Exploring the challenges income-earning households experience regarding household food security in the Vaalharts Irrigation Scheme

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"Happiness is not a matter of intensity but of balance, order, rhythm and harmony."
~ Thomas Merton

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Declaration

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I, Janice Harmse hereby declare that the dissertation which I hereby submit for the degree of Masters in Consumer Sciences at the North West University, is my own work and has not previously been submitted by me for a degree at this or any other institution.

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SUMMARY

Several factors have a contribution towards household food security status. Regular income is usually used as the determinant of household food security, however the argument brought forth through the current study is that regular income does not directly translate nor guarantee household food security. Food insecurity amongst poor/impoverished households is widely researched, whilst there is little information available about the consumption patterns and the challenges of regular income earners in South Africa. The study investigated food security statuses, consumption challenges, food choices and current coping strategies experienced by income-earning households in the Vaalharts Irrigation Scheme (VIS) community in the Northern Cape Province. A convergent mixed methods design was employed in two phases to collect data from income-earning households in this community. The quantitative phase comprised interviewer-administered questionnaires on food utilisation (N=87), while the qualitative phase included face-to-face interviews with a semi-structured questionnaire (N=46) to determine daily problems participants experience with regard to food consumption, individual food needs and challenges with food choices which affect their household. The quantitative phase included 63 males (72.4%) and 24 females (27.6%), who presented 41.4% food secure, 13.8% food insecure, and 44.8% households at risk of becoming food insecure. Several income-earning households in the Vaalharts community struggled to maintain household food security. Findings reflected that food insecurity was presented in low-, middle- and high-income households, and was common amongst households that struggled to meet their food needs from a single income contributor. The general food consumption patterns in the VIS showed maize meal as a staple food item. Whole chicken pieces and fruit were commonly consumed on a daily basis which reflects a positive consumption pattern as these foods are known to be nutritious. Food-secure households with a higher income had an advantage as they were able to spend more money on a variety of food items. Food insecure and at risk households resorted to more affordable and satisfying food options such as sweets/energy-dense foods, on a daily basis. Households often adopted coping strategies that included borrowing money (r=0.396; p<0.05), eating non-preferred foods (r=0.378; p=0.002) and reducing portion size (r=0.523; p=0.001) to feed the family. In the qualitative phase, participants expressed difficulty when making food purchasing and consumption choices due to a lack of knowledge reading food labels and choosing healthy foods and managing their finances, which prevented them from purchasing affordable, nutritious foods. Low dietary diversity was noted and participants indicated a need for assistance through practical help and knowledge of healthy and quality choices when buying food. Leaflets and posters containing information about vegetable gardens, food consumption patterns, budgeting skills and food labeling material should be provided to the VIS workplace. Sustainable community farming can positively impact access to fresh foods, thus supporting household food

security in this community. Although findings from the study cannot be generalised, the needs identified may be used as a starting point to support household food security.

KEYWORDS: Coping strategies, Food consumption, Food security status, Household food insecurity, Supporting skills

OPSOMMING

Verskeie faktore beïnvloed huishoudings se voeselsekerheidstatus. Gereelde inkomste is gewoonlik ʼn aanduiding van huishoudelike voedselsekerheid, maar in hierdie studie word hierdie argument bevraagteken omdat gereelde inkomste nie nie huishoudelike voedselsekerheid verseker nie. Voedselonsekerheid onder verarmde of minder gegoede huishoudings is wyd nagevors, terwyl daar min inligting oor die verbruikspatrone en die uitdagings van huishoudings in Suid-Afrika, wat gereelde inkomstes ontvang, beskikbaar is. Hierdie studie het die voedselsekerheiduitdagings van inkomste-genererende huishoudings van die Vaalharts besproeiingskema ervaar, ondersoek. ‘n Konvergente gemengde studie-ontwerp was in twee fases aangewend om data vanaf die inkomste-genererende huishoudings in hierdie gemeenskap te versamel. Die eerste kwantitatiewe fase is deur middel van onderhoud-geadministreerde vraelyste rakende voedsel aanwending *(N=87)* voltooi waarna die tweede kwalitatiewe fase ‘n semi-gestruktureerde vraelys *(N=46)* gebruik het om die uitdagings wat die deelnemers tydens huishoudelike voedselkeuses ondervind, te bepaal. Die kwantitatiewe fase het uit 63 (72.4%) manlike en 24 (27.6%) vroulike deelnemers bestaan, waarvan 41.4% voedselseker, 13.8% voedselonseker en 44.8% van die huishoudings het die risko geloop om voedselonseker te raak. Bevindinge toon dat voedselonsekerheid in die lae, middel sowel as hoë-inkomste huishoudings voorkom en die huishoudings met enkelinkomste het meer voedselonsekerheid ervaar. Die algemene voedselverbruikspatroon in die studie toon mieliemeel as stapelvoedsel aan. Hoenderporsies en vrugte, wat as voedsame items bekend is, is algemeen daagliks verbruik. Hoër inkomste voedselseker-huishoudings kon ‘n groter verskeidenheid van voedselsoorte bekostig. Voedselonseker en risiko-huishoudings het ʼn groter aanduiding van daagliks gebruik van lekkergoed en hoë-energie voedsel getoon. Algemene aanpassingsstrategië wat huishoudings aanwend om die gesin te voed, sluit die volgende in; leen geld vir voedsel (*r=0.396; p<0.05*), verbruik van nie-voorkeurkosse (*r=0.378; p=0.002*) en kleiner porsies (*r=0.523; p=0.001*). Tydens die kwalitatiewe fase was dit duidelik dat probleme wat die deelnemers tydens voedselkeuses ondervind het, ‘n gebrekkige kennis of onvermoë rakende die lees van voedseletikette. Verder het hulle aangetoon dat gesonde voedselkeuses problematies was en dat gebrekkige finansies daartoe lei dat hulle nie voedsel met ‘n hoë voedingswaarde kan bekostig nie. ‘n Daaglikse verskeidenheid van voedsel is beperk en monotoon terwyl die deelnemers ‘n behoefte aangetoon het vir bystand met gesonde en kwaliteit voedselkeuses tydens aankope. Daar het ‘n behoefte vir praktiese hulp en kennis na vore gekom. Pamflette en plakkate wat inligting oor groentetuine, voedselverbruikspatrone, begrotings en inligting op voedseletikette bevat, gaan by die werksplek beskikbaar gestel word. Huishoudelike voedselsekerheid in hierdie gemeenskap kan daadwerklik ondersteun word deur volhoubare gemeenskapsboerdery. Alhoewel bevindinge voortspruitend uit hierdie studie uiteraard nie veralgemeen kan word nie, is dit wel moontlik om dit te gebruik as beginpunt om

die gemeenskap se voedselsekerheid te verbeter. Basiese inligting rakende voedselverbruik en beplanning van bekostigbare gesonde keuses, deur die effektiewe gebruik van voedseletikette, sowel as gemeenskapsboerdery aktiwiteite sal waardevolle ondersteuning aan huishoudelikevoedselsekerheid bied.

SLEUTELWOORDE: Hanteringstrategieë, Huishoudelike voedselonsekerheid, Voedselverbruik, Voedselsekerheidstatus, Ondersteunende vaardighede

ABBREVIATIONS

ARNS	African Regional Nutrition Strategy
AUTHeR	Africa Unit of Transdisciplinary Health Research
CAADP	Comprehensive Africa Agricultural Development Programme
FAO	Food and Agriculture Organisation
FSPIP	Food Security Production Intervention Programme
HREC	Health Research Ethics Committee
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IFSSSA	Integrated Food Security Strategy of South Africa
LCS	Living Conditions Survey
MDG	Millennium Development Goals
NCD	Non-Communicable Disease
NWU	North-West University
REACH	Renewed Effort Against Child Hunger
SA	South Africa
SANHANES	South African National Health and Nutrition Examination Survey
SDG	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
Stats SA	Statistics South Africa
UN	United Nations
UNDP	United Nations Development Programme
USA	United States of America
VIS	Vaalharts Irrigation Scheme
WCG	Western Cape Government
WIN	Water Innovation Network
WFP	World Food Programme
WFS	World Food Summit

CONCEPT CLARIFICATION

AUTHeR: The Africa Unit for Transdisciplinary Health Research is specifically focused on bio-psycho-social health in the context of epidemiology toward preventing illness, maintaining and promoting health and facilitating quality health systems (NWU, 2018).

Food consumption pattern: The consumption of specific food items and the combination of these foods in meals or dishes (Gerbens-Leenes *et al*., 2010:598).

Food security: Defined as a state in which all people have accessibility to sufficient, safe and nutritional food of choice and which can provide the dietary requirements needed for an active healthy, prosperous and fruitful life (Carolan, 2013; Grobler, 2013:2), and further provides nutritional adequacy through a sustainable food system (Joubert, 2012:6).

Food system: The agricultural production of foods and food-related supply of commodities including the consumption of food (Gerbens-Leenes *et al*., 2010:599).

Food consumption: The consumption of food is affected by consumer's behaviour, food needs, planning and financial management. The origin of food influences consumers' decision-making in several ways, including attitudes, evaluation, eagerness and choice of purchase (Luomala, 2004:53). This could include how they budget for food needs, preparation and cooking.

Household: A group of people sharing a living space, namely a housing unit, and who share the same kitchen is known as a household, with the head of the household making socio-economic and household decisions (Ashraf & Routray, 2013:52).

Household food security: Defined as having access to safe, nutritious and adequate foods within a household, which allows members to have a healthy and active life at any given time (Sheriff, 2012:8).

Household size: The number of persons sharing a housing unit, and whom the head of the household is responsible for when making financial and household decisions (Ashraf & Routray, 2013:52; Immihelp, 2017).

Hunger hot spots: 'Hunger hot spots' refer to areas where food security is a concern and where consumers are malnourished or suffer from starvation.

Low-, middle-, high-income: According to Stats SA (2013:39) the low-income group consisted of households who earn less than R4 164, middle-income between R4 165 and R13 209, whereas the high-income group earned between R13 210 and R32 522.

Malnutrition: A person's intake of energy and/or nutrients are either deficient, in excess, or imbalanced (WHO, 2016). The IFPRI (2016:1) report supports WHO in saying that malnutrition occurs either when children do not grow and develop fully, people may carry too much weight or those who are underweight and prone to infection (IFPRI, 2016:1).

Nutrition security: Nutritious food which meet dietary requirements and food preferences to ensure an active and healthy life (FAO, 1996), and further requires a clean and sanitary environment, acceptable health services and a knowledgeable and healthy life for all (Sithole, 2005:12).

Rural area: An area is referred to as rural if its inhabitants are involved in agricultural activities; however the natural, social and economic environments also contribute largely in defining a rural area (Kenshújo, 2005:173).

Rural development: 'Rural' may often refer to an area where residents are involved in agricultural practices to make a living. However, social, natural and economic environments contribute largely in defining a rural area. Therefore rural development can be defined as the progression and improvement of sustainable livelihoods by paying close attention to characteristics within the communities (Kenshújo, 2005:173).

Sustainable livelihoods: A sustainable food system will achieve food and nutrition security today, as well as contributing to future generations' food and nutrition security needs. Additionally, sustainability should be demonstrated within the environmental, economic and social food system (UN, 2015:1). A livelihood consists of material and social resources, activities and expertise required for a means of living. Sustainability is a key quality of successful livelihoods and achieving this will ensure that the livelihoods can withstand and recover from stresses and shocks by maintaining or enhancing efficiency over time (Devereux & Maxwell, 2001:82).

WIN project: The WIN project stands for Water Innovation Network and focuses on rural health (NWU Website, 2018).

Clarification and meaning of the use of special terms/codes/phrases in this study:

"At risk households": *The phrase "at risk households" refers to households which are at a risk of becoming food insecure.*

"Cremora/ powdered coffee creamer": *The food item "cremora/powdered coffee creamer" has been listed as a dairy product due to participants perception, understand and consumption of this item which they relate to dairy products and the substitution thereof.*

"Household": *The participants who represented their household as the main income earner, also involved and/or responsible for food choice decisions was referred to as the "household" throughout the study. No other members of the same household was interviewed.*

"P#": *In phase 2, Table 4.6 consists of the participants responses. The code "P#" was used to refer to specific participants, for example "P#14" refers to "Participant number 14". This code was used to ensure accuracy and traceability of specific participants' responses. Table 4.6(a) in Appendix D reflects the field notes of each participant during data collection of phase 2.*

TABLE OF CONTENTS

ACKNOWLEDGEMENTS ..... **I**
SUMMARY ..... **III**
KEYWORDS ..... **IV**
OPSOMMING ..... **V**
SLEUTELWOORDE ..... **VI**
ABBREVIATIONS ..... **VII**
CONCEPT CLARIFICATION ..... **VIII**
LIST OF TABLES ..... **XIV**
LIST OF FIGURES ..... **XV**
CHAPTER 1: INTRODUCTION TO THE STUDY **1**
1.1 Food security overview **1**
1.2 Background of study **3**
1.3 Problem statement **4**
1.4 Aim and objectives **5**
1.5 Method of investigation **5**
1.6 Structure of the dissertation **6**
CHAPTER 2: LITERATURE REVIEW **7**
2.1 Introduction **7**
2.2 Global food security overview **7**
2.3 South African food security status **9**
2.3.1 Introduction 9
2.3.2 Rural development 10
2.3.3 Improving food security in South Africa 11
2.3.4 Impact on health, nutrition and well-being 12
2.4 Household food security **13**
2.4.1 Food availability 16
2.4.2 Food accessibility 16
2.4.3 Food utilisation 17
2.5 Factors influencing household food security **17**
2.5.1 Socio-demographic factors 17
2.5.3 Socio-economic status factors 18
2.5.4 Involvement in agricultural production: Vegetable gardens and livestock 19
2.6 Maintaining household food security: challenges experienced **22**
2.7 Food consumption challenges **22**
2.8 Coping strategies for households **23**
2.9 Practical solutions and recommendations to address household food security **25**
2.10 Summary **25**

CHAPTER 3: METHODOLOGY **28**
3.1 Introduction **28**
3.2 Research design **28**
3.3 Methodological framework **30**
3.4 Study population and environment **31**
3.4.1 Gaining entry to the community 31
3.5 Sampling **32**
3.6 Development of the measuring instrument **33**
3.6.1 Language, understanding and translation of questions 34
3.7 Data collection **34**
3.7.1 Phase 1: Household food security questionnaire 35
3.7.2 Phase 2: face-to-face interviews 35
3.8 Data analysis **36**
3.9 Validity and reliability **38**
3.10 Trustworthiness in qualitative research **39**
3.11 Ethical aspects **40**
3.11.1 Written informed consent 40
3.11.2 Risks and benefits 42
3.11.3 Ethics in data capturing 42
3.11.4 Data storage 43
3.12 Conclusion **43**
CHAPTER 4: RESULTS AND DISCUSSIONS **44**
4.1 Introduction **44**
4.2 Phase 1: Quantitative household food consumption and food security status **44**
4.2.1 Demographic characteristics 44
4.2.2 Household food security status 49
4.2.3 Factors affecting household food security status 49
4.2.4 General household food consumption patterns 54
4.2.5 Household consumption patterns within food security status groups 55
4.2.6 Understanding household food consumption patterns 66
4.3 Phase 2: Qualitative household food security needs **68**
4.3.1 Personal experiences of participants from the VIS 69
4.3.2 Household challenges, potential coping strategies and assistance with needs 81
4.4 Conclusion **83**
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS **86**
5.1 Introduction **86**
5.2 Conclusion **86**
5.3 Contribution of the study **90**
5.4 Recommendations for coping strategies **91**

5.5 Recommendations for future research **93**
5.6 Study limitations **94**
CHAPTER 6: REFERENCE LIST **96**
CHAPTER 7: RESEARCH ARTICLE **111**
7.1 Title page **111**
7.2 Abstract **112**
7.3 Introduction **112**
7.4 Methodology **113**
7.5 Results and discussions **114**
7.5.1 Demographic characteristics 115
7.5.2 Household food security status 115
7.5.3 Household food consumption 116
7.5.4 Qualitative research findings 119
7.6 Conclusions and recommendations **120**
7.7 Reference list **121**
APPENDIX A: QUANTITATIVE QUESTIONNAIRE **124**
APPENDIX B: QUALITATIVE INTERVIEWS **132**
APPENDIX C1: CONSENT FORM **135**
APPENDIX C2: CONFIDENTIALITY AGREEMENT **142**
APPENDIX D: ADDITIONAL RESULTS – TABLES AND FIGURES **143**
APPENDIX E1: ADVERTISEMENT AFRIKAANS **172**
APPENDIX E2: ADVERTISEMENT ENGLISH **173**
APPENDIX E3: ADVERTISEMENT XHOSA **174**
APPENDIX E4: FOOD SECURITY PAMPHLET **175**
APPENDIX E5: FOOD CONSUMPTION POSTER **176**
APPENDIX E6: FOOD CONSUMPTION LEAFLET **177**

LIST OF TABLES

Table 4.1: Summary of respondent's demographic characteristics (N=87) 45
Table 4.2: Monthly and annual Rand values for all income groups (N=87)* 46
Table 4.3: Chi-square cross-tabulations for factors affecting food security: Demographic characteristics & behavioural aspects 47
Table 4.4: General food consumption frequency throughout the week 55
Table 4.5: Food items with significant consumption differences within food security status groups 58
Table 4.6: Full descriptions of themes, concepts and sub-concepts identified from the qualitative phase 70

LIST OF FIGURES

Figure 2.1: Theoretical framework to determine factors influencing food security within the VIS. 15
Figure 3.1: Methodological framework for the food security study in the VIS. 30
Figure 4.1: Food security status of households at the VIS from Phase 1 and Phase 2. 49
Figure 4.2: Participants' income brackets within different food security status households..... 51
Figure 4.3: The relationship between household income contributors and food security status. 52
Figure 4.4: Total income spent on food each month within food security status groups..... 53
Figure 4.5: The percentage of households' consumption patterns regarding food items within food security status groups on a weekly basis ($p<0.05$)..... 59
Figure 4.6: Consumption of foods within food security groups with statistical significant differences represented on box plots..... 65

CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 Food security overview

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food on a daily basis to maintain their dietary needs and food preferences for a sustainable, active and healthy life (FAO, 1996; Sheriff, 2012:8). A recent paper by Devereux and Waidler (2017:13) shows evidence that in South Africa (SA) food insecurity has decreased in the past 20 years, with social grants contributing positively to these data. However, signs of undernourishment reflected through the increase on Non-communicable Disease (NCD) which is an indication of compromised diets remain a concern. One of the identified fundamental causes of food insecurity in SA are the rising food prices, which tend to initiate an unpredictable trend and directly affect consumers' buying behaviour. Unfortunately, the situation does not only affect the poor households but affects even the income-earning households. Due to the 2015 agricultural drought and the weak South African Rand (ZAR), it is predicted that food prices will continue to increase (Devereux & Waidler, 2017:15). In a study conducted by van Wyk from 2014 at the North-West University it was found that employees from the Vaalharts Irrigation Scheme (VIS) experienced a lack of food security at different income levels but the most concerning was an indication of a lack of food security amongst middle-income households (Van Wyk, 2014:71). Various studies have confirmed the complexity of food security and that several factors may contribute to a household's food security status, but little is known about specific challenges experienced by regular income-earning households. If all the components are functioning correctly, food security includes the availability, accessibility and utilisation of foods at household level or within the country (Jordaan, 2014:15), including adequate nutrient utilisation and the inclusion of nutritional security (Carolan, 2013; Grobler, 2013:2). Reference to food security in this study implies sufficient utilisation of nutritional foods.

South Africa had enough food available at national level, but that not everyone had adequate financial resources to purchase a variety of foods, especially with the increasing level of food prices (Cloete & Idsardi, 2012:3). Social, physical and economic access to food is an important priority in food security research (Mjonono *et al.,* 2009:2; Msaki & Hendriks, 2014:195). To reach a state of nutritional well-being, factors such as clean water, an adequate diet, and effective sanitation and health care all play vital roles in achieving food security (FAO, 2006).

Reduction of food insecurity, and specifically reducing world hunger by 50% by 2015, has been the driving force of the United Nations (UN) since 1996, when leaders combined to address the global concern of hunger and poverty-stricken populations by formulating the Millennium Development Goals (MDG, 2015). After a few years it became evident that the problem was

complex and multiple factors were involved to expand. The extent of food and nutritional security concerns are not only an issue for third world or developing countries. Corrigan (2011:1232) stated that the United States of America (USA) raised concerns regarding obesity and an associated increase in health problems, as well as emerging issues of increased obesity in SA. In addition to the MDG's aim to reduce the number of undernourished people in developing countries by 2015 (FAO, 2014), the Comprehensive Africa Agricultural Development Programme (CAADP) supported African countries to invigorate agriculture development as a strategy for achieving the MDG's aim by 2015 (AFDB, 2011:2). Of the 36 'hunger hot spots' in the world, 23 are located in Africa (Sheriff, 2012:8). Rural areas are more prone to experience poverty and unemployment, often resulting in a community which is food and nutrition insecure (Sheriff, 2012:9). The African population is growing by approximately 3% annually, with agricultural production declining in many areas (Sheriff, 2012:10). This decline negatively impacts the accessibility and availability of food products that subsequently leads to food insecurity in developing countries. One in four people in Sub-Saharan Africa (SSA) remains undernourished, the highest incidence in the world (FAO, 2014:4), even though the occurrence of undernourishment in SSA has decreased from 33.3% in 1990/1992 to 23.8% in 2012/2014 (FAO, 2014:9). According to Labadarios *et al.* (2011:891) a total of 814 million people is undernourished in developing countries; 204 million of these reside in SSA, including SA. The commitment to promoting food security in Africa transformed into improved results of food security status (FAO, 2014:9).

Labadarios *et al.* (2011:893) found that in 2008 food insecurities reduced considerably in the Northern Cape, from 63% to 14.2%. Given that the VIS is situated in the Northern Cape, Labadarios's findings are relevant, however, a large number of individuals specifically in the VIS remain food insecure and reasons were sought to determine factors contributing towards rural household food insecurity and to determine why households are at risk of becoming food insecure. In van Wyk's (2014:72) study, it was revealed that in the VIS community 48.8% of represented income-earning households experienced hunger and thus could be at risk of becoming food insecure, with a large percentage of these participating households forming part of the middle-income group. Van Wyk (2014:74) recommended future research which should consist of a mixed methods study to enable researchers to collect quantitative and qualitative data from participants who require urgent attention to prevent them from becoming food insecure. This current study has followed the above recommendation to explore food security challenges in the VIS.

1.2 Background of study

This study was performed in the Northern Cape in a small town called Jan Kempdorp where the VIS is situated. Jan Kempdorp is classified as a rural community, but consists of formal economic activities and urban amenities (Gordon *et al*., 2007:4). Pinstrup-Anderson (2009:3) stated that an understanding of food security is useful for monitoring aspects of a household's well-being, and for the design, implementation and evaluation of projects, programmes and policies. Research discovered from this study will be important for the VIS as well as South African rural communities in which household food insecurity is a reality. The identified food security needs of individuals and current coping strategies which were employed will be useful for assistance in future training and interventions. A previous study amongst income-earning households in the Vaalharts community revealed that 48.8% of income-earning households were at risk of becoming food insecure (Van Wyk, 2014:71). Furthermore, both food insecure and at risk respondents formed part of the middle-income earning group (Van Wyk, 2014:63). The latter finding reflects that finances were available in both groups of concern, therefore urgent attention is required to prevent them from becoming food insecure by exploring various other possibilities for current food insecurities.

Supermarkets which supply lower income areas offer better quality and cost of foods, for example, fresh fruits, than small local wholesalers and traders (Pereira & Drimie, 2016:23). Generally, higher quality, affordable products assist with household food security, but supermarkets also sell fast food which is poor in nutrition and therefore concerns about nutrition security is not being addressed (Pereira & Drimie, 2016:23). To increase affordability in rural areas, food is often sold cheaply, in small portions, and is easily accessible (Kimani-Murage *et al*., 2014:1105). Access to supermarkets and street vendors in lower income areas increases the consumption of convenience foods, which contain large amounts of sugar and salt, and are low in micronutrients, energy and fibre (Pereira & Drimie, 2016:24). There has been a progressive shift towards modern diets rich in sugars, oils and animal protein, which has an effect on household food consumption patterns in developing countries such as South Africa (Legwegoh & Hovorka, 2016:89).

This current study set out to investigate participant's income, food consumption patterns, current coping strategies and challenges experienced regarding food choice amongst individuals of different food security status groups who represent their household. Implementable knowledge and skills will be recommended by means of practical solutions to maintain sustainability. The inclusion criteria for participants of this study were made up of persons employed at the VIS and earning a salary, individuals over the age of 18 years, residing in the VIS community and those who made food choice decisions for their household.

1.3 Problem statement

South Africa has been shown to have sufficient food available to feed its population. However, at a household level, there are various factors which affect the level of food and nutritional security, resulting in a large number of at risk and food insecure households. The interpretation of the causes and implications of household food security requires further study (Altman *et al.,* 2009:25) so that a better understanding of the current issues may be developed. There is limited information and research available on the challenges and needs of income-earning households with regard to food security in rural households in SA, and this serves as the motivator for the study. Food insecurity is often associated with low household income and poverty, yet limited information is available on households with different income levels. An ongoing study in the VIS indicated high incidence amongst the middle-income group of households at risk of becoming food insecure (Van Wyk, 2014:72). Furthermore it was reported that only 48 of 162 respondents (29.6%) were food secure while 79 respondents (48.8%) were at risk and 35 respondents (21.6%) experienced food insecurity within the community. The findings of van Wyk (2014:72) ground the problem understudy, as the findings indicated that several households from the middle-income earning group as well as those from the low-income earning group were either at risk or food insecure.

A higher income did not always ensure food security in the community. Several households which were further at risk of becoming food insecure formed part of the middle-income group and it was thus important to investigate their food needs and knowledge of food security, including their view of a potential solution to resolve or to improve food security at a household level. It is reported that low-income households adopt a number of coping strategies including adjustments to diet, raising money to buy food and spending less money on non-food items (Devereux & Waidler, 2017:17). Additionally, households often buy incorrect quantities due to unaffordability or a lack of meal planning; borrow food from family members; buy cheaper unhealthy foods with low-nutrient value; reduce portion sizes; or skip meals. Income is often used incorrectly by spending on foods that are not nutrient-rich, but enjoyable, or else not spending enough on food items, which increases the risk of food insecurity, because healthy foods, in the correct quantities, are not consumed. It is therefore essential to explore income-earning households' food consumption patterns, food-related challenges such as spending patterns, and coping strategies with regard to food choice decisions at home. Van Wyk's (2014:74) study in the VIS area further indicated limited involvement in self-production activities such as vegetable gardens, however an interest was identified. Community vegetable gardens are an example of a tool for improving household food security. Small-scale vegetable gardens could contribute to household food security which could further extrapolate at a national level in SA, but more research is required and further exploration of household agricultural activities is needed (Altman *at al.,* 2009:7, 18). Assistance

is required in the form of education and training, community outreach programmes, funding and food-based interventions to promote health and well-being through improved food consumption behaviour to, in turn, increase food security in communities (Corrigan, 2011:1240).

The Department of Consumer Sciences, NWU, together with the ongoing WIN Project in the VIS has a relationship with the community members who expressed a need for assistance with regard to their food security situation. This current study focused on reasons contributing to risk or current food insecurity in VIS households, in order to propose constructive rather than negative coping strategies to develop more food secure households. Accordingly, the recommendation from van Wyk's (2014) study strongly motivated the reason for a further study of income-earning households which applies both quantitative and qualitative approaches, as this should allow researchers to gain a better understanding of the current food security challenges faced by households in VIS.

1.4 Aim and objectives

Aim:

The aim of this research was to gain a better understanding of the food consumption challenges experienced by different income-earning employees of the Vaalharts Irrigation Scheme after the households' food security status was determined.

Objectives:

- To determine participants' income and food security status
- To determine food consumption patterns and current coping strategies of the different food security and income groups
- To identify participants' challenges regarding food choice amongst the different food security status and income groups
- To recommend practical solutions to support the identified challenges

1.5 Method of investigation

This study made use of a convergent mixed methods design to explore aspects that are important to income-earning households for food security. This method comprises a quantitative and a qualitative phase, of equal importance (Creswell & Clark, 2011:71), in order to gain a better understanding of the phenomenon of a food-secure household. The first phase explored quantitative information about the food utilisation and food security of participating households to draw comparisons between different food security status groups. Focus is placed on low-, middle- and high-income earning households' food consumption, purchasing behaviour patterns, food

choices and other monthly income obligations. A questionnaire that was previously developed for an ongoing study in VIS households used in van Wyk's study in 2014, made use of interviewer-administered questions. The questionnaire has been evaluated by specialists at the North-West University (NWU), Potchefstroom Campus, and is accepted as valid and reliable. The quantitative phase creates a strong background profile to prepare participants for the qualitative phase, phase 2, which makes use of face-to-face interviews.

1.6 Structure of the dissertation

The dissertation consists of seven chapters. Chapter 1 gives a food security overview, a brief background to the study, problem statement, aim and objectives, method of investigation and structure of the dissertation. Chapter 2 provides a literature review of the field of study. Chapter 3 comprises the methodology and describes the methods applied to collect data. The results of the study are discussed in Chapter 4. In Chapter 5, conclusions and recommendations are presented. Chapter 6 is made up of the references used throughout the dissertation. Chapter 7 is a research article generated from the study. Appendices are included throughout the study as follows. Appendix A consists of the questionnaire; Appendix B provides the interview questions; Appendix C1 is the consent form and Appendix C2 confidentiality agreement; Appendix D contains additional results (tables and figures); Appendix E1-3 consists of the advertisements in their respective translated languages, Appendix E4 is the pamphlet for food security (Pre-educational material), Appendix E5 consists of the poster and appendix E6 the leaflet (Post-educational material).

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Food security is an increasing concern worldwide (Megersa *et al.,* 2013:16), and a country can only be categorised as being food secure if the four dimensions (availability, accessibility, utilisation, sustainability) of food security are addressed (UNDP, 2012:6). Accordingly, countries are focusing on the implementation of policies and programmes to improve food and nutrition security through these dimensions. Production, productivity and competitiveness promote the availability, accessibility and utilisation of adequate quantity and quality healthy, safe, nutritious foods, and to maintain sustainability of the dimensions (FAO, 2015b). Furthermore, the International Food Policy Research Institute (IFPRI, 2016:1) reports that every country is facing a serious public health challenge from malnourishment, therefore, globally, malnutrition and diet are the most serious risk conditions resulting from poor-quality diets and health and food behaviour. Additionally, obesity and diabetes have led to further health issues in various countries. A report shows estimates indicating that approximately 795 million people in the world were undernourished between the years 2014 – 2016, of which 220 million formed part of Sub-Saharan Africa. Furthermore, of these, 3.2 million people in Southern Africa were undernourished (FAO, 2015a:8). This incidence does not show significant positive change within Southern Africa and thus newer policies should be examined. In 2014, a Food and Nutrition Strategy was developed and approved in Southern Africa, focusing on the period between 2015 and 2025, with the aim of promoting the four dimensions of food security.

2.2 Global food security overview

The World Health Organisation (WHO) implemented the MDG in the late 1990s, and goals relevant to the nature of this study included eradication of hunger and poverty, achieving primary education, improving maternal health, combating HIV and Aids, ensuring environmental stability and cultivating a global partnership for development (MDG, 2015; Vasuthevan & Mthembu, 2016:246). The MDG aimed to minimise world hunger by 50% by the year 2015, and to some extent this has happened, but without attaining all the goals set out. In 2007, the MDG Africa Steering Group came together to identify and discuss the steps needed to achieve these goals in practical terms in Africa. In 2015, it was stated that Africa was capable of achieving these goals if recommendations put forward were fully implemented (MDG, 2015), barriers reduced and a base for economic growth created. Despite the overall progress made in reducing the prevalence of hunger, there still remained substantial potential for further improvement (FAO, 2015b).

As highlighted in the Sustainable Development Goals (SDG) 2 and 3, to end hunger and improve health, one of the major challenges in the 21st century is feeding the world's population a diet which is affordable, healthy and environmentally sustainable (Pereira & Drimie, 2016:18). In 2016, the United Nations General Assembly declared a 10-year nutrition action plan by coordinating actions and initiatives by all national governments, including low- and high-income groups (IFPRI, 2016:4). The aim of this plan is to build a global commitment to nutrition which can benefit countries that experience health concerns. For example, developing Asia's agricultural sector requires production openness to international instead of regional markets only, which would boost investment, employment projections and economic growth, and in turn reduce poverty within the area (Anderson & Strutt, 2016:32). Furthermore, Anderson and Strutt (2016:12) stated that food security was a spending and/or consumption problem instead of solely a production and self-sufficiency issue. It can be assumed that Asia's food security strategy could be adapted to the South African agricultural sector, which aims to reduce current food security concerns by improving production and growth of the South African economy.

In Africa, household food utilisation needs attention. According to Shisanya and Hendriks (2011:515), the South African National Department of Agriculture found that 58.4% of households in Sekhukhune, Limpopo, were severely food insecure. In addition to the MDG's aim to reduce the number of undernourished people in developing countries (FAO, IFAD & WFP, 2014:9), the Comprehensive Africa Agricultural Development Programme (CAADP) supported African countries in boosting agriculture development as a strategy to combat poverty and hunger (AFDB, 2011:2). African agriculture will face challenges within the next 10 years, and specifically for the agricultural food system. This will have an effect on household food security, as the food system is expected to provide food and nutrition requirements for the changing and growing population, with support in rural areas (FAO, 2015b:17). Taking action to accomplish growth and ensure food and nutrition security is thus essential. Coping strategies in Africa to achieve food and nutrition goals by eliminating hunger on a national and regional initiative level include key drivers, such as effective political leadership and governance, quality policies, strategies, macro-economic environment and economic growth in the food and agricultural sector to ensure food and nutrition security (FAO, 2015b:7). Political instability and environmental conditions may have resulted in the economic crises in Kenya, which have been associated with the rise in food insecurity in various areas (Kimani-Murage *et al*., 2014:1109). South Africa has experienced a similar situation and this may be a reason for the country's increased food insecurity.

Factors contributing to food insecurity are rising food prices, droughts and political instability eminent in several SSA countries. Food availability in SSA has increased over the past 20 years by approximately 12% (FAO, 2015b). According to a recent study, new research is being written in SSA, taking agricultural development into consideration, but more importantly, the

determination to combat food security in SSA (Rajaonarison, 2014:378). A report from the FAO (2015a:45) states that Southern Africa, which forms part of SSA is made up of Botswana, Lesotho, Namibia, SA and Swaziland, have not reached the MDG hunger reduction target, However, SSA's total of 18 countries have achieved the MDG 1c hunger target, with SA presenting less than 5% of undernourished people. In addition, 7 of these countries have achieved the World Food Summit (WFS) goal; SA is close to reaching this goal and should do so by year 2020 (FAO, 2015a:13). Of all regions in the world, SSA has the highest rates of infant and child mortality and of underweight children (Naicker *et al*., 2015:270). An initiative was developed by the African Union and its partners, namely, the African Regional Nutrition Strategy (ARNS), which focuses and commits to effective approaches and mechanisms for nutrition to end child hunger and malnutrition by 2025 (FAO, 2015b:14). Furthermore, the ARNS aims to improve nutrition by means of creating a supportive environment for various established sectors under the Scaling-Up Nutrition Movement and the Renewed Effort Against Child Hunger (REACH).

2.3 South African food security status

2.3.1 Introduction

Food security has improved for a large number of South Africans in the last 23 years, yet children's nutritional status has shown only a slight improvement (Devereux & Waidler, 2017:1), specifically in poor and rural households (Devereux & Waidler, 2017:22). On a household food security level, between 2002 and 2012 the General Household Surveys (GHS) indicator presented a 55% decrease in children experiencing hunger, from 23.8% to 10.8% (Devereux & Waidler, 2017:3) and indicated that the total population of SA experiencing hunger shows a similar decrease of 13.1%, to that of child hunger (Devereux & Waidler, 2017:4). The FAO (2008) report indicated that SA is largely considered a food secure country (Cloete & Idsardi, 2012:2) in terms of food availability (Drimie & McLachlan, 2013:220), yet large numbers of households within the country are food insecure (Altman *et al.,* 2009:7). This is supported by Devereux and Waidler (2017:2), who state that SA has enough food at a national level to feed its entire population, with sufficient staple food production to meet local food demands (Du Toit, 2011:4). However, food production has decreased in Southern Africa because of droughts, a lack of skilled farmers and political instability, resulting in food shortages, and therefore increasing malnutrition (Vasuthevan & Mthembu, 2016:249). In 2009, the South African population was estimated at 49 million with a population growth rate of 1.7% per annum (Du Toit, 2011:7). According to Stephan (2016), Statistics SA of 2016 reflected figures of 55 million people residing in SA.

The existence of food insecurity is due to the unavailability or inaccessibility of foods to make up a healthy and nutritious diet (Labadarios *et al.,* 2011:891), and exacerbated by a lack of

knowledge regarding certain aspects of food when making consumption choices. Every South African citizen has the constitutional right to access sufficient food and water, yet parts of Southern Arica including RSA, are chronically food insecure and do not have enough food to eat due to a lack of economic progression, poor agriculture, and environmental and climatic factors (Shisanya & Hendriks, 2011:511). Shisanya and Hendriks (2011:511) referred to the South African Integrated Food Security Strategy and stated that there were reasons for food insecurity, such as unstable and inadequate household food production, lack of purchasing power and weak support networks. Research revealed that between 1999 and 2008 the occurrence of food insecurity in SA decreased from 52.3% to 25.9%. Nevertheless, the consumers at risk of experiencing food insecurity remained nearly the same (Labadarios *et al.,* 2011:893). Labadarios *et al.'s* findings showed a lack of food knowledge, which played a significant role in the prevalence of food insecurity.

South Africa is classified as a middle-income country, yet a large portion of the population is regarded as low-income (MDG, 2010:23). As a developing country, SA presents high levels of poverty, income inequality, as well as household food and nutrition security concerns (Altman *et al.,* 2009:7; Cloete & Idsardi, 2012:3, 6), which are worsened by poverty and lack of amenities, such as access to water or electricity required for cooking, or money needed to purchase products (Corrigan, 2011:1239).

2.3.2 Rural development

The prevalence of food insecurity in rural SA has reduced from 62.0% to 33.1% (Labadarios *et al.,* 2011:893), which means that the number of households suffering from hunger and insufficient foods decreased. Inhabitants of rural communities do not generally produce food for personal profit, because many of these smallholders or agricultural labourers do not own sufficient land to produce enough food for their households or families (FAO, 2008:75). However, in these areas, agriculture and staple food production are an important occupation for most of the poor (FAO, 2008:75). In addition, lack of access to finance and agricultural participation is currently preventing South Africans from making farming progress (Du Toit, 2011:12). Furthermore, the FAO (2008) report showed that the majority of people living in rural areas had access to land but did not have the necessary skills to farm sustainably on the land (Du Toit (2011:11).

Rural and lower income households had limited food items in the household (Labadarios *et al*., 2011:894). Nevertheless, in rural and urban areas in SA, hunger prevails at a household level (Pereira & Drimie, 2016:20). According to Drimie and McLachlan (2013:220) the number of households experiencing hunger was the highest in Eastern Cape, Northern Cape and Limpopo Province, mainly associated with socio-economic factors, such as, household monthly income,

weekly expenditure on food and employment status. In the Western Cape, 31% of households reported food access problems (WCG, 2016:1). The Western Cape documented the highest food variety in both urban and rural households, across all income levels (Labadarios *et al*., 2011:894), which would, indicate that food is available but that the dilemma is the lack of accessibility. Poorer households in the Western Cape experience hunger and malnutrition as a result of the poor economy and obstacles to access and affordability of food (WCG, 2016:4).

2.3.3 Improving food security in South Africa

South Africa is currently able to improve national food sufficiency by means of its own production and food imports (FAO, 2015b). In the year 2012, the Food Security Production Intervention Programme (FSPIP), which promotes self-sufficiency and food security, was introduced to smallholder farmers, communities and households to provide an opportunity for increased production of basic foods by helping communities to grow their own food (FAO, 2015b:11).

SA has achieved the MDG's target, as mentioned progress towards the WFS goal. The commitment this shows towards improving food and nutrition security is evident. However, recent literature points out that 14 million South Africans do not have access to consistent food supply, and that furthermore 7 million are chronically hungry (BizCommunity, 2017). The South African National Health and Nutrition Examination Survey (SANHANES) stated that 26% of the population experience hunger (Pereira & Drimie, 2016:20). The government accords high priority to various national policies and programmes that contribute to the mutual goal of increasing nutritional levels, particularly for the vulnerable section of the population. An example of a policy, the Integrated Food Security Strategy of South Africa (IFSSSA), developed in 2000 to simplify, synchronise and integrate diverse food security programmes into one complete strategy to increase food security and nutrition in SA and to achieve sustainable access to safe food for a healthy and better quality of life for all people in the country (FAO, 2015b). The important role the IFSSSA plays in the current food security situation is that of maintaining, guiding and serving continued implementation of this programme, together with newer programmes and policies, to improve the food security status in SA. This current study together with other studies which form part of the ongoing WIN Project in the VIS can set up a proposal to approach the South African government for finances to implement such policies, however many similar projects stand in line to achieve similar goals. To achieve food security for the total population in SA, a shift towards agricultural and food systems which are stronger, more productive and sustainable will be required (FAO, 2016), and to maintain a secure national food supply, the farming sector would require effective, sustainable resources to assist with regional trade policies (Drimie & McLachlan, 2013: 220).

There have been improvements in household food security, yet many struggle to keep up with demands on the household income. SA has not reached an acceptable level of household food security compared with countries of similar economic development (WCG, 2016:4). There are concerns about the continued tenacity of income poverty, micronutrient deficiency and increased obesity, child malnourishment, and an escalation of Non-communicable Disease (NCD), such as diabetes, hypertension, cardiovascular and circulatory diseases (Vasuthevan & Mthembu, 2016:249). Although the general experience of hunger has been decreasing, the independent measurement of nutritional status does not give an impression of similar improvement (Devereux & Waidler, 2017:23). Nevertheless, food consumption has increased for some, thanks to social grants which for the most part provide financial support. Nawrotzki *et al.* (2014:292) reported that the social grant system in SA supported household food security status positively. However, this may not of itself improve household nutritional status if health care and sanitation environments are poor and unhygienic (Devereux & Waidler, 2017:23).

2.3.4 Impact on health, nutrition and well-being

Sub-Saharan Africa, which includes South Africa, has been identified as the region that carries the largest burden of disease in the world, such as Communicable Diseases (Vasuthevan & Mthembu, 2016:248). These constitute a public health problem and include HIV/Aids, tuberculosis, malaria, measles, hepatitis B, cholera and bilharzia, and have affected social and economic development. Furthermore, NCD (diabetes, hypertension, cancers) are believed to account for 40% of all deaths in developing countries (Vasuthevan & Mthembu, 2016:249). There was a slight decrease in the incidence of undernourishment in Southern Africa in the periods from 2010 to 2012 and 2014 to 2016, from 6.1% to 5.2% respectively (FAO, 2015a:8).

The impact of malnutrition in all forms (IFPRI, 2016:3) and emerging issues of increased obesity (Corrigan, 2011:1232) should be tackled in government policies and local interventions. The incidence of obesity has increased over the last few years in SA and often people think that healthy and nutritious foods are not affordable (Sheriff, 2012:8). The South African Strategy for the Prevention and Control of Obesity has placed emphasis on efforts to prevent and reduce obesity by 10% by 2020 (IFPRI, 2016:28). Several policy and programme developers are challenged by political, economic and social issues which contribute to the current food security situation. South Africa's household and community food security situation is less positive when compared to the national level. This has to do with micronutrient deficiency and malnutrition affecting growth and learning abilities in young children and subsequently the population (Drimie & McLachlan, 2013:220). Furthermore, overweight and obesity in households make a considerable contribution to the prevalence of chronic diseases such as diabetes and cancers. Lack of nutrition for children results in malnourishment which stems from factors such as scarce

access to food, lack of care for women and children, unhealthy environments and insufficient health services (Devereux & Waidler, 2017:22), and even more, from a lack of resources at an individual or household level which restricts adequate food from being obtained. It was proved that cereals contain a significant source of energy and iron, legumes were a key source of protein, and vegetables important sources of iron and vitamin A, and further, that fats are a major source of vitamin E (Msaki & Hendriks, 2014:210). Consumption of these food items would thus have nutrition and health benefits. Implementation and support for growing certain food items, such as legumes and vegetables, can have a positive impact for households in communities which struggle with their food security status.

2.4 Household food security

Household food security is access to safe, nutritious and adequate foods, which allow all persons living under the same roof to lead a healthy and active life at all times (Sheriff, 2012:8). Focusing attention on household food security and improving the accessibility of foods has influenced livelihoods and well-being of households in rural Kwazulu Natal (Msaki & Hendriks, 2014:193). A household's food security status is dependent on the four dimensions (availability, accessibility, utilisation, sustainability) of food security. The dimensions of food security have different levels of measurement (Figure 2.1), starting at the national level, which involves food availability, followed by food accessibility, measured at household level, and lastly food utilisation and consumption, measured at an individual level (Deitchler *et al*., 2011:2). If food availability, accessibility and utilisation of foods all function sufficiently, sustainability of foods can be achieved. Food security status is assessed by various factors, such as nutritional status, food consumption and nutritional intake, food practices, food and nutrition knowledge and attitudes, social capital, food system indicators, and lastly economic and social system indicators (Anderson & Cook, 1988:147). Affordability of sufficient food to feed the household is an aspect that causes households to compromise on food security, resulting in hunger (Devereux & Waidler, 2017:3). In addition, the accessibility of sufficient food to meet household needs is influenced by indicators that measure adequacy of food consumption, namely food expenditure and dietary diversity (Devereux & Waidler, 2017:9).

The nutritional challenge experienced in SA is focused largely on access to enough food and the means to produce it (FAO, 2008). However, although the majority of rural households may have had access to land, it was reported that they lacked development skills to farm sustainably within their communities. In addition, lack of access to finance and agricultural participation is currently preventing South Africans from making better farming progress (du Toit, 2011:12). Food security is an increasing concern worldwide and therefore it is imperative to focus on components such as availability, accessibility and utilisation of resources (Megersa *et al.,* 2013:16) by

understanding the impact they have on food security. Having this information will ensure that researchers are able to recognise and analyse the status of households. Sustainability and accessibility of foods are equally important, therefore once sustainability is achieved, foods will be accessible at all times, thus ensuring food security. There have been developments in household food security, yet many households struggle to keep up with demands on their income. Figure 2.1 presents a theoretical framework to support the literature review on food security challenges income-earning households experience.

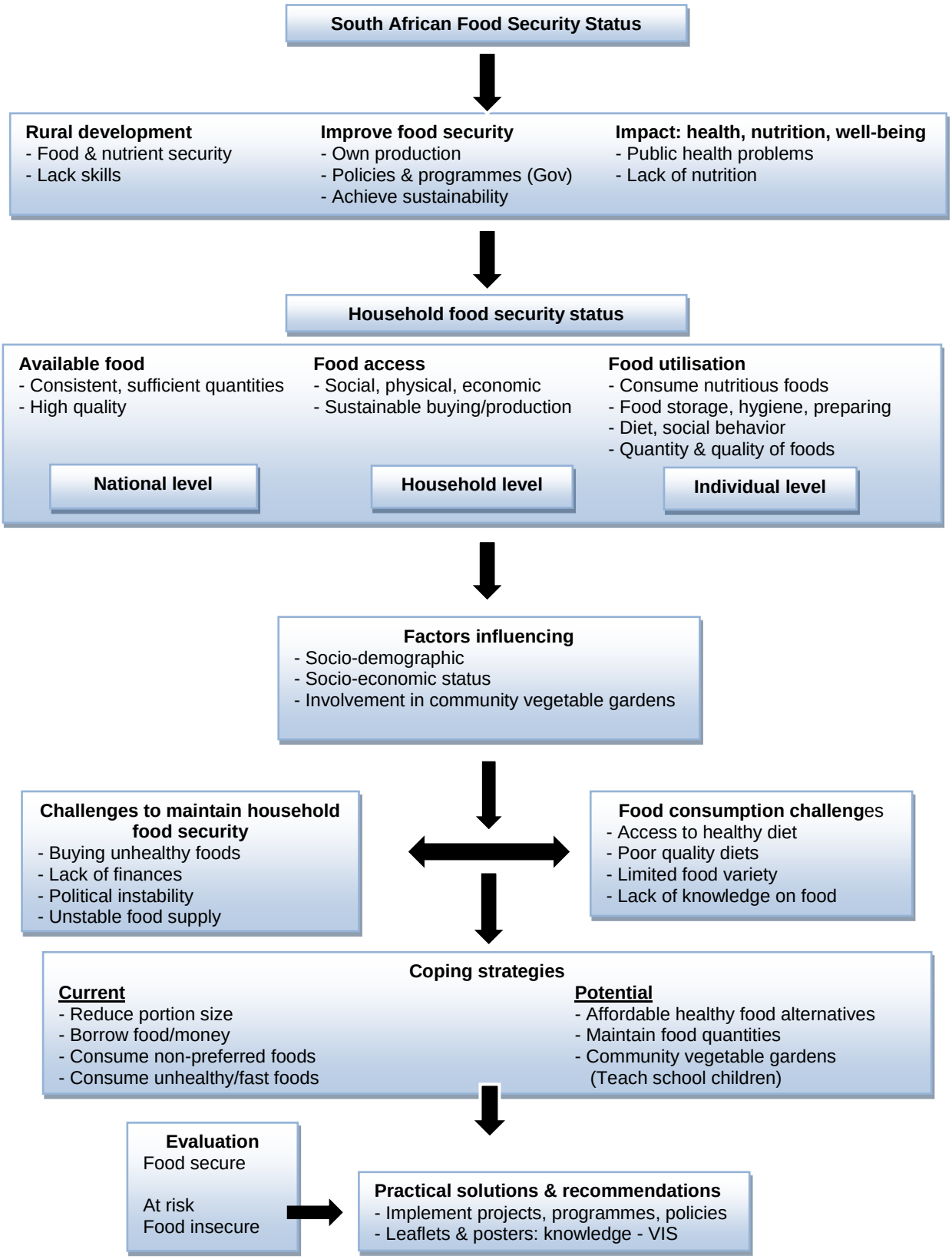


Figure 2.1: Theoretical framework to determine factors influencing food security within the VIS.

(adapted from Gross *et al.,* 2000:3 & Deitchler *et al*., 2011:2 & Leroy *et al*., 2015:170 & Renzaho & Mellor 2010:2)

2.4.1 Food availability

According to Du Toit (2011:2), having available food can be understood as the supply of consistent, adequate and sufficient quantities of high quality and diverse food available at a household level (FAO, 2015b; WCG, 2016:5). The importance of food availability refers to the total amount of food in an area at a specific time (Devereux & Waidler, 2017:2). Productivity and access to markets are intertwined and contribute both to accessibility and availability of food for households in agricultural farming areas, or other rural areas. An extreme example of food availability and accessibility is in Barana, Ethiopia, where 81% of households consume as little as one to three food items per week (Megersa *et al.,* 2013:20), instead of a variety of food items. Rural areas in SA experience a similar issue by having limited food access and utilisation opportunities.

2.4.2 Food accessibility

Social, physical and economic access to food is an important priority in food security research (Mjonono *et al.,* 2009:2; Msaki & Hendriks, 2014:195). Accessibility of foods addresses issues of consumer behaviour and purchasing power (Vasuthevan & Mthembu, 2016:324). Households need to be able to sustainably produce or purchase sufficient food for their household needs (Du Toit, 2011:2). Lack of access to basic resources for South African households, such as safe water, adequate sanitation and electricity, has hindered development and improvement (Vasuthevan & Mthembu, 2016:249). High unemployment rate, inadequate social welfare systems, high HIV/Aids prevalence, lack of access to finance, ineffective communication infrastructure, lack of education, skill and development facilities can affect access to food sources (Vasuthevan & Mthembu, 2016:324). Key indicators impacting on food's accessibility are prices, household income, expenditure and markets (WCG, 2016:5). Hence, if an individual or household has a high-income it is possible to purchase more food of a better quality (FAO, 2008:75). However, having adequate financial resources to buy a variety of foods is a concern, especially with increasing food prices (Cloete & Idsardi, 2012:3). Food prices and affordability of food should be economically accessible, while taking into consideration the influencing factors such as inflation, poverty and food prices (Devereux & Waidler, 2017:2). Access and availability of stores further influence accessibility of food in a community. Households' accessibility to foods relate to the type of stores they have access to, such as grocery stores or street vendors, as well as location of these stores. An individual should not have to travel too far for food, as this would affect its physical accessibility (Devereux & Waidler, 2017:2). The higher the level of access to food, the lower the poverty in the area; and as income grows, so food consumption patterns in a region will change (FAO, 2015b). Restricted access to food result in problems such as having to cut back on quantity, by reducing meal size or the number of meals and/or keeping to a monotonous diet or consuming undesirable

food. Severely inadequate access to food means running out of food, going to bed hungry or going a whole day and night without eating (WCG, 2016:1).

2.4.3 Food utilisation

Utilisation of foods involves the consumption of nutritious food, referring to storage, hygiene, feeding practices, preparation of foods, dietary diversity and social behaviours (WCG, 2016:5), determined by the health status of consumers, including amount and quality of diet (Devereux & Waidler, 2017:2). An adequate diet, sanitation and health care plays a vital role in food security and is achieved by a state of nutritional well-being and be grounded in knowledge of basic nutrition, and utilisation of food (Du Toit, 2011:2; FAO, 2006). Households need food to be sustainable by ensuring optimal and stable availability, accessibility and utilisation at all times (Devereux & Waidler, 2017:2; WCG, 2016:5).

2.5 Factors influencing household food security

There are various factors which influence household food security such as socio-demographic and socio-economic factors, and involvement in agricultural production that contribute to food utilisation.

2.5.1 Socio-demographic factors

Socio-demographic factors, namely age, gender, income (social-class), occupation, education, life stages, skills development, household size and personal food choices are all internal factors which contribute towards the level of food security in a household (Megersa *et al.,* 2013:20; Schiffman & Kanuk, 2014:53). Social class is based on the three objective variables, income, education and occupation (Schiffman & Wisenblit; 2015:57). Literacy and education are important factors in achieving optimal health and to enable people to make informed decisions regarding healthcare and lifestyle (Vasuthevan & Mthembu, 2016:8). Shariff and Khor (2008:30) stated that food insecurity has been shown to affect various dimensions of well-being, demonstrating that larger households are more food insecure, while households with a higher income are more food secure. Thus, available income, if utilised correctly, could serve as a starting point to improve food security status and so it would be beneficial to look at food needs, consumption behaviour and spending patterns of households in order to identify their needs. Household with a higher number of non-working members who are dependent on the breadwinner would be less likely to experience food security than households with a lower dependency ratio (Kimani-Murage *et al*., 2014:1103). Poorer South African households tend to include six or more members (Labadarios *et al*., 2011:896), which may have an effect on maintaining sustainability within the dimensions of

food security. However, in rural communities, high unemployment rates are prevalent and often women and children are not in a position to earn income, which could directly affect the food security status of households (Smith *et al.,* 2014:356). As indicated above, rural community member's face diverse challenges, often relating to their financial situation, which restrict them from providing sufficiently for their family (Grobler, 2013:1).

In a study by Sekhampu and Niyumbanira (2013:279) it was found that the head of a household's educational attainment and employment have a positive impact on household expenditure. Shariff and Khor (2008:26) mentioned that the level of education plays a role in affecting or restricting the food security status in a household in terms of the knowledge community members have regarding their food needs, the foods themselves and their utilisation. Possessing the knowledge and being educated about basic needs allow members of the community to better understand the concept of food security and its influence on their well-being (Grobler, 2013:9). A study carried out in rural SA in 2004 found that there was a positive association between the level of education and employment thus affecting income of working household members, which in turn promote household food security (Nawrotzki *et al.,* 2014:290). On the contrary, South Africans are not always equipped with sufficient knowledge or skills to support their family and applying correct coping strategies (Grobler, 2013:3). Grobler's findings show that individuals who are educated have a higher chance of being employed and therefore receive a higher income and in turn improve their living conditions and develop a better understanding of their food security status; however, improved food knowledge is also essential to enhance a household's food security status.This indicates that household food security is not solely income-related but rather dependent on a household's food consumption pattern.

2.5.3 Socio-economic status factors

Socio-economic factors namely communication infrastructure, food habits, spending and consumption patterns, have an effect on individual's dietary diversity and are more than likely a key indicator of household food insecurity(Du Toit, 2011:12, Shariff & Khor, 2008:26, Sithole, 2005:10). According to Kimani-Murage *et al*. (2014:1098), food and nutrition security is crucial for economic development due to the role of nutrition in healthy growth, human resources and capital development.

The majority of South African households lack the finances to purchase foods (IFSSSA, 2002:26). More specifically a decreased purchasing power in rural areas. Income is one of the main causes of food insecurity, and certain groups at a household level are thus more at risk than others, such as large families, single breadwinners and elderly people. According to Nawrotzki *et al.* (2014:293), having a higher percentage of working household members could improve food

security because a larger amount of combined income will be available. When people do not have the income to buy the correct foods, they tend to buy what they can afford. Often these foods are imbalanced, and could include foods high in energy and low in good nutrients, thus causing obesity (Corrigan, 2011:1232). In a study performed by Ghattas *et al.* (2013:1669) it was mentioned that food insecurity may decrease if the number of income earners in a household increased.

Household monthly income, weekly expenditure on food and employment status are socio-economic factors which have an effect on household food security (Drimie & McLachlan, 2013:220). Vulnerable groups, such as rural households, are at greater risk of experiencing food insecurity due to economic factors, for example, the unemployment rate, which play a role in determining access to food (WCG, 2016:2). In rural communities, high unemployment rates are prevalent and women and children are often not in an income-earning position which could directly affect the food security status of households (Smith *et al.,* 2014:356). Therefore women residing in households who struggle with a decent income find difficulty in purchasing enough food to feed the household (Labadarios *et al*., 2011:895). In a study by Sekhampu and Niyumbanira (2013:279) it was found that the educational attainment and employment of the head of the household had a positive impact on its expenditure.

Nawrotzki *et al.* (2014:292) reported that the social grant system in SA, as an external factor positively supported household food security status, however households that relied on social grants were food insecure, which is an indication of the demand on the households' income. Between 2004 and 2010, food security improved amongst households receiving child grants, but households that do not receive child grants also showed progression in their food security status (Nawrotzki *et al.,* 2014:290;292). Therefore, receiving child grants did not necessarily have a significant impact on improved food security status. As a short-term solution, social grants in SA have assisted with household income, but long-term coping strategies, such as improved employment opportunities, education and empowerment of women, are essential for positive change in food security (Naicker *et al*., 2015:270).

2.5.4 Involvement in agricultural production: Vegetable gardens and livestock

In 2009, a study suggested that small-scale agricultural activities could be a contributor to food security in SA. Furthermore, the current situation would benefit from further exploration of household agricultural activities (Altman *et al.,* 2009:7,18). Food insecurity is an ongoing problem, with 26% of the South African population experiencing hunger (Pereira & Drimie, 2016:20). Small-scale agricultural activities have a significant positive effect on the livelihoods of the poor in developing countries by increasing food income and availability (FAO, 2015a:26). Agriculture

plays an important role in relieving poverty by reducing food prices and creating employment, which in turn enhances income and wages through agricultural production (Vasuthevan & Mthembu, 2016:325). The benefit of small-scale agricultural activities is a source of economic empowerment which offers a livelihood to a variety of people, and provides food security and a source of dietary diversity in rural areas (Pereira, 2014:38).

2.5.4.1 Food production

Nawrotzki *et al.* (2014:293) observed a remarkable increase in food security between 2004 and 2010, but noted a negative effect in 2008 due to the global food crisis. However, food-insecure households managed to compensate and improve their food security during the time of the crisis by relying on natural resources and local food production. In the agricultural sector, food production plays an important role in economic activity as a source of exports and job creation (WCG, 2016:4). The negative relationship between food insecurity and household food production supports the hypothesis that food production may play a role in protecting against food insecurity (Ghattas *et al*., 2013:1669). A study by Megersa *et al.* (2013:6) focused mainly on livestock in Barana, Ethiopia, but it showed that the diversification of livestock farming was significantly connected to the improvement of household food security. It can therefore be assumed that households involved in a variety of food production and livestock practices are more prone to make additional contributions to food resources, and during times of food crisis would rely on natural resources and local food production (Nawrotzki *et al*., 2014:293).

2.5.4.2 Environmental factors

Environmental factors include harsh weather conditions such as drought and low rainfall, particularly associated with the Northern Cape region influence availability and access to fresh produce, and affect households of poorer rural communities, who rely on farming and livestock as a source of food (Devereux & Maxwell, 2001:67). Planting crops to accord with the rainy season will increase optimal growth of vegetable gardens, however households should have access to information regarding climate and rainfall (Ofoegbu *et al*., 2016:42). Furthermore, planting drought-resistant crops such as watermelons is advisable in order to cope during seasons when drought is experienced and can facilitate household livelihood flexibility (Ofoegbu *et al*., 2016:43). The reuse and conservation of water in areas that experience poor water supply would help households to improve efficiency of water use (Ofoegbu *et al*., 2016:43). Reusing water after cooking and cleaning for watering gardens will benefit the community. Accordingly, promoting this strategy as a regular practice might be useful in the VIS community.

2.5.4.3 Agricultural activities and sustainability in rural area

Food insecurity in Southern Africa has been conceptualised as a rural development problem because a large percentage of households is food and nutrient insecure (Cloete & Idsardi, 2012:3, 6), due to inadequate and unsustainable food and nutrition (Batterby, 2012:141). Promoting sustainable livelihoods would create a means to access affordable, quality foods for rural households (Altman *et al.,* 2009:5), and enable the members to take responsibility for their own health and well-being. Household food insecurity in SA is compromised by a lack of agricultural activity (Kirsten & Moldenhauer, 2006), hence suggestions to improve or overcome rural food insecurities should include participation in sustainable small-scale vegetable gardens at household level (Batterby, 2012:143). Agricultural sector growth can effectively reduce poverty by providing communities and households with farming produce, compared to non-agricultural areas which do not take part in farming activities (FAO, 2015a:28). In a study by van Wyk (2014:71) it was found that many households did not engage in self-production activities due to limited space. A previous study in rural KwaZulu-Natal, SA, found that households which were less involved in agricultural activities used destructive coping strategies to support their household needs, including selling their personal belongings (Shisanya & Hendriks, 2011:511). Destructive coping strategies should be replaced with constructive coping strategies to support improved rural food security.

The contribution of small-scale agricultural activities to food and nutrition security will be a success if productivity of agricultural resources is improved through strengthened sustainability, thus increasing food availability (FAO, 2015a:31). Focus can be given to small-scale vegetable gardens with the availability of resources and involvement of community members to provide sustenance to rural households and to improve food and nutrition status and security (Adekunle, 2013:67; Altman *et al.,* 2009:17). Evidence suggests that the preservation of smallholder farming and household agricultural activities play a vital role in sustaining food security and overcoming unstable working environments (Ghattas *et al.,* 2013:1669) while increased community productivity can sustain general growth. Moreover, besides reducing the staple food prices, accessibility to foods at a household level will be improved (FAO, 2015a:31). Modernisation of smallholder farming and household agriculture with its integration into the fast-growing agribusiness chains can produce quality products that meet the rapidly evolving urban demand, particularly to enhanced quality, convenience and safety of foods if correctly addressed (FAO; 2015b:17).

In rural Pakistan, local smallholder agricultural production suffered from constraints such as a lack of irrigation water, low market access and high cost of fertilisers; this could equally apply to rural communities in SA, specifically VIS. However a strong motivation for government policies and

programmes to be drawn up could possibly work to alleviate these challenges by providing an improved food-secure area (Amir *et al*., 2013:509). The focus on food security in communities should be on sustainable agriculture, rural development and sustainable development (Anderson & Cook, 1988:147), which entails meeting the basic needs of people without compromising the same opportunity for future generations, and can be successful with the integration of social, economic and environmental factors (Vasuthevan & Mthembu, 2016:243). If households have their own vegetable gardens or livestock it will promote self-sufficiency, personal responsibility and ultimately maximise their food and nutrition security status (Sheriff, 2012:1).

2.6 Maintaining household food security: challenges experienced

The consumption patterns of people who do not have access to a healthy diet, an escalating number of poor households who depend on buying more affordable, highly processed food, and the instability of prices in the market are a source of concern for public health in South Africa (Pereira & Drimie, 2016:21). Rural community members face various challenges, often relating to financial circumstances which prevent them from providing sufficiently for their family (Grobler, 2013:1). Access to food is not only linked to income, but rather to the pricing structure of the food system. Studies showed that a monthly income of approximately R5 630 would suffice for consumption of a “balanced daily food plate” for an average family (WCG, 2016:12). Household food security is not solely income-related but it is also dependent on food consumption patterns, although available income could serve as a starting point to improve food security status if utilised correctly. According to Sheriff (2012:8), there are several reasons for poor food security. This study will provide detailed quantitative and qualitative data from income-earning households within the VIS to understand reasons for various levels of food security status, investigation of participant’s income, food consumption patterns, current coping strategies and food choice challenges.

2.7 Food consumption challenges

According to Boyle and Holben (2013:326) there are differentiating factors affecting the consumption and use of food which contribute to the challenges of income-earning households. 1) quantity, which is the amount of food available to the consumer; 2) quality, the standard of foods produced including nutritional value; 3) suitability, the appropriate environmental aspects and appropriate foods according to cultural values, for example, in rural communities. These three are external factors because the consumer does not have control over them (Boyle & Holben 2013:114). There is one internal factor affecting food consumption challenges, namely, psychological, which is determined by the consumer’s mindset or process towards certain foods and how they choose to use these foods (Boyle & Holben 2013:121).

The food items a household consumes depends on external factors, as well as internal factors such as food choices made when purchasing and preparing food items. Political instability, poor economic development, inequality, conflict and certain aspects of globalisation are factors which contribute to poor-quality diets and poor-quality health which result in malnutrition (IFPRI, 2016:1). South African households are suffering from hunger and malnutrition which stem from external, economic factors, such as insufficient, unstable food supplies (IFSSSA, 2002:24), which directly affect household food security. Furthermore, attention should be paid during food purchases and preparation of meals to ensure that nutritious foods in correct quantities from all food groups are consumed. These food groups include starch, animal/plant proteins, fruits/vegetables, dairy products and energy-dense foods. The importance of consuming the correct amount from all five food groups (fruits and vegetables, cereals and grains, dairy, meat and meat alternatives, fats and sugars) will ensure a balanced diet (Kennedy *et al*., 2013:25). A healthy diet needs to include a large portion of staple foods beneficial for energy needs and a healthy lifestyle which makes up the dominant portion of a standard meal. However, the lack of access, availability and knowledge of a variety of foods can lead to the over-consumption of a staple food or under-consumption of other foods, thus resulting in malnutrition. This often occurs in rural households where the over-consumption of starch, such as maize meal occurs. According to Steyn and Ochse (2013:S13), a diet which lacks a variety of foods affects a consumer's nutrient intake and therefore increases the incidence of malnutrition. Poorer households are those classified as having few income earners, together with many dependent's (IFSSSA, 2002:25), often reliant on social security grants and therefore often vulnerable to food insecurity. South Africa is experiencing a worrying change, whereby stunting and under-nutrition in young children is occurring together with increased levels of obesity and overweight in older children and adults (WCG, 2016:1). The possibility of ending malnutrition goes hand in hand with development obligations such as healthier and more sustainable food systems and assisting businesses to become more supportive of sustainable development (IFPRI, 2016:3). According to FAO (2015a:27), economic growth is essential for alleviating poverty and reducing hunger and malnutrition. Additionally, growth is critical for sustainable employment and income, especially in lower income countries and therefore evident that food consumption patterns will depend on social, cultural and religious needs for food. Furthermore, habit, knowledge, finances and time available will depend on what foods are consumed (FAO, 2015a:27).

2.8 Coping strategies for households

A study carried out on small land farmers in Northern Pakistan suggested a coping strategy for these households to purchase less expensive foods, while maintaining the same quantities consumed, and which could help to manage their income as well as ensure sufficient food is consumed daily (Amir *et al*., 2013:507). This coping strategy can similarly serve as a guide for

South African rural farming households to improve their spending patterns and food security situation.

Bedouins who participated in food production practices in rural Lebanon, such as livestock herding and crop production, have been associated with an improved nutritional status, resulting in a more diverse diet (Ghattas *et al*., 2013:1670). These food production activites could have a similar positive effect on households in rural areas of Northern Cape, such as the focus area of this study, the VIS. Consequently, implementing small-scale agricultural activities could serve great significance for improved food security.

The study by Ofoegbu *et al*. (2016) found that rainwater harvesting was a current successful coping mechanism in rural Nigeria, and can easily be implemented in any rural community, such as the VIS, to collect water for cleaning, cooking or for vegetable gardens. This practice can equally well serve as a beneficial strategy in rural communities, such as Vaalharts, to ensure effectiveness and maintain sustainability if the appropriate storage tanks or a more affordable, large storage container for households could be used. This strategy can be applied not only to grow vegetable gardens but to provide the household with a water supply for cooking and cleaning. According to the study by Amir *et al*. (2013:508) small landholders who grew vegetables showed a trend of high economic returns, which reflects an appropriate and successful coping strategy, and can similarly be implemented in the VIS for small-scale agriculture. The households that consumed their own produce saved money and gained monetary incentives to enable them to purchase more food items from the local supermarket (Amir *et al*., 2013:509).

As suggested in a study by Musemwa *et al*. (2013:90) in the Eastern Cape Province, a potentially beneficial coping strategy which could be employed in the Northern Cape to enhance access to sufficient foods would be for policy makers in the agricultural sector, together with the education department, to design a curriculum that teaches children at a primary level about land use and small-scale farming, so that they possess the basic agricultural knowledge needed to assist with their food security status. In addition, it is important to ensure sustainability in agriculture activities in terms of productivity and for future generations (Musemwa *et al*., 2013:90). The knowledge and promotion of nutritious foods to community members will enable them to understand which food items are essential for consumption, as well as being valuable for increasing production activities of nutritious foods while supporting sustainability of foods and eliminating food waste (Hwalla *et al.,* 2016:171).

2.9 Practical solutions and recommendations to address household food security

An understanding of food security is useful for monitoring aspects of a household's well-being and for the design, implementation and evaluation of projects, programmes and policies. Research is important for South African rural communities in which household food insecurity is a reality (Pinstrup-Anderson, 2009:3). Food economy at a household level has instability concerns due to resource depletion and inadequate control of the food system, therefore there is a desperate need for vital redesign of how food is produced, processed, distributed, accessed and utilised (WCG, 2016:4). Parliament endorsed the National Development Plan, which addresses food security but focuses on more than agriculture by making recommendations to expand rural infrastructure development to ensure all entitled households have access to social grants, and by implementing measures for providing access to nutritional services, specifically for vulnerable groups such as elderly and chronically ill (Drimie & McLachlan, 2013:221).

If households have access to available knowledge of climate changes, such as heavy rainfalls, it will be possible to react or minimise their impact and effect on households' livelihood opportunities (Ofoegbu *et al*., 2016:39,40), such as those who manage vegetables gardens. Short-term coping strategies to decrease food insecurity include diversification of options for obtaining food, borrowing or saving money, increasing production activities, moving to places that offer better opportunities and adapting their behaviour or changing their diet (WCG, 2016:6). If households focus on short-term coping strategies, their long-term food security status will be less vulnerable. Households should utilise land for community vegetable gardens, support local stores or improve their knowledge of food expenditure. Migration to an urban area, such as Jan Kempdorp, in search of improved employment opportunities can serve as a long-term coping strategy and promote socio-economic development (Ofoegbu *et al*., 2016:41). It could be helpful to approach The Consumer Education Project of South Africa to provide the community with food charts describing the various food types and their nutritional value, including simple and nutritious recipes for the households to utilise.

2.10 Summary

Food and nutrition insecurity has affected countries globally, specifically in developing countries. Since 1996, food security served as a driving force initiated by the UN and much has been reported about the achievements of the MDG's. These goals aimed at eradicating hunger and poverty amongst several other broader food security and nutrition goals, globally. This has been achieved at a national level in South Africa, but the literature revealed that several households did not have access to adequate consistent food supplies. Food security entails the provision of adequate access to sufficient, safe and nutritious foods on a daily basis, to meet dietary needs

and to maintain an active and healthy life. Sustainable availability, accessibility and utilisation of foods are dimensions which are examined and addressed in a country to ensure a food-secure nation, and must be part of successful food and nutrition security policies and programmes to decrease hunger at a household level. Understanding the importance of the impact of food security and the requirements for reaching food and nutrition security targets will ensure good nutritional results. There has been substantial development in fighting hunger over the past 10 years, taking into consideration the global environmental challenges: unpredictable commodity prices, increased food prices, rising unemployment, global recessions and unpredictable weather changes. A combination of the different food security and nutrition policies and programmes is required over time to have an effective impact on food security, hunger and malnutrition in SSA, and specifically in Southern Africa, to provide support to the food security status down to household level. Literature showed that communication infrastructure, food habits, and spending and consumption patterns have an effect on an individual's dietary diversity and affect household food security while re-instatement of self-production activities will further enhance food access.

Food security has improved for a large number of South Africans but micronutrient deficiencies, in children specifically, is still prevalent. Increased levels of obesity, and overweight in older children and adults that can be related to incorrect food consumption patterns is an emerging public health concern. Thus, despite the decrease in food insecurity in South Africa, under- and malnourishment remain a concern, specifically in rural communities. The main aspects influencing household food security relating to this study include socio-demographic factors, food accessibility, socio-economic status and agricultural activities. Literature revealed that poorer households are frequently classified as low- or single-income contributing households with many dependants and are often reliant on social security grants. It is these households that are vulnerable to food insecurity. More than one income contributor to support the household allows for an increased amount of money available to feed the family; this was also highlighted in this study. Consumption and utilisation of food is further influenced by a basic knowledge of food and related aspects. Those who possess a higher level of education were often in a position to make better-informed food decisions. Furthermore, households with a larger family size face challenges such as not having enough food to feed the family for the entire month, due to a limited amount of money to buy food. Household members tend to buy affordable foods from street vendors and spaza shops due to easy accessibility and convenience. These foods are often energy dense, unhealthy and tasty, but cost the household more money in the long run and raise health-related concerns. Socio-economic status factors such as food habits affect household food security in the VIS. Familiarity with foods during purchasing and preparing meals prevent households from consuming other healthy and affordable foods because of limited knowledge of unfamiliar foods. The absence of small-scale agricultural activities and livestock for household purposes prevents the improvement of sustainability in the community. However, there was a strong interest in these

areas to obtain knowledge so that sustainability within households could progress. It was important to identify the food needs and consumption behaviour of households in the VIS community in order to understand the current situation and to develop educational material based on the main aspects influencing their household food security status. Households following a diet which is affordable, healthy and environmentally sustainable will improve their food security status. Although it has been recorded that achieving national food security in SA is imminent with ample improvement made since 1996, many households are still not able to meet their food needs by relying on their income alone and regularly depend on monotonous diets to meet basic food needs. It can thus be concluded that inadequate variety and limited quantities of foods impact negatively on the true definition of household food security. Therefore the relevance of this study is to gain insight into income-earning households' challenges and coping strategies that contributes strongly to the goal of achieving improved availability, accessibility, utilisation and sustainability of foods to maintain consistent household food and nutrition security.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The study's methodology process is described in this chapter, referring to information regarding the research process, study population, sampling, data collection, data analysis and ethical aspects. A mixed methods research approach also known as convergent design, was used to collect data from income-earning participants from the Vaalharts community. The need to address food security within this community was supported by a previous study undertaken by van Wyk (2014:72), which noted that a large group of income-earning employees experienced a food security risk. This chapter provides information on the methodology followed to achieve the objectives of the study.

3.2 Research design

A convergent mixed methods design was employed, it was divided into two phases of collecting data. Phase 1 and Phase 2 of the study were conducted with 87 and 46 participants respectively (Figure 3.1). The two phases served equal importance during data collection and data analysis (Creswell & Clark, 2011:71). Most of the respondents preferred to continue with phase 2 directly after phase 1 due to work constraints. This meant that all data collection was completed during the same session. There was however a short interval between the two phases, where the researcher was able to evaluate and analyse each questionnaire to categorise respondents accordingly (food secure, at risk, food insecure). There were participants who had more time available and therefore were able to follow the convergent design process for phase 1 and 2 respectively.

During phase 1, respondents were identified as food secure, at risk or food insecure, which was made possible by identifying both '*yes'* and '*no'* responses, as well as a scale of answers, ranging from a low to a high scale from the questionnaire (Section B: Food Security Section), which grouped respondents into food secure, food insecure and those at a food security risk, to prepare them for phase 2. Respondents from all three groups participated in phase 2, however, at risk and insecure respondents required the most attention. More detail regarding the participation from all three food security groups can be found in 3.7. The five base questions in phase 2 included a total of 11 probing questions which assisted the participants' with responses to allow the researcher sufficient information regarding their specific food security needs. Probing questions lead to more specific insights with the aim of obtaining lengthy and detailed information from the participants. The researcher completed field notes during phase 2 which related to questions from phase 1. This activity produced rich data connecting both phases effectively from beginning to

end. Thorough conclusions were able to be drawn from each participant. The sections from phase 1 which were included in this activity were *Food Utilisation and Consumption - Section A, Question 2, Food Security Status - Section B, Question 4 and Monthly Food and Household Expenditure - Section C, Question 9.*

It was important that the researcher logically dealt with the food security situation by studying participants' views in a quantitative and qualitative phase respectively (Creswell, 2014:8). Phase 1 used an interviewer-administered questionnaire to collect quantitative data from respondents who needed assistance with understanding particular questions. The relationship between numerous dependent variables was explored in the questionnaire (Creswell, 2014:274). The independent demographic variables had a potential influence on the dependent variables and statistical procedures were used (Creswell, 2014:85). The demographic variables considered in the study were gender, age, home language, level of education and household income (Creswell, 2014:217; Fouché & Delport, 2011:64). The researcher gained insight into the study population by exploring data qualitatively during phase 2 by means of an interviewer-administered face-to-face interview to explore household food security needs. Questions in the interviews included food consumption decisions, buying behaviour and daily problems with the use of foods.

3.3 Methodological framework

The study population, environment, research design, food security status groups and methods of data analysis can be seen in Figure 3.1.

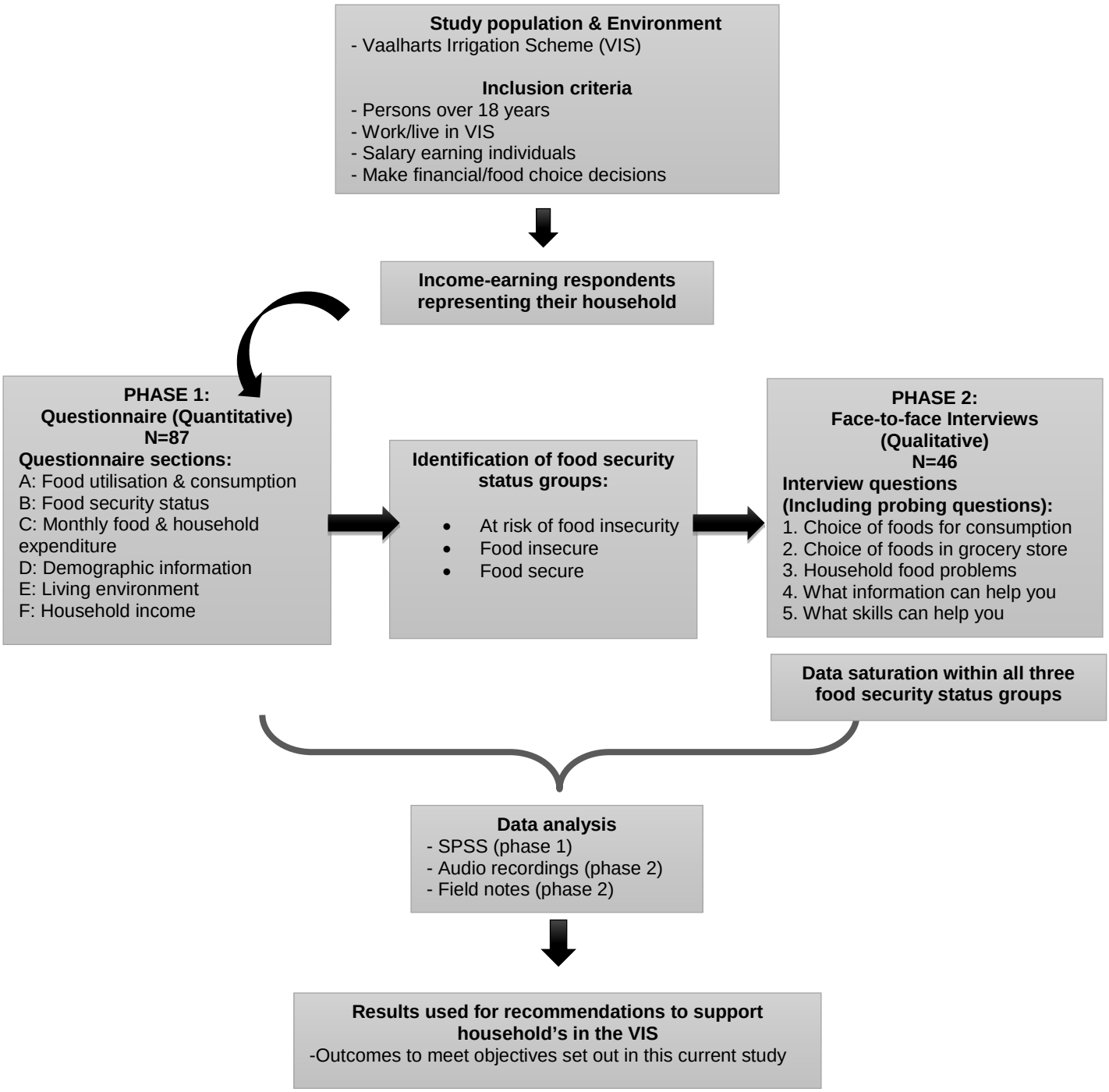


Figure 3.1: Methodological framework for the food security study in the VIS.

3.4 Study population and environment

This study forms part of an umbrella project called The Water Innovation Network (WIN), combining 13 sub-projects of different health science disciplines with a strong emphasis on building inter-sectorial partnerships to holistically improve rural health and well-being (NWU, 2018). Furthermore, WIN is a community project in the VIS which focusses on empowering and improving these resource-poor communities by employing research activities to address key aspects of rural health and well-being within food and nutrition security.

The VIS forms part of the Vaalharts region in rural Northern Cape (Maisela, 2007:4) and is one of the largest water schemes in South Africa. The VIS covers an area of 29 181ha, and is approximately 110km from Kimberley in the Northern Cape and 285km from Potchefstroom in the North West Province. It is situated in a valley between the Moroccan ridges (east) and the Ghaapseberg (west) (Maisela, 2007:28), where the Harts and Vaal rivers meet. The Phokwane municipality covers an area of 82 077ha and is made up of three main towns, Hartswater, Jan Kempdorp and Pampierstad. Other communities in the area are Sekhing, Ganspan, Valspan and Taung. A canal system runs through the Vaalharts municipality and serves as the main water contributor to the irrigation system for the farmers in the area (Kriel, 2014:139, Maisela, 2007:27). This system also provides irrigation water for household consumption and livestock. At the VIS, food production consists of good quality agricultural products such as wheat, peanuts, fruit, maize and cotton (Maisela, 2007:26). This allows room for potential value-added community farming activities. A study by Maisela (2007:4) showed that production on the land at the VIS is very low compared with other farms in the local surrounding areas, due to limited skills and knowledge, as well as a lack of money. The scheme consists of prime commercial farming, which can be beneficial from a knowledge perspective, for community farming activities.

3.4.1 Gaining entry to the community

The two gatekeepers involved in the study, who are both local residents from the VIS community, introduced the study to the employees by distributing advertisements and pamphlets (Appendix E), as well as by verbal communication to the employees to promote awareness of the study. This process established interest in participation, however, the inclusion criteria had to be met by all prospective participants. The inclusion criteria for the study population consisted of individuals over the age of 18 years, work and live in the VIS, earn a salary, and those who make financial and/or food choice decisions on behalf of their household. Potential participants who met the inclusion criteria of this study were eligible to take part in the study. Participants who volunteered to participant represented their household, as well as the VIS community (Vaalharts Water, water management services, Jan Kempdorp). The recruitment process took place at the Vaalharts

Water Offices within a two-week period prior to the commencement of data collection. The employees' work schedule had to be taken into consideration at all times to encourage successful involvement. Data collection took place between 07h00 and 09h00 and later in the day, from 14h00 to 15h30. Employees who were able to participate during hours other than the specified times, contributed to effective data collection. Data for both phase 1 and 2 were gathered in a neutral environment at the Vaalharts Water offices in a meeting room which had good natural light and comfortable seating. To promote effective data collection, participants had to be relaxed and feel at ease in the environment, with minimal disruption to their normal working day (Parasuraman *et al.,* 2007:94). Transport was not required for the participants.

3.5 Sampling

A sampling plan serves to define the appropriate target population, identifying the participants and determining the correct size of the sample (Hair *et al.,* 2006:65). The selection of an appropriate sample presented rich, valuable data to the study and ensured that significant features and elements of the population were represented in the sample (Blaikie, 2003:161,162).

In Phase 1 of the study, a purposive sampling method was used to select a variety of the population so that participants from the different allocated groups (Trochim & Donnelly, 2006:51), namely food secure, insecure and participants at risk are included in data collection. This sampling method is useful in exploratory research as it is based on subjective judgement, for which the researcher had background information on the population sample and shared a mutual set of characteristics (Strydom, 2011b:232). The background information and common need amongst these employees was determined in a previous study, which indicated a food security need. There were 162 employees at the VIS, of which 87 were available for research and therefore participated in the current study. A previous study by van Wyk (2014:37) provided information which supported the population sample of this study and which indicated a need to support households by focusing on the challenges of household food consumption and utilisation.

Phase 2 consisted only of participants recruited from the first phase and further utilised purposive sampling, namely critical case sampling (Yin, 2011:7, 8). This sampling method assisted with logical instead of statistical generalisations, in which a smaller group of participants were selected to take part (Palys, 2008:698). The advantage of this method was to study the meaning of consumers' lives (Yin, 2011:7, 8) and to explore their food security needs and challenges. The researcher ensured that respondents from all three food security status groups participated in phase 2, as explained in the research design, which would support rich, quality data.

In an article by Fusch (2014:1409), the concept of data saturation was discussed by Bernard in 2012, who said that the number of interviews required for a qualitative study to reach data saturation was a number he could not quantify. It was crucial, however, to make use of the same set of questions for all participants to ensure successful data saturation. During this study, data saturation occurred at number 49. The point at which data saturation is reached occurs when the ability to obtain additional new information has been achieved, and when there is sufficient information to replicate the study (Fusch *et al*., 2015:1408). Data saturation prevents the redundancy or duplication of data (Marshall *et al*., 2013:11). According to Galvin (2014:4), when no new information emerges during the interviews, but rather a repetition of information begins to occur, this may be the point of data saturation. The use of probing questions during the interviews assisted the researcher to reach data saturation successfully. Therefore reaching optimal data saturation reflects a study with high quality (Marshall *et al*., 2013:14). During the interviews it was safe to mark the point of data saturation when the repetition of information was identified within food secure, food insecure and at risk groups, however specific focus was placed on the food insecure and at risk groups to identify their problem areas.

3.6 Development of the measuring instrument

This current study used a standardised household food security questionnaire, in phase 1, which had been tested and used in previous studies at the North-West University (NWU). The questionnaire was adjusted and adapted specifically to suit the nature of this study, by only making use of certain sections. Adjustments were made by the researcher who removed parts not relevant to this study, and was verified by Consumer Science specialists at NWU. The questionnaires were designed by Hillers *et al*. (2002); Labadarios *et al.* (2009); Maunder (2000); Mofokeng (2013); Radimer *et al.* (1990) and Whati *et al*. (2005). It was necessary to test the questionnaire for reliability and effectiveness by conducting a pre-test with two consumers with similar characteristics to that of the study's respondents. These consumers did not reside in the VIS. The outcome of the pre-test was successful and showed that the average duration per questionnaire ranged between 20 and 30 minutes.

Data were collected on household food utilisation and consumption (Section A), and to determine the household food security status (Section B). It was important to understand how much money was spent on food on a monthly basis, taking into consideration the income earned (Sections C and F). The questionnaire further explored the demographics and living environment of the population (Sections D and E) such as gender, level of education and household food eating choices to form a basis for the study population.

The questionnaire was structured with fixed answers, which were chosen from a specific selection in the questionnaire. The selection of responses included scales. For example, a question asking '*How often do you consume bread?'* would offer a scale of answers from '*Never/Very seldom'* as the lowest scale, through to the highest scale of '*More than once a week'* (Question 2, Appendix A). The questionnaire also included multiple choice, biographical and closed questions. Closed questions would, for example, require the respondent to answer '*yes'* or '*no'* to a question such as *'Does your household ever run out of money to buy food?'* (Question 4, Appendix A). Owing to the nature of the study and interaction with less literate respondents, fixed answers and closed questions were considered to be the most appropriate methods to collect data. Ethical aspects were closely monitored to ensure that the researcher was able to accurately measure what was required (Maree & Van der Westhuizen, 2010:37). The field assistant patiently supported each respondent, specifically those who had difficulty understanding all the questions (Delport & Roestenburg, 2011:186).

3.6.1 Language, understanding and translation of questions

The Northern Cape has four official languages, namely Afrikaans, Setswana, Xhosa and English. However the most commonly spoken languages in the VIS are Setswana, Afrikaans and English. The questionnaire and interviews were available both in English and Afrikaans; and the field assistant supported Setswana participants by explaining the meaning of questions if they did not clearly understand what was being asked. The researcher was fluent in English and Afrikaans which ensured quality translations. In addition, the field assistant has previous experience in the ongoing WIN project at the VIS, and therefore AUTHeR provided the field assistant for the current study, to assist with translations for Setswana participants. Each question was developed according to a comprehensible level of language which was evaluated by the Flesch-Kincaid readability test. Moreover, translations were verified by using audio recordings during data analysis. The field assistant is also a resident of the VIS community and her role was to assist the researcher during data collection.

3.7 Data collection

Data was collected in two phases. The first phase consisted of an interviewer-administered questionnaire with fixed response questions while the second phase was made up of face-to-face interviews regarding participant's food security needs. Data collection took place at a convenient time for the participants over a ten-day period in September 2016 at the VIS premises. Respondents' comfort was taken into consideration and care was taken to ensure that their day-to-day routine was not disrupted (Fouché & De Vos, 2011:119). Data collection assisted in estimating a sample size which required concrete guidelines (Marshall *et al*., 2013:11).

3.7.1 Phase 1: Household food security questionnaire

The household food security questionnaire (Appendix A) consisted of the following sections:

Section A: Food utilisation and consumption
Section B: Food security status
Section C: Monthly food and household expenditure
Section D: Demographic information
Section E: Living environment
Section F: Household income

Section B of the questionnaire: Food Security Status, respondents were grouped according to their food security status group. Based on questions 4.1 – 4.9, mostly '*yes*' responses indicated a food insecure group, those with mostly '*no*' responses indicated a food secure group, and lastly responses of '*yes*' and '*no*' to these questions indicated a group at risk. Furthermore, at questions 5.1 – 5.6, respondents who answered mostly '*Every day*' and '*More than 4 days/week"* were grouped as food insecure, those who answered '*Never/Very seldom*' and '*1-2 days/month'* were grouped as food secure, and those respondents who answered '*1 day/week*' and '*2-4 days/week*' were at risk of becoming food insecure. At Section F: Household Income, the researcher was able to group respondents according to low-, middle- and high-income earning groups. The data collection strategy described above confirmed that it would be beneficial to conduct interviews in phase 2 which focused on all three (3) food security status groups, namely, food insecure and secure households, and those at a food security risk, to meet the objectives of the study.

3.7.2 Phase 2: face-to-face interviews

The qualitative data gathering method which formed Phase 2 of the study was presented as face-to-face interviews (Appendix B) which contained five semi-structured, pre-determined questions with a total of 11 probing questions to assist participants who found it difficult to answer the questions comfortably as well as to ensure sufficient information from each participant. The researcher and specialists in Consumer Sciences (NWU) formulated the face-to-face interview questions for the study. Greeff (2011:352, 359) stated that using face-to-face interview questions makes it possible to obtain information on opinions, views, attitudes and beliefs of participants regarding a certain phenomenon, by guiding answers instead of dictating. The questions in the interview schedule followed a logical sequence, including an opening, body and a closing section, which allowed for flexibility (Greeff, 2011:348,352). The questions were based on the study objectives and exploration of personal needs (Fouché & Delport, 2011:347), specifically participants' household food security needs (Greeff, 2011:352). These included participants' food

consumption decisions, behaviour and daily difficulties with foods. Noting the participants' body language and behaviour during the interviews formed a vital part of remembering and exploring the interview process (Greeff, 2011:359). Audio recordings were listened to for clarification of written data. Data collection continued until the desired information had been obtained and data saturation reached. No further recruitment of participants was required. The interview questions were tested prior to data collection to measure the effectiveness and duration of the interviews. Results showed that the interview lasted approximately 16 to 30 minutes.

3.8 Data analysis

Quantitative (Phase 1)

The questionnaires were coded, and data were entered into SPSS (2017) (Statistical Package for the Social Sciences, version 24). The researcher consulted with the Statistics Consultation Services of the North-West University (SCS, NWU), Potchefstroom Campus, during data analysis. Data were organised statistically and analysed for interpretation and to find meaning in the information so that conclusions could be drawn (Fouché & Bartley, 2011:249).

Respondents' demographic information was determined by using frequencies and percentages. Pearson Chi-Square tests were used to find the differences in food secure, food insecure and at risk respondents regarding various food-related aspects. P-values were used to describe the statistical significance, where P-values lower than 0.05 ($p<0.05$) indicate that two variables differ statistically significant. Symmetrical measures were determined by using cross-tabulations to indicate significant relationships between variables and illustrated by using the Cramer's-V test to describe the strength of a relationship between two variables, which shows a medium effect or tendency when 0.3, and only practically significant when 0.5. Correlations were used to describe strength and direction, of the relationship between two variables. The use of cross-tabulations demonstrated the relationship between household food security status and income. Descriptive and association analysis methods were used, and nominal variables and ordinal values were observed. Nominal variables are those categorised into a group according to subject, for example, gender or marital status and ordinal values have ranks (Fouché & Bartley, 2011:249, 50) from high to low, which could include a question such as '*How many times a day do you eat*?'. The ratio scale was also used as a measuring tool when analysing age, salary and number of dependants. In addition, methods of association could play an important role in discovering whether one variable was associated or connected to another variable, such as the comparison or association between food security status and consumption expenditure. This method will involve percentages and values, for example, consumption to earnings ratio (Fouché & Bartley, 2011:251).

In Section B of the questionnaire, food security status was analysed and grouped using Cronbach's alpha coefficient to guarantee the level of internal consistency and reliability of food security questions. The degree of food insecurity was calculated by using the number of affirmative answers given by respondents. Cronbach's alpha provides a measure of the internal consistency of a scale or test, expressed as a number between 0 and 1 (Tavakol & Dennick, 2011:53). Respondents answered '*yes*' or '*no*' to each question that determined the number of food secure, at risk and food insecure groups. In the current study, variables that represented strong correlations reflected a high internal consistency with a Cronbach alpha coefficient higher than 0.70 as a reliable measure. Reports reflect acceptable values of Cronbach alpha coefficient ranging from 0.70 to 0.95; however, very high Cronbach alpha coefficient values might suggest possible redundant items, therefore a maximum Cronbach alpha coefficient value is recommended at 0.90 (Tavakol & Dennick, 2011:54).

The Kruskal-Wallis one-way analysis of variance test was used in this study to find out if there were statistically significant differences between the consumption frequencies of specific food items for respondents from food secure, at risk and food insecure groups. Kruskal-Wallis one-way analysis of variance is a non-parametric method which is applied to show significant differences between several independent groups in various ranks (Mehotcheva, 2008:2). Illustrations of these data were given as box-plots, which use median scores, the middle score of a set of ordered observations (Mehotcheva, 2008:9), and also made use of quartiles to describe the data graphically.

Qualitative (Phase 2)

Schurink *et al.* (2011:397, 399) defined qualitative data analysis as the process of collecting order and structure and discovering the underlying patterns and meanings of situations. During phase 2, participant's answers were recorded independently on a unique answer sheet by the researcher and field assistant. Observations were noted during each interview sessions, for example, excitement, boredom or confusion. Field notes included what the researcher saw, heard, thought and experienced during the interviews (Greeff, 2011:359). Data were successfully captured and stored to ensure thorough analysis (Tustin *et al.,* 2005:479). The researcher had a clear picture of all the data to conceptualise and integrate (Schurink *et al.,* 2011:412). Data were studied closely and thematically coded according to concepts, topics and categories that emerged under the themes set by the interview questions, and grouped accordingly until data saturation occurred (Hope, 2011:15; Schurink *et al.,* 2011:402). Once data saturation was reached, all the responses were systematically transferred onto a spreadsheet to ensure confidentiality and further, to be able to clearly analyse each participants answer. Data were put into a consistent form by inductive reasoning so that common terms and phrases could be identified and critically evaluated to

capture the essence of their meanings (Schurink *et al.,* 2011:399, 402). Themes were developed where concepts and sub-concepts were created, which grouped transcriptions from the face-to-face interviews accordingly. This activity allowed for the transformation of data into findings (Schurink *et al.,* 2011:397), by reducing the amount of raw information. Open coding was used to label and categorise occurrences by closely examining data (Schurink *et al.,* 2011:412). Patterns were identified in the data which could support the research conclusions (Schurink *et al.,* 2011:403). The information obtained through qualitative face-to-face interviews were interpreted within the context of food security status obtained from the quantitative data (phase 1). At this point it was possible to interpret participant's responses and statements made, such as "*I eat what I feel like*" or "*My wife cooks*". These extraordinary responses allowed the researcher an opportunity to make sense of the "real world" which each participant experiences. Analysing data which is set out in a clear and understandable layout allows for a manageable process and reliable conclusions to be drawn.

3.9 Validity and reliability

Validity is described as the point at which the measuring instrument correctly reveals what it intends to measure (Maree & Pietersen, 2010:147). Validity aims to determine if the findings of the study are credible and accurate from various viewpoints, including the researcher and participants (Creswell, 2003:195). This was achieved by spending sufficient time in the field to gain an in-depth understanding of the study (Creswell, 2003:195). The type of validity measurement used in the present study is known as face validity. Face validity concerns face value of a measurement procedure and appears relevant to those completing the research (Delport & Roestenburg, 2011:174). The questionnaire was evaluated to ensure that the questions in the measuring instrument related to the objectives of the study. To confirm that the questionnaire and interview were both valid, the Statistics Consultation Services of the North-West University (SCS, NWU) and Consumer Science specialists scrutinised each question and compared it to the study objectives. The adapted questionnaire was reviewed and tested by specialists in the field, Consumer Sciences, and was previously used in similar studies (Van Wyk, 2014:120).

Furthermore, a factor analysis procedure was employed in the questionnaire by observing a measurement scale similar to the one used in this study. Content validity is concerned with the adequacy of an instruments content which focused on whether the most important aspects of the specific concept had been measured (Delport & Roestenburg, 2011:173). The literature review (Chapter 2) of this study was undertaken to describe and support the relevant objectives to confirm validity. A pre-test was performed for both the questionnaire and the interview to support and improve the measuring instrument to ascertain if the aim and objectives of the study could

be met by the study population. The pre-test also eliminated any possible problems or misunderstandings that might arise during data collection. A bilingual questionnaire and interview were used to assist the participants in completing data collection without difficulty.

Reliability can be described as the point at which the measuring instrument assures consistent patterns of which it measures (Richards & Morse, 2007:190). The reliability of the questionnaire together with the measuring procedures will produce identical measurements if repeated under the same conditions, using a similar sample and measuring the same variable (Delport & Roestenburg, 2011:177). The measuring instrument would only be reliable if it provides duplicate results. The questionnaire was formulated in line with the objectives of this study and furthermore supported consistency and reliability (Maree & Pietersen, 2010:147). All data was collected and analysed consistently by using the same questions in the same order, which increased the level of reliable results. According to Bapir (2012:13), reliability is about generating a measurable concept, which in this study refers to food security, and therefore forms the link between a measure and a concept. The researcher and field assistant interacted objectively throughout data collection to make sure each respondents feedback was clearly understood, without any data manipulation. This increased the reliability and value of data by affirming trustworthy interpretations. The field assistant received training from the researcher prior to the study to confirm that the questions used in the questionnaire were understood and read correctly without any manipulation to the questions. This ensured that no clues or assistance with a response was offered during data collection.

3.10 Trustworthiness in qualitative research

Credibility or authenticity, transferability, dependability and conformability are criteria which were followed to ensure quality and trustworthiness of data, including results and interpretations in this study (Schurink *et al*., 2011:419). In any study, the major goal is to build trustworthiness and credibility by basing the outcomes on the collected and analysed data (Yin, 2011:39). The application of trustworthiness in qualitative research is explained below. It was recommended to use a standardised method when drafting field notes as well as using an audio recorder during the qualitative interviews (Bapir, 2012:14). This enabled the researcher to select themes from the interview transcripts and recordings for comparisons to be made, thus ensuring trustworthiness.

Credibility or authenticity involves accepting methods which are reputable in qualitative research (Shenton, 2004:2). All data obtained during the interviews, including audio recordings, were accepted in the original state and regarded as credible. Transferability as an alternative to external validity (Schurink *et al*., 2011:420) is the application of study findings which could be useful to other situations or areas of interest (Shenton, 2004:7). The results obtained from this study

regarding food security status, i.e. the need for more knowledge on consumption of nutritious food, had to be recorded accurately by means of a research report to accord transferability the merit it requires (Strydom & Delport, 2011:385). Dependability of research is a process of integrating procedures or processes so that if future studies use the same criteria, i.e. participants, methods, it will provide similar results or conclusions (Shenton, 2004:9). This could be relevant for follow-up studies in the VIS which may involve training as a coping strategy. It is imperative for the researcher to ensure that, as far as possible, findings are of the experiences, ideas and opinions of the participants rather than of the researcher (Shenton, 2004:10). Confirming written interview responses with audio recordings ensures that both data collection methods conforms to one another. According to Schurink *et al*., (2011:421), findings of a study should be able to be confirmed by another study.

3.11 Ethical aspects

Ethical approval for this study was obtained (Ref. NWU-00020-16-A1) once all the requirements of the Health Research Ethics Committee (HREC) and the Faculty of Health Sciences at NWU, Potchefstroom Campus, had been met. A proposal document was presented to AUTHeR, a research entity under the WIN Project, to obtain permission to perform this study at the VIS in September 2016. Subsequently, the VIS human resource manager granted permission to conduct research, which began with the recruitment of participants. AUTHeR and the Vaalharts Water offices were both supportive of the study and formal permission was obtained before the commencement of data collection. Employees were given at least two days to discuss the study with their colleagues, family and friends while considering whether to take part. Those who showed an interest in the study and met the inclusion criteria were able to make a decision to participate so that the consent form (Appendix C) could be completed. The researcher had an ethical obligation to protect the participants within all possible reasonable limits from any type of harm, as well as from physical or emotional discomfort in the course of the study (Fouché & De Vos, 2011:115). Participation was completely voluntary and participants were not obliged to take part in the research (Strydom, 2011:116). Participants were given the option to withdraw or discontinue at any point in the study without being penalised or discriminated against (Tustin *et al.,* 2005:47); however, no one withdrew from this study. Employees who had questions about the study could ask one of the two gatekeepers or the field assistant for answers.

3.11.1 Written informed consent

A consent procedure was managed for each participant before data collection, because personal circumstances differ from person to person (Strydom, 2011:118). The consent form described the purpose, nature and objectives of the study, and included the researcher's personal particulars

as well as the duration of the study, benefits, anonymity and possibility of withdrawal from the study (Fouché & De Vos, 2011:115).

The consent form contained the following information (Appendix C):

- Title, introduction, objectives and inclusion criteria
- Responsibilities/involvement during data collection
- Benefits, risks, discomforts of the study
- Handling and accessibility of data during and after data collection
- Contact details of the researcher, data dissemination plan

The gatekeeper and field assistant explained confidentiality to the participants and stated that all personal particulars would remain confidential at all times and anonymity would be assured at all times to ensure professional research (Delport & Roestenburg, 2011:172). The participant's information was not exposed in any way in order to protect his or her social status and dignity by avoiding embarrassment, discrimination, violation or harm. This process was particularly important during sensitive questioning, such as income related questions. Each participant had the right to privacy and was able to decide to whom and to what extent information would be communicated (Strydom, 2011:119). Participants were also not obliged to answer questions which they did not feel comfortable.

The informed consent form (Appendix C) was signed by each individual participant before commencement of data collection and each participant was issued with a unique code which served to protect their identity by ensuring anonymity and confidentiality. This unique code appeared on both the questionnaire (Appendix A) and the interview question sheet (Appendix B) to maintain privacy, anonymity and accuracy throughout data collection. There was thus no connection between the participant's personal details and the corresponding questionnaire and interviews. The completed consent forms were handled with care and stored in the correct manner for accessibility and to ensure the ethical quality of the study (Strydom, 2011:117). A list of all the participants' names was kept separately and confidentially at all times to protect their personal information (Strydom, 2011:119). It was also required of the field assistant to complete a confidentiality agreement prior to the study.

To ensure effective data capturing, the researcher recorded participants' responses in writing as well as by audio recorder during both phases. According to Greeff (2011:359), participants had to give permission to be recorded before the study commenced, but they had the option of declining without penalty. Audio recordings were used to validate and verify written responses to ensure accuracy of data. Permission was obtained when the consent form was being completed.

Audio recordings were useful after data collection if information had not been clearly understood or noted. Accurate recordings allowed for effective transcriptions.

3.11.2 Risks and benefits

The data collection process were monitored while research was in progress to minimise any potential risk to participants. This process limited drop-out rates of participants in both research phases of the study. The expertise of the research team was important for this complex, mixed methods study to maintain focus and integrity during data collection. The risks experienced during data collection included physical discomfort, fatigue or losing concentration when sessions became lengthy due to additional explanation of questions. This occurred more frequently with less literate participants who did not understand the questions. The researcher and field assistant noticed certain behaviour or mannerisms and accordingly had to maintain the participant's interest, involvement and concentration by maintaining eye contact, which ensured quality research throughout data collection. Therefore interaction with the participants was important to prevent this risk. The researcher and field assistant took great care while dealing with the vulnerable community. Refreshments were available for the duration of the sessions. There was no direct benefit for participants during the study, but an indirect benefit was a platform for them to voice their opinions and needs and to promote the discussion of potential coping strategies and practical solutions to improve the community's household food needs.

3.11.3 Ethics in data capturing

The researcher and field assistant were required to concentrate throughout questionnaires and interviews to record accurate data and correct field notes (Yin, 2011:91), to ensure information was fully obtained (Greeff, 2011:352). Extended care and focus had to be maintained during the interviews due to the nature of open-ended questions which meant that responses from participants could vary greatly. The interviews focused on topics of particular interest with a considerable amount of flexibility throughout the interview (Greeff, 2011:348). Participants had the opportunity to speak openly, and thus the results were valid and not influenced by false responses during the discussions (Greeff, 2011:352). The field assistant translated information communicated in any language other than English and Afrikaans. Participants were encouraged to communicate as naturally as possible (Swain *et al.,* 2007:19) by answering questions freely and openly. Care was taken with vulnerable participants, such as low-income earners who were food insecure, by introducing sensitive questions to participate comfortably (Greeff, 2011:348). The researcher made sure that all necessary steps were taken to avoid disruption at the participant's workplace. Interviews took place in a comfortable, well-lit room at the VIS premises, with coffee/tea/juice and biscuits available throughout the sessions.

3.11.4 Data storage

The researcher collected and safely stored all materials from the study, including questionnaires, interviews, field notes and audio recordings (Schurink *et al.,* 2011:399). The participant's information was made available only to the researcher and persons directly involved in the study (Maree & Van der Westhuizen, 2010:41). All data gathered during this study were handled and stored separately from the consent forms on the premises of the NWU, Potchefstroom Campus, and only the researcher and study leaders had access to this data. Electronic data were stored on the IT platform in a password protected document and hard copy data were stored in a locked cabinet at the Consumer Science Department of the NWU, Potchefstroom Campus. All data will be discarded using the correct procedures after being in safe keeping for five years.

3.12 Conclusion

The ethical aspects followed throughout the study ensured the continued safety of participants as well as integrity of accumulated data. The results from this convergent mixed methods study were analysed to explore similarities and/or differences amongst various VIS employees and their food security status in order to create insightful, critical and essential interpretations about their current situation. The study was suitable for exploring individuals of the VIS who represented their household to meet the objectives set out for the research.

CHAPTER 4: RESULTS AND DISCUSSIONS

4.1 Introduction

The study used a convergent mixed methods design in two phases to collect data from VIS employees to gain a better understanding of respondent's household food security status. The first phase made use of a questionnaire to collect data from employees of the VIS which focused on household food security, demographic characteristics and food consumption amongst the three food security status groups. The second phase explored food security challenges which participants experienced, while identifying potential needs that may support household food security. Phase 1 consisted of 87 respondents while 46 participants completed Phase 2. Results obtained during both phases of the study will be discussed in this chapter.

4.2 Phase 1: Quantitative household food consumption and food security status

The questionnaire focused on income-earning employees of the VIS with a purpose of exploring the three food security status groups; food secure, insecure and those at a food security risk, to determine respondents food consumption patterns, challenges and coping skills. Results obtained from this study were as follows. (Additional tables and figures are available in Appendix D).

4.2.1 Demographic characteristics

Table 4.1 gives a summary of the demographic characteristics of the sample population and Figure 4.1 of the food security status of households participating in the study. The 87 respondents who participated in the quantitative phase (Phase 1) consisted of 63 males (72.4%) and 24 females (27.6%) (Table 4.1). The majority of respondents ranged between the ages of 35 and 44 years (32.2%). Most of the respondents' home language was Setswana (59.8%) or Afrikaans (28.7%) (Table 4.1). However, during data collection respondents communicated in Afrikaans as this was the common language spoken at the VIS. Results showed that most of the respondents in the current study indicated involvement with food eating choices (Table 4.3), thus indicating that males were showing increased involvement in the decision making of household food consumption patterns. The largest group of respondents completed secondary school (Grade 8-11) (36.8%), followed by a group which obtained matric (26.4%).

Table 4.1: Summary of respondent's demographic characteristics (N=87)

Demographic characteristics	Frequency (n)	Percentage of sample (%)
Gender		
Male	63	72.4
Female	24	27.6
Age (years)		
18 – 24	4	4.6
25–34	18	20.7
35–44	28	32.2
45 – 54	26	29.9
55–64	11	12.6
Home language		
Setswana	52	59.8
IsiXhosa	5	5.7
Sepedi	1	1.1
Sesotho	2	2.3
Tshivenda	1	1.1
English	1	1.1
Afrikaans	25	28.7
Education level		
None	7	8.1
Primary school	13	14.9
Secondary (Grade 8 – 11)	32	36.8
Matric (Grade 12)	23	26.4
Tertiary education	11	12.6
Other formal skills	1	1.2

According to Statistics South Africa (Stats SA) (2017:84), the poverty incidence of households who possess secondary education and who are the heads of their household, recorded a significant rise from 18.3% in 2011, to 21.8% in 2015, which reflects a significant 15.1% increase. Education plays a major role in household poverty and there is thus a strong tendency that household heads with a higher level of education are associated with lower levels of poverty (Stats SA, 2017:84).

The income of respondents is presented in Table 4.2. Majority respondents formed part of the middle-income bracket (58.6%), following high-income (27.6%), and lastly, a smaller percentage made up the low-income bracket (9.2%). Most respondents lived in permanent brick-built houses (85.1%) or semi-permanent structured houses (14.9%) made from wood or corrugated iron (Table 4.1(a), Appendix D). The majority of respondents had a household size of three persons living together under one roof (24.1%), followed closely by four persons per household (21.8%), and often more than six to form part of the larger households (20.5%). It was found that poor households had more people living in their household, resulting in a larger household size compared to non-poor households, with the average size of a poor household more than twice (4.6) that of a non-poor household (2.4) (Stats SA, 2017:110).

Table 4.2: Monthly and annual Rand values for all income groups (N=87)*

Monthly Rand value	Per annum Rand value	Respondents (n)	Percentage (%)
Low-income R1 363 – R4 164	R16 368 – R49 964	n=9	9.2%
Middle-income R4 165 - R13 209	R49 976 - R158 508	n=51	58.6%
High-income R13 210 - R32 522	R158 520 - R390 264	n=24	27.6%

Undisclosed n=3 (3.5%)

Within food security status groups

Home language within food security status groups reflected a tendency for more Setswana respondents to be food insecure (75%), followed by at risk (69.2%) and lastly food secure (44.4%) (r=0.265, p=0.047) (Table 4.3). Whereas the majority Afrikaans speaking respondents showed a tendency to be food secure (44.4%), followed by at risk (20.5%) and the smallest group reflecting 8.3% as food insecure (r=0.304; p=0.018). Within food security status groups, the majority of food secure respondents had secondary school education (30.5%), followed by matric (Grade 12) (25.0%) (Table 4.3). There was a tendency for most food secure respondents to be in possession of tertiary education (25%), followed by at risk (5.1%) and none in the food insecure group (r=0.293; p=0.065). Majority respondents at risk had obtained secondary school (41.0%), closely followed by 33.3% who obtained matric. Food insecure respondents had commonly achieved secondary school (41.6%). The Living Conditions Survey (LCS) 2014/2015 data reflected that households more vulnerable to poverty are those headed by females, black Africans, children (17 years and younger), the elderly (65+) and those who do not have an education (Stats SA, 2017:78). Certain factors from the LCS study relate to this current study, such as black Africans and those without or limited education, therefore individuals representing households within this group may be more vulnerable to poverty than households that are not included in these categories.

Table 4.3: Chi-square cross-tabulations for factors affecting food security: Demographic characteristics & behavioural aspects

		n=36	Food secure %	*n*=39	At risk %	*n*=12	Food insecure %	Pearson Chi-Square	Cramer's V
Household income (R)	Undisclosed	2	*5.6*	0	*0*	0	*0*	*0.298*	*0.397***
	R1 363 - R4164	2	*5.6*	6	*15.4*	1	*8.3*		
	R4 165 - R13 209	21	*58.3*	22	*56.4*	8	*66.7*		
	R13 210 – R35 522	11	*30.6*	10	*25.6*	3	*25.0*		
Amount of money spent on food (R)	R100 – R500	1	*2.8*	3	*7.7*	1	*8.3*	*0.041**	*0.353***
	R501 – R1 500	5	*13.9*	17	*43.6*	7	*58.3*		
	R1 501 – R3 000	18	*50.0*	15	*38.5*	4	*33.3*		
	>R3 000	12	*33.3*	4	*10.3*	0	*0*		
Highest level of education	Undisclosed	0	0	0	0	1	8.3	*0.065*	*0.293***
	None	1	2.8	4	10.3	2	16.6		
	Primary school	6	16.6	4	10.3	3	25.0		
	Gr. 8–Gr.11	11	30.5	16	41.0	5	41.6		
	Gr 12 (Matric)	9	25.0	13	33.3	1	8.3		
	Tertiary education	9	25.0	2	5.1	0	0.0		
Home language	Setswana	16	44.4	27	69.2	9	75.0	*0.047**	*0.265***
	IsiXhosa	2	5.6	1	2.6	2	16.7	*0.185*	*0.197*
	Sepedi	1	2.8	0	0	0	0	*0.488*	*0.128*
	Sesotho	0	0	2	5.1	0	0	*0.284*	*0.170*
	Tshivenda	0	0	1	2.6	0	0	*0.537*	*0.120*
	English	1	2.8	0	0	0	0		
	Afrikaans	16	44.4	8	20.5	1	8.3	*0.018**	*0.304***
Household food eating choices	Involved	34	94.4	35	89.7	8	66.7	*0.035**	*0.244***
	Not involved	2	5.6	4	10.3	3	25.0		
	Undisclosed	0	0	0	0	1	8.3		

* Pearson Chi-Square (*p*-value) interpreted as significant at levels $p<0.001/p\leq0.05$.
** Cramer's V (effect size) interpreted as $r=0.1$ small effect; $r=0.3$ medium effect; $r=0.5$ large effect.
*** Certain frequencies per week have been excluded from the table due to a 0.0 value.

Table 4.3 continued

		Food secure		At risk		Food insecure		Pearson Chi-Square	Cramer's V
		***n*=36**	**%**	***n*=39**	**%**	***n*=12**	**%**		
Consume foods available, yet not preferred* **	Seldom	30	83.3	21	53.8	1	8.3	*0.002**	*0.378***
	1-2day/month	3	8.3	11	28.8	7	58.3		
	1day/week	2	5.6	5	12.8	3	25.0		
	2-6days/week	1	2.8	2	5.1	1	8.3		
Limit portion size for household	Seldom	34	94.4	13	33.3	1	8.3	*0.000**	*0.523***
	1-2day/month	1	2.8	18	46.2	6	50.0		
	1day/week	0	0.0	7	17.9	5	41.7		
	2-6days/week	0	0.0	1	2.6	0	0.0		
	Every day	1	2.8	0	0.0	0	0.0		
Borrow money to buy food* **	Seldom	32	88.9	21	53.8	3	25.0	*0.000**	*0.396***
	1-2day/month	3	8.3	18	46.2	8	66.7		
	1day/week	1	2.8	0	0	0	0		
	2-6days/week	0	0	0	0	1	8.3		
Borrow food* **	Seldom	35	97.2	33	84.6	8	66.7	*0.018**	*0.305***
	1-2day/month	1	2.8	6	15.4	4	33.3		
Where food is bought	Spaza shop	3	8.3	3	7.7	4	33.3	*0.038**	*0.274***
	Supermarket	36	100.0	39	100.0	10	83.3	*0.002**	*0.383***

Respondents were allowed to select both food store options above.

* Pearson Chi-square (*p*-value) interpreted as significant at levels $p<0.001/p\leq0.05$.
** Cramer's V (effect size) interpreted as $r=0.1$ small effect; $r=0.3$ medium effect; $r=0.5$ large effect.
*** Certain frequencies per week have been excluded from the table due to a 0.0 value.

4.2.2 Household food security status

This study set out to understand challenges income-earning households experience to maintain food security in their households. Household food security status groups were determined in Section B of the questionnaire. Participants who formed part of the qualitative interviews (Phase 2) were chosen amongst respondents who had completed the quantitative questionnaire (Phase 1). The food security status groups of households in this study are presented in Figure 4.1. In phase 1, 41.4% of respondents were food secure, 44.8% were at risk of becoming food insecure, and 13.8% of respondents were food insecure while the food security distribution in phase 2 was 37.0% food secure, 47.8% at risk of food insecurity, and 15.2% food insecure. Thus the largest group of participants from both Phase 1 and Phase 2 formed part of the at risk group, 44.8% and 47.8% households respectively. The qualitative results obtained from different food security status households will be discussed in Section 4.3.

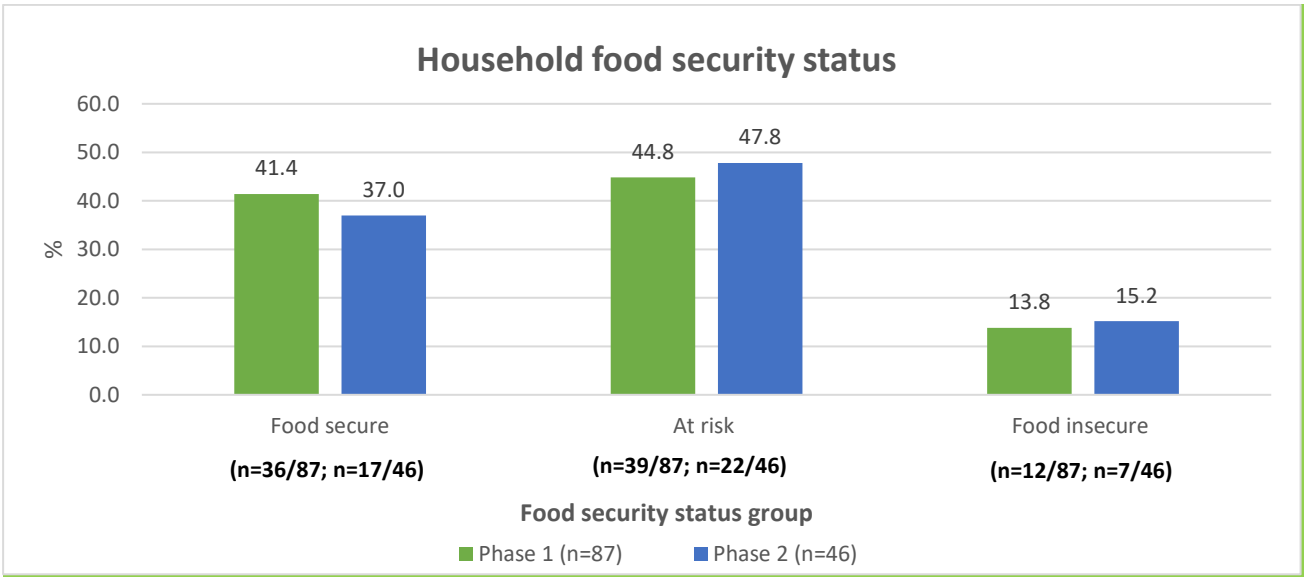


Figure 4.1: Food security status of households at the VIS from Phase 1 and Phase 2.

4.2.3 Factors affecting household food security status

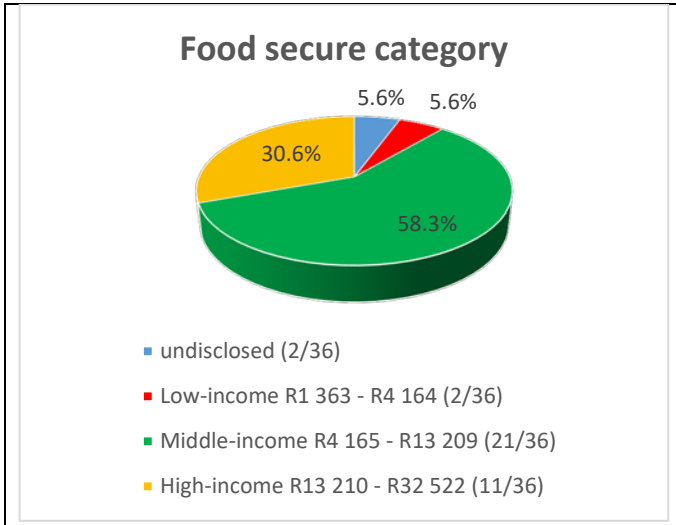
4.2.3.1 Low-, middle- and high-income brackets within food security status groups

Income does not guarantee household food security although it is one of the food security indicators. Within the three food security status groups at the VIS, the majority of respondents earned a middle-income and were food secure (58.3%) (Figure 4.2(a)), at risk (56.4%) (Figure 4.2(b)) and food insecure (66.7%) (Figure 4.2(c)) (r=0.397; p<0.05) (Table 4.3). Food insecurity was presented in low-, middle- and high-income levels. It emerged that respondents from various

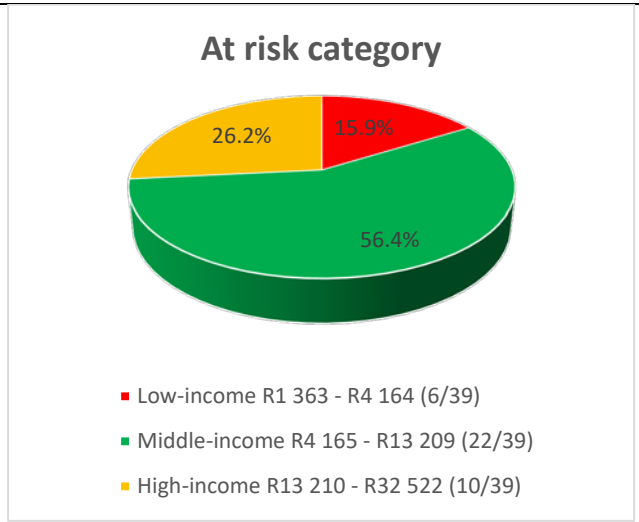
income-earning levels needed assistance to manage their money efficiently so that their household's food security status could be improved.

4.2.3.2 Household income contributors within food security status groups

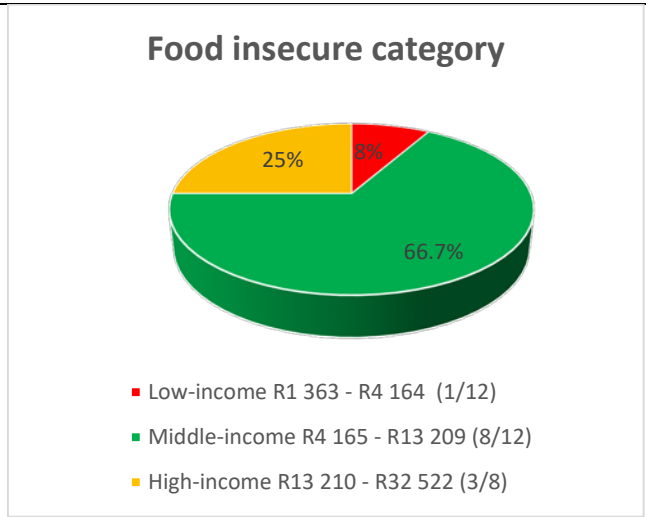
While the majority of food secure households included two income contributors (50%), 44.4% had one income contributor (Figure 4.3). This shows that having financial assistance from two members of the family can better support the household's food security status. The majority of households at a risk of becoming food insecure had only one income contributor (60.5%) and a smaller percentage had two income contributors (34.2%). This indicates that financial contribution towards the family's needs may be jeopardised if there is not enough support, and this can affect their food security status. Within the food insecure category, 50% of households had one person contributing to the family's income, and 41.7% had two income contributors. The lack of financial support from two or more household members within this food insecure status group may add to the struggle of an individual responsible for feeding the household. This causes the household to resort to adaptive coping strategies, such as surviving on a small budget to feed the family. Relying on one source of income increases the risk of poverty; however, a household with two income sources would be able to provide a sufficient livelihood with good living standards and be able to manage risks (Mathebula *et al*., 2017:1).



a) Food secure (n=36)



b) At risk (n=39)



c) Food insecure (n=12)

Figure 4.2: Participants' income brackets within different food security status households

i.e. Pie charts prepared from data in table 4.3.

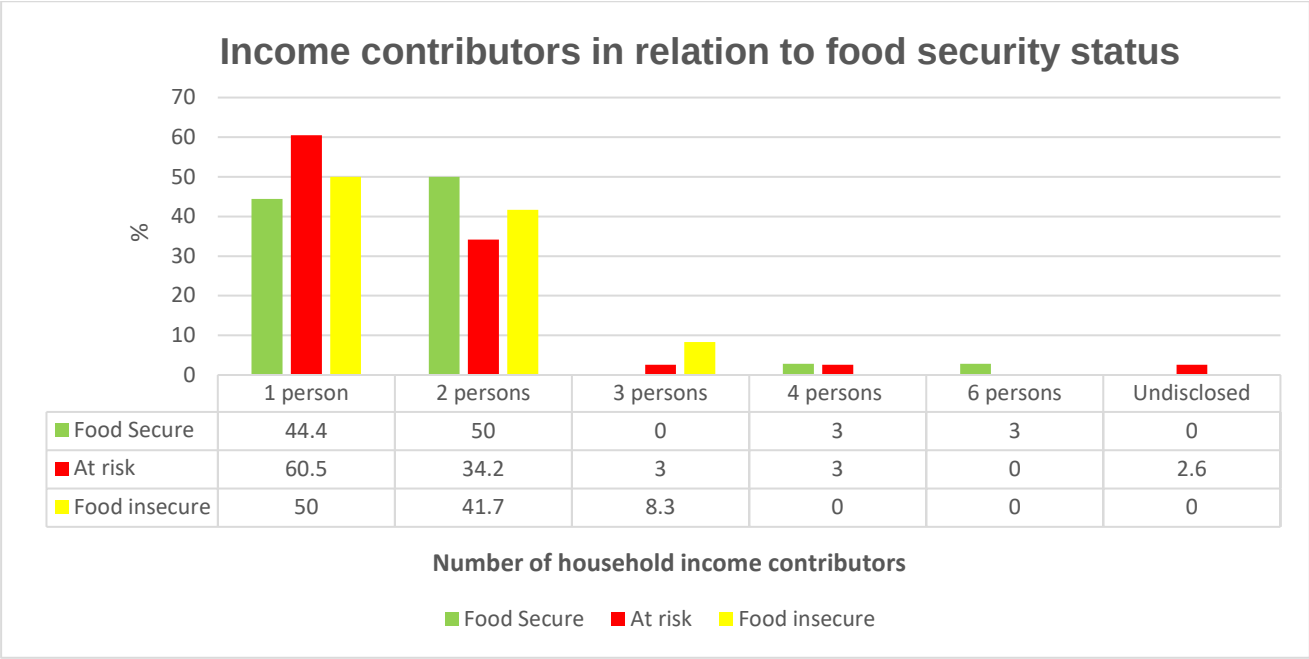


Figure 4.3: The relationship between household income contributors and food security status.

4.2.3.3 Household spending patterns within food security status groups

Figures for South Africa's household expenditure in rural and urban areas in 2015 showed that rural households spent approximately a quarter (23.0%) of their income on food, compared to urban households, which spent considerably less (11.2%) on food items in the same year (Stats SA, 2017:109). Urban households however spent income on housing and utilities (Stats SA, 2017:111). The majority of food secure respondents in the study (50.0%) spent between R1501 and R3000 on food monthly, which tended to be more than those at risk (43.6%) or food insecure (58.3%) respondents spent on food monthly (R501 to R1500) (r=0.353; p<0.05) (Table 4.3 and Figure 4.4). A study of South African middle classes in 2010/2011 reported that the total monthly expenditure of food and non-alcoholic beverages varied from R632 to R1049 (Vermeulen, 2015:24), which reflect that consumers do not have generous food budgets. In a study by Smith *et al.* (2013:283, 4), it was reported that very low income households frequently spent more money than their reported earnings, therefore food expenditure for low-income households is evidently an economic burden. According to Pretorius and Sliwa (2011:181), a low-income household is more likely to suffer food shortages than a household with a higher income. Changes in income determined the quantity and quality of foods purchased and consumed, amongst other factors. If income changes, households may be forced to resort to coping strategies such as buying smaller quantities of food, changing the types of food consumed, reducing dietary diversity and skipping meals.

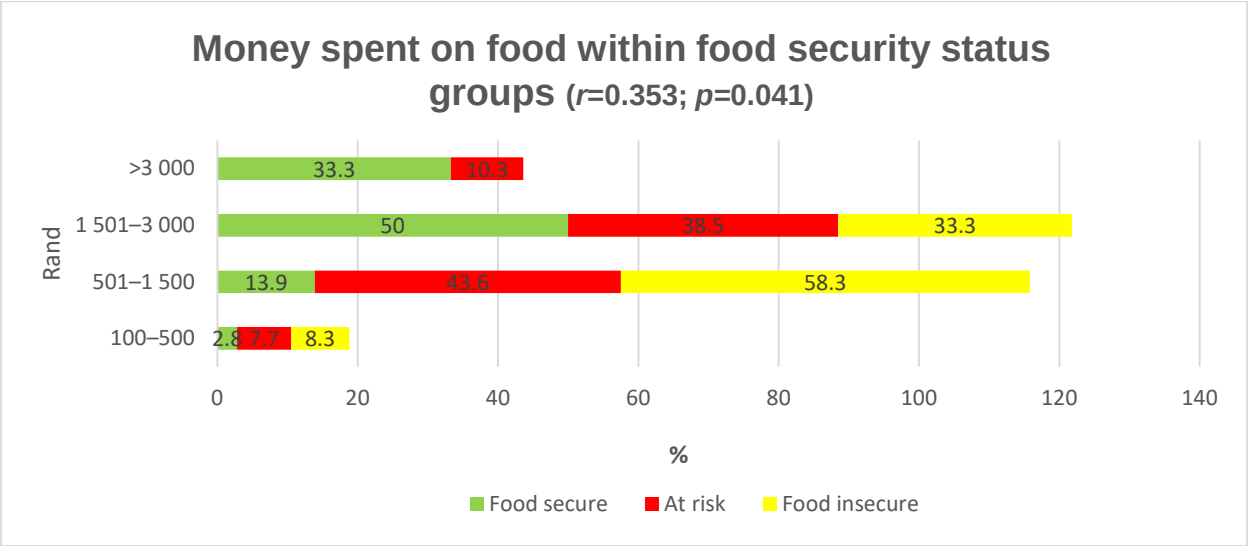


Figure 4.4: Total income spent on food each month within food security status groups.

4.2.3.4 Households' behaviour within food security status groups

A shortage of food in the household can be a result of a lack of money, time and/or knowledge. It was found that household size played a key role in household food security and the ability to cope during periods of food shortages (Gebrehiwot & van der Veen, 2014:237). It is evident that a small household benefits a household's coping ability and thus food security status. Table 4.3 demonstrates the frequency of coping strategies in this study applied to different food security status households. It was significant that at risk households and insecure households both applied some of the recorded coping strategies once or twice a month (Table 4.3). Coping strategies reflected that more food insecure households tended to eat food once a week that was not preferred (25%) (r=0.378; p=0.002) than at risk households (12.8%), and insecure households practically significantly limited portion sizes (41.7%) (r=0.523; p=0.000), as opposed to at risk households (17.9%) also once a week. A large group of food secure households seldom applied these strategies. A tendency to borrow money to buy food occurred once or twice a month in at risk (46.2%) and food insecure (66.7%) groups (r=0.396; p=0.000). Furthermore, there was only a tendency to borrow food amongst food insecure respondents once or twice a month (33.3%) (r=0.305; p=0.018). Food costs have a direct influence on food choices and in Legwegoh and Hovorka's study (2016:84) it was found that middle-income households more often buy preferred food items despite the price of the item, in contrast to lower income households that will keep to their maize and/or bread as staple food. It can thus be expected that although the lower income households may be seen as food secure, the food diversity may be limited and households may rely on daily consumption of cheaper staple foods.

4.2.4 General household food consumption patterns

Seventy two percent (72%) (63/87) of respondents had breakfast before 08h45 (Table 4.19(a), Appendix D). The majority (41.4%) ate breakfast between 08h00 and 08h45, while a smaller number of respondents noted that their first meal of the day was taken after 08h45 (27.6%). Many respondents consumed only two meals per day (47.1%), whereas three meals were consumed daily by 42.5% of respondents (Table 4.1(a), Appendix D).

The most consumed food items chosen by the total group is presented in Table 4.4. Maize meal was the starch most often consumed daily by many households (25.3%). Rice was mostly consumed between two and six days a week (62.1%). Vetkoek (deep-fried dough) was a starch consumed once a week (44.8%) as a convenient, affordable lunch meal. Sorghum/*Maltabella* was the least popular starch, seldom consumed (58.6%) by households in the VIS. After close observation of animal protein consumption, research showed that chicken was predominantly consumed every day (29.9%), followed by chicken eaten two to six days a week (56.3%) in the form of frozen, whole pieces (breast, thigh, leg), cooked for lunch or supper. Animal proteins consumed once per week included fish (hake, river fish) (49.4%) and tinned fish (pilchards) (47.1%). Chicken legs, neck or head (37.9%) were seldom/never consumed. There is a concern that not enough plant proteins were being consumed, as most respondents were not familiar with lentils or chickpeas and therefore seldom/never consumed them (77.0% and 83.9% respectively). There was a tendency for respondents with a higher level of education to be more familiar with lentils (r=0.28; p<0.05) rather than chickpeas (r=0.20; p=0.58). (Figure 4.8(a) and Figure 4.8(b), Appendix D). Participants with tertiary education accounted for the highest percentage (36.4%) for consumption of lentils once per week. Respondents were more familiar with beans (red, white and black), consuming them once a week (44.8%) (Figure 4.5(e), Appendix D). According to the FBDG, beans provide an excellent source of fibre (Venter *et al*., 2013:S37). In particular, red speckled beans, small white canning beans and large white kidney beans are the three types of beans mainly produced in South Africa (Venter *et al*., 2013:S42). As part of the nuts category, peanuts were predominantly consumed, between two and six days a week (37.9%) as an affordable and enjoyable snack (Figure 4.5(e), Appendix D).

Fruits were popularly consumed at the VIS on a daily basis (57.5%). Vegetables were predominately consumed between two and six days a week, namely potatoes (59.8%), tomatoes (58.6%) and onions (56.3%). Vegetables which were consumed once per week, generally prepared on a Saturday or Sunday lunch meal include pumpkin (52.9%), green beans (43.7%) and carrots (41.4%). A small group of respondents drank milk daily (28.7%), which may be a concern as not enough calcium is being taken in. Coffee creamer (*Cremora* or *Ellis Brown*) was used in coffee/tea either daily (41.4%) or seldom/never (40.2%) (Table 4.4). Cultured milk

products (amasi and yoghurt) were not popularly consumed with any frequency throughout the week. Further discussions of food consumption will be based on consumption within different food security status.

Table 4.4: General food consumption frequency throughout the week

Seldom/never		1 day/week		2-6 days/week		1/day	
Food item	*%*	*Food item*	*%*	*Food item*	*%*	*Food item*	*%*
Pronutro	92.0	Pumpkin	52.9	Rice	62.1	Fruit	57.5
Chickpeas	83.9	Fish (hake, river fish)	49.4	Potatoes	59.8	Powdered coffee creamer	41.4
Lentils	77.0	Tinned fish (*Pilchards)*	47.1	Bread	59.7	Chicken (whole pieces)	29.9
Sweetcorn	65.5	Beef stew	44.8	Tomatoes	58.6	Milk (drinking)	28.7
Sorghum/ *Maltabella*	58.6	Vetkoek	44.8	Onions	56.3	Sweets	28.7
Sweet Potatoes	55.2	Green beans	43.7	Chicken (whole pieces)	56.3	Maize meal	25.3
Samp	47.1	Carrots	41.4	Maize meal	52.8	Instant breakfast cereal	25.3
Powdered coffee creamer	40.2	Samp	39.1	Carrots	50.6	Bread	20.7
Instant breakfast cereal	39.1	Spinach/ morogo	36.8	Spinach/ morogo	48.3	Eggs	17.2
Chicken (legs neck head)	37.9	Cabbage	34.5	Cabbage	48.3	Potatoes	17.2
						Sorghum/ *Maltabella*	17.2

4.2.5 Household consumption patterns within food security status groups

A healthy diet consists of sufficient water, energy, macro- and micronutrient intake (Steyn & Ochse, 2013:S13), while inadequate nutrient intake may result in food and nutrition insecurity. Food products with statistically significant differences between food security status groups consumed in this study are demonstrated in Table 4.5, with histograms presenting consumption frequency differences between the food items between food security status groups in Figures 4.5(a), (b) and (c). Box plots illustrate frequency comparisons of food items, with statistically significant differences (Kruskal-Wallis p=0.0000-0.0286) between food security groups in Figure 4.6 (a-e). During data analysis, quartiles were used to point out the consumption frequency of the food items, with q1 and q3 quartiles representing 25% and 75% respectively. Additional details

with regards to the summary of the median, quartile one and quartile three of different food security status groups and the relevant food items can be found on Table 4.5 in Appendix D.

4.2.5.1 Consumption of starches

Instant breakfast cereals, for example, *Corn flakes, Weet-Bix*, showed statistical significance (r=0.313; p<0.05) and was consumed once a day by most food secure respondents (38.9%), and two to six days a week by respondents at a food security risk (33.3%) (Table 4.5). The majority of food insecure respondents seldom consumed instant breakfast cereals (83.3%). Foods which did not show statistical significance however consumed by respondents included *bread*, which was mostly eaten between two and six days per week by food secure (66.7%), at risk (51.3%) and food insecure (66.7%) respondents (Table 4.4(a), Appendix D). *Maize meal* was mostly consumed between two and six days a week by food secure (55.6%), at risk (52%) and food insecure (50%) respondents. *Rice* was readily consumed between two and six days a week by a large proportion of all three food security groups, food secure (66.6%), at risk (61.5%) and food insecure (50%). Results show that bread, maize meal and rice are popularly consumed by all three food security groups in the VIS. *Sorghum/Maltabella* and *samp* were overall not favoured by most respondents; however, a group of food insecure respondents consumed *sorghum/Maltabella* (2 – 6 days a week, 33.3%) and samp (one day a week, 58.3%). *Vetkoek*, as an affordable convenient food, was consumed at least once a week by at risk (61.5%) and food insecure (58.3%) respondents, but seldom by food secure respondents (47.2%). *Pronutro* and *Futurelife* were not familiar food items amongst respondents at the VIS.

A general guideline by the FBDG states that 10 food guide units should be eaten daily (Vorster, 2013:S32). One food guide unit is equivalent to one slice of bread, 35-40g. An indication for this guide would include breakfast cereal (rich in whole grain), rice, pasta, potatoes, bread and maize meal, all commonly consumed in the VIS. The staple food for numerous South Africans are grains such as maize and wheat, which improves the protein quality of a diet (Venter *et al*., 2013:S37). Staple carbohydrates in South Africa are maize meal as well as white and brown bread flour (Vorster, 2013:S32). Starch-rich foods should be consumed in sufficient quantities with most meals. The staple food expenditure behaviour of the South African middle class is led by maize meal, followed by brown bread, rice, white bread and potatoes (Vermeulen, 2015:25). The FBDG is formulated to motivate consumers to prepare meals with starch or high-carbohydrate food, instead of a protein food, as these carbohydrate foods help to prevent chronic diseases (Vorster, 2013:S28). To conclude, respondents in the VIS most commonly consumed starches such as bread, maize meal and rice.

4.2.5.2 Consumption of animal and plant proteins

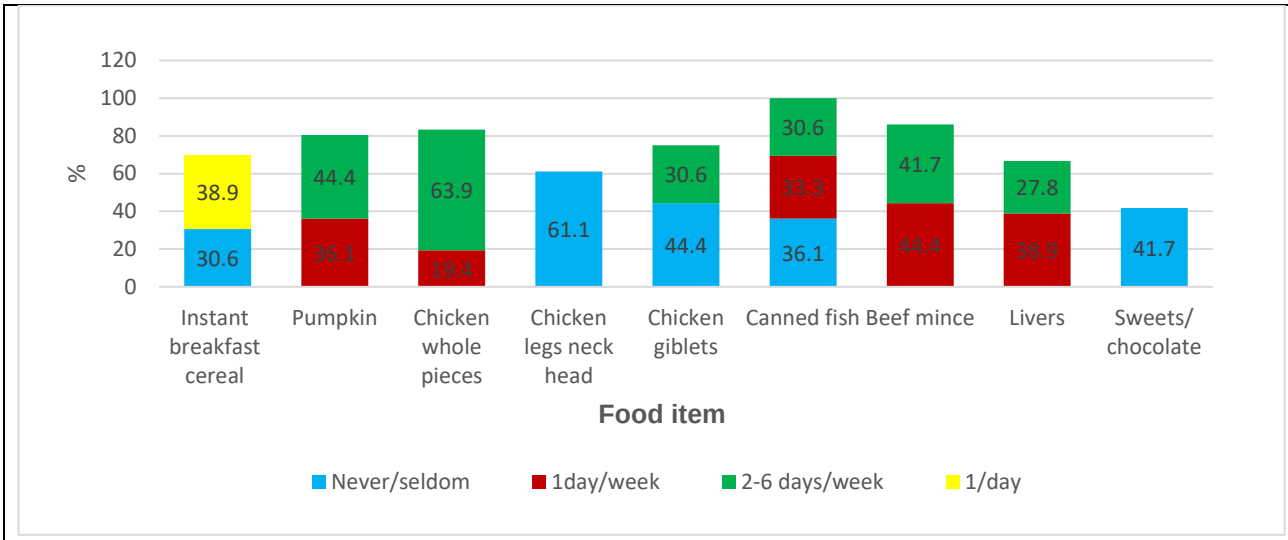
Animal proteins

Most food insecure respondents consumed *chicken (whole pieces)* up to once per day (58.3%) (Figure 4.5c), which tended to be more than most food secure and at risk respondents who consumed chicken between two and six days per week (63.9% and 56.4% respectively) (r=0.34; p=0.028) (Figure 4.5a, b), which shows that all three food security groups are dependent on frequent consumption of chicken (Table 4.5). *Chicken (legs, neck or head)* was frequently consumed between two and six days a week by most food insecure respondents (41.7%) (r=0.37; p=0.002). The legs, neck and head of a chicken are more affordable, hence their frequent consumption by food insecure respondents. There was no distinctive frequency throughout the week by at risk respondents for the consumption of chicken legs, neck or head. Most food secure respondents tended to seldom (61.1%) consume this food item. *Chicken giblets* were consumed between two and six days a week by many food insecure respondents (41.7%) and at risk respondents (41.0%). Giblets are affordable, which explains why this food item tended to be more popularly consumed (r=0.31; p=0.02) by these two food security groups, compared with the less frequent consumption (44.4%) by most food secure respondents who never/seldom consumed giblets. *Tinned fish*, *pilchards* (majority) or *tuna,* showed a tendency (r=0.29; p=0.02), for the low consumption once per week for at risk (51.3%) and food insecure respondents (75%). Food secure respondents showed an equal distribution of consumption throughout the week. *Tinned fish* is expensive and those with a higher salary generally spent money on this item. *Beef mince* tended to be enjoyed once a week by most at risk (59%) and food secure (44.4%) respondents, as compared to seldom/never by half of all the food insecure respondents (50.0%) (r=0.26; p<0.05).

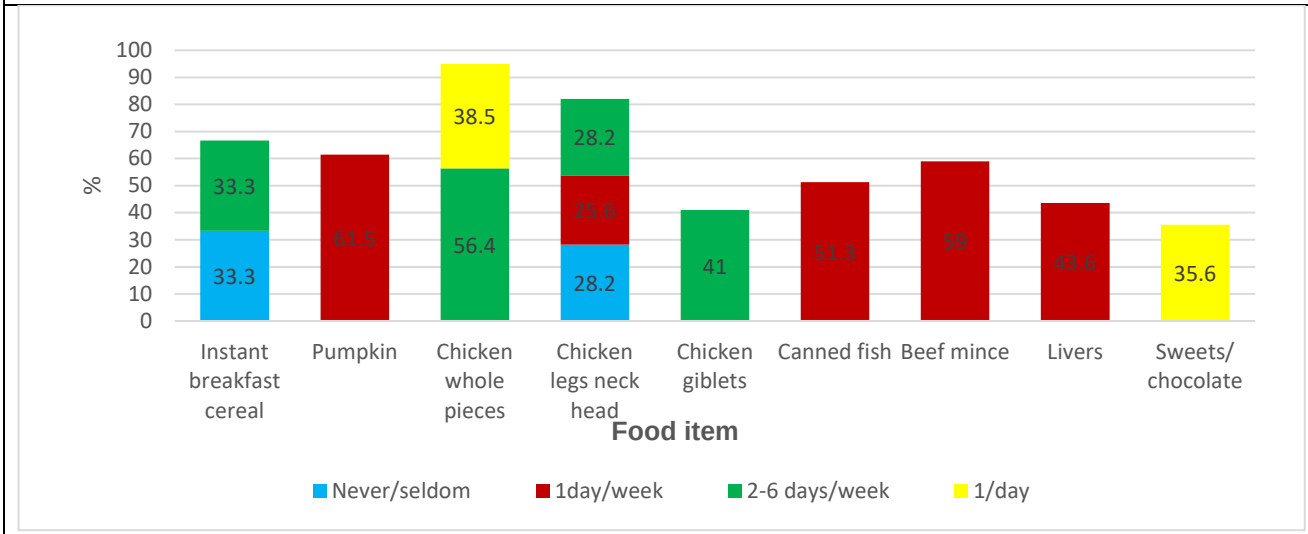
Table 4.5: Food items with significant consumption differences within food security status groups

Consumption	Frequency	*n=36*	Food secure %	*n=39*	At risk %	*n=12*	Food insecure %	Total within food security category (n)	Pearson Chi-Square	Cramer's V
Beef mine	Never/seldom	5	13.9	5	12.8	6	50.0	16	0.052*	0.268**
	1day/week	16	44.4	23	59.0	4	33.3	43		
	2-6 days/week	15	41.7	11	28.2	2	16.7	28		
Chicken Whole pieces	Never/seldom	2	5.6	1	2.6	0	0.0	3	0.028*	0.340**
	1day/week	7	19.4	0	0.0	1	8.3	8		
	2-6 days/week	23	63.9	22	56.4	4	33.3	49		
	1/day	4	11.1	15	38.5	7	58.3	26		
Chicken (Legs,neck,head)	Never/seldom	22	61.1	11	28.2	0	0.0	33	0.002*	0.378**
	1day/week	7	19.4	10	25.6	3	25.0	20		
	2-6 days/week	7	19.4	11	28.2	5	41.7	23		
	1/day	0	0.0	7	17.9	4	33.3	11		
Chicken giblets	Never/seldom	16	44.4	9	23.1	0	0.0	25	0.024*	0.319**
	1day/week	3	25.0	8	20.5	3	25.0	20		
	2-6 days/week	11	30.6	16	41.0	5	41.7	32		
	1/day	0	0.0	6	15.4	4	33.3	10		
Instant Breakfast cereal	Never/seldom	11	30.6	13	33.3	10	83.3	34	0.030*	0.313**
	1day/week	5	13.9	5	12.8	1	8.3	11		
	2-6 days/week	6	16.7	13	33.3	1	8.3	20		
	1/day	14	38.9	8	20.5	0	0.0	22		
Livers (Beef/chicken)	Never/seldom	11	30.6	8	20.5	3	25.0	22	0.008*	0.345**
	1day/week	14	38.9	17	43.6	1	8.3	32		
	2-6 days/week	10	27.8	11	28.2	3	25	24		
	1/day	1	2.8	3	7.7	5	41.7	9		
Pumpkin	Never/seldom	6	16.7	0	0.0	2	16.7	8	0.039*	0.331**
	1day/week	13	36.1	24	61.5	9	75.0	46		
	2-6 days/week	16	44.4	12	30.8	1	8.3	29		
	1/day	0	0.0	3	7.7	0	0.0	3		
Sweets	Never/seldom	15	41.7	6	15.4	4	33.3	25	0.039*	0.306**
	1day/week	7	19.4	7	17.9	0	0.0	14		
	2-6 days/week	9	25.0	12	30.8	2	16.7	23		
	1/day	5	13.9	14	35.9	6	50.0	25		
Tinned fish	Never/seldom	13	36.1	8	20.5	1	8.3	22	0.020*	0.293**
	1day/week	12	33.3	20	51.3	9	75.0	41		
	2-6 days/week	11	30.6	11	28.2	2	16.7	24		

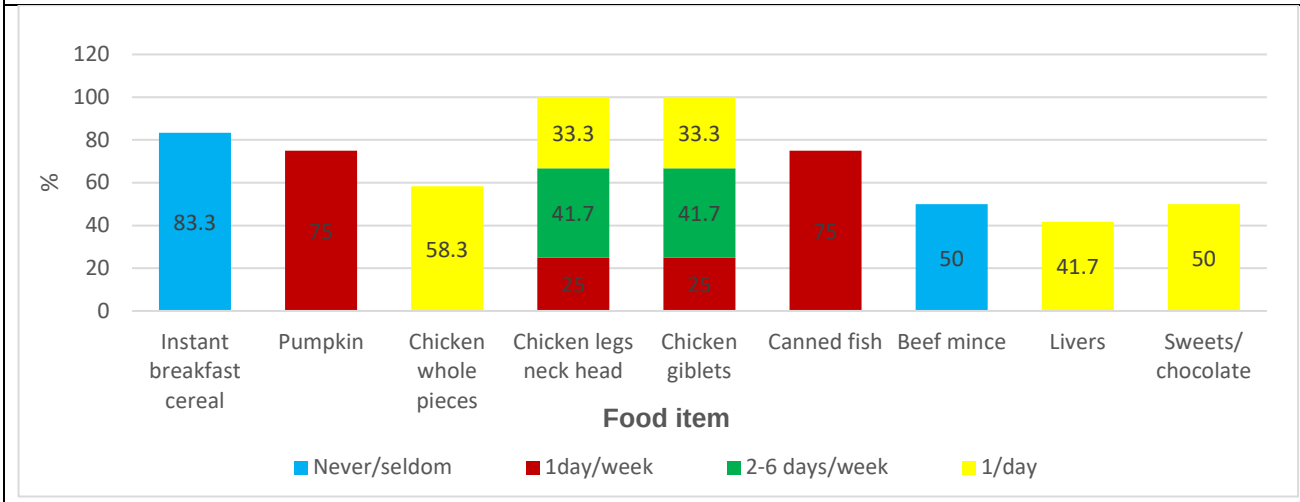
* Pearson Chi-square (*p*-value) interpreted as significant at levels $p<0.001/p\leq0.05$. ** Cramer's V (effect size) interpreted as $r=0.1$ small effect; $r=0.3$ medium effect; $r=0.5$ large effect.
*** Certain frequencies per week have been excluded from the table due to a 0.0 value.



a) Food secure households (n=36)



b) At risk households (n=39)



c) Food insecure households (n=12)

Figure 4.5: The percentage of households' consumption patterns regarding food items within food security status groups on a weekly basis (*p*<0.05).

Beef mince is not the most affordable animal protein, therefore at risk respondents spending money on this item may limit finances available for other food items. *Livers* (beef or chicken) tended to be mostly consumed once a day by food insecure respondents (41.7%), as compared to once a week by at risk (43.6%) and food secure respondents (38.9%) (r=0.34; p=0.008).

Animal proteins which were consumed by respondents but did not show practical significant differences included *fish* (hake, river fish), which was consumed once a week by food insecure (75%), food secure (50%) and at risk (41%) (Table 4.4(a), Appendix D). *Beef stew* was consumed two to six days a week by food secure (47.2%) respondents, and less often (once a week) by food insecure (50%) and at risk (48.7%) respondents. *Pork* was not a popular food item amongst the respondents; however, at risk respondents can be said to have consumed pork more frequently throughout the week (Table 4.4(a), Appendix D). Food secure and food insecure households consumed *eggs* between two and six days a week (41.7% and 50.0% respectively). Animal sources of food such as fish, chicken, lean meat and eggs, should be eaten daily to ensure that nutrient needs are being met (Schönfeldt *et al*., 2013:S72). Furthermore, the recommended intake is two to three fish portions a week (80-90g), three to four eggs per week, 80-90g potions of red meat per day, however not more than 560g per week.

Fish, chicken, meat and eggs, which are all animal sources of food contain high-quantity and high-quality protein (Schönfeldt *et al*., 2013:S66). The FBDG recommends that meat, poultry (chicken), fish and eggs should be eaten daily or as often as possible (Du Plessis *et al*., 2013:S133). According to the American and South African Heart Foundation dietary guideline, it is advisable to include at least two servings of fatty fish per week (Schönfeldt *et al*., 2013:S68). The food secure group had access to a variety of animal protein food items, while food insecure and at risk respondents were obliged to purchase more affordable options such as chicken, in the form of whole pieces, legs, neck, head, giblets and livers.

Plant proteins

While observing the consumption of plant proteins within food security status groups, it was found that *beans* (red, white or black) were typically consumed once a week by all three food security status groups: food insecure (58.3%), at risk (51.3%) and food secure (33.3%) (Figure 4.4(a), Appendix D). *Lentils* and *chickpeas* were seldom or never consumed by all three food security groups. Details of percentages can be seen on Figure 4.4(a), Appendix D. Predominantly, food secure (41.7%) and at risk (38.5%) respondents consumed *nuts*, peanuts in particular, between two and six days per week, whereas food insecure respondents consumed nuts only once a week (41.7%).

Dry beans, split peas, chickpeas and lentils are referred to as *pulses*, an economical source of good-quality protein, rich in dietary fibre, usually low in fat and practically free from saturated fatty acids (Venter *et al*., 2013:S36). Daily consumption of a half cup of pulses will advance nutrition as it supports an intake of fibre, folate, protein, zinc, iron and magnesium. These results support the FBDG for legume intake for South Africans (Venter *et al*., 2013:S37). Legumes are a valuable source of lysine-rich protein which complements maize as a staple food for a majority of South Africans (Venter *et al*., 2013:S38-S43). Soy beans and peanuts both have a higher fat content than other legumes (Venter *et al*., 2013:S36). Consumers should be made aware that legumes, whole grains and root vegetables are starchy foods and can also form part of staple food items (Vorster, 2013:S35).

4.2.5.3 Consumption of fruits and vegetables

The study observed the consumption of *vegetables* and found that *pumpkin* consumption tended to be more frequent during the week (2-6 days) by food secure households (44.4%) (r=0.33; p=0.039), compared to consumption once a week by at risk (61.5%) and food insecure respondents (75%) (Table 4.5). Food secure respondents showed similar consumption patterns, of two to six days a week for *spinach (morogo)* (58.6%), *green beans* (36.1%) and *carrots* (63.9%). Food insecure respondents reflected consumption of *spinach* (66.7%), *green beans* (58.3%) and *carrots* (16.7%), one day a week. *Spinach* was consumed between two and six days a week by at risk (48.8%) respondents (Table 4.4(a) Appendix D). The consumption of *cabbage* was common amongst food insecure (50.0%) and at risk (48.7%) respondents, two to six days a week. However, cabbage was consumed least by food secure respondents (16.7%). *Potatoes* were popular amongst all groups and consumed (2-6 days a week) by 55.5% food secure, 59% at risk and 75% food insecure groups. All three food security status groups consumed *tomatoes* and *onions* between two and six days a week. This indicates that tomatoes and onions are both popular food items in food secure, at risk and insecure groups' weekly consumption patterns. The consumption of *sweetcorn* and *sweet potatoes* was not common at the VIS, therefore seldom or never consumed. *Fruits* were consumed daily by food secure (66.7%), at risk (51.3%) and insecure (50.0%) respondents. Respondents had access to a variety of fruit in their community, which increased the popularity of this food.

Vegetables and fruits are rich in micronutrients, phytochemicals and other bioactive compounds as well as providing a good source of fibre, however not high in energy (Naudé, 2013:S46). An increased intake of vegetables and fruits has the potential to help reduce various cancers, cardiovascular disease mortality, coronary heart disease, ischaemic heart disease, stroke and cardiac failure in adults, and further reduce vitamin A deficiency in young children (Naude, 2013:S54). According to the FBDG, a variety of vegetables and fruits should be consumed every

day, either prepared raw or cooked, depending on the type of vegetable or fruit, to make them more digestible and palatable (Naude, 2013: S51). The recommended serving sizes of vegetables and fruit per day are as follows: half a cup of fresh, frozen or tinned vegetables, one cup of raw leafy vegetables, one medium (whole) or two small (whole) fresh fruits, half a cup (diced or cooked) fresh, frozen, or tinned fruit, and 125ml (half a cup) of 100% pure fruit or vegetable juice (Naude, 2013:S51). It was found through the interviews in the present study that vegetables were prepared together with protein such as read meat or chicken. When combining a meal with both animal food sources and plant-based foods it can contribute to improved human health (Schönfeldt *et al*., 2013:S66).

4.2.5.4 Consumption of dairy products and milk substitutes

At risk respondents (35.9%) consumed *milk* (as a drink) most frequently once a day (Table 4.4, Appendix D). Food secure and insecure respondents also enjoyed drinking a glass of milk, but less frequently, throughout the week. In a previous study, it was found low food security households spent, less on milk (Smith *et al.,* 2013:281). Low food security households can also be referred to as food insecure or at risk households; furthermore, even though milk was enjoyed by at risk households in this current study, it did not particularly fit into their budget. Milk plays an important role in the regulation of body weight and bone mineral content in children, and may protect against the development of non-communicable diseases, including obesity (Vorster *et al*., 2013:S57). *Yoghurt* and *amasi* were taken between two and six days in the week by food secure (52.7%) and at risk (35.9%) respondents, whereas food insecure respondents consumed these items only once a week (41.7%). *Cheese* (cheddar/gouda) was consumed most frequently in the week (2-6 days) by at risk respondents (35.9%), but it appeared that that 50% of insecure households seldom consumed cheese, which is understandable as it is expensive and this particular group may not necessarily be able to afford it. Food secure respondents consumed cheese once a week (47.2%). *Powdered coffee creamer* was consumed by a substantial group of food secure (47.2%), at risk (35.9%) and food insecure (41.7%) respondents once a day. According to the FBDG article, powdered coffee creamers are non-dairy creamers, hence not nutritious dairy products (Vorster *et al.,* 2013:S63). Milk powder blends and non-dairy creamers were popular and used by rural and urban households.

Low-fat dairy products are suggested for those who are overweight or obese Vorster *et al*., 2013:S59). However, new research has found that people who consumed low-fat dairy every day had a greater chance of developing Parkinson's disease compared to those who consumed full-fat dairy products and in whom no association with a risk of Parkinson's disease was found (Hughes *et al.,* 2017). The consumption of a variety of dairy products in rural areas is low, probably depending on availability and affordability (Vorster et *al*., 2013:S62). The supposedly negative

effects of milk and dairy products are often reported as barriers to adequate consumption. Several studies found barriers such as perceived lactose intolerance, negative association with taste, digestive problems and concerns about fat content (Vorster *et al*., 2013:S63) while price or even cultural barriers against dairy products in developing countries further impact on lower consumption.

4.2.5.5 Consumption of energy-dense foods

Respondents consumed *sweets* once a day in both at risk (35.9%) and food insecure (50.0%) groups (Table 4.5). A tendency to differ was obtained between these respondents and the daily consumption of energy-dense foods (r=0.31; p<0.05) when compared to most food secure respondents never/seldom consuming sweets. Foods items listed as energy-dense foods in this study include sugary sweets and chips/snacks. *Chips/snacks* were mostly consumed between two and six days a week by food secure respondents (44.5%) (Table 4.4, Appendix D). In an article by Liebman (2012:7), the American Heart Association suggested that women who consumed less than 33ml and men 48ml sugar daily could have slimmer waist lines, and a lower risk of heart disease, diabetes, osteoporosis and hypertension. According to the World Health Organisation (WHO), the intake of salt should be less than 5g per person per day to decrease the chance of cardiovascular disease (Mishra *et al.,* 2016:8); furthermore, Mishra *et al.* (2016:14) state that the consumption of salt is associated with high blood pressure, strokes and kidney malfunction.

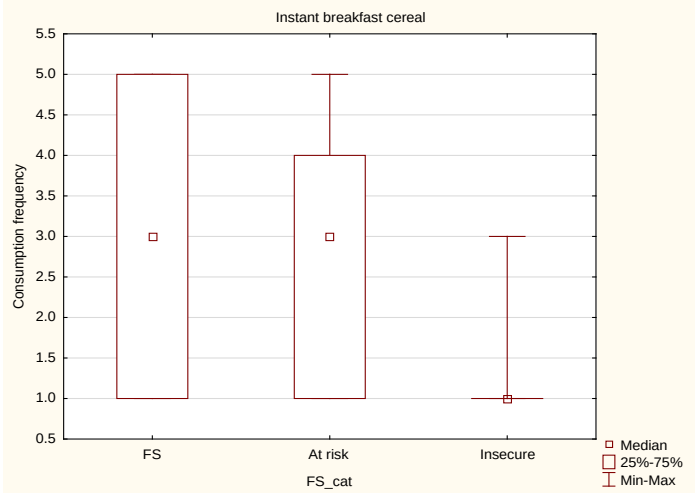
The term ‘junk’ foods is used for foods which are easy to prepare and quick to consume. They often consist of more fat, sugar and salt (sodium) than nutrients (Mishra *et al.,* 2016:4, 6). In the current study, focus was placed on energy-dense foods, such as sweets and chocolates, as well as potato chips/snacks, which may be referred to as ‘junk’ foods as they are fried and high in saturated fats and salt. The main source of salt in South Africa has been identified in processed foods (Wentzel-Viljoen *et al*., 2013:S112). Overconsumption and an excess intake of fatty foods and salt increase the risk of developing non-communicable diseases in South Africa, hence the need to promote a healthy lifestyle by increasing physical activity and healthy eating habits is highlighted (Botha *et al*., 2013:S19).

According to Claasen *et al.* (2016:8), there has been an overall increase in consumption of energy-dense food intake, sugar-sweetened beverages, processed and packaged foods, animal source foods, and added caloric sweeteners in rural communities, specifically in Mpumalanga. On the other hand, vegetable consumption has decreased. The increased consumption of sugary foods gives cause for concern, as does the decrease in vegetable consumption. In the current study, respondents communicated, sugar-filled foods were affordable, tasty and convenient,

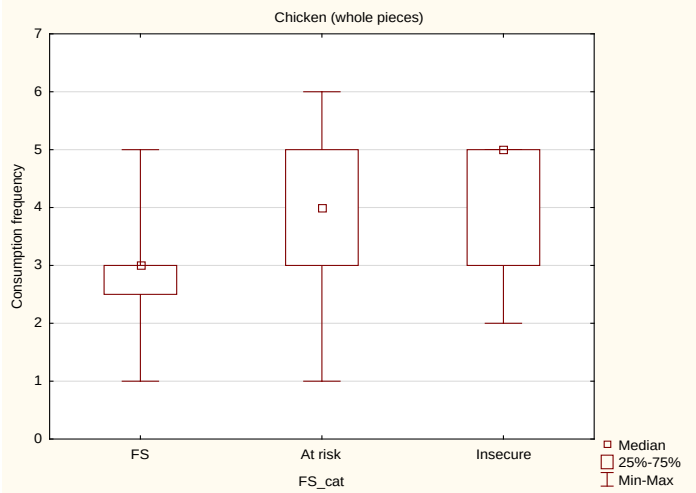
hence the increased consumption. Vegetables, however, were reported to have been consumed on special occasions for instance over the weekend, which accounted for the decrease in consumption.

4.2.5.6 Box plot representation of statistical significant differences within food security groups

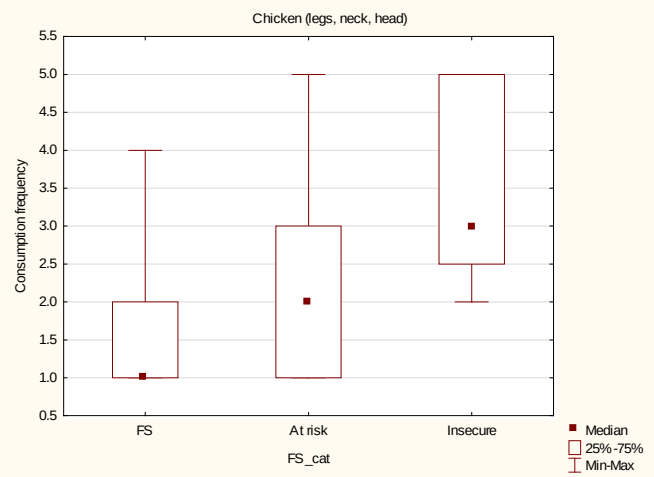
Significant differences in consumption patterns of foods often consumed, can be viewed in Figure 4.6 (a-e). Food secure and at risk respondents both showed a median of consumption of instant breakfast cereal of two to four days a week whereas food insecure respondents seldom/never consumed instant breakfast cereal (Figure 4.6a). The median chicken consumption by food insecure respondents were two to four days a week, at risk respondents more than four days a week and food insecure respondents once a day (Figure 4.6b). The consumption frequency of chicken by food insecure respondents was perhaps higher because it was more affordable than other animal protein food sources (Du Plessis *et al*., 2013:S133). Chicken legs, neck and head were also popular amongst food insecure respondents, showing a median of two to four days a week (Figure 4.6c). The median of at risk respondents consumed chicken (legs, neck, head) one day a week, whereas food secure respondents seldom or never consumed chicken (legs, neck or head). Chicken pieces, other parts of the chicken (legs, neck, head or giblets) are inexpensive and their affordability may be a reason for their frequent consumption by food insecure respondents, and in some cases at risk respondents. The median of food insecure and at risk respondents consumed chicken giblets between two and four days a week, while food secure respondents consumed chicken giblets only one day a week (Figure 4.6d). The median of food secure respondents consumed sweets only one day a week, whereas at risk respondents between two and four days a week while food insecure respondents consumed sweets more than four days in a week, up to once a day (Figure 4.6e).



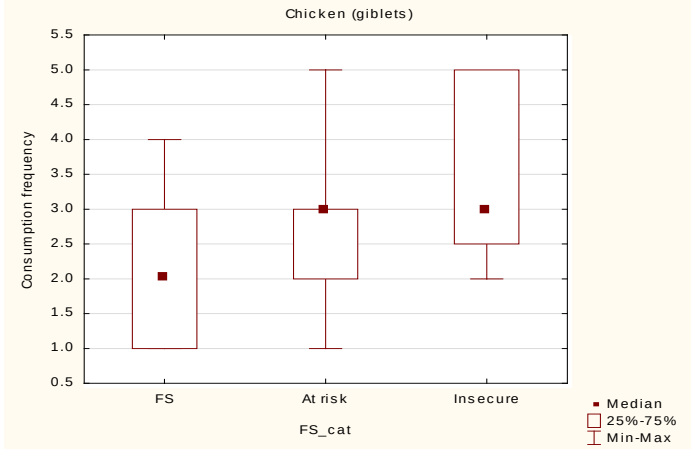
a) Instant breakfast cereal



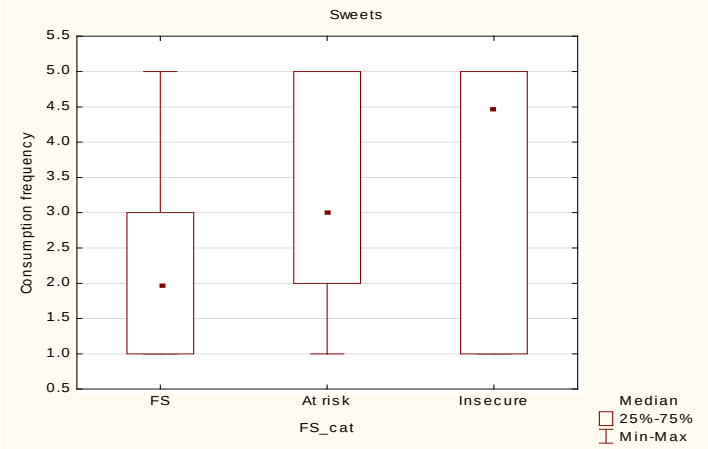
b) Chicken (whole pieces)



c) Chicken (legs, neck, head)



d) Chicken (giblets)



e) Sweets

Figure 4.6: Consumption of foods within food security groups with statistical significant differences represented on box plots.

**All box plots indicate the Food Secure group as FS, and the Food Security category as FS_cat.*

4.2.6 Understanding household food consumption patterns

When observing involvement in food eating choices within households at the VIS community, a tendency was found that 94.4% of food secure respondents were involved with the household's food consumption choices, followed by at risk respondents (89.7%) and a smaller group of food insecure respondents (66.7%) (Table 4.3, Section 4.2.1). It is essential to gain a better understanding of the coping strategies of households before providing support and assistance to improve their food choices and promote household food security status. According to a study by Smith *et al.* (2013:281), low food security households make compromises on certain food groups, namely fruit and vegetables, cereals and milk, but not on animal proteins (meat, fish and poultry). Furthermore, the small amount of money spent on food within this food security group is of great concern. Respondents who reported that their household experienced moderate food security showed a pattern of less compromise on food groups.

Respondents were asked if they *consumed foods which were available yet not preferred,* and it was reported that most at risk respondents (53.8%) were seldom/never found in this situation (Table 4.3, Section 4.2.1). This is a positive result because it shows that respondents from this particular group were not a concern in this respect and with the correct coping strategies could become more food secure. In comparison, more than half of the food insecure respondents had to '*consume foods which were available in their households yet not preferred*', up to two days in a month (58.3%). This category reflected a medium effect size with a tendency to differ (r=0.37; p=0.002). A large percentage of food insecure households (41.7%) had to *limit portion size for households* at least once a week, which is a concern because incorrect or lower amounts of foods are being consumed, whereas at risk households *limited portion size* once or twice per month (46.2%), which reflects a tendency to a smaller risk, but which should be addressed to improve the food security situation of these households. Food secure households seldom or never had to *limit portion size* (94.4%) (r=0.52; p=0.00). A larger proportion of food insecure respondents (66.7%) *borrowed money* from a family member or a friend once or twice a month to purchase foods, and a smaller number of respondents at risk (46.2%) borrowed money for food once or twice in the month, generally towards the last week of the month when their income was depleted. These values were found to be of medium effect, thereby presenting tendencies (r=0.39; p=0.00). Throughout feedback from the various respondents (refer to Table 4.3, Section 4.2.1), it was found that food was purchased mostly from a local supermarket, Shoprite, as this was the only supermarket in the area and is located in Jan Kempdorp, reflecting food secure (100.0%), at risk (100.0%), but a tendency to be less by food insecure (83.3%) respondents. It was found that a local spaza shop was a convenient place to purchase food items throughout the week, but food was said to be more expensive at spaza shops. Food insecure respondents tended to purchase foods from spaza shops most frequently, compared to at risk or food secure respondents. It would

be necessary to educate food insecure households on the price factor relating to foods from spaza shops, which could be affecting other consumption behaviour in their household. Food secure households very seldom *consumed foods available yet not preferred, limited portion size or borrowed money for food*, therefore these categories were not necessary for discussion.

More than a quarter of the respondents had access to a vegetable garden (27.6%), and to animals for food purposes, such as chickens, sheep, pigs and cattle (23.0%) (Table 4.6, Appendix D). These figures have an important impact on sustainability in the community, and show that the majority of households do not take part in community farming activities. This affects directly the amount of money spent on foods in supermarkets. In a previous study by van Wyk (2014:71), it was found that majority of respondents in the VIS did not engage in self-production activities and therefore did not have access to vegetables or livestock for food purposes, which supports the current study's findings, reflecting a lack of time, knowledge and finances to engage in self-production activities. This shows that there has been little improvement in the VIS within the last 3 years for growing of vegetables and keeping livestock for food purposes. There was positive interest from respondents from both studies for involvement in self-production activities to aid their household consumption, and in certain instances to generate a second income from selling vegetables grown from home.

Spending patterns of respondents from all three food security status groups were explored by asking them how frequently income was spent on food, clothing, household needs, transport, schooling and leisure. It was discovered that the majority of food secure households (83.3%), and all insecure (100.0%) and households at risk (100.0%) spent income on food on a monthly basis (Table 4.7, Appendix D). A small proportion of food secure households purchased certain foods on a weekly basis (13.9%), such as meats, bread and milk, as they were able to afford this pattern of purchasing behaviour. Statistics show that poorer South African households spent a large portion of their income on bread and cereals, while non-poor households spent a larger amount on meat and fish (Stats SA, 2017:111). Participants from all three food security groups spent monthly income on electricity, transport, schooling and household appliances. Respondents from all three food security status groups rarely spent money on leisure, in the form of holidays, visiting family or socialising. Price increases or decreases of food and non-food items as well as money spent on these items affect the ability to purchase food (Pretorius & Sliwa, 2011:181). It is thus especially important to assist respondents representing their household, with food choices for consumption as one of the objectives of this study. It was therefore decided to explore this community's personal food security needs and food choices during Phase 2 of this study.

4.3 Phase 2: Qualitative household food security needs

Participants (N=46) were recruited for the qualitative phase, of which 37% were food secure and 63% either at risk or insecure (Figure 4.1, refer to Section 4.2.1). The objective of this phase was to gain a better understanding of daily problems participants experience with regard to food consumption challenges, household food needs and challenges with food choices (Table 4.6). The information obtained through qualitative interviews was interpreted within the context of food security status obtained from the quantitative data. Participants mostly preferred to continue with the qualitative interviews shortly after completing the quantitative questionnaire. The conversation started with an informal discussion about their food consumption. The main findings will be discussed and linked with actual consumption patterns from Phase 1.

Participants communicated information about their food consumption patterns. They described their main meal, generally supper time, to include a choice of lamb/chicken/beef/fish/mince and less popular pork, with a starch, either potatoes/rice/pap/bread, and vegetables such as coleslaw, spinach (morogo), cabbage, broccoli, cauliflower, pumpkin, green beans. Most meals are accompanied with gravy/tomato relish, which is prepared from tomatoes and onions. Other meals are macaroni and mince, spaghetti bolognaise, beef/chicken stews and dumplings which are fried dough with meat inside served with gravy. Typical foods consumed as a meal included pork sausages (russian) and chips, bread or chips and beef sausage or 'patties', amasi and pap, and eggs and bread. Meals or food which participants did not prefer but was the available option in the household when money was not available, was maize meal with spinach (morogo). It was further important to understand that there are foods which a number of participants do not eat. They said that "*it gives me a rash*" or "*I am allergic to pork"*. Reasons for restricted foods was not part of this study but traditionally restrictions have cultural, religious roots or to protect human health (Meyer-Rochow, 2009:5). However, religious reasons may also play a role in food consumption practices.

Other food items participants enjoyed eating was 'vetkoek' as a convenient food product which was purchased during the day if hungry at work. This was affordable for food insecure participants, hence its popularity. Participants described animal proteins as foods which were consumed on special occasions such as a Saturday or Sunday lunch because they were generally expensive and could not consume these food items more frequently. Participants, specifically from the food secure group, found that purchasing meat in bulk from the local butchery or from a farmer was more affordable than buying from a supermarket. Vegetables such as pumpkin, spinach and green beans were consumed at Saturday or Sunday lunch; these foods were consumed more regularly by food secure participants due to affordability. Beans were prepared in soups and stews in the VIS households. It was mentioned by many of the participants that

avocado pears were widely enjoyed. Participants stated that the fruit they most popularly consumed included apples, bananas, pears and grapes. Other fruit enjoyed by the community throughout different seasons of the year included citrus fruits (oranges), papaya, mango, pineapple, plum, peach, pomelo, watermelon, dried fruit, litchi. Many participants said that they ate fruit twice a day. Dried fruit was also consumed by many participants and included dried pear or dried raisins.

Participants mentioned that non-dairy coffee creamers (*Cremora*/*Ellis Brown*) were affordable and lasted longer than fresh milk, a cost saving for many who enjoyed this item, resulting in consumption from all three groups in Phase 1 of the study, food secure (47.2%), at risk (35.9%) and food insecure (41.7%) once daily (Figure 4.4(a), Appendix D). Participants were not aware that coffee creamers were not dairy products, hence the association with "milk substitutes". Tea or coffee with sweeteners and creamers should be consumed with caution to improve overall health (Liebman, 2012:5). According to the interviews, cheese was consumed only once per week, because it was expensive. Participants stated that "*cheese is enjoyable, however this food item has become more expensive and cannot be consumed more often*". Expensive food items restricted frequent consumption for VIS households. It was also observed during Phase 1 that several insecure households consumed sweet/snacks daily. They noted in Phase 2 that these foods "*satisfy their hunger needs*", and were "*enjoyable*", "*affordable*" and "*accessible*". Participants indicated that they were not aware of the poor nutritional value of these foods. Energy-dense foods or 'junk' foods are low in nutritional value, with a high kilojoule value. Consumption of these foods should be limited out of concern that they are not healthy. People who consume 'junk' foods regularly may suffer from nutritional deficiencies, causing health problems (Mishra *et al.,* 2016:2, 3), therefore, total daily sugar intake should be limited (Liebman, 2012:7). Many participants did not know if these products were healthy or unhealthy and requested more information about various healthy and unhealthy foods. Participants who took part in the face-to-face interviews shared information about their consumption behaviour and daily food choice at home and when buying food. They also noted the challenges they experienced regarding different food choices and indicated their food skill requirements (Table 4.6.)

4.3.1 Personal experiences of participants from the VIS

Participants were asked to share opinions, needs and feelings about their households' food challenges, consumption patterns and choices. These concepts and sub-concepts were grouped according to four themes.

Table 4.6: Full descriptions of themes, concepts and sub-concepts identified from the qualitative phase

Concept and sub-concepts	Transcriptions from interviewer-administered face-to-face interviews
THEME 1: Food choice decisions in the household	
• Self-decision	*"I eat what I feel like"(p#1,22,24)* *"Whatever I feel like eating, I buy that food….Otherwise I eat whatever is in the house"(P#21)* *"I eat what I enjoy"(P#3)* *"I decide what I eat….what I like"(P#16,40,43,45)* *"I eat simple foods because I enjoy these, i.e. Bread (toast) and butter, with a glass of water"…"I drink 2 liters of water a day"(P#19)* *"I live alone so I eat a lot of fast foods….I enjoy this… I don't often cook for myself"(P#20)* *"Whatever is in the fridge (P#10,23), we cook…also we eat what we crave" (P#13,16)* *"I don't eat breakfast, but for dinner, I eat what I feel like"(P#22)* *"There is always food in the house, we are well prepared"(P#2)*
• Wife's/partners decision	*"My wife cooks(P#7,41), I am not fussy" (P#3)* *"My *wife decides what we are going to eat(P#46),sometimes asks me (P#27) (*Wife P#10,11,27,28,29,33,35,41,42,46,47). *Mother P#30, *Life partner P#29, *Child P# 38, *Girlfriend P#28,32)* *"I like food which makes me feel full" (P#7,39)* *"My wife decides for us, she cooks varieties, she knows what the family likes to eat"(P#10)* *"My wife decides what we will eat…2 meals per day…use to this pattern"(P#37)* *"I get home from work, my girlfriend decides what we will eat and cooks"(P#28,32)*
• Availability	*"What is available in the house"(P#6,8,9,11,21,38,42)* *"We eat what is available in the kitchen and cook for the family…Sometimes we have to ask our parents for food"(P#6) "What we have bought, we cook"(P#44)* *"My child sometimes makes food before I get home from work…cooks what is available in the kitchen".(P#38)* *"…rotation of food (P#11), cook different foods every night… we use what is available in the fridge"(P#13,23)* *"…during the day I eat less because there is no time at work"(P#24)*
• Affordability	*"We don't have a timetable, but we eat what the family enjoys and what we can afford". (P#4)* *" I buy cheap foods (P#26,40) and what I enjoy eating/budget allows" (P#25)* *"Depends on money matters"(P#44)* *"I eat foods which are cheap because that's what I can afford" (P#40)*
• Planned schedule	*"…know each day – schedule" (P#31)* *"We cook three times a week, the rest of the week we eat quick meals i.e. fish fingers, eggs and bacon".* *"…rotation of food, cook different foods every night…"* *"We know each day what we will eat, we have a schedule…been doing for a long time…we like the food we eat, we have a pattern"(P#31)* *"We have a 7 day menu, my life partner and myself"(P#29)*

	"…make enough food for three days. Wife decides….If no food in house, we buy biscuits" "….don't eat meat at night, out of habit"(P#47)
• Health related	*"...We eat healthy (P#14,35) and we like it" (P#28)* *"look at my high blood pressure (P#37), foods that give me energy" (P#16,43)* *"….depends on my appetite, what I feel like…fast foods, I am not healthy"(P#39)*
THEME 2: Food choice decisions in the grocery store	
• Decision pattern	*"When buying….start at aisle 1, move to end…takes what we need while walking" (P#26)* *"…buy what we need most…see things on shelves and take it"(P#42)* *"..purchase what we feel like (P#7), there is always an option" We top up food weekly, so that we have varieties available"(P#2)* *"We buy what we need for one week, no list"(P#12)* *"..no shopping list…know what we need"(P#4,18)* *"…wife decides…needs in month, and we both buy, see how much money we have on pay day" (P#21)* *"We work according to menu and buy brands I am familiar with"(P#29,33)* *"Wife buys with children, she knows…same every month"(P#41)* *"buy what is familiar (P#3,6,21)" "..always buy necessities"(P#3)* *"…as I know the products… and choose familiar foods"* *"…choose food that I need…what children love"(P#16)* *"…buy brands, not price. Don't buy what eye sees"(P#33)* *"I use labels when buying" (P#6,37)* *"check expiry dates"(P#7,37)* *"If products are close to expiry, don't buy"(P#24)* *"Wife and I decide" (P#7,21,35,47)* *"Wife decides" (P#21,24,36,37,41), "What I like (P#23,24,28,42,43), and need "(P#16,19,25,28,49)* *"Walk through the isle (P#26), What I enjoy to eat (P#33)*
• Make a list of needed items	*"Wife decides on menu"(P#33)* *"Wife and I buy together" (P#15,33,47)* *"…wife writes a list (P#17,18,24,25,28,33,35), what we need (P#10,11,12,15,28) and like at home (P#18,19,28,42,47" "…always buy meat"(P#28)* *"Work from schedule/list…what we need in the house (P#31)* *"Make a list (P#10)…what we need at home" (P#9,16,47)* *"We make a list of what we need' (P#7,28,38)* *"Wife buys food (P#36), I stand outside…she has a list" (P#17)* *"..check what's in the fridge, make a list and stock up" (P#10)* *"We make a list…standard procedure"(P#11)* *"We make a list of what we need, look at budget…wife buys" (P#19)* *"First check money and make a list…buy what I like" (P#22,43)* *"Make a list, I buy foods that I know I will use all month" (P#24)* *" make a list, also buy what I like/need"(P#25,32)*
• Health	*"Wife chooses according to my health"(P#37)* *" …and buy some healthy foods" (P#4)* *"..buy foods around my strict banting diet"(P#13)*
✓ Quality	*" We buy our meat from the butchery or from farmer"(P#1,3)* *"….buy quality foods" (P#4,5)*
• Affordability	*"… depends on price"(P#4), money(P#31)* *"… and what we can afford (P#3) with our budget"(P#25)*

	"…look at price" (P#4,6,8,13,16,27,39) *"See how much money we have" (P#21)* *"I buy food that I know (P#9), compare prices"(P#40,43,46,49)* *"…according to budget(P#30,40,45,49) and price"(P#16)* *"Choose favourite foods, don't always look at price"(P#32)* *"Wife chooses according to my budget, buy enough for one week"(P#37)*
✓ Price/Budget/Cheaper brands	*"…mom buys my food, I give money, I budget, buy every second day"(P#30)* *"…purchase foods in bulk, i.e. 12 tins fish…prepare for 1-2 months"(P#14)* *"check prices, promo's" (P#6,7,8,40,46)* *"Want to buy promotional foods but miss this… get paid after promo's"(P#6)* *"…buy food on special" (P#9,12,15,25,38,39,44)* *"…buy cheaper brands(P#21), specials" (P#11)* *"We look at specials/price" (P#7,13,20,25,39)* *"…don't buy specials"(P#18)* *"…look at pamphlets for specials and good price, also buy favourite foods"(P#20)* *"…various prices are not a big deciding factor" (P#22)* *"Price determines… irrelevant of brands" "We buy with our budget and what we need"(P#27)* *"I like my brands (P#29,38), look for promos/specials, check budget"(P#37,38,39)* *"…look at price (cheapest P#14,31) and specials, not brands" (P#27,35,39)* *"…mark specials in newspaper before buying"(P#44)* *"…wife and I decide…look at specials/price, I pay.."* *"…check budget, check specials…"(P#38)* *"…what we like, also look at specials"(P#7,14)*
THEME 3: Daily challenges regarding food choice decisions	
• Need knowledge	*"I rely on other people for better information"(P#30)* *"I only buy what I know…this might limit me to choice"* *"I don't know enough about food when buying" (P#45,46)* *"…help with more knowledge on nutritional information"(P#43)* *"Not familiar with information on products"(P#4)* *"...need education on the expiry dates on products" (P#5)* *"I can't read labels" (P#20)* *"…have to see if product has expired (P#24), takes time"* *"I only buy what I know(P#46), don't understand all labels" (P#25)* *"…need to be informed about labels/expiry dates"(P#29)* *"…can't read labels, wife and daughter come with to read for me"(P#7)* *"…false advertising and labeling is not correct" (P#11)*
✓ Food & health related	*"I buy unhealthy foods because they are cheaper"(P#12)* *"want to know more about food – make me feel better/healthy"(P#18)* *"I know what food is good for my health" (P#45)* *"We don't have enough information about the foods we purchase"(P#15)* *"…need information on food type(P#35), I only know basic"(P#41)* *"Not familiar with information on healthy vs unhealthy foods"(P#22)* *"I don't have enough knowledge on healthy and unhealthy foods, need help"(P#31)* *"I need help with menu (weekly)…healthy foods, I don't understand"(P#44)* *"…I need information about good/bad foods, i.e. salt, sugar, oil, meat?"(P#21,47)*
✓ Time constraints	*"…lack of time"*

✓ Food shortages/restrictions	*"There is not a variety of food and prices, i.e. apples"(P#6)* *"Don't have money to eat meat every day, but we don't get hungry"(P#12)* *"I buy cheapest foods…I understand price" (P#14)* *"if I am not familiar with product, I buy cheapest" (P#31)* *"I choose foods that make me feel full(P#7) for longer"(P#39)* *"Information on fruit/vegetables very limited, also prices are high, can't buy same as previously"(P#3)*
✓ Financial aspects	*"…will buy cheapest product"(P#25)* *"Food is expensive"(P#3,39)* *"…I can't budget when I buy food"* *"Money doesn't last"(P#5)* *"…budget never works out"(P#23)* *"…reduce buying many things…because of budget" (P#16)* *"I struggle to budget and work with money when buying"(P#38)* *"I need help with money matters/budget"(P#17)* *"I have to buy food I need but didn't prepare for" (P#27)*
THEME 4: Knowledge and skills required	
• Financial (budget)	*"…run short of food, which is a great concern"(P#6)* *"I buy food alone(P#44), may not always be enough for the month for family"* *"When we don't have enough money(P#40), I make a plan for the kids to have food…groceries always finish early, this is a problem"(P#47)* *"Have to ask mom/dad for money 2-3 days before pay day, for food"(P#11)* *"I have a problem with my budget and buying food to eat…never enough"* *"not enough money…have a shortage of meats to eat with pap, i.e. beef, chicken…we lend money to buy meat...it is expensive" (P#21)* *"Red meat (P#23), cheese (P#6) is expensive…"* *"I don't have a lot of money…and food is expensive…can't afford to buy food which is good for my health, therefore child doesn't eat healthy either"(P#24)* *"Don't eat every night, no food because of no money… run out of food by 20th of every month" (P#25)* *"…before pay day, no meat…we then eat pap and milk"(P#31)* *"…not always enough money for food, owe people money…girlfriend helps with finances"(P#32)* *"Struggling with money at month end, shortage of food for household" (P#35,38)* *"I think pap, morogo, milk and fruit is healthy…don't always have enough money to buy these foods"(P#40)* *"I have no money"(P#41)* *"I don't have enough money for fruits/vegetables but always have basics"(P#42,49)* *"…also month end, not enough food"* *"Other family distribute food (borrow food from family"(P#6)* *"Sometimes I have to borrow food from family"(P#47)* *"…draw up a budget and withdraw from loan sharks"(P#5)* *"I don't know what to eat(P#6), food is expensive, please help with money matters"* *"Need help to manage my budget…information and training on loans and food varieties…" (P#7)* *"…need training on money matters"(P#17)* *"…please help me to better manage my spending"(P#28)* *"…where I can save…budget(P#43), buy food products for household that are more affordable"(P#31)* *"I need methods to work with my money better and safer"(P#32)* *"I would like skills to cook and work with money on my own, also business skills. I want to have my own caravan food shop… Can we get training?"(P#38)* *"Want to know more about food and budget"(P#43)* *"…need skills to stretch my money…budget" (P#18,23)*

• Vegetable gardens	*"I want to have a garden with onions, tomatoes, strawberry, mint…problem we have is insects and heat in summer"(P#3)* *"…want to make better food choices. I have water to grow vegetables but struggling in soil type"(P#12)* *"Please can we have information/training for a vegetable garden…want to expand current garden…Also I want to learn what types of foods are healthy…suggestion to put posters up for us?"(P#14)* *"I think my place is too small for a vegetable garden, need information on alternatives and benefits"(P#17)* *"… like to learn to grow vegetables, I have done this previously…I am lazy"(P#23)* *"There is no yard where I live, alternatives to planting vegetables?...goats eat everything" "I am always at work, don't have time to manage a garden and shortage of water"(P#25)* *"….need knowledge on vegetable gardens, money management and training on food budget"(P#4)* *"…needs skills for a vegetable garden, teach me to grow food please"(P#42)* *"I want to understand more of types of foods, sun/water for a vegetable garden…please provide training"(P#31)* *" I spend more money buying vegetables"*
• Food choices	*"….need practical skills (P#44) and information about various foods so that I can manage my household better"(P#38)* *Sometimes I eat portions too big, even if I'm full. I don't eat breakfast, not use to it"(P#27)* *"I need skills when choosing foods" (P#18)* *"…can't cook properly, need help…not sure how to cook vegetables or make dough"(P#20)* *"Don't like cooking…mother cooks"(P#30)* *"…don't always feel like eating, go to bed hungry"(P#9)* *"Don't have all ingredients to cook, also don't have the correct pots/pans" (P#21)* *"Don't have electricity, only paraffin stove…have to eat foods immediately, cant store foods"(P#25)* *"…Parents sometimes eat less so that children can always eat enough"(P#7)* *"we buy perishables weekly, we don't have a fridge"(P#24)*
✓ Healthy choices	*"Need more health related information, to know effects of sugar, salt, fats"(P#10)* *"…not always eating healthy, also not hungry in the day, why?"(P#18)* *"Need more information on healthy food and different types" (P#19)* *"…daughter very overweight…We need a healthy diet for her"(P#22)* *"My opinion of healthy foods is bread, eggs, amasi, cabbage, unhealthy is pap with sugar/oil… I need information of foods that are actually healthy"(P#26)* *"…not always healthy, eat foods baked in oil…cholesterol?(P#27)* *"child eats unhealthy…I don't teach her right"(P#32)* *"I eat unhealthy"* *"…more information to cook foods…good vs bad foods"(P#29)* *"…like to know what to eat that is healthy, not too much sugar? Too much salt? Certain foods are better?...need help with these questions"(P#10)* *"Interested to know what foods are good for me…is what I buy good/bad?"(P#15)* *"…training on cooking(P#42) and preparing foods, what are healthy/unhealthy foods and health effects, i.e. sugar is bad for teeth"(P#20)* *"…need knowledge on different healthy foods" "…maybe they can have training courses at the VIS"(P#3)* *"…which foods can I buy that are cheaper yet healthy?"(P#25)* *"…provide us with pictures and training of healthy and unhealthy food"(P#39)* *"I know what is good/bad, but still eat it"(P#11)* *"I eat unhealthy because I lack time…takeaways"(P#3)*

✓ Food/Label information	*"Need more knowledge on products"(P#12)* *"I lose my appetite because I have low blood pressure…always tired, need skills and knowledge to inform me"(P#24)* *"…I have high blood pressure, request more information on what to eat"(P#24)* *"…and no knowledge on foods"(P#41)* *".need more knowledge on foods with iron…healthy foods, foods that won't make me tired"(P#3)* *"Spaza shops sell expired products, I check this, my money is my quality"(P#4)* *"It would be nice to have training on various foods…I have blood pressure problems"(P#37)* *"…give information about different foods, good vs bad, cheap vs expensive"(P#27)* *"I require training/education about food types"(P#25,28,42)* *"children are at school so they help read labels"(P#7)* *"I want skills about good foods, want to live well…ways to prepare foods"(P#47)* *"Please provide us with skills and posters/pictures of food"(P#6,44,47)*

4.3.1.1 Food choice decisions in the household (Theme 1)

The first theme covers information of participants on food choices in the household. The question was *"How do you decide what to eat?"* Concepts are revealed as self-decision, wife/partners decision, availability, affordability, planned schedule and health related aspects. The main decision makers were either the participants themselves or their wives. Participants who made food decisions themselves ate what they liked and enjoyed, which was a simple decision because they were generally the breadwinners *("I eat simple foods because I enjoy them,* for example, *bread (toast) and butter, with a glass of water"*) (P19). Most of the male participants indicated that their wives made the food choices and did the cooking for the household (*"My wife decides what we will eat, she cooks varieties…she knows what the family likes to eat"*) (P10). Single males tended to be more involved in unhealthy eating choices as they more frequently relied on fast foods ("*I live alone so I eat a lot of fast foods, I enjoy this, and I don't often cook for myself*") (P20). Foods which were chosen were not necessarily healthy foods and many participants were aware of it ("*…depends on my appetite, eat what I feel like…fast foods, I am not healthy"*) (P39). However, certain participants indicated a preference for healthy food choices *("…my girlfriend decides what we will eat and cooks, we eat healthy because we like it"*) (P28), especially when there was input from more than one person making the household food decisions. Often foods which were available in the household were an important factor in deciding what eat (*"We eat what is available in our kitchen and cook for the family…sometimes we have to ask our parents for food*") (P6) and sometimes children would cook for the family by using food which was available at home ("*My child sometimes makes food…cooks what is available"*) (P38). According to Wiig and Smith (2008:1733), nutrition education is important for children due to the role children play in food-related activities, food habits and preferences developed early in life and which can support their family and adulthood. Participants representing their household consumed foods they were able to afford and therefore were not always having balanced, healthy meals ("*I eat foods which are cheap because that's what I can afford"*) (P40) or they followed familiar

consumption patterns *("We know each day what we will eat, we have a schedule…been doing for a long time, we like the food we eat, we have a pattern"*) (P31), otherwise did not consume sufficient foods during the day, especially those participants who did not have much time available at work (*"During the day I eat less because there is no time at work"*) (P24). Dietary guidelines which serve to improve the nutritional quality of consumers' diets should be based on physical factors and dynamics that shape everyday food choices (Legwegoh & Hovorka, 2016:90), so that goals may be reached to improve food and nutrition security. The decisions of what to eat depended on factors which affect food purchasing, to be discussed under Theme 2.

4.3.1.2 Food choice decisions in the grocery store (Theme 2)

Concepts such as decision patterns, making a list, health, affordability and price factors (budget and cheaper brands), influenced participants purchasing decisions. It was evident that several participants use grocery lists, which and can be seen as planned purchase behaviour, while price of food items or buying according to a budget were the most important concepts revealed for food choices in the retail environment (Table 4.6 Theme 2). The ability to adhere to a budget may be a reason for some households to maintain a food security status or at least limit incidences of having to reduce portion sizes. Participants from food secure households were more inclined to buy what they want. Many participants were concerned about their health and diet ("*…buy foods around my strict Banting diet"* (P13)*,* (*"Wife chooses foods according to my health"*) (P37). Buying quality foods from good sources was important within certain households ("*We buy our meats from the butchery or from the farmer"*) (P1, 3) *and* (*"we buy quality foods"*) (P4, 5)*.* Food secure participants who earned a higher income also indicated that they bought meat from a farmer instead of a grocery store. In contrast, more participants were concerned with affordability and price of food. Affordability played an important role within the community when purchasing foods: (*"Wife chooses according to my budget, buy enough for one week"*) (P37) and (*"depends on price"*) (P4)*,* (*"what we can afford with our budget"*) (P3, 25). It was found that low-income households which were food insecure struggled with affordability of food items, whereas at risk households would spend their money on desired food items and realise later that they had overspent, for example by purchasing expensive foods such as cheese. Low-income households would find ways to adjust to increased costs, whereas middle-income households bought foods which were preferred, regardless of the cost (Legwegoh & Hovorka, 2016:84). In Legwegoh and Hovorka's research (2016:77), the study population was urban African. However, similarities within traditional eating and spending patterns relate to the present study. Although cultural and social factors influence choice of foods, cost is frequently the main determining factor for food choice in urban Africa (Legwegoh & Hovorka, 2016:78). Nutrition education is necessary for low-income households to ensure money is used effectively to purchase healthy food by teaching households the value of food budgeting skills and meal preparation strategies which involve

having more fruit and vegetables and less meat (Wiig & Smith, 2008:1732). Many participants in the study stated that they struggled with food budgeting ("*…need help with my budget and money matters"*) (P17) and ("*I don't know how to budget, I don't understand"*) (P25). In contrast, several participants in the study, generally those who were food secure , mentioned the current successful use of a budget when purchasing foods ("*I draw up a budget"*) (P5), ("*I choose according to a budget, I know my budget"*) (P16), ("*…good with my budget"*) (P22).

Participants indicated an interest (Theme 4) for knowledge of foods (P3, 27, 28, 39), assistance with money matters (P6, 7) and information about vegetable gardens (P14, 17, 31), to name a few. However, more research is required into low-income households with regard to changing their food preferences, i.e. for meat, as this animal protein appears to play a major role in their food choices (Wiig & Smith, 2008:1733). Foods popularly consumed by low-income households were maize meal and prepacked soup (Legwegoh & Hovorka, 2016:83). Similarly, maize meal was commonly consumed by households in the VIS, specifically in larger, unbalanced quantities by low-income households who were at risk or food insecure. Often this unbalanced eating pattern would be as a result of food price increases, forcing participants from these households to substitute a more expensive animal protein, beef, with chicken, otherwise, a more extreme case, when chicken pieces are then again substituted with legs, neck and head of the chicken, which are even more affordable (Legwegoh & Hovorka, 2016:84). However, households would often adjust their budget before making changes to their diet and food choices. In the current study, food secure, and occasionally at risk households with a middle to higher income could afford to purchase a variety of foods, consequently allowing them to consume a balanced diet, providing of course they had sufficient knowledge. Similarly, Legwegoh and Hovorka (2016:85) found that households with a higher income were able to purchase a larger variety of foods for their household.

Furthermore, lower price and cheaper brands often get preference in households in this community, as this attracted them to be able to buy more for less (*"I buy food on special"*) (P9, 12, 15, 25, 38, 39, 44), (*"Look at pamphlets for specials and good prices, compare prices*") (P20) and (*"Price determines, irrelevant of brands"*) (P27). However, some households buy what they enjoy (*"Buy what we like and whatever we need and want in the house"*) (P21, 31). Food secure and several at risk participants also preferred to buy foods in bulk to save money ("…*Purchase foods in bulk,* for example, *12 tins fish"*) (P14), however other at risk and food insecure households could not afford this type of buying behaviour.

The decision patterns of participants were explored and various purchasing behaviour were noted ("*When buying, I start in aisle 1 and move to the end, I take what we need while walking through the grocery store"*) (P26). Participants would buy known and familiar items, ("*We work according*

to a menu and buy brands I am familiar with") (P9, 33), (*"Wife buys, which is the same every month"*) (P41) and ("*We buy familiar brands*") (P3, 6, 21), *("…not according to price*") (P33). Food secure households had experienced wider choices available ("*We top up food weekly so that we have varieties available*") (P2), ("W*e purchase what we feel like (*P7), ("…*and there is always an option"*) (P2) and (*"We buy what we need most…see things on the shelves and take it"*) (P42). At risk and food insecure households experienced stricter patterns when purchasing foods ("*Buy what we need, wife and I buy, we see how much money we have on pay day"*) (P21). Many participants said that making a list before going grocery shopping was a good way to prepare what needed to be bought as well as the approximate amount to be spent *("Wife writes a list*") (P17, 18, 24, 25, 28, 33, 35), (*"what we need and like at home"*) (P25, 32), (*"We work from a schedule/list, what we need in the house"*) (P31), ("*look at price, the cheapest*") (P14, 31), ("…*always depends on money*") (P31) and (*"…check what is in the fridge, make a list and stock up*") (P10). Information on labels also helps participants to purchase foods efficiently ("*I use labels when buying and check expiry dates"*) (P37) and (*"If products are close to expiry, I don't buy"*) (P24). To meet realistic goals, emphasis must be placed on affordability, simple preparation of food, aesthetic qualities and nutrition through consumption practices of shopping, cooking and eating (Legwegoh & Hovorka, 2016:90). Participants also experienced challenges while purchasing and making food choice decisions, which prevent them from having a confident and satisfactory shopping experience. Discussion to follow.

4.3.1.3 Daily challenges regarding food choice decisions (Theme 3)

Participants had problems when buying foods at a supermarket ("*There is not a variety of food and prices,* for example, *apples*") and ("*a lack of time to buy groceries"*) (P6), which made it difficult to have a problem-free shopping experience. It was mentioned that in food insecure households, 'cheap' foods were being bought because of a limited budget ("*I am not familiar with products, I buy cheapest…"*) (P31) and ("*I buy unhealthy foods because these are cheap"*) (P25). Participants also tried to purchase foods they needed, and which looked familiar and healthy. However, healthy foods were associated with higher prices ("*I know what food is good for my health but I can't budget when I buy food, because these foods are expensive"*) (P24). Often participants have to compare prices, reduce buying quantity and need to budget. They noted that *"money doesn't last"* (P5) and *"I struggle to budget and work with money when buying"* (P38), which often occurred in food insecure households.

It was found that one of the biggest problems in the community was a lack of knowledge. Participants were not sure which foods were healthy and did not understand food labels, which forced them to buy familiar products even if they were unhealthy. Participants with family members in their household who understood food labels would occasionally assist during grocery

shopping. Many times, participants who lacked knowledge were from food insecure and at risk households, which was a reason for their poor food choices, compared to participants who represented their households that were food secure and could make more informed choices. Participants commented: *"We don't have enough information about the foods we purchase"* (P15), *"I need information about good/bad foods,* for example, *salt, sugar, oil, meat?"* (P21, P47) and *"I can't read labels, my wife and daughter come with me to read for me"* (P7). Information on food labels is a very important factor to consider during grocery shopping, but many participants lacked knowledge about food labelling and were not always able to make informed decisions.

The problems experienced during purchasing directly affects household consumption. A study by Legwegoh and Hovorka (2016:78) showed that diverse forms of diets, often Westernised food purchasing and consumption patterns, are interacting with African foodscapes, which produces new consumer cultures. As seen in the current study, the community members have taken to consuming foods that do not necessarily form part of their cultural diet norms, which include sauces, spices, energy-dense foods and fast foods such as deep-fried dough with mince (vetkoek). According to feedback from the VIS community members, fast foods are easy to access, affordable, tasty and do not require time to prepare. However, in terms of public health, high frequency consumption of affordable processed foods impacts negatively on healthy food consumption and general well-being in South African households. There is a need to explore what knowledge and skills are required for participants and community members in order to obtain and maintain an improved and healthy food security status.

4.3.1.4 Knowledge and skills required (Theme 4)

Eating patterns are affected by various negative factors which prevent households from having a consistently satisfactory consumption pattern. Participants said that not having electricity or appropriate cooking utensils affected their preparation of meals ("*I don't have all the ingredients to cook, also incorrect pots and pans"*) (P21) and ("*I don't have electricity, only paraffin stove*") (P25). Many of these households formed part of the food insecure group. Meals are often skipped due to a lack of food in the house, therefore less is being consumed. Participants said that reasons for this were financial: *"When we don't have enough money* (P40), *I will make a plan for the kids to have food* (P47)*…groceries always finish early, this is a problem"* and *"…we run short of food, which is a great concern"* (P6). Participants told us: *"I don't have a lot of money, and food is expensive…can't afford to buy food which is good for my health, therefore my child doesn't eat healthy either"* (P24), and, *"I eat unhealthy because I lack time, therefore I eat takeaways"* (P3) and *"…can't cook properly, need help,…not sure how to cook vegetables or make dough"* (P20), and lastly, *"I need more knowledge on foods with iron, healthy foods, and foods that won't make me tired"* (P3). Unfortunately a number of households did not have electricity or a fridge, so foods

cannot be stored (*"We buy foods weekly, we don't have a fridge, therefore must eat foods immediately"*) (P24).

Participants also borrow money or food towards the end of the month when there is no money to buy additional food items ("*Sometimes I have to borrow food from family*") (P47). This pattern was common in many households from insecure, at risk and a small group of food secure households. Participants emphasised a lack of information about budgeting for food needs, reading and understanding information on food labels, and knowing how to identify healthy and unhealthy foods. Comments from participants regarding budgeting were: *"I don't know what to eat, food is expensive, please help with money matters"* (P6, 17), *"Please give us information on different foods, good vs. bad, cheap vs. expensive"* (P27) and *"I require training and education about food, I need to better manage my spending"* (P28). Food insecure households in this study generally lacked the financial and budgeting skills which would have enabled them to manage their money efficiently, compared to food secure households which were able to manage their finances better and purchase foods for the entire month. According to Gundersen (2013:40), a recent study which included data from the *Survey of Household Finances and Childhood Obesity* revealed that participants from households with better financial management skills have a smaller chance of becoming food insecure than those with less financial management skills. Furthermore, participants were eager to know more about healthy/unhealthy foods ("*I would like to know what to eat that is healthy, not too much sugar, too much salt, which foods are better? Need help with these questions"*) (P10). Other participants commented: *"What are healthy foods? And health effects of unhealthy foods,* for example, *sugar is bad for teeth"* (P20), *"Maybe they can have training courses at the VIS, on healthy/unhealthy foods"* (P3) and *"Please provide us with pictures and training of healthy and unhealthy food"* (P39). Consumers have a tendency to consume processed foods, such as instant soups, processed meats, fried foods, and sugary beverages and foods (Legwegoh & Hovorka, 2016:89). Dietary patterns such as these were associated with a decrease in physical activity which increased diet-related diseases.

The last concept about which most participants had an opinion was vegetable gardens. Households in the VIS expressed an interest in starting their own small-scale vegetable gardens which can help to feed their household with certain fruits, vegetables or herbs, or by selling produce for an extra income. This in turn will make more money available for other food and non-food items, thus promoting sustainable living within the community. Food insecure, at risk and food secure participants all expressed an interest in starting a vegetable garden. Challenges/barriers were identified but these can be managed if addressed effectively. Participants gave their input and opinions as follows: *"Please can we have information and training for a vegetable garden…want to expand current garden, also want to learn what types of food are healthy…suggestion to put posters up for us in community?"* (P14), *"I think my place is*

too small for a vegetable garden, I need information on alternatives and benefits" (P17) and *"I want to understand more types of food, sun/water for a vegetable garden…please provide training"* (P31). The main challenges for a vegetable garden were identified as follows, extreme temperatures; specifically summer heat, poor soil composition, lack of knowledge/training, lack of time and limited space. Results from Gebrehiwot and van der Veen's (2014:237) study confirms that household food production plays a critical role in food security and coping capabilities. Coping strategies and support for the community will be discussed in the section to follow.

4.3.2 Household challenges, potential coping strategies and assistance with needs

Participants experienced difficulty reading and understanding the information on food labels, and managing their finances and lacked skills in food preparation as well as not being able to tell the difference between healthy and unhealthy foods (Table 4.6). The researcher has identified a concern that many participants struggled to read food product labels and expiry dates and this caused them to buy products which were close to expiry and not beneficial for their health, or an expensive item. It was mentioned that the spaza shops in the surrounding areas sell food items which have expired.

There was an interest for information relating to healthy foods, the effects of high-fat foods, sugar and salt intake and foods which increase, to be met in the form of leaflets and posters and will be presented to the community. The pamphlets and leaflets were designed after conclusions were drawn from the study, at this point it was clear what the participants' specific needs were. Public health campaigns have promoted traditional foods as the healthier option in Botswana. Such a campaign could be successful in traditional communities in the VIS, Northern Cape, by recommending diets which are affordable yet culturally and circumstantially appropriate (Legwegoh & Hovorka, 2016:90).

It is important to consume the right kinds of fat and oils, which contain polyunsaturated and monounsaturated fatty acids, instead of saturated fatty acids, which are animal fat and vegetable oils, and are associated with increased cholesterol and risk of coronary heart disease (Smuts & Wolmarans, 2013:S87, S93). Participants frequently purchased foods which were high in sugars and salt or processed food products, which is unhealthy. During the exploration of food choices in Phase 1, it was mentioned that sugar-filled sweets, chocolates, chips, for example NikNaks, and processed meats, for example pork viennas, were popularly and conveniently consumed in the VIS, often by food insecure and at risk participants, as these foods were tasty, often affordable and easily accessible. Although the higher sugar intake supplies energy needs, it lacks micronutrients (Temple & Steyn, 2013:S101) and leaves short-lived sensations of feeling satisfied or full. Many household members did not understand that energy-dense foods may give you the

sensation of feeling full, but that the high sugar content depletes energy levels and the ability to concentrate for extended periods of time (Mishra *et al.,* 2016:45).

Low-income households, specifically, choose foods which are filling when deciding what to eat (Legwegoh & Hovorka, 2016:83). A study performed in a rural community in Mpumalanga found that informal food vendors sold fried chips, vetkoek and processed cheeses and sauces, which were all energy-dense foods high in fat and low in fibre and micronutrients, and unhealthy food options (Claasen *et al.,* 2016:11), furthermore, these foods are often easily accessible, hence the obesity 'epidemic' in rural South Africa. Promoting informal food vendors who sell locally produced foods from vegetable gardens and healthier food options instead of energy-dense foods needs to be investigated and assessed (Claasen *et al.,* 2016:11). The high intake of savoury foods leads to higher salt consumption that potentially impacts blood pressure, thus escalating the risk of cardiovascular disease, coronary heart disease, hypertension, stroke, and kidney disease (Wentzel-Viljoen *et al*., 2013:S105).

Many VIS employees performed physical work and therefore their food choices play an important role in their well-being and energy levels. Factors such as poverty, lack of knowledge and social instability all affect food choices and methods of food preparation, as well as influencing healthy eating (Pretorius & Sliwa, 2011:182). The consumption of nutrient-dense foods and healthy snacks may add to an improved lifestyle, improved health and prevent diseases (Mishra *et al.,* 2016:14). It is therefore important to increase knowledge and awareness of healthy food choices. These foods include legumes, fruits, vegetables, and whole grains, as well as a diet rich in calcium, found in dairy sources, namely low-fat milk, cheese, yoghurt and amasi. In addition during Phase 2, participants at a food security risk mentioned that money was spent on alcohol. They saw this as a means of socialising, but did not understand the negative health effects or the financial burden it may have presented. Many VIS community members do not recognise that alcohol can easily be abused resulting in social, economic and health problems (Jacobs & Steyn, 2013:S114), it would be advisable to educate consumers on alcohol consumption.

Positively an interest was shown in starting vegetable gardens, but restricting factors such as poor soil composition, lack of knowledge, capital required, time available to manage the gardens and geographical factors such as extreme temperatures and the availability of land were current issues experienced. Such a community project could be proposed to the government or private bodies for financial support to allow these community members to improve their well-being. Involvement in vegetable gardens which include herbs, fruit and vegetables can be beneficial by promoting sustainability, which could further support their income if the produce was sold to other community members or local stores. Investing in rural infrastructure such as community or household vegetable gardens will assist farmers to deliver their farm produce to local stores at a

lower cost in order to fight food insecurity in anticipation of a better status (Gebrehiwot & van der Veen, 2014: 237). The establishment of vegetable gardens in South Africa has been supported by various government departments and contributed to the increased consumption of fresh produce by households and the community (Steyn & Ochse, 2013:S15). The Department of Agriculture and Rural Development also supported the establishment of community gardens. It would therefore be appropriate to approach relevant government departments for financial assistance for the VIS.

During the interviews, participants mentioned several factors which would assist them to improve their food security situation. The exploration of challenges and need requirements of VIS households allowed the researcher a better understanding to assist in the improvement of household's well-being. Participants showed a positive interest in the request for leaflets and posters to assist with the improvement of food consumption. Information and pictures of food groups, healthy/unhealthy foods, money management, reading food labels and vegetable gardens will be presented on the posters to improve household well-being. Research has proved that teaching financial management skills by making use of programmes involving food and nutrition education may improve financial literacy (Gundersen, 2013:40). Participants who could not budget or afford to buy enough food to last their household for the entire month developed coping strategies such as borrowing food or money from friends and family to get through the month. The promotion of food security can be done by providing financial assistance, food policy councils and education on food (Corrigan, 2011:1240). Data from this study revealed that basic food information, planning of food purchases and assistance with budgets may support households to improve food security status.

4.4 Conclusion

This study of income-earning respondents from the VIS community was conducted in two phases and set out to gain a better understanding of the food security status, food consumption patterns and challenges experienced within different food security status households. Households at risk of becoming food insecure made up the largest group (44.8%), followed by food secure households (41.1%), and the smallest group were the food insecure households (13.8%). Even though male respondents made up 72.4% of the study population they were involved with food consumption choices. The majority of respondents (58.6%) represented middle-income (R4 165 – R13 209) households, however food insecurity was reported amongst low-, middle- and high-income groups. It was further revealed that 43.6% of at risk and 58.3% of food insecure households' monthly food budget to feed their families was between R501 to R1500. These results reflected that a large number of households struggled to manage their finances, specifically the lower income group. Respondents were forced to resort to coping strategies for

their households' food needs, such as adjusting their diets by limiting portion size, consuming monotonous or undesirable foods or borrowing money to buy food.

Food consumption patterns in this study revealed that food secure households' daily consumption of food items were made up of a variety of food items at less frequent intervals in comparison with food insecure households' consuming a limited variety of food items. Starch as a staple carbohydrate, namely maize meal, bread and rice, were most commonly consumed by all three food security groups although the frequency differed. The consumption of chicken differed significantly amongst the three food security status groups. Chicken is a relatively inexpensive animal protein and giblets, legs, neck, head, and livers were consumed frequently by at risk and food insecure households. Beef mince, tinned fish (pilchards/tuna) and cheese were more expensive and therefore less frequently consumed by food insecure and at risk households. Respondents representing their household were not familiar with legumes such as lentils and chickpeas. Vegetables which were regularly enjoyed throughout the week by all three food security status groups were potatoes, tomatoes and cabbage. Fruit such as apples, bananas, pears and grapes were often consumed by all three food security status groups, as it appeared that participants understood the health benefit of this food item. Non-dairy coffee creamer was consumed frequently among all three food security status groups due to affordability, easy storage and shelf life but several respondents did not understand the difference between a coffee creamer and milk powder. The daily consumption of energy-dense foods such as sweets/chocolates by a large number of food insecure and at risk households was a major concern.

The number of respondents who were at risk of becoming food insecure (44.8%) was directly influenced by those who generally skipped lunch and only consumed two meals per day (47.1%) due to a lack of money to buy food. Certain respondents were not able to budget efficiently for their household or understand how to plan food consumption patterns for the month. Middle income food insecure and at risk households spent more income on non-food items such as clothing, housing, transport, education and leisure, than what they could afford.

In phase 2 of the study, it was clear that participants (often the breadwinner), were involved in the household's food choice decisions. It was further revealed that availability, affordability and buying according to a planned schedule were the main aspects that directed food choices. These concepts also emerged during food choice decisions in the grocery store when they often used shopping lists, budget and the price when choosing products. Quality and health were also important to some participants. Challenges were identified in making daily food choice decisions, included the lack of knowledge of healthy foods, reading labels, budgeting skills and managing finances. These challenges prevent households from having a successful and positive food purchasing and consumption experience. Participants indicated a need for assistance regarding

food health knowledge and information to plan and budget during food purchases. Responses included *"...need more knowledge"*, "*help with budget/spending"* and *"want to know more about food, make me feel better/healthy".* The participant's responses throughout the interviews showed a strong interest and need for education to make improved food consumption choices, learn more about starting a vegetable garden and be capable of effectively making healthy and sustainable food choices for the household. If VIS employees could adapt their lifestyles by having their own vegetable gardens, livestock or other valuable resources, it would assist them to become self-sufficient and ultimately improve their household food security status.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study of income-earning households set out to gain a better understand of food security status, food consumption patterns, food choice decisions and current coping strategies. In this chapter, the study's aim and objectives were used to draw conclusions of the main findings discussed in Chapter 4. A previous study by van Wyk (2014:74), suggested that there was a need to undertake a mixed methods study, which was applied and completed in this study. Implications and limitations were based on the results of the study, and recommendations were communicated for potential future studies and training within the Vaalharts community. The convergent mixed methods study was made up of phase 1 (N=87), the quantitative research phase which used questionnaires, and phase 2 (N=46), qualitative interviewer-administered face-to-face interviews. The research was undertaken in an agricultural farming community, namely the VIS, located in Jan Kempdorp, Northern Cape Province.

5.2 Conclusion

This study identified food secure, at risk and food insecure households from low-, middle- and high income-earning groups, all of whom expressed a similar concern. The demographic profile of the participants revealed that participants were predominantly Setswana speaking (59.8%), males (72.4%), aged 35 to 54 (32.2%) with secondary school education (Grade 8 – 11) (36.8%).

The first objective of the study was to assess participants' income and food security status. Households at risk of becoming food insecure made up the largest group (44.8%) at the VIS, followed by food secure (41.1%) and food insecure (13.8%), thus urgent attention is required to prevent at risk households of becoming food insecure. Findings reflected that food insecurity was presented in low-, middle- and high-income groups. Majority households from all three food security status groups earned a middle-income salary (R4 165 – R13 209) (58.6%) (r=0.397; p<0.05). A lack of income was thus not the reason of food insecurity in the VIS, but it was a contributing factor, together with a lack of knowledge on food labelling, varieties of food and money management for their household needs.

The second objective was to determine food consumption patterns and current coping strategies of the different food security and income groups. The majority of respondents consumed two meals per day, with a close number of respondents consuming three meals per day. Respondents who had to be at work early in the morning often did not eat breakfast, and thus formed part of the group that consumed only two meals per day. The general food consumption patterns of

starch, animal and plant proteins, fruits and vegetables, dairy products and energy-dense foods/'junk' foods persisted throughout a typical week. It was found that maize meal was commonly consumed on a daily basis as a staple food item by all three food security status groups. Low-income households, which were food insecure or at risk, spent a large amount of their income on breads and cereals such as maize meal, which may result in unbalanced diets, lacking in nutrition, but which produced a sensation of feeling full. Chicken was most frequently consumed by all three food security groups as the most affordable meat/protein for the household. Chicken legs, neck, head or giblets were even more affordable and were often consumed by the food insecure group. Most respondents representing their households were not familiar with plant proteins, such as lentils and chickpeas, therefore a large proportion seldom consumed these legumes. Peanuts were popularly consumed by many respondents as an affordable and enjoyable snack. A large proportion of households enjoyed fruits and vegetables. The consumption of dairy products was not popular, which may be due to a lack of knowledge. Non-dairy coffee creamers were often enjoyed daily in a cup of coffee or tea. Households that consumed sweets and chips/snacks need to be educated on the health concerns attached to these food items. They do not sustain for long periods and therefore the sensation of feeling full does not last long. Food items which were not popularly consumed included pork, sweet potatoes, sweet corn, sorghum/*Maltabella*, samp and *Pronutro/Futurelife*. Reasons for their absence include unfamiliarity, lack of knowledge or an unappealing taste.

Consumption patterns of food secure households

A positive observation was that food secure respondents were involved in food eating choices. Food secure respondents revealed daily consumption of instant breakfast cereals, fruit and powdered coffee creamer. The following foods showed the highest consumption percentage between two and six days a week by food secure households: bread (66.7%), maize meal (55.6%), rice (66.6%), chicken (whole pieces) (63.9%), beef stew (47.2%), eggs (41.7%), peanuts (41.7%), pumpkin (44.4%), spinach (morogo) (58.6%), carrots (63.9%), potatoes (55.5%), yoghurt/amasi (52.7%) and chips/snacks (44.5%). Food secure households often had a higher income and were able to spend more money on a variety of food items. Households classified as food secure, such as non-poor households, spent money on food monthly and weekly.

Consumption patterns of households at risk

Respondents at risk of food insecurity (89.7%) were positively involved in their household's food choices, which together with additional education may further improve this group. fruits (50%), milk (drinking) (35.9%), powdered coffee creamer (35.9%) and sweets/energy-dense foods (35.9%). Foods popularly consumed between two and six days a week include bread (51.3%), maize meal (52%), rice (61.5%), chicken (whole pieces) (56.4%) (r=0.34; p=0.028), giblets (41%)

(r=0.31; p=0.02), peanuts (38.5%), spinach (morogo) (48.8%), cabbage (48.7%), potatoes (59%), yoghurt/amasi (35.9%), cheese (35.9%), and chips/snacks (33.3%).

Consumption patterns of food insecure households

Food insecure respondents (66.7%) did not show positive involvement in the household's food eating choices. Future studies will be useful to explore this aspect. Increasing the involvement of all household members in food eating choices may make them aware of a variety of food, preparation methods and related health aspects. Foods consumed daily by food insecure respondents were chicken (whole pieces) (58.3%), livers (41.7%), fruit (50%), powdered coffee creamer (41.7%) and sweets/energy-dense foods (50.0%) (r=0.31; p<0.05). Foods popularly consumed by this group between two and six days a week are bread (66.7%), maize meal (50%), rice (50%), chicken (leg, neck, head) (41.7%), giblets (41.7%), eggs (50%), cabbage (50%) and potatoes (75%).

Households generally from a lower income group, including food insecure households and a small group of at risk households often adapted to various coping strategies during food consumption, such as changing their normal diet by consuming foods not particularly preferred but available and affordable, limiting meal portion sizes, borrowing money to buy food and borrowing food from family members. Strategies used to cope with not having enough money for food included altering spending patterns by buying more affordable foods or smaller quantities, and buying from street vendors. Statistically significant differences were found amongst these households who had to borrow money (r=0.39; p=0.00). Additional expenditure on household items other than food, often more expensive appliances, compromised the household's funds available for food. It was reported that 87.2% of at risk households spent money on appliances, for example, fridges, on a monthly basis in comparison to food secure (69.4%) and insecure (83.3%) groups. Coping strategies were apparent amongst at risk and food insecure households, furthermore both groups required financial assistance to avoid unnecessary monthly spending on household appliances so that they can improve their food security status. It was also indicated as an interest and need in Phase 2. This is a major concern as at risk households may develop food insecurity if finances are not managed effectively.

The third objective was to identify challenges regarding food choice amongst the different food security status and income groups. A large number of food secure (94.4%) and at risk (89.7%) respondents indicated that they were involved in the households' food choices, whereas a smaller number of food insecure (66.7%) respondents were involved. This high percentage of at risk respondents showing involvement in food choices is a positive shift towards food security as there is direct input from the head of the household and food choice behaviour. Focus should be placed

on food insecure households that are not directly involved in food choices, so that the continual negative impact on them is relieved.

Households which had more than one income contributor, generally two contributors, were found to be more food secure than households with only one income contributor. It was easier to meet household needs when there was enough income to purchase food items for a full month. Food insecurity was common amongst households that struggled to sustain their food consumption needs from a single income contributor. Food secure households (50.0%) were able to spend more money on food items (R1501 and R3000), compared to at risk (43.6%) and insecure (58.3%) households which spent between R501 to R1500 on food items per month. However, the latter households kept finding themselves in a situation of having exhausted their money and food sources before the end of the month, hence the classification of their food security status.

Food was generally purchased from Shoprite, the only local supermarket in Jan Kempdorp. The spaza shops and smaller convenience stores in the communities were more expensive, but convenient for buying items households ran out of during the month, such as fruit, bread and convenient foods such as vetkoek. It has however been mentioned by participants that spaza shops often sell expired food products. Food secure households who earned a higher income bought meat from the butchery to last the month.

During the qualitative face-to-face interviews, participants had the opportunity to personally share challenges regarding needs and requirements involving various concepts and sub-concepts. Participants said that they found it difficult to manage their financial situation and budget throughout the month, which meant that money was being spent on other household items or paid to 'loan sharks' who charged them high interest for the money they borrowed. Urgent assistance was required for spending patterns. Participants were interested in starting vegetable gardens, but the soil in their gardens were of poor quality and they were not familiar with planting methods and therefore they requested more information. Informed decisions when making food choices can only be possible if households obtain sufficient information to assist with these choices, such as food label knowledge, characteristics of healthy and unhealthy foods and money management skills. Children who attended school helped their parents and the older generation to read labels ("*…children are at school so they help read labels"* P7) and with other food related aspects they knew about, but this was not enough to assist household heads to make informed decisions at all times. Participants expressed a need to be able to purchase healthy, nutritious foods which are affordable and readily available in the supermarket. This can be done once they are better informed about food, including preparation and cooking methods.

The fourth objective was to make recommendations for practical solutions to maintain sustained household food security in the VIS community. Information leaflets and posters were designed by the researcher and will be printed for distribution at the VIS workplace. This material will contain basic information, as listed below in section 5.4. Posters will be put up in communal areas at the workplace for employees to view and leaflets will be handed out. The key factor is knowledge, and focusing on this aspect will make it possible to increase household food security status and well-being. Delivery of this material will be arranged once the full study has been through the examination process and the leaflets and posters have been certified.

To conclude, this study reflected internal factors affecting household utilisation of foods, namely preference, familiarity, and price and promotion perception, whereas external factors expressed by households was of knowledge of food related aspects, low-income, a lack of budgeting skills and meal planning. The researchers were able to recognise and analyse the status of households by understanding their level of knowledge. Participants need to become familiar with various foods and their nutritional value, so that meals can be made up of a wider variety of healthy and nutritious foods. Based on findings in Phase 2, households would need to develop improved consumption patterns by obtaining information about healthy and unhealthy food types, how to grow vegetable gardens, budgeting for food needs, money management skills and be able to read labels well enough to make informed food choices. These factors all have a contribution towards household food security status. Knowledge of food aspects, together with income play an important role in promoting food security. Members of the community need to comprehend that sustainability and accessibility of foods are equally important. Once sustainability is achieved, foods will be accessible at all times, thus ensuring food security. Recommendations and implementation of effective coping strategies will be discussed below.

5.3 Contribution of the study

The contribution of this study was to gain an understanding of the VIS employee's challenges regarding food security status, food choice decisions, food consumption patterns and current coping skills. The study focused on assisting the VIS with meeting food needs by establishing ways of improving their food security status by enabling households to experience an improved quality of life by consuming nutritional foods. The data was used to determine implementation methods to achieve optimal food security and sustainability in the VIS community. The quantitative and qualitative findings together with other relevant research should contribute to assist food-based interventions. The multi-dimensional nature of food security can be supported by research because opinions from participants who live in households in the community were studied, so that informed recommendations may be made to improve the rural food security situation. The researcher successfully obtained data on income and spending patterns which

allowed for the understanding on what money was spent on. This study revealed that food insecurity was represented in low-, middle- and high-income groups, which shows that middle and high-income groups may also experience a lack of food security, and the aim was to make recommendations to better the food security situation of all three groups. Moreover, it emerged that insufficient income was not the only contributing factor to food insecurity in the VIS, but rather, a lack of knowledge about a variety of healthy, nutritious and sufficient foods and effective money management. Additionally, involvement in utilising vegetable gardens and livestock for consumption and possibly generate an income might contribute to the well-being of community members. Although the findings of this study cannot be generalised, it is expected that many households in South Africa may experience similar challenges as food inflation and prices have escalated during the past years.

The participants who agreed to take part in the study did not benefit in the course of the research, but data obtained was used to make recommendations to improve the current food security status in the community, thus providing indirect benefit to participants and community members. There remains a need to implement Lifeplan® in the community to improve participants' spending patterns, budgeting and decision making skills. As discussed in van Wyk's (2014:14) study Lifeplan® is a development programme striving to improve consumers' well-being through education of consumption patterns. Based on the study findings, if food security programmes are employed in the VIS community, households would be able to increase their self-sufficiency. The distribution of understandable leaflets and posters, designed by the researcher, will contain information on vegetable gardens, food consumption patterns, budgeting skills, training and educational material which can contribute positively to this community. Furthermore, all analysed data in this study could contribute towards practical solutions to: 1) improve household food security in the community; 2) include improved spending and consumption patterns; and 3) introduce consumers to a variety of foods, and sustainable eating plans, and thereby contribute to participants' well-being.

5.4 Recommendations for coping strategies

The aim of the study was achieved by gaining a better understanding of food consumption within food secure, at risk and food insecure households. Members of the VIS community will be given educational material in the form of leaflets and posters which was designed after data analysis which includes information on the value of food consumption choices, food labels, budgeting skills and vegetable gardens. Training and education can contribute to improving their current household food security situation. Promoting sustainable livelihoods would create a means to provide affordable, quality foods for rural households (Altman *et al.,* 2009:5). Furthermore, Altman

et al. (2009:5) added that rural households should take personal responsibility for their own health and well-being. The leaflets and posters will provide knowledge on the following practical ideas:

Food consumption choices

- ✓ Design a “my plate” concept for visual understanding of food groups and eating choices
- ✓ Healthy food choices: whole and fresh grains, fruits and vegetables, and proteins (chicken, eggs, beans and lentils), which are generally more affordable

Food labels

- ✓ Ingredients list: quantity of ingredients in descending order
- ✓ Be able to point out wholesome ingredients on the list (whole wheat flour)
- ✓ Products with high fibre or protein content: be able to identify and use serving sizes

Help with food budget

- ✓ Buy products in season, when they are cheaper
- ✓ Help with household shopping list to stretch their money
- ✓ Plan meals, focus on food budget

Vegetable gardens

- ✓ How to plant a variety of easy-to-grow vegetables
- ✓ Start growing vegetables on small area for home use: vegetable gardens will supply households with fruits/vegetables/herbs, therefore money will be available for other food needs
- ✓ Sustain your household

Avoid certain food items

- ✓ Foods that consist of refined grain ingredients (cake flour)
- ✓ Foods containing high sugar (carbonated drinks), or salt (chips)
- ✓ Foods which contain saturated fat in high quantities: indicated as unsaturated fat on label (margarine)

To achieve better food security amongst income-earning rural communities, it could be beneficial to implement a support system to teach communities how to effectively minimise malnutrition by focusing on spending patterns and food consumption needs. Growing vegetables in the ground, or using alternative methods such as containers, aquaponics or hydroponics are all effective methods to garden. Educating all members of the community, for example teaching children in primary schools to grow vegetables, fruits and herbs by integrating the concept and practical methods into their learning system. This may be an effective way of saving money for the household, improve knowledge of generations to follow and becoming sustainable in the community. As a coping mechanism, cultivating their own vegetables would help these

households to take responsibility of their own food security and nutritional progress by maximising food security with existing resources (Sheriff, 2012:1). The value of information about food consumption patterns will allow households to improve their knowledge of healthy foods, including the negative effects of 'junk' foods or processed foods which contain salt, sugar and fat in excess and are low in micronutrients. The Consumer Education Project of South Africa focuses on education about milk and dairy products which is an acceptable way to create awareness of the importance and nutritional value of dairy products and of a number of other foods (www.rediscoverydairy.co.za). It is beneficial to inform households about available substitutes for expensive nutritious foods, such replacing red meat with a plant protein, for example lentils, to aid as a constructive coping strategy. Plant proteins are healthy, affordable and easy to grow, which allows for better money management. Participants should know how much food their families consume in a month to ensure better meal and financial planning within their household. Supporting informal food vendors selling locally produced foods from vegetable gardens and healthier food options instead of consuming energy-dense foods would be a good way to promote healthy, convenient food consumption patterns. Ideally, for health reasons, foods consumed by households in the VIS should include fruits, vegetables, grains, milk, meat, fish, poultry and oils, explains Susan Krebs-Smith of the National Cancer Institute.

5.5 Recommendations for future research

Sheriff (2012:53) stated that to achieve better food security in rural communities it is important to implement programmes that involve actions to teach communities to reduce malnutrition effectively by focusing on food needs and spending patterns. Corrigan (2011:1240) suggested solutions which could contribute to the promotion of food security: financial assistance, food policy councils and education on food. However, VIS employees' needs regarding the above solutions were considered so that education may be used to their advantage to make informed decisions about the food they consume (Corrigan, 2011:1240).

This study proposes future researchers collect data in the VIS workplace, on the same group of employees, focusing on the influence and impact of coping strategies presented in the form of informative leaflets and posters. This can be done quantitatively, by using a structured questionnaire with fixed answers, for which the responses include scales. For example, a question, asking '*How much information did you gain on healthy and unhealthy foods from the poster*?' would offer a scale of answers ranging from '*None/Limited'* as the lowest scale, through to '*Very informative'*, as the highest scale. Other questions may include multiple choice by choosing the most correct answer to '*Which foods would you regard as sugar-filled foods?'* for which the options for answers would read A: *Vetkoek,* B: *Chips/snacks*, C: *Sweets/Chocolates*, D: *Chips/Snacks*. The questionnaire could also include multiple choice, biographical and closed

questions. Closed questions would, for example, require the respondent to answer '*yes*' or '*no*' to a question such as *'Does your household ever run out of money to buy food?'* (Question 4, Appendix A). Due to the nature of the study and interaction with less literate respondents, fixed answers and closed questions were the most appropriate methods for collecting data. A future study with questions of this nature would provide feedback for the effectiveness of this current study and if the educational material served its purpose. It may also emerge in future studies that participants struggle to understand visual material, and indicate a further need for face-to-face educational training sessions in the community. Future research would allow researchers to explore this specific need.

Suggestions for future research include exploration of positive effects of food choice involvement on the food insecure group, as it was found in the current study that this group did not show involvement. Questions to ask food insecure households could include '*Do you have an interest in being involved with food choice decisions for your household? Please provide reasoning*'. Furthermore, future research in various other rural areas with similar demographics could consider using the same qualitative face-to-face interview method to closely explore households involved in the food choice decisions of the home and while grocery shopping, their daily challenges regarding food choice decisions, and additional knowledge and skills required.

Coping strategies designed from this study, and future research into feedback on the success rate of these strategies, with possible future training and education in the community on food consumption and spending patterns would help to reduce the percentage of food insecure and at risk households, and improve the overall food security status of households in the VIS. It will be valuable to educate the children in school on the various aspects of food security, so that knowledge may be taken home and passed on to parents and other family members. All members of the household should contribute to the food needs of the family, for instance by helping in the vegetable garden or making a financial contribution. Children who learn about vegetable gardens at school will be able implement these skills at home. If community members work together it will promote improved food security status and sustainability of households in the VIS. In view of this study's findings, additional research could assist and support the VIS by investigating whether small-scale food production methods could benefit household food security status.

5.6 Study limitations

This study was limited to a group of employees in one community and results from this study cannot be generalised to a greater population. A possible limitation of the present study could have been a language barrier as the majority of participants' home language was Setswana. These participants could speak Afrikaans, and some English, however, answering of questions

from the questionnaire and face-to-face interviews were lengthy due to this reason. Level of education and knowledge of various food groups was limited amongst many participants, such as those with a lower education attainment level, smaller income, and those in food insecure households. However, this was useful in the current study because it prompted support for new coping strategies to improve the household food security situation.

The formulation of the probing questions (interviews, phase 2) may have appeared to be bias, however, these questions were only introduced in a case where the original question was not clearly understood by the participant. The study population included a diverse group of participants, therefore to ensure sufficient responses during each interview, probing questions were necessary to include.

CHAPTER 6: REFERENCE LIST

Adekunle, O.O. 2013. The role of home gardens in household food security in Eastern Cape: a case study of three villages in Nkonkobe Municipality. *Journal of agricultural sciences, Vol*. 5(10).

AFDB see Africa Development Bank Group.

Africa Development Bank Group (AFDB). 2011. Improving statistics for food security, sustainable agriculture & rural development. An action plan for Africa, 2011-2015. www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Improving%20Statistics%20for%20food%20security_Sustainable_Agriculture%20and%20Rural%20Development.pdf Date of access: 02 Apr. 2015.

Altman, M., Hart, T. & Jacobs, P. 2009. Food security in South Africa. http://www.hsrc.ac.za/en /research-outputs/ktree-doc/2643 Date of access: 27 Nov. 2016.

Amir, R.M., Shahbaz, B., Ali, T. & Zafar, M.I. 2013. Analysis of household food security concerns and coping strategies of small farmers in North Western Highlands of Pakistan. *Pakistan journal of agricultural sciences,* 50(3):505-510.

Anderson, K. & Strutt, A. 2016. Growth in emerging economics and food security by 2030, Chap 2. (*In* Trewin, R. Crucial Agricultural Policy: Analysis of Key Threats to Food Security. World Scientific publishing. 273p). www.worldscientific.com Date of access: 19 Jan. 2017.

Anderson, M.D. & Cook, J.T. 1988. Community food security: Practice in need of theory? http://www.academia.edu/4347339/Community_Food_Security_Practice_in_Need_of_Theory. Date of access: 27 May 2017.

Ashraf, M. & Routray, J.K. 2013. Perception and understanding of drought and coping strategies of farming households in the north-west Balochistan. *International journal of disaster risk reduction,* 5(2013):49-60. ScienceDirect. http://www.sciencedirect.com.nwulib.nwu.ac.za/science Date of access: 29 May 2017.

Bapir, M.A. 2012. Validity and reliability in qualitative research. The University of Warwick. http://www.academia.edu/997438/validity_and_reliability_in_qualititative_research (p. 13-14) Date of access: 26 Aug. 2014.

Batterby, J. 2012. Beyond the food desert: finding ways to speak about urban food security in South Africa. *Geografika Annaler: Series B. Human geography,* 94(2):141-159.

BizCommunity, 2017. Can organic farming improve food security for SA's poor communities? http://www.bizcommunity.com/Article/196/358/156819.html Date of access: 13 Feb. 2017.

Blaikie, N. 2003. Analyzing quantitative data: From description to explanation. Sage Publications UK.

Botha, C.R., Wright, H.H., Moss, S.J. & Kolbe-Alexander, T.L. 2013. "Be active!" Revisiting the South African food-based dietary guideline for activity. *South African journal of clinical nutrition*, 26(3):S18-S27.

Boyle, M.A. & Holben, D.H. 2013. Community Nutrition in Action: An Entrepreneurial approach. 6th ed.

Carolan, M. 2013. Reclaiming Food Security. Taylor & Francis Group Publishers. 196p.

Claasen, N., van der Hoeven, M. & Covic, N. 2016. Food environments, health and nutrition in South Africa, *Working Paper 34*. Cape Town: PLAAS, UWC and Centre of Excellence on Food Security. http://www.plaas.org.za/sites/default/files/publicationspdf/WP34%20Claasen%20etal_final_0.pdf Date of access: 25 Oct. 2017.

Cloete, P.C. & Idsardi, E. 2012. Bio-Fuels and Food Security in South Africa: The role of indigenous and traditional food crops.

Corrigan, M.P. 2011. Growing what you eat: Developing community gardens in Baltimore, Maryland. *Applied Geography* 31 (2011) 1232-1241

Creswell, J.W. 2003. Research design: Qualitative, quantitative and mixed methods approaches. 2nd ed. Sage Publications. 246p.

Creswell, J.W. 2014. Research design: Qualitative, quantitative and mixed methods approaches. 4th ed. Sage Publications. 273p.

Creswell, J.W. & Clark, V.L.P. 2011. Designing and conducting mixed methods research. 2nd ed. Sage Publications. 488p.

Deitchler, M., Ballard, T., Swindale, A. & Coates, J. 2011. Introducing a simple measure of household hunger for cross-cultural use. Food and nutrition technical assistance. https://www.fantaproject.org/sites/default/files/resources/HHS-Indicator-Guide-Aug2011.pdf Date of access: 17 June 2017.

Delport, C.S.L & Roestenburg, W.J.H. 2011. Quantitative data-collection methods: questionnaires, checklists, structured observations and structured interview schedules. (*In* de Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L., *ed*. Research at grass roots: for the social sciences and human service professions. 4th ed. Pretoria: Van Schaik. p. 171-205).

Devereux, S. & Maxwell, S. 2001. (reprinted in 2005). Food Security in Sub-Saharan Africa. 350p.

Devereux, S. & Waidler, J. 2017. Why does malnutrition persist in South Africa despite social grants? Centre of Excellence in Food Security.http://foodsecurity.ac.za/Media/Default/Publications/Final_Devereux%20%20Waidler%202017%20-%20Social%20grants%20and%20food%20security%20in%20SA%2025-Jan-17.pdf Date of access: 10 Apr. 2017.

Drimie, S. & McLachlan, M. 2013. Food security in South Africa: first steps toward a transdisciplinary approach. *Food security: Springer Publications,* 5(2):217-226.

Du Plessis, L.M., Kruger, H.S. & Sweet, L. 2013. Paediatric Food-Based Dietary Guidelines for South Africa. II Complementary feeding: a critical window of opportunity from six months onwards. *South African journal of clinical nutrition*, 26(3):S129-S140.

Du Toit, D.C. 2011. Department of Agriculture, Forestry & Fisheries. Food security: Directorate Economic Services. Production economics unit. Republic of South Africa.

FAO see Food and Agricultural Organisation of the United Nations.

Food and Agricultural Organization of the United Nations (UN), International Fund for Agricultural Development (IFAD) and World Food Programme (WFP). 2014. The State of Food Insecurity in the World: Strengthening the enabling environment for food security and nutrition. Rome: FAO.

Food and Agricultural Organization of the United Nations, International Fund for Agricultural Development and World Food Programme. 2015(a). The State of Food Insecurity in the World 2015. Meeting the 2015 International Hunger Targets: Taking stock of uneven progress. Rome: FAO. http://www.fao.org/hunger/glossary/en/ Date of access: 27 Apr. 2017.

Food and Agricultural Organization of the United Nations. 1996. Rome Declaration on World Food Security and World Food Summit Plan of Action. World Food Summit 13-17 Nov. 1996. http://www.fao.org/docrep/005/y4671e/y4671e06.htm#fnB30 Date of access: 07 May 2017. Rome: FAO.

Food and Agricultural Organization of the United Nations. 2002. Human Vitamin and Mineral Requirements: Corporate document repository Chapter 11. Rome: FAO. http://www.fao.org/docrep/004/y2809e/y2809e0h.htm#bm17.2 Date of access: 27 Apr. 2017.

Food and Agricultural Organization of the United Nations. 2006. Policy Brief. Food security. Issue 2. www./fao.org/forestry/13128. Date of access: 23 Mar. 2015.

Food and Agricultural Organization of the United Nations. 2008. The State of food and agriculture. Biofuels: Prospects, risks and opportunities. http://www.fao.org/3/a-i0100e.pdf Date of access: 10 Apr. 2017.

Food and Agricultural Organization of the United Nations. 2015(b). Regional overview of Food Insecurity in Africa. Rome: FAO. http://www.fao.org Date of access: 27 Apr. 2017.

Food and Agricultural Organization of the United Nations. 2016. Issues of Food Security in South Africa and FAO's role in eradication of food insecurity and malnutrition.

Fouché, C.B. & Bartley, A. 2011. Quantitative data analysis and interpretation. (*In* de Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: For the

social sciences and human service professions. 4th ed. Pretoria: Van Schaik, 248-276).

Fouché, C.B. & De Vos. 2011. Formal Formulations. (*In* de Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: For the social sciences and human service professions. 4th ed. Pretoria: Van Schaik, 89-120).

Fouché, C.B. & Delport, C.S.L. 2011. Steps unique to the quantitative process. (*In* de Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: For the social sciences and human service professions. 4th ed. Pretoria: Van Schaik, 133-157).

Fusch, P.I. & Ness, L.R. 2015. Are we there yet? Data saturation in qualitative research. *The qualitative report* 2015 Vol 20(9):1408-1416http://www.nova.edu/ssss/QR/QR20/9/fusch1.pdf Date of access: 20 Feb. 2017.

Galvin, R. 2014. How many interviews are enough? Do qualitative interviews in building energy consumption research produce reliable knowledge? University of Cambridge, UK. *Journal of building engineering,* 2–12.

Gebrehiwot, T. & van der Veen, A. 2014. Coping with food insecurity on a micro-scale: Evidence from Ethiopian rural households. *Ecology of food and nutrition,* 53(2):214-240. http://www.tandfonline.com/action/journalInformation?journalCode=gefn20& Date of access: 31 October 2017.

Gerbens-Leenes, P.W., Nonhebel, S. & Krol, M.S. 2010. Food consumption patterns and economic growth. Increasing affluence and the use of natural resources. *Appetite journal*, Vol 55(3):597-608. https://www.utwente.nl/en/et/wem/staff/former%20staff/gerbens/appetite2010.pdf Date of access: 23 Mar. 2018.

Ghattas, H., Barbour, J.M., Nord, M., Zurayk, R. & Sahyoun, N.R. 2013. Household food security is associated with agricultural livelihoods and diet quality in a marginalized community of rural Bedouins in Lebanon. *Journal of nutrition: community and international nutrition,* 143:1666-1671.

Gordon, R., Nell, M. & Bertoldi, A. 2007. Overview of urban land as a commodity in South Africa: Research findings and

recommendations. http://www.urbanlandmark.org.za/downloads/commodity_final_report/pdf Date of access: 28 May 2017.

Government of the Western Cape (WCG): Household food and nutrition security strategic framework.
2016. https://www.westerncape.gov.za/sites/www.westerncape.gov.za/files/assets/140916_wcg_household_food_and_nutrition_security_strategic_framework.pdf Date of access: 01 June 2017.

Greeff, M. 2011. Information collection: Interviewing. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: For the social sciences and human service professions. 4th ed. Pretoria: Van Schaik, 341-374).

Grobler, W.C.J. 2013. Spending patterns of food insecure households in a low income neighbourhood in South Africa. In: proceedings of world business and social science research conference, Bangkok, Thailand, 24 – 25 October 2013.

Gross, R., Schoeneberger, H., Pfeifer, H. & Preuss, H.J. 2000. The four dimensions of food and nutrition security: definitions and concepts. http://www.ieham.org Date of access: 10 Sep. 2015.

Gundersen, C. 2013. Food insecurity is an ongoing national concern. *American society for nutrition. Advances in nutrition,* (4):36-41. Department of Agricultural and Consumer Economics, University of Illinois. 41p. http://advances.nutrition.org/ Date of access: 31 October 2017.

Hair, J.F., Bush, R.P. & Ortinau, D.J. 2006. Marketing research: with a changing information environment. Boston, Massachusetts: McGraw-Hill.

Hillers, V., Bergmann, V., Medeiros, L., Cheng, G., Kendall, P. & Schroeder, M. 2002. A questionnaire to assess knowledge of recommended food safety behaviors. http://foodsafety.osu.edu/downloads/evaluations/knowledge.pdf Date of access: 9 Jan. 2012.

Hope, J. 2011. Identifying risk & protective factors in multi-problem poor families living in Cape Town. Potchefstroom: North West University (Dissertation).

Hwalla, N., Labban, S.E. & Bahn, R.A. 2016. Nutrition security is an integral component of food security. *Frontiers in life science,* 9(3):167-172. http://www.tandfonline.com/doi/full/10.1080/21553769.2016.1209133 Date of access: 17 Jun. 2017.

IFPRI see International Food Policy Research Institute.

IFSSSA see The Integrated Food Security Strategy for South Africa.

Immihelp. 2017. Calculating Household Size for Affidavit of Support. https://www.immihelp.com/affidavit-of-support/household-size.html Date of access: 4 Dec. 2017.

International Food Policy Research Institute. 2016. *Global Nutrition Report 2016: From promise to impact: ending malnutrition by 2030.* Washington D.C.

Jacobs, L. & Steyn, N.P. 2013. "If you drink alcohol, drink sensibly." Is this guideline still appropriate? *South African journal of clinical nutrition*, 26(3):S114-S119.

Jordaan, F. 2014. Exploring household food security in the Viljoenskroon area. Potchefstroom: North West University.

Kennedy, G., Ballard, T. & Dop, M. 2013. Guidelines for measuring household and individual dietary diversity. 2nd ed. Rome: Food and Agriculture Organization.

Kenshújo, K. K. S. 2005. Approaches for systematic planning of development projects: agricultural and rural development. JICA Research institute. 172p.

Kimani-Murage, E.W., Shofield, L., Wekesah, F., Mohamed, S., Mberu, B., Ettarh, R., Egondi, T., Kyobutungi, C. & Ezeh, A. 2014. Vulnerability to food insecurity in urban slums: Experiences from Nairobi, Kenya. *Journal of urban health: Bulletin of the New York Academy of Medicine,* 91(6):1098-1113. https://link.springer.com/content/pdf/10.1007%2Fs11524-014-9894-3.pdf Date of access: 22 Jun. 2017.

Kirsten, J. & Moldenhauer, W. 2006. Measurement and analysis of rural household income in a dualistic economy: The case of South Africa. *Agrekon journal*, 45(1): 66-77.

Kriel, M. 2014. Planning child-friendly spaces for rural areas in South Africa: The Vaalharts case study. Potchefstroom: North West University (Dissertation).

Labadarios, D., Davids, Y.D., Mchiza, Z. & Weir-Smith, G. 2009. The assessment of food insecurity in South Africa. 49p.

Labadarios, D., Mchiza, Z.J., Steyn, N.P., Gericke, G., Mauder, E.M.W., Davids, Y.D. & Parker, W. 2011. Food security in South Africa: a review of national surveys. (Theories from Food and Agricultural Organization, FAO). p891-899.

Legwegoh, A.F. & Hovorka, A.J. 2016. Exploring food choices within the context of nutritional security in Gaborone, Botswana. *Singapore journal of tropical geography,* 37:76-93.

Leroy, J.L., Ruel, M., Frongillo, E.A., Harris, J. & Ballard, T.J. 2015. Measuring the food access dimension of food security: A critical review and mapping of indicators. http://journals.sagepub.com.nwulib.nwu.ac.za/doi/pdf/10.1177/0379572115587274 Date of access: 17 June 2017.

Liebman, B. 2012. Sugar Belly: How much is too much sugar? Nutrition action health letter: Center for Science in the public interest. https://uhs.berkeley.edu/sites/default/files/wellness-nutritionactionsugarbelly.pdf Date of access: 23 Oct. 2017.

Maisela, R.J. 2007. Realizing Agricultural potential in land reform: The case of Vaalharts Irrigation Scheme in the Northern Cape Province. Cape Town: Western Cape University (Masters).

Maree, K. & Pietersen, J. 2010. The quantitative research process. (*In* Maree, K., *ed*. First steps in research. 6th ed. Pretoria: Van Schaik. p. 144-153).

Maree, K. & Van der Westhuizen, C. 2010. Planning a research proposal. (*In* Maree, K., *ed*. First steps in research. 6th ed. Pretoria: Van Schaik. p. 23-45).

Marshall et al.,, B., Cardon, P., Poddar, A. & Fontenot, R. 2013. Does sample size matter in qualitative research: A review of qualitative interviews in is research. *Journal of computer information systems,* 11 – 22.

Mathebula, J., Molokomme, M., Jonas, Siyanda & Nhemachena, C. 2017. Estimation of household income diversification in South Africa: A case study of three provinces. *South African journal of science*. www.sajs.co.za Date of access: 28 Sep. 2017.

Maunder, E. 2000. Food procurement and household food inventory questionnaire. http://www.sun.ac.za/english/faculty/healthsciences/interdisciplinary-health-sciences/Documents/Ch7_FPHI_Text.pdf Date of access: 23 Feb 2017.

Megersa, B., Markemann, A., Angass, A. & Zárate, A.V. 2013. The role of livestock diversification in ensuring household food security under a changing climate in Barana, Ethiopia. *Food security 2014,* 6:15-28.

Mehotcheva, T.H. 2008. The Kruskal-Wallis Test. www.let.rug.nl/nerbonne/teach/rema-stats.../Mehotcheva-2008-Kruskal-Wallis.pdf Date of access: 06 Nov. 2017.

Meyer-Rochow, V.B. 2009. Food taboos: their origins and purposes. *Journal of ethnobiology and ethnomedicine,* 5(18):1-10. https://ethnobiomed.biomedcentral.com/track/pdf/10.1186/1746-4269-5-18?site=ethnobiomed.biomedcentral.com Date of access: 14 Nov. 217.

Millennium Development Goals (MDG): Country Report 2010. http://www.statssa.gov.za/MDG/MDGR_2010.pdf Date of access: 15 Feb. 2017.

Millennium Development Goals (MDG): Setting free from poverty. 2015. Australian Lutheran World Service. http://alws.s3.amazonaws.com/New%20ALWS%20Web%20Site/Discover%20More/Schools/Mozambique/Millennium%20Development%20Goals.pdf Date of access: 15 Feb. 2017.

Mishra, V.N., Singh, P.K., Dixit, A. & Dwivedi, P. 2016. A Report on the evaluation of the effect of junk food on the health of the school children in Delhi. Centre of consumer studies, Indian institute of public administration, Indraprastha Estate. New Delhi. www.consumereducation.in/ResearchStudyReports/JunkFood2016.pdf 56p Date of access: 25 Oct. 2017.

Mjonono, M., Ngidi, M. & Hendriks, S.L. 2009. Investigating household food insecurity coping strategies and the impact of crop production on food security using coping strategies

index (CSI). 17th International Farm Management Congress, Bloomington/Normal, Illinois, USA.

Mofokeng, M.J. 2013. Nutritional status and dietary intake patterns of children aged 7-13 years in Qwa-Qwa. Vanderbijlpark: VUT. (Thesis – Masters).

Msaki, M.M. & Hendriks, S.L. 2014. Measuring household food security using food intake indicators in rural KwaZulu Natal, South Africa. *Ecology of food and nutrition,* 53(2):193-213. Date of access: 21 Nov 2016.

Musemwa, L., Zhou, L., Ndhleve, S. & Adhdasi, F. 2013. Factors affecting household access to enough food in the Eastern Cape Province of South Africa. *Journal of development and agricultural economics,* 5(3):84-91. http://www.academicjournals.org/journal/JDAE/article-full-text-pdf/E8177D22016 Date of access: 17 Jun. 2017.

Naicker, N., Mathee. A. & Teare, J. 2015. Food insecurity in households in informal settlements in urban South Africa. *South African medical research council,* 105(4): 268-270.

Naude, C.E. 2013. "Eat plenty of vegetables and fruit every day": a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S46-S56.

Nawrotzki, R. J., Robson, K., Gutilla, M.J., Hunter, L.M., Twine, W. & Norlund, P. 2014. Exploring the impact of the 2008 global food crisis on food security among vulnerable households in rural South Africa. *Food security,* 6:283-297.

NWU (North-West University). 2018. Health Sciences: Auther. http://health-sciences.nwu.ac.za/auther Date of access: 22 Mar. 2018.

Ofoegbu, C., Chirwa, P.W., Francis, J. & Babalola, F.D. 2016. Assessing forest-based rural communities' adaptive capacity and coping strategies for climate variability and change: The case of Vhembe district in South Africa. *Environmental development,* 18(2016):36-51. http://www.sciencedirect.com.nwulib.nwu.ac.za/ Date of access: 29 May 2017.

Palys, T. 2008. Purposive sampling. (*In* L.M. Given., *ed*. The Sage Encyclopedia of qualitative research methods. Vol. 2. Sage: Los Angeles. pp697 – 698).

Parasuraman, A., Grewal, D. & Krishnan, R. 2007. Marketing research. 2nd ed. Boston: Houghton Mifflin Company.

Pereira, L., & Drimie, S. 2016. Governance arrangements for the future food system: Addressing complexity in South Africa. *Environment science and policy for sustainable development,* 58(4):18-31.

Pereira, L.M. 2014. The future of South Africa's food system: What is research telling us? *Southern Africa Food Lab.* http://awsassets.wwf.org.za/downloads/safl_the_future_of_south_africas_food_system.pdf Date of access: 22 Jun. 2017.

Pinstrup-Anderson, P. 2009. Food security: definition and measurement. 3p.

Pretorius, S. & Sliwa, K. 2011. Perspectives and perceptions on the consumption of a healthy diet in Soweto, an urban African community in South Africa. http://www.socru.org/images/uploads/SAHJ_Pretorius_Sliwa_Diet.pdf p178-183 Date of access: 26 Oct. 2017.

Radimer, K.L., Olson, C.M. & Campbell, C.C. 1990. Development of indicators to assess hunger. *Journal of nutrition*, 120:1544-1548.

Rajaonarison, H.M. 2014. Food and human security in Sub-Saharan Africa. *Procedia environmental sciences,* 20(2014) 377-385.

Renzaho, A.M.N., & Mellor, D. 2010. Food security measurement in cultural pluralism: missing the point or conceptual misunderstanding. *Nutrition*, 26(1), 1-9.

Richards, L. & Morse, J.M. 2007. User's guide to qualitative methods. 2nd ed. Sage Publications. 288p.

Schiffman, L. & Kanuk, L.L. 2014. Consumer behaviour: Global and Southern Africa perspective. 10th ed. Pearson Education South Africa. 502p.

Schiffman, L.G. & Wisenblit, J. 2015. Consumer behaviour. 11th ed. Pearson Education South Africa. 508p.

Schönfeldt, H.C., Pretorius, B. & Hall, N. 2013. "Fish, chicken, lean meat and eggs can be eaten daily": a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S66-S76.

Schurink, W., Fouché, C.B. & De Vos, A.S. 2011. Qualitative data analysis and interpretation. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: For the social sciences and human service professions. 4th ed. Pretoria: Van Schaik, 397-423).

Sekhampu, T.J. & Niyimbanira, F. 2013. Analysis of the factors influencing household expenditure in a South African township. *International business & economics research journal,* 12 (3):279-284.

Shariff, Z.M. & Khor, G.L. 2008. Household food insecurity & coping strategies in a poor rural community in Malaysia. *Nutrition research and practice,* 2(1):26-34.

Shenton, A.K. 2004. Strategies for ensuring trustworthiness in qualitative research projects: Education for information, p63–75. Northumbira University, Newcastle UK.

Sheriff, K. 2012. Participatory assessment of household food security and nutrition. Lambert Academic Publishing. 68p.

Shisanya, S.O. & Hendriks, S.L. 2011. The contribution of community gardens to food security in the Maphephetheni uplands. *Development Southern Africa,* 28(4):509-526.

Sithole, T.S. 2005. Nutrition security of farm workers in the North West Province, South Africa. Potchefstroom: North West University (Mini-dissertation – Masters).

Smith, C., Parnell, W.R., Brown, R.C. & Gray, A.R. 2013. Balancing the diet and the budget: Food purchasing practices of food-insecure families in New Zealand. *Journal of nutrition & dietetics,* 70:278-285.

Smith, M.T., Schroenn Goebel, J. & Blignaut, J.N. 2014. The financial and economic feasibility of rural household biodigesters for poor communities in South Africa. *Waste management,* 34:352-362.

Smuts, C.M. & Wolmarans, P. 2013. The importance of the quality or type of fat in the diet: a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S87-S99.

South Africa. Department of Agriculture. 2006.

SPSS Inc. 2017. IBM SPSS Statistics Version 24, Release 23.0.0, Copyright© IBM Corporation and its licensors. http://www-01.ibm.com/software/analytics/spss/

Stats SA (Statistics South Africa). 2013. Domestic tourism survey 2012. http://www.statssa.gov.za/Publications2/P03521/P035212012.pdf Date of access: 24 Mar. 2018

Stats SA (Statistics South Africa). 2017. Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2015. http://www.statssa.gov.za/publications/Report-03-10-06/Report-03-10-062015.pdf Date of access: 13 Sep. 2017

Stephan, A. 2016. Food Forward SA. http://www.foodbanksa.org/news/the-food-security-state-of-our-nation/ Date of access: 15 Feb. 2017.

Steyn, N.P. & Ochse, R. 2013. Enjoy a variety of foods: as a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S13-S17.

Strydom, H. & Delport, C.S.L. 2011. Sampling in the quantitative paradigm. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: For the social sciences and human service professions. 4th ed. Pretoria: Van Schaik, 222-235).

Strydom, H. 2011. Ethical aspects of research in the social sciences and human service professions. (*In* De Vos, A.S., Strydom, H., Fouché, C.B. & Delport, C.S.L. Research at grass roots: For the social sciences and human service professions. 4th ed. Pretoria: Van Schaik, 113 – 130).

Swain, J., Hammond, C. & Johnson, A. 2007. The benefit of part-time study for mature students: findings from interviews with Birkbeck graduates. United Kingdom: University of London.

Tavakol, M. & Dennick, R. 2011. Making sense of Cronbach's alpha. *International journal of medical education*, (2):53-55. https://www.ijme.net/archive/2/cronbachs-alpha.pdf Date of access: 06 Nov. 2017.

Teh, L.S.L., Lam, V.W.Y., Cheung, W.W.L., Miller, D., Teh, L.C.L. & Sumaila, U.R. 2016. Impact of high seas closure on food security in low income fish dependent Countries. *PLOS one journal*. University of Hong Kong.

Temple, N.J. & Steyn, N.P. 2013. Sugar and health: a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S100-S104.

The Integrated food security strategy for South Africa 2002. Department of Agriculture http://www.gov.za/sites/www.gov.za/files/foodpol_0.pdf Date of access: 1 Jun. 2017. Pretoria: RSA. 36p.

Trochim, W.M.K. & Donnelly, J.P. 2006. The research methods knowledge base. 3rd ed.

Tustin, D.H., Ligthelm, A.A., Martins, J.H. & Van Wyk, J. 2005. Marketing Research in Practice. Pretoria: The University of South Africa.

UNDP see United Nations Development Programme.

United Nations Development Programme 2012. Africa human development report 2012: Towards a food secure future. New York: United Nations Development Programme.

Van Graan, A.E., Bopape, M., Phooko, D., Bourne, L. & Wright, H.H. 2013. "Drink lots of clean, safe water": a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S77-S86.

Van Wyk, D. 2014. Exploring household food security in the Vaalharts area. Masters Dissertation. Potchefstroom: North West University.

Vasuthevan, S. & Mthembu, S. 2016. De Haan's Health of Southern Africa. 11th ed. JUTA South Africa. 336p.

Venter, C.S., Vorster H.H., Ochse, R. & Swart, R. 2013. "Eat dry beans, split peas, lentils and soya regularly": a food-based dietary guideline. *South African journal of clinical nutrition*, 26(3):S36-S45.

Vermeulen, H. 2015. Potatoes within the staple food consumption of the South African middle class. Consumer economist, Bureau for Food and Agricultural Policy (BFAP). http://www.potatoes.co.za/SiteResources/documents/Bemarking%20%20-%20%20Staple%20food%20consumption.pdf 27p Date of access: 25 Oct. 2017.

Vorster, H.H. 2013. "Make starchy foods part of most meals": a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S28-S35.

Vorster, H.H., Wenhold, F.A.M., Wright, H.H., Wentzel-Viljoen, E., Venter, C.S. & Vermaak, M. 2013. "Have milk, maas or yoghurt every day": a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S57-S65.

WCG: Western Cape Government: see Government of the Western Cape

Wentzel-Viljoen, E., Steyn, K. & Charlton, K.E. 2013. "Use salt and foods high in salt sparingly": a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S105-S113.

Whati, L., Senekal, M., Steyn, N.P. 2005. Nutrition knowledge questionnaire for 13-19 year olds based on the food-based dietary guidelines. http://www.sahealthinfo.org/lifestyle/urban.pdf Date of access: 3 Aug. 2012.

World Health Organization (WHO). 2016. What is Malnutrition? http://www.who.int/features/qa/malnutrition/en/ Date of access: 23 Mar. 2018.

Wiig, K. & Smith, C. 2008. The art of grocery shopping on a food stamp budget: factors influencing the food choices of low-income women as they try to make ends meet. *Public health nutrition,* 12(10):1726-1734.

Yin, R.K. 2011. Qualitative research from start to finish. New York: The Guilford Press. 348p.

CHAPTER 7: RESEARCH ARTICLE

7.1 Title page

Exploring the challenges income-earning households experience to enhance household food security in the Vaalharts Irrigation Scheme

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7.2 Abstract

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food on a daily basis to maintain their dietary needs and food preferences for a sustainable, active and healthy life (FAO, 1996; Sheriff, 2012:8). Income-earning households in the Vaalharts Irrigation Scheme (VIS) community, Northern Cape Province made up the study population. Household food security status is affected by several factors, including income as a determinant, however in the current study the argument was brought forth that regular income does not directly translate nor guarantee household food security. The study was conducted during two phases to explore the study populations' food security status, consumption challenges, food choices and current coping strategies to assist with potential solutions improve the current situation. Findings presented 41.4% food secure, 13.8% food insecure, and 44.8% households at risk of becoming food insecure, with food insecurities forming part of low-, middle- and high-income households, and was common amongst households that struggled to meet their food needs from a single income contributor. The general food consumption pattern showed maize meal as a staple food item. Whole chicken pieces and fruit were commonly consumed on a daily basis. Participants representing households often adopted coping strategies such as borrowing money or food, consuming non-preferred foods and reducing portion sizes to feed all the family members in their household. A need for practical help and knowledge emerged to address these issues. Leaflets and posters providing information about vegetable gardens, food consumption patterns, budgeting skills and food labelling material will be provided to the VIS workplace.

Keywords: Coping strategies, Food consumption, Food security status, Household food insecurity, Supporting skills

7.3 Introduction

Food security is an increasing concern worldwide (Megersa *et al.,* 2013:16), and a country can only be categorised as being food secure if the four dimensions (availability, accessibility, utilisation, sustainability) of food security are addressed (UNDP, 2012:6). Several factors have a contribution towards household food security status. Regular income is usually used as the determinant of household food security, however the argument brought forth through the current study is that regular income does not directly translate nor guarantee household food security. Food insecurity amongst poor/impoverished households is widely researched, whilst there is little information available about the consumption patterns and the challenges of regular income earners in South Africa. According to Devereux and Waidler (2017:13) evidence shows that in South Africa (SA), food insecurity has decreased in the past 20 years, with social grants contributing positively to this data, but signs of undernourishment remain a concern. Rising food

prices in SA have provoked an unpredictable trend and directly affect the buying behaviour of consumers. The existence of food insecurity is due to the unavailability or inaccessibility of foods to make up a healthy and nutritious diet (Labadarios *et al.,* 2011:891), and exacerbated by a lack of knowledge regarding certain aspects of food when making consumption choices.

In a study conducted by van Wyk from 2014 at the North-West University it was found that employees from the Vaalharts Irrigation Scheme (VIS) experienced a lack of food security at different income levels but the most concerning was an indication of a lack of food security amongst middle-income households (Van Wyk, 2014:71).This community indicated a need for assistance regarding household food security.

The aim of this study was to explore food consumption challenges faced by income-earning individuals representing their households in the Vaalharts Irrigation Scheme community. The study focused on four objectives to determine household food security needs. These include the assessment of participants' income and food security status, food consumption patterns and current coping strategies, and challenges regarding food choice amongst food secure, at risk and insecure households. Objective four was based on determining implementable knowledge and skills to improve rural household food security, and to recommend practical solutions to maintain sustain household food security. Ethical approval for this study was obtained (Ref. NWU-00020-16-A1) once all the requirements of the Health Research Ethics Committee (HREC) and the Faculty of Health Sciences at NWU, Potchefstroom Campus, had been met. Statistical analysis was undertaken by Statistics Consultation Services of the North-West University (SCS, NWU).

7.4 Methodology

A convergent mixed methods design was employed in two phases to collect data from income-earning households in the Vaalharts community, Northern Cape Province, to explore households' food consumption challenges. This study forms part of an umbrella project called The Water Innovation Network (WIN) which is a community project in the VIS focussing on empowering and improving resource-poor communities to address key aspects of rural health and well-being within food and nutrition security. The VIS forms part of the Vaalharts region in rural Northern Cape (Maisela, 2007:4) and is one of the largest water schemes in South Africa. A canal system runs through the Vaalharts municipality and serves as the main water contributor to the irrigation system for the farmers in the area (Kriel, 2014:139, Maisela, 2007:27). This system also provides irrigation water for household consumption and livestock.

The researcher logically dealt with the food security situation by studying participants' views in a quantitative and qualitative phase respectively (Creswell, 2014:8). Phase 1 consisted of an

interviewer-administered quantitative household food security questionnaire (*N*=87) with the following sections, food utilisation and consumption, food security status, monthly food and household expenditure, demographic information, living environment and household income. Phase 2 was conducted by means of a qualitative interviewer-administered face-to-face semi-structured questionnaire (*N*=46) to determine challenges participants experienced with household food choices during food purchasing and daily consumption problems.

The inclusion criteria for the study population consisted of individuals over the age of 18 years, who work and live in the VIS, earn a salary, and those who make financial and/or food choice decisions on behalf of their household. Phase 1 consisted of a purposive sampling method to select a variety of the population so that respondents from the different allocated groups (Trochim & Donnelly, 2006:51), namely food secure, insecure and those at risk were included in data collection. There were 162 employees at the VIS, of which 87 were available to participate in the current study. In a previous study by van Wyk (2014:37) information was provided which supported the population sample of this study and further indicated a food security need and food consumption challenges amongst these households. Phase 2 was made up of participants which were recruited from phase 1 and further utilised purposive sampling, namely critical case sampling (Yin, 2011:7, 8). This sampling method assisted with logical instead of statistical generalisations, in which a smaller group of participants were selected to take part (Palys, 2008:698). It was required to make use of the same set of questions in the same order for all participants to ensure successful data saturation, which occurred at number 49. It was safe to confirm data saturation at the point when repetition of information was identified within food secure, food insecure and at risk groups, however specific focus was placed on the food insecure and at risk groups to identify their problem areas.

7.5 Results and discussions

The statistical methods used during data analysis in this study included Pearson Chi-Square tests to find the differences in food secure, food insecure and at risk respondents regarding various food-related aspects. P-values were used to describe the statistical significance, where P-values lower than 0.05 indicate that two variables differ statistically significant. Symmetrical measures were determined by using cross-tabulations and illustrated by using the Cramer-V test to describe the strength of a relationship between two variables, which are essentially significant when Cramer's-V value show a medium effect or tendency when 0.3 and only practically significant when 0.5.

7.5.1 Demographic characteristics

The respondents who participated in the study consisted of 63 males (72.4%) and 24 females (27.6%), with the majority of the respondents aged between 35 and 44 (32.2%), and 45 and 54 (29.9%). Most of the respondents' home language was Setswana (59.8%), or Afrikaans (28.7%). Home language within food security status groups reflected a tendency for more Setswana respondents to be food insecure (75%), followed by at risk (69.2%) and lastly food secure (44.4%) (r=0.265, p=0.047). Whereas the majority Afrikaans speaking respondents showed a tendency to be food secure (44.4%), followed by at risk (20.5%) and the smallest group reflecting 8.3% as food insecure (r=0.304; p=0.018). The highest level of education amongst VIS employees was secondary school (Grade 8 – 11), attained by 36.8%, but no significance amongst food security status was recorded. Within the three food security status groups, the majority of respondents earned a middle-income salary ranging from R 4 165 to R13 209, including food secure (58.3%) (Figure 1a), at risk (56.4%) (Figure 1b) and food insecure (66.7%) (Figure 1c) (r=0.397; p<0.05). This shows that the respondents have income available for food needs but may not necessarily be managing their money efficiently. The reasons were explored in the qualitative interviews.

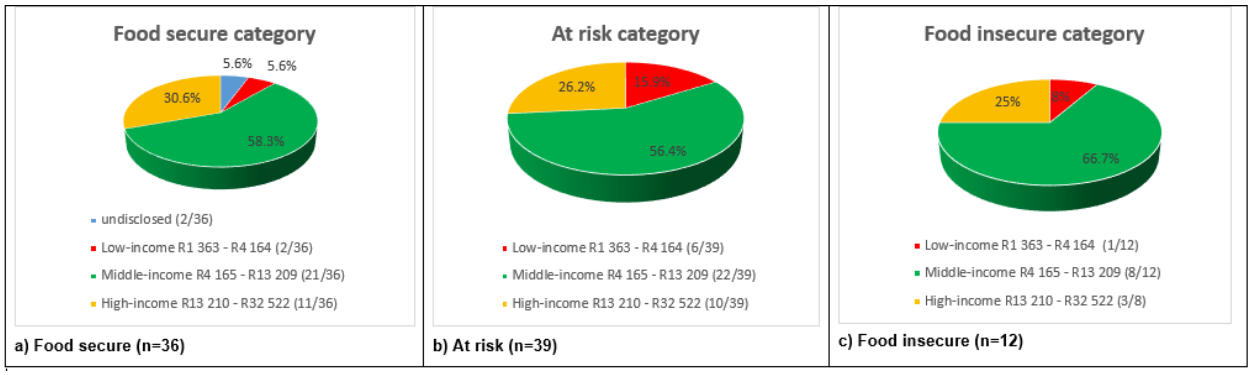

Figure 1 Participants' income brackets within different food security status households.

7.5.2 Household food security status

It was found that the largest group of participants from both Phase 1 and Phase 2 formed part of the at risk group, being 44.8% and 47.8% households respectively (Figure 2). This was explored further to discover reasons for different food security status as it was also indicated in figure 1 that food insecurity was presented in low-, middle- and high-income levels. This is specifically important to prevent respondents at risk not to eventually become food insecure. Households with a lower income often adapt to certain types of coping strategies, which include adjustments to diet, raising money to buy food and spending less money on non-food items (clothing, housing, transport, education and leisure) (Devereux & Waidler, 2017:17). More food insecure households tended to consume food not preferred (25%) (r=0.378; p=0.002) than at risk households (12.8%), and insecure households practically significantly limited portion sizes (41.7%) (r=0.523; p=0.000), as opposed to at risk households (17.9%). Most of the food secure households seldom applied

these coping strategies. A tendency to borrow money to buy food occurred once or twice a month in at risk (46.2%) and food insecure (66.7%) groups (r=0.396; p=0.000). Furthermore, there was only a tendency to borrow food once or twice a month amongst food insecure respondents (33.3%) (r=0.305; p=0.018). To achieve better food security in rural communities, it will be beneficial to implement potential coping strategies at the VIS with a support system to teach communities how to effectively minimise malnutrition by focusing on food needs and spending patterns (Sheriff, 2012:53).

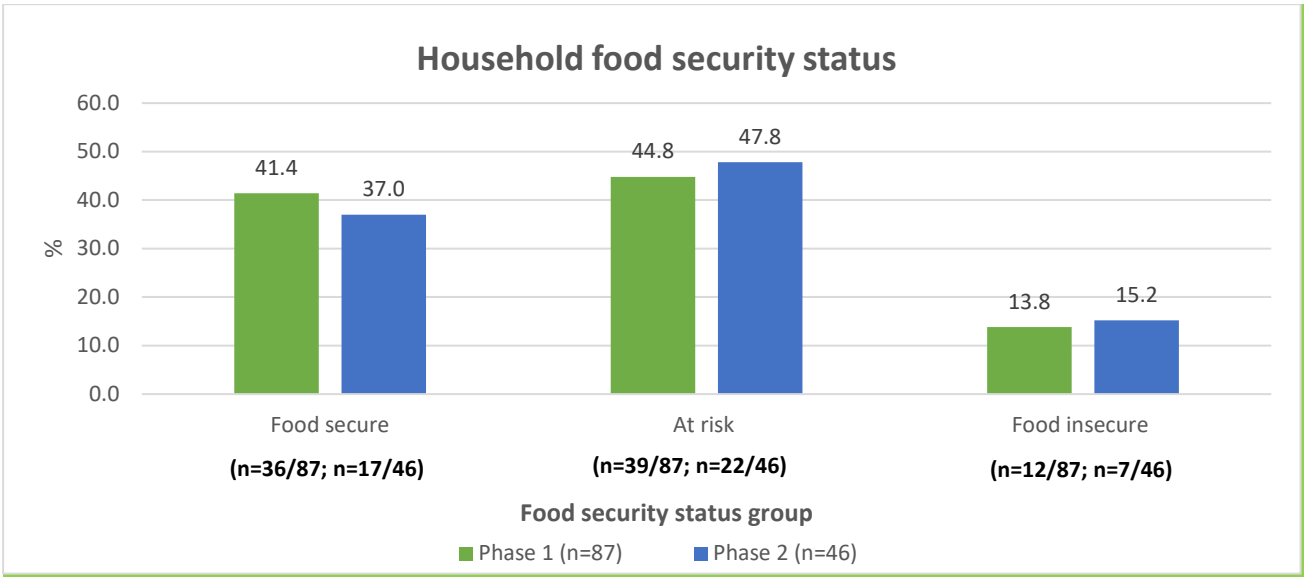

Figure 2 Food security status of households at the VIS from Phase 1 and Phase 2.

The majority of food secure respondents (50.0%) spent between R1501 and R3000 on food per month, which is significantly more than expenditure by at risk (43.6%) and food insecure (58.3%) respondents on food per month (R501 to R1500) (r=0.353; p<0.05). Food insufficiency in the household may be due to having a limited amount of money available to spend on food items. A large number of food secure (94.4%) and at risk (89.7%) VIS respondents indicated that they were involved in the households' food eating choices, whereas a smaller tendency of food insecure (66.7%) respondents were involved in their household's food eating choices (r=0.244; p<0.05).

7.5.3 Household food consumption

Food consumption did not differ practically between groups except for the items listed in Table 1 and Figure 3a. Starches, as a staple food, were the most frequently consumed item by all three food security groups. Low-income households, which were mostly food insecure or at risk, spent a significant amount of money on breads, maize meal and cereals, resulting in unbalanced diets, poor nutrition, however gave a sensation of feeling full. Within all three food security status

groups, whole chicken pieces were consumed in majority, two to six days per week (56.3%) to form the main component of lunch or supper (r=0.340; p<0.05) (Figure 3a). Many food secure respondents consumed instant breakfast cereals such as corn flakes or Weet-Bix (r=0.313; p<0.05) (Table 1), once per day (38.9%) (Figure 3b). Beef mince (44.4%) and livers (chicken/beef) (38.9%) were consumed once per week, by food secure households. Many respondents who were at risk of food insecurity consumed whole chicken pieces (56.4%) and chicken giblets (41%) two to six times per week (Figure 3c). These two variables indicate statistical significant differences with a medium effect of r=0.340; p<0.05 and r=0.319; p<0.05, respectively. The at risk group's consumption of sweets and chocolates at least once a day (35.9%) (r=0.306; p<0.05) was of concern. Food insecure respondents consumed whole chicken pieces (58.3%), chicken giblets (33.3%), livers (41.7%) and sweets and chocolates (50%) (r=0.306; p<0.05) at least once a day. This group found that buying frozen whole chicken was more affordable than buying beef mince, hence beef mince was never or seldom consumed by half of the respondents (50%) (Figure 3d).

Table 1 Chi-square cross-tabulations for food items consumed amongst food security status groups

	Instant breakfast cereal	Pumpkin	Chicken whole pieces	Chicken legs neck head	Chicken giblets	Tinned fish	Beef mince	Livers	Sweets/ chocolate
Pearson Chi-Square	0.030*	0.039*	0.028*	0.002*	0.024*	0.020*	0.052*	0.008*	0.039*
Cramer's V	0.313**	0.331**	0.340**	0.378**	0.319**	0.293**	0.268**	0.345**	0.306**

* Pearson Chi-square (p-value) interpreted as significant at levels p<0.001/p≤0.05.
** Cramer's V (effect size) interpreted as r=0.1 small effect; r=0.3 medium effect; r=0.5 large effect.

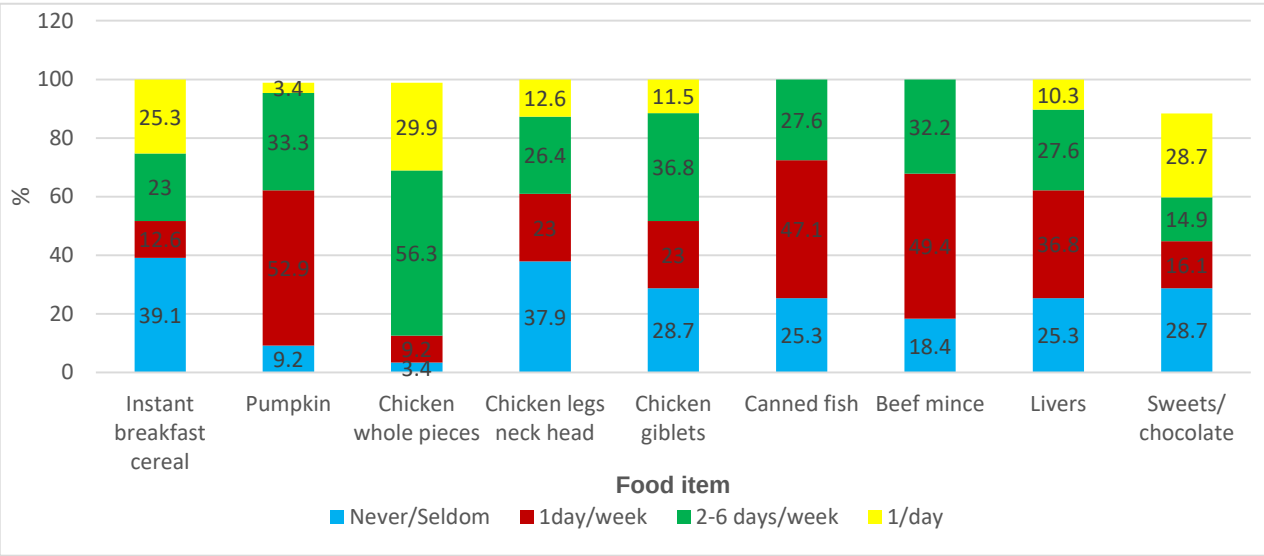

Figure 3a Statistically significant percentages of all households' consumption patterns regarding various food items on a weekly basis (N=87).

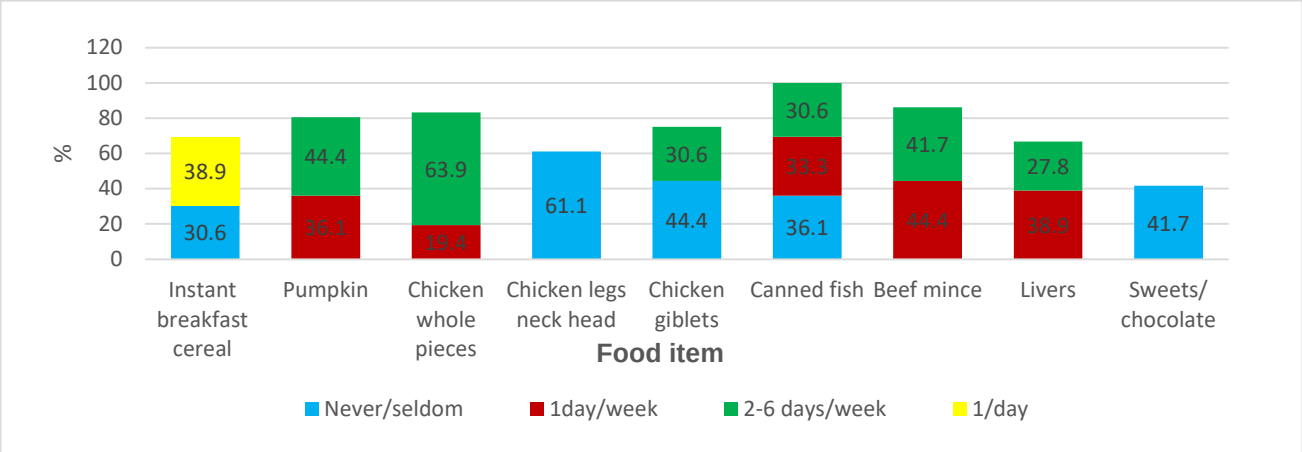

Figure 3b The percentage of food secure households' consumption patterns regarding food items on a weekly basis (n=36).

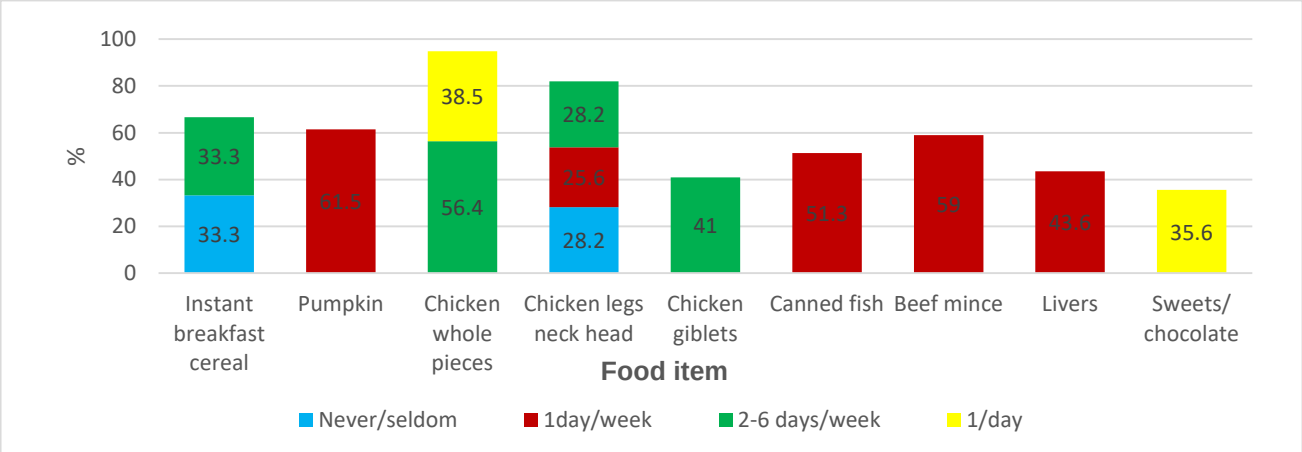

Figure 3c The percentage of at risk households' consumption patterns regarding food items on a weekly basis (n=39).

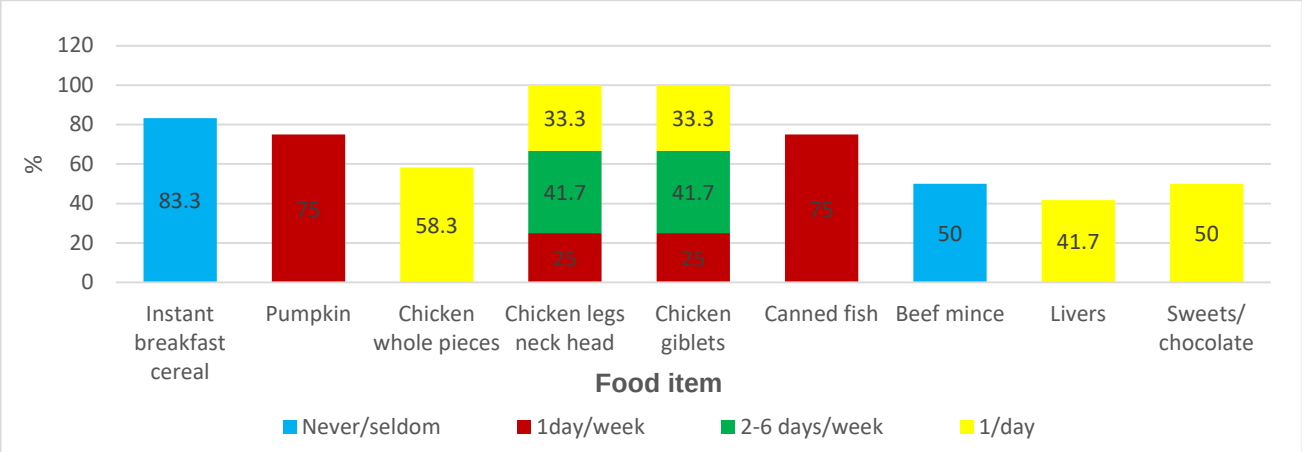

Figure 3d The percentage of food insecure households' consumption patterns regarding food items on a weekly basis (n=12).

7.5.4 Qualitative research findings

The qualitative research phase (N=46) aimed to gain an understanding of why high- middle- and low income-earning participants experienced food insecurities. All three food security status groups were represented, of which 63% were either at risk of insecure (Figure 2). A summary of daily food choice and consumption behaviour which indicated a need for assistance is presented in Table 2.

Table 2 Summary of themes, concepts and sub-concepts identified from the qualitative phase

Concept and sub-concepts	Transcriptions from interviewer-administered face-to-face interviews
THEME 1: Food choice decisions in the household	
• Self-decision • Wife's/partner's decision • Availability • Affordability • Planned schedule • Health related	*"I eat what I feel like"* (P2, 8, 16, 22, 23, 24, 39, 40, 43, 45, 49) *"wife decides"* (P7, 10, 27, 33, 35, 37, 42, 47) *"What is available in the house"* (P2, 6, 9, 11, 21, 23, 37, 42) *"I buy cheap foods* (P26, 40) *and what I enjoy eating/budget allows"* (P25) *"…know each day – schedule"* (P31) *"look at my high blood pressure* (P37), *…foods that give me energy"* (P16, 43)
THEME 2: Food choice decisions in the grocery store	
• Decision pattern ✓ Make a list of needed items • Affordability • Familiarity • Price/ budget • Special/ promotion • Brand	*"buy what we need most, see things on shelves and take it"* (P42) *"…wife writes a list… from schedule/list"* (P10, 11, 17, 19, 24) *"… and what we can afford"* (P3, 4, 40) *"I buy food that I know"* (P9, 24, 46) *"look at price"* (P4,6,8,13,16,27,39) *"We buy with our budget and what we need"* (P25, 27, 30, 40, 45, 49) *"check prices, promo's"* (P4, 6, 7, 8, 13,16, 27, 39, 40, 46) *"…buy food on special"* (P7, 9, 11, 12, 13, 15, 20, 25, 38, 39, 44*)* *"I like my brand"* (P29, 38)
THEME 3: Daily challenges regarding food choice decisions	
• Need knowledge ✓ Food & health related ✓ Food shortages/restrictions ✓ Financial aspects	*"more knowledge"* (P3,12,19, 37) *"healthy food"* (P3, 10, 18, 19, 27, 32, 49) *"Don't have money"* (P24, 25, 38, 40, 41, 42) *"…help with budget/ finances"* (P32, 35, 38, 47)
THEME 4: Knowledge and skills required	
• Financial (budget) • Vegetable gardens • Food choices ✓ Healthy choices ✓ Food/label information	*"help to manage my budget…"* (P7) *"…needs skills for a vegetable garden, teach me to grow food please"* (P42) *"…want to make better food choices"* (P12) *"I want skills about good foods, want to live well…ways to prepare food"* (P47) *"Need more knowledge on products* (P4, 12) */ food types* (P35)

Participants frequently purchased foods which were high in sugars and salt or processed food products, which is unhealthy. Increasing the salt intake leads to elevated blood pressure, which increases the risk of cardiovascular disease, coronary heart disease, hypertension, stroke, and kidney disease (Wentzel-Viljoen *et al*., 2013:S105), with further health related problems. During the exploration of food choices in Phase 1, it was mentioned that sugar-filled sweets, chocolates,

chips, for example NikNaks, and processed meats, for example pork viennas, were popularly and conveniently consumed in the VIS, often by food insecure and at risk participants, as these foods were tasty, often affordable and easily accessible. Although the higher sugar intake supplies energy needs, it lacks micronutrients (Temple & Steyn, 2013:S101) and leaves short-lived sensations of feeling satisfied or full.

Informed decisions during food choices can only be possible if households acquire sufficient information to assist with these choices, such as food label knowledge, characteristics of healthy and unhealthy foods and money management skills. Participants gave feedback with included: *"...need more knowledge"*, "*help with budget/spending"* and *"want to know more about food, make me feel better/healthy".* If households are aware of their families' consumption patterns, this may ensure better meal and financial planning. Participants also mentioned that they needed food knowledge for special diets, weight loss and healthy food consumption.

Participants asked for assistance with information on food labels, namely the expiry date, ingredients and preparation of the item, and on managing their budget and how to spend wisely. The benefits of vegetable gardens for food consumption were mentioned and participants also indicated during the interviews that they would welcome more information about planting various herbs, fruits or vegetables. Participants showed considerable interest in starting vegetable gardens, but the soil in their gardens were of poor quality and they were not familiar with planting methods, therefore many of them requested more information. Participants communicated the following: *"Please can we have information and training for a vegetable garden…want to expand current garden, also want to learn what types of food are healthy…suggestion to put posters up for us in community?".* Participants also indicated that they struggled for the month, and consequently had to borrow food from friends and family to get through the month. Information leaflets and posters were designed for the VIS employees and will be distributed in the community to aim at improving household food consumption knowledge. Food security may be promoted in various ways, for instance through the contribution of financial assistance, food policy councils and education on food (Corrigan, 2011:1240). Data from this current study revealed that basic food information, planning food purchases and assistance with budgets may support households to improve their household food security status.

7.6 Conclusions and recommendations

Food security is not secured by a middle to higher income alone. The status of at risk and food insecure groups appeared in 58.6% of presented households during data collection for this study. Disturbingly, this trend of insufficient food supply was recorded in three high-income households, perhaps indicating a lack of money management and knowledge about different types of food.

Food insecure participants did not have enough income to spend on sufficient food items, yet they still managed to survive on a small budget to feed their family. This would suggest that dietary diversity is low and often consumption depended on staple foods such as maize meal due to affordability, although no significance in maize meal consumption amongst different food security status households was recorded. Significant differences with a medium effect size was recorded for only a few foods (r=0.3; p<0.05). Pumpkin, chicken with white meat, tinned fish, beef mince and liver were consumed more frequently in food secure households. These items were mostly consumed only once a week in at risk and food insecure households. In food insecure households chicken and chicken/beef giblets were most frequently consumed, with a third of these households indicating daily consumption. Participants from at risk and insecure households also reported a higher daily consumption of sweets and chocolates.

During Phase 2 participants reported that they compensated for insufficient food by reducing portion sizes, skipping meals or borrowing food/money. Several indicated a need for assistance with food budgets and information about food choices. Participants indicated an interest in starting their own vegetable gardens so that they would spend less money on certain foods. Data from this study could further support an intervention plan in the community as well as future research to assist community members in improving their household food security status.

7.7 Reference list

Corrigan, M.P. 2011. Growing what you eat: Developing community gardens in Baltimore, Maryland. OH: Ohio University.

Creswell, J.W. 2014. Research design: Qualitative, quantitative and mixed methods approaches. 4th ed. Sage Publications. 273p.

Devereux, S. & Waidler, J. 2017. Why does malnutrition persist in South Africa despite social grants? Centre of Excellence in Food Security. http://foodsecurity.ac.za/Media/Default/Publications/Final_Devereux%20%20Waidler%202017%20-%20Social%20grants%20and%20food%20security%20in%20SA%2025-Jan-17.pdf Date of access: 10 Apr. 2017.

Kriel, M. 2014. Planning child-friendly spaces for rural areas in South Africa: The Vaalharts case study. Potchefstroom: North West University (Dissertation).

Labadarios, D., Mchiza, Z.J., Steyn, N.P., Gericke, G., Mauder, E.M.W., Davids, Y.D. & Parker, W. 2011. Food security in South Africa: a review of national surveys. (Theories from Food and Agricultural Organization, FAO). p891-899.

Maisela, R.J. 2007. Realizing Agricultural potential in land reform: The case of Vaalharts Irrigation Scheme in the Northern Cape Province. Cape Town: Western Cape University (Masters).

Megersa, B., Markemann, A., Angass, A. & Zárate, A.V. 2013. The role of livestock diversification in ensuring household food security under a changing climate in Barana, Ethiopia. *Food security 2014,* 6:15-28.

Palys, T. 2008. Purposive sampling. (*In* L.M. Given., *ed*. The Sage Encyclopedia of qualitative research methods. Vol. 2. Sage: Los Angeles. pp697 – 698).

Sheriff, K. 2012. Participatory Assessment of Household Food Security and Nutrition. Lambert Academic Publishing. 68p.

SPSS Inc. 2017. IBM SPSS Statistics Version 24, Release 23.0.0, Copyright© IBM Corporation and its licensors. http://www-01.ibm.com/software/analytics/spss/

Temple, N.J. & Steyn, N.P. 2013. Sugar and health: a food-based dietary guideline for South Africa. *South African journal of clinical nutrition*, 26(3):S100-S104.

Trochim, W.M.K. & Donnelly, J.P. 2006. The research methods knowledge base. 3rd ed.

UNDP see United Nations Development Programme.

United Nations Development Programme 2012. Africa human development report 2012: Towards a food secure future. New York: United Nations Development Programme.

Van Wyk, D. 2014. Exploring household food security in the Vaalharts area. Masters Dissertation. Potchefstroom: North West University.

Wentzel-Viljoen, E., Steyn, K. & Charlton, K.E. 2013. “Use salt and foods high in salt sparingly”: a food-based dietary guideline for South Africa. *South African journal of clinical Nutrition*, 26(3):S105-S113.

Whati, L., Senekal, M., Steyn, N.P. 2005. Nutrition knowledge questionnaire for 13-19 year olds based on the food-based dietary guidelines. http://www.sahealthinfo.org/lifestyle/urban.pdf Date of access: 3 Aug. 2012.

Yin, R.K. 2011. Qualitative research from start to finish. New York: The Guilford Press. 348p.

APPENDIX A: Quantitative questionnaire

DATE: _____	UNIQUE CODE: _____

Quantitative Questionnaire:

SECTION A FOOD UTILISATION AND CONSUMPTION *(TICK THE BEST OPTION)*
AFDELING A VOEDSELGEBRUIK EN –VERBRUIK *(Merk die beste opsie)*

1. Do you have access to a vegetable garden?
(Het u toegang tot 'n groentetuin?)

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

1.1 Do you keep or have access to any animals for food purposes e.g. Chickens, sheep, pigs, cattle etc?
(Hou u enige diere aan of het u toegang tot diere vir kos doeleindes bv. Hoenders, skape, varke, beeste ens?)

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

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 Starch *(Stysel)*						
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	1	2	3	4	5	6

(*Ontbytgraan- vlokkies: Corn flakes/Weet-Bix*)						
2.1.8 ProNutro/ Future life	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 (P*atats*)	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 Tomatoes *(Tamaties)*	1	2	3	4	5	6
2.2.10 Onion *(Uie)*	1	2	3	4	5	6
2.2.11 Other *(Ander)*_____	1	2	3	4	5	6
2.3 Fruit (*what type)* ***(Vrugte) (****waste tipe)*	1	2	3	4	5	6
2.4 Dairy *(Suiwel)*						
2.4.1 Milk, drinking (*Melk, drink*)	1	2	3	4	5	6
2.4.2 Inkomaas/Amazi/Yoghurt (*Inkomaas/Amazi/Jogurt*)	1	2	3	4	5	6
2.4.3 Cheese *(Cheese)*	1	2	3	4	5	6
2.4.4 Powdered coffee creamer (*Koffieverromer) (Cremora)*	1	2	3	4	5	6
2.5 Meat *(Vleis)*						
2.5.1 Chicken: whole, pieces (*Hoender: heel, stukke*)	1	2	3	4	5	6
2.5.2 Chicken: legs, neck, head (*Hoender: pote, nek, kop*)	1	2	3	4	5	6
2.5.3 Chicken giblets (*Hoenderafval*)	1	2	3	4	5	6
2.5.4 Fish *(Vis)*	1	2	3	4	5	6
2.5.5 Pilchards/sardines (sardyne): Lucky star/ tuna	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)	1	2	3	4	5	6
2.5.9 Liver *(Lewer)*	1	2	3	4	5	6

2.5.10 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
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
2.7 Other *(Ander)*						
2.7.1 Sweets *(Lekkers*)	1	2	3	4	5	6
2.7.2 Chips/ snacks (Skyfies/ versnaperinge)	1	2	3	4	5	6

3. Where do you buy food? (*Waar koop u kos?)*	**Yes** *(Ja)*	**No** *(Nee)*
3.1 Spaza Shop	1	2
3.2 Street Vendor *(Straatverkoper)*	1	2
3.3 Supermarket *(kruidenierswinkel)*	1	2
3.4 Other, specify *(Ander, spesifiseer)*	1	2

SECTION B FOOD SECURITY STATUS
AFDELING B VOEDSELSEKERHEID STATUS

	Yes *(Ja)*	**No** *(Nee)*
4. Are you a single parent? *(Is u enkellopend ouer?)*	1	2
4.1 Does your household ever run out of money to buy food? *(Het u huishouding ooit te min geld om kos te koop?)*	1	2
4.2 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?)*	1	2
4.3 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?)*	1	2
4.4 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?)*	1	2

4.5	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?)*	1	2
4.6	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?)*	1	2
4.7	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?)*	1	2
4.8	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?)*	1	2
4.9	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?)*	1	2

5. How often do you and the household members do the following...?
(*Hoe gereeld doen u en die huishouding se mense die volgende?*)

(Tick one block only for every question) *(Merk slegs een blokkie vir elke vraag)*	**Never / Very seldom** *(Nooit / Baie selde)*	**1-2 days/month** *(1-2 dae/maand)*	**1 day/week** *(1 dag/week)*	**2 – 4 days / week** *(2- 4 dae / week)*	**More than 4 days/week** *(Meer as 4 dae/week)*	**Every day** *(Elke dag)*
5.1 Eat food that is not preferred because it is available (*Eet kos wat nie verkies word nie want dit is beskikbaar*)	1	2	3	4	5	6
5.2 Limit portion size for everyone in the household (*Beperk porsie-groottes vir almal in die huishouding*)	1	2	3	4	5	6
5.3 Reduce 3 meals to 2 meals/day *(Verminder 3 maaltye na 2 maaltye/dag)*	1	2	3	4	5	6
5.4 Borrow money to buy food *(Leen geld om voedsel te koop*)	1	2	3	4	5	6
5.5 Borrow food *(Leen voedsel*)	1	2	3	4	5	6
5.6 Eat only 1 staple product e.g pap (*Eet slegs 1 stapelvoedselproduk*)	1	2	3	4	5	6

SECTION C MONTHLY FOOD AND HOUSEHOLD EXPENDITURE AFDELING C MAANDELIKSE VOEDSEL- EN HUISHOUDELIKE UITGAWES	
6. How much money is spent on food PER MONTH, by the household? (*Tick only one)* *(Hoeveel geld word deur die huishouding aan kos PER MAAND spandeer? (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

7. How often do you spend your income on the following?
(Hoe dikwels spandeer u u inkomste op die volgende?)

*(**Tick one block only for every question**)* *(Merk slegs een blokkie vir elke vraag)*		**Never / Very seldom** *(Nooit / Baie selde)*	**Once/ twice a year** *(1/ 2 keer per jaar)*	**Monthly** *(Maandeliks)*	**Weekly** *(Weekliks)*
7.1	Food *(Kos)*	1	2	3	4
7.2	Clothes *(Klere)*	1	2	3	4
7.3	Housing: home loan, rent *(Behuising: huisverband, huurgeld)*	1	2	3	4
7.4	Housing: rates, taxes, electricity*(Behuising: heffings, belastings, elektrisiteit (water,ligte))*	1	2	3	4
7.5	Transport *(Vervoer)*	1	2	3	4
7.6	School-/ University fees *(Skoolfonds/ Universiteitsgelde)*	1	2	3	4
7.7	Household aspects e.g. furniture, appliances *(Huishoudelike aspekte bv. meubels, toestelle)*	1	2	3	4
7.8	Leisure (*Onspanning)*	1	2	3	4

SECTION D DEMOGRAPHIC INFORMATION
AFDELING D DEMOGRAFIESE INLIGTING

8. Gender (*Geslag)*

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

9. Age *(Ouderdom)*					
18-24	25-34	35-44	45-54	55-64	65 +

10. Home language *(Huistaal)*	**Yes** *(Ja)*	**No** *(Nee)*
10.1 Setswana	1	2
10.2 IsiXhosa	1	2
10.3 Sepedi	1	2
10.4 isiZulu	1	2
10.5 Sesotho	1	2
10.6 Tshivenda	1	2
10.7 isiNdebele	1	2
10.8 Xitsonga	1	2
10.9 siSwati	1	2
10.10 English	1	2
10.11 Afrikaans	1	2

11. 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: Diploma/ Degree *(Tersiêre opleiding: Diploma/ Graad)*	5
Other formal skilled training *(Ander formele vaardigheidsopleiding)*	6

SECTION E LIVING ENVIRONMENT
AFDELING E LEEFOMGEWING

12. 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

13. How many people live in your house, including you?
(Hoeveel mense woon in u huis, saam jou?)

1	2	3	4	5	6	7	8	9	>9

14. Are you involved with the household's food eating choices?
(Is u betrokke by die huishouding se voedsel keuse?)

Yes / *Ja*	1
No / *Nee*	2

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

16. What time do you eat your first meal of the day? *(Hoe laat eet u die eerste maaltyd van die dag?)*	
17. If you do not eat breakfast, why not? *(Indien u nie ontbyt eet nie, hoekom nie?)*	
17.1 There is not enough time *(Daar was nie genoeg tyd nie)*	1
17.2 There is no food in the house *(Daar is nie kos in die huis nie)*	2
17.3 I am not hungry in the morning *(Ek is nie honger in die oggend nie)*	3
17.4 Other reason? What:_____	4

SECTION F HOUSEHOLD INCOME
AFDELING F HUISHOUDELIKE INKOMSTE

18. How many people contribute to the total household income? (*Hoeveel mense dra by tot die totale huishoudelike inkomste?)*	

19. What is the total monthly income of the household from all contributors PER MONTH?
[Tick only one]
(Wat is die totale inkomste vanaf alle bydraes vir 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

Thank you for your participation/Dankie vir U deelname

APPENDIX B: Qualitative interviews

** a - d are probing questions for if a participant does not know what to answer and needs guidance.*

DATE: _____	**UNIQUE CODE: _____**	
Observations	**Questions**	**Responses**
	1. How do you decide what to eat? *Verduidelik vir my watter tipe kos jy sal kies om te eet?* *a.* *[What food do you eat mostly] *Watter tipe kos eet jy die meeste?* *b.* *[Why?] *Waarom eet jy die kos die meeste?* *2.* How do you choose foods in the grocery store? *Hoe kies jy die kos wat jy in die kruidenierswinkel koop?* 3. Explain to me what daily problems you have in your household when eating foods? *Verduidelik vir my watter daglikse probleme het jy in verband met kos wat jy eet?* a. *[how much you know about using food] *In verband met jou kennis van kos benutting* b. *[the skills you have when using food] *In verband met vaardighede om kos te benut*	

	c. *[the money you use for food] *In verband met kostes om kos te benut* *4.* What information of food can help you to better your household's well-being? *Verduidelik watter inligting en kennis oor kos sal jou help om jou huishouding se welstand te verbeter?* *a.* [What will help you buy good/better food?] *Watter kennis sal jou help om beter kos te koop?* *b.* [What will help you to use your money "better"/with budget?] *Watter kennis sal jou help om jou geld beter te spandeer op kos asook met jou begroting?* 5. What skills do you want to help you better manage food for your household? *Is daar enige tipe vaardighede wat jy graag sal wil leer om jou huishouding beter te bestuur?* *a.* *[What skills will help you to choose better foods?] *Watter vaardighede sal jou help met kos keuses en om beter kos te kies?* b. *[What skills will help you to work with your money (monthly)?] *Watter vaardighede sal jou help om met jou maandelikse geld te kan werk?* c. *[What skills will help you to choose what to buy (for the house)?] *Watter vaardighede sal jou help om te kies watter tipe kos jy sal vir jou huishouding*	

	koop? d. *[What skills will help you “stretch” your money/spend money better?] *Watter vaardighede sal jou help om jou geld beter te bestuur om langer uit te kom met jou geld?*	

Thank you for your participation/ Dankie vir U deelname

APPENDIX C1: Consent form

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

HREC Stamp

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR EMPLOYEES AND INCOME-EARNING HOUSEHOLDS OF THE VAALHARTS IRRIGATION SCHEME

TITLE OF THE RESEARCH PROJECT:
Exploring the challenges income-earning households experience to enhance household food security in the Vaalharts Irrigation Scheme

REFERENCE NUMBER: 20764227

PRINCIPAL INVESTIGATOR: Janice Harmse

ADDRESS: 41 Via Ticino, corner Hornbill & Leslie Avenue, Douglasdale, Sandton, Johannesburg, 2191

CONTACT NUMBER: +2784 320 0009

We would like you to take part in a study by North-West University.

You must be older than 18 years of age.

It is your choice to take part or not. If you say no, this will not be held against you.

You can stop taking part in the study at any time.

You can read this form in your time.

Talk to your family and friends to decide to take part or not.

This study is accepted by the Health Research Ethics Committee. This Committee will protect you,

PURPOSE OF THE STUDY

We ask you to take part so we can learn about food security problems in your house.

To agree to take part in this study, you will need to complete the consent form. You can ask the field assistant to help you.

WHAT IS THE STUDY ABOUT?

This study will take place in the Northern Cape at the Vaalharts Irrigation Scheme in September 2016.

A trained health researcher will ask you questions.

You will answer questions about your house, family and foods you eat. (Questionnaire)

You will also answer questions about what you want and need at home. (Interview)

All employees from Vaalharts Irrigation Scheme can take part.

The study needs 162 people to answer questions.

THE OBJECTIVES OF THIS RESEARCH ARE:

To see if you are choosing the best foods for you and your home.

To see what your food security status is.

Learn more about your eating patterns.

To see if we can teach you and your household to have a better food security status.

To see how we can help you to keep your household eating well.

Teach you to live better.

WHY ARE YOU INVITED TO TAKE PART?

- ✓ Over the age of 18 years
- ✓ Live in Vaalharts Irrigation Scheme
- ✓ Have food security problems
- ✓ Work at the Vaalharts Irrigation Scheme
- ✓ You are from low-, middle- or high-income group
- ✓ You are food secure, food insecure or at risk of becoming food insecure

- ✓ Choose/buy food for your house.

WHAT DO YOU NEED TO DO IN THE STUDY?

Answer questions about your family, income, food needs, food security status and what food you eat.

We need you for 30 minutes.

If we select you for the interview, you will answer more questions about food needs.

The interviews will take 45 minutes of your time.

HOW WILL YOU BENEFIT?

We can help you to use money better.

We can help you eat better.

We can teach you to grow vegetables to feed your family.

We can help you learn about good food.

This will help you have better food security.

ANY RISKS OR WORRIES

Physical risk – low. *(Focus or physical discomfort)*

Psychological risk – Medium. *(Emotions, embarrassment, being bored**)***

Questions take 30 minutes – might feel long.

Interview questions tale 45 minutes – longer time to sit.

Please drink water, dress is comfortable clothes, take breaks.

We will explain that all information you give is private. No one will see this.

We can arrange a trained counsellor if you feel emotional or need help.

Social risk – low*. (All information you give is private and will not be spoken about. No one can judge you. You will be protected).*

Legal risks – No.

Economical risks – No/low*. (1 hour away from work. The Vaalharts Irrigation Scheme will give permission).*

Dignitary risks – No risk to affect your beliefs or values*.*

All risks in the study are low or medium risks.

We will protect you and treat you well, then there will be no risks and no harm.

You will benefit more than possible risks.

If you do not want to answer a question or feel emotional, you can skip the question. This will not be held against you at all.

TAKE PART AND/OR WITHDRAW

You can choose if you want to be a part of this study or not.

You can choose to pull out from the study at any point without being judged.

You may refuse to answer any questions that make you uncomfortable, but still remain in the study.

CONFIDENTIALITY

All your information will be kept private.

All your information will be identified using a unique code, NOT your name. Example: QN1234.

Interviews will be audio recorded to have correct information, but you can say no to this.

Audio recordings will be deleted after conclusions made,

Questionnaires and interview answers will be kept safe in locked cupboard for 5 years.

Documents on the computer will have a password and kept safe for 5 years.

Interviews will also have a unique code. Example: QN1234.

All personal information will always be kept safe and private.

PAYMENT/COSTS TO TAKE PART

You will not be paid.

You will get coffee, tea, water and muffins.

There are no transport costs. There are no costs for you.

CONCLUSIONS/FINDINGS FROM STUDY

The results from the study will be shared with you in a follow-up visit.

You will get a leaflet to help your food security at home.

Practical solutions such as buying foods, easy cooking will help you.

IF YOU HAVE ANY QUESTIONS/CONCERNS/COMPLAINTS

You can contact the researcher (NWU):

Miss Janice Harmse

084 320 0009 at NWU

Lab@gautengdairy.co.za

You can contact the Health Research Ethics Committee:

Mrs Carolien van Zyl at 018 299 1206

carolien.vanzyl@nwu.ac.za

You will get copy of this information and consent form to keep for yourself.

Declaration by participant

By signing below, I ……..…… agree to take part in a research study titled: **Exploring the challenges income-earning households experience to enhance household food security in the Vaalharts Irrigation Scheme**

I declare that:

- I have read this information and consent form and it is written in a language I understand and comfortable with.
- I had a chance to ask questions to the person obtaining consent and all my questions have been answered.
- I understand that taking part in this study is **voluntary** and I have not been forced to take part.
- I can leave the study at any time and will not be penalised or discriminated against in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…....…… on the (*date*) ……...…….. 20....

.....	**.....**
Signature of participant	Signature of witness

Declaration by person obtaining consent

I *(name)* ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) .....….....…… on the (*date*) ……...…….. 20....

.....	.....
Signature of person obtaining consent	Signature of witness

Declaration by researcher

I *(name)* ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) .....….....…… on the (*date*) ……...…….. 20....

.....	**.....**
Signature of researcher	**Signature of witness**

APPENDIX C2: Confidentiality agreement

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Confidentiality agreement for data collection at the Vaalharts Irrigation Scheme (VIS)

I, _____, ID number _____ the gatekeeper/supervisor/field assistant **(please circle relevant role)** will be involved during research at the VIS. I understand that my involvement includes respecting the participants personal information at all times during data collection. Under no circumstances may any information provided by any participants be communicated to any employees of the VIS. The researcher, WIN Project Committee, Vaalharts Irrigation Scheme or Ethics Committee at North-West University, will not be held responsible for gross negligence or failing to comply with this confidentiality agreement.

I understand what I am signing on this form and agree to ensure all participants information remains private and confidential at all times.

If you have any questions, please ask the researcher.

_____	_____	_____
Please circle below	Signature	Date
Gatekeeper/		
Supervisor/		
Field assistant		

_____	_____	_____
Researcher name	Signature	Date

_____	_____	_____
Witness name	Signature	Date

APPENDIX D: Additional results – tables and figures

Additional tables

Table 4.1 (a) Living environment & consumption patterns of respondents

Table 4.4 (a) Consumption of food items within food security status groups

Table 4.5 Summary of median, quartile 1 & quartile 3 of different food security status groups with statistically significant differences of various food items

Table 4.6 (a) Field notes of participant's responses during phase 2 data collection

Table 4.7 Chi-square cross-tabulations for factors affecting food security – Spending patterns

Additional figures

Figure 4.5(c) Total consumption of starches within the VIS

Figure 4.5(d) Total consumption of animal proteins within the VIS

Figure 4.5(e) Total consumption of plant proteins within the VIS

Figure 4.5(f) Total consumption of fruit and vegetables within the VIS

Figure 4.5(g) Total consumption of dairy products within the VIS

Figure 4.5(h) Total consumption of energy-dense/'junk' foods within the VIS

Figure 4.8(a) Consumption of lentils in relation to the level of education within the VIS

Figure 4.8(b) Consumption of chickpeas in relation to the level of education within the VIS

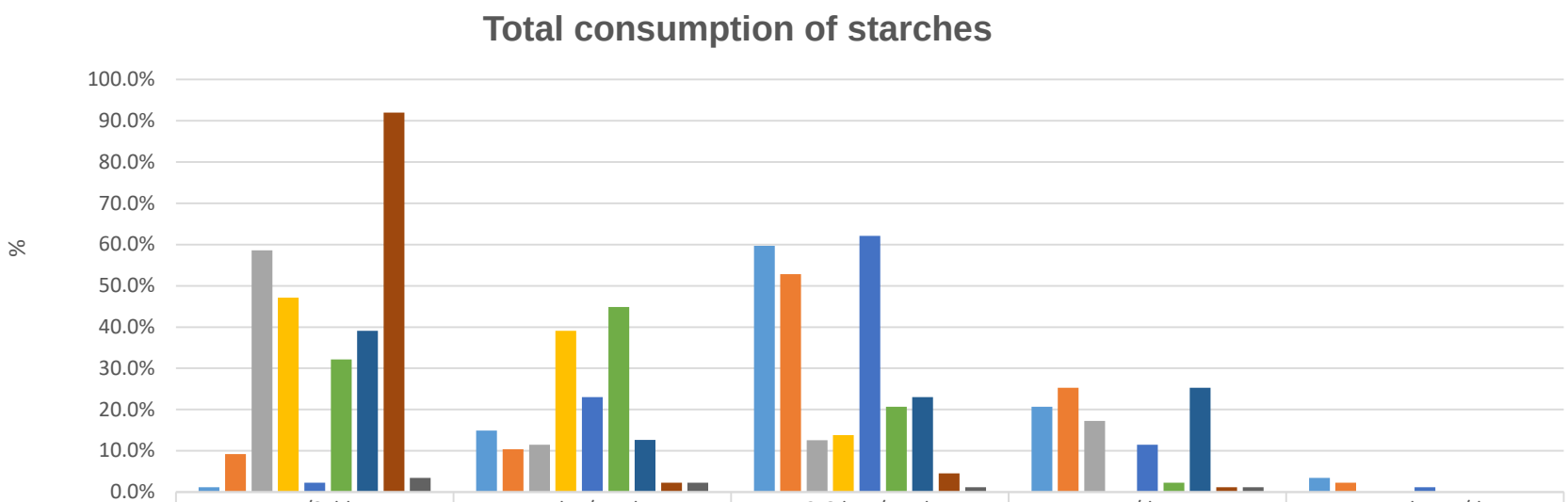
Table 4.1(a) Living environment & consumption patterns of respondents

Living environment	Frequency (N=87)	Percentage (%)
Type of dwelling		
Permanent structure: brick	74	85.1
Semi-permanent structure: corrugated iron/wood	13	14.9
Household size		
1	7	8.0
2	9	10.3
3	21	24.1
4	19	21.8
5	13	14.9
6	6	6.9
7	3	3.4
8	3	3.4
9	3	3.4
10	3	3.4
Food consumption		
Meals consumed per day		
0	2	2.3
1	5	5.7
2	41	47.1
3	37	42.5
>3	2	2.3
First meal of the day		
05h00-05h45	3	3.4
06h00-06h45	17	19.5
07h00-07h45	7	8.0
08h00-08h45	36	41.4
Later than 08h45	24	27.6

Table 4.7 Chi-square cross-tabulations for factors affecting food security: Spending patterns

Spending		Food secure *n*=36	Food secure %	At risk *n*=39	At risk %	Food insecure *n*=12	Food insecure %	Pearson Chi-Square	Cramer's V
Income spent on food	Once/twice per year	*1*	*2.8*	*0*	*0*	*0*	*0*	*0.058*	*0.229*
	Monthly	*30*	*83.3*	*39*	*100*	*12*	*100*		
	Weekly	*5*	*13.9*	*0*	*0*	*0*	*0*		
Income spent on clothing	Never/seldom	*10*	*27.8*	*2*	*5.1*	*2*	*16.7*	*0.099*	*0.212*
	Once/twice per year	*21*	*58.3*	*29*	*74.4*	*9*	*75.0*		
	Monthly	*5*	*13.9*	*8*	*20.5*	*1*	*8.3*		
Income spent on housing (loan/rent)	Never/seldom	*26*	*72.2*	*25*	*64.1*	*8*	*66.7*	*0.751*	*0.081*
	Monthly	*10*	*27.8*	*14*	*35.9*	*4*	*33.3*		
Income spent on housing (rates/tax/elec)	Never/seldom	*7*	*19.4*	*3*	*7.1*	*1*	*8.3*	*0.269*	*0.173*
	Monthly	*29*	*80.6*	*35*	*89.7*	*10*	*83.3*		
	Weekly	*0*	*0*	*1*	*2.6*	*1*	*8.3*		
Income spent on transport	Never/seldom	*10*	*27.8*	*16*	*41.0*	*4*	*33.3*	*0.771*	*0.102*
	Monthly	*20*	*55.6*	*16*	*41.0*	*6*	*50.0*		
	Weekly	*6*	*16.7*	*7*	*17.9*	*2*	*16.7*		
Income spent on school/ university	Never/seldom	*18*	*50.0*	*11*	*28.2*	*5*	*41.7*	*0.330*	*0.163*
	Once/twice per year	*7*	*19.4*	*13*	*33.3*	*2*	*16.7*		
	Monthly	*11*	*30.6*	*15*	*38.5*	*5*	*41.7*		
Income spent on household contents	Undisclosed	*0*	*0*	*0*	*0*	*1*	*8.3*	*0.075*	*0.257*
	Never/seldom	*10*	*27.8*	*5*	*12.8*	*1*	*8.3*		
	Once/twice per year	*1*	*2.8*	*0*	*0*	*0*	*0*		
	Monthly	*25*	*69.4*	*34*	*87.2*	*10*	*83.3*		
Income spent on leisure	Never/seldom	*11*	*30.6*	*18*	*46.2*	*5*	*41.7*	*0.561*	*0.167*
	Once/twice per year	*8*	*22.2*	*7*	*17.9*	*4*	*33.3*		
	Monthly	*10*	*27.8*	*9*	*23.1*	*3*	*25.0*		
	Weekly	*7*	*19.4*	*5*	*12.8*	*0*	*0*		

* Pearson Chi-square (*p*-value) interpreted as significant at levels $p<0.001/p\leq0.05$.
** Cramer's V (effect size) interpreted as $r=0.1$ small effect; $r=0.3$ medium effect; $r=0.5$ large effect.
*** Certain frequencies per week have been excluded from the table due to a 0.0 value.

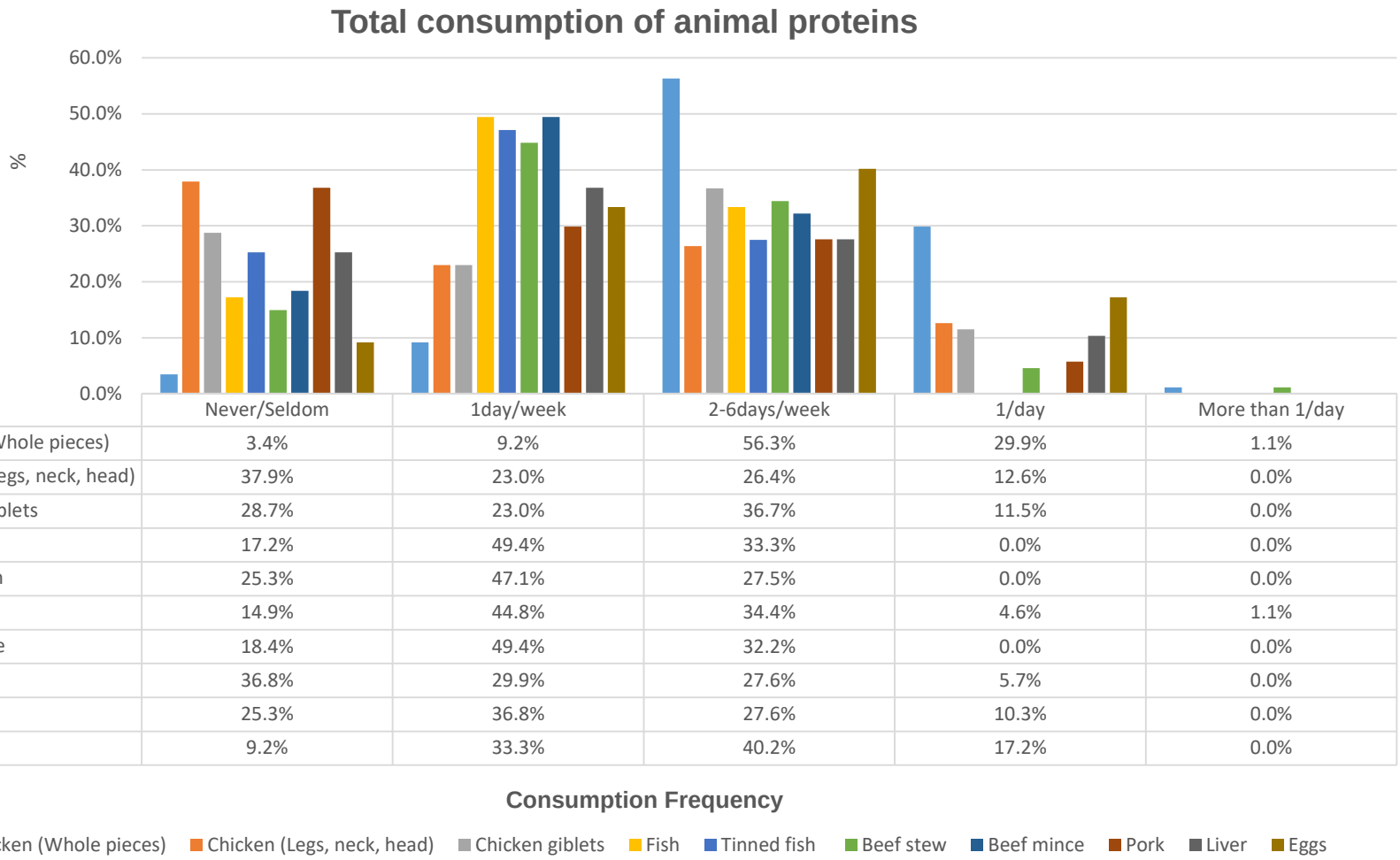


	Never/Seldom	1day/week	2-6days/week	1/day	More than 1/day
Bread	1.1%	14.9%	59.7%	20.7%	3.4%
Maize meal	9.2%	10.3%	52.8%	25.3%	2.3%
Maltabella	58.6%	11.5%	12.6%	17.2%	0.0%
Samp	47.1%	39.1%	13.8%	0.0%	0.0%
Rice	2.3%	23.0%	62.1%	11.5%	1.1%
Vetkoek	32.2%	44.8%	20.7%	2.3%	0.0%
Instant breakfast cereal	39.1%	12.6%	23.0%	25.3%	0.0%
Pronutro/Future life	92.0%	2.3%	4.5%	1.1%	0.0%
Other	3.4%	2.3%	1.1%	1.1%	0.0%

Consumption frequency

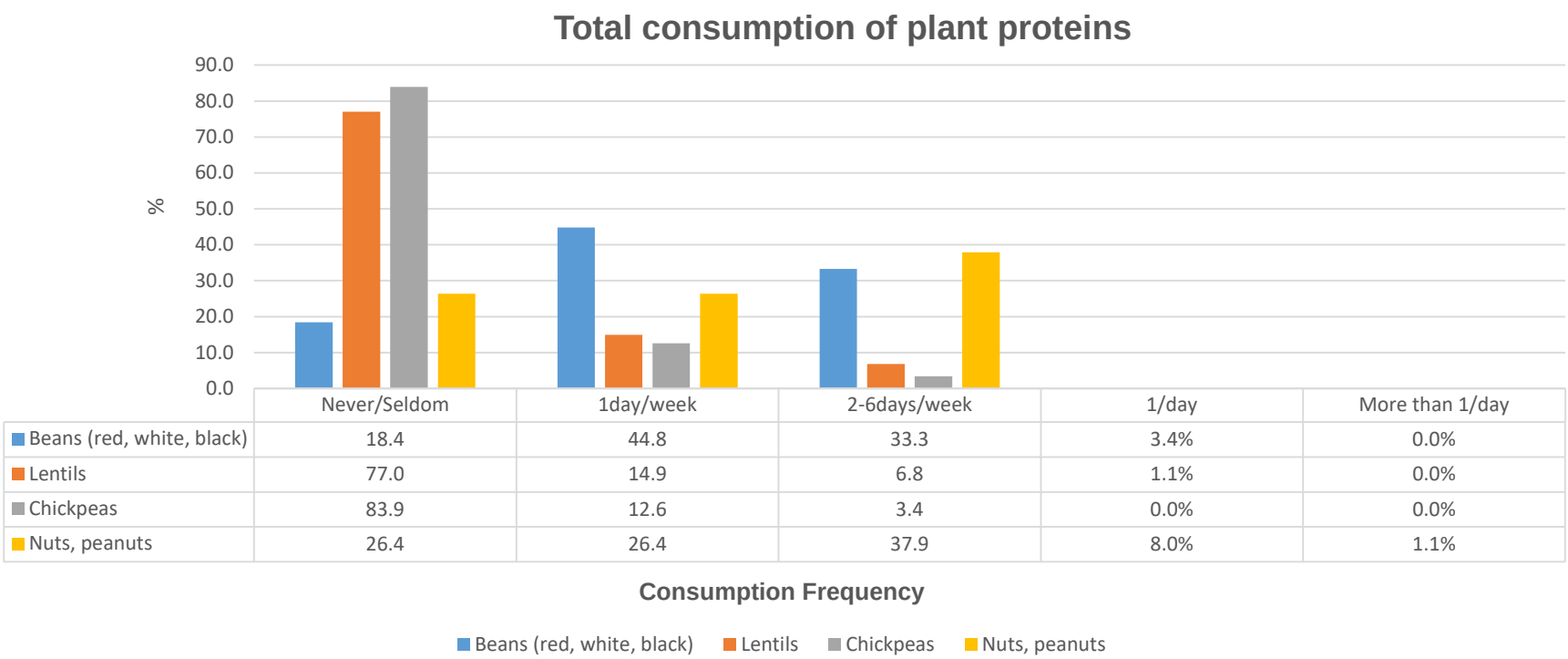
Bread Maize meal Maltabella Samp Rice Vetkoek Instant breakfast cereal Pronutro/Future life Other

Figure 4.5(c) Total consumption of starches within the VIS.



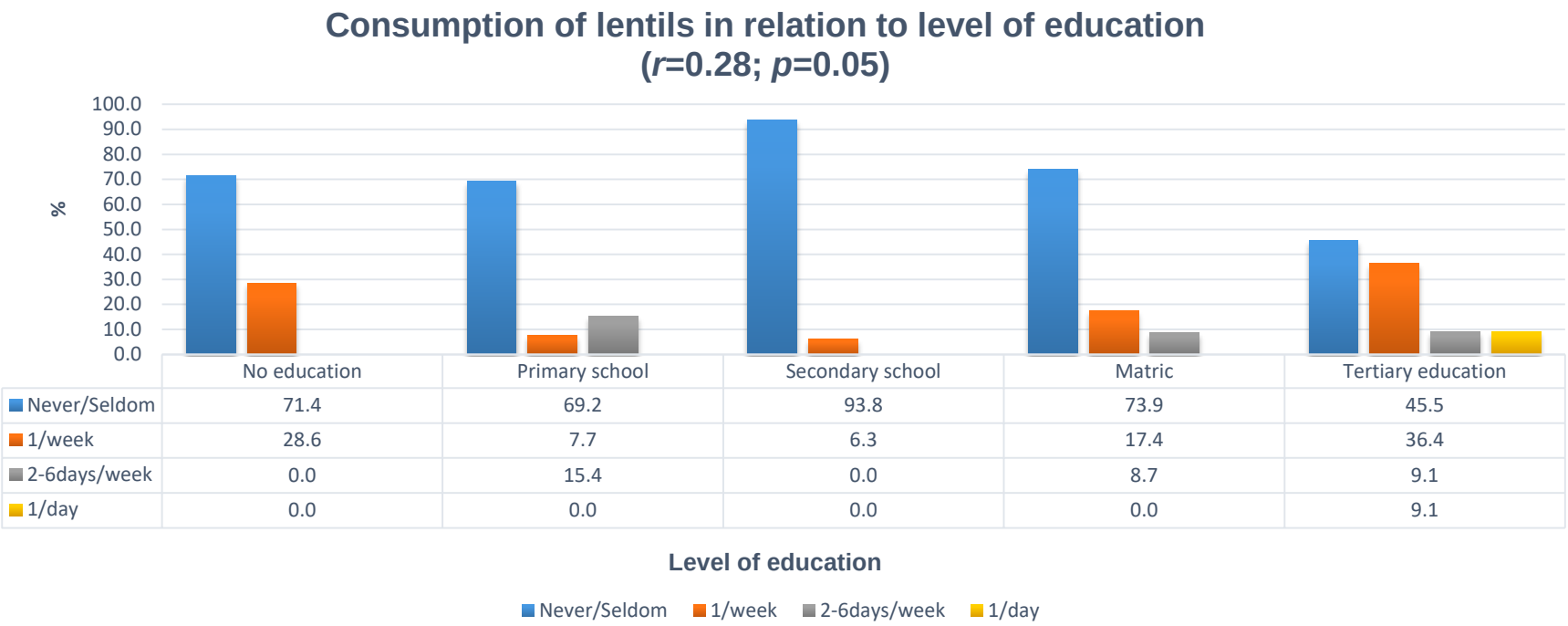
	Never/Seldom	1day/week	2-6days/week	1/day	More than 1/day
Chicken (Whole pieces)	3.4%	9.2%	56.3%	29.9%	1.1%
Chicken (Legs, neck, head)	37.9%	23.0%	26.4%	12.6%	0.0%
Chicken giblets	28.7%	23.0%	36.7%	11.5%	0.0%
Fish	17.2%	49.4%	33.3%	0.0%	0.0%
Tinned fish	25.3%	47.1%	27.5%	0.0%	0.0%
Beef stew	14.9%	44.8%	34.4%	4.6%	1.1%
Beef mince	18.4%	49.4%	32.2%	0.0%	0.0%
Pork	36.8%	29.9%	27.6%	5.7%	0.0%
Liver	25.3%	36.8%	27.6%	10.3%	0.0%
Eggs	9.2%	33.3%	40.2%	17.2%	0.0%

Figure 4.5(d) Total consumption of animal proteins within the VIS.



	Never/Seldom	1day/week	2-6days/week	1/day	More than 1/day
Beans (red, white, black)	18.4	44.8	33.3	3.4%	0.0%
Lentils	77.0	14.9	6.8	1.1%	0.0%
Chickpeas	83.9	12.6	3.4	0.0%	0.0%
Nuts, peanuts	26.4	26.4	37.9	8.0%	1.1%

Figure 4.5(e) Total consumption of plant proteins within the VIS.



	No education	Primary school	Secondary school	Matric	Tertiary education
Never/Seldom	71.4	69.2	93.8	73.9	45.5
1/week	28.6	7.7	6.3	17.4	36.4
2-6days/week	0.0	15.4	0.0	8.7	9.1
1/day	0.0	0.0	0.0	0.0	9.1

Figure 4.8(a) Consumption of lentils in relation to the level of education within the VIS.

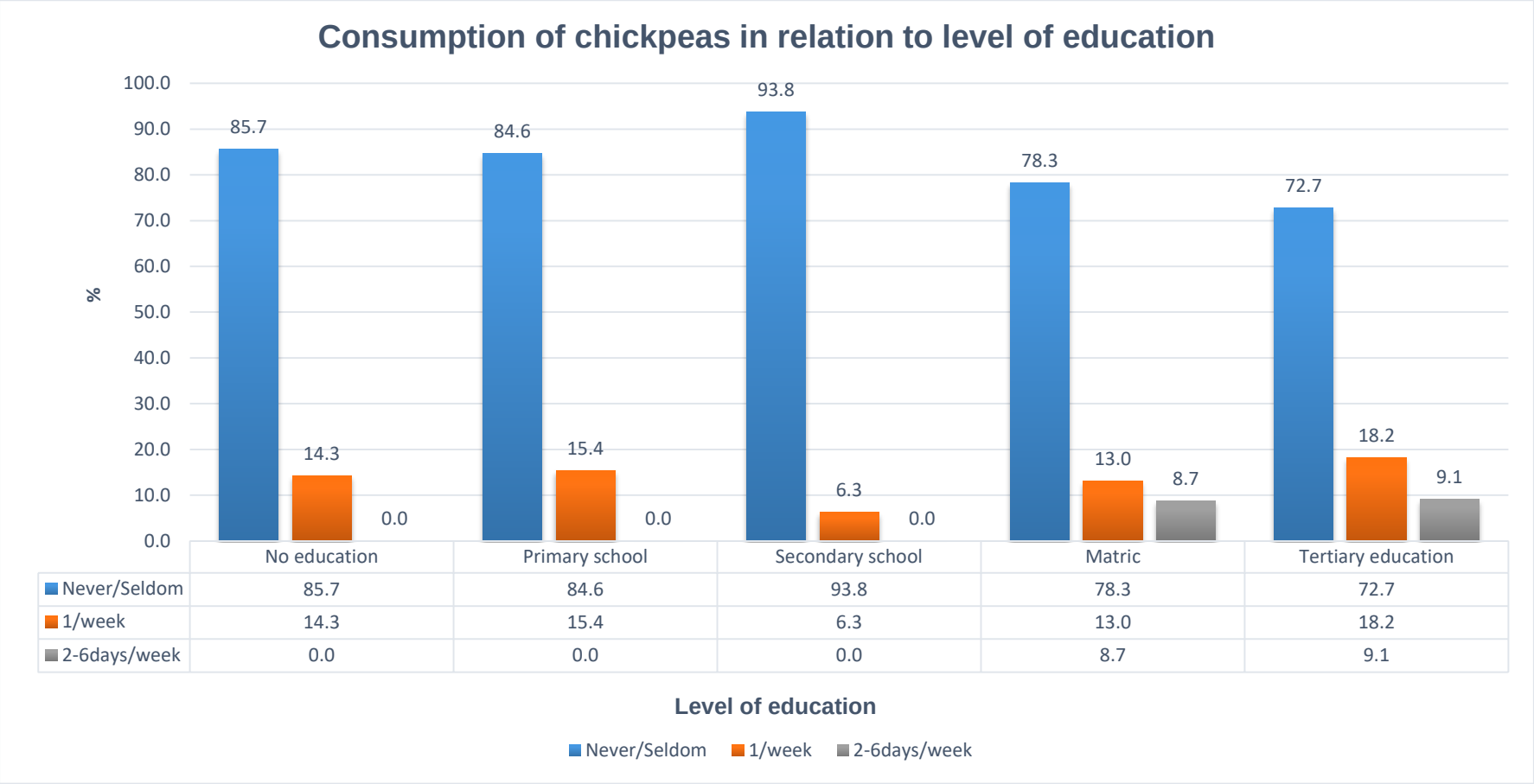
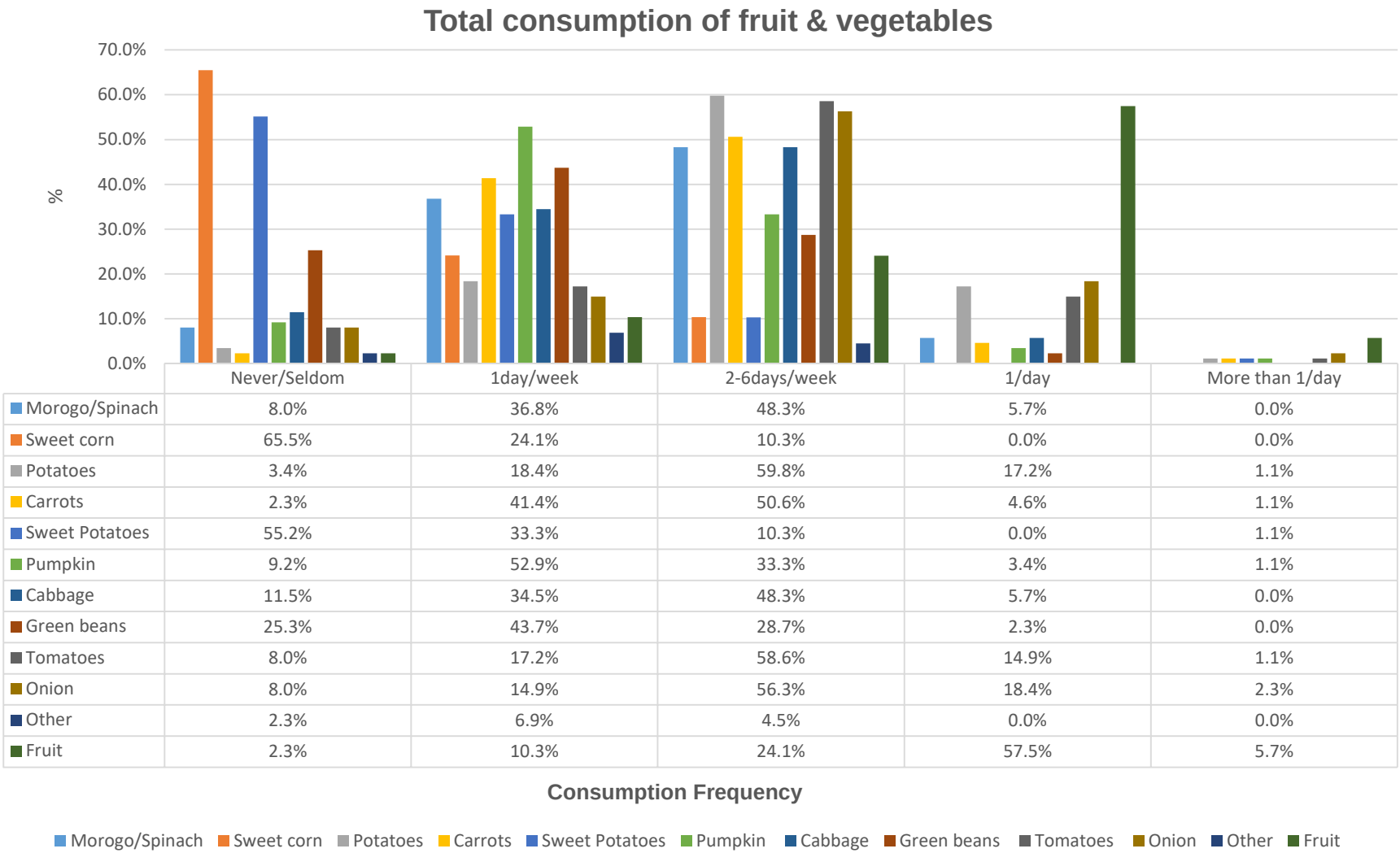
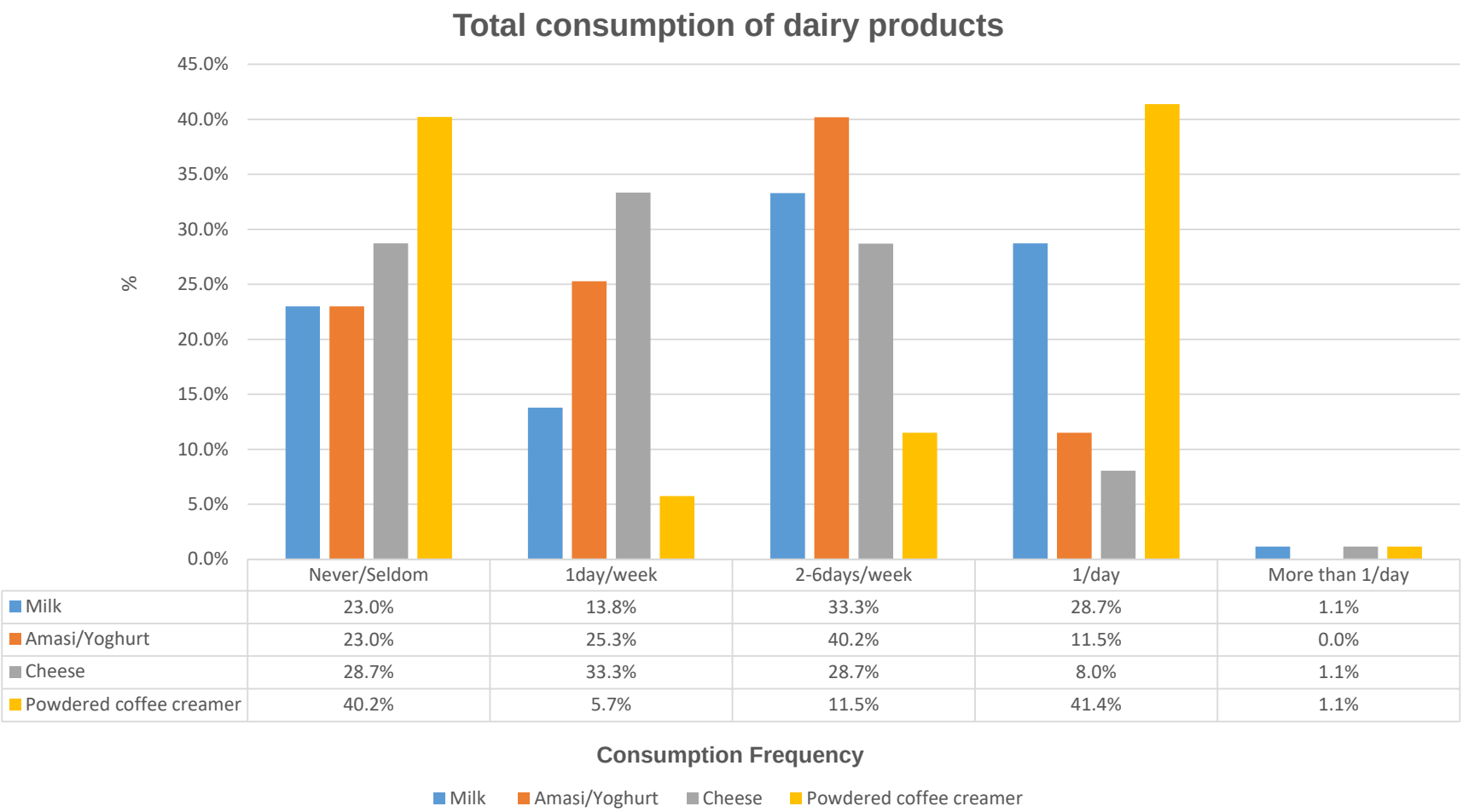


Figure 4.8(b) Consumption of chickpeas in relation to the level of education within the VIS.



	Never/Seldom	1day/week	2-6days/week	1/day	More than 1/day
Morogo/Spinach	8.0%	36.8%	48.3%	5.7%	0.0%
Sweet corn	65.5%	24.1%	10.3%	0.0%	0.0%
Potatoes	3.4%	18.4%	59.8%	17.2%	1.1%
Carrots	2.3%	41.4%	50.6%	4.6%	1.1%
Sweet Potatoes	55.2%	33.3%	10.3%	0.0%	1.1%
Pumpkin	9.2%	52.9%	33.3%	3.4%	1.1%
Cabbage	11.5%	34.5%	48.3%	5.7%	0.0%
Green beans	25.3%	43.7%	28.7%	2.3%	0.0%
Tomatoes	8.0%	17.2%	58.6%	14.9%	1.1%
Onion	8.0%	14.9%	56.3%	18.4%	2.3%
Other	2.3%	6.9%	4.5%	0.0%	0.0%
Fruit	2.3%	10.3%	24.1%	57.5%	5.7%

Figure 4.5(f) Total consumption of fruit and vegetables within the VIS.



	Never/Seldom	1day/week	2-6days/week	1/day	More than 1/day
Milk	23.0%	13.8%	33.3%	28.7%	1.1%
Amasi/Yoghurt	23.0%	25.3%	40.2%	11.5%	0.0%
Cheese	28.7%	33.3%	28.7%	8.0%	1.1%
Powdered coffee creamer	40.2%	5.7%	11.5%	41.4%	1.1%

Figure 4.5(g) Total consumption of dairy products within the VIS.

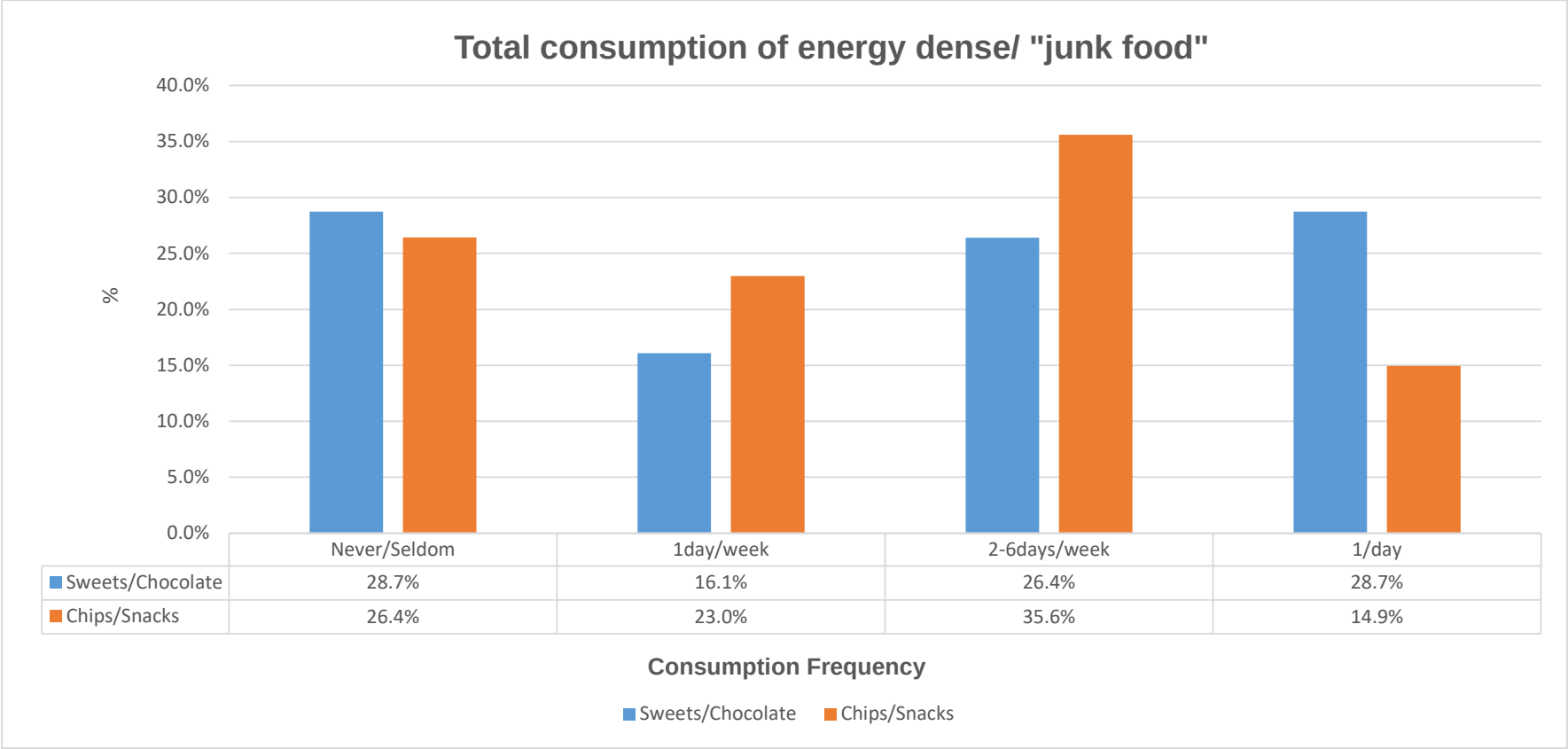


Figure 4.5(h) Total consumption of energy-dense/ "junk" food within the VIS.

Table 4.4(a) Consumption of food items within food security status groups

Consumption of food products	Frequency	*(n=36)* Food secure %	*(n=39)* At risk %	*(n=12)* Food insecure %
Starch				
Bread	Never/seldom	0	2.6	0
	1day/week	8.3	20.5	16.7
	2-6 days/week	66.7	51.3	66.7
	1/day	16.7	25.6	16.7
	More than 1/day	8.3	0	0
Maize meal	Never/seldom	16.7	5.1	0
	1day/week	13.9	7.7	8.3
	2-6 days/week	55.6	52	50
	1/day	8.3	35.9	41.7
	More than 1/day	5.6	0	0
Sorghum/*Maltabella*	Never/seldom	66.7	56.4	41.7
	1day/week	8.3	15.4	8.3
	2-6 days/week	8.4	10.3	33.3
	1/day	16.7	17.9	16.7
	More than 1/day	0	0	0
Samp	Never/seldom	55.6	46.2	25
	1day/week	33.3	38.5	58.3
	2-6 days/week	11.1	15.4	16.7
	1/day	0	0	0
	More than 1/day	0	0	0
Rice	Never/seldom	5.6	0	0
	1day/week	16.7	23.1	41.7
	2-6 days/week	66.6	61.5	50
	1/day	8.3	15.4	8.3
	More than 1/day	2.8	0	0
Vetkoek	Never/seldom	47.2	23.1	16.7
	1day/week	33.3	51.3	58.3
	2-6 days/week	16.7	23.1	25
	1/day	2.8	2.6	0
	More than 1/day	0	0	0
Pronutro/Future life	Never/seldom	86.1	94.9	100
	1day/week	5.6	0	0
	2-6 days/week	8.4	2.6	0
	1/day	0	2.6	0
	More than 1/day	0	0	0

Animal protein				
Fish (Hake, river fish)	Never/seldom	11.1	23.1	16.7
	1day/week	50	41	75
	2-6 days/week	38.9	35.9	8.3
	1/day	0	0	0
	More than 1/day	0	0	0
Beef stew	Never/seldom	13.9	15.4	16.7
	1day/week	38.9	48.7	50
	2-6 days/week	47.2	25.7	25
	1/day	0	7.7	8.3
	More than 1/day	0	2.6	0
Pork	Never/seldom	38.9	35.9	33.3
	1day/week	27.8	28.2	41.7
	2-6 days/week	25	33.3	16.7
	1/day	8.3	2.6	8.3
	More than 1/day	0	0	0
Eggs	Never/seldom	11.1	10.3	0
	1day/week	22.2	38.5	50
	2-6 days/week	41.7	35.9	50
	1/day	25	15.4	0
	More than 1/day	0	0	0
Plant protein				
Bean (red, white, black)	Never/seldom	30.6	7.7	16.7
	1day/week	33.3	51.3	58.3
	2-6 days/week	30.6	38.5	25.0
	1/day	5.6	2.6	0
	More than 1/day	0	0	0
Lentils	Never/seldom	69.4	76.9	100
	1day/week	13.9	20.5	0
	2-6 days/week	13.9	2.6	0
	1/day	2.8	0	0
	More than 1/day	0	0	0
Chickpeas	Never/seldom	86.1	82.1	83.3
	1day/week	8.3	15.4	16.7
	2-6 days/week	5.6	2.6	0
	1/day	0	0	0
	More than 1/day	0	0	0
Nuts/Peanuts	Never/seldom	27.8	23.1	33.3
	1day/week	22.2	25.6	41.7
	2-6 days/week	41.7	38.5	25.0
	1/day	8.3	10.3	0

	More than 1/day	0	2.6	0
Fruit and Vegetables				
Morogo/Spinach	Never/seldom	11.1	7.7	8.3
	1day/week	25	38.5	66.7
	2-6 days/week	58.4	48.8	6.7
	1/day	5.6	5.1	8.3
	More than 1/day	0	0	0
Sweetcorn	Never/seldom	58.3	69.2	75
	1day/week	25	23.1	25
	2-6 days/week	16.7	7.7	0
	1/day	0	0	0
	More than 1/day	0	0	0
Potatoes	Never/seldom	2.8	2.6	8.3
	1day/week	19.4	17.9	16.7
	2-6 days/week	55.5	59	75
	1/day	19.4	20.5	0
	More than 1/day	2.8	0	0
Carrots	Never/seldom	0	2.6	8.3
	1day/week	27.8	48.7	16.7
	2-6 days/week	63.9	46.1	25
	1/day	5.6	2.6	8.3
	More than 1/day	2.8	0	0
Sweet potatoes	Never/seldom	44.4	59	75
	1day/week	36.1	33.3	25
	2-6 days/week	16.7	7.7	0
	1/day	0	0	0
	More than 1/day	2.8	0	0
Cabbage	Never/seldom	22.2	5.1	0
	1day/week	36.1	41	33.3
	2-6 days/week	16.7	48.7	50
	1/day	28	5.1	16.7
	More than 1/day	0	0	0
Green beans/Peas	Never/seldom	22.2	28.2	25
	1day/week	36.1	46.2	58.3
	2-6 days/week	36.1	25.6	16.6
	1/day	5.6	0	0
	More than 1/day	0	0	0
Tomatoes	Never/seldom	8.3	10.3	0
	1day/week	8.3	20.5	33.3
	2-6 days/week	72.3	53.8	33.3
	1/day	8.3	15.4	33.3
	More than 1/day	2.8	0	0

Onions	Never/seldom	11.1	7.7	0
	1day/week	16.7	12.8	16.7
	2-6 days/week	61.1	51.2	58.4
	1/day	8.3	25.6	25
	More than 1/day	2.8	2.6	0
Fruit	Never/seldom	0	2.6	8.3
	1day/week	8.3	7.7	25
	2-6 days/week	19.5	30.8	16.7
	1/day	66.7	51.3	50
	More than 1/day	5.6	7.7	0
Dairy				
Milk (Drinking)	Never/seldom	19.4	20.5	41.7
	1day/week	11.1	10.3	33.3
	2-6 days/week	38.9	33.3	16.7
	1/day	27.8	35.9	8.3
	More than 1/day	2.8	0	0
Amasi/Yoghurt	Never/seldom	19.4	23.1	33.3
	1day/week	16.7	28.2	41.7
	2-6 days/week	52.7	35.9	16.6
	1/day	11.1	12.8	8.3
	More than 1/day	0	0	0
Cheese	Never/seldom	16.7	33.3	50
	1day/week	47.2	20.5	33.3
	2-6 days/week	25	35.9	16.7
	1/day	11.1	7.7	0
	More than 1/day	0	2.6	0
Powdered coffee creamer	Never/seldom	47.2	35.9	33.3
	1day/week	2.8	7.7	8.3
	2-6 days/week	2.8	18	16.7
	1/day	47.2	35.9	41.7
	More than 1/day	0	2.6	0
Other				
Chips/snacks	Never/seldom	33.3	15.4	41.7
	1day/week	16.7	30.8	16.7
	2-6 days/week	44.5	33.3	16.7
	1/day	5.6	20.5	25
	More than 1/day	0	0	0

Table 4.5 Summary of median, quartile 1 & quartile 3 of different food security status groups with statistically significant differences of various food items

	Food secure			At risk			Food insecure			Kruskal-Wallis p-value
Food item	**Median**	**Quartile 1**	**Quartile 3**	**Median**	**Quartile 1**	**Quartile 3**	**Median**	**Quartile1**	**Quartile 3**	
Instant breakfast cereal	*2-4 days/week	Never/ seldom	1 day/week	*2-4 days/week	Never/ seldom	*>4 days/week	Never/ seldom	Never/ seldom	Never/ seldom	P=0.0027
Chicken (whole)	*2-4 days/week	1 day/week – *2-4 days/week	*2-4 days/week	*>4 days/week	*2-4 days/week	1/day	1/day	*2-4 days/week	1/day	P=0.0005
Chicken (leg/neck/head)	Never/ seldom	Never/ seldom	1 day/week	1 day/week	Never/ seldom	*2-4 days/week	*2-4 days/week	1 day/week – *2-4 days/week	1/day	P=0.0000
Chicken (Giblets)	1 day/week	Never/ seldom	*2-4 days/week	*2-4 days/week	1 day/week	*2-4 days/week	*2-4 days/week	1 day/week – *2-4 days/week	1/day	P=0.0008
Sweets/ chocolates	1 day/week	Never/ seldom	*2-4 days/week	*2-4 days/week	1 day/week	1/day	*>4 days/week – 1/day	1 day/week	1/day	P=0.0089

*Consumption frequency of categories *"2-4 days/week"* and *">4days/week"* have been reported as "*2-6 days/week".*

Table 4.6 Respondents' self-production practices (N=87)

Indication of self-production activities	n	%	n	%
	Yes		No	
Access to a vegetable garden	24	27.6	63	72.4
Access to animals for food purposes	20	23.0	67	77.0

Table 4.6 (a) Field notes of participants' responses during phase 2 data collection

Data analysis - interviews						Comments
Respondent	Q1	Q2	Q3	Q4	Q5	
Relates to	QN Q2		QN Q4	QN Q9		
1						fruit twice/day, Meat from butchery
2	Eat what's available & feel like.	Feels like/option. Don't want to starve. Must always be food.	Fiancé cooks. No skills needed.	NA	N/A	Lamb stew every day. Top up food weekly. Q18 training: Management & distribution of water, health & safety, first aid level 1. Income- undisclosed.
3	What I enjoy. Wife cooks. Not fussy. Have a choice. Typical: sheep/chicken/beef with potatoes, coleslaw, rice, veg. No smoke/drink.	Familiarity, budget/afford. Necessities. Butchery meat or buy from farmer.	More knowledge - food with iron, healthy, get tired, why?? Eat unhealthy, lack of time. Takeaways.	Info on fruit/veg, very limited f/v to buy in JK. Prices very high. Can't buy same as before - expensive. Still have a choice.	Have garden- onions tomatoes strawberry mint. Insects - summer/ heat is high. Water- free - water garden. Knowledge on diff healthy foods. Vienna/ polony - expensive.	Gave a lot of info. Buys fruit/veg daily. Training: VIS courses PC. Fruits at Vaalharts: oranges grapes pecan peanuts R68/kg
4	No timetable. Eat what enjoy/afford Rice macaroni mince chicken fish red meat	Price. Healthy foods: fruit sweets-love choc chicken fish veg - eat at night. Don't eat white bread	No problems. Cook enough for the night. Buy quality. Not cheaper or name brand.	Info on prod - not familiar with. Don't waste food- give to dog. Buy what I need.	Veg garden- knowledge. Manage money- not 100%. Training on food budget.	Access to goat's sheep. Spaza shops sell expired products. I check this, my money is my quality and quality foods. Veg from street vendor.
5	Pap chicken read meat morogo	Buy quality foods	No problems.	Expiry date on prod - educate. Eg: milk 10 days. Reduce shark loans. I don't budget. Need loan - money doesn't last.	Only buy food not expired. Draw a budget. Withdraw from the loan sharks.	Leisure - travel to family. Training - operate machines.

6	Cook for family. Other family distribute food. Eat what available.	Price - as I know them. Promo - sometimes miss it due to when we get paid. Use label when buying. Familiar foods.	Enjoy food I eat. Great concern - run short. Yes more skills to grow veg, therefore more money for other foods. Space small to grow.	Pamphlet/ posters/pic of foods. Variety in shops/prices. Eg apples.	Only money. Don't know what to eat. I like cheese but expensive.	Access-chickens. Cheese expensive. Ask parents for food. Don't waste food.
7	Wife decides. Food which makes me full. Rice-a lot. Dumplings/meat with gravy/soup. Vetkoek. Veg – kool tomatoes onions potatoes.	Wife and I decide. I pay. R2000/ look at specials/price. Expensive - rice sugar red meat.	Wife cooks. Children always get more food if hungry. I eat less- sometimes parents don't eat enough. At work-buy vetkoek. R3. Buy food together.	Have wife and daughter who reads the labels. I understand labels too. Price-yes, compare prod for specials.	Budget - manage. Info/training - loans. Children are at school so can help read labels.	Min water for veg garden. Fruits I eat: apple pear dried pear grapes- dried.
8	Feel like-then buy. Whatever in house. 2 incomes. Pap chick, pork, dumpling with beef.	Make list, what I need. Price, promo-Check expiry dates.	Work in a coffee shop- I understand kitchen. Know a lot about food. I know how to handle money.	No prob.	All good.	Banana pear apples. Eat fish: baby hake. R2000 groceries. End of month.
9	What's in house. She cooks. Pap vleis kool aartappels rys en vleis or tin vis.	Specials. Need in house. Want.	Don't feel like eating- hungry to bed. Allergic/don't like - don't eat all foods. Can cook - has skills.	Yes familiar with labels. Pricing. Buy what I know.	Don't understand questions???	Didn't understand questions well.

			Don't need help.			
10	Wife decides. Divides into beef chicken fish - varieties. Family knows what they like. Braai weekend.	What's in fridge/stock. Boere wors rolls. Walk in the list.	Just to know health related info. Sugar salt fats - effects.	no problem	Like to know what to eat which is healthy. Not too much sugar, too much salt. Certain foods better?	Fruit: apples or any avail. But sheep 3 monthly: R3000.
11	Avail in house. Rotation (mince-chick-boere) spaghetti bolognaise and tomato relish and frozen mix veg. mash/mince. Chick salad with tin pineapple pieces. Stews-beef/chick.	Prefer white sugar not brown. Cheaper brands. diff chutney dep on price. Specials. List - standard.	mom/dad-money. 2/3days before pay. I know what's good/bad. Still do eat it though.	Correct labelling. False advertising	NO prob.	Apple pear grapes. Nuts peanuts expensive. Dstv
12	Cooks 3 times/wk. rest of week-fish fingers, eggs, bacon. Steamed chick. Broc cauliflower. Pampoen green beans, lamb chops.	What I need. Fruit veg. No list. Buy 1/week. Buy all food (veg) avail for wk.	Unknown prod-more knowledge. Family overseas help me learn.	Buy unhealthy food-cheaper. If healthy foods cheaper we would buy. Don't have money to eat meat everyday-but we don't get hungry.	Making better choices for food. Have water but struggling to grow in soil type.	Have chick-use their eggs. Fruit I eat: bananas, apples paw-paw any. Buy full sheep R1600.
13	In fridge. Crave. Veg and meat. Fish and mix veg. beef stew and mix veg. sweet/sour pork and broccoli.	Banting-strict. Prices/specials. Use coconut oil-pricey. Fruit/veg-shop.	no	no	n/a	Fruit: grapes bananas apples pears citrus fruits avo-daily. Banting. 3
14	Pap and chick. Rice veg chick. Chips Russian bread. Stampmielies. Pap and braai meat. Bread and chips. Drink a lot of juice.	Buy monthly-bulk. 12 tins: fish beans beef chakalaka tomatoes. Eat with pap, rice, samp. Store R2900 for food-lasts 2months.	I eat healthy. Bread makes me full.	Cheapest. Price-I understand. I buy at shop. Suggestion: posters.	Info/training-veg garden. Want to expand current garden. Types of food: healthy. Want to learn.	Veg garden: carrots spinach beetroot. Eats bread mostly. Apples pears banana

15	Rice and chick. Bread and guava juice.	Special. What I like and eat. Buy with my wife.	no prob.	Healthy foods. Which we buy-more info about foods	Interested to know what foods are good for me and if what I buy is good/bad.	
16	I decide what I eat - what I like. Pap rice bread chick head. I eat to have energy - work with difficult things.	Choose food that I need and what children love. Choose accord to budget and price.	budget related prob.	Budget-prices. Don't buy unnecessary stuff. Reduce buying many things. Know my budget.	Know what I need. Read labels of food. Choose food that will last whole month. Budge!	Have sheep. Apple banana. Buy cheese when I have enough money. Eat what I crave. No schooling - but formal skills from work.
17	Dumplings. Bakes bread. Pap and milk. Not always meat. Weekends-veg.	Wife buys food. I stand outside. List.	no	Place too small for veg garden. Help with money matters/budget.	Training -money matters. Benefits of veg garden.	Avo mango apples banana
18	Meat rice. Beans with samp. Water 4L/day	Don't make list. Know what I need/what's short at home. No specials.	Don't always think I'm eating healthy. Want to know why I don't feel hungry in the day.	Want to know more about food - make me feel better/healthy. Sometimes I don't feel like eating. Foods contain sugar/salt. Would like posters/pic of food groups.	Skills-like help! Choosing foods-need skills. I know how to stretch my money.	Sundays: pumpkin cabbage green beans tomatoes. Cheese. Fruit: apples paw-paw. Have hair dresser business - for extra money.
19	Amasi pap. Pork pap. Tin fish rice. Baked bread and butter. Toast and drink water. I enjoy these. Water 2L/day	What I need. List. Budget. Wife buys.	Need more info. Healthy food. Diff types of food. Wife knows how to cook	Veg garden? Not interested/no time. Garden is small.	Exercise- yes gym.	Apple banana pear. Buy food 15th (pay) 27th (pay) or 10th (pay). I budget.

20	Live alone. Eat a lot of fast food. Bread/eggs. Bread/wors/ pap/meat. Bread/baked fish. Enjoy.	Pamphlets - specials - price. Price-compare. Favourites.	Rice-can't cook properly. Help! Veg-not sure how to cook. Cook the way I think it must be done. I can't make dough.	Can read labels.	Training on cooking/prep foods. In my opinion: healthy=pap white bread eggs. Use to white bread but heard brown is better. Unhealthy= chocolates-teeth problem-sugar.	Live on own - don't often cook. Banana oranges apples avo. Ultramel. Use powder milk- to save fresh milk.
21	What's in the house. Chicken pap cabbage potatoes rice bread vetkoek.	Me and wife buy. See how much money we have - pay day. Wife-what she needs in month. Choose food which I enjoy.	Shortage to eat pap with - meat chicken. Don't have all ingredients or pots/pans - lend money. Meat - expensive.	Wife chooses eg: huletts sugar - familiar. Otherwise buy cheaper.	Info on foods-healthy. Unhealthy. Fatty. Sugary.	Banana apples pear. Cheese-expensive. No pork-religion/stomach.
22	No breakfast. What I feel like eat. Pap meat/chicken. Inkomasi. Break and eggs. White or brown bread. Rice and mince.	Wife decides. Wors chick beef sheep pork mince russians/cheese. Patties-meat. Various prices - not big deciding factor.	Problem-family member-girl 8 years old-very fat. Want help. Info to help losoe weight.	Info on diff foods- healthy vs unhealthy.	I can cook. Good with budget.	Apples banana pineapple peaches paw-paw. Always have food - well prepared.

23	What you have in fridge. What I like. Pap meat. Cabbage. Chicken. Milk-everyday. A lot of coffee. Stew rice carrots.	Pap-first think, coffee/sugar - NB!! Check money and list. Snacks. 5kg chick frozen. Wors. Buy what I like.	Can cook. Have worked in kitchen before. Food expensive: red meat. Sugar. Cake flour. I make vetkoek or bake dumplings.	Healthier but cheaper? Budget never works out.	Skills - stretch money - budget. Would like to learn to grow veg. I have before. I am lazy.	Green apples pear orange. Borrow money from mother.
24	I eat what like. Rice chicken. Pap cabbage. Potatoes. Chick. Vetkoek.	List. Expiry - so don't buy. Buy what I like and what I eat. Things I'm going to use the whole month.	Low blood press= loose appetite. Always tired/sleep. Don't know many foods to help change this. Only beetroot. Yes - skills to inform! Little money - can't buy expensive food. Can't afford to buy food which is good for my health. Child also doesn't eat healthy as a result.	See prev Q. when I do shopping-I see if prod is not expired. Eg: fresh milk - once opened=2 days if no fridge.	Training - various food - blood press.	Apple pear don't eat banana. Don't like cheese. Eats less in a day - no time at work. No fridge. Buy perishables weekly.

25	Baked beans pilchards. Flour maize meal. Cremora. Tea. 2kg chick. Budget. What I like.	Budget. What I like/need. Make a list. Special.	Not eating every night- no food. No money. Food finished. Today 20th!! 3 sep must last until. Only have paraffin stove. No elec. Keep food cold - don't store. Eat immed or next day.	How to budget. Don't understand all labels. Only buy what I know. Will buy cheapest prod.	Training - food types. Cheaper yet healthy foods. No yard-where I live. Goats eat everything. Shortage of water. Mostly at work. No time. Shift 6-6.	Apples banana pear. No elec where I live.
26	Chicken every day. Read meat-expen. Cheap foods I buy and what I enjoy. Mostly eat: chick pap. Rice tin fish - pilchards and baked beans. Amasi pap. Bread butter peanut butter.	Start at aisle 1 - move to end. She takes what she needs when walking through. Once/month.	I think I eat enough and know enough about foods. My opinion: healthy = bread eggs amasi cabbage. Unhealthy= pap with sugar or oil. 3tsp in coffee - sugar	Pictures of foods - will help me. Info on how to cook good foods. Manage money - info please.	Veg garden - skills? Yes please. Teach to grow. Maybe she can sell veg - more money for herself.	Apple banana orange

27	Wife decides. Sometimes asks me. Rice chick. Pap beef stew. Spaghetti mince. White bread wors. Enjoy the above.	Price determines. Brands - wont to buy no name. rice - spekko or tastic. Budget and what we need.	Not always healthy. I eat foods baked in oil. Cholesterol. Sometimes I eat portions too big even if I'm full. Don't want to eat in morning. Body not use to -too early.	Want to know what food cause cholesterol and unhealthy food. If I can stick to budget - buy food which I need but didn't prepare for.	Give info about diff foods - good vs bad. Cheap/ expensive?? Veg garden - have space. Must start planting again.	Apple pear banana grapes.
28	Get home - girlfriend cooks/decides. Pap meat. Veg - spinach. Eggs and bread-brown. Healthy and like it.	Wife write a list. What we need at home. Buy what we like. Buy a lot of meat - R600.	Sunday - cook a lot. Leftovers maybe go to waste.	Don't know if what I eat is healthy for me, kids and wife. Healthy in my opinion: spinach.	Train/education= about food. Help with money spending.	pear apple banana
29	Whole week-menu 7days. Life partner and myself. 2 child. Chick potatoes porridge/pap vetkoek and mince.	Work accord to menu. Use brown sugar-healthy. Buy brands that I know.	No problem.	Would like a veg garden. Informed about labels/expiry dates.	More info to cook - good vs bad food.	Green apples pear dried fruit. Have 2nd job
30	Mother decided. Rice mine mix veg potatoes. Spinach and mince pap. Chicken rice. Braai meat and pap salad.	Buy every 2nd day. Mom buys I give money. Budget. Buy kids food separately.	Don't like cooking. Mother cook,	Mother works in kitchen, knows food, and knows food. Better info from other people, info on veg garden	No.	Banana apple pear grapes. Eat snoek.
31	We know each day - schedule. Long time going. We like the food we eat.	Work from schedule. List as well. What we short. Look at price - cheapest. Depends on money.	Near pay day. No meat. Pap and milk	Would like to know more about healthy eating. Breakfast NB - tell me which one. Which foods make fat or not.	Training veg garden. Sun/water - more info. Types of food and info thereof, to understand more. Budget - where I can save. Buy	Would like veg garden. Apple banana.

					prod more affordable.	
32	Breakfast-bread tomato bacon. Choose food - gf cooks. Bread: toasted eggs russians tomato. Cold drink. Rice and chicken. Pork chops and tomato gravy. Cup of tea. Potjie - stew with mash pot and pap.	Choose fav food. Chutney - expensive. Won't buy. Don't always look at price.	No prob. Can cook. Amount changes monthly. Not always enough money - owe money. Gf helps with finance. Child eats unhealthy. 16 years old. Snacks juice choc biltong ice cream.	Need info on eating less food. Loose weight. Alcohol use-a lot of money.	Want to learn to become an occupational health and safety officer. Budget skills. Swipe vs cash. Make a list. Methods to work with money better and safer.	Fruit-expensive. Apple banana gapes mango litchi. Training: plumber, admin. A lot of probing needed. Participant didn't understand well.
33	Wife decides on menu. Mince and rice. Cooked meat and rice. Wors and pap. Liver and pap. Patties and bread. Drink black tea. No alcohol, coffee, coke.	What we enjoy and need. Don't buy what eye sees. Brands not necessary price. Meat-butchery or shoprite.	no problem.	N/A I read a lot.	N/A	Only small yard. Apple pear banana watermelon
34	Chicken and spinach/cheese/mushrooms. Spaghetti and corn and chicken. What I want to eat.	N/A	N/A	N/A	N/A	Banana apple pamelo oranges. Training: still studying. Chemical engineer degree
35	My wife cooks/decides. Porridge and bread. Beef stew onion gravy pap. Maize rice. What I enjoy.	12kg porridge sugar coffee etc all large quantities, potatoes. Wife and I. list at home.	I'm sick - not eating so much. Must eat brown bread. I can cook too. I eat healthy.	To remain happy. Send children to school. Encourage to go to church. Info on diff	Budget skills.	Dumplings. Maize meal. Banana. Soft food. Training pc.

			End month not enough food.	types of food. Opinion healthy: fruit juice meat pork - nice and doesn't give gout. Unhealthy: read meat - gout.		
36	Chicken green pepper onion tomatoes macaroni. Braai bread pap salad. Potato salad. Enjoy all foods.	Wife buys, I go with. Just buy. Don't look at price really.	no.	Coke - unhealthy.	N/A	Apple pear banana. Drink raw milk. Training: work related.
37	Wife decides. 2meals/day (use to). Look at my high blood pressure. Pork braai pap gravy	Wife chooses according to my health. Buy enough for the week (fri). Budget	High blood press. Request more info.	Look at expiry and label. Buy weekly. Work from budget.	Don't think I need any skills. I have a lot of experience in suffering. (Education). Before: only pap. We learnt a lot.	Apple banana pear.
38	Child sometimes makes food before I get home. What's available	List- only what I need at home. Budget. Specials/promo. Like my brand.	Struggling with money - end of month. Shortage of food for hh. Mom- pensioner (she helps). I get a grant (child)	I work in kitchen so I know about food. Business opportunities - caravan food (to learn how).	Skills-to work on my own. I.e. cooking and work with money. Skills- healthy/unhealthy.	Small yard. Apple pear banana. Allergy-tomatoes. Pork: tonsils get sore.
39	Appetite - what I feel like. Fast foods - I know not healthy - slap chips. Vetkoek, russians. X2 a week. Chicken and rice. Pap and wors and gravy (tomato/onion). Pap/beef stew. Spinach.	Look at price. Pork cheaper than steak. Don't look at brand. Specials.	At risk??	Food expensive. More money at work – more food. Weekends -eat more. Understand various foods. "full for longer".	Pictures and training. Unhealthy/healthy food.	stampmielies - rash/allergy. Apple banana. Wife eats certain foods I don't like. Eg: chicken livers. Training: hospitality.

40	What I like. Pap chick milk and pap vetkoek. Because it's cheap and I can afford it.	Budget. What I eat mostly. Compare the prices.	Don't have enough money. What I think is Healthy: pap morogo milk fruits.	To use food correctly. Can read label/expiry dates. Money and budget.	Enough money. Open a business. Buy cheap food. Know what I want and need.	Apple pear banana.
41	Wife cooks. I'm happy with the food. Meat rice tinned beans. Bread butter tea (dinner). Breakfast stiff pap and meat. Lunch - same.	Wife buys with children. She knows. Same every month,	No money. No knowledge.	Need info, very basic.	N/A	Illiterate - very difficult to understand.
42	Wife decides. Whatever is in the house. So I can make. Chick rice. Mince pap. Bread chick .veg on Sundays. Beef/pork-butchery.	What we use the most. See things which I like on the shelves and take it. Make a list at home - every month is similar.	Not enough money for fruit/veg but always have basics.	Healthy-veg. teach how to grow and maintain.	Skills: cooking. Types of food - good and bad? Teach me.	Don't eat veg often. Fruit: expensive. Pear banana. Cheese: expensive.
43	What I like. Pap milk. Braai meat. Mixed veg. cereal. They give me energy. Vitamins.	What I like most. Compare the prices.	I can read the labels of food.	Nutritional info. Know more about food, budget, to save.	Know more about food. Budget	Cabbage on Sundays. Orange apple banana pear. Training/skills: mechanic - machine operating.
44	Depends on money matters. Whatever we have bought we cook. Rice chick. Rice tin fish. Pap meat and salad. Chakalaka beans tomato gravy.	Ouma buys (monthly) - makes a list. R2500/month. R1500 meat. Specials. Newspapers - mark specials.	Brother - drugs steals 18 years old. Possibly to work in veg garden? Ouma-wheel chair. Oupa - mental; issues. I buy food alone.	Help me with money (weekly) - healthy. Posters - types of food. I don't understand.	Skills - practical and talk about info.	Apple banana orange plum sheep chick and cow liver. Drinks a lot of alcohol.
45	I decide what to eat due to when I like. Pork. Pap and chick. Bread brown.	My little sister always chooses food for me	The only problem I have is cigarettes. I can read labels.	To know what food is good for my health. Budget.	Budget. Know more about food	Banana apples pear orange. Borrow food to buy beer.

46	Wife decides what I eat. Pap chicken Rice gravy- mix veg Sundays. Bread vetkoek.	Compare the prices. Buy food that I know	All I know is that I must eat three meals a day	More info on how to quit cigarettes because most times when I'm smoking I don't eat.	My wife always decides. Budget. Know more about the food I buy	Banana.
47	Pap meat. Make enough for 3days. Breakfast: coffee/brown bread. Wife decides. If food not in house - will buy biscuits. Last night- bread jam rama oros juice. No meat at night. (habit)	Wife and I go together. First check what we need at house - list. We will buy other food we see in the shop.	If not enough money-I make a plan for the kids. Take more money out of my budget. Groceries- finish early- problem- must biuy more. Borrow form family (food)	Save money and food. Info about food. Sugar salt oil - info - good/bad. A lot of meat- good/bad. Get sick - what causes? Fatty foods - meats - don't make me feel well	Want skills about good foods. Want to live well. Foods which we must eat. Way to prep food. Provide skills here. i.e. poster/pic	Brown bread. Veg garden: cabbage spinach beans apple pear orange banana
48	N/A - food secure.					Own animals: cow sheep buck. Apple pear banana grapes
49	I always eat what I like and know. Rice chicken. Dumplings with chicken. Spinach. Maize rice. Samp.	I choose food that I know starts with the basics. Pap cake flour rice chick.	Sometimes I don't feel like eating. I know what food to eat	Know food I eat. Budget. Compare prices.	Pap. Maize rice. Know more about the food. Buy food that is most important.	Veg garden: pumpkin watermelon. Apple pear.
50	N/A					Veg garden: spinach. Apples. Banana. Pear. No children.

APPENDIX E1: Advertisement Afrikaans

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

ONS ROEP ALLE VAALHARTS WATER SKEMA WERKERS!!

HELP ONS OM JOU GEMEENSKAP TE HELP!!

ONS WIL JOU GEMEENSKAP BESTUDEER OM:

HULP TE VERLEEN OM DIE VOEDSELSEKERHEIDSITUASIE TE VERBETER

HOEKOM MOET JY DEELNEEM?

- HELP FAMILIE / GEMEENSKAP
- VERBETER VOEDSELGEBRUIK
- BETER LEWENSTYL
- MEER KENNIS
- MEER VAARDIGHEID

NEEM ASSEBLIEF DEEL AS JY:

- OUER AS 18 JAAR IS
- WERK BY VAALHARTS WATERSKEMA
- BLY IN VAALHARTSGEMEENSKAP
- ALLE INKOMSTE GROEPE
- MENSE VERANTWOODELIK VIR HUISHOUDELIK VOEDSELKEUSES EN -GEBRUIK

WAAR/WANEER SAL DIT GEBEUR:

- NABY GELEë PLEK – GEMEENSKAP SENTRUM
- GEEN REISKOSTE
- SEPTEMBER 2016

VIR ENIGE NAVRAE, SKAKEL ASSEBLIEF JANICE 084 320 0009 (NAVOSER)

APPENDIX E2: Advertisement English

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

CALLING ALL VAALHARTS IRRIGATION SCHEME EMPLOYEES!!

HELP US TO HELP YOUR COMMUNITY!!

LET US STUDY YOUR COMMUNITY TO:

HELP IMPROVE THE FOOD SECURITY SITUATION

WHY TAKE PART?

- HELP YOU TO BUY FOOD, EAT FOOD & USE FOOD
- BETTER LIFESTYLE, KNOWLEDGE, SKILLS
- HELP FAMILY, HELP COMMUNITY

PLEASE TAKE PART IF YOU ARE?

- ✓ OVER 18 YEARS OLD
- ✓ WORK & LIVE IN VAALHARTS IRRIGATION SCHEME COMMUNITY
- ✓ HAVE A SALARY
- ✓ IF YOU BUY AND COOK FOOD FOR FAMILY

WHERE/WHEN WILL THIS TAKE PLACE?

- AT COMMUNITY CENTRE IN VAALHARTS IRRIGATION SCHEME
- IN SEPTEMBER 2016
- NO TRAVEL COSTS FOR YOU

HOW MUCH OF YOUR TIME?

- NOT MORE THAN 2 HOURS
- YOU WILL ANSWER QUESTIONS ABOUT YOUR FOOD CHOICES

FOR ANY QUESTIONS, PLEASE CONTACT JANICE 084 320 0009 (RESEARCHER)

APPENDIX E3: Advertisement Xhosa

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

SIMEMA BONKE ABAHLALI BASE VAALHARTS IRRIGATION SCHEME EMPLOYEES!!!

SINCEDE SIZOKWAZI UKUNCEDA ABAHLALI!!

MASITUNELE ABAHLALI

SIZOKWAZI UKUQHUBE KISA UKUTJA OKUPHEPHILE

KUNGANI KUMELE UBAMBE IQHAZA?

- SIZOKUNCENDA UKUTHI U THENGA UKUTJA, NOKUTHI UTJE KAKU KANYE NOKUSEBENZISA UKUTJA.
- ISIKOMPILO ENGCONO, ULWAZI KANYE NETHALENTE.
- UKUSIZA USAPHO, UKUSIZA ABAHLALI.

SICELA UBAMBE IQHAZAUMA UNALOKHU?

- ✓ KUMEZE UBE NEMINYAKA ENGU 18 NOMA NGAPHEZULU
- ✓ KUMELE UPHANGELE NOMA UBE NGUMHLALI WAS VAALHARTS COMMUNITY
- ✓ KUMELE UBE UMUNTU OHHOLAYO
- ✓ KUMELE UBE NGUMUNTU OTHENGA NOMA OPHEKA UKUDLA LOSAPHO

KUPHI NOMANINI LAPHO KUZOBA KHONA LEMBIZO?

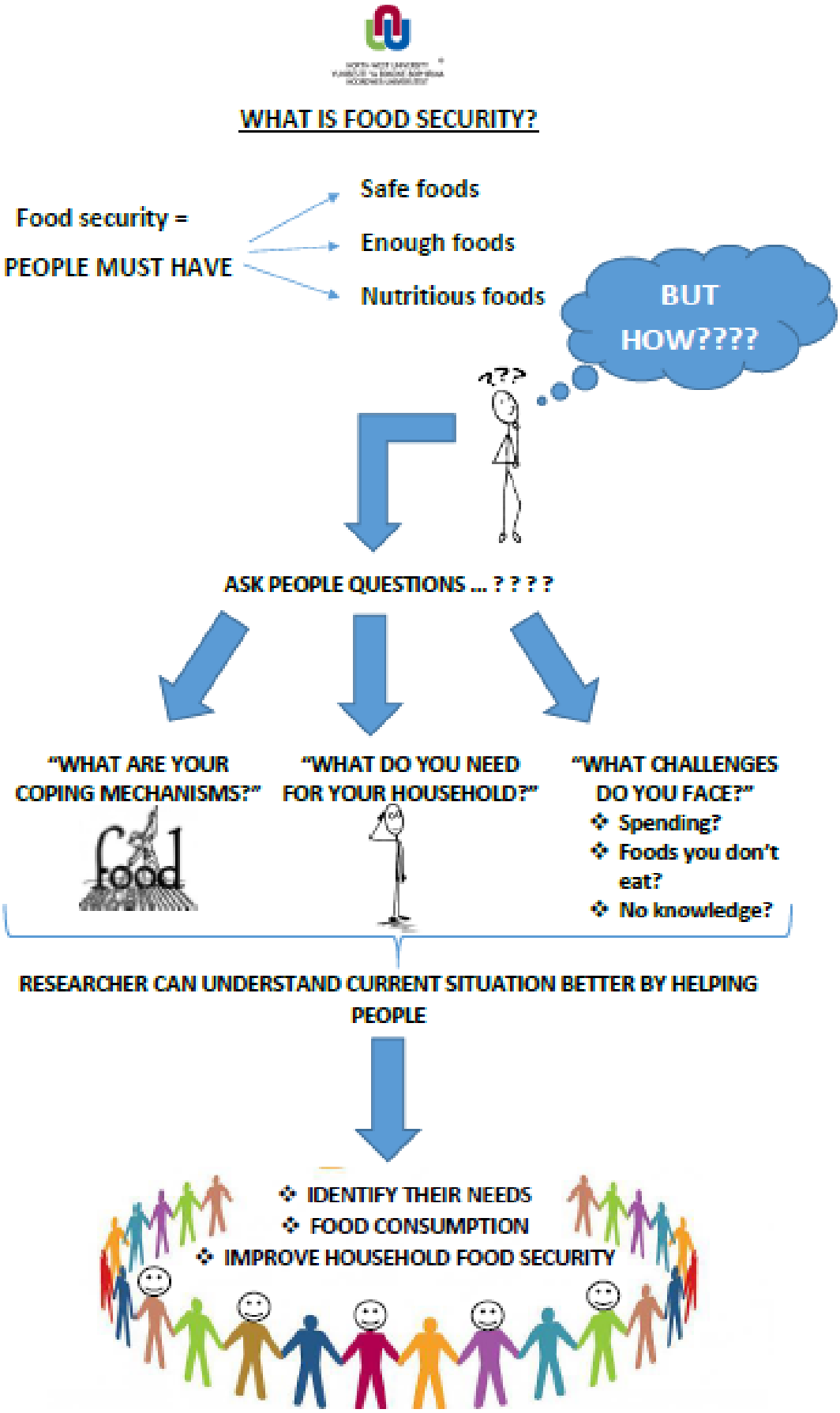
- IZOBA SEHHOLO LECOMMUNITY CENTRE IN VAALHARTS IRRIGATION SCHEME
- NGELEZINYANGA SEPTEMBER 2016
- IZINTO ZOKUHAMBA ZIKHONA KANTI ZIMAHHALA

KUZODLA IXESHA ELINGAKANANI?

- AMAHOR AMIBILI NOMA NGAPHANSI
- UZOKWAZI UKUPHENELULA NGEKHETHELO LAKHO LOKUDLA

FOR ANY QUESTIONS, PLEASE CONTACT JANICE 084 320 0009 (RESEARCHER)

APPENDIX E4: Food security pamphlet



APPENDIX E5: Food consumption poster

IMPROVE YOUR HOUSEHOLD FOOD CONSUMPTION

Exploring the challenges income-earning households experience to maintain household food security in the Vaalharts region, November 2017.
Janice Harmse, Hanli de Beer, Annchen Mielmann.
School of Physiology, Nutrition and Consumer Sciences, North-West University, Potchefstroom Campus.
Email: Hanli.debeer@nwu.ac.za

NORTH-WEST UNIVERSITY
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EAT FOODS FROM EACH FOOD GROUP

2. STARCH (GRAINS/CEREAL)

- Types: Bread, rice, maize meal, pasta, oats (always choose wholegrain & high fibre varieties)
- Benefits: staple food source
- Consume with each meal, everyday

3. FRUITS & VEGETABLES

- Types (Fruit): Apple, banana, pear, grapes, mango, plum, papaya
- Types (Veg): Potatoes, carrots, mielies/corn, pumpkin, broccoli, mushrooms, onion, tomato, green beans, cabbage
- Benefits: contain vitamins, minerals, dietary fibre, keep body healthy, blood sugar control, improve weight loss, lower blood pressure, improve digestive system
- Consume 5 or more e veryday

4. DAIRY (CALCIUM)

- Types: Milk, yoghurt, amasi, cheese
- Benefits: excellent source of calcium for strong, healthy bones
- Consume 2-4 servings each day

1. ANIMAL & PLANT PROTEIN

- Types (Animal): beef, chicken, pork, fish, eggs
- Types (Plant): lentils, chickpeas, beans, nuts, seeds
- Benefits: builds, maintains and repairs the tissues in our body. Good for muscles & other organs (heart)
- Eat 46g each day

5. SUGARS/FATS/SALT

- Types: Sweets, chocolates, chips, soft drink (Cream soda, fanta), fast foods (burgers), alcohol, cake/biscuits, oil, margarine
- Benefits: Sugar – increases blood sugar quickly
  Good fats – good for normal body function. Salt – maintain water balance in body
- Consume small amount or none each day

MANAGE MONEY BETTER = "STRETCH YOUR MONEY"

- Plan meals – make shopping list – stick to it!
- Never shop for food when you hungry
- Eat meat alternatives (eggs, lentils, beans) = more affordable
- Check specials, promos in newspapers & magazines
- Don't spend more than budget
- Check "expiry date/best before date" on discounted items
- Check price of different sizes of same product, example: Buying 500g VS 1.5kg
- Check price of different products with same purpose (provide protein), example: lentils VS red meat
- Buy fresh fruit/vegetables with top quality
- Use leftover food for other meals
- Cook from scratch – Don't buy convenient prepared foods, for example: pre-cooked whole chicken = more expensive

TIPS FOR A HEALTHIER LIFESTYLE

- Drink a lot of water = helps digestion, skin, kidneys & muscles
- Exercise (run, fast walk, dance) = 30 min a day
- Eat regular meals
- Eat high fibre, whole grain breads (rye bread), cereals (oats), rice (brown) and pasta
- Reduce fat, sugar, salt, sauces
- Eat meat with less fat & take skin off chicken
- Use herbs/spices instead of sauces & fats
- Eat slowly, take small bites, chew food carefully
- Drink unsweetened fruit juice
- Reduce alcohol consumption

HOW TO READ FOOD LABELS

1. Look at serving size = to know how much to eat
2. Look at calories = how much energy you get from one serving
3. Ingredients list = shows you what is in the product
4. Look out for good nutrients = fibre (beans, dried fruit, wholegrain), vitamin A (beef liver, carrots, spinach), vitamin C (dark leafy greens, broccoli, oranges), iron (soybeans, lentils, chickpeas, pumpkin), calcium (dairy, sardines)
5. Avoid bad nutrients = fat (from beef, pork, lamb), sodium/salt (tinned meat, pizza), cholesterol (butter, margarine, fatty meat)
6. Expiry date/best before date = the date when the product's quality is no longer at its best
   Example: BB 20/05/2017 = "Eat product before 20 May 2017" – this is when it is at its freshest

IF YOU CAN READ FOOD LABELS, YOU CAN

- compare products more easily
- find out nutritional value of food
- better manage special diets. Example: if you have high blood pressure
- eat more or less quantities of certain foods

VEGETABLE GARDENS

- You don't need a lot of money
- All you need is: soil, sunshine, water & your seeds

HOW-TO-PLANT

1. Start with good soil
2. Plant in area with full sun (you can always use a shade cover if needed)
3. If you have a garden – plant directly into the ground
   If you don't have a garden – plant above the ground in: wooden boxes, pots, brown potato bags, plastic containers
4. Water your garden for 5-10 minutes each day to keep ground moist
5. Start with easy-to-grow vegetables
   A. Radishes: grow fast, insects don't like them, hard to kill
   B. Carrots: fun to grow, do not attract insects
   C. Lettuce: fast growing, cut some to eat – it will keep growing
   D. Sugar & snap peas: fun to grow, can be eaten right away, kids love them
   E. Beetroot: The leaves & roots can both be eaten

= SUSTAINABILITY

Healthy eating habits = healthy life, weight loss, reduce sickness, live longer, have energy, happy life

Eat brighter Live Lighter

References
Eat Right Ontario. 2015. Decoding the Nutrition label. https://www.eatrightontario.ca/en/Articles/Nutrition-Labelling/Decoding-the-Nutrition-Label.aspx Date of access: 30 Nov. 2017
Healthy kids association: Promoting and influencing healthy food choices for children. http://healthy-kids.com.au/food-nutrition/5-food-groups/ Date of access: 15 Nov. 2017
Government of Bermuda, Department of Health. 2017. Eat Well Bermuda: Dietary guidelines for Bermudians. https://www.gov.bm/eat-well-bermuda-dietary-guidelines-bermudians Date of access: 15 Nov. 2017
Government of Bermuda, Department of Health. 2017. Eat Well Bermuda: Bermuda's Daily Dietary Guidelines. https://www.gov.bm/sites/default/files/2949_EatWell_bda_Dietary_Guidelines%2Brevised%20july%202017%29.pdf Date of access: 15 Nov. 2017
Government of Bermuda, Department of Health. 2017. Your Personal Eating Plan. https://www.gov.bm/sites/default/files/5857_Eating_Plan_flyer%2Brevised%20july%202017%29.pdf Date of access: 15 Nov. 2017
Wolford, D. 2017. 5 Easy-to-grow vegetables for the beginner gardener. https://www.weedemandreap.com/5-vegetables-beginner-gardener/ how to grow vegetables. Date of access 30 Nov 2017

APPENDIX E6: Food consumption Leaflet pg1

IMPROVE YOUR HOUSEHOLD FOOD CONSUMPTION

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MANAGE MONEY BETTER = "STRETCH YOUR MONEY"

- Plan meals – make shopping list – stick to it!
- Never shop for food when you hungry
- Eat meat alternatives (eggs, lentils, beans) = more affordable
- Check specials, promos in newspapers & magazines
- Don't spend more than budget
- Check "expiry date/best before date" on discounted items
- Check price of different sizes of same product, example: Buying 500g VS 1.5kg
- Check price of different products with same purpose (provide protein), example: lentils VS red meat
- Buy fresh fruit/vegetables with top quality
- Use leftover food for other meals
- Cook from scratch – Don't buy convenient prepared foods, for example: pre-cooked whole chicken = more expensive

TIPS FOR A HEALTHIER LIFESTYLE

- Drink a lot of water = helps digestion, skin, kidneys & muscles
- Exercise (run, fast walk, dance) = 30 min a day
- Eat regular meals
- Eat high fibre, whole grain breads (rye bread), cereals (oats), rice (brown) and pasta
- Reduce fat, sugar, salt, sauces
- Eat meat with less fat & take skin off chicken
- Use herbs/spices instead of sauces & fats
- Eat slowly, take small bites, chew food carefully
- Drink unsweetened fruit juice
- Reduce alcohol consumption

HOW TO READ FOOD LABELS

1. Look at serving size = to know how much to eat
2. Look at calories = how much energy you get from one serving
3. Ingredients list = shows you what is in the product
4. Look out for good nutrients = fibre (beans, dried fruit, wholegrain), vitamin A (beef liver, carrots, spinach), vitamin C (dark leafy greens, broccoli, oranges), iron (soybeans, lentils, chickpeas, pumpkin), calcium (dairy, sardines)
5. Avoid bad nutrients = fat (from beef, pork, lamb), sodium/salt (tinned meat, pizza), cholesterol (butter, margarine, fatty meat)
6. Expiry date/best before date = the date when the product's quality is no longer at its best
   Example: BB 20/05/2017 = "Eat product before 20 May 2017" – this is when it is at its freshest

IF YOU CAN READ FOOD LABELS, YOU CAN

- compare products more easily
- find out nutritional value of food
- better manage special diets. Example: if you have high blood pressure
- eat more or less quantities of certain foods

VEGETABLE GARDENS

- You don't need a lot of money
- All you need is: soil, sunshine, water & your seeds

HOW-TO-PLANT

1. Start with good soil
2. Plant in area with full sun (you can always use a shade cover if needed)
3. If you have a garden – plant directly into the ground
   if you don't have a garden – plant above the ground in: wooden boxes, pots, brown potato bags, plastic containers
4. Water your garden for 5-10 minutes each day to keep ground moist
5. Start with easy-to-grow vegetables
   - A. Radishes: grow fast, insects don't like them, hard to kill
   - B. Carrots: fun to grow, do not attract insects
   - C. Lettuce: fast growing, cut some to eat – it will keep growing
   - D. Sugar & snap peas: fun to grow, can be eaten right away, kids love them
   - E. Beetroot: The leaves & roots can both be eaten

= SUSTAINABILITY

Healthy eating habits = healthy life, weight loss, reduce sickness, live longer, have energy, happy life

Eat brighter Live Lighter

Food consumption Leaflet pg2

HOW TO PLAN YOUR MEALS

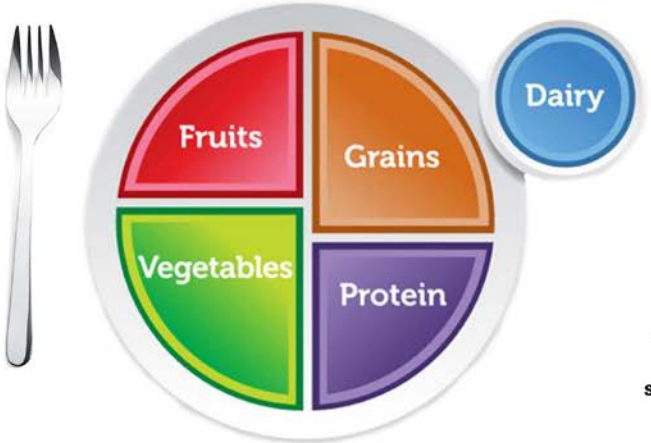
DESIGN YOUR OWN PLATE

ACTIVITY

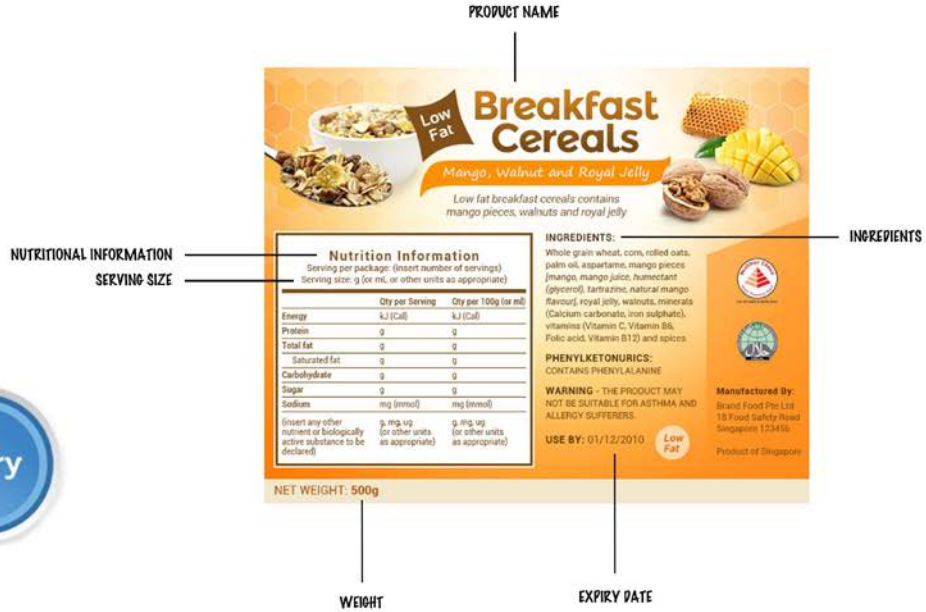
What should you put on your plate?

Your daily plate should include:

- ANIMAL & PLANT PROTEINS
- STARCH/GRAINS
- FRUIT AND VEGETABLES
- DAIRY



EXAMPLE OF A FOOD LABEL



Exploring the challenges income-earning households experience to maintain household food security in the Vaalharts region, November 2017.
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