicated a "food secure" household. Affirmative answers (Yes) for one to five of the nine questions indicated that respondents are "at risk of being food insecure". Positive answer (Yes) for six or more questions indicated that the household is "food insecure" (Labadarios *et al*., 2009:16). Questions regarding the amount of meals eaten each day, the time of day the first meal is eaten and restrictions to breakfast consumption were also included.

Section E

Food knowledge questions were obtained from Hillers *et al*. (2002) and Whati *et al*. (2005). Whati *et al*. (2005) determined consumers' knowledge regarding food consumption while Hillers *et al*. (2002) determined consumers' food handling knowledge.

Section F – H

All three sections (F-H) consisted of questions regarding the population's demographic characteristics, living environment, income and food expenditure. The questions designed by Mofokeng (2013) were used to obtain these answers.

3.5.3 Language and translation of questionnaire

The recognized communication language at the VIS is Afrikaans and Setswana (Kruger, 2012). The Setswana mother tongue speakers understand Afrikaans or English but not all Afrikaans mother tongue speakers understand Setswana (Kruger, 2012). A bilingual (Afrikaans and English) questionnaire was used as all respondents understood Afrikaans or English. All questionnaires' original language was English.

The English questionnaires were translated into Afrikaans and then back translated to English by two independent bilingual experts of the North West University. The questionnaire was not translated into Setswana, as interpreters would be needed during data collection which might have increased the possibility of communication failures taking place between the fieldworkers and respondents. After the questionnaire was back translated, the original English version of the questionnaire was compared with the translated version to determine the quality of translation (Liamputtong, 2010:152). Differences observed between the original questionnaire and the translated version was discussed with the bilingual expert panel until both, the researcher and the expert panel, were satisfied. The researcher ensured that the content of the questionnaire remained the same while the bilingual expert panel took care of grammatical errors in the questionnaire.

3.5.4 Pre-test

A pre-test was conducted prior to data collection. Ten consumers with similar demographic characteristics (Setswana and Afrikaans mother tongue speakers, adults of 18 years and older who have diverse educational levels and are from various ethnicity groups) than respondents of the present study were chosen to take part in the pre-test. This ensured that most difficulties which might have been potentially experienced during data collection were addressed (Strydom, 2011c:241). The pre-test determined whether all concepts of the questionnaire were clear and

had a logical flow, without potential misunderstandings of the terminology of the questionnaire (Malhotra, 2009:350). If consumers hesitated to answer the question or answered the question incorrectly, the fieldworkers asked for their opinion regarding the question. This made it possible to determine whether the question was a sensitive matter or whether they did not understand the question correctly. If the pre-test respondents did not understand the question asked, they were requested to give an alternative phrase or words that are commonly used in their culture. This was especially important for the present study as some of the questions were adjusted for a South African population consisting of different cultural groups (Babbie & Mouton, 2011:244). The pre-test also made it possible to identify the approximate time needed to complete a questionnaire (Strydom, 2011c:245). After the completion of the pre-test, the questionnaire was adapted according to findings obtained. The terminology of the questionnaire was adapted for low literate consumers as it was found that respondents did not understand the questionnaire completely.

3.6 Data collection

A cross-sectional descriptive method was used which reflect respondents' food security status at a specific time, namely during January 2013. Data collection was conducted over three weeks on the premises of the VIS by means of fieldworkers to prevent the researcher from being biased. A consent form was filled out prior to data collection where respondents gave permission to take part in the study under certain conditions. The most effective way of data collection in South Africa is face-to-face interviews (Babbie & Mouton, 2011:249). Face-to-face interviews were used as there was a possibility that not all respondents were literate. More than a third of the Phokwane Local Municipality either did not attend school or completed primary school (Stats SA, 2012a:76). The data was obtained by means of an interviewer-administered questionnaire which is a form of face-to-face interviews. This enabled fieldworkers to ask the questions orally and complete the questionnaire according to respondents' answers (Babbie & Mouton, 2011:249). This method ensured complete information from questionnaires (Babbie & Mouton, 2011:250) as well as a high response rate (Delport & Roestenburg, 2011:186). Interviewer-administered questionnaires could also be referred to as a "structured interview schedule" (Delport & Roestenburg, 2011:186). Structured questionnaires enabled the fieldworkers to ask several questions in a prearranged order (Malhotra, 2009:214; Malhotra & Birks, 2007:265). This ensured that the answers are accurate and consistent and that it could be compared afterwards (Wilson & MacLean, 2011:270).

Most respondents were recruited in the morning at the VIS' office while they waited for transportation to the irrigation scheme. Other respondents were recruited after work when they arrived at the office from the irrigation scheme. An appointment was made with respondents

who did not have time to be interviewed at the time that they were approached. In order to comfort the respondents a natural environment was created through informal conversations that were made with respondents regarding their well-being. After the respondent felt more relaxed he or she was asked whether he or she had time to complete the questionnaire. If it was inconvenient for the respondent, an appointment was made for another time (Cooper & Schindler, 2003:329). If respondents agreed that they had time to complete the questionnaire, he or she were informed about the purpose of the study and what was expected of them. Respondents' rights regarding withdrawal from the study and to stay anonymous was also explained (Ghauri & Grønhaug, 2010:131). If respondents responded positively a comfortable place without any distractions (Eriksson & Kovalainen, 2008:183, 184) was found where the fieldworkers and respondent could sit to conduct the questionnaire. This ensured effective participation during completion of questionnaires. Non-verbal communication skills were used to make respondents feel more comfortable such as eye contact and nodding. The average time duration to complete a questionnaire was approximately 20 minutes.

3.7 Data analysis

The questionnaires were coded, data entered into SPSS, (Statistical Package for the Social Sciences version 22) and analysed by the researcher in consultation with the Statistical Consultation Services of the North West University (SCS, NWU).

Respondents' demographic characteristics and self-productions activities were measured by using frequencies and percentages. Each food security group was classified in a certain income group with the use of midpoint values. Correlations were used to determine the relation between respondents' food security status and the following variables: education, income, amount of money spent on food, percentage of income spent on food and household members per household. During data analysis p-values were used to determine whether variables differed statistically significant (Pietersen & Maree, 2010d:210). P-values lower than 0.05 indicates that two variables differ statistically significant (Pietersen & Maree, 2010d:209). Correlations were further used to describe the strength and direction of the linear relationship between two variables' (Pietersen & Maree, 2010a:234). Spearman rho's correlation coefficient was used to determine the association between two categorical variables. Two variables are practically significant if it contains (r) values of 0.3 and higher. This made it easier to investigate the associations between questions asked. A bi-plot was further used to demonstrate the relationship between households' food security status and income. If households' food security status is grouped close together with a certain income interval, then there is a stronger relationship between the specific food security status and the income interval than when they were grouped further apart (Bartholomew *et al*., 2008:93).

In the food security section, nine food security questions each with sub-divisions were analysed. Respondents have answered either yes or no to each question. The regularity of affirmative answers was used to calculate the degree of food insecurity amongst households. The more affirmative answers given, the more food insecure they were. Cronbach alpha's coefficient was performed to ensure internal reliability between food security questions. For strong correlations between items, a high internal consistency with a Cronbach alpha coefficient higher than 0.6 and close to 1.0 is obtained (Malhotra & Birks, 2007:358).

Confirmatory factor analysis was used to group certain questions regarding food knowledge which were answered similarly and measure the same factor together (Pietersen & Maree, 2010b:219). Four factors were extracted namely "Are the following safe to eat", "The surface is clean when", "Hygiene" and "Food can cause illnesses when". These factors were used to describe respondents' food knowledge. In order to determine whether there was internal consistency between the food knowledge questions, a mean correlation coefficient was used. A mean correlation coefficient indicates the correlation between the averages of all the correlations. A mean correlation coefficient between 0.15 and 0.55 is acceptable. Cronbach alpha coefficient was also calculated for each factor which further indicates internal consistency.

Analysis of variance (ANOVA) was used in the present study to determine whether the three different food security groups' average food knowledge scores of each food knowledge question differ from one another. The ANOVA only indicated that a statistically significant difference was obtained (Pietersen & Maree, 2010a:230) but did not specify between which two groups. A p-value of 0.05 or lower indicates that the ANOVA is statistically significant. As the ANOVA was statistically significant, the post hoc test of Tukey's B was used to determine specifically which two food security groups differ from each other. Cohen's d-values, which are the standardised difference between averages, were used to indicate practical significance between the three different food security groups' average food knowledge score. D-values of 0.5 and larger indicate that there is a practical significant difference between two specific groups (Pietersen & Maree, 2010d:211).

Kruskall-Wallis one-way analysis of variance is a non-parametric technique used to indicate significance and is based on ranked data (Field, 2009:559-560). Kruskall-Wallis one-way analysis of variance was used in the present study to determine whether there is a statistically significant difference between the frequencies of consumption of specific food products for different food security groups. These data were illustrated with the use of box-plots. Box-plots use medians and quartiles to describe the data through a graphical illustration (Pietersen & Maree, 2010c:192). Medians split data into two equal parts to present the middle score (Field, 2009:23). Quartiles give a global presentation of the position of data (Field, 2009:23).

3.8 Validity

Validity can be defined as the degree to which a measurement instrument accurately reflects what it intends to measure (Schiffman & Kanuk, 2010:58). There are four different types of validity, namely content validity, face validity, criterion validity and construct validity. Face, content and construct validity were used in the present study. Face validity evaluate the instrument and verifies whether the instrument measures what it appears to measure (Pietersen, & Maree, 2010b:217). This was done by evaluating the questionnaire to determine whether particular questions that were asked relate to the objectives of the study. The questionnaire was analysed by the SCS NWU of the Potchefstroom Campus and by project leaders. This ensured that each question was analysed and compared to the objectives of this study in order to determine whether the questionnaire was valid to use. Face validity was further ensured by asking clear and comprehensible questions (Zikmund & Babin, 2010:336).

Content validity tests whether the questionnaire covers all the aspects it is intended to measure (Babbie & Mouton, 2011:123). A thorough literature review was done to describe the relevant objectives of this study and to establish validity. Standardised questionnaires already tested and used in similar studies were used in the present study (McDonald *et al*., 2003:15). Content validity was further improved through a small scale pre-test which ensured that the aim and objectives of the study was reached (Malhotra, 2009:352) and that all relevant concepts regarding food security were included. Potential misunderstandings of the terminology and layout of the questionnaire were further tested through the pre-test (Malhotra, 2009:352). As a bilingual questionnaire was used, respondents were able to complete the questionnaire without any difficulties (Fraenkel *et al*., 2012:150). The layout of the questionnaire involves whether the combination in which questions were asked were correct for the specific context in which it was asked. The questionnaire was adapted to eliminate potential problems identified during the pre-test.

Construct validity is used to determine what the measuring instrument is measuring and how and why it works in this specific way (Delport & Roestenburg, 2011:175). Factor analysis was used to ensure construct validity amongst the food knowledge section of the questionnaire. Factor analysis groups certain aspects within the food knowledge section which is answered in the same way, and therefore measures the same dimension together (Pietersen & Maree, 2010b:219).

3.9 Reliability

Reliability can be defined as the degree to which a measuring instrument is consistent in what it measures (Schiffman & Kanuk, 2010:58). The questionnaire could thus only be regarded as

reliable if it provides reproducible results (Zikmund & Babin, 2010:334). Only structured and standardised questionnaires which were validated to be reliable in previous published studies were used. The results are reliable as structured questionnaires were used and the same fieldworkers asked the same questions in the same order. Cronbach alpha's coefficient was used to determine internal reliability within constructs (Malhotra & Birks, 2007:358). This made it possible to determine to which extent each question in the food knowledge and food security sections of the questionnaire is associated with all the other questions in that specific section (Wilson & MacLean, 2011:72).

The questionnaire was assessed by SCS of the NWU. This was done to identify all potential questions which could have been misinterpreted (Cooper & Schindler, 2003:232) and to ensure that the questions were correctly formulated and could be analysed statistically. It is important that experts are used to assess questionnaires since they analyse each question thoroughly in terms of comprehension, information retrieval, judgement and response generation (ABS, 2001:3). Differences between the original questionnaire and the translated version were compared to ensure that the content of the questionnaire remained the same and to correct grammar mistakes. Fieldworkers received training prior to the study which ensured that they had read the questions exactly as they were printed and gave no non-verbal clues or assistance of any kind during the completion of the questionnaire. A pre-test was also conducted to determine the reliability of the questionnaire as questions were asked in a different combination as in the original questionnaires.

3.10 Ethical aspects

Ethical approval for this study was obtained (NWU-00040-13-A1) after all requirements of the Faculty of Health Science and the Ethics Committee of the North West University were met. Although management of the VIS was positive towards research being done amongst their employees, formal permission was obtained from management to conduct the research and to use the premises at the VIS.

Data was collected non-invasively and without disrupting participants' day-to-day activities (Babbie & Mouton, 2011:521). A cover letter which served as an informed consent form was attached to all questionnaires which explained the aim and objectives, the possible benefits and ethical aspects that were expected to influence the willingness of respondents to participate in the study. These aspects included the purpose of the study, the time it would take to fill out the questionnaire, respondents' rights regarding withdrawal from the study and to stay anonymous (Strydom, 2011a:117). The withdrawal process was explained in detail with respondents. Respondents could at any time during the study inform the fieldworkers if they felt that their rights were violated. They had then the right to distance them from the study and would not be

interviewed anymore, as participation of the study was voluntary without any manipulation (Babbie & Mouton, 2011:521). As low literate respondents were part of the study, all written information in the cover letter was discussed with respondents prior to data collection. After respondents were informed about all aspects included in the cover letter, they were requested to complete consent documentation prior the completion of the questionnaire (Babbie & Mouton, 2011:529). The informed consent form is an indication of respondents' willingness to take part in the study (Strydom, 2011a:117). There is no connection between the questionnaires and respondents' names as only a respondent's signature was required to give consent for filling out the questionnaire. A code was assigned to each respondent since they were not obligated to provide any personal information. This ensured that respondents stayed anonymous and that all information remained confidential (Babbie & Mouton, 2011:523). Even though potentially sensitive questions such as "total household income" were included in the questionnaire, respondents were not obligated to answer questions which they preferred not to. Furthermore, respondents have indicated their "total household income" by choosing from different income brackets. This method made respondents feel more at ease to answer the question as they did not have to be specific regarding their household income. After the completion of the questionnaire, the consent form was stored separately from the questionnaire.

No harm was caused to any respondent during the research period (Babbie & Mouton, 2011:522) as there were no physical contact between the fieldworkers and respondents. No remuneration was given to respondents for participating in the study. Incentives, in the form of a cold soft drink and a salt snack were given to respondents as a token of appreciation. The incentives were not a bribe to participate in the study as the items were only given after respondents completed the questionnaire. Respondents also did not know that they will receive an incentive prior to data collection. All information regarding the research was transferred to a hard drive for safe keeping in the Consumer Science department of the North West University Potchefstroom Campus, and all documents which containing information regarding respondents are password protected. After the completion of the study questionnaires will be stored separately from the consent form in a safe place for five years at the Consumer Science department of the North West University Potchefstroom Campus. Findings regarding the study will be communicated to the employees of the VIS which give them the opportunity to work on their shortcomings.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

Basic food knowledge, food access, optimum food utilisation and effective food handling practices are important components to support food security especially, on a household level. A questionnaire was used to obtain information from the employees of the Vaalharts Irrigation Scheme (VIS) regarding their basic food knowledge, access, utilisation (which include food handling and consumption practices) and food security statuses (as described in Chapter 3 and Appendix B). Results obtained from the questionnaire are discussed in this chapter. A need to support employees was identified by management of the VIS and the Lifeplan® programme was introduced to this community during 2010. Lifeplan® is a comprehensive development programme which addresses food utilisation and other aspects to support well-being. In a previous study, consumers in the Vaalharts region indicated a need to become more aware of hygiene and the consumption of adequate as well as a variety of food (Coetzee, 2011:23). A purposive sampling method was used.

4.2 Demographic characteristics and the living environment of respondents

A total of 162 respondents participated in the study. Table 4.1 contains a summary of respondents' demographic information. The majority of respondents were black (70.4%) males (94.4%) whose ages ranged between 45 and 64 (54.4%). Respondents were mainly Setswana (56.8%) and Afrikaans (31.5%) mother tongue speakers. However, the Setswana mother tongue speakers could also speak and understand Afrikaans. Almost a third (29.6%) of respondents only completed primary school, 33.9% completed secondary school and 23.5% completed matric (Table 4.1).

Table 4.1 Summary of respondents' demographic characteristics (n=162)

Demographic characteristics	Frequency (n)	Percentage of sample (%)
Gender		
Male	153	94.4
Female	9	5.6
Race		
Black	114	70.4
Coloured	31	19.1
White	17	10.5
Age		
18-24	5	3.1
25-34	33	20.4
35-44	34	21.0
45-54	50	30.9
55-64	38	23.5
65+	2	1.2
Home language		
Setswana	92	56.8
Afrikaans	47	29.0
Education level*		
None	9	4.9
Grade 1 – 7	48	29.6
Grade 8 – 11	55	33.9
Grade 12	38	23.5
Degree/ diploma	12	7.4

The majority of respondents (107/162) indicated that their households earn an income between R4165 – R13209 (Figure 4.1) which forms part of the middle income group (Stats SA, 2013a:39). The low income group consisted of 26/162 households who earn less than R4 164 while upper income households (29/162) earn between R13 210 and > R32 522. This is in line

with literature which states that the majority of the citizens in the Northern Cape are black (Stats SA, 2012a:10), mainly Setswana or Afrikaans speaking (Stats SA, 2003:15), have a low education level (Stats SA, 2012a:14) and are in the middle income group (Stats SA, 2012b:42).

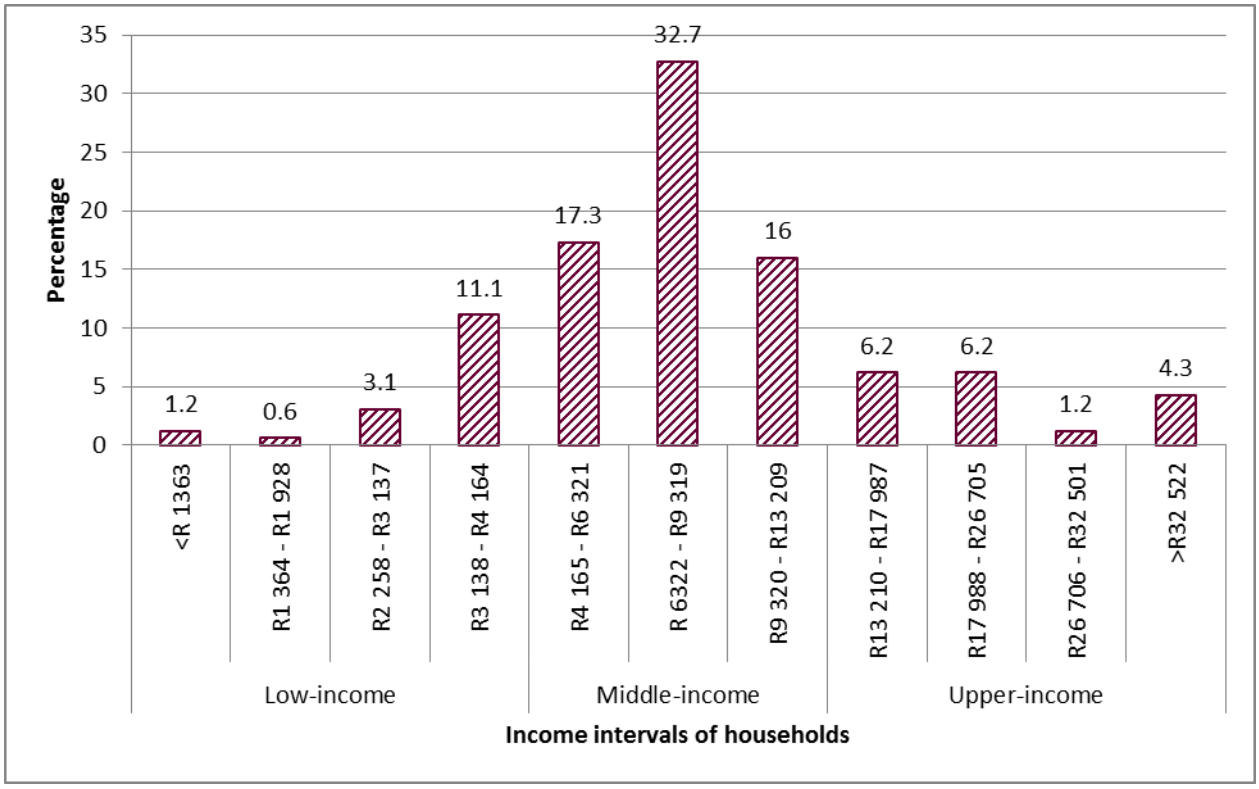

Figure 4.1 The percentage distribution of indicated households' monthly income

Households in the present study consisted of an average of 4.4 household members, which are more than the average 3.7 household members in the Northern Cape (Stats SA, 2012a:17). The majority, 151/162 (93.2%), of respondents live in a permanent brick structure house, 139/162 (85.8%) households have a separate kitchen as part of the house and 100/162 (61.7%) have running tap water inside the house. Most respondents in the present study have access to appliances and services such as refrigerators (94.4%), stoves (97.5%) and use electricity to cook food (92.6%). More respondents in the present study have access to refrigerators and stoves than the average person living in the Northern Cape. According to statistics South Africa (2014a:167) 71.0% of consumers living in the Northern Cape possess a refrigerator and 87.2% own an electric stove. This is most probably due to all respondents being employed and receives an income.

4.3 Food availability and access through self-production

The first objective of this study was to determine food availability and access through self-production amongst respondents' households. Self-production activities such as vegetable

cultivation and animal rearing are an effective way of increasing household food availability and access (Renzaho & Mellor, 2010:4, 5). Only 44/162 (27.2%) respondents cultivate vegetables in home gardens and 72/162 (44.4%) keep livestock (Table 4.2).

Respondents indicated that they mainly cultivate vegetables (95.5%), and rear animals (90.3%) for household consumption. This is consistent with the findings of Statistics South Africa (2014a:59) which indicated that consumers in the Northern Cape mainly use home gardens as an extra source of food. Respondents (73/118) indicated that insufficient space is the main reason for not cultivating vegetables. Although only a few respondents have vegetable gardens, 61.7% of respondents who did not have a vegetable garden indicated that they would like to have one. Improving respondents' ability to cultivate vegetables in an area with limited space might support food availability and accessibility on household level.

Climbing vegetables, such as tomatoes or green beans will take up less space. There are successful established methods available to cultivate these types of vegetables in used tyres, bags filled with soil and gutters cut in half. Furthermore, community vegetable gardens could be an effective way to provide vegetables for consumers without land or who could not cultivate vegetables themselves (Earl, 2011:62, 66).

Table 4.2 Summary of respondents' self-production practices (n=162)

Respondents' self-production activities	**n**	**%**	**n**	**%**
Indication of self-production activities	**Yes**		**No**	
Vegetable garden	44	27.2	118	72.8
Livestock	72	44.4	90	55.6
Food utilisation	**Vegetable garden (n=44)**		**Livestock (n=72)**	
Household consumption	42	95.5	65	90.3
Selling	2	4.5	22	30.6
Preserving for the future	13	29.5	20	27.8
Give away to family and friends	12	27.3	20	27.8

*Where (n=44) and (n=72): The question was only applicable to respondents who indicated that they own vegetable gardens or livestock.

4.4 Basic food knowledge

Food knowledge often directs consumers' food utilisation practices, as it has an influence on their food choices (FAO, 2013b:49) and food handling practices (Langiano *et al*., 2012:49). The second objective of this study was to determine whether respondents have basic knowledge regarding food usage and handling practices. An aspect mainly focussed on was food safety linked to food usage.

Table 4.3 contains a summary of the frequencies of respondents' correct responses to basic food knowledge. Basic food knowledge questions were used to do a confirmatory factor analysis. A Cronbach alpha coefficient was calculated for each factor. The Cronbach alpha coefficient for the food knowledge section varied between 0.6 and 0.8 which indicate an acceptable internal consistency (Malhotra & Birks, 2007:358). The question regarding whether respondents wash the surface in-between preparing meat and salad was excluded from the factor analysis and the above table as it lowered the internal consistency regarding food knowledge. The mean correlation coefficients of the present study were between 0.281 and 0.495, which further indicate an acceptable internal consistency.

Table 4.3 Summary of the frequencies of respondents' correct responses to basic food knowledge (n=162)

Item	% Correct	Mean ± SD	Cronbach Alpha	Mean correlation coefficient
Are the following safe to eat:		0.89±0.22	0.7	0.48
Chicken reheated more than 3 times	77.2			
Swollen can of tuna	94.4			
Bread covered in mould	91.4			
Pilchards left uncovered in the sun	94.4			
The surface is clean when:		0.88±0.21	0.6	0.28
Cleaned with soap and water	88.3			
Cleaned with damp cloth	87.7			
Cleaned with dry cloth	95.7			
Cleaned with warm water	79.0			
Hygiene		0.89±0.11	0.8	0.50
Wash the surface before and after preparing food	97.5			
Wash the surface after preparing food	98.8			
Wash the surface before preparing food	97.5			
Never washes the surface	98.8			

Food can cause illnesses when:		0.93±0.15	0.6	0.38
Uncovered pilchards left in warm conditions for a long time	97.5			
A lot of flies on food	97.5			
Hands not washed before eating cooked food	98.1			
Fruits or vegetables not washed	95.1			
Chicken is undercooked	77.8			

SD = Standard Deviation

It might have been assumed that male respondents lack food knowledge as households represented by males most probably have a female (wife or mother) who prepared food at home. The contrary was true for this study. The majority of respondents answered questions regarding basic food knowledge correctly. Therefore only questions which were answered correctly by less than 80% of respondents were discussed. More than a 20% of respondents were uncertain regarding the safety of chicken that is reheated repeatedly or undercooked. It is concerning that there were respondents who think that it is safe to reheat chicken repeatedly or to eat undercooked chicken as such practices can cause foodborne illnesses (CDC, 2009:12, 17). A study conducted by Du Toit and Venter (2005:84) indicated that none of its participants knew that inadequate cooking of chicken could be associated with foodborne diseases while 80% of them indicated that they do not reheat food more than once. Respondents in the present study are thus more knowledgeable regarding the safety of consuming undercooked chicken. Nearly 80% of respondents in the present study indicated that it is safe to clean a food preparation surface with warm water only. This is not a concerning factor as the questionnaire did not specify whether the surface was used to prepare bread or meat on.

A possible reason for respondents answered questions correctly might be since respondents participated in The Lifeplan® Programme which was introduced to this community during 2010. Lifeplan® is a development programme which addressed a balanced food plan and personal hygiene, amongst other aspects.

As respondents' basic food knowledge was investigated, their food storage practices were also explored. Results revealed that an average of 85.4% of respondents apply correct food storage practices for raw, dry and leftover food. As such, most respondents choose suitable methods to store different food products. This is consistent with a study in South Africa which indicated that 89.5% of consumers use correct storage methods (Du Toit & Venter, 2005:80). Respondents without refrigerators indicated that they either throw food away or feed their pets. Appropriate food storage practices are important as it have an influence on the safety of food consumed.

Sixty six percent of respondents indicated that they have obtained basic food knowledge from their parents. The same data was obtained from a study conducted by Zarnowiecki *et al*. (2011:1286) which indicated that children's food knowledge is indirectly influenced by their parents' food knowledge. This highlights the importance of parents having sufficient food knowledge. Schooling also played a role in 75/162 (46.3%) of respondents' food knowledge. Increasing food knowledge taught at school level might enable respondents to identify unhealthy or unsafe food choices made at home (Phaswana-Mafuya & Shukla, 2005:25; UNDP, 2012:89).

4.5 Food consumption practices

The third objective aimed to identify the different types of food consumed amongst respondents. The questionnaire included options which varied from seldom to more than once a day for each food product. According to the food based dietary guidelines, respondents' diet should include a variety of food and comprise mainly of starchy food (Ontong *et al*., 2011:108). After respondents' food consumption data were analysed, it seemed as if the majority of households consumed food from each food group on a weekly basis (Figure 4.2). Proteins (88.9%), vegetables (87.0%) and cereals and grains (75.9%) were consumed by the majority of the households once a week. The same trends of households' consumption were observed for food groups consumed two to four days a week as proteins, vegetables and cereals and grains were also consumed by the majority of the households two to four days a week. The situation for daily consumption looks different. As expected, cereals and grains were the main staple, as it was consumed on a daily basis by 86.0% of households. A concerning fact is that only 48.8% of households consumed proteins and 31.5% vegetables on a daily basis. The majority of households consumed a larger variety of vegetables and proteins either once a week or a two to four days week. The types of food being consumed most frequently were further investigated.

Regular meal consumption is also essential amongst employees to ensure stable energy levels (Earl, 2011:54). The high cost of food often necessitates low income households to reduce the amount of meals consumed on a daily basis (FAO, 2008:29). The majority (60.5%) of respondents in the present study consumed three meals a day while a third (30.2%) of them only consumed two meals a day.

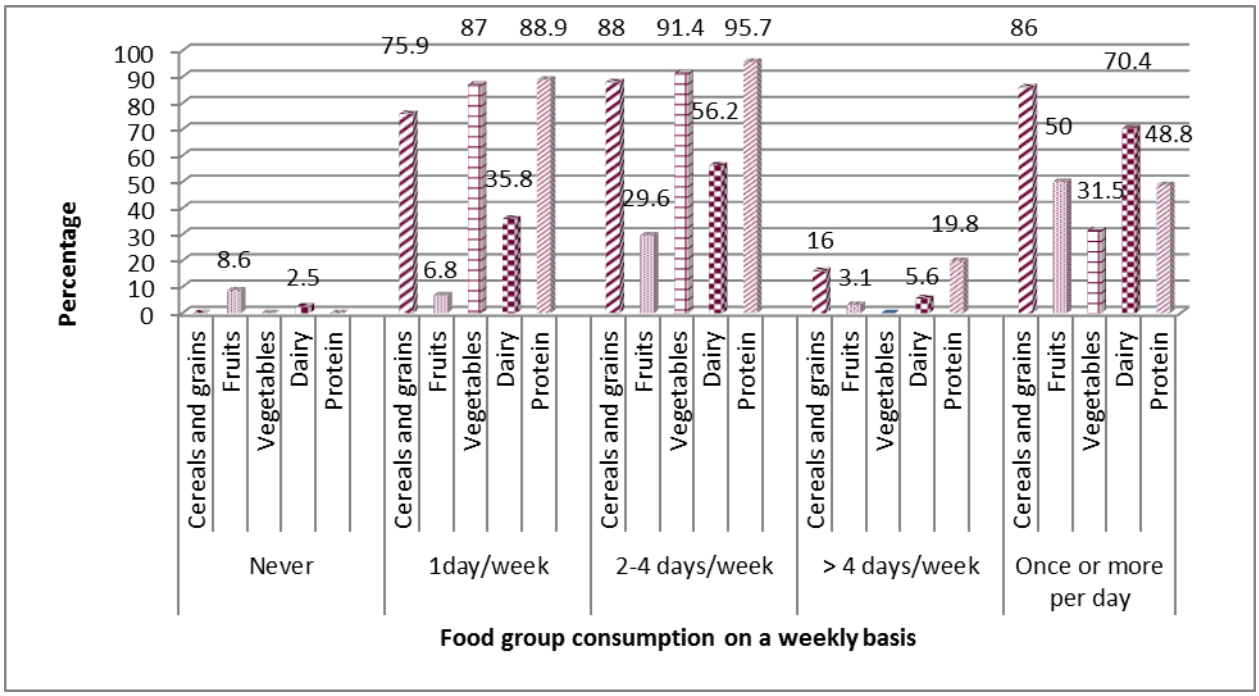

Figure 4.2 The percentage of households' consumption patterns regarding different food groups on a weekly basis

4.5.1 Food items consumed on a daily basis

Milk, fruits and maize meal were the three most frequently consumed food products amongst households on a daily basis. Figure 4.3 presents households' top 10 foods consumed on a daily basis. These findings correspond to some extent with those of Labadarios *et al*. (2005:540) which indicated that milk and maize meal is one of the top five food products consumed by South Africans. Milk is a versatile dairy product which can be used as a drink (pure milk or milk in coffee and tea), to eat with porridge or to cook food in. This might explain respondents' high milk consumption as milk is often used with maize meal, while maize meal is also a frequently consumed food amongst respondents. Almost half (44.5%) of respondents consume maize meal once or more than once a day. Maize meal is a popular food source as it is an inexpensive food source (Schönfeldt *et al*., 2013:231) which gives a feeling of satiety (Viljoen *et al*., 2005:55).

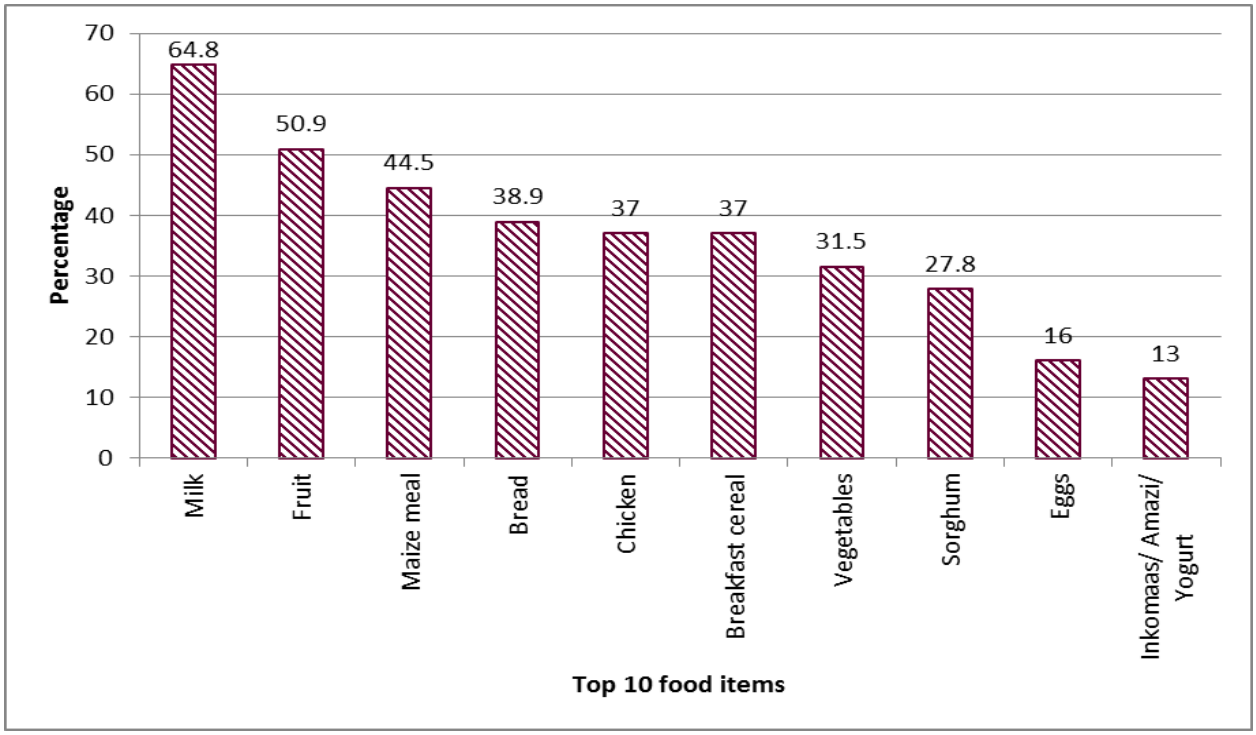

Figure 4.3 The percentage of households' top 10 indicated food items consumed on a daily basis (n=162)

More than half (50.9%) of respondents consume fruits on a daily basis. Fruit might be an affordable food source as it is locally available at the Phokwane Local Municipality area (UE, 2004:57, 62, 64) and is easy to prepare.

Chicken and eggs were the only foods in the protein food group which formed part of the top ten indicated foods consumed on a daily basis. These results correspond with those of Viljoen (2009:110, 122) who indicated that chicken dishes are highly preferred items amongst Africans. Chicken and eggs are moderately low in cost, can be kept in consumers' backyard for personal use (Farrell, 2010:1, 2) and is easy to cook. Different parts of the chicken such as their feet or heads are also a popular meal amongst low income Africans (Schönfeldt *et al*., 2013:231) as it is low in cost. Furthermore, no major taboos are found on the consumption of chicken and eggs (Farrell, 2010:1).

A large percentage (41.3%) of respondents indicated that they consume non-dairy coffee creamer on a daily basis. As 94.4% of respondents owned refrigerators, the reason for coffee creamer consumption could not be due to respondents not having sufficient storage facilities for fresh milk as no refrigerator is necessary as indicated by Walsh *et al*. (2003:94). The taste or price might be the reason for consumers' consumption of non-dairy coffee creamer. It is also possible that non-dairy coffee creamer is mainly used when respondents are at work and do not have access to a refrigerator. On the other hand, non-dairy coffee creamer such as Cremora has negative effects on consumers' cholesterol levels (PCRM, 2010:2) due to the presence of saturated fatty acids (Katsri *et al*., 2014:76).

4.5.2 Food items consumed weekly

Respondents' food consumption practices two to four days a week and more than four days a week were combined to form a new category a few days a week. Vegetables were the most frequently consumed food a few days a week (Figure 4.4).

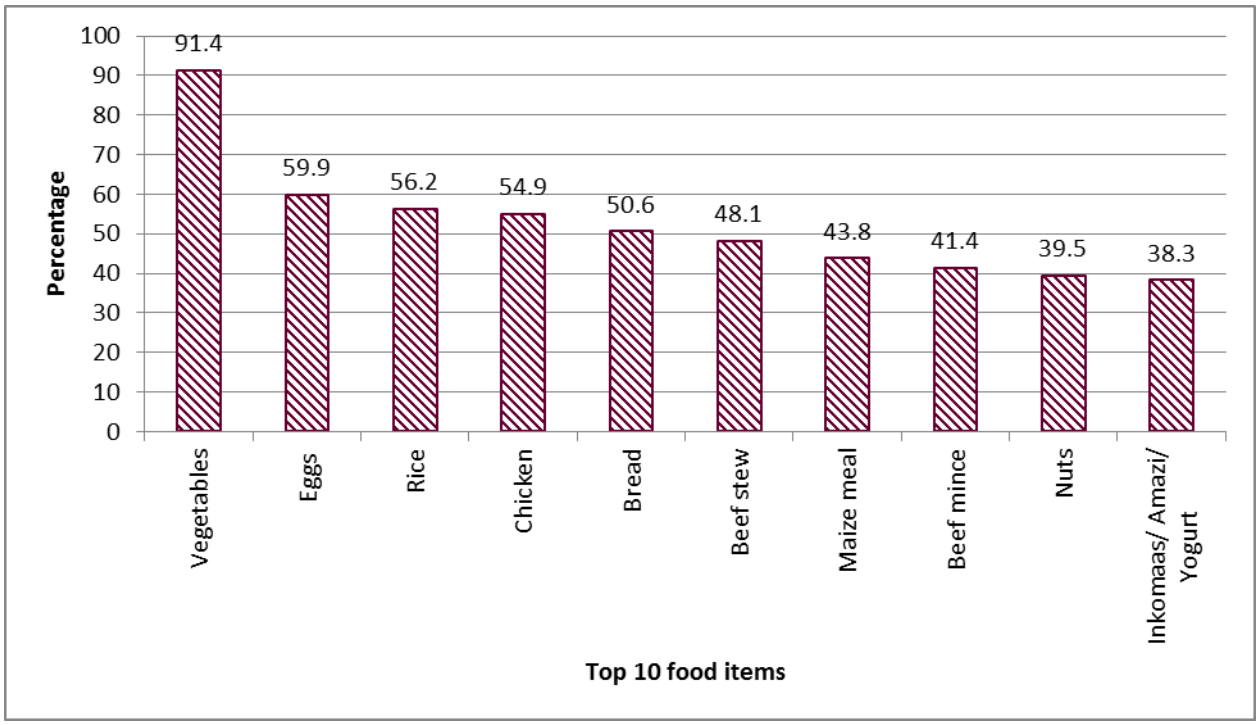

Figure 4.4 The percentage of households' top 10 indicated food items consumed a few days a week (n=162)

Households' vegetable consumption consisted mainly of potatoes (62.3%) and marogo (54.9%). The high consumption of potatoes might be due to the high satiety value (Anderson *et al*., 2013:361) and versatility as it could be used in several meals and is often mixed with other vegetables to increase the volume of the vegetable dish being served. Marogo, on the other hand, is an inexpensive vegetable which is readily available in the field (Van der Walt *et al*., 2009:447). The only food in the protein food group which form part of the top 10 indicated foods consumed by more than half of respondents a few days a week were eggs and chicken (Figure 4.4). This is most probably due to eggs and chicken being the most cost effective protein source with no major restrictions on the consumption of it (Farrell, 2010:1). Rice and bread were the most frequently consumed cereals and grains products. Rice is easy to prepare while bread is readily available and can be served as the basis for most meals. It was also interesting to notice that nuts were the only vegetable protein which form part of the top 10 indicated food items consumed a few days a week. Respondents' high consumption of nuts might be because it is a cost effectiveness snack as it is cultivated in the Northern Cape.

Vegetables were also the most frequently consumed food once a week (Figure 4.5). However, respondents indicated that they consume a larger variety of vegetables and protein food products once a week. This is most probably on Sundays which is a special occasion and mainly used to serve more expensive food which they do not necessarily consume on

weekdays. These findings are similar to those of Viljoen (2009:94) who indicated that consumers consume more expensive food products over weekends. Vegetable consumption once a week might also be due to respondents having more time to prepare food than they would have had over weekdays. More than half of households indicated that they consume pumpkin mainly once a week. This might be due to pumpkin which needs a longer preparation time than vegetables such as marogo as it needs to be peeled, cut and cooked before it can be consumed. As pumpkin is only consumed once a week such as on Sundays, respondents do not have work responsibilities and have time to prepare pumpkin.

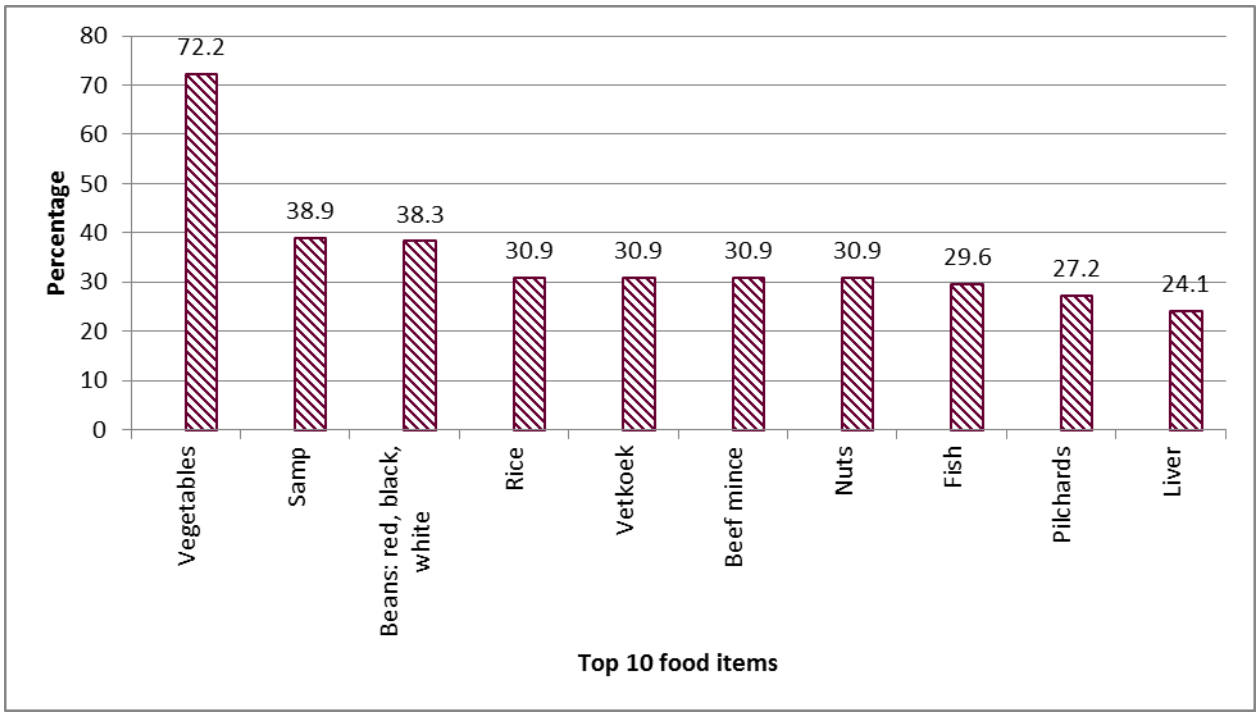

Figure 4.5 The percentage of households' top 10 indicated food items consumed once a week (n=162)

Protein foods (plant and animal) which formed part of the top 10 most frequently consumed food once a week consisted of beans, beef mince, fish, pilchards and liver (Figure 4.5). It is clear that respondents consumed a larger variety of protein food products once a week. This might be due to protein food products being expensive and could only be afforded once a week or on special occasions.

4.5.3 Foods seldom consumed

The majority of food that is seldom consumed amongst respondents consisted of proteins especially plant protein. A very low consumption of plant protein, such as lentils (17.9%) and chickpeas (22.8%) were found amongst respondents. These findings correspondens with a

study conducted by Labadarios *et al*. (2011:8) who indicated that consumers in South Africa do not consume plant protein on a regular basis.

The study mainly focused on the food security status of the employees of the VIS, and as such households' data were analysed according to the differences between the three different food security groups.

4.6 Household food security

The study ultimately aimed to explore the food security status of households represented by respondents of this study. The Labadarios *et al*. (2009:15) and Radimer *et al*. (1990:1547) food security measuring instruments were used to determine respondents' food security status. Respondents who answered "No" to all questions asked were regarded as food secure. Respondents who gave one to five affirmative responses were at risk of being food insecure and respondents who gave more than five affirmative responses were food insecure. A Cronbach alpha coefficient was determined for the food security section of the quesstionnaire. A coefficient of 0.9 was obtained which indicated an acceptable internal consistency (Malhotra & Birks, 2007:358). Results obtained from the present study revealed that only 48 (29.6%) of the respondents were reported to be food secure households while 79 (48.8%) were at risk and 35 (21.6%) experienced food insecurity. According to Shisana *et al*. (2013:145), approximately 45.6% of South African households are food secure, and 28.6% are at risk of being food insecure. Respondents of the present study are thus more prone to be food insecure than the rest of South Africa.

All respondents of the present study are employed and receive regular monthly income (Figure 4.1) but are either at risk or food insecure. More in depth investigations were conducted to determine the reason for this phenomenon.

4.6.1 Comparison of different food security groups

All three food security groups (food secure, at risk, food insecure) were compared with one another to determine if any trends or characteristics could be observed or identified within the food security groups. Potential identified characteristics will assist researchers to develop strategies to support household food security. As 48.8% of households in the present study were at risk of being food insecure prevention strategies need to be implemented.

Statistical analysis on different data sets obtained from the different sections of the questionnaire was correlated with the food security status. A statistically significant medium correlation (r=0.36; p=0.00) was obtained between respondents' food security status and their income. The bi-plot from Figure 4.6 was used to display the relationship between households'

food security status and income. The closer together the two variables are, the stronger the relationship between the two variables is (Bartholomew *et al*., 2008:93). As can be expected the bi-plot in Figure 4.6 indicated that higher income households were more likely to experience food security while low-income households have a lower food security status. This corresponds with Omonona and Agoi (2007:404) who indicated that households' income have an influence on their food security status. It was also interesting to note that 58.7% of respondents did not receive financial help from their family members. Encouraging household members to be actively involved in income earning activities might therefore have a positive influence their food security status.

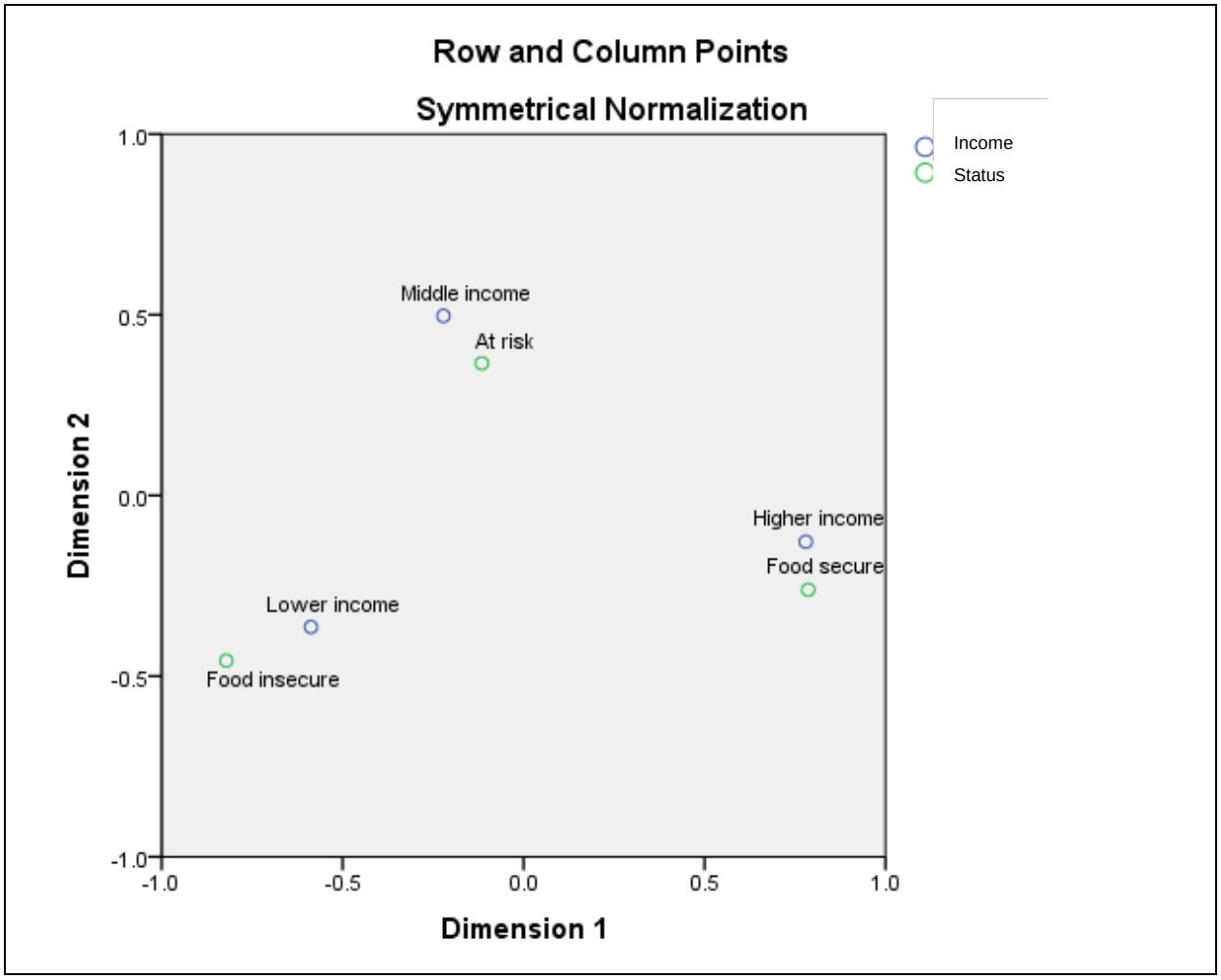

Figure 4.6 Relationship between households' food security status and income

Statistically significant differences with a low practically significance could be found between the following variables and household food security: amount of money spent on food (p= 0.018; *r*= 0.19), percentage of income spent on food (p= 0.007; *r*= -0.21) and household members per household (p= 0.020; *r*= -0.18) (Table 4.4).

Table 4.4 An indication of different food security groups' income, money spent on food and percentage of money spent on food (n=162)

	Mean ± SD	p-value	Effect size
Income		0.00	*r*= 0.37
Food secure	R14 485 ± 10886.72		
At risk	R9 388 ± 6906.55		
Food insecure	R6 237 ± 2893.84		
Money spent on food		0.018	*r*= 0.19
Food secure	R1 816 ± 897.28		
At risk	R1 567 ± 827.37		
Food insecure	R1 364 ± 793.69		
Percentage of money spent on food		0.007	*r*= -0.21
Food secure	17.0% ± 11.42		
At risk	23.0% ± 26.11		
Food insecure	30.4% ± 46.51		
Household members per household		0.020	*r*= -0.18
Food secure	3.8		
At risk	4.7		
Food insecure	4.8		

SD: Standard Deviation

*r=0.1 small coefficient, r=0.3 medium coefficient, r=0.5 large coefficient

**p< 0.05 statistically significant

These results indicated that there was a tendency that the amount of money spent on food, percentage of income spent on food and the household size has an effect on households' food security status. The amount of money spent on food has a positive correlation coefficient, which means that there is tendency that the more money respondents spend on food the more likely they will be food secure. The percentage of income spent on food, and household members per household have a negative correlation coefficient. This indicates that there is a tendency that

households with a low food security status spends higher percentages of their income on food and have larger household sizes than food secure households.

Both, food insecure and at risk respondents, mainly fall in the middle-income group as they earn an income of R6 237 and R9 388 respectively (Table 4.4), according to the midpoint values. Both of these food security groups spend a smaller amount of money (R1 364 and R1 567) on food than the food secure respondents (R1 816). To make matters worse these two groups have larger household sizes (Table 4.4). Food insecure respondents' low food security status might therefore be due to respondents spending less of their money on food and more on non-food items. This statement was confirmed by food insecure respondents who indicated that they spend most of their money either on food or housing (rent, furniture, appliances) (Figure 4.7). NCR (2012:45) indicated that consumers who fall in the low to middle income group often spend more money than they have available which makes it difficult to subsist. It is possible that these respondents purchase articles such as furniture on credit and need to use a large amount of their income to pay their debt every month (Jones, 2002:6). This leaves respondents food insecure as they do not have an adequate amount of money left to purchase enough food for each household member.

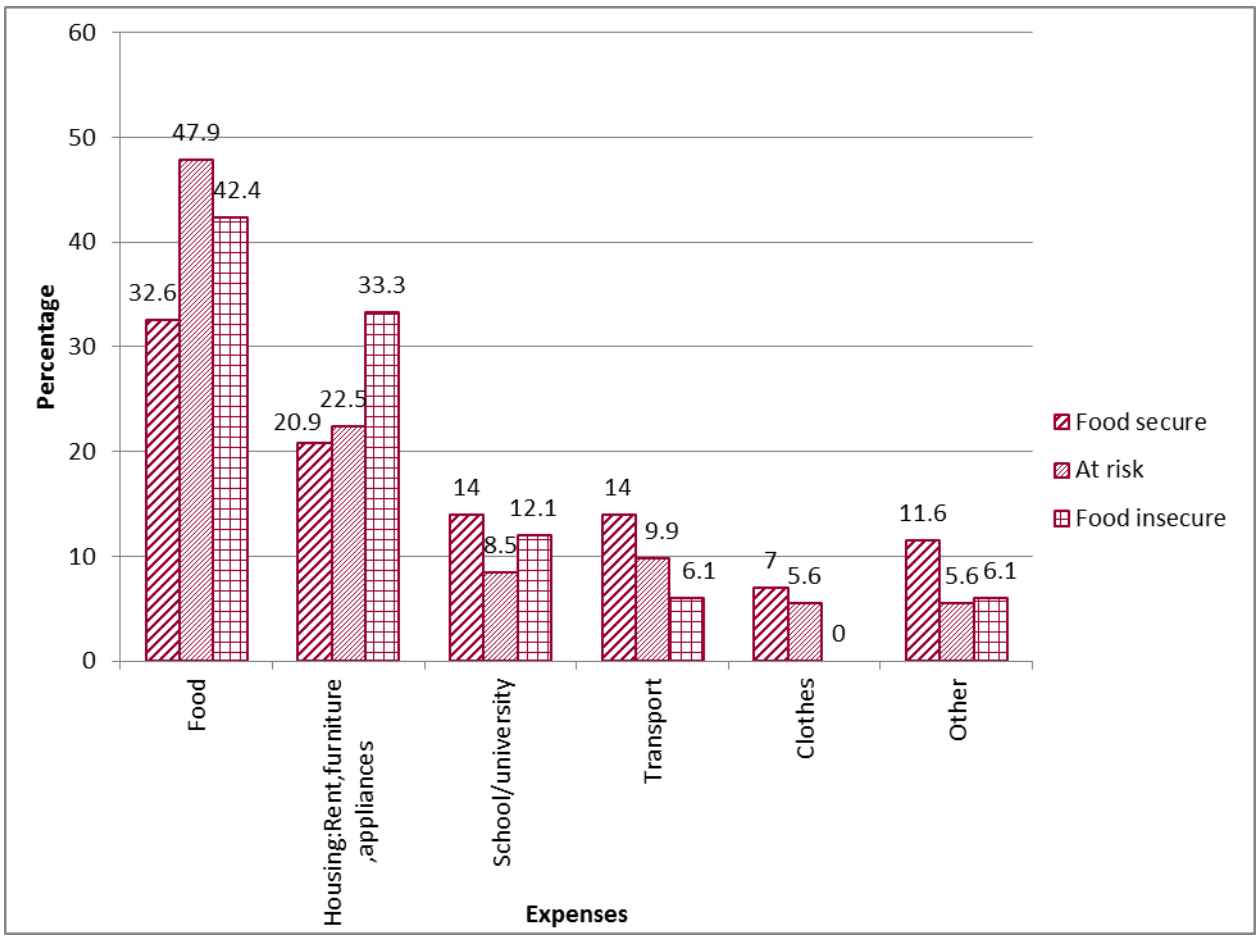

Figure 4.7 Percentage of respondents in all three food security groups' income which is mainly spent on different aspects

At risk respondents indicated that they spend most of their income on food. Despite the fact that at risk respondents spend most of their money on food, they remain at risk of being food insecure. Further investigations to determine specific item consumption and expenditure should be done to understand the reason for the low food security status and to be able to assist these households with monthly budgeting. It is possible that these respondents purchase more expensive food but in a lower quantity, which negatively influences their food security status. Another explanation might be that at risk respondents do not use purchased food products optimally. More attention needs to be given to how these respondents use their resources, such as income, and whether they have a budget which gives guidelines on how much money is available to spend on specific aspects per month. A large percentage (78.4%) of respondents also indicated that they were not part of community projects. It is possible that respondents do not take part in such programmes because they are uninformed about the benefits of community projects. Encouraging respondents to take part in community projects which improve their ability to use resources optimally might have positive outcomes on their food security status.

Respondents' in different food security groups' self-production activities

After analysing the different food security groups separately, results revealed that 9/48 food secure, 17/79 at risk and 12/35 food insecure respondents were engaged in self-production activities. Due to the limited amount of respondents in each food security group who were engaged in self-production activities, no correlations could be drawn between respondents' food security status and those who were engaged in self-production. The effect which self-production activities have on respondents' food security status could therefore not be determined.

Respondents in different food security groups' basic food knowledge

A small statistically significant correlation (r=0.2; p=0.01) was obtained between respondents' food security status and level of education. This corresponds with Omonona and Agoi (2007:404) who indicated that a households' education has an influence on their food security status. Respondents' education level was further correlated with their basic food knowledge to determine whether their level of education has contributed to their basic food knowledge. A small statistically insignificant correlation (r=0.12; p=0.06) was obtained between respondents' basic food knowledge and their education level. The education level of respondents in the present study thus has no influence on their basic food knowledge.

The majority (84.12% – 94.27%) of respondents in all three food security groups answered questions regarding basic food knowledge correctly (Table 4.5). An ANOVA was used to determine whether the three food security groups' average basic food knowledge scores differ from one another (Pietersen & Maree, 2010a:229). The question regarding "whether the following food is safe to eat" was the only question with a p-value lower than 0.05 (p=0.00).

Table 4.5 Summary of statistical analysis of respondents' answers regarding "whether the following food is safe to eat"

	N	Mean ± SD	ANOVA Sig
Food secure	48	0.94 ±0.30[a]	
At risk	79	0.90 ±0.21[ab]	
Food insecure	35	0.82 ±0.30[b]	
Total	162	0.89 ±0.22	0.00

*Medians with different superscripts differs statistically significant

SD = Standard Deviation

The post hoc test of Tukey's B was further used to determine specifically which two food security groups differ from each other. The food secure and food insecure groups differ with an average of 0.12 and have a medium practical significant difference (*d*=0.4). The food secure group therefore has a higher average basic food knowledge score for the question regarding "whether the following food is safe to eat" than the food insecure group. These results support the definition of food utilisation of Rivera and Qamar (2003:31) who stated that adequate food knowledge is necessary for optimal food utilisation, which in turn influences the food security status of households.

Different food security groups' food consumption practices

The consumption of maize meal, chicken and green beans were the only food products with statistically significant differences (Kruskall-Wallis p=0.0003 - 0.0223) between the different food security groups. Only food products with statistically significant differences between food security groups were illustrated on box-plots. This made it possible to compare the frequency of food consumption in different food security groups. Quartiles were used in the present study to indicate how often respondents consume certain food products. Q1 and q3 represent the 25% and 75% quartile respectively. Table 1 which contains more detail regarding the median, q1 and q3 of maize meal, green beans and chicken can be found in Appendix C.

The median of food insecure respondents consume maize meal once per day, at risk respondents more than four days a week while food secure respondents consume maize meal only 2-4 days a week (Figure 4.8). Thus, the higher the risk for respondents to be food insecure the more likely they were to consume maize meal more than four days a week. Maize meal could be reckoned as food insecure respondents' staple food. Food insecure respondents most probably consume maize meal more frequently, as it is less expensive (Schönfeldt *et al*., 2013:231) with a high satiety value (Viljoen *et al*., 2005:55). Chicken consumption (Figure 4.9) showed the same trend. The median of food insecure respondents consume chicken once a day, at risk respondents more than four days a week and food secure respondents 2-4 days a week. Food insecure respondents most probably consume more chicken as it is relatively inexpensive compared to other animal protein sources (Scholtz *et al*., 2001:S39) and is easy to cook. Respondents' chicken consumption does not necessarily consist only of the chicken's meat, but might also include other inexpensive parts of the chicken, such as their feet or giblets. This might further contribute to the large percentage of food insecure respondents consuming chicken.

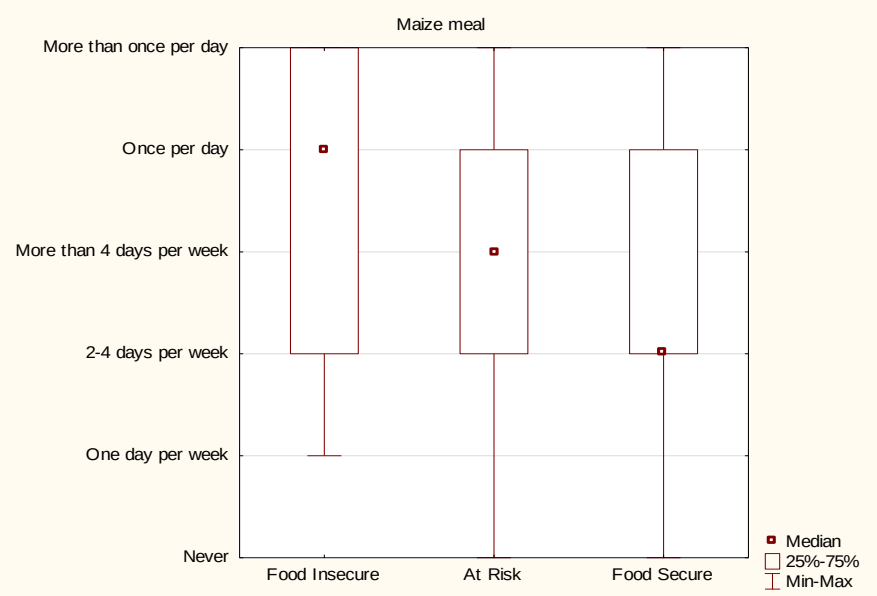

Figure 4.8 Maize meal consumption between the three different food security groups

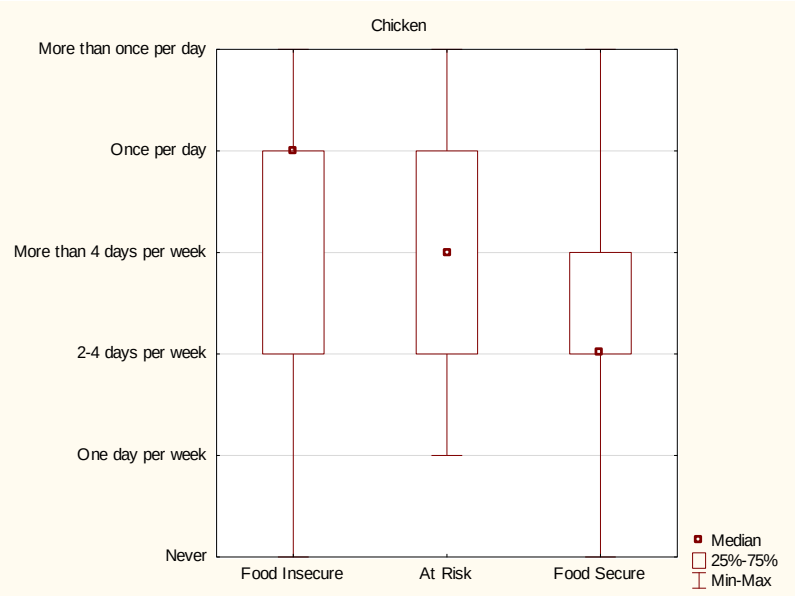

Figure 4.9 Chicken consumption between the three different food security groups

Figure 4.10 Green bean consumption between the three different food security groups

The median of food insecure and at risk respondents consume green beans once a week while food secure respondents consume green beans only 2-4 days a week (Figure 4.10). This is supported by the tendency that food insecure respondents mainly consume vegetables once a week. Respondents indicated that vegetables are mainly consumed on special occasions such as Sundays. It is possible that these practices are more commonly applied by food insecure respondents as they might not have enough money to purchase vegetables on a daily basis due to its high cost (FAO, 2008:29).

The following tendencies were also found regarding the consumption of different food groups. Cereals and grains and proteins were the most frequently consumed food groups amongst all three food security groups. Fruits, vegetables and dairy products were the most frequently consumed food groups amongst food secure respondents. It is clear that food insecure respondents' staple food consisted of cereals and grains and proteins of limited variety while food secure respondents included a wider variety of products within the food groups in their diet. This is most probably due to diets consisting of a variety of food being more expensive (FAO, 2008:29). As proteins, specifically meat is an expensive food (Schönfeldt & Hall, 2012:15) it is expected that respondents with a lower food security status who earn a lower income will consume a diet low in proteins. The opposite was true when looking at food groups consumed amongst the three food security groups. There was a tendency that food insecure respondents consumed protein food products more frequently amongst all three food security groups. However, after analysing food insecure respondents' protein consumption, it was indicated that their daily protein consumption consisted mainly of chicken and its products which is an inexpensive source of protein (Scholtz *et al*., 2001:S39). There was also a tendency found that

at risk respondents included more expensive protein food sources such as beef mince and beef stew more frequently in their diet than food secure and food insecure respondents. Plant protein was also consumed more frequently by respondents at risk of being food insecure. The rest of their diet corresponds approximately to those of food insecure respondents. Milk was consumed by a large percentage (>60%) of all three food security groups on a daily basis. All the above results support the statement of Coates *et al*. (2007:19) who indicated that food insecure respondents consume a smaller variety of food groups. Consequently a monotonous diet might inhibit nutrient intake (FAO, 2008:29) which might cause malnutrition.

4.7 Conclusion

The employees of the VIS' food security status were investigated by exploring food availability and access through self-production, basic food knowledge and food consumption practices. All respondents were employed, while less than a third were food secure and more than half of them were either at risk or food insecure. Respondents' demographic characteristics, food availability, basic food knowledge and food consumption patterns were thus examined to determine whether these factors might have an influence on their food security status.

At risk and food insecure respondents were mostly part of the middle-income group but have large household sizes. There was a tendency that larger household sizes were associated with a lower household food security status. Results further revealed that respondents with a higher income were prone to be food secure. Respondents' spending patterns might also have an influence on their food security status. There was a tendency that respondents who spent a larger amount of money on food were more prone to be food secure while respondents who spent a larger percentage of their income on food were more likely to be food insecure.

Self-production activities might play an important part to support the amount of food available at respondents' homes. The majority of respondents indicated that they did not have enough space to cultivate vegetable gardens. Respondents most probably purchase the majority of their food. Additionally more attention needs to be paid on respondents' expenditure patterns as the majority of respondents were part of the middle income but more than half of respondents' were either food insecure or at risk of being food insecure.

Respondents answered most food knowledge questions correctly which indicated that all of them have basic food knowledge. The only statistically and practically significant differences found between the three different food security groups' basic food knowledge, were a question regarding which food is safe to eat. Food secure respondents have better basic food knowledge than food insecure respondents regarding which food is safe to eat. Basic food knowledge is an important aspect contributing to respondents' overall food security status.

After analysing each food security group's food consumption practices, it was found that food secure respondents consume the largest variety of food within the different food groups on a daily basis amongst all three food security groups. At risk respondents were more prone to consume expensive protein food products such as mince meat and beef stew. Food insecure respondents' daily diets were rather monotonous and mainly consisted of maize meal, milk and chicken. A larger variety of different protein and vegetable foods were consumed once a week, which are most probably on Sundays.

The most concerning problem identified from the results are the large percentages of respondents that are either at risk of being food insecure or is food insecure even though they generate a relatively good income. Respondents most probably do not know how to manage their income when they receive large amounts of money at once. Programmes might enable respondents to use their available resources such as income more effectively and develop their budgeting skills. If respondents have a better understanding regarding budgeting each month for necessities such as food, the percentage of food secure respondents might increase. The last objective of the study, to recommend appropriate solutions to enhance household food security, was discussed in the following chapter. Recommendations regarding shortcomings identified in this chapter as well as ways to improve respondents' participation in community projects form part of the next chapter.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, conclusions were made regarding the aim and objectives of the study. As the study's results were already thoroughly discussed in Chapter 4, this chapter will only contain a summary of the main findings. Based on the results, implications and limitations were discussed, and in closing, recommendations for future studies were discussed.

5.2 Conclusion

The aim of the present study was to explore household food security in the Vaalharts area. This was done by investigating households' food availability and access through self-production, basic food knowledge regarding food usage and handling and individual households' food consumption practices.

Respondents were mainly black males with low education levels. More than half (66.1%) of respondents were from the middle income group and earn between R4165 and R13209. The average household size of household members in the present study was larger than the average household size of the Northern Cape. Most respondents also had access to basic facilities, such as a permanent brick house, running tap water, refrigerators, stoves and electricity.

The first objective of the study was to determine respondents' food availability and access through self-production. Respondents (27.2%) indicated that they cultivate vegetables in home gardens and 44.4% keep livestock for food purposes. Although a large percentage of respondents were not engaged in self-production activities, some respondents indicated that they wanted to take part in self-production activities. The main reason for respondents not participating in self-production activities were due to the limited availability of space. Respondents further indicated that self-production activities were mainly used as an extra source of food.

The second objective was to determine the current status of respondents' basic food knowledge regarding food usage and handling. The majority (77% - 99%) of respondents knew most of the answers regarding basic food knowledge. Questions concerning the safety of repeatedly reheated and undercooked chicken as well as whether it is a proper measure to clean a surface only with warm water were the only questions which respondents were uncertain about. The reason for the high rate of respondents answering basic food knowledge questions correctly might be due to the majority of them still remembering what they have learned through

Lifeplan®, a development programme. Respondents also indicated that they apply safe food storage practices and choose suitable methods to store raw, dry and leftover food. Respondents' basic food knowledge was mainly obtained from their parents while schooling also played an important role. It is therefore essential that parents have sufficient food knowledge and that schools transfer information regarding food knowledge correctly to children.

The next objective explored respondents' food consumption patterns. Data revealed that the majority of households consumed food from each food group on a weekly basis. As expected, cereals and grain consumption was the main staple consumed on a daily basis by 86.0% of households. Furthermore 70.4% of households consumed dairy products, 50% fruits, 48.8% proteins, and 31.5% vegetables on a daily basis. The low percentage of households consuming proteins and vegetables on a daily basis are concerning. However the high fruit consumption amongst respondents might contribute to their dietary variety. When looking at individual foods consumed and not at food groups as a whole, milk, fruits, and maize meal, were the three most frequently consumed food products amongst households on a daily basis. The large amount of respondents consuming milk might probably be due to milk being used as a companion for maize meal. Vegetables were the most frequently consumed food a few days a week which consisted mainly of marogo and patatoes. Chicken and eggs were the only food high in protein which formed part of the top 10 most frequently consumed food a few days a week. A larger variety of vegetables and protein food products were consumed once a week which was most probably on Sundays. Sundays are a special occasion during which respondents consumed more expensive food or foods that need a longer preparation time. Food items to be least consumed were lentils (17.9%) and chickpeas (22.8%).

The fourth objective was to determine households' food security status. The hunger scale of Labadarios *et al*. (2009) was an effective way of determining households' food security status. Only 48 (29.6%) of the income earning respondents reported to be food secure households while 79 (48.8%) were at risk and 35 (21.6%) experienced food insecurity. The effect of the different aspects of food security investigated in this study was considered. Income has a medium effect on households' food security status. As such, respondents with a higher food security status earned a larger amount of money. Furthermore the only tendencies that could be found were between respondents' food security status and the amount of money spent on food, the percentage of money spent on food and household members per household. Respondents who spent a larger amount of money on food were more prone to be food secure while food insecure households were more inclined to spend a higher percentage of their income on food and had a larger household size. It was concerning to notice that both, at risk and food insecure households were in the middle income group but spend percentage wise less on food than other South Africans in the same income group. Households need to be introduced to different

programs which can give them guidelines regarding how resources such as income and food should be utilised effectively. This is especially important for low to middle income households who do not know how to budget due to its low educational level and lack of awareness regarding the importance of a budget (Ogori *et al*., 2013:49).

Respondents of different food security groups' basic food knowledge were also determined. All three food security groups answered the majority of questions regarding basic food knowledge correctly. Households in the food secure group had a higher average score regarding the question "whether the following food is safe to eat" than the food insecure group. No statistically significant differences could be obtained between the rest of the questions and the three different food security groups.

The only statistically significant differences which could be perceived between respondents' food consumption practices and their food security status were their maize meal, chicken and green bean consumption. Respondents with a low food security status were more prone to consume maize meal and chicken on a daily basis than respondents with a higher food security status. Maize meal and chicken most probably form part of food insecure respondents' staple food. Green beans were consumed more frequently in food secure households than in food insecure households. Tendencies regarding respondents' consumption of different food groups were also analysed. Food secure respondents consumed a larger variety of vegetables 2-4 days a week while food insecure respondents consumed vegetables mainly once a week. Fruits, vegetables and dairy were most frequently consumed by food secure respondents. However, a large percentage of at risk and food insecure respondents also indicated that they consume fruits and milk on a daily basis. Cereals and grains and protein food products were most frequently consumed amongst food insecure respondents. This is an interesting phenomenon as protein food products are expensive. After analysing the specific protein food products consumed by food insecure respondents, results revealed that the majority of their protein consumption consisted of chicken. This might explain their high protein consumption as chicken is relatively cheap protein food product. It was also interesting to note that respondents at risk of being food insecure sometimes include more expensive protein food sources such as beef mince and beef stew in their diet. Plant protein was the only food group consumed most frequently by respondents at risk of being food insecure.

To finally conclude, it can be said that food security is a problem for many households at the VIS. Income, food knowledge and food consumption practices all had an influence on the food security status of respondents. A few recommendations had been made for future studies as well as for programmes that could be developed in the future. This might facilitate the government in planning and implementing different intervention programmes to improve

respondents' food security status and prevent those who are at risk of being food insecure to become food insecure.

5.3 Recommendations

A mixed method study is recommended for future research as it will enable the researchers to collect quantitative and qualitative data. Qualitative data, such as observations, will give more insight in respondents' actual food utilisation practices. This will make it possible to determine whether each household consumes a variety of food groups in satisfied amounts as it will be easier to regulate the quantities of food eaten. A better understanding regarding respondents' food diversity could also be obtained with the use of food variety scores and a QFFQ (quantitative food frequency questionnaire). A food frequency questionnaire provides more detail regarding foods and beverages which respondents usually consume for a specific period (Vioque *et al*., 2013:2).

Recommendations regarding the improvement of respondents' food security status were also made. Two thirds of respondents in the present study were either at risk or food insecure. Few aspects of concern were identified after analysing respondents' self-production activities, food utilisation knowledge, food consumption practices and food security status. In order to improve the food security status of respondents, a few examples of how shortcomings identified in the study could be approached were mentioned below.

5.3.1 Vegetable gardens

More than half of respondents without vegetable gardens indicated that they would like to have a vegetable garden but are inhibited by limited space. Simple but effective measures to grow vegetables in a small area which take less space should be implemented, for example climbing vegetables such as tomatoes or green beans. Cultivating vegetables in used tyres or bags filled with soil will also take less space than a vegetable garden. If restrictions regarding self-production activities are addressed, respondents' food access and availability will improve which will ultimately lead to an improved food security status.

Improving respondents' ability to use resources optimally, such as an open area nearby which could be used for a community vegetable garden or to keep livestock could further enhance their access to food. Community vegetable gardens are an effective way to provide vegetables to a community who could not cultivate it themselves (Earl, 2011:62, 66). It also allows respondents to save their money which would have spent on food (Reddy & Moletsane, 2009:13). Attention should be given to new and already established programmes which create awareness amongst respondents regarding the importance of vegetable gardens and the risks

involved when excluding vegetables from their diets. This will ensure that programmes are frequently updated and that new and interesting information are communicated to respondents.

5.3.2 Food consumption

Adjusting respondents' food consumption practices might be beneficial to their health and productivity. Food insecure respondents mainly consume a monotonous diet which consists of maize meal and chicken and occasionally include vegetables.

Respondents' low vegetable consumption might either be due to the high cost of vegetables or due to the time consuming aspect as some vegetables needs to be processed (peeled, chopped and cooked) before consumption. Processing and refrigerating vegetables that is time consuming in advance, such as pumpkin, might improve vegetable consumption. Specific days such as Saturdays or Sundays when respondents do not have work responsibilities could be allocated for such activities. As the majority of respondents have freezers or refrigerators, most of the food prepared in advance could be kept fresh in a refrigerator until needed. These procedures might improve vegetable consumption during the week.

A large percentage (41.4%) of respondents consumed non-dairy coffee creamers on a daily basis. Respondents might thus benefit from a programme which compares the nutrition characteristics of non-dairy coffee creamers with milk powder and fresh milk. The whole family will benefit from this programme as respondents who use non-dairy coffee creamer on a daily basis might also use it as a milk substitute to feed their children. This will increase the incidence of cholesterol and chronic diseases (PCRM, 2010:2) due to the amount of saturated fatty acids found in non-dairy coffee creamer (Katsri *et al*., 2014:76). Although non-dairy coffee creamer might be used primarily due its convenient aspect, respondents should rather consider replacing non-dairy coffee creamer with powder milk if they do not have access to fresh milk.

Respondents' diet variety could further be improved by including plant protein in their diet. Plant protein is a cost effective source of protein with a long shelf life and could be purchased in bulk. Plant protein also needs little electricity for preparation. Introducing respondents to different recipes used for plant protein and health aspects that could be addressed with the consumption of plant protein might improve respondents' plant protein intake. Respondents who are sceptical to try out new recipes could mix plant protein with familiar food such as rice, soup, beef/chicken stew or any other meal which is consumed with sauce.

5.3.3 Management of income and expenditures

As already indicated respondents either purchase expensive food products with low nutritional value or use large amounts of their income on non-food items while many of them are at risk or

are food insecure. Programmes improving respondents' money use, budgeting skills and decision making such as Lifeplan® need to be reintroduced to respondents. Other skills such as the ability to choose food low in cost but of good quality should also be improved. For example plant protein is an inexpensive protein source which could be mixed with different dishes to improve the protein quality of a meal. Furthermore, only small amounts (41.3%) of households who live with a family receive financial help from their family members. It is important that the whole family is engaged in activities that will improve households' food security status. It would be ideal if other household members are also employed and earn an income. Even children who are not employed could improve households' food security status, as they could help cultivate vegetable gardens or assist their parents collecting vegetables in the field. This will also teach children to take on responsibilities and learn certain skills already from a young age which might be beneficial when they are older. Premises where food related information, such as those above, could be disseminated should therefore be chosen carefully to ensure that the majority of respondents are reached.

5.3.4 Premises where food related information could be disseminated

There is still a possibility that these messages may not reach or be understood by respondents who need them the most. Almost a third (29.6%) of respondents' educational level ranges between grade 1 and grade 7 with 4.9% of respondents having no education at all. Thus more than a third of respondents have a low literacy rate as consumers in South Africa are regarded as literate if they have passed grade 7 (Stats SA, 2011:3). The medium used to introduce the programmes to respondents thus needs to be comprehensible by all respondents with different levels of education. Individuals introducing respondents to food related healthcare information should use demonstrations as it is the most effective method of educating low functionally literate consumers (Viswanathan & Gau, 2005:1991). A functionally literate person is someone who can "meaningfully acquire, development and use reading and writing (also for numeracy purposes) in everyday life, as a tool for self-expression, information, communication, lifelong learning, work and civic participation, and as a means to improve one's life and to contribute to family, community and national transformation and development" (Torres *et al*., 2005:2).

The Department of Health and WHO have disseminated several posters and brochures. Most of these posters and brochures consist primarily of written information which could not be successfully used for a population with low education levels. Posters and brochures consisting mainly of pictures with minimal writing (Viswanathan & Gau, 2005:1991) could be spread to clinics, hospitals and supermarkets where most of the respondents do their shopping. Programmes could also be successfully launched at schools, the VIS itself and churches.

5.3.4.1 Schools

Targeting schools is an efficient way to ensure food secure communities for the future, as the children of today are the adults of tomorrow. Informed children could also have a positive influence on households' food security status as they often help with food preparation or vegetable cultivation activities. Food security could easily be incorporated in the school syllabus as children learn about nutrition and food handling in subjects such as consumer studies, hospitality studies, technology, biology and life orientation. However, two problem areas are identified. At first, teachers are often not educated on subjects and transfer the wrong knowledge to children. Secondly, except for life orientation all subjects regarding nutrition and food handling in schools are optional. Only few children thus obtain knowledge regarding these subjects.

It is therefore essential to develop programmes regarding food knowledge which involves all children irrespective of their school subjects. Several schools offering training programmes also to parents regarding the cultivation of vegetable gardens or safe food preparation that could further enhance households' food security status. These training programmes will enable respondents to pose knowledge and skills which could be applied at home and will improve their access to fresh produce. To ensure effective functioning of school gardens, competitions could be held amongst different schools with prizes to be won. This might also encourage them to take care of the garden during holidays.

5.3.4.2 Clinics

Consumers visiting clinics or healthcare centres are normally those who are vulnerable to diseases. Insufficient food consumption and food handling practices might be the origin of these diseases. These facilities could play an important role in respondents' education regarding healthy lifestyles. It is of utmost importance that the personnel of clinics have sufficient knowledge regarding food consumption and food handling practices as wrong information could easily be communicated to the community. Respondents and the rest of the community will therefore benefit from a programme which also includes the personnel of healthcare centres. Furthermore posters, pamphlets and programmes regarding sufficient food consumption and handling practices could be disseminated or conducted while respondents wait for doctors' assistance.

5.3.4.3 Vaalharts Irrigation Scheme

The irrigation scheme could also be targeted to introduce respondents to programmes regarding food consumption and food handling practices. Programmes could be launched at

different times of the year to include all employees as it is difficult to reach respondents who is responsible for the maintenance of the irrigation system. These programmes should include information regarding vegetable cultivation in an area with limited space, appropriate food handling practices, healthy food choices for lunchboxes, and how to use a budget. Information regarding healthy food choices for lunchboxes will have a direct influence on their work performance as food choices have an effect on consumers' productivity. A canteen which subside cooked meals could also be used to regulate respondents' food intake and ensure that they consume a balanced diet with sufficient energy to be productive. Chapter 4 revealed important information regarding respondents' food consumption practices. This could be used as a guideline when determining which food needs to be served at the canteen.

5.3.4.4 Church

Apart from schools and clinics, many individuals could be reached when approaching them after church. Programmes and information dissemination do not necessarily need to be conducted on Sundays as some cultures also have church on weekdays. The church places much emphasis on the importance to have respect for your body which might further contribute to the adoption of healthy practices and avoidance of things which might be harmful to their bodies (Marks *et al.,* 2005:457). Biblical legislations further stretched the importance of conducting good personal hygiene and avoid food being contaminated. Such rules are already introduced to consumers as early as 2000 BC through the Bible.

A church-based programme was conducted by Resnicow *et al*., (2002:566,567) who primarily focused on black churches. They used a video and a cookbook based on biblical values to convince consumers to eat more fruits and vegetables. The video contained scenes of a family with healthy eating habits and another family with unhealthy eating habits together with the health consequences which could be associated with each family. Information regarding the health benefits of a diet consisting mainly of fruits and vegetables as well as the cost of fruits and vegetables compared with other food were entwined with the story line. Recipes and cooking tips also form part of the video. Daniel, a biblical figure, was used in the video with which consumers could have related themselves with as he did not accepted the "kings diet" which were high in fat but rather choose a "natural diet" high in fruits and vegetables. Other biblical messages used in the video were "whatever you do, whatever you eat, do it for the glory of God" and "your body is God's temple". A video might be more effective than a cookbook in the present study as more than a third of the population of the present study might have difficulties reading due to their low education level. On the other hand, a recipe book consisting mostly of pictures might also be effective.

5.4 Implications and limitations

The present study improved the knowledge of the researcher regarding the food security situation in the VIS, focussing more specifically on their food knowledge, consumption, handling and storage practices. This is valuable information which enables the community to identify shortcomings that could serve as a basis for future studies. Intervention programmes could be developed based on the recommendations made in the present study and used to improve the food security status of individuals as well as on household level. Intervention programmes like these could also be disseminated for communal use in other rural areas of South Africa. The present study will further improve other researchers' awareness of the situation in the Northern Cape which might increase research studies conducted in this province. This is essential, since to the researchers' knowledge, none of the food security studies which have been conducted in South Africa have focus primarily on the Northern Cape. Once factors that might possibly influence the food security status of this province have been analysed, government institutions and Non-Governmental Organisations can cooperatively plan effective strategies and appropriate measures to address all causes of household food insecurity.

This study was limited to quantitative methods. A deeper insight into reasons for specific behaviour amongst respondents could not have been determined with the use of quantitative methods. The non-probability sample used in this study was relatively small and research was conducted only in the VIS. The results could therefore not be generalised to the greater South African or Northern Cape population. Future studies regarding food security should use a probability sample technique which consists of a larger sample size in different provinces of South Africa or which covers a larger part of the Northern Cape. Furthermore, data obtained are only limited to information which representatives of each household communicated to the fieldworkers. For future studies more household members should have to be included in the data collection process especially those who are the main food preparers of the household.

The questionnaire also had a few limitations. A QFFQ may provide additional information regarding dietary intake patterns and also allows for assessment of food intake over an extended period of time. The quantity and use of milk consumption may be more specific and different types of traditional food such as chicken livers and feet should form part of the questionnaire in the future.

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CHAPTER 7: RESEARCH ARTICLE

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Title: Exploring household food security in the Vaalharts area

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Abstract

Food insecurity is a global phenomenon which negatively affects consumers' health and productivity. This phenomenon is also present in South Africa. Food security is a multifaceted concept which is mainly influenced by food availability, access and utilisation. Respondents' self-production activities, food knowledge and consumption practices were therefore investigated. The employees of the Vaalharts Irrigation Scheme, Northern Cape, South Africa indicated that they have a need to improve their awareness regarding hygiene and the consumption of adequate and variety of food. As hygiene and consumption practices have an influence on household food security, the study aimed to explore the food security status of the employees of the Vaalharts Irrigation Scheme. An exploratory survey approach was followed to collect data through interviewer-administered questionnaires. Respondents (n=162) at the Vaalharts Irrigation Scheme were recruited with the use of a purposive sample. The majority of respondents were either at risk or food insecure. Possible reasons for respondents' low food security status were further investigated. The effect which self-production activities had on respondents' food security status could not be measured due to a lack of respondents in each food security group who took part in self-production activities. Food secure respondents had a better understanding regarding food safety than at risk or food insecure respondents. Food secure respondents were also more prone to consume a variety of food while food insecure respondents' diets were monotonous and consisted mainly of maize meal and chicken. In conclusion, food knowledge and food consumption practices have an influence on respondents' food security status.

Key words:

Food availability, food knowledge, food consumption, consumer behaviour

1 Introduction and background

South Africa is seen as a food secure country but lacks sufficient and adequate food resources on household level to meet daily demand (Drimie & McLachlan, 2013:220). Food secure households have "physical, social and economic access to sufficient, safe and nutritious food at all times to meet consumers' dietary and food preferences for an active and healthy life" (DoA, 2002). Food security is a complex concept (Renzaho & Mellor, 2010) which includes the availability access and utilisation of food (UNDP, 2012). Households' food security status depends largely on their ability to have sustainable food availability, access and utilisation (FAO, 2006). There are different methods through which households can ensure that they have sustainable availability, access and utilisation of food. Diet quality (McDermott et al., 2013:670) and the amount of food available could be improved through self-production, which is less expensive as a smaller amount of money is needed to purchase food from markets (Reddy & Moletsane, 2009). On the other hand, food production is often restricted by the seasonality of food products (UNDP, 2012), insufficient land, space or time (FAO, 2011). Accordingly, the majority of consumers need to rely on their purchasing power and access to markets to ensure that households are food secure throughout the year. Food security also depends on the quality of food consumed which includes the safety, variety and nutrient content of food (FAO, 2012). Households could therefore not be reckoned as food secure without considering the food utilisation aspect of food security.

Food utilisation refers to the safety, quality and quantity of food consumed in a household (USAID et al., 2007). Consequently knowledge regarding nutrition and food handling play an important role in consumers' food utilisation practices. Food knowledge includes healthy eating (FAO, 2013) and handling of food in such a way that it is safe for human consumption (Langiano et al., 2012). In addition, food knowledge influence the type of food consumed and the method used to prepare and store food (Valsamis et al., 2009). Improving consumers' knowledge regarding the risks involved when handling food unsafely is an important driver of their behaviour (Munro et al., 2012).

Food consumption practices, which form part of food utilisation, are an essential component of consumers' food security status, as it contributes to their development, growth and protection against chronic diseases (UNDP, 2012). Low income (FAO, 2008) and food insecure households' diets are mostly monotonous (Shisana et al., 2013) which consist of cereals and grains with a low variety of fruits, vegetables and foods high in animal protein (FAO, 2008). The cost effectiveness of cereals and high

satiety value of maize meal might contribute to this phenomenon (FAO, 2008; Viljoen et al., 2005). Adequate food choices that determine the quality of food consumed (Valsamis et al., 2009) are of special importance for the consumers of the present study, as all of the participants were employed at the time of data collection and need to be productive.

Consumers' socio-economic characteristics, such as their income, education and employment status, determine the quality and quantity of food (FAO, 2005; FAO, 2008) consumers have access to. Subsequently consumers' food utilisation practices are also influenced (Omonona & Angoi, 2007). A stable income contributes to consumers' ability to have sufficient access to food (Agarwal, 2011), but is negatively affected by unemployment. Education, which enhance the likelihood of consumers to be employed or contribute to consumers earning a higher income (FAO, 2005:14) positively influence their food access (Agarwal, 2011:15). Consequently consumers' food security status also improves (De Kock et al., 2013:275).

The Northern Cape province is geographically the largest province in South Africa and is identified as a semi-arid area with the least populated density of all provinces (Anderson, 1996). This province is associated with high levels of poverty (Pauw, 2005), hunger (Stats SA, 2014), and unemployment (Stats SA, 2013b; Stats SA, 2012c). In a previous study conducted at the Vaalharts region, consumers indicated that they have a need to improve their awareness regarding hygiene and the consumption of adequate and a variety of food (Coetzee, 2011). They also indicated that they do not have sufficient access to food (Coetzee, 2011). This serves as the motivation for the study to explore food utilisation and the associated household food security status of employees of the Vaalharts Irrigation Scheme (VIS), located in the Phokwane Municipal area in the Northern Cape province.

2 Methodology

An exploratory research approach, which is quantitative in nature, was followed, as food security is an under-researched problem in the VIS (Fouché & De Vos, 2011). According to Babbie and Mouton (2011) a survey, which was used in the present study, is suitable to collect data for exploratory research. A non-probability purposive sampling method was used to recruit respondents (n=162), who were all available the employees at the VIS.

Data collection

Ethical approval for this study was obtained (NWU-00040-13-A1). The questionnaire was compiled from questionnaires of Mofokeng (2013), Labadarios et al. (2009), Whati et al. (2005), Hillers et al. (2002) and Radimer et al. (1990). Only close-ended questions were used, but additional remarks made by respondents were noted. A pre-test was conducted to ensure that potential problems are addressed before the main study commences (Strydom, 2011). After potential problems were identified, adaptions were made to the questionnaire. Interviewer-administered questionnaires were used in the present study as the possibility that some respondents might have low literacy levels was identified (Stats SA, 2012a). Fieldworkers were used to collect data on the premises of the VIS. This method ensures that researchers were not biased. Respondents were requested to complete a consent form prior to data collection, where they had to give permission to take part in the study.

Data analysis

Data analysis was conducted by the Statistical Consultation Services of the North-West University, Potchefstroom Campus (SCS, NWU), using the Statistical Package for Social Science (SPSS) version 22. Descriptive statistics, such as frequencies and percentages, were used to analyse respondents' demographic characteristics. Food security status was determined based on the Community Childhood Hunger Identification Project who developed indicators to assess hunger. This questionnaire was used by both Labadarios et al. (2009) and Radimer et al. (1990). Respondents have answered either yes or no to each question. The regularity of affirmative answers was used to calculate the degree of food insecurity amongst households. The more affirmative answers given, the more food insecure they were. Cronbach alpha's coefficient was performed to ensure internal reliability between food security questions. A high internal consistency is indicated by a coefficient between 0.6 and 1 (Malhotra & Birks, 2007).

Confirmatory factor analysis was performed to group questions in the food knowledge section together that measure the same factor (Pietersen & Maree, 2010b). Internal reliability was also determined between questions of the food knowledge section with the use of Cronbach alpha's coefficient (Malhotra & Birks, 2007).

A one-way ANOVA was performed to determine whether there were statistically significant differences (Pietersen & Maree, 2010a) between the three food security groups and their food knowledge scores. Tukey's B post hoc test was further used to determine specifically which two food security groups' food knowledge differed significantly.

The Kruskall-Wallis one-way analysis of variance was used to indicate whether there were statistically significant differences between different food security groups and the type of food consumed. Medians and quartiles were obtained from the data and were used to make box-plots (Pietersen & Maree, 2010b). This made it easier to compare data.

Throughout the analysis p-values and effect sizes were determined to indicate whether a statistical or practical significance occur amongst variables. A p-value of 0.05 or lower is an indication of statistical significant differences between variables (Pietersen & Maree, 2010c). The Spearman correlation coefficient was further used to indicate practical significant differences between variables. Practical significance is indicated by *r*-values of 0.3 and higher.

Validity and reliability

Different strategies were implemented to ensure that the questionnaire was valid and reliable. At first a thorough literature review was completed through which all the relevant objectives of this study were described. Validity was further insured by a panel of experts in the study field who participated in the development of the questionnaire. After the development of the questionnaire the Statistical Consultation Services North West University of the Potchefstroom Campus analysed the questionnaire. A small scale pre-test was also conducted to point out whether there were difficulties regarding the terminology and layout of the questionnaire (Malhotra, 2009). This also ensured that all relevant aspects regarding food security were included in the questionnaire.

3 Results and discussion

The respondents of the present study consisted mainly of black (70.4%) males (94.4%), who were between ages of 45 and 64 (54.4%). The average household members per household were 4.4 which are more than the average 3.7 household members in the Northern Cape (Stats SA, 2012a). Respondents'

mother tongue language was mainly Setswana (56.8%) and Afrikaans (31.5%). However, the Setswana mother tongue speakers could also speak and understand Afrikaans. Results indicated that although the majority of respondents had attended school, only 29.6% completed primary school, 33.9% completed secondary school, 23.5% completed matric and 7.4% obtained a degree or diploma. Respondents' income varied between the minimum wage and the top salary for management and 66% of the respondents formed part of the middle income group (Stats SA, 2013a). These results are in accordance with the general demographic profile for the Northern Cape province (Stats SA, 2003; Stats SA, 2012a; Stats SA, 2012b). The majority of respondents have access to basic facilities such as a brick structure house (93.2%), separate kitchen as part of the house (85.8%) and running tap water inside the house (61.7%). Electrical appliances such as refrigerators and stoves were owned by 94.4% and 97.5% of respondents respectively.

Household food security status

According to data obtained from the present study, only 48 (29.6%) of respondents could be classified as food secure, while 79 (48.8%) were at risk and 35 (21.6%) experienced food insecurity. A Cronbach alpha coefficient of 0.9 was obtained which indicated internal reliability between the food security questions. After comparing these results with the rest of South Africa, respondents in the present study had a lower food security status than the average South African. Approximately 45.6% of South African households are food secure, and 28.6% are at risk of being food insecure (Shisana et al., 2013). Possible reasons for such a large percentage of respondents in the present study who were at risk or food insecure were further investigated.

Food cultivation and knowledge

Respondents (27.2%) indicated that they cultivate vegetables in home gardens and 44.4% keep livestock for food purposes. Within the different food security status groups results revealed that 9/48 of the respondents were food secure, 17/79 were at risk and 12/35 were food insecure respondents who were engaged in self-production activities. Limited space was indicated as the reason for no activity. No correlation could have been obtained between the different food security groups and their self-production practices due to the small number of respondents in each food security group who were engaged in self-production activities. The relationship between respondents' food knowledge and food security status

were also analysed to determine whether their food knowledge might have an influence on their food security status. Food knowledge questions were answered correctly by most (84.12% – 94.27%) respondents (Table 1). The Cronbach alpha coefficient for the food knowledge section varied between 0.6 and 0.8 which indicated an acceptable internal consistency (Malhotra & Birks, 2007:358). The only questions which respondents were uncertain about were questions regarding the safety of chicken that is reheated repeatedly or undercooked and whether a surface is clean when cleaned only with warm water. It is concerning that there are respondents who think that it is safe to reheat chicken repeatedly or to eat undercooked chicken as such practices can cause foodborne illnesses. The mean correlation coefficients of the present study were between 0.28 and 0.48 which further indicated an acceptable internal consistency. The three food security groups' (food secure, at risk of being food insecure and food insecure) average basic food knowledge scores were analysed with the use of an ANOVA to determine whether these scores differed from one another. The only question with a p-value lower than 0.05 were the "safe to eat food" question which has a p-value of 0.00. The Tukey's B test was used to determine specifically which two food security groups differed from each other. The food secure and food insecure groups differed with an average of 0.12 and had a medium practical significant difference (d=0.4). Thus the food secure group had a better knowledge regarding whether food is safe to eat than the food insecure group. These results support the statement of the UNDP (2012) that adequate food knowledge is necessary for optimal food utilisation, which in turn influences the food security status of households. Sixty six percent of respondents indicated that they had obtained basic food knowledge from their parents. The same data was obtained from a study conducted by Zarnowiecki et al. (2011) who indicated that children's food knowledge is indirectly influenced by their parents' food knowledge. This highlights the importance of parents having sufficient food knowledge. Schooling also played a role in 75/162 (46.3%) of respondents' food knowledge. Increasing food knowledge taught at school level might enable respondents to identify unhealthy or unsafe food choices made at home (UNDP, 2012:89; Phaswana-Mafuya & Shukla, 2005).

Table 1 Summary of the frequencies of respondents' correct responses to basic food knowledge (n=162)

Questions regarding food safety and hygiene aspects	Mean ± SD	Cronbach Alpha	Mean correlation coefficient
Safe to eat food	0.89±0.22	0.7	0.48
Cleanliness	0.88±0.21	0.6	0.28
Food preparation	0.89±0.11	0.8	0.50
Food cause illnesses	0.93±0.15	0.6	0.38

Food consumption practices

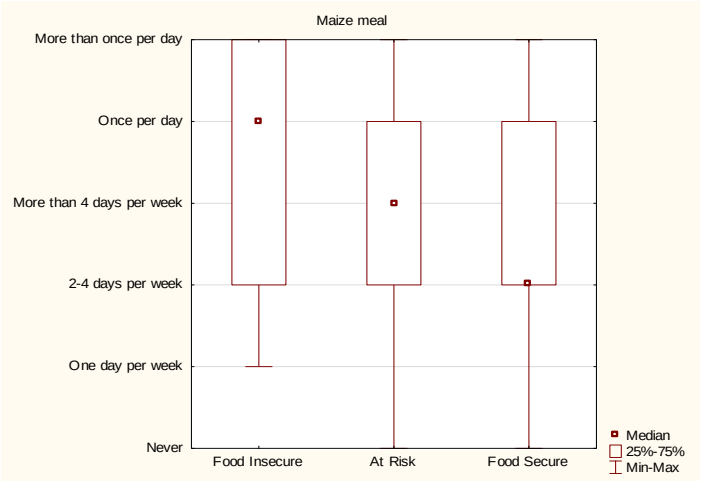
After respondents' food consumption data were analysed, it seemed as if the majority of households consume food from each food group on a weekly basis. Proteins, vegetables, and cereals and grains were consumed by the majority of respondents "two to four days a week" and "once a week". Respondents' "daily" food consumption looks different. As expected, cereals and grains consumption was the main staple consumed on a "daily" basis by 86.0% of households. The fact that only 48.8% of households consumed proteins and 31.5% vegetables on a daily basis is worrying. On the other hand, the majority of households consumed a larger variety of vegetables and proteins "once a week". This is most probably on Sundays as respondents indicated that they consume more expensive food products on Sundays. These results correspond to those of Viljoen et al. (2009) who indicated that a larger variety of expensive food products are mainly consumed on special occasions such as Sundays.

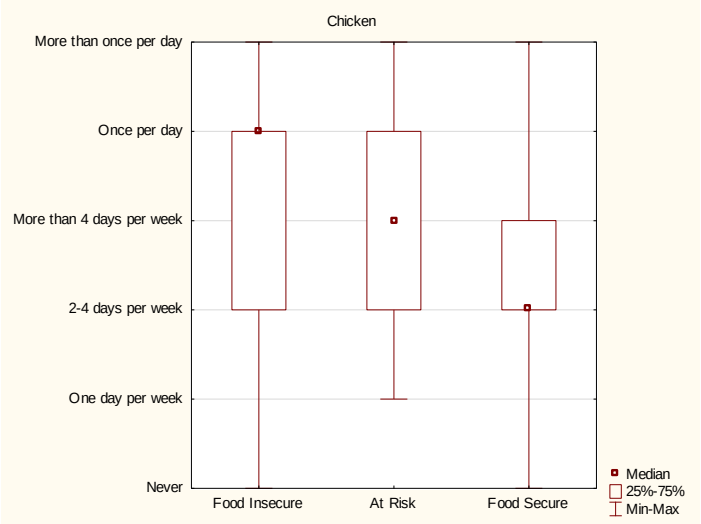
After analysing respondents' individual food consumption, findings revealed that milk, fruit, and maize meal were the three most frequently consumed food products amongst households on a "daily" basis. These findings somewhat correspond with those of Labadarios et al. (2005) who had indicated that milk and maize meal is one of the top five food products consumed by South Africans. Milk is a versatile dairy product which can be used as a drink (pure milk or milk in coffee and tea), to eat with porridge or to cook food in. This might explain respondents' high milk consumption, as milk is often used with maize meal, while maize meal is also a frequently consumed food amongst respondents. Almost half (44.5%) of respondents consume maize meal once or more than once a day. Maize meal is a popular food source as it is an inexpensive food source (Schönfeldt et al., 2013) which gives a feeling of satiety (Viljoen et al.,

2005). Furthermore, the high fruit consumption amongst respondents might be due to its affordability as it is locally available at the Phokwane Local Municipality area (UE, 2004:57, 62, 64) and is easy to prepare. Chicken and eggs were the only food rich in protein which formed part of the top ten indicated foods consumed on a "daily" basis. These results correspond with those of Viljoen et al. (2005) who indicated that chicken dishes are highly preferred items amongst Africans. Chickens and eggs are moderately low in cost and can be kept in consumers' backyard for personal use (Farrell, 2010:1, 2). Different chicken parts such as the feet or heads are also a popular meal amongst low income Africans (Schönfeldt et al., 2013) which are low in cost.

Households' vegetable consumption consisted mainly of potatoes and marogo. The high consumption of potatoes might be due to the high satiety value (Anderson et al., 2013:361) and versatility of the vegetable, as it could be used in several meals and is often mixed with other vegetables to increase the volume of the dish being served. Marogo might be a popular food source as it is readily available in the field and is cheap (Van der Walt et al. 2009). Pretorius and Sliwa (2011:183) indicated that vegetables primarily consumed in a traditional rural diet consisted of marogo and/or pumpkin. The majority of food that is seldom consumed amongst respondents consisted of protein, especially plant protein. A very low consumption of plant protein, such as lentils and chickpeas were found amongst respondents. These findings correspondents with a study conducted by Labadarios et al. (2011:8) who indicated that consumers in South Africa do not consume plant protein on a regular basis.

Kruskall-Wallis one-way analysis of variance was performed to determine whether statistical significant differences between the frequencies of consumption of specific food products for different food security groups exists (Field, 2009). Maize meal, chicken and green beans were the only food products with statistically significant differences (Kruskall-Wallis p=0.0003 - 0.0223). These food products were illustrated on box-plots (Fig 1) as it made it easier to compare the frequency of different foods consumed by the three different food security groups. Respondents were more prone to consume maize meal and chicken as their food security status lowers while green beans were more frequently consumed by food secure households.





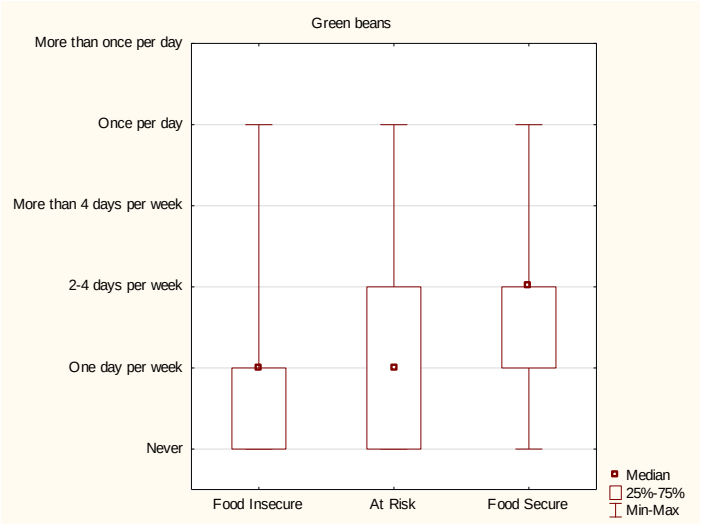


Figure 1 **Maize meal, green beans and chicken consumption between the three different food security groups**

4 Conclusion and recommendations

The majority of respondents in this study were either at risk or food insecure. Different aspects which might influence respondents' food security status were determined. Few respondents were involved in self-production activities to provide vegetables or meat to support household food access. Limited availability of space was indicated as reason. Promotion of self-production might support households' access to food sources. Different strategies could be implemented to improve respondents' ability to cultivate vegetables in a limited area. This includes climbing vegetables which use minimal space or take part in community activities and start a community garden.

Food secure respondents had more knowledge than food insecure respondents regarding whether food is safe to eat. As food knowledge could be associated with consumers' food security status more attention need to be paid to food insecure respondents' food knowledge as it might possibly contribute to a more food secure community.

Food insecure respondents' diets were monotonous in nature and the most eaten foods were maize meal and chicken. On the other hand food secure respondents enjoyed a larger variety of food. It was interesting to note that at risk respondents were more inclined to consume a larger variety of food high in protein, which is also more expensive. Further studies need to find specific reasons regarding respondents from all three food security groups' food choices as it might be an important contribution to possible educational programmes or intervention implementation in the future.

Educational programmes or interventions which might be conducted in the future amongst the employees of the VIS thus need to focus more intensively on respondents' food consumption practices and food expenditure, especially among the at risk to become food insecure group. Community gardens might form part of an intervention programme where the whole community receive training regarding the importance of a vegetable garden and the inclusion of a variety of food items within the different food groups. The introduction to plant protein food sources such as kidney beans and lentils, are often cheaper than animal proteins and should also enhance nutritional variety and security in households.

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Appendix A

Notes

Composition of food basket: Apples (1 kg), Bananas (1 kg), Beef chuck (1 kg), Brick margarine (500 g), Butter beans – tinned (410 g), Cabbage (1k g), Ceylon/black tea (62.5 g), Chicken portions fresh (1kg), Chicken portions frozen (1 kg), Eggs (1.5 dozen), Canned fish (excluding tuna) (425g), Full cream milk long life (1ℓ), Instant coffee (750g), Loaf of brown bread (700 g), Loaf of white bread (700 g), Maize meal super (5 kg), Onions (1 kg), Oranges (1 kg), Peanut butter (400 g), Potatoes (1 kg), Rice (2 kg), Sunflower oil (750 mℓ), Tomatoes (1 kg) (Thabethe et al., 2013:9)

Appendix B

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 Dorette van Wyk, (Master‟s Degree student) at 21068607@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) Dorette van Wyk te kontak by 21068607@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:* _____

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
1.2.2 Not enough time (*Nie genoeg tyd nie*)	2
1.2.3 Not enough space (*Nie genoeg plek nie*)	3
1.2.4 Buy all vegetables (*Koop alle groente*)	4
1.2.5 Not interested in a vegetable garden (*Stel nie belang in 'n groentetuin nie*)	5

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** *(Nooit / Baie selde)*	**1 day/week** *(1 dag/week)*	**2 – 4 days / week** *(2- 4 dae / week)*	**More than 4 days/week** *(Meer as 4 dae/week)*	**1 x/day** *(1 x/dag)*	**More than once a day** *(Meer as een keer 'n dag)*
2.1. Grains *(Grane)*						
2.1.1 Bread (*Brood*)	1	2	3	4	5	6
2.1.2 Maize Meal (*Mieliemeel*)	1	2	3	4	5	6
2.1.3 Sorghum/ Maltabella	1	2	3	4	5	6
2.1.4 Samp *(Stampmielies*)	1	2	3	4	5	6
2.1.5 Rice (*Rys*)	1	2	3	4	5	6
2.1.6 Vetkoek	1	2	3	4	5	6
2.1.7 Instant breakfast cereal: Corn flakes / Weet-Bix (*Ontbytgraan- vlokkies: Corn flakes / Weet-Bix*)	1	2	3	4	5	6
2.1.8 ProNutro	1	2	3	4	5	6
2.1.9 Other *(Ander)*_____	1	2	3	4	5	6
2.2. 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 Potatoes (Aartappels)	1	2	3	4	5	6
2.2.4 Carrots (Wortels)	1	2	3	4	5	6
2.2.5 Sweet Potatoes (Patats)	1	2	3	4	5	6
2.2.6 Pumpkin (Pampoen)	1	2	3	4	5	6
2.2.7 Cabbage (Kool)	1	2	3	4	5	6
2.2.8 Green beans, peas (Groenbone, ertjies)	1	2	3	4	5	6
2.2.9 Other (Ander)_____	1	2	3	4	5	6

	Never / Very seldom *(Nooit / Baie selde)*	**1 day/week** *(1 dag/week)*	**2 – 4 days / week** *(2- 4 dae / week)*	**More than 4 days/week** *(Meer as 4 dae/week)*	**1 x/day** *(1 x/dag)*	**More than once a day** *(Meer as eenkeer 'n dag)*
2.3. Fruit *(Vrugte)*	1	2	3	4	5	6
2.4. 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* (*Poeiermelk: Nespray, Elite*)	1	2	3	4	5	6
2.4.4 Powdered coffee creamer: Cremora (*Koffieverromer: Cremora*)	1	2	3	4	5	6
2.4.5 Other *(Ander)*_____	1	2	3	4	5	6
2.5. 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)*	1	2	3	4	5	6
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)						
2.5.9 Eggs (*Eiers*)	1	2	3	4	5	6
2.6. 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

	Never / Very seldom *(Nooit / Baie selde)*	**1 day/week** *(1 dag/week)*	**2 – 4 days / week** *(2- 4 dae / week)*	**More than 4 days/week** *(Meer as 4 dae/week)*	**1 x/day** *(1 x/dag)*	**More than once a day** *(Meer as eenkeer 'n dag)*
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 els** *(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 *(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

14. Are you single with no children? *(Is u enkellopend met geen kinders?)*	**YES/**JA	**NO/**NEE
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 (G*eslag)*

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)*	1
35.2	Once a week	(*Eenkeer 'n week*)	2
35.3	Once a month	(*Eenkeer 'n maand*)	3
35.4	More than once a month	(Meer as eenkeer n maand)	4
35.5	Other, specify	(*Ander, spesifiseer*) _____	5

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)

Appendix C

Additional results

Table 1 **Summary of the median, quartile 1 and quartile 2 of different food security groups' maize meal, green beans and chicken consumption**

	Insecure			At risk			Secure			Kruskall-Wallis p-value
	median	**q1**	**q3**	**median**	**q1**	**q3**	**median**	**q1**	**q3**	
Maize meal	Once per day[a]	2-4 days a week	More than once per day	More than 4 days a week[b]	2-4 days a week	Once per day	2-4 days a week[b]	2-4 days a week	Once per day	.0003
Green beans	1 day a week[a]	Never or seldom	1 day a week	1 day a week[a]	Never	2-4 days a week	2-4 days a week[b]	1 day a week	2-4 days a week	.0223
Chicken	Once per day[a]	2-4 days a week	Once per day	More than 4 days a week[ab]	2-4 days a week	Once per day	2-4 days a week[b]	2-4 days a week	More than 4 days a week	.0041

*Medians with different superscripts differs statistically significant

Appendix D

Authors guidelines for research article

MANUSCRIPT:

For the initial submission of manuscripts for consideration, submit a hardcopy with disk [The manuscript, including references cited, should be typed or laser-printed, double-spaced on bond or heavy-bodied paper A4 or 8.5x11.7" (21 x 29.5 cm), or the nearest local equivalent, with a 1" (2.5 cm) margin on all sides. Number the manuscript pages consecutively, beginning with the title page. Submit an original manuscript, including the text and one set of original illustrations. In addition, two copies of the text and two good-quality copies of the illustrations are required for review purposes. The manuscript should have a uniform style and be submitted exactly as it is to appear in print.]

OR

E-mail the text to kre@airtelmail.in

The manuscripts are categorised under three types - Regular Articles, Short Communications and Reviews. Prepare the manuscript as per the style of the Journal. Manuscripts which do not duly confirm to the Journal style will be returned to the Authors.

MANUSCRIPT SHOULD CONSIST OF THE FOLLOWING SUBDIVISIONS (1-10) EACH PREPARED AS A UNIT ON SEPARATE SHEETS:

1. Title Page, 2. Key words, 3. Abstract, 4. Text, 5. Acknowledgement (if any), 6. Footnotes, 7. References, 8. Tables, 9. Figures/Illustrations, 10. Appendix (if any), 11. Metric System, 12. Symbols.

1. TITLE PAGE:

The title page must contain:

• Title

• Author's Name (or Names)

• Institution from which the paper emanated, with City, State, Country, Postal Code, and E-mail Address

• Number of Text Pages, plus References, Figures, Graphs, Charts, and Tables

• Abbreviated Title (Running Headline) not to exceed 50 letters and spaces

• Name, Address, Telephone Number, Fax Number, and E-mail Address of the Person to whom all the correspondence is to be addressed.

2. KEY WORDS:

Key words should be included, should not repeat terms used in the article title, and should not exceed 80 characters and spaces.

3. ABSTRACT:

The abstract should consist of 250 words or less. The abstract should be written in complete sentences and should succinctly state the objectives, the experimental design of the paper, and the principal observations and conclusions; it should be intelligible without reference to the rest of the paper.

4. TEXT:

• Indent the first line of every paragraph.

• Do not divide words at the ends of lines; if they are unfamiliar to the printer, they may be incorrectly hyphenated.

• Corrections to the manuscript should be typed or printed legibly in ink.

• Do not begin sentences with abbreviations.

• The word ‘Figure” is not abbreviated in the text, except when it appears in parentheses: (Fig. 2) (Figs. 4-6).

• The spellings of non-technical terms should be that recommended in the current Webster’s International Dictionary.

• Always spell out numbers when they stand as the first word in a sentence; do not follow such numbers with abbreviations. Numbers indicating time, weight, and measurements are to be in Arabic numerals when followed by abbreviations (e.g., 5 mm; 4 sec; 9 ml)

• Use italic font for text that is to be italicized. If italic font is not available, use normal font and underline text.

5. ACKNOWLEDGEMENT (IF ANY):

The acknowledgement should consist of 150 words or less. The acknowledgement should be written in complete sentences.

6. FOOTNOTES:

Footnote text should be placed as endnotes following the last page to text. Footnotes to the text should be limited as much as possible and must be numbered consecutively. The corresponding reference numbers must be clearly indicated in the text. Additional references to the identical footnotes are to be numbered with the next following consecutive number, for example:

2Material used for this experiment was provided by

3See footnote 2.

Footnotes to a table should be typed directly beneath the table and numbered with superscripts (1, 2, 3, etc.). They should not be numbered in sequence with the footnotes in the text. Also, if superscript numbers could be mistaken for exponents, substitute superscript a, b, c, etc.

7. REFERENCES:

References in the Text: References citations in the text should be in parentheses and include author name(s) and year of publication. Text citations of two or more works at the time should be given in chronological order. When citing a paper written by three or more authors, write the name of the first author plus “et al.” (However, all authors must be given in the Reference section). Where there are two or more papers by the same author in one year, distinguishing letter (a, b, c....) should be added to year. All references should be carefully cross-checked; it is the author’s responsibility to ensure that references are correct.

Examples:

In the text, references to the literature should be cited by author’s surname followed by year of publication:

……studies by Sanghvi (1978) reveal……..

……studies by Bhasin and Fuhrmann (1972) reveal……..

……studies by Bhasin et al. (1973) reveal ……..

……an earlier report (Haldane 1940) ……..

When more than one author is cited, the listing should be first alphabetical by name and then chronological by date:

……...earlier reports (Bhasin et al. 1992, 1993; Walter et al. 1993)……

When references are made to more than one paper by the same author, published in the same year, they should be designated in the text as (Bhasin and Khanna 1992a,b)

Bhasin MK, Khanna Asha 1992a. Serological variations among two tribal groups of Ladakh, Jammu and Kashmir, India. J Hum Ecol, 3: 151-154.

Bhasin MK, Khanna Asha 1992b. Distribution of blood groups among the Bodhs, Baltis and Tibetans of Jammu and Kashmir, India. J Hum Ecol, 3: 163-166.

References should be listed at the end of article, arranged alphabetically according to the surnames of the authors and then chronologically. Following are examples of the proper reference style of various sources:

Journals:

Chopra VP 1983. Population structure of the Indian people. Some microevoluntary aspects. Anthrop Anz, 41: 111-117.

Books:

Bhasin MK 1988. Biology of the People of Indian Region. A Classified and Comprehensive Bibliography (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka). Delhi: Kamla-Raj Enterprises.

Sections of Books:

Bhasin MK, Bhasin V 2001. Ecology and Health: The Indian Scenario. In: Veena Bhasin, Vinay K Srivastava, MK Bhasin (Eds.). Human Ecology in the New Millennium. Delhi: Kamla-Raj Enterprises, pp. 43-82.

Newspaper / Magazine:

Bhasin Veena 1982. Ecology and Gaddi Culture. Hindustan Times, Weekly, August 29, 1982, P.9.

Radio/Television Talk:

Bhasin Veena 1986. Radio Talk - Gaddis of Himachal Pradesh. All India Radio 'Yuv Vani' - 1st July, 1986.

Meeting Paper:

Bhasin V, Bhasin MK, Singh IP 1978. Some problems in the education of Gaddis of Bharmour, Chamba District, Himachal Pradesh. Paper presented in Seminar on Education and Social Change in Himachal Pradesh (H.P.) in H.P. University, Shimla, November 13 to 16, 1978.

Report:

UNESCO 1974. Report of an Expert Panel on MAB Project 6: Impact of Human Activities on Mountain and Tundra Ecosystems. MAB Report Series No. 14, Paris: UNESCO.

Thesis / Dissertation:

Bhasin Veena 1981 Ecological Influence on the Socio cultural System of the Gaddis of Bharmour Sub-Tehsil, Chamba District, Himachal Pradesh. Ph. D. Thesis, Unpublished. Delhi: University of Delhi.

Work "in press":

Bhasin Veena 2004. Economic pursuits and strategies of survival among Damor of Rajasthan. J Hum Ecol, (in press).

Website:

Official Home Page of Work and Income New Zealand 2004. From <http://ww.workandincome.govt.nz> (Retrieved March 18, 2004)

When there are more than five authors use et al. in place of rest of the authors.

The References list must be arranged alphabetically by Author's or Authors' Surname(s) and chronologically for each author, in the following style:

Author's Name (or Names), Year of Publication, Complete Title, Volume, and inclusive Pages as follows:

Bhasin MK 1988. Biology of the People of Indian Region. A Classified and Comprehensive Bibliography (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka). Delhi: Kamla-Raj Enterprises.

Bhasin MK, Bhasin V 2001. Ecology and Health: The Indian Scenario. In: Veena Bhasin, Vinay K Srivastava, MK Bhasin (Eds.): Human Ecology in the New Millennium. Delhi: Kamla-Raj Enterprises, pp. 43-82.

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