

FOOD SECURITY STATUS AND RELATED FACTORS OF
UNDERGRADUATE STUDENTS RECEIVING FINANCIAL AID AT
THE UNIVERSITY OF KWAZULU-NATAL, PIETERMARITZBURG
CAMPUS

BY

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DECLARATION OF ORIGINALITY

I, Nophiwe Job, student number 207526109, declare that the work in this dissertation submitted to the University of KwaZulu-Natal, School of Agricultural, Earth and Environmental Sciences is my own independent work, except where otherwise stated. The work in this dissertation has not been submitted for any degree before, to any tertiary institution by me or any other person. Data from other sources in this dissertation has been appropriately acknowledged and referenced.

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ABSTRACT

Objectives: To determine the prevalence of food insecurity and related factors among undergraduate recipients of financial aid at the University of KwaZulu-Natal, Pietermaritzburg Campus (UKZN- PMB) and whether there is a relationship between food security status and academic performance.

Design: A cross-sectional descriptive survey was conducted assessing the food security status and related factors of students on financial aid.

Setting: UKZN-PMB campus, situated in Scottsville, Pietermaritzburg, with a student population of 9 785.

Subjects: A sample of 268 students on financial aid was randomly selected. First year and post graduate level students were excluded.

Outcome measures: A self-administered questionnaire consisting of the four main sections, including: anthropometric status and socio-demographic information, food frequency questionnaire (FFQ), household food insecurity access scale (HFIAS), nutrition knowledge questionnaire (NKQ) and combined performance index (CPI) scores.

Results: The mean BMI of the study sample was $24.4 \pm 4.7 \text{ kg/m}^2$. A fifth (21.4%) of the sample was overweight and a tenth (12.4%) was obese. An increase in BMI was associated with an increase in food insecurity. The foods consumed ‘more than once a day’, included the starch group, fats and coffee and tea. Just over half (53.0%) of the sample received no additional allowance apart from financial aid. The majority (82.4%) of the sample spent most of their money on food. The mean amount of monthly food expenditure was $\text{R}558.40 \pm \text{R}211.12$. Over a third (34.7%) of the sample was food insecure with another third (33.6 %) being at risk of food insecurity. Almost a tenth (9.7%) of the sample was severely food insecure and just over a fifth (22%) was food secure. The main coping strategy adopted was seeking assistance from friends. The mean NKQ score of the sample was 18.8 ± 3.8 (58.6%) which fell within the “average” range. Food insecure students had a lower mean CPI score than those who are food secure.

Conclusion: There was a high prevalence of food insecurity and obesity among the study sample. The diets lacked diversity with a low consumption of fruit and vegetables. Nutrition

knowledge seems to have no impact on food choice. Food insecurity impacted negatively on academic performance.

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CHAPTER 1: INTRODUCTION, THE PROBLEM AND ITS SETTING

1.1 IMPORTANCE OF THE STUDY

Access to food is a basic human right [Food and Agriculture Organization of the United Nations (FAO) 2006]. It is therefore the responsibility and obligation of the government to ensure that all South African citizens are food secure. The right to food, as entrenched in the constitution of South Africa, is the basis for the National Integrated Food Security Strategy (IFSS) [Human Sciences Research Council (HSRC) 2004]. The vision of the IFSS is “to attain universal physical, social and economic access to sufficient, safe and nutritious food by all South Africans at all times to meet their dietary needs and food preferences for an active and healthy life” (Department of Agriculture South Africa pg.13, 2002). This goal is adapted from the definition of food security as stated by the FAO which seeks to ensure that the first Millennium Development Goal (MDG) which aims to eradicate hunger, malnutrition and food insecurity is achieved by 2015 [World Health Organization (WHO) 2012; FAO 2006].

Food insecurity can be explained as having insufficient food and/or the experience of hunger as a result of food shortage and being unable to afford sufficient food. It is also the consumption of a diet containing insufficient nutrients due to limited food options (i.e. lack of dietary diversity) and anxiety about acquiring food or having to rely on food aid. To be food secure therefore means that one is not worried about where their next nutritious meal will come from (Labadarios, Davids, Mchiza & Weir-Smith 2009; FAO 2006).

Addressing food security is a major global challenge, especially in developing countries (Koch 2011; Labadarios *et al* 2009; FAO 2006; HSRC 2004) and especially in sub-Saharan Africa. South Africa has been termed as food secure as it is a net exporter of agricultural commodities, has a high per capita income, participates in foreign exchange and is not landlocked. However, sub-populations within the country have been identified as food insecure [Koch 2011; Altman, Hart & Jacobs 2009; FAO/ World Food Programme (WFP) 2009; Human Sciences Research Council (HSRC) 2004; Rose & Charlton 2001]. In 2004, the HSRC reported that an estimated 35% (14 million people) of the South African population were suspected to be vulnerable to food

insecurity. These vulnerable groups included those of a low socio-economic status and at a geographic disadvantage, the homeless and young children (FAO/WFP 2009). In 2012, the South African government estimated that approximately 11 million South Africans were food insecure (Food Bank South Africa 2013). This translates into 1 in 5 people being food insecure in a population estimated to be 52, 98 million in mid-2013 (Statistics South Africa 2013).

Income inequality, a major contributing factor to food insecurity in South Africa, resulted in South Africa being ranked among countries with the highest rate of income inequality in the world (Altman *et al* 2009; FAO/WFP 2009; Rose & Charlton 2001). Compared to other middle income countries, South Africa has extremely high levels of absolute poverty (Altman *et al* 2009; FAO/WFP 2009; Rose & Charlton 2001). Absolute poverty is defined by the United Nations (UN) as ‘a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to services’ (UN, pg.41, 1995). Over and above these variables, South Africa also has high unemployment rates; steep increases in food and fuel prices, energy tariffs and interest rates. These factors have placed poor households at an even higher risk of becoming food insecure (Labadarios *et al* 2009). Poor households spend significantly larger proportions (70%) of their budgets on food, fuel and electricity than those of a higher socio-economic status (Bhorat & Oosthuizen 2005). In contrast, those of a higher socio-economic status spend a larger proportion of their budgets on transport and medical care. Consequently, poor households are significantly more vulnerable to food price shocks as it is their major expenditure (Labadarios *et al* 2009; Bhorat & Oosthuizen 2005).

The South African government, along with other UN countries, have committed to the MDGs (Crush & Frayne 2012). The first MDG, which is especially associated with the IFSS, is “to eradicate hunger, malnutrition and food insecurity by half by 2015.” Achieving household food security is a critical component in meeting this goal (Crush & Frayne 2012). Ideally, poverty and food insecurity could be addressed by expanding employment opportunities, thereby enhancing household income (Crush & Frayne 2012; HSRC 2004), which in turn, improves buying power. Employment has expanded substantially since the mid-1990s. However, this has not been enough to address income poverty (Crush & Frayne 2012; Petersen, Louw & Dumont

2009). As a result, income poverty has been identified as the main driver of food insecurity (Petersen et al 2009).

Unemployment in South Africa has increased by 100 000 to 4, 6 million between the fourth quarter of 2012 and the first quarter of 2013, resulting in an increase in the level of unemployment to 25, 2 % (Statistics South Africa 2013). The probability of finding employment increases with higher levels of education. In addition, those with a higher level of education also tend to earn more (van der Berg 2008). A better-educated household is therefore less likely to experience food insecurity.

A substantial increase in student enrolments has been experienced by South African universities in the past decade, with numbers reaching 538 210 in 2011 and were expected to rise by 2% in 2012 (Cloete & Moja 2005). At an institution such as the University of KwaZulu-Natal (UKZN), it is a basic requirement that at least 15% of all students in all Colleges be from low socio-economic backgrounds, i.e. students who have completed their schooling at Quintile 1 or 2 high schools (UKZN selection criteria policy 2012). As a result, many students enrolling for higher education are from economically disadvantaged backgrounds (Department of Higher Education & Training 2011; Petersen et al 2009; Letseka & Maile 2008). These students are vulnerable to food insecurity as they are both unemployed and economically disadvantaged. Hence, large numbers of students enrolled in South African universities have been found to experience great financial difficulties, food insecurity, hunger, a lack of dietary diversity and low nutrient intakes (Department of Higher Education & Training 2011; Petersen et al 2009).

Student poverty, food insecurity and hunger result in high drop-out rates and low graduation rates, especially at South African universities (Hughes, Serebryanikova, Donaldson, Leveritt 2011; Petersen et al 2009; Letseka & Maile 2008). Letseka, Breier & Visser (2010) reported that the main reason for student drop-outs was found to be financial as opposed to academic difficulties. In fact, only two (2) out of the 23 local universities namely, Stellenbosch University and University of the Witwatersrand reported academic reasons as the main reason for student drop-outs. Letseka et al (2010) further explained that due to the historically white (Caucasian) nature of these institutions, the bulk of the students were of a high socio-economic status and

therefore did not require financial assistance. The factors contributing to food security and its resultant outcomes in South African universities are illustrated in Figure1.1.

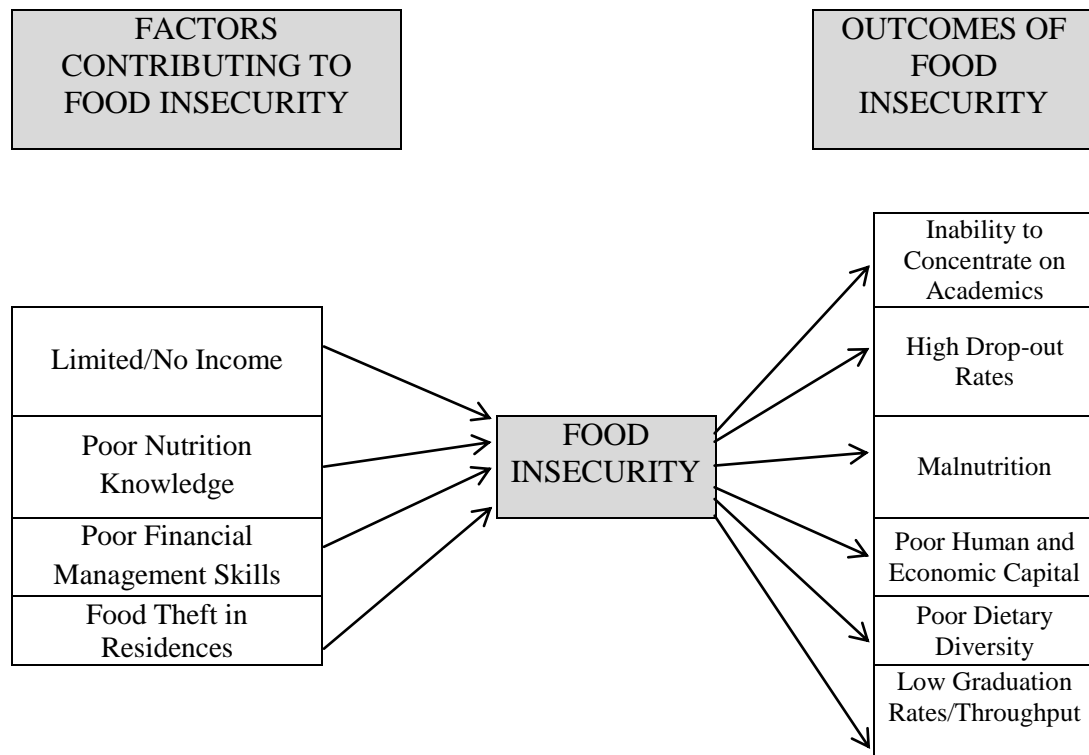


Figure1.1: Factors contributing to food security and its resultant outcomes among South African university students.

Adapted from: Dlamini 2012; Hughes et al 2011; Azadbakht & Esmailzadeh 2010; Innes-Hughes et al 2010; Letseka et al 2010; Petersen et al 2009; Letseka & Maile 2008; Norvilitis, Merwin, Osberg, Roehling, Young & Kamas 2006; Wilde & Peterman 2006; Adams, Grummer-Strawn & Chavez 2003; Vozoris & Tarasuk 2003; Hoddinott & Yohannes 2002; Steyn & Ochse (2013); Robert & Jones 2001; Newton & Turale 2000; Steyn, Senekal, Britz & Nel 2000; Reily, Mock, Cogill, Bailey & Kenefick 1999.

It is a governmental function to pro-actively engage in activities intended to strengthen access to food and the use of resources to enable people to feed themselves (Right to Food 2010). As a result, the South African government gives financial aid to the majority of financially needy students through the National Student Financial Aid Scheme (NSFAS) (Letseka & Maile 2008). Financial aid is given to students with financial needs (determined by a national means test), and having the academic potential to succeed in their studies (NSFAS 2013). Financial Aid is provided with the intention of enabling students to complete their undergraduate studies. This in turn would improve their employment prospects and consequently result in food security and economic independence (Innes-Hughes, Bowers, King, Chapman & Eden 2010).

Food insecurity undermines the primary function of higher education, which aims to improve human and social capital, thereby improving the socio-economic status of people (Innes-Hughes et al 2010). Very little published data is available to shed light on the level of food insecurity among South African university students. It is therefore, important to conduct studies to investigate the degree of food insecurity among local university students. Furthermore, it is important to establish whether food insecurity is associated with poor academic performance, thereby contributing to higher dropout rates. This relationship has, to date, only been documented amongst school-going children in some American, Asian and European countries (Taki, Hashizume, Sassa, Takeuchi, Asano, Kotozaki, Nouchi, Wu, Fukuda & Kawashima 2011; Cooke 2007; Frongillo, Jyoti & Jones 2006; Jyoti, Frongillo & Jones 2005; Alaino, Olson & Frongillo 2001).

1.2 PURPOSE OF THE STUDY

To determine the prevalence of food insecurity and related factors among recipients of financial aid at the University of KwaZulu-Natal, Pietermaritzburg Campus (UKZN-PMB) and to assess nutrition knowledge, nutritional status, dietary diversity and coping strategies of this population. Lastly, to determine whether there is a relationship between food security category and academic performance.

1.3 STUDY DESIGN

A cross-sectional descriptive survey was conducted to assess the food security status and related factors of students on financial aid enrolled at UKZN-PMB campus. This method was best suited as the study aimed to establish the prevalence of a condition at one point in time (Grimes 2002), which in the current study was food insecurity.

1.4 STUDY OBJECTIVES

The study objectives, in relation to undergraduate students on financial aid, were to:

- 1.4.1 Determine the prevalence of food insecurity;
- 1.4.2 Determine the anthropometric status using Body Mass index (BMI) as a proxy;
- 1.4.3 Determine the dietary diversity by means of a non-quantified food frequency questionnaire;
- 1.4.4 Determine the nutrition knowledge;
- 1.4.5 Determine the relationship between academic performance and food security status ;
- 1.4.6 Determine the relationship between food security status, BMI, dietary diversity, nutrition knowledge and academic performance.

1.5 STUDY PARAMETERS

Only students registered at UKZN-PMB Campus for the 2012 academic year were eligible for the study. First year academic students were excluded from the study based on the fact that there were additional confounding variables that could not be accounted for, in addition an academic history for university performance was not available. Postgraduate students were also excluded

from the study as the majority of them had some form of formal employment, even with the university and earned an income.

1.6 ASSUMPTIONS

For the purpose of this study it was assumed that participants were truthful when completing the survey questionnaires and that the data collected is representative of the study population. The nature of the study (cross-sectional descriptive survey), will enable us to identify indicators (study parameters) that exist within the sample (i.e. food security status, nutritional status, nutrition knowledge and academic performance), the distribution of these indicators within the sample and how these indicators may relate with each other.

1.7 DEFINITIONS

Academic Performance: For the purpose of this study, academic performance was measured using the Combined Performance Index (UKZN Student funding centre 2012).

Body Mass Index: A measure indicating the nutritional status of adults, defined as weight in kilograms divided by the square of height in metres (kg/m^2) of a person. It provides the most useful population-level measure of overweight and obesity (WHO 2012).

Combined Performance Index (CPI): A single index used to track student academic performance over the course of their studies (UKZN Student funding centre 2012).

Dietary diversity: The number of different kinds of foods consumed over a given period of time (Hoddinott & Yohannes 2002).

Financial Aid: A loan and bursary scheme funded by the Department of Higher Education and Training for students who do not have the financial means to fund their studies and/or cannot access bank funding, study loans or bursaries. Recipients have to come from households with a total household income of R130 000/annum or less (Dlamini 2012).

Food security: A state whereby all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary requirements and preferences for healthy and active lifestyles (FAO 2006).

Nutritional Status: For the purpose of this study, nutritional status refers to energy/weight status with regards to adiposity. Adiposity was measured using the BMI (WHO 2012).

Underweight: A BMI of lower 18.5 kg/m² is defined as underweight (WHO 2012).

Normal weight: A BMI in the range of 18.5 - 24.99 kg/m² is defined as normal (WHO 2012).

Overweight: A BMI greater than or equal to 25 kg/m² is defined as overweight (WHO 2012).

Obesity: A BMI greater than or equal to 30 kg/m² is defined as obesity. Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. The cause of obesity and overweight is an energy imbalance where kilojoules consumed exceed kilojoules expended (WHO 2012).

1.8 ABBREVIATIONS

BMI	Body Mass Index
CPI	Combined Performance Index
DUT	Durban University of Technology
FAO	Food and Agriculture Organization of the United Nations
FBDGs	Food Based Dietary Guidelines
FFQ	Food Frequency Questionnaire
HFIAS	Household Food Insecurity Access Scale
HFII	Household Food Insecurity Index
HSRC	Human Sciences Research Council
IFSS	Integrated Food Security Strategy
ISAK	International Standards for Anthropometric Assessment

Kg/m²	Kilograms per metres squared
MDG	Millennium Development Goals
n	Number
NCDs	Non-communicable diseases
NGOs	Non-governmental Organisations
NKQ	Nutrition Knowledge Questionnaire
NKT	Nutrition Knowledge Test
NSFAS	National Students Financial Aid Scheme
PMB	Pietermaritzburg
RDA	Recommended Dietary Allowance
SCC	Student Counselling Centre
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
UKZN	University of KwaZulu-Natal
UKZN-PMB	University of KwaZulu-Natal Pietermaritzburg campus
UN	United Nations
USAID	United States Agency for International Development
US FSSM	United States Food Security Survey Module
WFP	World Food Programme
WHO	World Health Organization

1.9 CONCLUSION

Achieving food security is essential for meeting the first MDG, namely, ‘to eradicate extreme poverty and hunger’. As a country, South Africa may be food secure; however, there are pockets of the population that are at a high risk of being food insecure. Students receiving financial aid have been identified to be at risk of becoming food insecure as most of them are from a low socio-economic background. Food insecurity threatens the physical, emotional and cognitive wellbeing of these students which might ultimately result in high drop-out and low graduation rates. Therefore, food insecurity may undermine the primary function of higher education, which is to improve the socio-economic status of people.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

Despite South Africa's national "food-secure" status, an estimated 14 per cent of the population was vulnerable to becoming food insecure in 2011 and 1 in 5 being food insecure in 2012 (Statistics South Africa 2013; Koch 2011). Food insecurity has a strong impact on dietary quality. Malnutrition is prevalent among the local student population as a result of inadequate, poor quality and unpredictable food intake (Hughes *et al* 2011; Hoddinott & Yohannes 2002; Steyn & Ochse 2013). Paradoxically, food insecure individuals consume a diet that results in obesity and overweight (FAO/WFP 2009; Wilde & Peterman 2006). This phenomenon is the result of diets that are high in energy and low in nutrient density. In addition, diets of this nature are usually more affordable than foods such as fruits and vegetables with a higher nutrient density (Oldewage-Theron & Egal 2010; Temple, Steyn, Myburgh & Nel 2006; Kruger, Kruger & MacIntyre 2005). This form of malnutrition increases the risk for the development non-communicable diseases (NCDs) among the student population (Adams *et al* 2003; Vozoris & Tarasuk 2003; Steyn *et al* 2000). In fact, students who are food insecure tend to give a poor health report of themselves (Hughes *et al* 2011; Newton & Turale 2000) and a poor self-worth as a result of the cycle of debt they get themselves into (Newton & Turale 2000). The debt incurred may also be as a result of poor financial management and abuse of credit through impulsive buying (Norvilitis, Merwin, Osberg, Roehling, Young & Kamas 2006). Dlamini (2012) reported that when students were advised to purchase food in bulk in order to get better value for money, the majority of students UKZN-PMB reported food theft as a serious problem in student residences.

There is a lack of published evidence documenting a relationship between food insecurity and academic performance among university students. However, there is a substantial amount of literature providing evidence that food insecurity has a negative impact on the academic performance outcomes of children (Taki *et al* 2011; Cooke 2007; Frongillo *et al* 2006; Jyoti *et al* 2005; Alaino *et al* 2001). Dlamini (2012) reported that students at the UKZN-PMB, who are recipients of financial aid, often complained about not being able to concentrate on their studies

due to hunger as a result of an inability to purchase food. In addition, this phenomenon was reported to be more common during exam time.

Since poor nutrition knowledge has been linked to poor dietary habits (Beydoun & Wang 2008), the literature discussing the nutritional status, dietary diversity and nutrition knowledge of students will be explored. This will allow an investigation into the impact of nutrition knowledge or the lack thereof on the food security status, nutritional status and dietary diversity of students on financial aid.

2.2 FOOD SECURITY STATUS

Food security, as defined by the USAID (Riely et al 1999), is made up of fundamental elements that include food availability, food access, food stability and food utilization. According to this definition, food availability is achieved when enough of food is consistently available to all individuals supplied through household production, other domestic output, commercial imports, or food assistance (Riely et al 1999). Food access is achieved when households and all individuals within them have adequate resources to obtain appropriate food for a nutrient dense diet. Access depends on available income, the distribution of income, and the price of food (Riely et al 1999). Food utilization refers to the bio-availability of food. This requires a diet sufficient in energy and essential nutrients, as well as access to clean water, and adequate sanitation (Riely et al 1999). However, effective food utilization depends largely on knowledge regarding food storage, processing techniques and basic nutrition principles (Riely et al 1999).

2.2.1 Food security status of students on financial aid

Poverty has been universally accepted as the main cause of undernutrition, and it is a serious problem affecting the nutritional status of South Africans (Woolard & Leibbrandt 1999). It would be expected that students receiving financial aid would be protected from food insecurity since financial security is essential in addressing food insecurity (Petersen et al 2009) however, this has not been true. Over the past decade, both overall government education spending and funding for higher education has increased substantially (Letseka & Maile 2008). The increases

in university enrolments have resulted in the amount of available funding per student being lower than a decade ago (Letseka & Maile 2008). The cost of food is significant for those with limited finances and is a determining factor with regards to what they can purchase and how they allocate their disposable income (Hughes *et al* 2011; Bhorat & Oosthuizen 2005). Students receiving government financial assistance are classified as at risk, as financial aid is offered to those whose socio-economic status is often 20–39% below the poverty line (Hughes *et al* 2011). In South Africa, 70% of the families of higher education drop-outs surveyed were in the category referred to as “low economic status” (Letseka & Maile 2008). Black families were found to be particularly poor, with some parents and guardians earning less than R1 600 a month. The report from the Department of Higher Education & Training (2011) states that without exception, every Vice Chancellor and Deputy Vice Chancellor as well as the overwhelming majority of student leaders interviewed from South African Universities indicated that the levels of NSFAS funding provided for accommodation and food was inadequate.

At UKZN, Munro, Simpson & Quayle (2013) reported that on average, students’ weekly food expenditure was R127.93 and that they were significantly more likely to go hungry near exam time. Dlamini (2012) explained that this was due to the fact that the students usually had exhausted their monetary allowance in the preceding month. Dlamini (2012) also reported that at exam time students visit the student funding offices in order to request advances for the following semester as they have run out of food. The students complain of the inability to concentrate, demotivation and fatigue, as a result of hunger. More than 38% of the students surveyed by Munro *et al* (2013) were affected by food insecurity, with 11% highly vulnerable to food insecurity and those on financial aid being more vulnerable to food insecurity than others. This was confirmed by Dlamini (2012) who stated that most students who are recipients of financial aid frequently complain about experiencing hunger. The findings of Munro *et al* (2013) were also supported by those of Hughes *et al* (2011) who found that student food insecurity was significantly associated with receiving financial aid. Meldrum & Willows (2006) conducted a study among students of the University of Alberta (Canada) to evaluate the adequacy of loans funding and the risk of food insecurity. It was also found that students receiving financial aid were likely to have insufficient funds for a nutritionally adequate diet and were highly vulnerable

to becoming food insecure. Dlamini (2012) also reported that approximately 70% of students on financial aid claim to be living with grandparents who support them with pension grants.

Ntuli (2005) stated that a lack of income adversely affected the ability of students to maintain satisfactory eating habits at the Durban University of Technology (DUT), as inadequate income limited the quantity, quality and variety of the food being consumed. Ntuli (2005) also suggested that students lack consumer skills such as budgeting, in order to optimally utilise available resources and make good food choices.

The UKZN-PMB campus is located in close proximity to supermarkets and cafeterias where food is available. However, food choice also depends on suitability/convenience with regards to shelf life, cooking and preparation time, packaging and affordability (Ali, Kapoor & Moorthy 2010; Ayalew 1997). Foods that are nutritious and those that can be classified as being high in fat, salt, sugar and low in dietary fibre such as chips, hamburgers and pastries are freely available to students from food sources such as street vendors, kiosks and cafeterias. However, despite availability, consumption is ultimately affected by the affordability of food items. Therefore, food availability in terms of food systems does not guarantee consumption (Ali *et al* 2010; Ayalew 1997). It is therefore clear that even if food is available to students, it might not be affordable. Food availability should therefore be described as a wide choice of food options accessible through food systems that are both acceptable and affordable (Ali *et al* 2010; Ayalew 1997).

2.2.2 Common methods of measuring food insecurity among young adults

The most common methods of measuring food security include the use of the Household Food Insecurity Access Scale (HFIAS), Food Insecurity Index, and the Coping Strategies Index, the US FSSM, Hunger Scales and various nutrition indicators (Bickel, Nord, Prince, Hamilton & Cook 2000).

Msaki (2010) conducted a study in the Umbumbulu district of KwaZulu-Natal which included 200 individual members from 176 households. This study was aimed at developing and testing

tools to measure household food insecurity. The results showed that while the Household Food Insecurity Index (HFII) explained the influence of demographic and socio-economic variables on household food insecurity well, the HFIAS was found to be the most convenient in application (easy data management and computation process). In addition, it was also strongly related to the Coping Strategies Index scores. The HFIAS was found to be a good tool in differentiating between food secure and food insecure households.

Holland, Kennedy & Hwang (2011) conducted a study among free living adults (≥ 18 years) to compare the HFIAS, the US FSSM and a modified version of the US FSSM. The findings of this study suggested that the HFIAS was a more appropriate instrument than the US FSSM for measuring food security among these free living adults as it was more easily understood by the study group surveyed.

2.3 ASSESSMENT OF NUTRITIONAL STATUS

Anthropometric measurements are commonly used as indicators of nutritional status and to determine gross body composition (So, Swearingin, Dail & Melton 2012; Wenhold & Faber 2007; Gibson, pg.6 2005; Moreno, Joyanes, Mesana, González-Gross, Gil, Sarriá, Gutierrez, Garaulet, Perez-Prieto, Bueno, Marcos & the AVENA Study Group 2003). In addition, they are used to measure and forecast performance, health and survival of individuals and reflect the economic and social well-being of populations (Gibson pg.233, 2005; Cogill 2003). These measurements allow for the identification of persons or populations that require nutrition intervention and to assess the impact of an intervention (Cogill 2003).

Anthropometry is advantageous as it is non-invasive, quick, inexpensive, and requires limited training. Portable equipment can be used and it is reliable, given that the equipment being used is calibrated. This makes it ideal for field studies, nutrition surveys, epidemiological studies and conducting nutritional surveillance (So et al 2012; Gibson pg.233, 2005; Cogill 2003; Moreno et al 2003).

Anthropometric measurements also provide information on nutritional status history which cannot be accurately obtained using other assessment methods (So et al 2012; Gibson pg.233, 2005; Moreno et al 2003). Anthropometric measurements include weight and height measurements. These raw measurements are often combined and expressed as an index in order to aid interpretation (Gibson pg. 7, 233 2005; Cogill 2003; Moreno et al 2003). An example of this is the BMI. The selection of anthropometric indices for assessment of nutritional status depends on a number of factors, such as the study objectives, sampling methods, calculated sample size, validity, reproducibility, accuracy, random errors, systematic errors, sensitivity, specificity, prevalence, predictive value and ethical issues (Gibson pg. 234, 2005; Cogill 2003).

2.3.1 Anthropometric measurements commonly reported when surveying young adults

Weight-to-height ratios (obesity indices) have proven to be the most useful in measuring adiposity and serve as indicators of nutritional status among adult populations (So et al 2012; Wenhold & Faber 2007; Gibson pg.259, 2005). These indices include the weight/height ratio and BMI.

BMI has been found to be reasonably unbiased by height, and correlates well with laboratory based measurements of obesity among all adult groups and adolescents (So et al 2012; Gibson pg.259, 2005; Cogill 2003; Moreno et al 2003). The BMI is appropriate for examining effects of short-term dietary changes such as seasonal changes in food supply or short-term nutritional stress brought about by illness and is a good reflection of energy status (Faber & Wenhold 2007; Cogill 2003, WHO 2000). It has also been found to be more precise than skinfold thickness measurements and is easy to implement in large scale nutrition surveys and epidemiological studies (So et al 2012; Gibson pg.259, 2005). As a result, it is globally used to classify weight status among adults of all ages (Gibson pg.259, 2005). The formula for BMI is weight divided by the squared height (WHO 2006).

Dimkpa & Oji (2010) conducted a cross-sectional study among young adult students in Ebonyi State University, Nigeria, to investigate the relationship between BMI and haemodynamic variables and abnormalities among 710 participants (350 males and 360 females) aged 20–25

years. Resting blood pressure, resting heart rate and BMI were calculated and it was found that in both genders, BMI showed significant correlations ($p < 0.001$, $p < 0.01$ and $p < 0.05$ respectively) with these haemodynamic variables. As a result, the findings of this study showed that BMI is a good predictor of cardiovascular disease risk. So et al (2012) conducted a study investigating body fat measurements and their correlation with estimations based on BMI, waist circumference, and bioelectrical impedance analysis, compared to air displacement plethysmography among African-American students. It was found that BMI was a good estimator of body fat.

Weight and height measurements for calculating BMI are commonly measured with the study group dressed in light indoor clothing and without shoes (Gibson pg.235, 2005; Moreno et al 2003). The WHO (2004) BMI classifications and associated risk for co-morbidities are depicted in table 2.1. The table shows the association between BMI category and the risk for mortality. All students with a BMI $\geq 25 \text{ kg/m}^2$ are classified as overweight, while students with BMI $< 18.5 \text{ kg/m}^2$ are classified as underweight. All students with a BMI ranging between 18.5 - 24.99 kg/m^2 are considered to be of a normal weight. However, it is important to note that BMI cannot distinguish between weight associated with fat (adiposity), oedema or muscle and gives no indication of body fat distribution (Gibson pg.259, 268, 2005).

Table 2.1: WHO classification of overweight in adults according to body mass index

Classification	BMI (kg/m^2) ¹	Risk of co-morbidities
Underweight	< 18.50	Low (but risk of other clinical problems is increased)
Normal Range	18.50 – 24.99	Average
Overweight	≥ 25.00	
Preobese	25.00 – 29.99	Increased
Obese Class I	30.00 – 34.99	Moderate
Obese Class II	35.00 – 39.99	Severe
Obese Class III	≥ 40	Very Severe

Source: WHO 2004

¹Body Mass index defined as weight in kilograms divided by the square of height in metres (kg/m^2) of a person

2.3.2 Anthropometric status of young adults

Puoane, Steyn, Bradshaw, Laubscher, Fourie, Lambert & Nbananga (2002) conducted a study as a follow up to the 1998 South African Demographic and Health Survey (SADHS), where a sample of 13 089 males and females (≥ 15 years) were randomly selected and then stratified by province as well as urban versus rural areas in South Africa. The mean BMI for males and females were 22.9 kg/m² and 27.1 kg/m², respectively. Males had a 29.2% overweight or obesity prevalence, while females showed a 56.6% prevalence of overweight or obesity rate. Underweight was found among 12.2% of the males and 5.6% of females. The study findings showed that obesity increased with age, and higher levels of obesity were found among urban black women. These values are much higher than those documented in the 1998 SADHS (Puoane *et al* 2002) that reported that 31.8% of black women (over the age of 15 years) were obese and that a further 26.7% were overweight. The prevalence of obesity among men of the same age was 6.0%, with 19.4% being overweight. These findings imply that the prevalence of obesity is increasing among young as well as older South African adults.

In a study investigating the possible causes of obesity in a relatively young population (75% of the sample were younger than 35 years) residing in Khayelitsha, Cape Town, it was found that the prevalence of overweight/obesity was high (76.5%) (Malhotra, Hoyo, Østbye, Hughes, Schwartz, Tsolekile, Zulu & Puoane 2008). In addition, obesity was more common among women (53.4%) than men (18.7%).

Black women were also found to have the highest prevalence of obesity in a study conducted by Senekal, Steyn & Nel (2003) among a locally economically active adult population (18– 65 years). The figures for combined overweight/obesity in the different ethnic groups were as follows: black women, 75%; black men, 49%; coloured women, 66%; coloured men, 45.7%; Indian women, 37%; Indian men, 36%; white women, 42%; and white men, 56%. When Venter, Walsh, Slabber & Bester (2009) conducted a study assessing the body size perception of black women in the Free State, 500 pre-menopausal women aged 25-44 years were recruited. Venter *et al* (2009) found that 3.2% of the women were underweight, 6.3% were in the lower normal weight range (18.5<20 kg/m²), 37.8% had a normal weight, 29.1% were overweight and 23.6%

were obese. The largest percentage of those women chose overweight as the healthiest body image and acceptable weight.

2.3.3 Anthropometric status of university students

Cilliers, Senekal & Kunnene (2005) conducted a cross-sectional study on 360 female first year students at the University of Stellenbosch to investigate the association between the weight status of first-year female students and various weight management-related characteristics to identify possible components of a weight management programme for students. The mean BMI of the study sample was 21.8 kg/m², with 7.2% being underweight, 81.9% being of a normal-weight, 10.0% overweight and 0.8% obese.

Beukes, Walker & Esterhuyse (2009) conducted a study among 349 female first year students from the University of the Free State. For the purpose of this study, a BMI of 20 kg/m² or lower was considered to be underweight, while a BMI higher than 25 kg/m² was considered overweight. Beukes *et al* (2009) found that 19.2% of the study group were underweight, while 55% had normal weight, and 25.8% were overweight. The mean BMI for the entire sample was 23.43kg/m².

Reddy, Resnicow, James, Kambaran, Omardien & Mbewu (2008) conducted a study among 9224 adolescents (13-19 years) within selected South African government-funded schools in all nine provinces. Findings were that 9.0% of the sample was underweight. In addition, a significantly higher percentage of males than females were underweight, while 16.9% of the total sample was overweight. A significantly higher proportion of females than males were overweight and obese, particularly at the age of 18 years.

When determining selected risk factors for the development of metabolic syndrome and assessing the metabolic risk status of third-year physiology students at the University of Stellenbosch (88 males and 178 females), Smith & Essop (2009) found that the average BMI for males and females were within the normal range.

Ntuli (2005) found significant gender differences for BMI at the DUT in that 17% of the female students were overweight and 13% were obese while 10% of the males were found to be overweight and 7% were obese. Therefore, more females were found to be overweight and obese than males. Steyn *et al* (2000) reported a prevalence of overweight of 23% among black students at the University of the North in South Africa.

The prevalence of overweight and obesity was 21.6% and 4.9% respectively in a study conducted by Terry, Huang, Harris, Lee, Nazir, Born & Kaur (2003) among American university students. This implies that obesity rates among South African university students are comparable to those documented in other, more developed countries.

In addition, the above findings are in line with that of Park & Kim (2005) among Chinese university students, where the prevalence of overweight was 24%. Angeles-Llerenas, Carbajal-Sanchez, Allen, Zamora-Munoz & Lazcano-Ponce (2005) conducted a study among 13 293 Mexican students aged 11–24 years. Findings were that of the total sample size, 7.3% were underweight, 16.4% had a normal weight, 20.3% were overweight and 20.4% were obese. Contrary to the above findings, only 2.0% of a sample of female Polish students was obese, 6.6% overweight, 75.5% of a normal weight and 15.9% underweight (Jaworowska & Bazylak 2009).

2.3.4 Relationship between food security and anthropometric status

Gooding, Walls & Richmond (2011) found that food insecure young adult women were more obese than their food secure counterparts. Even though Gooding *et al* (2011) did not find a relationship between food security status and BMI among young men, Wilde & Peterman (2006) found that both men and women from food insecure households were more obese and gained more weight over a twelve month period than their peers from food secure households. A significantly high prevalence of obesity was also reported among food insecure African-American, White, and Mexican-American women by Brown (2008) and Adams *et al* (2003). The relationship between food insecurity and obesity was also found in children, i.e. obesity increased with a decrease in food security status (Buscemi, Beech & Relyea 2011). It is therefore clear that the relationship between obesity and food insecurity is a strong one.

2.4 DIETARY DIVERSITY

2.4.1 Methods used to determine dietary diversity

Dietary diversity is measured by assessing the kind of foods individuals consume. Methods measuring dietary diversity can be extensive, assessing not only which foods are consumed but the methods of preparation, quantities consumed and beverage consumption, including alcohol and caffeine containing beverages (Grosvenor & Smolin pg.47, 2006; Gibson pg. 41, 2005; Whitney & Rolfes 1993). Tools used for measuring food consumption include 24-hour recalls, food diary or food intake record, weighed food records, dietary history and food frequency questionnaires (Gibson pg. 41, 2005; Whitney & Rolfes pg.16, 1993).

Another method used for assessing food consumption is known as the food frequency questionnaire (FFQ) which aims to assess the usual intake of foods or specific groups of foods (Gibson pg. 46, 2005; Whitney & Rolfes pg.16, 1993). Modifications and new computerised technologies have enabled this method to reflect usual intakes. Specific combinations of foods (food groups) are used as predictors for certain nutrients. For example, fruits and fruit juices are used as predictors of vitamin C intake; green leafy vegetables and carrots as predictors of carotenoids; cereals, legumes, nuts and fruits and vegetables as predictors of fibre intake; and dairy products as predictors of calcium intake (Gibson pg. 47, 2005). The FFQ is less demanding than other methods for both the researcher and participants and is commonly used in epidemiological studies (Ambrosini, de Klerk, O'Sullivan, Beilin & Oddy 2009). Ambrosini et al (2009) assessed the reliability of the use of a semi-quantitative food frequency questionnaire among adolescents and found that the questionnaire was able to correctly rank a reasonable proportion of adolescents in terms of dietary diversity.

2.4.2 Nutritional requirements of young adults

Young adulthood is the stage of the life cycle with individuals aged between 17 - 30 years (Grosvenor & Smolin pg.466, 2006). As far as nutritional needs are concerned, growth and development are not completed in young adults (Grosvenor & Smolin pg. 460, 2006; Gibson 2005; Weigley, Mueller & Robinson 1997; Whitney & Rolfes pg. 527,528, 1993). During adolescence, the composition of the body changes and nutrient requirements of both males and females increase, as at this stage of the life cycle, sexual maturation as well as accelerated growth occurs (Grosvenor & Smolin pg. 459, 2006; Whitney & Rolfes pg. 527, 1993), thereby making the energy and protein requirements in adolescence higher than at any other stage of the life cycle (Grosvenor & Smolin pg. 459,460, 2006; Whitney & Rolfes pg. 528, 1993).

In addition, micronutrient requirements increase in order to facilitate this accelerated growth especially that of vitamin B6 as it is important for protein synthesis. Food sources of vitamin B6 include chicken, meat, fish, liver, green vegetables and cereal grains (Grosvenor & Smolin pg. 248,460, 2006; Whitney & Rolfes pg.311, 1993). In order to facilitate cell division, folate and vitamin B12 requirements increase. Vitamin B12 is found exclusively in animal products while folate is found in liver, legumes, oranges, green leafy vegetables and fortified cereals (Grosvenor & Smolin pg.460, 2006; Whitney & Rolfes pg. 314, 371, 1993). It is recommended that women of childbearing age consume increased amounts of folic acid from supplements or fortified foods (Grosvenor & Smolin pg.460, 2006; Whitney & Rolfes pg. 313, 1993).

Young adults incorporate twice the amount of iron, zinc and magnesium into their bodies during periods of active growth when compared to other stages of the life cycle (Grosvenor & Smolin pg. 461, 2006; Whitney & Rolfes pg. 528,408, 1993). Organ development and the growth of skeletal muscle cause an increase in zinc requirements due to an increase in protein synthesis (Grosvenor & Smolin pg. 461, 2006; Gibson 2005; Whitney & Rolfes pg. 420, 1993). There is also an increase in iron requirements and as a result, iron deficiency anaemia is common among young adults (Grosvenor & Smolin pg. 461, 2006; Gibson 2005; Oldewage-Theron et al 2000; Whitney & Rolfes pg.528, 1993). Iron is required in greater amounts to accommodate the expansion of blood volume and myoglobin to facilitate an increase in muscle mass, particularly

in males (Grosvenor & Smolin pg. 461, 2006; Whitney & Rolfes pg. 406, 1993). Females however, have increased iron needs as a result of menstrual losses (Grosvenor & Smolin pg. 461, 2006; Whitney & Rolfes pg. 408, 1993). Sources of iron include meat, fish, poultry, green leafy vegetables, legumes and whole and enriched cereals (Grosvenor & Smolin pg. 308, 2006; Whitney & Rolfes pg. 413, 1993).

Calcium is required for bone development in order for healthy skeletal growth to occur (Grosvenor & Smolin pg. 461, 2006; Gibson 2005; Whitney & Rolfes pg.384, 1993). Forty-five per cent of skeletal growth occurs during late adolescence and early adulthood (Grosvenor & Smolin 2006; Whitney & Rolfes pg. 385, 1993). Hence, the Recommended Dietary Allowance (RDAs) for calcium and vitamin D are set at adolescent levels until young adults reach 25 years of age (Whitney & Rolfes pg. 387, 1993). Physical growth continues to about the age of 21 years, and bone growth continues to the mid-to-late twenties (Grosvenor & Smolin 2006; Whitney & Rolfes pg. 387, 1993). Calcium deficiencies increase the risk of osteoporosis in later life. Therefore it is important to ensure an adequate calcium intake during this stage of the lifecycle (Grosvenor & Smolin 2006; Gibson 2005; Whitney & Rolfes pg. 387,528, 1993). Good dietary sources of calcium include dairy products, fish with edible bones and green leafy vegetables (Grosvenor & Smolin 2006; Whitney & Rolfes pg. 387, 1993).

From the above it is therefore evident that nutrients that are more likely to be inadequate in the diet of young adults with suboptimal eating patterns are iron, zinc, calcium, folate, magnesium, vitamin A, vitamin B6 and vitamin B12 (Grosvenor & Smolin 2006; Whitney & Rolfes pg.528, 1993).

2.4.3 Common nutrition deficiencies among young adults

A significant portion of the student population that enter higher education is still in late adolescence and early adulthood in terms of growth (Hill 2009). Oldewage-Theron et al (2000) found that iron deficiency was widespread among females aged 13-25 years, and that it was induced by a plant-based South African diet that is low in bio-available iron. Steyn et al (2000) also found that both female and male students were unable to meet the RDA for energy, calcium

and iron. A study conducted by Badenhorst, Dannhauser, Slabber, du Toit & Nel (1998) where the nutrient intake of students enrolled at the University of the Free State was assessed, found that more than 50% of the students had an insufficient intake of micronutrients, especially calcium and vitamin A. The student population showed insufficient intake of various other micronutrients that including folate, iron, magnesium, niacin, protein, riboflavin, thiamin, vitamin B12, vitamin B6, vitamin E and zinc. The authors concluded that the dietary pattern of the student sample surveyed resembled a typical westernised urban diet, high in energy with a lack of micronutrients.

In the report from the Department of Higher Education & Training (2011) describing student housing at institutions of higher education in South Africa, it was reported that the nutritional quality of food consumed by students is poor. Moreover, there were students who went hungry for days and hunger was highly prevalent among students at all South African universities. Pap (stiff porridge) and milk was reported to be the most frequently consumed meal in most of the self-catering university residences. It is therefore not surprising that Ntuli (2005) found that the dietary intake from the vegetable, fruit, meat and dairy groups was low among students at the DUT. As a result, the intake of nutrients such as iodine, calcium, vitamin A, zinc, vitamin C, riboflavin, vitamin B6, iron and magnesium was reported to be inadequate. Ntuli (2005) further stated that according to the FFQ administered, the dietary habits of students were westernized as most reported to be consuming foods from the cereal, meat, sweets and oil groups, with a significantly low consumption from the fruit and vegetable group. Fruits that were consumed almost daily included: apples and bananas (27%); oranges (4%) and fruit juice (23%). As a result, the vitamin C intake of 77% of the sample was significantly low due to a low consumption of fruit. Ntuli (2005) also reported that 65% of the sample reported the consumption of less than one vegetable serving per day. Legumes, soya products and nuts were not consumed by 66% of the sample and only 30% consumed canned baked beans and/or soup powders. The per capita bread intake was high as a significant portion of the sample reported the consumption of bread for all three meals of the day.

Foods that resemble a traditional eating pattern such as maize meal, mabele, jeqe (steamed bread), samp and beans were seldom consumed. In addition, Ntuli (2005) found that the diet of

the students were not in line with dietary recommendations when compared to the South African food-based dietary guidelines (FBDGs) (Vorster 2001). Contrary to the findings by Ntuli (2005), Steyn et al (2000) found that students from rural areas followed a more traditional diet compared to urban students. Urban students consumed significantly more sugar and confectionery, while rural students consumed more cereals and legumes. This implied that students continued to consume familiar foods, even when they were away from home. The nutritional intake of all students surveyed was generally poor, with their diets mainly lacking calcium, iron and zinc (Steyn et al 2000).

2.5 NUTRITION KNOWLEDGE OF UNIVERSITY STUDENTS

The improvement of nutrition knowledge in order to improve dietary habits has received a great deal of attention in the literature (Beydoun & Wang 2008; Kolodinsky, Harvey-Berino, Berlin, Johnson & Reynolds 2007; Park & Kim 2005; Steyn et al 2000; Ladzani 1996; Walsh 1995; Barr 1987). After Badenhorst et al (1998) found that the dietary pattern of students enrolled at the University of the Free State resembled a typical westernised diet, it was suggested that one of the factors that are related to insufficient micronutrient intake is the lack of nutrition knowledge. Ntuli (2005) also reported that students at the DUT did not consume diets that comply with dietary guidelines as a result of their lack of nutrition knowledge regarding sound nutrition practices. Foods that were consumed and proved to have a positive correlation with the Nutrition Knowledge Test (NKT) were: maize meal, pasta, samp, rice, eggs, pilchards, dried beans and peanut butter, fruits and fruit juice. These correlations were however not statistically significant. The results showed that students had poor intakes of fruits and vegetables as a result of lack of nutrition knowledge regarding ‘the use of food by the body’. The study results also suggested that students may lack an understanding of the relationship between nutrients and optimal health.

Kolodinsky et al (2007) conducted a cross-sectional study investigating whether the eating patterns of 200 American college students were related to their knowledge of dietary guidance. It was found that students who had increased nutrition knowledge about fruit, dairy, protein, and whole grains had an increased likelihood of meeting their dietary recommendations. In addition, nutrition knowledge was related to making more nutrient-dense food choices. Kolodinsky et al

(2007) suggested that guidelines such as the national dietary guidelines in conjunction with effective public-awareness campaigns may be a useful mechanism for promoting healthier food choices among communities. Park & Kim (2005) reported that after nutrition education was given to Chinese students, meals were consumed more regularly. Steyn *et al* (2000) also found that poor nutrition knowledge led to a low consumption of food rich in calcium, iron and zinc among rural and urban black South African students. Kicklighter, Koonce, Rosenbloom & Commander (2010) documented that first year students welcomed nutrition guidelines that could be practically integrated into their lifestyles. As a result, students were given nutrition education as part of their orientation course. Many reported to have gained nutrition knowledge and found the module worthwhile.

Contrary to the above, available literature has also revealed that nutrition knowledge has minimal impact on the dietary choices of different population groups (Temple *et al* 2006; Cleland, Worsley & Crawford 2004). In a study conducted by Temple *et al* (2006), it was found that knowledge was unrelated to whether the adolescents attending schools in Cape Town would purchase nutrient dense foods or not. In fact, 66% of the learners who purchased the low nutrient dense items knew that those were the least nutritious options. The same results were found by Cleland *et al* (2004) among grade five and six Australian learners who chose the correct foods to term 'healthy', yet purchased high energy, low nutrient foods at the tuck shop (canteen) with fruit and vegetable purchases being at a minimum. Sakamaki, Toyama, Amamoto, Liu & Shinfuku (2005) found that although 85.6% of Chinese students were aware of the concept of nutritionally balanced meals, only a small number of students (7%) applied this concept when selecting food from a menu and described unhealthy options as more 'tasty'. Moreover, only 51% of students showed a desire to learn about healthy eating habits.

Nutrition knowledge also did not have an impact on the food choices of a food insecure community of QwaQwa as the adolescents surveyed showed an understanding and appreciation of adding variety to their diets. However, this was not reflected in their daily food choices, based on the top 20 most commonly consumed food items (which included potato chips and vetkoek) and their low nutrient intakes. Eighty-two per cent of the sample knew that variety should be included in their diets. However, their dietary habits were unchanged even though 72% of the

sample knew that different foods performed different functions in their body. This could be related to the fact that foods high in fat and low in micronutrients were the most affordable (Oldewage-Theron & Egal 2010).

2.6 CONCLUSION

There seems to be a high prevalence of food insecurity among local students on financial aid. Student poverty, food insecurity and hunger have resulted in high drop-out and low graduation rates. As a result, food insecurity undermines the primary function of higher education which is to improve human and social capital, with the additional aim to improve the economic status of people. Food insecurity increases the risk of the development of NCDs as food insecure individuals were found to be more obese than their food secure counterparts. There is a generally low consumption of nutrient-dense foods such as fruits, vegetables and whole grains among the student population. There are conflicting reports on whether nutrition knowledge has an effect on dietary habits and there is a lack of available data on whether food insecurity affects academic performance. It would therefore be important to investigate the prevalence of food insecurity, nutritional status, dietary diversity, nutrition knowledge and academic performance of students on financial aid at the UKZN-PMB in order to implement corrective measures to address the factors that contribute to food insecurity amongst this study population.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter presents and discusses the research methods and measuring instruments used in the study. The questionnaire design, pilot study, sample selection, data collection, capturing and statistical analysis are discussed. The specific data collection methods employed in relation to each study objective is also explained.

3.2 STUDY DESIGN

A cross-sectional descriptive survey was conducted. This method was suitable as the study aimed to establish the prevalence of a condition (Grimes 2002), in this case, food insecurity. With this study design, the sample is studied at one point in time, thereby making it cost effective in terms of time and operational costs. As a result, a relatively large sample size can be investigated at any given instant in time. The main disadvantage of this design is however that variations and patterns of behaviour cannot be controlled for (Grimes 2002) and the results are very specific to the study population.

3.3 SAMPLE SELECTION

3.3.1 Study population

UKZN comprises of five campuses based in the Durban and Pietermaritzburg area, with a total population of 39 989 students. UKZN - PMB campus is situated in one of the suburbs in PMB, namely Scottsville. This campus includes three colleges representing three different areas of study with a student population of 9 785 (UKZN Management Information Fact Site 2013). Of the total number of students on this campus, approximately 55% are recipients of financial aid (Dlamini 2012).

3.3.2 Sample selection

The study participants were randomly selected from the study population which represented students who were recipients of financial aid and studied at the UKZN-PMB Campus. The PMB campus was conveniently chosen and two hundred and sixty-eight (n=268) participants across three colleges with different study majors participated in the study through simple random sampling. The sample size was representative of 5% of the student population receiving financial aid at UKZN - PMB. Participants were excluded if they were in their first year of study or at a masters, doctoral, or post-doctorate level of study.

All students receiving financial aid were invited to participate through UKZN student email notifications, posters and word of mouth. The latter information was obtained from the university financial aid database through the Student Funding Centre office. Interested students were then invited to participate in the study. Posters were posted at various sites around the campus and specified the inclusion criteria of the study.

3.4 METHODS AND MATERIALS

A self-administered questionnaire (Appendix A) was developed for the purpose of the study by the researcher based on the literature and personal communication with various experts in the field. The questionnaire was used to collect information regarding socio-demographic characteristics, dietary diversity, accommodation, amount of money spent on food, the use of support services and experiences relating to food insecurity, including coping strategies. As a result, the four main sections of the questionnaire included a section on socio-demographic information, a food frequency questionnaire (FFQ), the household food insecurity access scale (HFIAS) (Coates, Swindale & Bilinsky 2007) and a nutrition knowledge questionnaire (NKQ) (Whati 2005).

The first part (section A) of the questionnaire was used to record weight and height. Anthropometric measurements were taken by trained fieldworkers in accordance with the International Standards for Anthropometric Assessment (ISAK) (ISAK 2001) under supervision of the researcher. Participants were requested to remove their shoes and were weighed in light indoor clothing. Weight was measured using a digital floor scale (Seca Digital Personal) calibrated to the nearest 100g. Height was measured using a stadiometer with a fitted measuring

tape and a sliding headboard (Seca Portable Stadiometer). Height was measured and recorded to the nearest 0.1 cm. Each measurement (weight and height) was repeated three times and the mean value was calculated. The mean weight and height of each participant was used to calculate BMI which was then compared to WHO reference values (Wenhold & Faber 2007; WHO 2006).

The FFQ used was semi-quantitative in nature and has been proven to be reproducible and valid among black adolescents older than 15 years and women in the North West province and the Birth-to-Twenty study (MacKeown, Pedro & Norris 2007). For the purpose of this study, the FFQ was adapted by the researcher using a FFQ that was piloted and implemented for use in an adult isiZulu speaking population by Kassier (2008).

The HFIAS (Coates et al 2007) (Appendix E) was used to determine the food security status of the study participants. Since the tool is normally used to measure household food security, it was adapted by the researcher to measure individual food security status. The original tool was therefore merely reworded to make it relevant for the purpose of the current study. For example, appendix A, section C, question 8: “In the past 4 weeks/30 days, did you or any household member go to sleep at night hungry because there was not enough food?” was reworded to; “In the past four weeks, did you go to sleep hungry at night because there was not enough food?”

The HFIAS score is a measure of the degree of food insecurity (access) in the individual (household) over the past four weeks (30 days). Firstly, a HFIAS score variable is calculated for each individual (household) by adding up the codes for each frequency-of-occurrence question. However, before adding up the frequency-of-occurrence values, data was coded as follows: frequency-of-occurrence was coded as zero (0) for all cases where the answer to the corresponding occurrence question was “no”. A response code of one(1), two (2) and three (3) were given for all the cases where the answer to the corresponding occurrence question was “rarely”, “sometimes” and “often”, respectively. The maximum score for an individual (household) would subsequently tally as 27 if the individual response to all nine frequency-of-occurrence questions was “often” (coded with response code of 3). The minimum score was zero (0) if the individual responded “no” to all frequency-of-occurrence questions. Therefore, the higher the HFIAS score, the more food insecurity (access) the individual experienced and the

lower the score, the less food insecurity (access) an individual experienced (Coates et al 2007). Table 3.1 presents the HFIAS categories for the purpose of this study.

Table 3.1: HFIAS categories

HFIAS category	HFIAS score
Food secure	0 - 6.24
At risk of food security	6.25 - 13.49
Food insecure	13.5 - 20.74
Severely food insecure	20.75 – 27

The HFIAS occurrence questions relate to three different domains of food insecurity (access) namely: i) Anxiety and uncertainty about the household food supply (addressed by question 1); ii) Insufficient Quality, which includes variety and preferences of the type of food (addressed by question 2, 3 and 4) and; iii) Insufficient food intake and its physical consequences (addressed by questions 5,6,7,8 and 9).

The HFIAS categorizes the sample into four levels of household food insecurity (access) (see table 3.1): food secure, mildly-, moderately- and severely food insecure (Coates et al 2007). Persons are categorized as increasingly food insecure if they respond positively to more severe conditions and/or experience those conditions more ‘often’. A food secure person experiences none of the food insecurity (access) conditions, or just experiences worry, but ‘rarely’ so (Coates et al 2007).

A mildly food insecure (access) person is one which worries about not having enough food ‘sometimes’ or ‘often’, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only ‘rarely’. He/she does not cut back on quantity nor experience any of the three most severe conditions (running out of food, going to bed hungry, or going without food for a whole day and night) (Coates et al 2007).

Moderately food insecure persons sacrifice quality more frequently, by eating monotonous diets or undesirable foods ‘sometimes’ or ‘often’, and/or have started to cut back on quantity by

reducing the size of meals or number of meals, ‘rarely’ or ‘sometimes’. However, they do not experience any of the three most severe conditions (Coates et al 2007).

Severely food insecure persons have cut back on meal size or number of meals ‘often’, and/or experience any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even if as infrequently as ‘rarely’. Therefore, any person that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure (Coates et al 2007). Table 3.2 presents the HFIAS questionnaire illustrating the food insecurity (access) categorization scheme.

Table 3.2: HFIAS categorization scheme

Question	Frequency			
	No (0)	Rarely (1)	Sometimes (2)	Often (3)
1				
2				
3				
4				
5				
6				
7				
8				
9				

Source: Coates et al 2007

	FOOD SECURE		MODERATELY FOOD INSECURE
	MILDLY FOOD INSECURE		SEVERELY FOOD INSECURE

The last section of the questionnaire was used to determine the nutrition knowledge of the study group. These questions were extracted from a 60 question NKQ developed by Whati (2005) for adolescents who were to participate in the Birth-To-Twenty study. The key concepts covered in this questionnaire are based on the South African Food Based Dietary Guidelines (FBDGs) (Voster 2001).

Table 3.3: Categorisation of items in questionnaire based on the South African food-based dietary guidelines.

FBDGs	items numbering in Whati (2005) questionnaire	Questions included	Items re- numbering
1. Enjoy a variety of foods	16,17,24,37,40,51	16,37,51	3,20,31
2. Be active	14,22,26,29	-	-
3. Make starchy foods the basis of most meals	4,9,35,45,47,49	4,9,35,	1,12,9
4. Eat plenty of vegetables and fruit every day	7,15,21,25,42,57	7,25,42,57	11,7,10,17
5. Eat dry beans, split peas, lentils and soy regularly	54,55,56,58,60	54,55,56,58,60	30,23,29,24,18
6. Chicken, fish, meat, milk or eggs can be eaten daily	2,18,23,33,46,59	2,18,23,33	6,4,13,8
7. Eat fats sparingly	8,19,43,48,50	8,19,43,48,50	2,5,14,15,16
8. Use salt sparingly	6,20,28,34	6,36,34	26,28,22
9. Drink lots of clean, safe water	5,27,30	-	-
10. If you drink alcohol, drink sensibly	10,31	10,31	27,21
11. Use food and drinks containing sugar sparingly and not between meals	1,32,36,39,52	1,39,52	25,19,32
12. Nutrition in pregnancy	3,11,12,13,38,41,44,53	-	-

The above table (table 3.3) shows the questions extracted and re-numbered from the original questionnaire by Whati (2005). The FBDGs were chosen as the relevant literature revealed that students consume diets that lack diversity and micronutrients (Temple *et al* 2006; Ntuli 2005; Sakamaki *et al* 2005; Cleland *et al* 2004; Steyn & Ochse 2013). Since poor dietary diversity results in obesity among young adults (Azadbakht & Esmailzadeh 2010), questions related to FBDGs 1, 3 and 4 were included. Protein is often found to be lacking in the diets of the poor and food insecure (Brooks, Simpson & Raubenheimer 2010). Therefore, all the questions related to FBDGs 5 and 6 were included as these assess knowledge of plant and animal sources of protein. Questions relating to FBDGs 7, 8, 10 and 11 were included as students and food insecure populations have been found to consume high amounts of fat, sugar, salt and alcohol (Oldewage-Theron & Egal 2010; Temple *et al* 2006; Ntuli 2005; Sakamaki *et al* 2005; Cleland *et al* 2004). Questions related to alcohol were included as Dlamini (2012) reported that males were found to spend a substantial amount of their money on alcohol. The questions pertaining to physical activity (FBDG 2), water (FBDG 9) and nutrition in pregnancy were not included.

Table 3.4 Nutrition NKQ score categories

Category	Score
Poor	1-49
Average	50-69
Good	70-100

The nutritional knowledge of the study sample was determined by calculating the test score of each participant as a percentage. “Poor” nutrition knowledge was defined as a score ranging from 0 - 49%, while an “average” nutrition knowledge score was defined as a score ranging from 50 – 69% and a “good” score ranging from 70 – 100%(see table 3.4 above).

The entire questionnaire was self-administered. However, the developer of the questionnaire recommended that persons from historically disadvantaged backgrounds should receive fieldworker assistance when completing the questionnaire (Whati 2005), as fieldworker assistance will ensure that the participant has adequate understanding of each item before giving his/her response to each multiple choice question.

In order to assess the academic performance of the sample, the combined performance index (CPI) was used. This index is used by the UKZN to track the overall performance of individual students for the duration of their studies. The sample was then divided into three quartiles (25th, 50th and 75th) according to their CPI scores. Therefore the poorest performing students would fall under the 25th quartile while the best performing would fall above the 75th quartile.

3.5 FIELDWORKER RECRUITMENT AND TRAINING

The fieldworkers were recruited from the student complement of the UKZN-PMB Department of Dietetics and Human Nutrition. They received training by the researcher on administering the questionnaires and taking anthropometric measurements in accordance with ISAK standards.

3.6 PILOT STUDY

The sample used for conducting the pilot study was recruited in the same manner in which the study sample was recruited i.e. email notifications, posters and word of mouth. The sample consisted of 15 students, representing 5% of the study sample size.

The purpose of the pilot study was to identify ambiguous questions forming part of the study questionnaire. In addition, pilot testing was also used to determine how long it would take participants to complete the questionnaire in order to guard against respondent fatigue. The pilot study also allowed the fieldworkers to gain practical experience on working together as a team and to standardise anthropometric measurement techniques. As participants answered the questionnaire in a satisfactory manner and the questionnaire was not found to be ambiguous, no subsequent changes were necessary prior to commencement of data collection.

3.7 DATA COLLECTION

Data collection was conducted over a two week period. Various lecture theatres and library discussion rooms were booked for this purpose; at various sites on the UKZN-PMB campus. The venues used for data collection had the necessary furniture to ensure that participants were comfortably seated while data collection took place. In addition, booked venues had sufficient open spaces for conducting anthropometric measurements. It was ensured that the venues were

quiet and communication between participants was discouraged to reduce respondent bias and to enable fieldworkers to assist participants who had queries.

Upon arrival at the data collection venue, participant's names and student numbers were checked against the list of financial aid recipients obtained from the Student Funding Centre. This was to ensure that only students receiving financial aid participated in the study. Participants were then asked to complete an informed consent form (see Appendix B). This was followed by weighing and taking of height measurements. Once this was completed, participants were seated and were instructed on how to complete the self-administered questionnaire. Two fieldworkers were responsible for measuring height while two measured weight and oversaw the questionnaire administration.

3.8 DATA CAPTURING, PROCESSING AND ANALYSIS

At the end of each data collection day, data was captured into the Statistical Package for Social Science (SPSS) version 21. All data sets were found to be acceptable by the researcher. As a result, no data sets were rejected. The data was reviewed by a statistician and found acceptable and requiring no cleaning. Table 3.5 shows how the data was analysed.

Table 3.5: Analysis of data

Objective	Variables	Statistical analysis
Demographic characteristics	<ul style="list-style-type: none"> • Gender • Age • Race • Residence • College • Year of study • Employment status 	<ul style="list-style-type: none"> • Frequency distributions • Descriptive statistics
Anthropometric measurements	<ul style="list-style-type: none"> • BMI • gender • Food security status 	<ul style="list-style-type: none"> • frequency distributions • ANOVA test • ANOVA test (analysis of variance) • Two-sample t
Dietary diversity	<ul style="list-style-type: none"> • Food frequency • Nutrition knowledge 	<ul style="list-style-type: none"> • Frequency distributions • Chi-squared
Food security status	<ul style="list-style-type: none"> • HFIAS • Monthly food expenditure • Monthly expenses • Longest time without food • Additional allowance • Coping strategies 	<ul style="list-style-type: none"> • Chi-square test • ANOVA • Frequency distributions • Levene's test for equality of variances • ANOVA test • ANOVA test
Nutrition Knowledge	<ul style="list-style-type: none"> • Nutrition Knowledge Questionnaire • BMI • Year of study 	<ul style="list-style-type: none"> • Frequency distributions • Levene's test for equality of variances • Levene's test for equality of variances
Academic performance	<ul style="list-style-type: none"> • CPI scores • Struggled to concentrate in class? • HFIAS • Additional allowance 	<ul style="list-style-type: none"> • Chi-square test • Levene's test • ANOVA test • ANOVA test

3.9 ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Humanities and Social Sciences Research Ethics Committee (HSS/0150/012M) (Appendix D) of the University of KwaZulu-Natal. All participants were referred to by a code in order to guarantee their anonymity and to prevent a specific data set from being traced back to specific study participants. The weight and height measurements of all participants were taken away from the seating area where questionnaires were completed to ensure privacy.

3.10 CONCLUSION

This chapter outlined the procedures followed in obtaining the data using a cross-sectional descriptive survey method. The measuring tools used to obtain the data related to each study objective were discussed. The chapter discussed the manner in which sample selection, exclusion criteria, questionnaire formulation, administration of data capturing, the interpretation of the data for each study objective, the pilot study and the recruitment of field workers was conducted. The results of the data analysis are reported in Chapter four.

CHAPTER 4: RESULTS

4.1 INTRODUCTION

Food security is an important nutrition topic amongst vulnerable population groups such as the young and the socioeconomically disadvantaged. University students often fall into these categories as they are young, have relatively low levels of disposable income and often live away from home for the first time. This chapter presents the prevalence of the study parameters (i.e. food security status, nutritional status, and nutrition knowledge), the distribution of these indicators and how these indicators may relate with each other among undergraduate students on financial aid at UKZN-PMB campus.

4.1.1 SAMPLE CHARACTERISTICS

The sample size consisted of 268 students ($N = 268$) on financial aid that met the study's inclusion criteria (see Chapter three). Table 4.1 presents the socio-demographic characteristics of the study sample.

Table 4.1: Socio-demographic characteristics of study sample (N=268)

Variable		n	% [*]
Gender:	Male	110	41.0
	Female	158	59.0
Age:	17-21	185	69.0
	22-26	80	29.8
	27-31	2	0.8
	32-36	0	0
	>37	1	0.4
Race:	Black	267	98.9
	White	0	0
	Coloured	1	0.4
	Indian	0	0
Residence:	Home	14	5.2
	Campus Residence	211	78.7
	Private Accommodation	42	15.7
	Other	1	0.4
College:	Humanities	82	30.6
	Engineering and Science	141	52.6
	Law and Management Studies	45	16.8
Year of Study:	Second	124	46.3
	Third	120	44.7
	Fourth	20	7.5
	> Fourth	4	1.5
Part-time Employment Status:	Employed	4	1.5
	Unemployed	143	98.1
Additional Allowance ¹ :	Receiving	123	45.6
	Not Receiving	143	53.0

¹ Additional allowance refers to a monthly allowance received from family or caregiver(s).

* % of total sample (n = 268)

From the above table it is evident that nearly two thirds of the sample was made up of females. The predominant race group was black (98.9%) while more than two-thirds (69%) of the sample fell in the 17-21 year age category and nearly a third (29.8%) in the 22-26 year age category. The bulk of the sample consisted of students in their second (46.3 %) or third (44.7%) year of study, while the most (78.7%) of the students resided in university residences. The bulk of the sample was unemployed, i.e. did not hold a part-time job (98.1%), with just over half (53.0%) reporting that they did not receive additional financial assistance such as an allowance from family or caregivers.

4.2 FOOD SECURITY STATUS

The HFIAS score is a continuous measure of the degree of food insecurity (access) in the individual (household) over the past four weeks (30 days). The mean HFIAS score for the study sample was 11.9 ± 6.78 , which was indicative of the ‘at risk of food insecurity’ category.

The mean HFIAS score for males was lower (11.7 ± 6.5) than that for females (12.1 ± 6.8). However, according to Levene’s test for equality of variances (where $p = 0.78$) and the T-test (where $p = 0.65$), the difference in the mean food security test score between males and females was not statistically significant. Therefore it can be concluded that the mean HFIAS score between males and females was similar.

Table 4.2 Household Food Insecurity (Access) categorization scale showing the frequency-of-occurrence Household Food Insecurity Access-related conditions

Question	No n (%) [*]	YES		
		Rarely n (%) [*]	Sometimes n (%) [*]	Often n (%)
1. In the past month, did you worry that you would not have enough food?	56 (20.7)	40 (14.8)	119 (44.1)	54 (20.0)
2. In the past month, were you not able to eat the kinds of foods you preferred because of lack of resources?	38 (14.1)	43 (15.9)	105 (38.9)	81 (30.0)
3. In the past month, did you have to eat a limited variety of foods due to lack of resources?	44 (16.3)	49 (18.1)	96 (35.6)	78 (28.9)
4. In the past month, did you have to eat some foods that you really did not want to eat because of lack of resources to obtain other types of food?	52 (19.3)	57 (21.1)	93 (34.4)	67 (24.8)
5. In the past month, did you have to eat a smaller meal than you felt you needed because there was not enough food?	86 (31.9)	51 (18.9)	90 (33.3)	42 (15.6)
6. In the past month, did you have to eat fewer meals in a day because there was not enough food?	74 (27.4)	62 (23.0)	92 (34.1)	40 (14.8)
7. In the past month, was there ever no food to eat of any kind in your room because of lack resources to get food?	113 (41.9)	63 (23.3)	70 (25.9)	23 (8.5)
8. In the past month, did you go to sleep at night hungry because there was not enough food?	140 (51.9)	58 (21.5)	52 (19.3)	16 (5.9)
9. In the past month, did you go a whole day and night without eating anything because there was not enough food?	171 (63.3)	50 (18.5)	38 (14.1)	10 (3.7)

	FOOD SECURE
	MILDLY FOOD INSECURE
	MODERATELY FOOD INSECURE
	SEVERELY FOOD INSECURE

* % of total sample (n = 268)

Table 4.2 presents the HFIAS questionnaire depicting the frequency-of-occurrence of food insecurity access conditions. The three most severe conditions of food insecurity (namely; running out of food, going to bed hungry or going for a whole day and night without food) were experienced by the sample. Just over a quarter (25.9%) of the sample ‘sometimes’ had no food of any kind in their rooms while close to 1 in 10 (8.5%) of the sample experienced this condition ‘often’.

Almost one fifth (19.3%) of the sample ‘sometimes’ went to bed hungry due to a lack of food. This condition was also experienced ‘often’ by 5.6% of the sample, while another fifth (21.5%) of the sample experienced it ‘rarely’.

The last most severe characteristic of food insecurity (going a whole day and night without food) was experienced ‘often’ by 3.7% of the sample, while 14.1% experienced it ‘sometimes’ and almost a fifth (18.5%) experienced it ‘rarely’.

The condition experienced ‘often’ by most (30%) of the sample was the inability to eat the kinds of foods they preferred because of the lack of resources followed by the obligation ‘to eat a limited variety of foods due to lack of resources’ by 28.9% of the sample.

Table 4.3 presents the food security status and additional sources of income of the study sample.

Table 4.3 Food security status of students on financial aid and additional sources of income¹

	HFIAS score ¹	Do you receive an additional allowance to financial aid?			How much is the additional allowance you receive per month?	How much money do you spend on food per month?
		Total	Yes	No		
		n (%) ²	n (%)	n (%)		
Food secure	0 - 6.2	59 (22.0)	34 (12.8)	23 (8.6)	R373.71 ± R391.75	R569.50 ± R214.20
At risk of food insecurity	6.3 - 13.5	90 (33.6)	44 (16.5)	46 (17.3)	R310.42 ± R440.55	R554.60 ± R176.17
Food insecure	13.5 - 20.7	93 (34.7)	38 (14.2)	54 (20.4)	R204.14 ± R291.25	R555.68 ± R253.44
Severely Food Insecure	20.8 – 27.0	26 (9.7)	9 (3.5)	18 (6.7)	R138.92 ± R234.86	R558.00 ± R152.53
Total		268 (100)	125 (47)	141 (53)	R270.22 ± R372.36	R558.40 ± R211.12
Mean HFIAS score	11.9 ± 6.7		10.9 ± 6.7	12.9 ± 6.5		

¹ Mean ± SD (n = 268) is reported

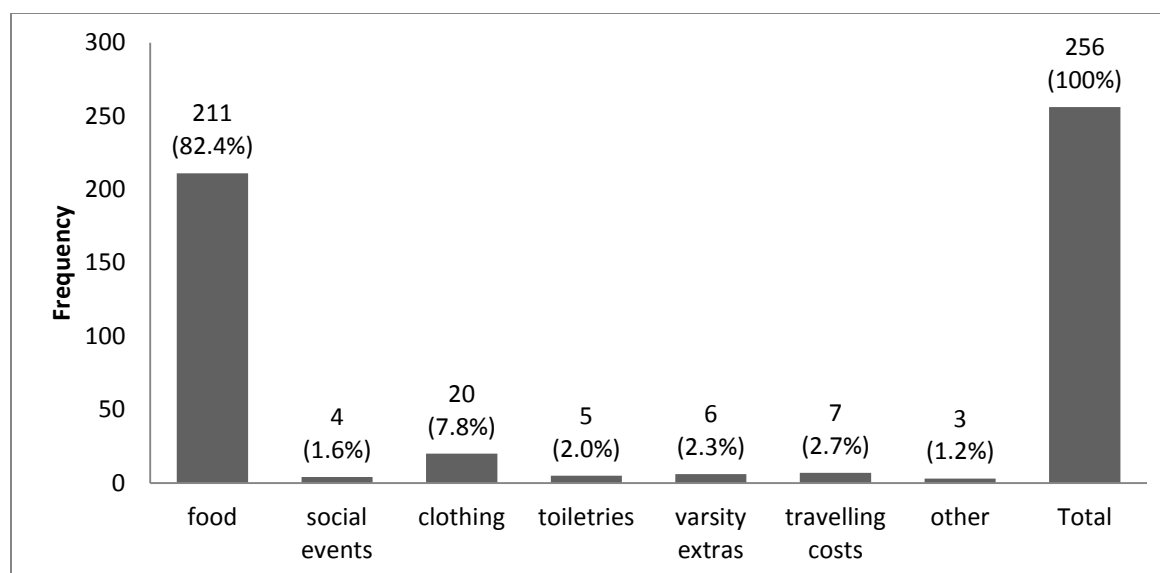
* % of total sample (n = 268)

Over a third (34.7%) of the study sample was food insecure with another third (33.6 %) being at risk of food insecurity. Almost a tenth (9.7%) of the study sample was found to be severely food insecure and just over a fifth (22%) of the study sample was found to be food secure.

The mean additional allowance received by the sample, apart from financial aid, was R270.22 ± R372.36 per month. There was a statistically significant difference ($p = 0.01$) in the food security status of students receiving an allowance and those that did not. Just over half (53%) of the study sample reported that they received no other allowance in addition to financial aid. Students who did not have an additional source of income had the highest mean HFIAS score (12.9 ± 6.5). The remainder of the sample (47%) that did receive an additional allowance received a mean of R270.22 ± R211.12 per month. The amount of money received, decreased with an increase in vulnerability to food insecurity. In addition, students who were severely food insecure and received an allowance (3.5%) received the least mean allowance (R138.92 ± R234.86). The difference in allowance received by food secure- (22%) and severely food insecure students (9.7%) was statistically significant ($p = 0.006$).

The mean amount of monthly food expenditure was R558.40 ± R211.12. There was no statistically significant difference between the amounts of money spent on food between the different HFIAS score categories. It would therefore seem as if monthly food expenditure did not affect food security status.

Figure 4.1 represents a breakdown of the monthly expenses of the study sample what the study sample.



¹ % of total sample (n = 256)

Figure 4.1: A breakdown of the monthly expenses of the students on financial aid at UKZN-PMB¹.

From the above it is evident that the vast majority (82.4%) of the sample spent most of their money on food. The second highest expenditure was reported to be clothing (7.8%).

Table 4.4: Coping strategies of food insecure students on financial aid at UKZN-PMB campus¹

Coping Strategy	% (n)*	Mean HFIAS Score ¹
Friends	46.8 (117)	13.2 ± 6.2
Keep Busy	13.2 (33)	11.8 ± 6.9
Drink Water	12.0 (30)	12.4 ± 5.5
Family	11.2 (28)	8.8 ± 6.4
Other	16.8 (42)	12.5 ± 7.4
Total	250 (100)	12.3 ± 6.5

¹ Mean ± SD (n = 250)

* % of total sample (n = 250)

When the study participants were asked to elaborate on their coping strategies when they ran out of food and money, the four main responses included: (i) calling family members for assistance with food or money; (ii) asking friends for assistance with food or money; (iii) keeping busy in order to ignore the feeling of hunger; and (iv) drinking lots of water. Table 4.4 presents the coping strategies of the study sample when running out of food and/or money.

It was found that 11.2% of the sample size sought help from family, while almost half of the sample (46.8%) sought assistance from friends, 13.2% kept busy in order to ignore the feeling of hunger and 12% drank a lot of water to curb hunger. Students who sought assistance from family members had the lowest mean HFIAS score (8.8 ± 6.4) while those who sought assistance from friends had the highest mean HFIAS score (13.2 ± 6.2). Therefore students who sought help from family members were more food secure than those who sought assistance from friends.

4.3 ASSESSMENT OF NUTRITIONAL STATUS

Table 4.5 presents the nutritional status of the study sample in terms of BMI (kg/m²).

Table 4.5: Nutritional status of students on financial aid at UKZN-PMB campus

WHO Classification	BMI (kg/m²)¹	Males n (%)[*]	Females n (%)[*]	Total n (%)[*]
Underweight	<18.50	3 (1.1)	4 (1.5)	7 (2.6)
Normal Range	18.50 - 24.99	88 (33.0)	82 (30.7)	170 (63.7)
Overweight	≥25.00-29.99	16 (6.0)	41 (15.4)	57 (21.45)
Obese	≥30	3 (1.1)	30 (11.2)	33 (12.4)
Mean BMI		23.0 ± 3.5	25.4 ± 5.2	24.4 ± 4.7

Source: WHO (2004)

¹ body mass index as weight in kilograms divided by the square of height in metres (kg/m²) of a person

^{*} % of total sample

The mean BMI of the study sample was within the normal range according to the WHO (2004) ($24.4 \pm 4.7 \text{ kg/m}^2$). However, the mean BMI of females were significantly higher ($p = 0.00$) than that of males and fell in the overweight category ($25.4 \pm 5.2 \text{ kg/m}^2$) while the mean BMI of males was within the normal range ($22.0 \pm 3.5 \text{ kg/m}^2$).

The majority of the study sample (63.7%) had a BMI within the normal range while a fifth (21.4%) was overweight and over a tenth (12.4%) was obese. The percentage of obese females (11.2%) was ten times higher than that of males (1.1%) and the percentage of overweight females (15.4%) was more than double of overweight males (6%).

Table 4.6 illustrates the relationship between food security status and BMI.

Table 4.6: The mean BMI of students in different food security categories

Food security status	n (%)[*]	Mean BMI (kg/m²)¹
Food secure	59 (22.0)	24.0 ± 4.4
At risk	90 (33.6)	24.3 ± 5.2
Food insecure	93 (34.7)	24.4 ± 4.6
Severely food insecure	26 (9.7)	25.5 ± 4.5
Total	268	24.4 ± 4.7

¹Body mass index as weight in kilograms divided by the square of height in metres (kg/m²) of a person

^{*} % of total sample (n = 268)

From the above table it is evident that there was a trend showing how an increase in BMI was associated with an increase in food insecurity. The study participants who were severely food insecure (9.7%) had the highest mean BMI (25.5 ± 4.5) which fell into the overweight category. However, an ANOVA analysis yielded a non significant p-value ($p = 0.79$), illustrating that the relationship between food insecurity and BMI was not a significant one.

4.4 DIETARY DIVERSITY

Table 4.7: Results generated by non-quantified food frequency questionnaire

How often to you eat the following foods?	More than once/day n (%)*	Once/day n (%)*	2-3 times a week n (%)*	Seldom n (%)*	Never n (%)*
Milk (fresh milk, maas, yogurt, cheese, milk powder)	39 (14.6)	80 (30.0)	73 (27.3)	70 (26.2)	4 (1.5)
Other dairy products (e.g. cheese, yoghurt, ice-cream)	14 (5.2)	48 (18.0)	70 (26.2)	111 (41.6)	19 (7.1)
Breakfast cereals/porridge	23 (8.6)	135 (50.6)	47 (17.6)	44 (16.5)	12 (4.5)
Bread, rice, pasta, mealie rice, samp, phutu, jeqe (steamed bread), potatoes	160 (59.9)	73 (27.3)	25 (9.4)	6 (2.2)	0 (0)
Legumes (dried beans, peas, baked beans, lentils, soya mince)	16 (6.0)	40 (15.0)	85 (31.8)	96 (36.0)	26 (9.7)
Meat, fish, poultry	45 (16.9)	73 (27.3)	111 (41.6)	25 (9.4)	2 (0.7)
Processed meats (e.g. ham, polony) & organ meats	35 (13.1)	57 (21.3)	62 (23.2)	84 (31.5)	23 (8.6)
Eggs	44 (16.5)	58 (21.7)	65 (24.3)	81 (30.3)	13 (4.9)
Peanut butter, nuts	20 (7.5)	23 (8.3)	43 (16.1)	107 (40.1)	67 (25.1)
Vegetables	45 (16.9)	64 (24.0)	74 (27.7)	70 (26.2)	7 (2.6)
Fruit	50 (18.7)	78 (29.2)	77 (28.8)	48 (18.0)	7 (2.6)
Fats (e.g. sunflower/cooking oil, margarine, mayonnaise)	105 (39.3)	90 (33.7)	52 (19.5)	16 (6.0)	2 (0.7)
Sweets (e.g. cakes, doughnuts, candy, chocolate, biscuits)	71 (26.6)	52 (19.5)	71 (26.6)	69 (25.8)	2 (0.7)
Salty snacks (e.g. potato chips, corn chips, pretzels)	39 (14.6)	61 (22.8)	81 (30.3)	72 (27)	8 (3.0)
Fizzy drinks & cool drinks	29 (10.9)	36 (13.5)	90 (33.7)	92 (34.5)	15 (5.6)
Alcohol (e.g. beer, wine)	1 (0.4)	4 (1.5)	17 (6.4)	65 (24.3)	170 (63.7)
Coffee & tea	93 (34.8)	70 (26.2)	46 (17.2)	39 (14.6)	14 (5.2)
Fast foods (e.g. pizza, pies, sausage rolls, samosas, KFC, Nando's, Chicken Licken)	12 (4.5)	34 (12.7)	65 (24.3)	137 (51.3)	16 (6.0)

* % of total sample (n = 268)

According to table 4.7, the study sample consumed 'milk' (30%) more often than 'other dairy products' (18%) on a daily basis. However, it is evident that just over a quarter of the sample surveyed consumed any form of dairy products only two to three times a week, whereas just over a quarter (26.2%) of the sample seldom consumed milk.

It was evident that starchy foods such as bread, porridge, rice and phutu served as staple foods in the diets of those surveyed as the starch group was consumed 'more than once a day' by nearly two-thirds (59.9%) of the study sample. More affordable sources of protein such as legumes, peanut butter and eggs were seldom consumed by the bulk of the study sample, whereas 'meat, fish and poultry' took preference over the consumption of other animal sources of protein such as processed meat and eggs. Most of the sample (41.6%) consumed meat, fish and poultry '2-3 times a week', while it was consumed on a daily basis by nearly a third (27.3%) and 'more than once a day' by 16.9% of the study sample. A fifth of the study sample consumed processed meats once a day (21.3%) or 2-3 times a week (23.2%), while nearly a third (31.5%) consumed them 'seldom'.

Vegetable consumption proved to be low as it was only consumed more than once a day by 16.9% of the study sample while 24 % consumed it on a daily basis followed by 27.7% consuming it '2-3 times a week' and 26.2% seldom consuming them. Fruit consumption proved to be marginally higher than vegetable consumption as 18.7% consumed it more than once per day, followed by daily consumption reported by 29.2% and '2-3 times a week' by 28.8 % of the study sample respectively.

Most of the study sample (39.3%) consumed fats 'more than once a day' followed by 'once a day' for 33.7% of the study sample. A quarter (26.6%) of the sample consumed sweets 'more than once a day', followed by a fifth (19.5%) consuming it on a daily basis and another quarter (26.6%) consuming it '2-3 times a week'. Most of the study sample (30.3%) consumed salty snacks '2-3 times a week'. While fizzy drink consumption was reported to be consumed '2-3 times per week' by a third of the sample (33.7%) followed by 'seldom for 34.5%. Just over ten per cent (10.9%) of the sample consumed fizzy drinks more than 'once a day.'

The majority (63.7%) of the sample reported that they 'never' consumed alcohol while 24.3% seldom drank it. Coffee and tea was consumed 'more than once a day' by the most (34.8%) of

the sample and was consumed once a day by 26.2%. Just over half (51.3%) of the study sample reported to consume fast foods seldom while a quarter (24.3%) consumed fast foods ‘2-3 times a week’.

In summary, the most frequently consumed foods that were consumed more than once a day included the starch group (bread, rice, pasta, phuthu, jege, etc.), fats (cooking oil, margarine, mayonnaise) and coffee and tea. This was followed by milk, breakfast cereals/porridge and fruits, which were consumed by the bulk of the study sample ‘once a day’.

4.5 NUTRITIONAL KNOWLEDGE

Table 4.8 presents the nutrition knowledge of students on financial aid at UKZN-PMB campus.

Table 4.8: The nutrition knowledge of students on financial aid at UKZN-PMB campus¹

Nutrition Knowledge	Score (%)	n (%)*
Poor	0 - 49	51 (19.0)
Average	50 - 69	177 (66.0)
Good	70 - 100	40 (14.9)
Mean score (%)	58.6	268 (100.0)

¹ total nutrition knowledge test score obtained expressed in %

*% of total sample (n = 268)

The mean score of the sample was 18.8 ± 3.8 (58.6%) which fell within the “average” range. Most (66.0%) of the sample had an average NKT score while 14.9 % had good nutrition knowledge. Almost a fifth (19.0%) of the sample had ‘poor’ nutrition knowledge. Table 4.9 presented below, gives an overview of NKT scores in relation to academic year of study.

Table 4.9: Nutrition knowledge test scores of students according to academic year of study.

Academic year	n (%)	Mean (SD)
Second	118 (45)	18.5 ± 3.8
Third	120 (45.8)	18.8 ± 4.0
Fourth	20 (7.6)	19.6 ± 2.9
over fourth	4 (1.6)	18.0 ± 4.6
Total	262 (100)	18.7 ± 3.8

¹ Mean ± SD (n = 262)

* % of total sample (n = 262)

From the above table it is evident that there is an increase in the mean NKT score as students progressed to subsequent years of study. To determine whether the improvement in NKT score was statistically significant, Levene's test and a t-test for equality of means were performed to compare the mean test scores of students in their second academic year to those in their fourth year of study. Levene's test for equality of variances of means showed that there was no statistically significant difference in the variances ($p = 0.14$). The t-test also showed that there was no statistically significant difference between the mean test scores of the two years of study ($p = 0.23$). It can therefore be concluded that academic year of study has no effect on nutrition knowledge.

Table 4.10 illustrates the relationship between BMI category and mean nutrition knowledge score of the study sample.

Table 4.10: The mean nutrition knowledge score across different BMI categories¹

BMI Category	n	Mean Nutrition knowledge score
Underweight	7	18.6 ± 4.2
Normal	171	18.7 ± 3.8
Overweight	57	18.5 ± 4.1
Obese	33	19.6 ± 2.7
Total	268	18.8 ± 3.8

¹Mean ± SD (n = 268) is reported

The above table illustrates that there might be an increase in the mean NKT score with an increase in BMI category as participants who fell into the obese category had the highest mean nutrition knowledge score (19.6 ± 2.7). To test whether the increase was significant, Levene's test for equality of variances and a t-test were performed to compare the mean nutrition knowledge score between the normal BMI category and obese category. Levene's test yielded a p-value = 0.04. As a result, the null hypothesis (the null hypothesis states that the variances are equal) is rejected and it can be concluded that the variances in nutrition knowledge between these two groups were not equal. The t-test however, showed that there was no statistically significant difference in the mean NKT scores between the two groups (p = 0.23).

Table 4.11 shows the impact of nutrition knowledge on the frequency of food consumption in relation to different food groups.

Table 4.11 Impact of nutrition knowledge on the frequency of consumption of foods

	Nutrition Knowledge	n	p-value
Fresh milk, maas, yoghurt, cheese, powder milk	poor	51	0.81
	good	40	
Other diary products	poor	50	0.43
	good	40	
Breakfast cereals/porridge	poor	49	0.63
	good	40	
Bread, rice, pasta, maize meal, samp, potatoes	poor	51	0.61
	good	39	
Legumes	poor	51	0.42
	good	38	
Meat, fish, poultry	poor	49	0.06*
	good	39	
Processed meats and organ meats	poor	50	0.00*
	good	38	
Eggs	poor	50	0.65
	good	40	
Nuts and peanut butter	poor	49	0.73
	good	40	
Vegetables	poor	50	0.39
	good	39	
Fruits	poor	51	0.48
	good	39	
Cooking oil, margarine, mayonnaise	poor	51	0.55
	good	40	
Cakes, doughnuts, candy, chocolate, biscuits	poor	51	0.03*
	good	40	
Potato chips, corn chips, pretzels	poor	50	0.35
	good	38	
Fizzy dinks and cool drinks	poor	51	0.01*
	good	39	
Beer, wine	poor	51	0.28
	good	39	
Coffee & tea	poor	49	0.67
	good	39	
Pizza, pies, sausage rolls, samoosaa, KFC	poor	50	0.04*
	good	40	

*p-value < 0.05

From the above table it would seem as if there was a significant relationship between good versus poor nutrition knowledge on the consumption of the following groups of foods: processed meats ($p = 0.00$); cakes, doughnuts, sweets ($p = 0.03$); fizzy drinks ($p = 0.01$) and; pizza, pies, samosas, Kentucky Fried Chicken (KFC) ($p = 0.04$). There was a moderate significant difference for the food group ‘meat, fish, and poultry ($p = 0.06$)’.

4.6 ACADEMIC PERFORMANCE OF STUDENTS ON FINANCIAL AID

Table 4.12: Academic performance of students on financial aid at UKZN-PMB¹.

	CPI 25 th quartile	CPI 50 th quartile	CPI 75 th quartile	Totals
Total number of students [n (%)*]	72 (28.0)	128 (49.8)	57 (22.2)	257 (100)
Have you ever struggled to concentrate in class due to hunger?				
Yes [n (%)]	39 (15.2)	58 (22.6)	30 (11.7)	127 (49.4)
No [n (%)]	33 (12.8)	70 (27.2)	27 (10.5)	130 (50.6)
HFIAS score	11.9 ± 7.2	11.5 ± 6.6	12.3 ± 6.3	11.9 ± 6.7
How much is the additional allowance do you receive per month?	R539.81 ± R364.46	R527.81 ± R265.39	R576.25 ± R343.47	

¹ CPI (combined performance index) scores used to track student academic performance over the course of the studies

*% of total sample (n = 257)

The above table shows the academic performance of the study sample. In order to assess the academic performance, the combined performance index (CPI) was used. This index is used to track the overall performance of individual students for the duration of their studies. The sample was divided into three quartiles (25th, 50th and 75th) according to their CPI scores. Therefore, the poorest performing students would fall under the 25th quartile while the best performing would fall above the 75th quartile. In this study, 28% (n=72) of the sample’s CPI was below the 25th quartile while 22.2% were above the 75th quartile. Approximately half (49.4%) of the sample reported that they have struggled to concentrate in class due to hunger. More than 15% of the sample that reported this had CPI scores below the 25th quartile. The portion of the

sample (22.2%) that had CPI scores above the 75th quartile received a considerably higher monthly allowance than those below the 25th quartile; however the difference was not statistically significant. The differences in the HFIAS scores among the two groups were also not statistically significant.

4.7 RELATIONSHIP BETWEEN FOOD SECURITY STATUS AND OTHER VARIABLES

In table 4.13 the study sample divided into 3 food security categories namely; food secure (score range 0-6.24), moderately food insecure (score range 6.25- 13.49) and food insecure (score range 13.5 - 27). This table shows the relationship between food security status and numerical means with their standard deviations of BMI, monthly food expenditure, days gone without food and CPI scores.

Table 4.13: Relationship between food security status and other study variables

	Food Secure	Moderately Food Insecure	Food Insecure
BMI/ (kg/m²)¹	24.0 ± 4.4	24.0 ± 5.2	25.5 ± 4.5
Monthly food expenditure (R/month)²	R569.50 ± R214.20	R554.60 ± R176.17	R558.00 ± R152.53
Days gone without food (n)³	4.40 ± 13.89	4.54 ± 6.25	6.64 ± 9.01
CPI 2011⁴	85.9 ± 10.4	86.9 ± 13.3	83.8 ± 8.5

¹Mean ± SD body mass index weight in kilograms divided by the square of height in meters of a person

²Mean ± SD money in rands (ZAR) spent per month

³Mean ± SD number of days spent without food

⁴Mean ± SD total CPI index score of student over the course of their study

The trends depicted in the above table suggest that an increase in BMI is associated with an increase in food insecurity. In addition, it would seem that food secure students spend more money on food than those who are food insecure. What is very evident is that with the worsening of food security status, the number of days participants have gone without food also

increases. Food insecure students have a lower mean CPI score when compared to those that are food secure. However, the difference was not statistically significant.

4.8 CONCLUSION

From this chapter it is evident that the vast majority of the study sample had no form of employment and while only half of the sample received additional allowance besides financial aid. Another alarming finding in this chapter was that more than 14% of the sample ‘sometimes’ went a whole day and night without food. Asking friends for assistance seemed to be the main coping strategy adopted by the sample. This coping strategy seemed to buffer food insecurity more than asking family for assistance. The diet of the sample show a low intake of micronutrients as less than 20% of the sample consumed vegetables and fruits ‘more than once a day’. This could be as a result of insufficient funds for food as mean NKT score of the sample was average. The portions of the sample with the highest academic score were also received higher mean monthly allowances. The results of this study are discussed in the following chapter.

CHAPTER 5: DISCUSSION

5.1 INTRODUCTION

In South Africa, hunger is not a result of supply as the country can grow enough food to feed all its citizens. Rather, the problem is one of access to food. Pockets of the population do not have access to food. In this regard, one of the vulnerable groups that fall into this category is university students, especially those on financial aid. This chapter will discuss the findings of this study with reference to the available published data.

5.2 FOOD SECURITY STATUS

Students on financial aid at UKZN-PMB are at high risk of food insecurity. These findings emulate the findings of Hughes *et al* (2011) and Meldrum & Willows (2006) who reported that students on financial aid are highly vulnerable to food insecurity. In the current study sample 20% of the participants were food secure, while over 30% (1 in 3 students) was food insecure and 10% severely food insecure. This figure is higher than the one in five people estimated by the South African government (Statistics South Africa 2013).

On average, one out of five students experiences one or more or all the three most severe conditions of food insecurity described in the literature (Coates *et al* 2007) as: completely running out of food, going to bed hungry and going the whole day and night without food once or more times a month. These are in line with the findings of Munro *et al* (2013) who also conducted a study among UKZN students as a whole (did not target only those on financial aid) and found that 38% of the sample was affected by food insecurity with 11% of the sample highly vulnerable to food insecurity.

This high prevalence of food insecurity reported in the current study could be due to the fact that half of the study sample did not receive an allowance in addition to financial aid. Therefore, financial aid was their sole source of income. The Council of Higher Education (2011) reported that all vice-chancellors of all universities in South Africa confirmed that financial aid alone was not enough to cover food-related and accommodation costs. In the current study, of those students who received an allowance in addition to financial aid, an additional R270.22 per month was received. Students who received an allowance had a lower mean HFIAS score, thereby

illustrating that an increase in dispensable income decreases vulnerability to food insecurity. Ntuli (2005) also found that a lack of income adversely affected the ability of students at the DUT to maintain adequate nutrient intakes.

The mean monthly food expenditure amounted to R558.40 in the current study. This can be translated into R139.60 per week. These findings are similar to that of Munro *et al* (2013) who documented a weekly food expenditure of R127.93 in 2007. In view of the 49% increase in food prices over the past 5 years (Statistics South Africa 2013), the student monthly food expenditure has remained relatively the same. This could either mean that students are purchasing cheaper foods in order to maintain the quantity of food items in their shopping baskets or they are buying food in smaller quantities and cutting down on meal sizes and the number of meals consumed. Either way, this would be characteristic of a food insecure individual (Coates *et al* 2007).

It is also of interest to note that there was only a R10 difference in the mean monthly food expenditure of food secure versus the food insecure group. However, this difference was not statistically significant, thereby indicating that all students on financial aid spend a similar amount of money on food. This phenomenon can also be attributed to the fact that even those least vulnerable to food insecurity do not have extra money to spend on food.

Food costs represented the highest monthly expenditure of the study sample as a whole. This could be indicative of the fact that the sample is highly vulnerable to food insecurity as poor households are reported to spend a significantly larger proportion (70%) of their household income on food than those of a higher socio-economic status (Bhorat & Oosthuizen 2005). Over 80 % of the study sample spent the bulk of their money on food. This means that the sample is significantly more vulnerable to food price hikes as it is their major source of expenditure (Labadarios *et al* 2009; Bhorat & Oosthuizen 2005).

The current study showed that food insecure students spent on average nearly one week (6.6 days) without food. This finding was also echoed by a report given by the Council of Higher Education (2011) that reported how students at South African universities claimed to have spent days on end without food.

The main coping strategy reported by the sample when they ran out of food and/or money was to 'seek help from a friend'. Asking for money from family was the last resort when it came to

coping with food insecurity. This could be due to the fact that most, if not all, of the students on financial aid are from a low socio-economic background (Department of Higher Education and Training 2011; Peterson *et al* 2009). As a result, family members are not in a position to assist in an attempt to curb food insecurity. Letseka & Maile (2008) reported that some of the students receiving financial aid were from homes with parents earning less than R1600 per month. In fact, students that depended on family members for financial assistance were most vulnerable to food insecurity while seeking assistance from friends proved to be a more reliable buffer against food insecurity in the current study.

5.3 ASSESSMENT OF NUTRITIONAL STATUS

One in five (1 in 5) students were overweight and one in ten (1 in 10) were obese. Female participants showed a significantly higher prevalence of overweight and obesity than males. These results are similar to that reported by Ntuli (2005) among the students from DUT where one in five of females sampled were overweight and one in 10 females were overweight. Females have also shown a significantly higher prevalence of obesity in studies conducted by Cilliers *et al* (2005) among first year students at the University of Stellenbosch and Beukes *et al* (2009) among first year female students at the University of Free State. The above findings could be due to the fact that females tend to be less active and have a higher body fat content than males as well as that cultural norms favour an overweight /obese state among females (Venter *et al* 2009).

Food insecure students had higher BMI readings and the mean BMI of the severely food insecure sample fell within the overweight category (WHO 2000). The same phenomenon was reported by Gooding *et al* (2011) in a sample of food insecure young adult women. Wilde and Peterman (2006) also found that food insecure young adult females were more likely to be obese and gained more weight than their food secure counterparts. This trend has also been identified in children (Buscemi *et al* 2011). These findings show that food insecurity increases the risk of development of NCDs. In the current study however, the relationship was not statistically significant.

5.4 DIETARY DIVERSITY

A lack of dietary diversity was found amongst the study sample. The most frequently consumed foods included foods from the starch group (bread, jeje, maize-meal, rice, pasta and potatoes), fats (cooking oil, margarine and mayonnaise), tea and coffee, breakfast cereals, sweets and milk. These results are in line with the report given by the Department of Higher Education and Training (2011) stating that the most frequently consumed meal in university residences is stiff pap (porridge) and milk.

In the current study, as was with the case reported by Ntuli (2005), there was low consumption of vegetables, fruits and meat and a high intake of cereals and sweets. Meat was consumed 2-3 times a week whereas legumes, a more affordable source of protein, were seldom consumed. This finding could be due to that fact that meat is expensive. As a result it is possible that the study sample might not be consuming the daily recommended amount of protein. Although the frequency of consuming fruit was higher than that of vegetables, it was lower than the recommended guideline of 5 vegetables and fruit a day (see chapter 3, table 3.3 FBDG 4). As a result, one would expect the diets of study group to be low in micronutrients such as vitamin C, iron, folate, vitamin A, riboflavin, vitamin B6, zinc and magnesium (Ntuli 2005; Oldewage-Theron et al 2000; Badenhorst et al 1998).

5.5 NUTRITION KNOWLEDGE

The majority of the study sample had average nutrition knowledge (score between 50 - 69%). However, one in five students had poor nutrition knowledge (score between 1 – 49%). There was no statistically significant difference in nutrition knowledge between students in different academic years of study.

Students who fell in the obese BMI category had the highest nutrition test scores. This implies that in the current study sample nutrition knowledge did not have an impact on food choice. Nutrition knowledge was also reported to not have an impact on the food choices of a food insecure community of QwaQwa, as their intakes largely included high energy and foods of a low nutrient density (Oldewage-Theron et al 2000).

There were a few food groups where the consumption thereof showed a relationship with nutrition knowledge. In fact, the higher nutrition knowledge of the study sample, the higher the consumption of meat, processed meats, cakes, doughnuts and sweets, fizzy drinks and pizza, pies, samosas and take-away foods. Temple *et al* (2006) also found that nutrition knowledge was unrelated to whether adolescents chose nutrient dense foods or not. These results were also reproduced in grade five and six learners in a study conducted by Cleland *et al* (2004) and Samaki *et al* (2005) among Chinese students. All these samples understood the importance of ‘healthy’ food items to the body but chose to consume low nutrient containing foods. This could be related to the fact that foods high in energy and low in micronutrients are more affordable. As a result, affordability of foods may supersede nutrition knowledge and good nutrition practices.

5.6 FOOD SECURITY AND ACADEMIC PERFORMANCE

The portion of the study sample showing the highest food insecurity scores had lower CPI scores. However, in the current study sample this relationship was weak and statistically insignificant. It does however point towards a trend in the relationship between food security status and academic performance. Although food insecurity might not directly affect mental capacity, the experience of hunger may lead to fatigue and the feeling of hunger which impairs concentration (Dlamini 2012). Dlamini (2012) reported that most students approached the student funding center with claims of inability to concentrate due to hunger.

In this current study more than 90% of the sample reported the experience of hunger, especially near exam time. Dlamini (2012) reported that the Student Funding Center of UKZN receives the highest number of complaints of hunger during exam time as the students’ monetary allowance would have been exhausted in the previous month. Previously, the Student Counseling Center also had the highest numbers of students collecting food parcels during exam time (Dlamini 2012). These physiological effects (fatigue and inability to concentrate) of hunger due to food insecurity may hinder the progress of students in their studies, especially during exam time.

5.7 CONCLUSION

The long term overwhelming trend of hunger and food insecurity seen in both developed and developing countries seems to be spreading over into university campuses. Ninety-eight per cent (98%) of this sample had no form of employment; with more than half of the sample receiving no other form of income either than financial aid. Over a third of the sample was food insecure and a fifth was severely food insecure. A tenth of the sample often had no food of any kind to eat in their room, while a fifth sometimes went to bed hungry because of the lack of food. This is a significant problem as food insecurity is thought to result in a poor health status, psychological distress, reduced social interaction and an altered ability to learn and concentrate. The diets of this sample were monotonous and good nutrition knowledge did not seem to improve food choice. Food insecurity in the student population may not only be a threat because it may impair academic performance, but because it threatens the health status of students. Food insecure individuals tend to have higher BMIs, consume diets high in energy and low in micronutrients. This puts individual at risk of chronic diseases of lifestyle.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

In this chapter, conclusions and recommendations based on the study methods and results are discussed. The aim of this study was to investigate the prevalence of food insecurity among the recipients of financial aid in the student population of UKZN-PMB campus. It also aimed to establish whether there exists a relationship between food security status and other study variables such as nutritional status, dietary diversity and nutrition knowledge. In addition, it aimed to investigate whether there is a relationship between food security status and academic performance as per the CPI index used by UKZN to track academic performance over time.

6.2 CONCLUSIONS

There was a high prevalence of food insecurity among students on financial aid of the UKZN-PMB campus. The three most severe conditions of food insecurity (running out of food, going to bed hungry because there is no food and, going the whole day and night without food) were experienced by over 15% of the students. On average students reported to not have eaten for up to a week. However, an increase in monthly income was found to reduce the vulnerability to food insecurity significantly.

The sample spent most of their monthly budget on food. This is characteristic of a household of low socio-economic status. This places students at greater risk for becoming food insecure when price hikes occur in the food industry.

Students mainly relied on friends for assistance with food and money during episodes of severe food insecurity (transient/acute food insecurity) as they come from families that are not financially capable of providing them with food or money.

Food insecurity poses a threat to the health status of students as it promotes the consumption of inexpensive, high energy and low nutrient dense foods. As a result, food insecure individuals present with higher BMIs which is associated with the development of NCDs of lifestyle that include diabetes mellitus, hypertension, certain types of cancers and cardiovascular disease.

There was a lack of dietary diversity in the diets of this study sample. The three most frequently consumed foods were found to be starchy foods, fats and oils and tea and coffee. This places this group at risk of developing micronutrient deficiencies. Students dependent on financial aid are likely to have insufficient money for a nutritionally adequate diet. Budgeting and making good food choices, while important, would be insufficient to alleviate food insecurity among student populations as the insufficiency of funds may supersede these practices. The cost of nutrient dense food options may be expensive compared to their non-nutrient dense, high energy counterparts.

It would seem that there is no relationship between nutrition knowledge and food choice. It is therefore not surprising that although the nutrition knowledge of the study sample was average, it did not seem to have an impact on the frequency of consumption of healthier food choices such as fruits, vegetables and legumes.

Food insecurity and hunger impair concentration, a characteristic which is imperative during exam time. Should this be the case, food insecurity undermines the primary aim of higher education and government financial assistance namely to improve human capital and consequently improve the socio-economic status of the poor and disadvantaged.

6.3 RECOMMENDATIONS

- The first recommendation would be for a national investigation/review to be conducted on the amount of financial aid received by underprivileged students. However, an investigation of this nature will have to be preceded by research with convincing evidence that food insecurity has a negative impact on academic performance. Therefore, as part of a comprehensive intervention that seeks to promote academic performance and improved throughput in students from disadvantaged backgrounds, more research should be conducted to investigate this relationship on larger sample sizes.
- University residences at UKZN are self catering. It is therefore recommended that university residences provide subsidized meals for students at least twice a day to ensure that students receive adequate nutrition. The cost of these meals and the necessary staffing could be added to the residence fees on an annual basis.

- Food banks should be established at all university campuses. These are non-perishable food storehouses that could be established at campuses. These banks can be sponsored by voluntary food contributions from nearby businesses and non-governmental organisations (NGOs), the community and even students. This venture could be overseen by the student counselling centre (SCC), which will be responsible for the issuing of food to eligible students.
- Food gardens could be encouraged at university residences. They will serve as a buffer against severe food insecurity and add diversity to student diets. This venture could be made possible by a liaison between the Department of Agriculture, SCC and interested NGOs. The Department of Agriculture could be the main sponsor of seed and maintenance. Students could also be given the opportunity to work as garden assistants for a small monetary remuneration. Students who do not have food could visit the SCC (as it was done in the past at UKZN-PMB campus) where they could be recommended for receiving the produce.
- It is recommended that the orientation of first year students should include life skills such as budgeting and the acquisition of basic nutrition knowledge to facilitate healthier food purchases.
- It is also recommended that all private accommodation used by students is overseen by the university, to ensure that rent prices are kept reasonable for students. This could allow for increased amount of income to be used for food.

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APPENDIX A: QUESTIONNAIRE COMPLETED BY ALL PARTICIPANTS

Questionnaires to be completed for investigation of food security status and related factors of students on financial aid at the University of KwaZulu-Natal, Pietermaritzburg Campus

Participant code: _____

Dear participant

Kindly complete the following questionnaire as honestly as possible. There are no right or wrong answers. Please note that the results of this research project will not be, in any way, linked or traced back to you in person.

For field worker use:

WEIGHT	HEIGHT	Calculated BMI
1.	1.	
2.	2.	
3.	3.	
Mean:	Mean:	

Make a cross (x) in the appropriate box

1. Age (in years)

17-21	22-26	27-31	32-36	>37

2. Gender

Male	Female

3. Race

Black	White	Coloured	Indian	Other (please specify)

4. Where do you live?

Home	Residence (University)	Off-campus i.e. private accommodation	Other (please specify)

5. If you stay in a UKZN residence, would you prefer it if prepared meals were provided by the residence i.e. catering company?

Yes	No

6. Under which College are you currently studying?

Humanities	Agriculture, Engineering and Science	Law and Management Studies

7. What academic year are you in?

2nd	3rd	4th	Over 4th

8. a. Are you currently employed?

Yes	No

b. If yes, please indicate where you are employed _____
and position held _____

9. How much money do you spend on food per month? R _____

10. a. Do you receive an allowance in addition to financial aid?

Yes	No

b. If yes, please specify. I receive R _____ per month

11. Where do you purchase your food? (Please choose one)

Supermarket (e.g. Checkers)	Vendors	Cafeterias	Tuck shops	Other (please specify)

B. Food Frequency Questionnaire

How often do you eat the following food? (Put an "X" in the block)

Food	More than once/day	Once /day	2-3 times/week	Seldom	Never
Milk (fresh milk, maas, yogurt, cheese, powder milk e.g. Nespray, Klim)					
Other dairy products (e.g. cheese, yoghurt, ice-cream)					
Breakfast cereals/porridge					
Bread, rice, pasta, mealie rice, samp, phutu, pap, jeqe (steamed bread), potatoes					
Legumes(dried beans, peas, baked beans, lentils, soya mince)					
Meat, fish, poultry					
Processed meats (e.g. ham, polony) & organ meats					
Eggs					
Peanut butter, nuts					
Vegetables					
Fruit					
Fats (e.g. sunflower/cooking oil, margarine, mayonnaise)					
Sweets (e.g. cakes, doughnuts, candy, chocolate, biscuits)					
Salty snacks (e.g. potato chips, corn chips, pretzels)					
Fizzy drinks & cool drinks					
Alcohol (e.g. beer, wine)					
Coffee & tea					
Fast foods (e.g. pizza, pies, sausage rolls, samosas, KFC, Nandos, Chicken Licken)					

C. Individual Food Insecurity Access Scale

Please make a "X" in the box.

Question	No	Rarely	Sometimes	Often
1. In the past month, did you worry that you would not have enough food?				
2. In the past month, were you not able to eat the kinds of foods you preferred because of lack of resources?				
3. In the past month, did you have to eat a limited variety of foods due to lack of resources?				
4. In the past month, did you have to eat some foods that you really did not want to eat because of lack of resources to obtain other types of food?				
5. In the past month, did you have to eat a smaller meal than you felt you needed because there was not enough food?				
6. In the past month, did you have to eat fewer meals in a day because there was not enough food?				
7. In the past month, was there ever no food to eat of any kind in your room because of lack resources to get food?				
8. In the past month, did you go to sleep at night hungry because there was not enough food?				
9. In the past month, did you go a whole day and night without eating anything because there was not enough food?				

D. Nutrition Knowledge

THE FOLLOWING QUESTIONNAIRE CONTAINS TWO TYPES OF QUESTIONS, MULTIPLE CHOICE AND TRUE/ FALSE

a. Multiple choice: Draw a circle around the number which you think is correct

1. You should not have starches at most meals because

They are not important for your health	1
Even eating small amounts can cause weight gain	2
They cause diseases	3
None of the above	4

2. Which of the following is a low fat snack?

"Simba" Chips	1
Popcorn	2
Fried chips	3
"Niknaks"	4

3. The key to a healthy way of eating is to

Eat many different kinds of foods	1
Eat some foods more than other foods	2
Eat certain kinds of foods in moderate or small amounts	3
All of the above	4

4. Which foods contain a lot of calcium?

Chicken and eggs	1
Milk, yoghurt	2
Pilchards	3
2 and 3	4

5. The healthiest snack is:

A glass of milkshake	1
A tub of unbuttered popcorn	2
A slab of chocolate	3
2 and 3 above	4

6. Cooked meat/ fish/ chicken sold on the street may not always be safe to eat because

It may have been undercooked	1
The cook may not have used fresh meat	2
It may have been kept for a long time before being cooked	3
All of the above	4

7. How many fruits and vegetables should be eaten?

1 fruit and vegetable a day	1
3-4 fruits and vegetables a day	2
5 or more fruits and vegetables everyday	3
There is no need to eat fruits and vegetables daily	4

8. How much milk or maas should you have a day?

None	1
Half a cup	2
One cup	3
Two cups	4

9. A well- balanced diet

Consists mostly of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	1
Consists mostly of vegetables, and smaller amounts of meat and dairy products	2
Consists mostly of starches, vegetables and fruits, with smaller amounts of meat and dairy products	3
None of the above	4

10. Which one of the following groups of nutrients are found in large amounts in fruits and vegetables?

Fibre, Vitamin A	1
Starches, fat, Vitamin D	2
Fats, Iron, Calcium	3
None of the above	4

11. What is a portion of cooked vegetables?

1 Tablespoon	1
Half a cup	2
1 Cup	3
2 Cups	4

12. From which group of foods should you eat the most every day?

Bread, samp, rice, porridge	1
Apples, bananas, spinach, carrots	2
Milk, yogurt, cheese	3
Chicken, fish, beans, eggs	4

13. Which of the following choice of foods prevent certain diseases?

Fish, Chicken without skin, and lean meat	1
Beef sausage, bacon, and lean mince	2
Fried fish, fried chicken, and regular mince	3
All of the above	4

14. Which of the following breakfast menus contain little fat?

Whole-wheat toast with thinly spread margarine	1
Weet-Bix with 2% fat milk	2
Bacon and egg	3
1 and 2	4

15. To make sure that you stay healthy you should eat

Lean meat, fruits and vegetables, low fat dairy products, and breads and cereals	1
Fruit and vegetables only	2
Bread, cereals, fruit and vegetables only	3
Low fat dairy products and lean meat only	4

16. Which of the following foods are the lowest in fat?

Corn flakes and full cream milk	1
Grilled lean steak and boiled carrots	2
Pizza and milkshake	3
Fried lamb chops and creamed spinach	4

17. Which group of foods has the most Vitamin A?

Oats, whole wheat bread, rice	1
Carrots, spinach, sweet potatoes	2
Pies, cakes, pudding	3
None of the above	4

18. The reason why beans, peas and lentils are good for you is that

They contain only small amounts of fat	1
They contain a lot of fibre	2
They can protect you from some diseases	3
All of the above	4

b. Choose whether the following statement is true or false.

	STATEMENT	TRUE	FALSE
19	Sugar contains a lot of vitamins and minerals		
20	Eating a lot of different kinds of foods is healthier than eating only a few kind foods		
21	You can drink as much wine, beer, ciders as you want provided you have eaten first		
22	Your body only needs a little bit of salt to be healthy		
23	Soya mince is as healthy as meat		
24	Dry beans, peas, lentils are a healthy choice to eat in place of meat		
25	You should eat a lot of sugar to have enough energy		
26	You should add extra salt to your cooked food before you even eat it		
27	Drinking a lot wine, beer, cider can cause weight gain		
28	Sugar and foods that contain sugar should be eaten in small amounts		
29	You can eat as much meat as u want everyday		
30	Dry beans, peas, and lentils should be eaten often		
31	To protect yourself from disease you should avoid eating many different kinds of foods		
32	It is healthy to snack on foods that contain a lot of sugar		

THE END

THANK YOU FOR YOUR PARTICIPATION

APPENDIX B: CONSENT FORM COMPLETED BY ALL PARTICIPANTS

Consent to participate in a research study

Title of research project:

Food security status and related factors of students on financial aid at the University of KwaZulu- Natal, Pietermaritzburg Campus.

Principal investigator:

Nophiwe Job

Discipline of Dietetics and Human Nutrition

School of Agricultural, Earth and Environmental Sciences

University of KwaZulu-Natal

Pietermaritzburg

Contact details:

Phone: 033 260 6063 (during working hours)

Email: nophiwejob@yahoo.com

You are hereby invited to participate in the above study conducted by Job NA (207526109) from the Department of Dietetics and Human Nutrition. This study aims to investigate the food security status and related factors of recipients of the NSFAS (financial aid).

Why have you been invited to participate?

As you are a recipient of financial aid your input is appreciated in determining whether financial aid meets the requirements of students at UKZN.

What procedures will be involved in this research?

- Your weight and height, while wearing light indoor clothing, will be measured.
- You will be required to complete a four part questionnaire that is estimated to take up no more than 15 minutes of your time.

There are a few things we would like you to know:

- This project was approved by the relevant ethics committee at UKZN to assure that the research is acceptable (relevant reference will be quoted once ethics approval is obtained).
- Your opinion will be treated as private and confidential as the researcher will identify you with a code number only.
- Your participation is voluntary.
- The results of this study could be published for scientific purposes but will not reveal your name or include any identifiable reference to you.

If you have any questions or concerns regarding the research, please feel free to contact Prof F. Veldman on 033 2605597 or Suna Kassier on 033 2605431.

Declaration by participant

By signing below I (full name) _____ agree to take part in this study.
I understand that I can withdraw from the study at any time without any negative consequences.

I declare that I have read this information and consent form. I have had a chance to ask questions and all my questions have been adequately answered. I understand that participation in this study is voluntary and I have not been pressurised to take part.

Signature of participant

Signature of witness

Date

APPENDIX C: FOOD-BASED DIETARY GUIDELINES

FOOD-BASED DIETARY GUIDELINES FOR SOUTH AFRICA 2013

1. Enjoy a variety of foods
2. Be active
3. Make starchy foods part of most meals
4. Eat dry beans, split peas, lentils and soya regularly
5. Eat plenty of vegetables and fruit every day
6. Have milk, maas or yoghurt every day
7. Fish, chicken, lean meat and eggs can be eaten daily
8. Drink lots of clean, safe water
9. Use fats sparingly: choose vegetable oils rather than hard fats
10. Use foods and drinks containing sugar sparingly, and not between meals
11. Use salt and foods high in salt sparingly
12. If you drink alcohol, drink sensibly

APPENDIX D: LETTER OF ETHICAL APPROVAL FROM THE HUMANITIES AND SOCIAL SCIENCES ETHICS COMMITTEE, UNIVERSITY OF KWAZULU-NATAL



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16 May 2012

Ms N Job (207526109)
School of Agriculture, Earth and Environmental Sciences

Dear Ms Job

PROTOCOL REFERENCE NUMBER: HSS/0150/012M

PROJECT TITLE: Food security status and related factors of students on financial aid at the University of KwaZulu-Natal, Pietermaritzburg Campus

In response to your application dated 11 April 2012, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.
PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Professor Steven Collings (Chair)
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

cc. Professor F Veldman and Suna Kassier
cc. Ms Michelle Francis
cc. Ms Sibongile Ntuli

APPENDIX E: HOUSEHOLD FOOD INSECURITY ACCESS SCALE FOR MEASUREMENT OF FOOD ACCESS: INDICATOR GUIDE



Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide

VERSION 3

Jennifer Coates
Anne Swindale
Paula Bilinsky

August 2007

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In Version 3 of the guide, the HFIAS questions have been refined to address the recommendations of the Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations (FAO), which carried out HFIAS adaptation work in multiple countries under the EC/FAO Programme on Food Security to Information. We thank the Nutrition and Consumer Protection Division of FAO for its partnership with FANTA in work related to the HFIAS.

1. BACKGROUND

Food security is defined as a state in which “all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life” (USAID, 1992).ⁱ Because it is a complex, multidimensional concept, measuring food insecurity has been an ongoing challenge to researchers and practitioners alike. Until very recently, most household-level measures of food access, such as income and caloric adequacy, have been technically difficult, data-intensive, and costly to collect.

USAID Title II and Child Survival and Health Grant programs require relatively simple, but methodologically rigorous, indicators of the access component of household food insecurity (hereafter referred to as household food insecurity (access)) that can be used to guide, monitor and evaluate program interventions. Over the past several years, USAID’s Food and Nutrition Technical Assistance (FANTA) project has supported a series of research initiatives to explore and test different options for meeting this need.

This document is a guide for implementing one such option, the Household Food Insecurity Access Scale (HFIAS), which is an adaptation of the approach used to estimate the prevalence of food insecurity in the United States (U.S.) annually. The method is based on the idea that the experience of food insecurity (access) causes predictable reactions and responses that can be captured and quantified through a survey and summarized in a scale. Qualitative research with low-income households in the U.S. provided insight into the following ways that households experience food insecurity (access) (Radimer et al., 1990, Radimer et al., 1992, Wehler et al., 1992, Hamilton, 1997):

- Feelings of *uncertainty* or *anxiety* over food (situation, resources, or supply);
- Perceptions that food is of insufficient *quantity* (for adults and children);
- Perceptions that food is of insufficient *quality* (includes aspects of dietary diversity, nutritional adequacy, preference);
- Reported *reductions* of food intake (for adults and children);
- Reported *consequences* of reduced food intake (for adults and children); and
- Feelings of *shame* for resorting to socially unacceptable means to obtain food resources.ⁱⁱ

The eighteen-question U.S. Household Food Security Survey Module (US HFSSM) asks respondents to describe behaviors and attitudes that relate to these various aspects, also called ‘domains’, of the food insecurity experience (Hamilton et al., 1997). For example, a question relating to perceptions of insufficient *quantity* asks whether any adults had to eat less than they thought they should. The *uncertainty*-related questions include one about whether the respondent worried that the household’s food would run out. Responses to the US HFSSM are summarized in a scale to provide a continuous indicator of the degree of a household’s food insecurity. Cut-off points on the scale enable categorical classification of whether households are food secure or not. These data are used to monitor food assistance programs and to report on national prevalence of household food insecurity.

Recent field validation studies of this approach to measuring food insecurity (access) more directly, by constructing measures based on households’ experience of the problem, have demonstrated the feasibility and usefulness of the approach in very different, developing country

contexts (Webb et al., 2002, Coates et al., 2003, Frongillo and Nanama, 2003). The measures constructed were strongly correlated with common indicators of poverty and food consumption as well as with indicators currently used by Private Voluntary Organizations (PVOs) to monitor their food security-related activities. They were also sensitive to changes in the households' situation over time, making them valid and useful for assessing program impact. There are other studies where US HFSSM questions have been translated, with some adaptation, to developing country settings and found to be correlated with poverty and food consumption indicators (Melgar-Quinonez, 2004, Perez-Escamilla et al., 2004). Furthermore, based on a review of evidence from 22 different scale applications, a paper examining commonalities in the experience and expression of food insecurity (access) across cultures identified four domains and several sub-domains of food insecurity (access) that appear to be universal across different countries and cultures. The paper recommended that questions related to these domains be used as the basis of future food insecurity (access) scale measures (Coates, 2005).

Based on this growing body of evidence, FANTA and its partners have identified a set of questions (see Table 1, Household Food Insecurity Access Scale Generic Questions) that have been used in several countries and appear to distinguish the food secure from the insecure households across different cultural contexts.ⁱⁱⁱ These questions represent apparently universal domains^{iv} of the household food insecurity (access) experience and can be used to assign households and populations along a continuum of severity, from food secure to severely food insecure. The information generated by the HFIAS can be used to assess the prevalence of household food insecurity (access) (e.g., for geographic targeting) and to detect changes in the household food insecurity (access) situation of a population over time (e.g., for monitoring and evaluation). The questions can be added to a standard baseline and final evaluation survey. When using the scale to determine impact, it is important to follow the standard sampling methods commonly used in Title II evaluations. A detailed discussion of sampling can be found at: <http://www.fantaproject.org/publications/sampling.shtml>.

If assessing the change in the household food insecurity (access) situation between two or more years, it is important to administer the survey at the same time of year each time. The most appropriate time of year should be determined based on the intended use of the scale. When using the scale to determine impact of a food security program, it is preferable to administer the survey during or directly after the worst of the 'lean season', because the greatest number of households is likely to be affected by food insecurity (access) at this time. This height of the lean season, however, may not be best if the scale is being used for geographical targeting, because the program may not be able to differentiate among those who are severely food insecure during many months of the year and those who are food insecure only during the lean season. This may be important if the program is attempting to target areas with the greatest number of chronically food insecure households.

The intent of this guide is to provide a means for food security programs to easily measure the impact of their programs on the access component of household food insecurity. Understanding and measuring the impact of programming on the utilization component of food insecurity is equally important, but is better accomplished using other measurement tools, such as anthropometric indicators. One aspect of utilization is the question of nutritional quality. In the context of the HFIAS, food quality questions do not refer directly to nutritional quality. Rather

these questions attempt to capture the household's perception of changes to the quality of their diet regardless of the diet's objective nutritional composition (e.g., households may perceive that a change from rice to corn has caused a decline in the quality of their diet when the nutritional quality has not in fact changed significantly).

Efforts to measure food insecurity (access) have sometimes relied in part on an index of coping strategies. In earlier versions of the HFIAS, questions about a household's strategies to augment its resource base, such as taking a loan, were included in the scale along with questions about consumption-related coping strategies that ask about reductions or redistribution of food within the household, such as skipping meals or eating less preferred foods. Further research and discussion has led FANTA to conclude that the former type of coping strategies (to augment the household resource base) should be excluded from the HFIAS. The reasons for this decision are as follows:

- 1) In order to construct an accurate scale, all the questions in the scale must reflect a single statistical dimension (unidimensionality), even if the phenomenon (in our case, food insecurity (access)) is multidimensional. Statistical models, such as the Rasch model used to develop the US HFSSM, showed that the questions about strategies to augment the resource base represent a distinct statistical dimension of household food insecurity (access) from the dimension measured by the domains in the HFIAS.
- 2) Questions about strategies to augment the resource base are subject to household supply and access constraints – that is, not all coping strategies are accessible or available to all families (e.g., taking a loan is not an option for extremely food insecure households to whom even informal moneylenders will not lend). Responses to these questions are therefore misleading because a negative response does not necessarily indicate that the household is food secure. For example, a very food secure family who did not need a loan and a family who could not get a loan would both respond negatively to a question about getting a loan, even though the latter is much more food insecure than the former.
- 3) The types of resource augmentation coping strategies that households resort to and the level of severity they indicate vary widely across cultures and countries, making it very difficult to identify a universally relevant set of resource augmentation questions.

Resource augmentation coping strategies are important to consider, however, in gaining a more detailed picture of the experience of food insecurity (access) in any particular context. Households that resort to unsustainable coping strategies, such as selling productive assets or taking high interest loans, represent a crucial area of concern for those working with the most food insecure populations. These household strategies, along with behaviors such as migration or begging, indicate the nature of the household's vulnerability. An examination of common resource augmentation coping strategies and their impact on food insecure households should be part of any program's initial food security assessment. Such coping strategies may represent areas that are amenable to program focus in order to increase household resiliency and as such are important to monitor as households' food security status changes.

Earlier versions of this guide also included the following question relating to the psychological effects, like feelings of shame, that result from having to use socially unacceptable strategies to get food: “Did you or any household member have to do something that made you feel ashamed because there was not enough food?” Though a cross-cultural review of ethnographic research on the experience of access-constrained food insecurity had concluded that this domain is a relevant aspect of the experience in many cultures, few studies have tried to ask questions about “shame from socially unacceptable strategies” in a survey. Those that did ask such questions sometimes found that the shameful or socially unacceptable actions and feelings were very sensitive issues and that it was difficult to elicit an accurate response. FANTA concluded that not enough field-based success existed for a ‘generic’ question to be included in the HFIAS questionnaire, so the question has been dropped from this revised version of the HFIAS. Further work is needed in order to determine the feasibility, and most appropriate way, of including the shame/social unacceptability dimension in a standardized HFIAS.

The rest of the guide is presented as follows: Section 2. *Adapting the Questionnaire and Probing* lists the generic questions and describes a two-step process to adapt the model questionnaire; Section 3. *Interviewer Instructions* provides specific instructions to the interviewers; Section 4. presents the *Model Questionnaire*; and Section 5. *Indicator Tabulation Plan* describes how the questions can be tabulated to make indicators and provides recommendations for their use and interpretation.^v

Table 1: Household Food Insecurity Access Scale (HFIAS) Generic Questions

Each of the questions in the following table is asked with a recall period of four weeks (30 days). The respondent is first asked an occurrence question – that is, whether the condition in the question happened at all in the past four weeks (yes or no). If the respondent answers “yes” to an occurrence question, a frequency-of-occurrence question is asked to determine whether the condition happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four weeks.

Example:

1. In the past four weeks, did you worry that your household would not have enough food?

0 = No (skip to Q2)

1 = Yes

- 1.a. How often did this happen?

1 = Rarely (once or twice in the past four weeks)

2 = Sometimes (three to ten times in the past four weeks)

3 = Often (more than ten times in the past four weeks)

No.	Occurrence Questions
1.	In the past four weeks, did you worry that your household would not have enough food?
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
6.	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?

2. ADAPTING THE QUESTIONNAIRE

2.1. Overview of Questionnaire

The recommended questionnaire format for the HFIAS can be found in Section 4. The questionnaire consists of nine occurrence questions that represent a generally increasing level of severity of food insecurity (access), and nine “frequency-of-occurrence” questions that are asked as a follow-up to each occurrence question to determine how often the condition occurred. The frequency-of-occurrence question is skipped if the respondent reports that the condition described in the corresponding occurrence question was not experienced in the previous four weeks (30 days). Some of the nine occurrence questions inquire about the respondents’ *perceptions* of food vulnerability or stress (e.g., did you worry that your household would not have enough food?) and others ask about the respondents’ *behavioral responses* to insecurity (e.g., did you or any household member have to eat fewer meals in a day because there was not enough food?). The questions address the situation of all household members and do not distinguish adults from children or adolescents.^{vi} All of the occurrence questions ask whether the respondent or other household members either felt a certain way or performed a particular behavior over the previous four weeks.^{vii}

The HFIAS occurrence questions relate to three different domains of food insecurity (access) found to be common to the cultures examined in a cross-country literature review (FANTA 2004, Coates, 2004).^{viii} The generic occurrence questions, grouped by domain, are:

1) Anxiety and uncertainty about the household food supply:

- Did you worry that your household would not have enough food?

2) Insufficient Quality (includes variety and preferences of the type of food):

- Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
- Did you or any household member have to eat a limited variety of foods due to a lack of resources?
- Did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?

3) Insufficient food intake and its physical consequences:

- Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
- Did you or any household member have to eat fewer meals in a day because there was not enough food?
- Was there ever no food to eat of any kind in your household because of a lack of resources to get food?
- Did you or any household member go to sleep at night hungry because there was not enough food?

- Did you or any household member go a whole day and night without eating anything because there was not enough food?

The questionnaire should be asked in its entirety, however, the enumerator should follow the embedded skip rules to avoid asking frequency-of-occurrence questions when they are not applicable. Project staff should avoid picking and choosing only certain questions. Though users may want to report the results of individual questions alongside other indicators (see Section 5), research has shown that the complete set of questions does a better job of distinguishing the household food insecurity (access) level than any question on its own.

The questions in the model questionnaire are worded to be as universally relevant as possible. Certain questions contain *phrases*, however, that may need to be adapted to the local context to ensure that respondents know their meaning. Some questions require that the interviewer read a locally appropriate definition (e.g., of 'household') the first time these words are used in a question. Finally, certain questions may require that the interviewer provide locally relevant *examples* when the respondent requires further prompting.

In order to adapt the phrases, definitions, and examples to the local context and to ensure that questions are understood appropriately, they should be reviewed with a group of key informants and then refined with a small group of respondents before the pre-test. A detailed description of the process of discussing the questions with key informants is provided in Appendix 1. These two steps are described briefly below:

2.2. Step 1: Review with Key Informants

As a first step, gather a few key informants who are familiar with the conditions and experiences of household food insecurity (access) in the areas where the survey will be conducted. These key informants could be PVO staff members, government officials, academics, prominent community members, or other knowledgeable individuals. It should be explained to the key informants that they are being consulted to ensure that the food insecurity (access) questions are understandable in their country or culture. They should also be given the option to participate or not, and should be informed that they can choose to leave or refuse to answer a question at any time. Where possible, the key informants should be consulted as a group, so that any discrepancies in their suggestions can be clarified at the same time.

The person conducting the key informant interviews (the "Interviewer") should follow the Key Informant Interview Guide, presented in Appendix 1. The Interviewer should read each question to the key informant and then read the probes listed below that question. For instance, the Interviewer should read:

"Q1: Did you worry that your [household] would not have enough food?"

Then the Interviewer should read the following probe:

- We would like to add a culture-specific definition of “household.” For instance, in some cultures “household” might be defined as “people who live together and share food from a common pot.” Can you tell us how people here commonly describe a household?

The word or phrases that the key informants should focus on are written in bold in the Key Informant Interview Guide.

After the informant has the chance to respond, and once the Interviewer is satisfied that he or she has enough information to adapt the question appropriately, then the Interviewer should move on to each subsequent question in the Key Informant Interview Guide, using the same procedure. All of the discussions with the informants should be recorded by a note-taker.

At the conclusion of the key informant interviews, the key informants’ suggestions for adapting phrases and examples should be incorporated into the questionnaire. Included in the Key Informant Interview Guide in Appendix 1 are text boxes with examples of how each question might look after the information from key informants has been integrated. The final product of this step should be a draft questionnaire, with locally relevant phrases and examples where necessary, that can be tested with a group of respondents in Step 2.

2.3. Step 2: Refining the Questionnaire

The second step in preparing the questionnaire is to ensure that the questions are understood by respondents as they are intended. This step, which is very important in any survey context, enables further refinement of the questions and examples based on insights into how the questions are actually being interpreted.

Identify 8-10 individuals that are representative of the survey population (but who are not part of the survey sample). As with the key informants, these individuals should also be informed of the option to participate or not, and should be informed that they can choose to leave or refuse to answer a question at any time.

For this step, the discussions are best done with one respondent at a time. First, the Interviewer should read the question, including any suggested rephrasing or examples incorporated after the key informant session. After the respondent has a chance to provide a response, the Interviewer should begin to explore the respondent’s own understanding of the question and its meaning. Tips for doing so are included in Table 2. A note-taker should record these discussions. Once all of the respondents have provided their input, the notes from all of these discussions should be pooled and examined. Based on respondent feedback, particular phrases, definitions, words, or examples that were unclear should be reworded accordingly. Remember, the goal is to retain the original meaning of the question while making the meaning clearer to respondents where necessary. The final product of this step should be an improved draft questionnaire that is ready to be pre-tested in the field.

Table 2: Example Probes for Use in Refining Questions with Respondents

Comprehension/ interpretation probes	<ul style="list-style-type: none">• When I asked you about..., what were you thinking about?• Can you tell me in your own words what this question means?• In thinking about..., what comes to mind? <p>Examples:</p> <ul style="list-style-type: none">• What does the phrase "eat a limited variety of foods" mean to you?• In your own words, can you tell me what "not enough food" means?
Paraphrase	<ul style="list-style-type: none">• Can you repeat the question in your own words?
Recall probe	<ul style="list-style-type: none">• How did you remember? For example, how did you remember that another household member went to sleep at night hungry because there was not enough food?
Specific probe	<ul style="list-style-type: none">• Why do you think that? For example, why do you consider those foods as ones you really did not want to eat?
General probes	<ul style="list-style-type: none">• How did you arrive at that answer?• How hard was that to answer?• I noticed that you hesitated before you answered -- what were you thinking about?

Adapted from Frongillo et al., 2004

3. INTERVIEWER INSTRUCTIONS

3.1. Organization of the HFIAS Questionnaire

The HFIAS consists of two types of related questions. The first question type is called an occurrence question. There are nine occurrence questions that ask whether a specific condition associated with the experience of food insecurity *ever* occurred during the previous four weeks (30 days). Each severity question is followed by a frequency-of-occurrence question, which asks *how often* a reported condition occurred during the previous four weeks.

Each occurrence question consists of the stem (timeframe for recall), the body of the question (refers to a specific behavior or attitude), and two response options (0 = no, 1 = yes). There is also a 'skip code' next to each "no" response option. This code instructs the enumerator to skip the related frequency-of-occurrence follow-up question whenever the respondent answers "no" to an occurrence question.

Each HFIAS frequency-of-occurrence question asks the respondent how often the condition reported in the previous occurrence question happened in the previous four weeks. There are three response options representing a range of frequencies (1 = rarely, 2 = sometimes, 3 = often). Table 3 illustrates these different question components and can be referred to in using these instructions.

Table 3: Structure of Questions

	Occurrence Question
Body	In the past four weeks, did you worry that your household would not have enough food?
Response Options	0=No (Skip to ...) 1=Yes
	Frequency-of-occurrence Question
Body	How often did this happen?
Response Options	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)

3.2. Asking Questions and Recording Answers

The questions should be directed to the person in the household who is most involved with the food preparation and meals.^{ix} Most of the questions require the respondent to answer on behalf of the household and all its members.

There are two terms used throughout the questionnaire that are highly context specific: “household” and “lack of resources.” Context-specific definitions for these terms should have been developed during the questionnaire adaptation phase and added to the questionnaire. The definitions for these terms should be read by the interviewer the first time they are used in a question. These definitions and the questions themselves should be read just as they are written on the questionnaire.

Below is an example of an occurrence question with an interviewer-provided definition. The entire thing should be read by the enumerator:

Q1: In the past four weeks, did you worry that your household would not have enough food?

By “household” we mean those of you that sleep under the same roof and take meals together at least four days a week.

If the respondent does not understand the question, then the interviewer may prompt the respondent by reading any examples or contextual clarifications that were discussed during training. These interviewer-provided examples are written in *italics* below the question itself. For example, a question with an interviewer-provided example might appear as follows:

Q4: In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources?

Interviewer-provided example: “A food you really did not want to eat” might include wheat porridge, wild taro root, etc.

Although there are pre-coded response options, the interviewer should not read these options aloud each time but rather allow the respondent to answer in his or her own words. The interviewer will select the most appropriate response option based on the respondent’s reply. For instance if, after asking an occurrence question, the respondent says “no” but adds that it only happened a few times, then the correct code is ‘1’ (yes). The frequency-of-occurrence question should then be asked. If the respondent describes a frequency that would translate to “three to ten times” in the past four weeks, the correct response selection for the frequency-of-occurrence question is “sometimes”, and the correct code is ‘2’. If the respondent has difficulty replying then the interviewer can encourage a response by listing the set of options again. The box below illustrates the example described, above. :

No	Question	Response Options	Code
Q7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food? <i>Respondent Answer: No. Well, just a few times.</i>	0 = No (skip to Q.8) 1 = Yes	1
Q.7.a.	How often did this happen in the past four weeks? <i>Respondent Answer: four times</i>	1=Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)	2

After completing the questionnaire and before leaving the household, interviewers should check over the questionnaires to ensure that all questions have been asked and that the responses are complete and legible. They may wish to write notes in the margins next to any unusual responses or stories that emerged in relation to a particular question. Such notes can help later on in interpreting the data from the entire sample. The administration of the questionnaire requires approximately 15 minutes per household.

3.3. Instructions for Individual Questions

Q1: Worry about food

This question asks the respondent to report their personal experience with uncertainty and anxiety about acquiring food during the previous month. The interviewer should also read the definition of a “household” that was developed during the preparation of the questionnaire. Mention that this definition of household applies to all the questions with that term.

Q2: Unable to eat preferred foods

One domain of food insecurity (access) is having limited choices in the type of food that a household eats. This question asks whether any household member was not able to eat according to their preference due to a lack of resources. Preference can refer to the form of a particular food (i.e., whole rice vs. broken rice), type of staple (i.e., millet vs. corn) or a high quality food (i.e., a piece of meat or fish). Preferred foods may or may not be nutritionally high quality. The interviewer should also read the definition of a “lack of resources.” Mention that this definition of household applies to all the questions with that term. The respondent needs to answer on behalf of all household members

Q3: Eat just a few kinds of foods

This question asks about dietary choices related to variety – i.e., whether the household had to eat an undesired monotonous diet (little diversity in the different types of foods consumed). The

interviewer should read the description of what a monotonous diet might be. The respondent needs to answer on behalf of all household members.

Q4: Eat foods they really do not want eat

This question, which also captures the dimension of limited choices, asks whether any household member had to eat food that they found socially or personally undesirable due to a lack of resources. Often these are foods or food preparations that are consumed only under hardship. Different people may consider different foods to be undesirable, so it is best not to provide examples here at first. The respondent needs to answer on behalf of all household members, according to his or her own perception of the types of food household members ate during the previous four weeks. If more encouragement is required, the interviewer may give some examples using any examples included in the questionnaire and reviewed during training. For all questions, it is important to remind respondents that the examples are not an exhaustive list.

Q5: Eat a smaller meal

This question asks whether the respondent felt that the amount of food (any kind of food, not just the staple food) that any household member ate in any meal during the past four weeks was smaller than they felt they needed due to a lack of resources. The respondent should answer according to his or her perception of what constitutes enough food for the needs of the household members. The respondent needs to answer on behalf of all household members.

Q6: Eat fewer meals in a day

This question asks whether any household member, due to lack of food, had to eat fewer meals than the number typically eaten in the food secure households in their area. The respondent needs to answer on behalf of all household members.

Q7: No food of any kind in the household

This question asks about a situation in which the household has no food to eat of any kind in the home. This describes a situation where food was not available to household members through the households' usual means (e.g., through purchase, from the garden or field, from storage, etc.).

Q8: Go to sleep hungry

This question asks whether the respondent felt hungry at bedtime because of lack of food or whether the respondent was aware of other household members who were hungry at bedtime because of lack of food. The respondent needs to answer on behalf of all household members.

Q9: Go a whole day and night without eating

This question asks whether any household member did not eat from the time they awoke in the morning to the time they awoke the next morning due to lack of food. The respondent needs to answer on behalf of all household members.

4. QUESTIONNAIRE FORMAT

Table 4: Household Food Insecurity Access Scale (HFIAS) Measurement Tool

No	QUESTION	RESPONSE OPTIONS	CODE
1.	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes __
1.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) __
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q3) 1=Yes __
2.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) __
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes __
3.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) __
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to	0 = No (skip to Q5) 1 = Yes __

	obtain other types of food?		
4.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) ___
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q6) 1 = Yes ___
5.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) ___
6.	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes ___
6.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) ___
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes ___
7.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) ___

8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes __
8.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) __
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No (questionnaire is finished) 1 = Yes __
9.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) __

5. INDICATOR TABULATION PLAN

This section provides guidance on analyzing the data to create HFIAS indicators. It assumes that these questions will be part of a population-based survey instrument and will be applied to all the households in the sample.

The HFIAS module yields information on food insecurity (access) at the household level. Four types of indicators can be calculated to help understand the characteristics of and changes in household food insecurity (access) in the surveyed population. These indicators provide summary information on:

- Household Food Insecurity Access-related *Conditions*
- Household Food Insecurity Access-related *Domains*
- Household Food Insecurity Access *Scale Score*
- Household Food Insecurity Access *Prevalence*

The responses from the household food insecurity (access) measure should be entered into a database, spreadsheet, or statistical software like EpiInfo or SPSS. Computer tabulation is recommended for these indicators, though if necessary the data may also be tabulated by hand.

5.1 Household Food Insecurity Access-related Conditions

These indicators provide specific, disaggregated information about the behaviors and perceptions of the surveyed households. For example, if a program is providing assistance in growing staple crops and improved storage facilities, it might be useful to understand what percent of households had run out of food. The indicators present the percent of households that responded affirmatively to each question, regardless of the frequency of the experience. Thus they measure the percent of households experiencing the condition at any level of severity. Each indicator can be further disaggregated to examine the frequency of experience of the condition across the surveyed households.

<p>Household Food Insecurity Access-related Conditions</p> <p>Households experiencing condition at any time during the recall period.</p>	<p>Percent of households that responded, “yes” to a specific occurrence question. For example: “Percent of households that ran out of food.”</p> <p>Example:</p> $\frac{\text{Number of households with response = 1 to Q7}}{\text{Total number of households responding to Q7}} \times 100$
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Households experiencing condition at a given frequency	<p>Percent of households that responded “often” to a specific frequency-of-occurrence question. For example: “Percent of households that ran out of food often.”</p> <p>Example:</p> $\frac{\text{Number of households with response = 3 to Q7a}}{\text{Total number of households responding to Q7}} \times 100$
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5.2 Household Food Insecurity Access-related Domains

These indicators provide summary information on the prevalence of households experiencing one or more behaviors in each of the three domains reflected in the HFIAS - Anxiety and uncertainty, Insufficient Quality, and Insufficient food intake and its physical consequences.

<p>Household Food Insecurity Access-related Domains</p> <p>Households experiencing any of the conditions at any level of severity in each domain</p>	<p>Percent of households that responded “yes” to any of the conditions in a specific domain. For example: “Percent of households with insufficient food quality.”</p> <p>Example:</p> $\frac{\text{Number of households with response = 1 to Q2 OR 1 to Q3 OR 1 to Q4}}{\text{Total number of households responding to Q2 OR Q3 OR Q4}} \times 100$
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5.3 Household Food Insecurity Access Scale Score

The HFIAS score is a continuous measure of the degree of food insecurity (access) in the household in the past four weeks (30 days). First, a HFIAS score *variable* is calculated for each household by summing the codes for each frequency-of-occurrence question. Before summing the frequency-of-occurrence codes, the data analyst should code frequency-of-occurrence as 0 for all cases where the answer to the corresponding occurrence question was “no” (i.e., if Q1=0 then Q1a=0, if Q2=0 then Q2a =0, etc.). The maximum score for a household is 27 (the household response to all nine frequency-of-occurrence questions was “often”, coded with response code of 3); the minimum score is 0 (the household responded “no” to all occurrence questions, frequency-of-occurrence questions were skipped by the interviewer, and subsequently coded as 0 by the data analyst.) The higher the score, the more food insecurity (access) the household experienced. The lower the score, the less food insecurity (access) a household experienced.^x

HFIAS Score (0-27)	Sum of the frequency-of-occurrence during the past four weeks for the 9 food insecurity-related conditions Sum frequency-of-occurrence question response code (Q1a + Q2a + Q3a + Q4a + Q5a + Q6a + Q7a + Q8a + Q9a)
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Next, the *indicator*, average Household Food Insecurity Access Scale Score, is calculated using the household scores calculated above.

Average HFIAS Score	Calculate the average of the Household Food Insecurity Access Scale Scores ^{xi} $\frac{\text{Sum of HFIAS Scores in the sample}}{\text{Number of HFIAS Scores (i.e., households) in the sample}}$
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5.4 Household Food Insecurity Access Prevalence

The final indicator is a categorical indicator of Food Insecurity Status.^{xiii} The Household Food Insecurity Access Prevalence (HFIAP) Status indicator can be used to report household food insecurity (access) prevalence and make geographic targeting decisions. The change in HFIAP can also be tabulated. For instance, if 60 percent of households are severely food insecure (access) at baseline and only 30 percent are severely food insecure (access) at the end of the program, the prevalence of household food insecurity (access) would have decreased by 30 percentage points (or by 50 percent). Because the average HFIAS score is a continuous variable, it is more sensitive to capturing smaller increments of changes over time than the HFIAP indicator. Therefore, the HFIAP indicator should be reported in addition to, rather than instead of, the average HFIAS Score for program monitoring and evaluation.





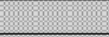

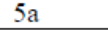


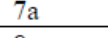


The HFIAP indicator categorizes households into four levels of household food insecurity (access): food secure, and mild, moderately and severely food insecure. Households are categorized as increasingly food insecure as they respond affirmatively to more severe conditions and/or experience those conditions more frequently.

A food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. A mildly food insecure (access) household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. But it does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating). A moderately food insecure household sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the

size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions. A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure.

Table 4 below illustrates this categorization. The categorization scheme is designed to ensure that a household's set of responses will place them in a single, unique category.

Table 4. Categories of food insecurity (access)

Question	Frequency		
	Rarely 1	Sometimes 2	Often 3
1a			
2a			
3a			
4a			
5a			
6a			
7a			
8a			
9a			



- food secure



- moderately food insecure



- mildly food insecure



- severely food insecure

First, a HFIA category *variable* is calculated for each household by assigning a code for the food insecurity (access) category in which it falls. The data analyst should have coded frequency-of-occurrence as 0 for all cases where the answer to the corresponding occurrence question was “no” (i.e., if Q1=0 then Q1a=0, if Q2=0 then Q2a=0, etc.) prior to assigning the food insecurity (access) category codes. The four food security categories should be created sequentially, in the same order as shown below, to ensure that households are classified according to their most severe response.

HFIA category	<p>Calculate the Household Food Insecurity Access category for each household. 1 = Food Secure, 2=Mildly Food Insecure Access, 3=Moderately Food Insecure Access, 4=Severely Food Insecure Access</p> <p>HFIA category = 1 if [(Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]</p> <p>HFIA category = 2 if [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1) and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0]</p> <p>HFIA category = 3 if [(Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0]</p> <p>HFIA category = 4 if [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3]</p>
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Next, the **prevalence** of different levels of household food insecurity (access) is calculated.

HFIA Prevalence	<p>Percentage of households that fall in each food insecurity (access) category. For example: “Percentage of severely food insecure (access) households.”</p> <p>Example:</p> $\frac{\text{Number of households with HFIA category =4}}{\text{Total number of households with a HFIA category}} \times 100$ <p>For example: “Percentage of severely food insecure (access) households”</p> $\frac{\text{Number of households with HFIA category =4}}{\text{Total number of households with a HFIA category}} \times 100$
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	Total number of households with a HFIA category
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The HFIS indicators presented in the tabulation plan above are useful for reporting food insecurity (access) prevalence, for making population level targeting decisions, and for examining the impact of program activities on overall food insecurity (access) or some dimension of it. The indicators are not intended, however, to be used to determine the causes of a problem or to guide a response—e.g., assessments of nutrition knowledge in order to design a behavior change intervention. Though the information generated from the application of the HFIAS can be used for geographical or population-based targeting, it is important to use caution if targeting resources at an individual or household level (i.e., as a program eligibility criterion) since administering subjective questions to a household in order to determine whether that particular household will receive a benefit can easily create respondent bias.

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APPENDIX 1: KEY INFORMANT INTERVIEW GUIDE

The Key Informant Interview Guide describes the type of discussion that is required in order to develop words/phrases, examples, and definitions that are adapted to the local context so that questions are understandable to survey respondents. Each question below, along with the probes beneath it, should be reviewed with a group of key informants. For each question, the words or words that should be tested with the key informants are bolded in brackets. Based on information from the key informants, modifications may be made to the questionnaire. Modifications may either be “phrases” (where the context-specific words are added directly in the body of the question), “definitions” (to be added directly after the question the first time a term, like “household”, is used), and “examples” (to be added in italics after the question). The instruction following each question and set of probes below specifies whether the modification should be done as a phrase, definition, or example.

Q1: Did you worry that your [household] would not have enough food?

Probes:

- We would like to add an interviewer definition to clarify the way that a “household” is described in this culture.
- For instance, in some cultures “household” might be defined as “people who live together and share food from a common pot”
- Can you tell us how people here would commonly describe a household?
- Based on the responses to the probes, an interviewer-provided definition is then added to the questionnaire.

Example Adapted Question (Q1):

Did you worry that your household would not have enough food?

By “household” we mean those of you that sleep under the same roof and take meals together at least four days a week.

Q2: Were you or any household member not able to eat the [kinds of foods you preferred] because of a [lack of resources]?

Probes:

- This question asks about one aspect of sufficient diet quality, which is having control over the kinds of foods that one eats.
- By “kinds of foods you preferred” we mean foods that food secure people eat that food insecure people cannot afford to eat.
- We would like to add interviewer-provided examples of different kinds of foods that are considered “preferred foods” in this culture.
- What are some examples of foods that food secure people eat that food insecure people cannot afford to eat?
- This question asks whether the preferred foods were inaccessible due to a “lack of resources.”
- By “lack of resources” we mean not having money or the ability to grow or trade for the food.
- How do people here usually talk about a “lack of resources”?

Based on the responses to the probes, an interviewer-provided definition for “lack of resources”, and an interviewer example for “kinds of foods you preferred”, should be added to the questionnaire.

Example Adapted Question (Q2)

How often were you or any of your household members not able to eat the kinds of foods you preferred because of a lack of resources?

Whenever we say “lack of resources”, we mean not having the means to get food, either through growing it, purchasing it, or trading for it.

Interviewer-provided example 1:

“Preferred foods” might include big fish, sweets, cake, etc.

Interviewer-provided example 2:

“Preferred foods” might include fruits bought from the market, eggs, meat etc.

Interviewer -provided example 3:

“Preferred foods” might include whole rice rather than broken rice.

Q3: Did you or any household member have to eat [a limited variety of foods] due to a lack of resources?

Probes:

- When we say “a limited variety of foods”, we want to mean an undesired monotonous diet for an extended period of days.
- We would like to add interviewer-provided examples of what an undesirable monotonous diet might be.
- What types of foods are included in a diverse diet in this culture?

Based on the responses to the probes, context specific examples of “just a few kinds of foods” should be added to the questionnaire.

Example Adapted Question (Q3)

Did you or any household member eat a limited variety of foods due to a lack of resources?

Interviewer -provided example 1:

“A limited variety of foods” might be tortilla and salt.

Interviewer -provided example 2:

“A limited variety of foods” might be rice and beans only.

Q4: Did you or any household member have to eat some foods [that you really did not want to eat] because of a lack of resources to obtain other types of food?

Probes:

- We would like to know whether the household had to eat food that it considered to be undesirable or socially unacceptable.
- We would like to add an interviewer-provided examples of different kinds of foods that poor, food insecure people may eat that are considered undesirable in this culture.
- Are there examples of such foods that could apply here?

Based on the responses to the probes, context specific examples of a “foods that you really did not want to eat” should be added to the questionnaire.

Example Adapted Question (Q4)

Did you or other members of your household have to eat some foods that you really did not want to eat because you lacked resources to obtain other types of food?

Interviewer-provided example 1:

"A food you really did not want to eat" might include wheat porridge, wild taro root, etc.

Interviewer -provided example 2:

"A food you really did not want to eat" might include broken rice, wild grasses, discarded food, etc.

Q5: Did you or any other household member have to eat a smaller [meal] than you felt you needed because there was not enough food?

Probes:

- This question asks about having to eat less in a meal than the respondent thinks they should.
- The term "meal" is understood differently in different cultures. By "meal" we mean the major eating occasions (not including snacks).
- We would like to make sure that the word "meal" is understood this same way.
- How are can we express this same concept of "meal" in this language and culture?

Based on the responses to the probes, a context specific word or phrase meaning "meal" should be added to the body of the question in the questionnaire.

Example Adapted Question (Q5)

Did you or any household member eat less in either the morning or evening meal than you felt you needed because there was not enough food?

Q6: Did you or any household member have to eat [fewer meals in a day] because there was not enough food?

Probes:

- This question asks about eating “fewer meals in a day” than the social norm.
- We would like to make sure that the phrase “fewer meals in a day” is understood relative to the local norm, which you can help us define.
- How many meals a day do food secure people in this population usually eat during this time of year?
- Was there any period of time during the last four weeks (30 days) when the number of meals per day varied from the norm?

Based on the responses to the probes, a context specific phrase with the number of meals that food secure people usually eat should be added to the body of the question in the questionnaire.

Example Adapted Question (Q6)

Did you or any household member have to eat fewer than three meals in a day because there was not enough food?

Q7: Was there ever no food to eat of any kind in your household because of lack of resources to get food?

Probes:

- We would like to add a phrase here that clarifies the meaning of “no food to eat”
- By “no food to eat” we mean that the food was not available in the household and could not be accessed by the household’s usual means (e.g. through purchase, from the garden or field, from storage, etc.).
- What are the terms that best describe the concept of not having food on hand and not being able to access food through the usual channels?

Based on the responses to the probes, a context specific phrase meaning “no food to eat” should be added to the body of the question in the questionnaire.

Example Adapted Question (Q7)

Example 1: Did your household ever have no food on hand and there was no way of getting more?

Example 2: Were your household food stores ever completely empty and there was no way of getting more?

Q8: Did you or any household member go to sleep at night hungry because there was not enough food?

Probe:

- We think this question may not require any adaptation. Do you agree?
-

Q9: Did you or any household member go a whole day and night without eating anything because there was not enough food?

Probe:

- We think this question may not require any adaptation. Do you agree?
-

ENDNOTES

ⁱ Three distinct variables are essential to the attainment of food security: 1) Food Availability: sufficient quantities of appropriate, necessary types of food from domestic production, commercial imports or donors other than USAID are consistently available to the individuals or are within reasonable proximity to them or are within their reach; 2) Food Access: individuals have adequate incomes or other resources to purchase or barter to obtain levels of appropriate food needed to maintain consumption of an adequate diet/nutrition level; and 3) Food Utilization: food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition and child care techniques exist and is applied, and adequate health and sanitation services exist (USAID Policy Determination, Definition of Food Security, April 13, 1992).

ⁱⁱ Questions relating to coping strategies to augment the household resource base were tested, but not incorporated into the US Household Food Security Survey. These items did not fit the statistical model of food insecurity when tested alongside items representing another dimension of the problem (Hamilton et al., 1997).

ⁱⁱⁱ In April 2004, FANTA held a two-day workshop bringing together USAID staff, researchers and Title II and Child Survival and Health Grant representatives to discuss the development of a scale to measure the severity of household food insecurity (access). This workshop was instrumental in the development of the original set of questions. The workshop report is found at www.fantaproject.org.

^{iv} Domains are defined as the most core experiences of food insecurity that are common across countries and cultures (Coates, et al., 2005).

^v This guide represents a set of “best practices” based on current research. However, researchers continue to investigate the best form and function of HFIAS. There is a need for further testing based on use of the same set of questions across multiple field sites. Field validation will provide data to test the unidimensionality and universality of the scale empirically.

^{vi} The U.S. Household Food Security Survey Module (US HFSSM) and some household food insecurity (access) scales created for other countries included sets of questions addressing the conditions of adults and children separately. Because adults tend to “buffer” children from the effects of food insecurity, evidence of child deprivation often reflects a very severe manifestation of household food insecurity (access). However, because child-referenced questions are not applicable to the entire population, the U.S. HFSSM relies on a statistical method of equating the responses of households with and without children. Due to the uncertain validity of this statistical approach (see Wilde, 2004) and the inability to draw conclusions about individual child hunger from a household measure, US officials are working to develop a separate child food insecurity scale. The set of model questions presented in this guide avoids these issues by asking about all household members- with the understanding that the HFIAS’s ability to discriminate between degrees of household food insecurity (access) at the most severe levels may be slightly compromised.

^{vii} Applications of food insecurity scales have generally used either 12-month, 6 month, or 30 day recall periods (Coates, 2004). The choice of recall period should be based on the following considerations 1) the degree to which household food insecurity is likely to fluctuate over time, 2) the intended application of the data, and 3) the ability of the respondent to accurately remember behaviors and attitudes. The 30-day recall period is recommended here based on the following considerations arising from experience in several contexts. This HFIAS is expected to be used both in contexts with rapidly changing situations, where the primary interest is in detecting acute/ transitory insecurity, as well as in relatively stable situations, where the problem is one of chronic food insecurity. The shorter recall period can be used for either type of situation and is more likely to elicit accurate and reliable responses.

^{viii} These dimensions differ slightly from the ones that form the basis of the U.S. Household Food Security Survey Module. Based on a cross-country literature review (Coates, 2004), participants at the FANTA workshop agreed that this list was more comprehensive, and better-represented commonalities of the food insecurity (access) experience in different cultures.

^{ix} Tufts University researchers are analyzing the responses of males and females in the same household to determine the implications of relying solely on one or the other gender as the respondent. Meanwhile, since interviewing several members in each household is usually not cost-effective, the person in charge of food preparation appears to be a reasonable alternative.

^x If the average HFIAS score at a project baseline was '4', what does that average HFIAS score mean in and of itself? Is a household with a score of '4' food secure or not? It turns out that this is not an easy question to answer, since the HFIS is designed to provide a continuous, rather than a categorical, indicator of food insecurity (access) that captures relative shifts in the situation over time. Instructions for calculating a categorical indicator of food insecurity (access) are provided in Section 5.

^{xi} The US HFSS uses a statistical model called the "Rasch Model" to create a food insecurity (access) scale in which intervals are equal (e.g. a score of 4 is twice as food insecure as a score of 2). The additive approach described here is much simpler, but as a result one cannot assume that the intervals between 0-27 on the HFIS are *necessarily* equivalent, (i.e. that an increase in the score from 25 to 27 means the same thing as an increase from 18 to 20). For instance, it is not recommended that an average increase from 12 to 24 be reported as a "doubling of food insecurity", but rather as a "doubling of the food insecurity score." The difference between using an additive scale versus an interval scale may not be large, and additive scales are quite commonly used in research and operational applications despite this technical limitation

^{xii} To date, there is no universally accepted approach to setting these cut-off points. One approach suggested in this section. It is based on a number of assumptions. FANTA will work with academicians and program managers to analyze HFIAS data collected by a range of users to test the universality of the suggested approach empirically.