COMPARISON OF INDICATORS OF HOUSEHOLD FOOD INSECURITY USING DATA FROM THE 1999 NATIONAL FOOD CONSUMPTION SURVEY

DISSERTATION SUBMITTED BY

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ABSTRACT

Information on the present situation of household food insecurity in South Africa is fragmented. There is no comprehensive study comparing different indicators of household food security. Better information on the household food security situation in South Africa would permit relevant policy formulation and better decision-making on the allocation of limited resources. The availability of a national dataset, the first South African National Food Consumption Survey data (1999), provided the opportunity to investigate some of the issues raised above, and to contribute to knowledge on the measurement of household food security.

The aim of this study was to use the data from the 1999 National Food Consumption Survey (NFCS) to:

- Determine and compare the prevalence of household food insecurity using different indicators of household food security;
- Determine the overlap of households identified as food insecure by the different indicators (i.e. how many of the same households are identified as food insecure); and to
- Investigate whether there was any correlation between the indicators selected.

The indicators of household food security selected were: household income, household hunger experienced, and using the index child: energy and vitamin A intake (from 24 Hour Recall (24HR) and Quantified Food Frequency data), dietary diversity (from 24HR data) and anthropometric indicators stunting and underweight. The cut offs to determine food insecure household were those used in the NFCS and the cut off for dietary diversity was exploratory.

The main results of the study were as follows:

- The prevalence estimates of household food insecurity ranged from 10% (underweight indicator) to 70% (low income indicator). Rural areas consistently had a higher prevalence of household food insecurity than urban areas. The Free State and Northern Cape provinces had higher levels of household food insecurity, with the Western Cape and Gauteng the lower levels of household food insecurity.

- Quantified Food Frequency (QFF) data yielded lower prevalence of household food insecurity estimates than 24 hour recall (24HR) data. Household food insecurity as determined by low vitamin A intakes was higher than that determined by low energy intakes for both the 24HR and QFF data.
- There was little overlap with the indicators (9-52%), indicating that the same households were not being identified by the different indicators. Low dietary diversity, low income, 24HR low vitamin A intake and hunger had higher overlaps with the other indicators. Only 12 of 2826 households (0.4%) were classified by all nine indicators as food insecure.
- The dataset revealed a number of statistically significant correlations. Overall, low dietary diversity, low income, 24HR low energy intake and hunger had the stronger correlations with the other indicators.

Food security is a complex, multi-dimensional concept, and from the findings of this study there was clearly no single best indicator of household food insecurity status. Overall, the five better performing indicators (higher overlaps and correlations) were: low income, 24 hour recall low energy intake, 24 hour recall low vitamin A intake, low dietary diversity and hunger; this merits their use over the other selected indicators in this study. The indicator selected should be appropriate for the purpose it is being used for, e.g. estimating prevalence of food insecurity versus monitoring the long term impact of an intervention. There are other important criteria in the selection of an indicator. Income data on a national scale has the advantage of being available annually in South Africa, and this saves time and money. The 24HR vitamin A intake and 24HR energy intake indicators has as its main draw back the skill and time needed to collect and analyse the information, which increases cost and decreases sustainability. Dietary diversity and hunger have the advantage of being simple to understand, and quicker and easier to administer and analyse.

It is suggested that a national food security monitoring system in South Africa uses more than one indicator, namely: 1) household income from already existing national data, 2) the potential for including a hunger questionnaire in the census should be explored, and 3) when further researched and validated, dietary diversity could also be used in national surveys.

DECLARATION

I, the undersigned, hereby acknowledge that this study represents original work and has not previously been submitted in its entirety or in part for any degree to any University.

Where use has been made of the work of others, it is duly acknowledged in the text.

Sayed

Signature: N Sayed

13 April 2006

Date

Elaine Maunder (Signature)

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17/05/06

DEDICATION

This dissertation is dedicated to all the women in my family. Thank you.

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LIST OF ABBREVIATIONS

24HR	24 hour recall
CASE	Community Agency for Social Enquiry
CCHIP	Community Childhood Hunger Identification Project
Comm farm	Commercial farm
EC	Eastern Cape province
FAO	Food and Agricultural Organisation
FIVIMS	Food Insecurity and Vulnerability Information Mapping System
FS	Free State province
GT	Gauteng province
KN	KwaZulu-Natal province
ML	Mpumalanga province
MLL	Minimum Living Level
MRC	Medical Research Council
NC	Northern Cape province
NFCS	National Food Consumption Survey
NP	Northern province (this was the province name at the time of the NFCS and this name will be used in this study; the province has since been renamed to Limpopo province)
NW	North West province
QFFQ	Quantified Food Frequency Questionnaire
SALDRU	South African Labour and Development Research Unit
SAVACG	South African Vitamin A Consultative Group
THUSA	Transition and Health during Urbanisation in South Africa
US	United States of America
WC	Western Cape province

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CHAPTER 1: BACKGROUND AND RATIONALE FOR THE STUDY

1.1 Introduction

The South African government recognizes the basic human right of all people to food, and this is entrenched in the Bill of Rights: 'Everyone has the right to have access to .... sufficient food and water' (Constitution of South Africa 1996). Access by all people to food available in South Africa is a reflection of the extent to which South Africa is transforming and moving towards equity in the country. Hunger is not just a food issue, but also a social, political, economic and ultimately a development issue.

Hendriks (2005) concluded that food insecurity and hunger in South Africa is likely to increase due to increasing reliance on purchasing foods, the increasing price of foods, and the growing HIV/AIDS epidemic in the country. Hunger has a wide impact and far reaching consequences: malnutrition results in decreased physical ability, decreased cognitive development and learning ability, and results in the lower productivity/working ability of people (FAO 2001a). In this way the quality of lives of many individuals and their families are irreversibly affected. The long-term effects of malnutrition and death will translate into a loss of human potential for South Africa, and so result in greater economic cost as well.

The main aim of this study was to compare different selected indicators of household food insecurity using data from the 1999 National Food Consumption Survey (Labadarios, ed. 2000) in South Africa. Food insecurity is identified as one of the main causes of malnutrition (UNICEF conceptual framework for malnutrition - UNICEF (1998); Appendix A). The next section of this Chapter, section 1.2, highlights the evolution of the food security concept, and section 1.3 summarises the current information on the household food security situation in South Africa, to get a better understanding of what is currently known on this issue.

1.2 The food security concept

The origins of the term 'food security' can be traced back to the FAO World Food Conference held in Rome in 1974. At this conference, experts from various disciplines convened to discuss their concerns over the millions of people in the world at risk for hunger and starvation due to the increasing grain prices globally, and the low food production in developing countries (Van Zyl and Kirsten 1992). There are many definitions available for food security. These definitions have evolved over time and will no doubt continue to do so as the understanding and appreciation of this multi-faceted issue grows. Many of the definitions are reflective of one particular concern precedent or 'fashionable' at that time.

Sen (1977, cited by Van Zyl and Kirsten 1992) viewed hunger and starvation as the result of poverty or the lack of food entitlement, e.g. no income or access or land or credit. In 1981 Sen (cited by Van Rooyen and Sigwele 1999) defined food security as 'the acquirement of sufficient and nutritious quantities of food'. The World Bank (1988) defines food security succinctly as 'access by all people at all times to enough food for an active and healthy life'. At the 1996 World Food Summit, where world leaders pledged to reduce the number of hungry people in the world by half in 2015, food security was defined as 'the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and the fundamental right for everyone to be free from hunger' (FAO 2001b).

In a paper on the World Bank approach to food security analysis, Hindle (1990), describes food security as an 'approach to developmental thinking', an 'organizing principle' for strategies and policies to make people more food secure, and a useful concept in 'determining poverty' in a country.

Maxwell (2001, p14) outlined the 3 main shifts in the progression of thinking about food security: the shift from the global and national to the household and individual level; the shift from a 'food first' perspective to a livelihood perspective; and the shift from objective indicators to subjective perception of food insecurity.

National food security is achieved when a country has enough food available to feed all its people, and is usually assessed by looking at the food available for human consumption in a country, e.g. total available energy per capita per day calculated from food balance sheet data (Steyn, Abercrombie and Labadarios 2001). The food supply available in a country refers not only to a country's own food production but to food imports as well. It is well known and accepted that South Africa has enough food available to meet the food needs of its entire population (Steyn, Robertson, Mekuria and Labadarios 1998; Food Price Monitoring Committee 2003). National food availability is however a poor reflection of household food security as not all households have equal access to the food available in a country (Steyn, Abercrombie and Labadarios 2001).

Household food security refers to a household's ability to access (purchase or produce) adequate food at all times for all members in the household (adapted from Haddad, Kennedy and Sullivan 1994). This is largely related to a household's purchasing power or household income (Kennedy and Haddad 1992). Chapter 3 (Conceptual framework for this study) further clarifies the concept of household food security as used in this study. Appendix B includes a glossary of other common terminology that relates to food security (chronic versus transitory food security, individual food security, nutrition security, and livelihood security).

1.3 Current information on household food security in South Africa

Louw (1990, cited by Van Zyl and Kirsten 1992) noted the following factors that contributed to a worsening household food security situation in South Africa: 20% of the White farmers produced 80% of the total agricultural output in South Africa; arable land was limited and largely possessed by white commercial farmers; and black rural areas were becoming increasingly dependent on external food sources instead of producing their own foods. The apartheid system of government not only resulted in a political crisis in South Africa, but the economic and social development of the country was affected as well. The Gross Domestic Product (GDP) growth rate for South Africa declined for 30 years since the 1960s, with a deepening recession experienced in the

late 1980s and early 1990s (Cooper and Van Zyl 1994). This economic state contributed to a degenerating situation where many people were further marginalized in accessing the food available in South Africa.

The information currently available on the household food security situation in South Africa is set out below, according to the main type of information found when conducting the literature review (only selected information from the 1999 National Food Consumption survey is included (section 1.3.6) since comparison of the different indicators of food insecurity using this data formed the basis of this study).

1.3.1 Demographic and poverty information

Poverty is defined by the World Bank as 'the inability to attain a minimal standard of living' in terms of basic consumption needs (like food), or income/resources required to satisfy those needs (May, Woolard and Klasen 2000, p26). May *et al* (2000, p48) concluded that 40-50% of households in South Africa were poor. Poverty has been identified as the one common characteristic of households that are food insecure (Van Zyl and Kirsten 1992).

Other common characteristics of food insecure households include: having a greater number of dependents, having no land, and spending a large proportion of the household income on staple food or on resources for subsistence farming (Von Braun, Bouis, Kumar and Pandya-Lorch 1992). Some of the main characteristics of the poor in South Africa (May *et al* 2000, p34-35) were: that they largely were black South Africans, belonged to female headed households, had an increased number of very young household members and had additional unemployed household members. Lower levels of education (no secondary or tertiary education) increased the probability of poverty and there appeared to be a 'regional dimension' to poverty (households in the Eastern Cape, Free State and Northern province were more likely to be poor, rural households had an even greater probability of being poor, and households in the former homeland areas were the worst off) (May *et al* 2000, p34-35). The discussion document on food security policy (Makhura 1998) estimated that approximately 14 million South Africans were vulnerable to food insecurity, with food insecurity being highest in the

Black population (and in many coloured households), and in provinces with the largest rural populations (Northern and Eastern Cape). Other information presented in this section (section 1.3) tends to support the observations outlined above.

Simkins (1991, cited by Van Zyl and Kirsten 1992) estimated that 47% of all black people in South Africa lived below the poverty line, whereas the Development Bank of South Africa estimated that 50% of the population (about 19 million) lived below the poverty line (cited by Cooper and Van Zyl 1994). In a more recent review of the population that falls below the poverty line (Bradshaw, Masiteng and Nannan 2000), it was estimated that 61% of black South Africans, 38% of coloureds, 5% of Indians and 1% of whites met this criterion.

According to the 1996 South African National census data (Statistics South Africa 1996), 45% of the employed earned R1000 or less per month and 26% R500 or less per month. The percentage of employed people earning R500 or less per month was highest in the Northern Cape, followed by the Northern Province, Free State, Mpumalanga and Eastern Cape.

The second Community Agency for Social Enquiry (CASE) health inequalities report (Community Agency for Social Enquiry 1999), reported that black respondents were more likely to have a low or medium socio-economic status compared to other groups, and that rural respondents were more likely to fall into the low socio-economic category. Nationally, across all racial groups, 33% of people were identified as having a low socio-economic status.

The Committee for the Development of a Food and Nutrition Strategy for South Africa (1990) used income data to identify how many people in South Africa were not getting adequate food. Income data estimated that 16.3 million people (93.5% black) had an income lower than the minimum subsistence level (R577–R736 per month for a five member household; this estimate included people living in the urban and rural areas, 'white' areas, and 'homelands'). The population living below the minimum subsistence level included 21% of the urban population and 63% of the rural population (cited by Van Zyl and Kirsten 1992).

A national household survey of health inequalities carried out in 1994 on a nationally representative sample of 4000 households (Community Agency for Social Enquiry 1995), found that the majority of black households (72%) had incomes below the minimum living level (total income less than R900), compared to 11% of whites, 14% of indians and 36% of coloureds. Gauteng was the only province in South Africa where more than half of the households (51%) had incomes above the minimum living level (MLL). People living in rural areas and the former homeland areas were worse off (only 18% having incomes above the MLL) as compared to those living in informal settlements in urban areas (32% with incomes above MLL) and those in formal housing in urban areas (54% with incomes above MLL). People living on white owned farms in the rural areas were the most impoverished with only 7% of households having an income higher than the minimum level.

South Africa's Gini co-efficient, a measure of inequality, is very high at 0.58, and is indicative of a skew distribution of income (May *et al* 2000, p26). The poorest 40% of households (households spending less than R352.53 per adult equivalent), who make up 50% of the population, only contributed to 11% of the income in South Africa (May *et al* 2000, p26). The median white household income in 1995 was R60 000/year, for indian households this was R40 500/year, coloured households R19 400/year and black South African households R12 400/year (May *et al* 2000, p27). Urban households in South Africa had a median income of R28 000/year and rural households R10 300/year (May *et al*, pp27-28). The poor in South Africa also spend about 60% of their total income on food, compared to the wealthiest 10% of households which spent only 16% of their income on food (May *et al* 2000, p45).

Many people in the rural areas and former homelands are dependent on the urban areas and welfare provided by the government for their income (Cooper and Van Zyl 1994). In South Africa, only 4% of the income in poor households was contributed by agriculture, 40% by wages, 20% by state transfers, and 17% by remittances (May *et al* 2000, p39). Urban households with low and irregular incomes were also vulnerable to developing food insecurity (Makhura 1998).

Rose and Charlton (2000) analysed data from the 1995 Income and Expenditure Survey to develop a quantified objective measure of food insecurity, which they called 'food

poverty' (an indication whether the money spent by a household on food was enough to purchase a basic subsistence diet). Using the food poverty indicator, they found that 45% of households in South Africa were food insecure. Higher food poverty rates were found in black-headed households, households with lower incomes, a greater number of household members and female headed households (these results were reproduced using Minimum living levels and dietary energy requirements of the household compared to food purchased for the month).

High levels of unemployment are also linked to poverty and food insecurity, and in South Africa it is known that households buy most of their food (and not grow it) (Labadarios, ed. 2000), so unemployment will mean less money to buy food. The official unemployment rate for South Africa in 1999 was 23.3%, and the expanded definition of unemployment, which includes those not actively seeking employment, estimated unemployment at 36.2% (Day and Gray 2001). Both official and unofficial statistics indicated that unemployment was highest in the Northern Province and the Eastern Cape, and in black South Africans (unemployment ranging from 29% to 46%) (Day and Gray 2001).

Household size is also related to household food security. The CASE household survey of health inequalities (Community Agency for Social Enquiry 1995), found that black households had the most number of people in the household (on average 5.2 people per household), but in the majority of cases (72%) these households had only one person earning an income. More recent data on South African household size (Day and Gray 2001) indicated that the average household size is 4.5 (household size was largest in KwaZulu-Natal (5.7), Eastern Cape and Northern Province (5.2), and consistently larger in black South African households (4.8)).

1.3.2 Energy and nutrient intake information

Steyn, Robertson, Mekuria and Labadarios (1998) analysed the 1993/1994 Food Balance Sheet (FBS) data and compared the energy available per capita per day to reported intakes of food consumption from dietary surveys conducted in South Africa. Urban and rural blacks had energy and macronutrient intakes far below what was

available as indicated by food balance sheet data, and the intakes of whites were higher. This again highlights the large difference in access to the food available in South Africa. In an update to the analysis mentioned above, Steyn, Abercrombie and Labadarios (2001) examined the 1998/1999 FBS data in relation to dietary surveys conducted in South Africa, and found that black and coloured children especially had intakes less than that available for consumption at the national level.

There is other confirmatory evidence of low energy intakes and micronutrient malnutrition in South Africa. The SAVACG study (1996), found that 1 in 3 children had marginal vitamin A status (related to rural areas and poorly educated mothers), and that 1 in 5 children were anaemic (more prevalent in urban areas). Vorster, Oosthuizen, Jerling, Veldman and Burger (1997), in a report on the meta-analysis of South African dietary data from 1979-1996, found widespread prevalence of vitamin A, iron and folate deficiencies, and low energy intakes in rural black 2-6 year olds and adult women (except rural black women in KwaZulu-Natal). A high incidence of parasitic infections was also identified in areas of crowding and lack of sanitation, and this would accelerate the development of malnutrition.

1.3.3 Anthropometric information

A SALDRU (South African Labour and Development Research Unit)/World Bank study on baseline household characteristics, carried out in 1993/94 on 3689 children, documented the highest level of stunting in black South African children (cited by Harrison 1995). Furthermore, the Primary School Study (which collected anthropometric data on 97 790 children nationally in 10 primary schools per magisterial district in 1994) showed the highest level of stunting and underweight in coloured children (cited by Harrison 1995). Both these studies identified the Northern Cape and the Eastern Cape as the provinces with the highest level of stunting. This indicated the chronic food and nutrient deprivation experienced by households in these areas. High levels of stunting have also been reported by the SAVACG study (1996) carried out on 6 – 71 month old children in 1994. The incidence of stunting was 1 in 4, and stunting was worse in rural areas, in traditional or informal housing areas and where mothers had little formal education. This study also found wasting in 2.6% of the children, and that 1

in 10 children was underweight. Vorster *et al* (1997) found evidence for pockets of high prevalence of malnutrition; rural black and coloured children were identified as being the most vulnerable to malnutrition, with 20-25% of pre-school and 20% of primary school children having been identified as stunted.

1.3.4 Information on perceptions of hunger experienced

The CASE household survey (1995) also asked people about their hunger status. More than half (55%) of all black households reported experiencing problems in feeding all household members (7% often go hungry, 31% sometimes, 17% occasionally), compared to the 97% of white, 98% indian and 71% of coloured households that reported household members never go hungry. The authors noted that households may be embarrassed to admit to being unable to feed household members, and so it was likely that this data represented under-reporting. It was also identified that households with an income below the MLL were likely to go hungry more often. Bradshaw *et al* (2000) reported that according to the 1999 October household survey, the percentage of households that reported hunger was 21.9% nationally (with the highest rates in Mpumalanga, followed by Eastern Cape, KwaZulu-Natal, Free State and North West province).

Latham (1997, p19) mentioned a critical dimension to the concept of food security that is often ignored: the individuals own desire / 'want' for food (below the level of over-consumption). This means considering more aspects other than that of not just meeting the minimum requirements for nutrients. An important aspect to a healthy life is satisfied people enjoying food, and not just struggling each day to meet minimum food needs.

1.3.5 Province specific information

Some specific data is available on the extent of the household food security problem at provincial level. Mekuria and Moletsane (1996) carried out research in the Northern Province in 1995, and found a high incidence of and variability in household food

security (a household was identified as food insecure when the value of food purchase requirements was less than or equal to the household income). Fifty-eight percent of the households were food insecure and 17% of households vulnerable to food insecurity. Households cited drought and lack of income as the main causes of food shortages.

Research carried out by Lemke, Van Rensburg, Vorster and Ziche (2000) in the North West Province as part of the THUSA project, found that about two thirds of households experienced chronic food insecurity (this was ascertained by a range of indicators, for example, the types of food purchased, experience of hunger and food shortages, and coping strategies employed). The majority of households had incomes less than R1000 and many relied on pensions to supplement the household income.

Leroy, Van Rooyen, D'Haese and de Winter (2001) looked at the food security of rural farming households in the Northern Province, and found that as households had an increasing proportion of land under cultivation they had a decreased income per hectare. Having fewer people in the household, and higher income from non-farm activities was related to better food security status (defined as adequate household availability of energy and protein).

Aliber and Modiselle (2002) surveyed 30 households in North West Province, Gauteng and KwaZulu-Natal to investigate the impact of food prices on households. The structured household questionnaire enquired on dietary diversity by asking about the number of food items consumed by household members in the past week (categorised by food group). They found that urban, "better-off" households had more diverse diets, and in rural areas households who grew crops had more diverse diets.

The Northern Province, North West and Eastern Cape are largely rural provinces (Bradshaw *et al* 2000). The poverty share and poverty rate of the rural areas (versus urban areas) is 70%, and the poverty rates are highest in the Northern Province and Free State (May *et al* 2000, pp30-31). The annual population growth rate (1993-1996) is 2.4%, being highest in the Northern Province, Mpumalanga and KwaZulu-Natal (Day and Gray 2001). There was a large disparity when provinces were arranged according to the Human Development Index (a composite development index developed by the

United Nations), and the Northern Province had the lowest level of human development in South Africa (May *et al* 2000, p24). Black South Africans also had the lowest level of human development and the highest level of poverty (60.7%) when compared to other racial groups (May *et al* 2000, p24 and p32).

1.3.6 Information from the National Food Consumption Survey Report

The National Food Consumption Survey (1999) (Labadarios, ed. 2000) collected a variety of information, but reported the prevalence of household food insecurity from the response to the eight questions on the Hunger Scale Questionnaire[1]. Table 1.1 summarises the main results from the response to the Hunger Scale Questionnaire. Fifty-two percent (52%) of households were considered "hungry", and 23% of households were classified as being at "risk of hunger". In total, as many as 75% of households seemed to experience some food insecurity in South Africa, as assessed by this hunger questionnaire, and only 25% appeared to be food secure.

When specific questions from the Hunger Scale questionnaire were analysed (Table 1.1), the national prevalence of hunger at household level was 66%, at the individual level it was 56%, and child hunger was 30%.

Overall, rural areas had significantly more households that experienced hunger. Specifically (results not shown in Table 1.1), the households in informal urban and rural tribal areas and rural commercial farms experienced the most hunger.

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[1] *This was the same questionnaire developed by the Community Childhood Hunger Identification Project in the US (Wehler, Scott and Anderson 1992), and is discussed further in section 2.6.*

Table 1.1: Prevalence of hunger in South Africa as determined by the Hunger Scale Questionnaire (Labadarios, ed. 2000)

	Nationally	*Rural areas*	*Urban areas*
HUNGRY 'Yes' to 5 or more questions	52%	62%	41%
AT RISK OF HUNGER 'Yes' to 1 to 4 questions	23%	-	-
HOUSEHOLD HUNGER 'Yes' to question 1 and 2	66%	75%	53%
INDIVIDUAL HUNGER 'Yes' to question 3 and 4	56%	63%	44%
CHILD HUNGER 'Yes' to questions 5 to 8	30%	37%	23%

The NFCS also found a significant variation in the prevalence of hunger at the provincial level: the Eastern Cape, Northern Cape and North West province had the highest prevalence of hunger (83%, 63% and 61%).

Other findings from the NFCS validated the findings of the hunger scale questionnaire. A significantly poorer anthropometric status was found in households experiencing hunger or at risk of hunger. The energy and selected micronutrient intakes (vitamin A, vitamin C, calcium, iron and zinc) of children were the lowest in the households in South Africa that experienced hunger. "Hungry" households were more likely to be of the informal dwelling type, and the level of maternal education in these households was lower. "Hungry" households also had the lowest monthly income and spent the smallest amount on food weekly. These households procured a significantly smaller number of food items and had a smaller number of food items recorded in the household inventory (indicative of low variety of the diet).

The present study aimed to build on the information from the NFCS in terms of understanding and comparing the various selected indicators of household food security.

1.4 Rationale for this study

It is clear from the above discourse on the current information on household food security in South Africa, that available data estimating the prevalence of household food insecurity in South Africa has tended to examine the picture from one particular angle only, e.g. economic or nutritional point of view. Despite the availability of food at the national level, a variety of household food security indicators (demographic, subjective and nutritional) reveal that many households are still not food secure - these estimates range from around 20% of households to over 50% of households in South Africa being food insecure (from section 1.3).

Information on the present situation of household food insecurity in South Africa is fragmented. There is no comprehensive study of the household food insecurity situation in South Africa using different types of indicators which examines how the indicators compare with each other, or even if the same households are being identified by the different indicators as food insecure. In a recent paper, Hendriks (2005) comments on the "dearth of comparitive and conclusive empirical estimates" of food insecurity in South Africa.

In order to get a better picture of the food security situation in South Africa, a national assessment, focusing on the different indicators of household food security, needs to be conducted. Such a study would also provide data on how many households are food insecure, and where the main areas of household food insecurity are (where these households are located in the country). Such a study would also define the overlap, if any, of the different indicators of household food security, and would indicate whether the same households are being identified as food insecure by the different indicators. The correlation of the different indicators would further assist in selecting an indicator/s for household food security, particularly if one indicator is easier to collect or already available in comparison to another selected indicator.

More specific and complete information on the household food security situation in South Africa will permit better decision-making and allocation of limited resources.

This information would also facilitate more effective planning and action that addresses food insecurity at the household level.

Information from such an approach will ultimately contribute to more relevant policy formulation, and improved efficiency and effectiveness in strategies formulated to improve South Africa's food security situation.

The measurement of a household's food security status is still a new and challenging area of research. Internationally, there is much debate and discussion on which indicator/s best tell us that a household is food insecure. At the 2002 Food Insecurity and Vulnerability Information Mapping System (FIVIMS) Symposium (FIVIMS 2002), it was concluded that "no one measure captures all aspects of food insecurity" – each indicator tells us more on one particular aspect of the multi-dimensional household food security situation. The indicators commonly used to measure household food security include: demographic and poverty indicators, individual energy and nutrient intake, dietary diversity, individual anthropometry, and the perception of household food security. Each indicator has its own strengths and limitations, and varies in terms of their availability, ease of collection, and validity and reliability. Information on these indicators is detailed in Chapter 2.

Household food security indicators are useful not only for the purpose of estimating the prevalence of food insecurity, but as mentioned, more importantly assist in better decision-making, resource allocation, household targeting and screening, and in the long term - household food security monitoring and evaluation. The monitoring of household food security in South Africa will allow for the assessment of the developmental progress being made to end poverty and hunger.

The availability of a national dataset - the first South African National Food Consumption Survey (NFCS) data (1999), provided the opportunity to investigate some of the issues raised above and to contribute to the body of knowledge on the measurement of household food security status. The NFCS data meets the criteria for consideration in a household food security monitoring system, in that the data has already been collected, data on a wide range of variables were collected, and the data is of good quality and credibility. This national survey will at some stage be repeated and

data to monitor and compare the household food security situation will become available – this further ensures sustainability of a food security monitoring system and moderates the cost.

1.5 Outline of dissertation

The next chapter (Chapter 2) gives a review of the literature on some indicators of household food security status used in South Africa and internationally. Chapter 3 sets out the Conceptual framework for this study. In Chapter 4, the Objectives of this study are detailed, and Chapter 5 clarifies aspects related to the Methodology of this study. Chapter 6 sets out the Results of this research, while Chapter 7 Discusses the results. The final chapter - Chapter 8 - ends with Conclusions of the study and Recommendations for further research.

CHAPTER 2: LITERATURE REVIEW OF INDICATORS OF HOUSEHOLD FOOD SECURITY

2.1 Introduction

The original definition of nutrition surveillance was 'to watch over nutrition in order to make decisions which will lead to improvements in nutrition in populations' (Babu and Quinn 1994, citing Mason *et al* 1984). 'Food security and nutrition surveillance' allows for the inclusion of socio-economic variables in nutrition monitoring systems. With food security as the objective, it helps to mobilise other relevant sectors towards a common goal (Babu and Quinn 1994, citing Arnold *et al* 1990). Food security and nutrition monitoring could be defined as 'a process of monitoring, analysis and interpretation of the indicators and causal factors associated with household food security and nutrition, in order to make appropriate decisions that will lead to effective interventions which result in improvements in the food security and nutritional status of the population' (Babu and Quinn 1994).

The focus of surveillance data in Africa has mainly been on food supply data or nutritional status data, although some integrated systems exist (Quinn and Kennedy 1994). Previously, indicators of food security have been mainly measures of regional or national food supply and its correlates (e.g. rainfall). Supply indicators were believed to be highly correlated with indicators of household food access, but the validity of this perception is being eroded because hunger and household food insecurity still exist despite the national availability of food (Maxwell and Frankenberger 1992). Nutritional status data has been used in Sub-Saharan Africa to manage and evaluate intervention efforts, e.g. in the targeting of food resources to those most in need (Quinn and Kennedy 1994, citing Maribe 1988).

Measuring household food security status in South Africa would provide a measure of the prevalence of the food insecurity problem, and also be useful for the monitoring and evaluation of all efforts made to improve household access to the food available in South Africa. Babu and Quinn (1994) see food security and nutrition monitoring as a

policy generating mechanism in Africa, and emphasise that policy makers must recognise the importance of information-based decision making. With limited resources and increasing pressure on the government to meet targets for development, 'evidence based nutrition practice and policy formulation', defined as 'the application of the best available systematically assembled evidence in setting nutrition policy and practice' (Egger *et al* 2001, cited by Margetts, Vorster and Venter 2002), is a necessity.

In order to facilitate relevant policy formulation and better decision-making on resource allocation, an understanding of the various types of indicators available is first needed, as well as a justification of the merits of their use against the use of other possible indicators. Section 2.2 to 2.6 in this Chapter provides an overview from the literature on some of the commonly used indicators of household food security, and discusses some of the limitations in their use. Research results correlating and validating the different indicators is included to build the argument for the use of these indicators. The practical and logistical considerations in the choice of indicators are discussed in section 2.7, and section 2.8 looks at other studies that have compared food security indicators.

The measurement of household food security is extremely difficult as it is a conditional state which varies greatly both temporally and spatially (Quinn and Kennedy 1994). Rose (1999) described food insecurity as a 'causal chain that begins with economic considerations and ends with nutritional outcomes' – the range in the type of indicators available for household food security measurement (as outlined below) ratifies this. As the discussion that follows will illustrate, there seems to be shift from the quantitative objective measures to the qualitative subjective measurement of household food security status: a move from using socio-economic variables, anthropometric assessment and food consumption information to increasing use of the self-perception of food security status. This chapter draws on information from both South African studies as well as international studies on food security. Of course this discussion is not exhaustive and does not preclude other potential alternate indicators that may measure household food security better. These may be indicators that already exist or those that are not currently used but are easy to collect and analyse (Haddad, Kennedy and Sullivan 1994).

Indicators are sometimes referred to as "direct" or "indirect" indicators, e.g. Hendriks (2005) classifies information on food consumption and hunger perception as direct indicators, and dietary diversity and anthrpometric indicators as indirect indicators. This study will not attempt to classify the selected indicators.

Information on household energy and nutrient availability as an indicator of household food security is purposefully excluded in this Chapter as it was not used as an indicator in this study. It was not possible to use the household inventory data from the National Food Consumption Survey to calculate household energy and nutrient availability, since data was collected primarily from households in the low socio-economic areas and due to the large amount of missing data.

2.2 Demographic and poverty indicators

In discussing single indicators that correctly classify a high percentage of households as food or nutrition insecure (defined as failure of the household to meet at least 80% of its recommended energy adequacy), Haddad, Kennedy and Sullivan (1994) concluded that household size was a good predictor of household energy adequacy as was total income or total expenditure per capita (smaller household or larger income translating to better ability to meet households energy needs).

Cristofar and Basiotis (1992) found that those reporting the highest food expenditure were more likely to report that they had enough of the kinds of foods wanted (reported food sufficiency). Using a linear regression model, household size and available economic resources were found to be the best estimators of reported food sufficiency status.

The hunger rate in the United States of America (US) was found to decline sharply with rising incomes (Rose 1999). The 1995 Current Population Survey in the US showed that 17% of households with incomes <50% of the poverty level were affected by some form of hunger, whereas the rate fell to 1.4% for those with incomes >185% of the poverty level. This basic relationship between income and hunger has been identified in many different surveys at different times carried out using different sampling strategies

and different indicators. Rose (1999) postulated that those households which are food insufficient are more likely than food sufficient households to have experienced a recent stressful event, which stresses the household budget. Other factors associated with poor food security and food insufficiency (cited by Rose 1999) included: not owning a home (reflection of assets), the household head not having completed high school, larger households, and households with a single adult with children.

The poverty level in a country may also be used as a proxy measure for household food insecurity. Rose *et al* (1998, cited by Rose 1999) found that those in poverty were >3.5 times as likely to be food insufficient as those with incomes above the poverty thresholds. However as Rose (1999) pointed out: "a one-to-one correspondence between measures of food insecurity and poverty does not exist, and the use of indirect indicators like poverty would incorrectly identify a large percentage of households as being affected by hunger; also many households that are not in poverty are food insecure".

A new measure of household food insecurity, called 'food poverty', has been proposed by Rose and Charlton (2002). This 'food poverty' indicator is regarded as a quantitative and objective measure. A household is regarded as experiencing 'food poverty' when their monthly food spending is less than the cost of a nutritionally adequate very low cost diet (this is calculated using data from 1995 Statistics South Africa Household Income and Expenditure survey and the University of Port Elizabeth's Household Subsistence Level series). The prevalence of 'food poverty' in South Africa was found to be 43%, with higher rates of food poverty experienced with decreasing income, increasing household size (households with 7 or more had highest food poverty), in rural households, and female-headed households (50% experienced food poverty). The results of this research was confirmed using 2 other methods of internal validation: the University of South Africa's Minimum Living levels (same patterns were found in the results; the food poverty rate was higher at 50%), and using the food energy available to each household versus total energy needs of the household (most patterns were the same; this method estimated food insecurity in South Africa even higher at 55%).

Although socio-economic indicators are becoming increasingly important to household food security monitoring systems, Maxwell and Frankenberger (1992) point out some of the limitations related to their use:

- They are location specific and need to understood and interpreted in context (as norms in different countries/areas would be different);
- Baseline information is always needed to understand what is normal;
- The quality of data needs to be validated before inclusion; and
- It may not be possible to aggregate data or compare across regions.

2.3 Energy and nutrient intake

Maxwell and Frankenberger (1992, citing O'Brien-Place and Frankenberger 1998) advised food frequency assessment of dietary intake as a cost effective tool for detecting consumption differences between households in the assessment of food security, as long as this technique is fine tuned to the cultural setting for which it is used. In a recent keynote paper describing various survey methods for measuring food intake at the individual level and the feasibility of using these methods for the assessment of food security, Ferro-Luzzi (2002) gave the same recommendation. The food frequency questionnaire, regarded as a low cost, simple and expedient method was determined to be the most suitable method for the assessment of food security in countries around the world.

The food frequency method is not without its drawbacks however. Ferro-Luzzi (2002) pointed out that it is the least robust method in terms of dietary assessment and needs to be adapted to ensure that the questions are culturally competent. In this regard, the socio-cultural and demographic characteristics of surveyed communities need to be taken into account, e.g. the culturally specific ways of purchasing food, storing, cooking, and sharing food, whether food is home grown or gathered in the bush.

Ferro-Luzzi (2002) also highlighted that the seasonal variation of food security is likely to exist and repeated dietary intake surveys may be needed over different seasons to give a more accurate picture, adding to the already high cost of individual survey

methods. However, food frequency assessment is likely to have an advantage over other dietary intake assessments methods in this regard. Ferro-Luzzi (2002) also made the comment that diets in developing countries have little day-to-day variation, and suggested that a smaller number of survey days may be required to obtain accurate information on the habitual diet. No evidence is cited in the paper to support this assumption, but if it holds true, then it will argue for the use of the 24 hour recall in assessing food consumption.

Shetty (2002) stressed that although dietary or nutritional intake assessment methods tended to provide an estimate of the risk of the population and/or individual to inadequacy of food, they did not help to identify actual individuals in the population who are deficient and did not help define the degree of severity of the food inadequacy.

Dietary assessment raises several methodological issues, and the main issues highlighted by Ferro-Luzzi (2002) are summarised below:

- Costs, logistics and representativeness:

  The cost and logistics in surveying a representative sample is a most vital consideration in dietary assessment. The more expedient methods rely on advanced technological inputs and support, and this may not always be feasible, e.g. using food models or hand-held computers in surveys.

- Interpretation issues:

  It is difficult to derive a measure of household food security from the assessment of individual intake, although it may be useful to elect 'indicator persons' (from the most insecure/vulnerable category of household members) and concurrently use suitable anthropometric indicators in assessing household food security status.

  It is not correct to assume that available food is equally distributed within the household according to each member's needs. Distribution may favour the more vulnerable household members, e.g. young children, or the most valuable members, e.g. the household breadwinner/main income earner, or even be determined according to socio-cultural dictates, e.g. the man of the household getting the largest portion and eating first.

The estimate of group adequacy of energy and nutrient intake is made on the basis of a probabilistic approach, and provides an estimate of the proportion of individuals likely to have adequate intakes. The interpretation of survey results at this probabilistic level is however still likely to provide a sufficient basis for decision-making for policy purposes.

❖ Errors:

The error structure of individual surveys is better understood, making the data more reliable. Dietary survey errors can be random (reducing reliability, e.g. the day-to-day variability of intakes), or systematic (e.g. bias in recall, under-reporting, selective memory, inability to recall quantities correctly). There are ways to minimise errors, e.g. by increasing the number of days or the number of subjects in the dietary survey random errors may be reduced.

Dietary energy intake is often used as the main parameter to assess adequacy of dietary intake. Ferro-Luzzi (2002) and Shetty (2002) justified the emphasis on dietary energy to measure food adequacy by stating that it is safe to assume that a diet adequate in all nutrients is unlikely to be energy deficient, and that with increased energy intake - intake of other nutrients also increase. Shetty (2002) also indicated that a situation of increased dietary energy is a necessary condition for nutritional improvement even if it is not always sufficient alone.

Micronutrient malnutrition is a real problem in the developing world, and it may be more useful to also assess micronutrient intake, instead of energy intake alone. Mason (2002) commented on this issue, and remarked that the food frequency method was designed to assess dietary quality rather than energy intake.

Individual intake survey methodology could also be used as a validation tool for food security measurement methods routinely used, e.g. household budget surveys or Food Balance Sheets (Ferro-Luzzi 2002). This stills leaves the burning question unanswered - – what 'standard' should be used to validate these indicators?

Other indicators of food consumption may also be useful in assessing household food security status. Babu and Mthindi (1994) suggest the use of 'number of meals eaten in a day' as an indicator of household food security – it would be expected that food insecure households would have fewer meals in a day than food secure households.

The research studies from the US reported on below reveal unexpected findings on the dietary intakes of children in food insecure households. Rose and Oliviera (1997) quantified the relationship between food insufficiency and nutrient intake in pre-school children, adult women, and the elderly. They found the strongest association between food insufficiency[2] and nutrient intake in the elderly. In pre-school children, food insufficiency was not associated with a low intake of any nutrients. Although this finding was unexpected, the authors theorised that those for whom access to food is difficult are more likely to remember what they ate and thus exhibit less under-reporting of food intake, implying that the results are a true reflection of the actual situation in a food insecure household.

Rose (1999) found similar results. Pre-schoolers from food insufficient households were found not to consume significantly lower amounts of nutrients than pre-schoolers from food sufficient households, but mean intakes for the rest of the members in food insufficient households were significantly lower. The author speculated that it could be that adult care givers sacrifice their own consumption to maintain adequate intake for children, and that a reduction in food intake by children does not occur until after sacrifice by other household members, and thus is indicative of the most severe form of hunger. This may mean that households in South Africa who have children with low dietary intakes are in households most severely affected by household food insecurity. Further qualitative analysis on the coping strategies of food insecure South African households would be needed to confirm this. The results reported on above are based on cross-sectional data whereas food insecurity may be periodic in nature.

Cristofar and Basiotis (1992) examined the dietary, social, demographic and economic correlates associated with the perceptions of hunger in low income households

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[2] *Food insufficiency refers to those households responding that they sometimes or often do not have enough to eat.*

containing women 19-50 years old and their children 1-5 years old. Women who reported "not enough to eat" differed from the rest of the sample in the type and amounts of food eaten. Children in these food insufficient households were at lower nutritional risk than the women in the household. The authors suggested that this may be due to the fact that the proxy reporter of the child's intake was biased in seeing the child's food intake as being adequate, or it may be that women in the household ensured that their children get food at their own deprivation. The intakes of cereal and grain foods were also higher in women and children reporting not enough to eat, and the authors concluded that on average individuals have the ability to reliably estimate their food sufficiency status.

2.4 Dietary diversity

Dietary diversity is an emerging research area and has been defined and measured in many different ways. There is a need to harmonise approaches in dietary diversity measurement which would make comparison of various studies easier (Ruel 2003). A draft report by Hoddinott and Yohannes (2002) explored the use of 'dietary diversity' to measure household food security ('dietary diversity' is defined as the number of unique foods consumed over a given period of time). The researchers drew on data from 10 countries, and found that an increase in dietary diversity is associated with increased per capita consumption, household and individual energy availability. Ruel (2003) commented that dietary diversity may be a good proxy for income and higher socio-economic status (higher level of education, more income, greater access to services and food).

Hatloy, Torheim and Oshaung (1998), concluded that the count of food items (Food variety score) and the count of food groups (Dietary diversity score) consumed in a specific period gave a "fairly good assessment" of nutritional adequacy (energy and micronutrients) of the diets of 13-58 month old children in Mali, West Africa. The Dietary Diversity Score (count of food groups) was found to be a better predictor of nutritional adequacy than the Food Variety score (count of food items).

This finding (that is, food group diversity is a stronger predictor of nutrient adequacy than a simple count of food) is re-iterated by Ruel (2002) in a recently published discussion paper on dietary diversity in developing countries (reporting on studies on children in Mali, Kenya and Niger). In this paper, dietary diversity was defined as the number of different foods or food groups consumed over a given reference period. Another finding that Ruel reported on is the consistent positive association between dietary diversity and child growth (found in studies in Ethopia, Mali, Niger and Kenya amongst others). In a more recent analysis, Arimond and Ruel (2004), found a strong and statistically significant association between dietary diversity tertile and height-for-age Z-scores in nine of the eleven countries studied. Arimond and Ruel (2004) also found that the 7-day dietary recall did not reveal more information than the 24-hour recall in terms of finding out which food groups are consumed regularly.

Swindale and Bilinsky (2005) proposed the use of household dietary diversity (versus individual dietary diversity), where an adult in the household (preferable the one who is responsible for food preparation) answers a series of yes/no questions on a specific list of food groups that people in the household consumed the previous day. The food group list could be expanded to include specific programme goals, e.g. consumption of vitamin A rich fruit or vegetables.

Many dietary guidelines emphasise dietary variety. However, dietary diversity is one aspect of a good quality diet and will not by itself ensure that all dietary goals are met (Ruel 2002). Furthermore, there are still many questions around the measurement of dietary diversity, for example: which food groups to use, how to select cut off points, and whether to consider portion sizes (Ruel 2002). The knowledge that diets which have more energy from animal source foods are associated with greater dietary diversity, has implications for the food grouping system used (Ruel 2003). Another consideration would be the typical consumption of food items in a specific population and what portion size consumed justifies inclusion in assessment of dietary diversity (Ruel 2003).

Despite these unresolved measurement issues, dietary diversity data has many advantages: it is easier and cheaper to use than traditional food security indicators (Ruel

2003), it requires uncomplicated training of fieldworkers, has a low interviewee burden, and is less intrusive (Swindale and Bilinsky 2005).

2.5 Anthropometry

Nutritional status assessment is regarded as an objective measurable criterion, which indicates the characteristics of the individual as a consequence of inadequate intakes of food for long periods of time, or as a result of seasonal fluctuations in intakes of food or poor absorption and utilisation of ingested food (Shetty 2002). The nutritional status of a person is the outcome of the entire process of producing/procuring, accessing and consuming food, and estimation of poor growth in children from anthropometrical indices would be a key reflection of the state of food insecurity. Pacey and Payne (1985, p20) summarised this succinctly by stating that 'when we measure and assess nutritional status then we have a good index/proxy of the entire food systems impact on the individual'.

Shetty (2002) is of the view that the assessment of growth[3] in infants and children under 5 years old, has been the single most important measure that best defines their nutritional status, and it is also an indirect measure of the quality of life of the entire community. Quinn and Kennedy (1994) reported that many African countries already have information systems that collect anthropometric data for use in advocacy, policy and planning.

An advantage in the use of anthropometry, is that it allows for the disaggregation of the data or stratification of results by age, sex, region, urban/rural area and other socio-demographic characteristics of the population. The same anthropometric indicator provides different information at different ages of the children in a community (e.g. high prevalence of stunting in 1 year olds vs. stunting in 5 year olds) (Shetty 2002). Other advantages include the lower cost in comparison to other measurements and the fact that the data may already be available (Maxwell and Frankenberger 1992).

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[3] *Low weight for age, height for age, or weight for height (underweight, stunting, wasting) is judged by Z scores less than –2SD (below median).*

Despite its usefulness, anthropometry is a non-specific indicator of multiple past and current processes, and the proper interpretation of these requires additional data (Shetty 2002). Maxwell and Frankenberger (1992) emphasised the disadvantage of anthropometry in not always correlating to food availability and access. Furthermore, secure access to enough food to meet household food needs is a necessary but not sufficient condition for good nutritional status, as many other factors affect nutritional status, e.g. care and presence of disease. The age of the child may be questionable, leading to difficulties in interpretation of the anthropometric data (Maxwell and Frankenberger 1992). In anthropometric surveys, attention must be paid not only to the quality and reliability of the data to be collected but also to the sampling frame, to produce truly representative data with the required degree of precision (Shetty 2002).

Shetty (2002) concluded that although anthropometry is constrained by not being able to capture the multi-dimensional nature of the problem of hunger and poverty, it may still better reflect the situation of poverty in the community than other approaches that only assess food availability, and it can also complement the information obtained by other approaches. Anthropometry is still the most direct method of assessing the status of food security at the household level, and provides a simple and practical way of describing the problem in the community (Shetty 2002).

Matheson, Varady, Varady and Killen (2002) found that children from food secure households (determined by qualitative assessment), were significantly heavier than children from food insecure households[4]. We are cautioned by the authors not to discern causal links between food insecurity and the nutritional health of children from the results of cross sectional research. Based on studies in China, researchers found that even in households that are food secure, some members may be undernourished while others may be overweight (Shetty 2002, citing Doak *et al* 2001).

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[4] *There was no evidence of stunting in this sample, and children from the food insecure household were not underweight.*

2.6 Perceptions of hunger experienced

The 1996 World Food Summit spurned a renewed interest in food security, with policy-makers seeking measurement methods that were direct, simple to use and easy to interpret and analyse (Kennedy 2002). Qualitative methods represent a newer approach to measuring food insecurity (used either alone or in tandem), and ask questions relating to concern over food, behaviour to cope with limited food, and hunger experienced. These methods have been developed primarily in industrialised countries, most notably the United States, where the lack of any authoritive measure of the number of hungry people in the US prevented any firm conclusions about the magnitude of hunger and food insecurity (Olson 1999).

Food insecurity can be regarded as a sequence of stages, varying through a range of severity levels and thus quantifiable in the dimension of the degree of basic need deprivation experienced (Carlson, Andrews and Bickel 1999). Radimer (1990, cited by Carlson *et al* 1999) called hunger 'a managed process'. Although the food insecurity phenomenon is multi-dimensional, it is also measurable by a uni-dimensional scale of severity (Carlson *et al* 1999).

Two of the most influential and frequently cited research studies on the qualitative assessment of food insecurity and hunger, were by Radimer and colleagues (Radimer, Olson, Greene, Campbell and Habicht 1992) and Wehler and colleagues (Wehler, Scott and Anderson 1992).

Radimer, Olson and Campbell (1990) defined hunger[5] as 'the inability to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so'. The researchers strongly recommended that household and individual dimensions of hunger, and hunger in

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[5] *Keenan, Olson, Hersey and Parmer (2001) define hunger as 'the uneasy or painful sensation caused by a lack of food', and 'a potential but not necessary consequence of food insecurity'.*

women and children be assessed[6] separately as they are experienced at different times and to different degrees. Household hunger was found to be the most common (vs. women or child hunger): in households designated as hungry 81% of the women and 66% of the children were designated as hungry by their respective scales.

Radimer and colleagues conducted a qualitative analysis of interviews with 32 women in a low-income area, and identified 2 levels of hunger – individual hunger and household hunger (Radimer *et al* 1992). At both these levels, hunger had quantitative, qualitative, psychological and social components. Based on this conceptualisation of hunger, surveys items (known as the Radimer or Radimer/Cornell scales) were developed in 189 women in the same areas. Three scales (4 items directed at the household, 4 items at women's and 4 at children's hunger) were found to be valid and reliable indicators for measuring hunger in this sample population.

A measure is considered valid if it is precise, dependable and accurate for a given context (Frongillo, Rauschenbach, Olson, Kendall and Colmenares 1997). In validating the Radimer/Cornell measures of hunger in a population group with a wide range of incomes (criterion related validity), Kendall, Olson and Frongillo (1995) found that as food insecurity and hunger worsened, there was a significant and progressive increase in the percentage of subjects participating in food programs and having a low income, low education and employment level, and a significant decline in the average household food availability, as well as fruit and vegetable consumption. The authors' advise to include items to assess diet quality in order to accurately estimate the prevalence of individual level food insecurity when assessing the food security status in groups not experiencing overt hunger or in a socio-economically diverse population.

The Radimer scale has face validity (as words used in the questionnaire were taken directly from the qualitative study with women) and content validity (based on the understanding of hunger and food insecurity from interviews), and the measures were

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[6] *The researchers recommend that for monitoring hunger the frequency distributions of scale scores are probably the easiest and most useful forms of data.*

found to correlate with low income and to households on food assistance (Kendall, Olson and Frongillo 1995).

Using the Radimer scale Keenan, Olson, Hersey and Parmer (2001) found that total household food supplies and the amount of food available in all major food categories progressively declined with an increase in the severity of food insecurity as measured by this index.

The Radimer scale was also used in Russia (Kennedy 2002, citing Welch *et al* 1998). Seventy-seven percent (77%) of the women surveyed, 70% of the households, and 32% of children in the households were classified as hungry. However, only 3% of the children surveyed had a weight-for-age <-2 Z scores and 25% were anaemic (Hb <11g/dl in 2 year olds). The authors interpreted these findings as the children's energy needs being met but food quality was poor (resulting in anaemia).

A goal of the CCHIP (Community Childhood Hunger Identification Project) was to construct a measure of hunger appropriate for socio-economic conditions in the US (for low income families having at least one child under 12) (Wehler *et al* 1992). A hunger index was developed, which was an additive measure of various aspects of food insufficiency due to constrained resources. This index was found to be sensitive enough to identify chronic, subclinical undernutrition among poor families in the US, and was found to meet face (understood as intended), internal content (each item correlates with overall scale), construct, and external validity with the theoretical model of domestic hunger. The CCHIP hunger index was found to be strongly associated with economic and socio-demographic variables, reliance on coping strategies and health problems in children in the US (Keenan *et al* 2001).

The sensitivity of a measure refers to the percentage of households definitely food insecure by the criterion measure, that are also determined to be food insecure by the questionnaire measure; while specificity refers to the percentage of households definitely food secure that were also determined secure by the questionnaire based measure (Frongillo *et al* 1997). For use in screening and targeting, excellent sensitivity is more important than specificity because further evaluation will identify false positives (those who appear to have a food problem but do not). For estimating

prevalence both sensitivity and specificity are important (the false positives and negatives will be about equal in number taking into account sampling variability) (Habicht *et al* 1982, cited by Frongillo *et al* 1997). No single item alone is sufficient for assessing hunger and food insecurity, and food insecurity has a range in severity. The Radimer/Cornell measure and CCHIP have good specificity and excellent sensitivity when compared with criterion measures (the estimate of prevalence by both these measures were almost equal), and both these measures are valid for use in screening rural households in the US (Frongillo *et al* 1997, Kennan *et al* 2001).

In 1994 the USDA sponsored the first ever food security measurement conference, and following the conference, a food security questionnaire was drafted and administered in 1995 (Kennedy 2002). This food security measurement scale is a measure that was regarded as qualitative but not subjective as it correlated with other known measures of food insecurity and hunger (18 questions for households with children, 10 questions for households without children) (Kennedy 2002). There is no gold standard against which this food security measure can be compared (Kennedy 2002, citing Hamilton *et al* 1997), but there is evidence that this food security measure correlates with the traditional measures of food security, e.g. it was found that food insecurity correlated negatively with household income, and that the lower the level of food expenditure the more likely a household was to be classified as food insecure. The US country level food insecurity rate was also found to be linked to poverty (although the association is not perfect), and to follow a geographic pattern (Kennedy 2002).

Two instances have been reported in Zimbabwe and India (Kennedy 2002, citing Holben 2000 and Satpathy 2001) of researchers using the US food security module unmodified. This saves time but the validity of the measure in another country is untested. Since the mid-nineties there has been a proliferation of activities worldwide to develop country specific qualitative food security measures (Kennedy 2002, citing work being done in Bangladesh, Burkino Faso, Guatemala, Kenya and Ethiopia). Kennedy (2002) identifies the possibility of determining a potential common indicator item being greatly enhanced as soon as the number of such conceptually and methodologically similar scales have been developed and tested in their own right.

Frongillo (1999) defined validation as 'the process of determining whether a method is suitable for providing useful analytical measurement for a given purpose and context', and described various validation criteria (well grounded construction, performance consistent with understanding, precision and dependability, accuracy). The author also recommended further validation research for sub-groups of the population to establish validity for monitoring population changes in prevalence, and to develop and validate robust and contextually sensitive measures in a variety of countries to reflect how people experience and think about food insecurity and hunger (Frongillo 1999). In South Africa, qualitative research is needed to clarify the issues on these aspects.

Although quantitative measures of food insecurity may often be given prominence, qualitative measures of food security have their advantages (Kennedy 2002): they are well grounded in science (can be modified and refined over time), quick to administer and analyse, understood by policy makers (asset for advocacy), easily incorporated into ongoing surveys, the respondent burden tends to be low, and it is a more direct measure then other proxy measures. An important aspect is that it includes the cultural acceptability of food (Maxwell and Frankenberger 1992).

The disadvantages include the high cost and time need for their development, they are only feasible if they can be linked to regular ongoing surveys, and the argument that one scale can never measure the complexity of hunger (Kennedy 2002). Another possible shortcoming of using the household perception of food security is that households may deliberately distort their response in order to gain developmental assistance (Maxwell and Frankenberger 1992). Deliberate misinformation may also be given when questions on household income or food availability are asked. If qualitative measures are designed to measure hunger, it is also possible that there are households that are food insecure but which do not experience hunger. This may underestimate the prevalence and identification of food insecure households (a similar argument may be true for the use of the indicator 'stunting in children'). Another perspective on this may be that at least the households worst off are being identified and can be targeted as a priority for intervention.

2.7 Considerations in the choice and use of indicators

Many issues need to be considered before the selection of household food security indicators. Table 2.1 summarises some of the challenges and emerging issues in food security and nutrition monitoring identified by Babu and Pinstrup-Anderson (1994). Some of these issues and considerations in the choice and use of indicators will be detailed below.

Table 2.1: Challenges and emerging issues in food security and nutrition monitoring (Babu and Pinstrup-Anderson 1994)

- having multiple objectives
- using existing vs. newly created infrastructure
- timeliness in data processing, analysis and policy interventions
- matching the data analysis to the decision making needs
- information and action linkages
- creating a demand for information
- making decision makers accountable
- the nature and extent of decentralization
- a national focal point for information dissemination
- institutional human capacity
- recognizing the prevailing political economy issues, power structures and appropriate planning of institutions
- the cost of operating food security and nutrition monitoring

❖ Cost of collection:

The consideration of the cost of collecting data on a specific indicator is a vital and underlying consideration (Eele 1994). This cost needs to be considered broadly, and Haddad, Kennedy and Sullivan (1994) speak about considering the 'cost of collection' vs. the 'cost of non-collection' (i.e. people dying of hunger and malnutrition). With limited resources there is a pressing need to identify indicators that best reflect the levels of food insecurity and malnutrition with minimum costs and efforts involved in their collection (Babu and Pinstrup-Anderson 1994). It is crucial for policy makers and analysts to carefully assess all existing data, and then identify gaps in the information;

otherwise an unnecessary costly duplication of efforts will result (Devereaux 2001, p214).

❖ Ease of collection:

This consideration favours indicators that can be collected easily and quickly. This may be secondary data or indirect indicators, which can be obtained by observation or a simple interview (Eele 1994). If secondary data is relied upon for developing indicators, then there may be problems in achieving collaboration from others, and this will affect sustainability.

❖ Resource availability:

The design of an information system for planning and policy making will depend on several factors including the existing infrastructure and availability of resources to collect food and nutrition information and conduct analysis (Babu and Mthindi 1994). Maxwell and Frankenberger (1992) emphasise resource availability (financial, human, institutional, infra-structural) considerations as they affect sustainability. The use of existing infrastructure also helps to minimise cost and makes monitoring more sustainable. Babu and Mthindi (1994) argue for the decentralisation of activities (the focus of monitoring continues to be at the national level in most Sub-Saharan African countries) (Babu and Quinn 1994, citing Babu and Mthindi 1992). Quinn and Kennedy (1994) suggested that institutional responsibility for food security monitoring be free from 'biases of individual line ministry' and multi-sectoral committees be set up rather than a permanent office for monitoring food security. Institutional problems like poor integration in government structures, separation of data collection activities from policy making processes, problematic relationships between donors and governments and lack of institutional memory all often hamper the effectiveness of food security monitoring systems (Devereaux 2001). The human capacity available to analyse and interpret the data is an important consideration as well, and this will be a challenge for Africa to meet (Babu and Mthindi 1994).

❖ Sustainability:

A monitoring system that is simple, user driven, based on existing institutional structures, and has the commitment of relevant decision makers is more likely to be successful and sustainable (Babu and Pinstrup-Anderson 1994).

❖ Timeliness:

This refers to a system which generates information rapidly, is able to predict problems, presents results to decision makers in time to make decisions and take action (Maxwell and Frankenberger 1992; Eele 1994).

❖ Credibility:

Credibility is achieved when information agrees with that generated by other non-quantitative non-statistical systems, when use is made of a limited number of simple, clear, unambiguous indicators that are easily understood even if the full complexity of the food system is not detailed, when the methods used for collection and analysis are well known and widely understood, and there is political acceptability of the measures used (Eele 1994, citing Buchanan–Smith and Petty 1992, Davies *et al* 1991, and Dreze and Sen 1989).

❖ Reliability, validity, accuracy and relevance:

Relevance refers to whether a measurement is sensitive to changing local conditions (Maxwell and Frankenberger 1992). Sometimes a trade-off between cost and accuracy may be needed (Maxwell and Frankenberger 1992, citing Davies *et al* 1991). Maxwell and Frankenberger (1992, citing McCracken *et al* 1998 and Haddad *et al* 1991) and Haddad, Kennedy and Sullivan (1994, citing Chambers 1993) speak about 'optimal ignorance' (not finding out more than what is needed) and 'appropriate imprecision' (not measuring more accurately than is necessary for practical purposes).

❖ Simplicity, ease of interpretation and use:

Very often, data collection tends to become a goal in itself and the understanding and use of the information is forgotten (Babu and Quinn 1994, citing Babu and Mthindi 1992). More attention is given to technical questions of what indicators to collect and how to analyse the data than to what the data will be used for and who will use it (Eele 1994). Data that does not become information and knowledge does not lead to any action (Devereaux 2001, p207). Data should match information needs, be understandable, and ideally provide alternative decision scenarios (Babu and Quinn 1994). Another problem is that the dissemination of information is often in the form of general lengthy documents not targeted at any specific audiences. Novel and creative

methods such as workshops, seminars, or wall charts and maps, which are more easily understood, should be explored. Past efforts in food and nutrition monitoring need to be evaluated since the impact on decision-making appears to be weak (the uses and users of this information must be examined more thoroughly) (Quinn and Kennedy 1994).

- Multiple indicators:

To minimise inaccuracies multiple indicators should be used whenever possible to ensure more confidence in action, but all indicators used should be pre-tested in terms of their validity and reliability, and indicators should be limited to a manageable number (Maxwell and Frankenberger 1992).

2.8 Comparison of indicators of household food security

Many studies on the measurement of household food security status validate one indicator against others, but there are very few studies which compare various indicators of household food security, and even fewer which examine whether the same households are being identified by the various indicators.

Haddad, Kennedy and Sullivan (1994) looked at combinations of indicators that best identified food insecure households. The problem with assessing whether an indicator best identifies households as food insecure is that one indicator has to be regarded as the benchmark for comparison, and the error of the benchmark indicator misclassifying households as food insecure or not identifying households as food insecure may be disregarded. The preferred method of association between traditional and alternative indicators is the overlap technique, where the percentage of households classified as food insecure by an indicator is compared to a benchmark indicator of food insecurity (Haddad, Kennedy and Sullivan 1994).

Hoddinott (1999) outlined the use of correlation co-efficients to validate indicators of food insecurity, However, correlation coefficients are subject to measurement errors and outliers (the correlation may be driven by association of one part of the distribution only) (Haddad, Kennedy and Sullivan 1994; Hoddinott 1999).

Khan and Riely (1995), in a letter to the editor, critiqued the overlap methodology employed by Haddad, Kennedy and Sullivan (1994) and stated:

1) Vulnerable households may not be identified,

2) The assumption made was that the degree of food insecurity in all households is the same,

3) Indicators selected for monitoring should be responsive to short term changes in the food security situation, and

4) More direct low cost indicators like anthropometry may better serve the needs of a monitoring system.

Household food security measurement is a complex and as yet unresolved area. The advantage of using a range of indicators to assess the household food security status is that each indicator, despite its disadvantages, reflects a different dimension of the food security situation in the household. The indicator/s selected need to suit the purpose for which the indicator/s is/are assessed, e.g. targeting households for food security assistance, monitoring of a programme or evaluation of efforts to improve the food security situation.

CHAPTER 3: CONCEPTUAL FRAMEWORK FOR THIS STUDY

The preceding Chapter 2 outlined the range of indicators commonly used to assess household food security status. The indicators selected for this study reflect the array of indicators in the literature (objective and subjective indicators), and was also dictated by the type of data available from the 1999 NFCS. Figure 3.1 below illustrates the conceptual framework for this study and the main indicators selected. The household food security indicators depicted in this conceptual framework is by no means exhaustive, but only reflects and contextualises the indicators used in this study.

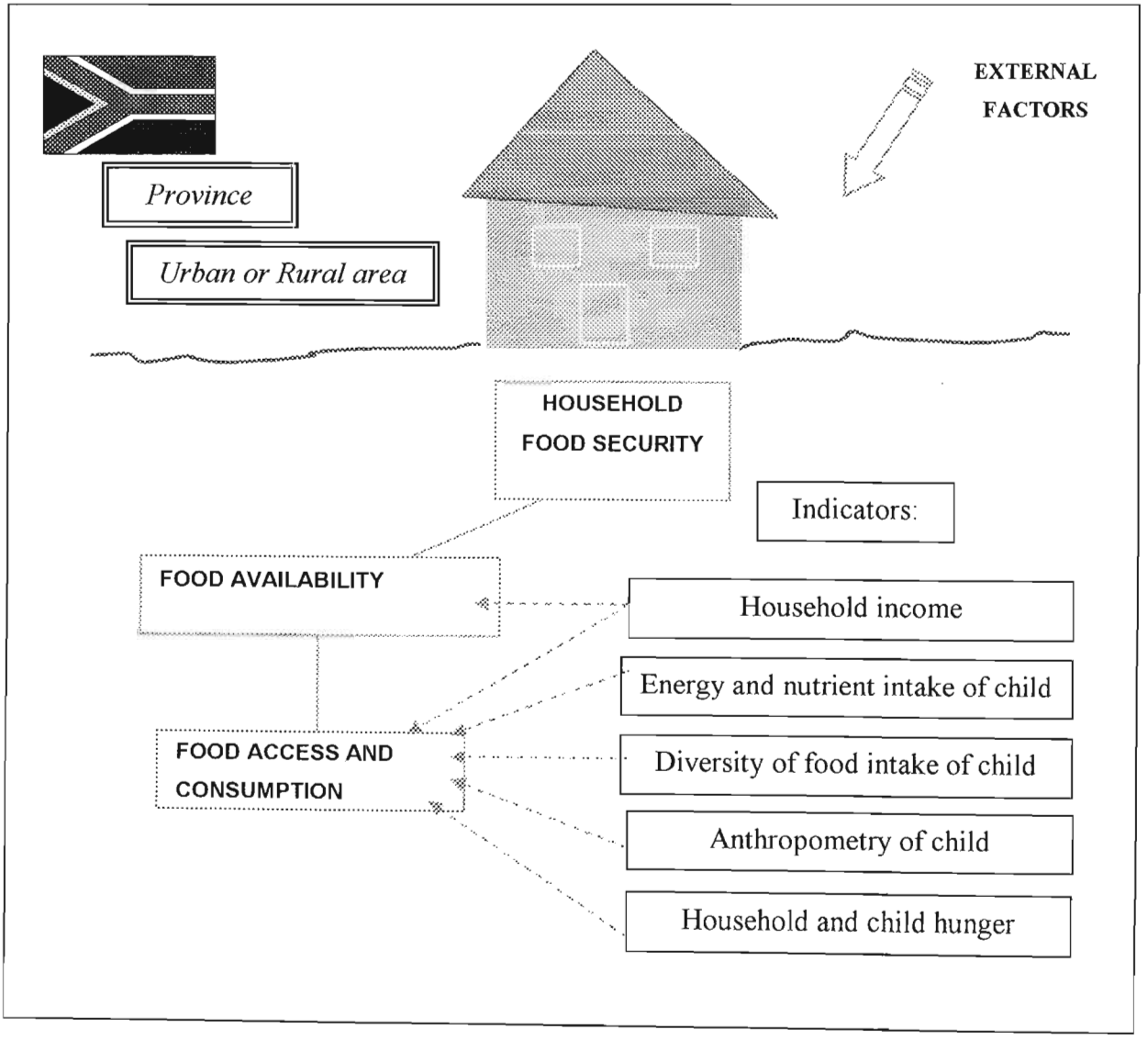

Figure 3.1: Conceptual framework of household food security with main indicators of household food security status investigated in this study

The conceptual framework for this study is briefly outlined below:

Household food security (a household's ability to access adequate food at all times for all members in the household) is determined by both **food availability** to the household, and by **food access and consumption** by members of the household.

- The income of the household can be regarded as an indicator of both food availability and food access and consumption in the household.
- The energy and nutrient intake of a child* in the household can be regarded as an indicator of food access and consumption in the household.
- The diversity of food intake of a child* in the household can be regarded as an indicator of food access and consumption in the household.
- The anthropometry of a child* in the household can be regarded as an indicator of food access and consumption in the household.
- The experience of hunger by the household and child* in the household (as measured by a subjective scale) can be regarded as an indicator of food access and consumption in the household.

* The child is regarded as a key indicator person in the household as it is a vulnerable member of the household.

External factors e.g. an increase in food prices, a drought, or the illness of a household member can also affect the household food security situation. For the purposes of this study these external factors were not explored. Gender issues and the intra-household distribution of food were also outside the scope of this study.

This study examined the prevalence of household food security in **South Africa** as a whole, for each of its nine **provinces**, and also for **Urban or Rural areas** (as defined by the 1999 National Food Consumption Survey data).

CHAPTER 4: STUDY OBJECTIVES

4.1 Main objectives

Using the data from the first National Food Consumption Survey in South Africa (1999), the main aims of this study are:

- ❖ To determine and compare the prevalence of household food insecurity using different indicators of household food security;
- ❖ To determine the overlap of households identified as food insecure by the different indicators (i.e. how many of the same households are identified as food insecure); and
- ❖ To investigate whether there is any correlation between the indicators selected.

Section 4.2 below outlines the study objectives. Further details on the study objectives and cut-off points for the specific study variables are specified and justified in Table 5.2 in Chapter 5.

4.2 Specific study objectives

1 To determine the number and percentage of **low income** households [low income = income < R12000/ year]

2 To determine (from **24 Hour Recall data**) the number and percentage of children not receiving adequate **nutrient intakes** [< 2/3 of RDA for energy and vitamin A].

3 To determine (from **Quantified Food Frequency data**) the number and percentage of children not receiving adequate **nutrient intakes** [< 2/3 of RDA for energy and vitamin A]

4 To determine the number and percentage of children with low **dietary diversity** [estimated by less than 6 food groups consumed by the child in the household in 1 day (**24 Hour Recall data**)]

5 To determine from the age and height measurement taken, the number and percentage of children that are **stunted** [Height-for-age Z score < -2 SD from median reference]

6 To determine from the age and weight measurement taken, the number and percentage of children that are **underweight** [Weight-for-age Z score < -2 SD from median reference]

7 To determine the number and percentage of households that experience **'household and child hunger'** [5 or more positive responses to the 8 questions asked in the qualitative questionnaire]

8 To **compare the estimates of the prevalence** of household food security made by the different indicators above

9 To determine the **overlap** in the identification of food insecure households by the different indicators of household food insecurity (i.e. how many of the same households are identified)

10 To investigate whether there is any **correlation** between the indicators selected (see Table 4.1 below for correlations investigated in this study)

Table 4.1: Correlations investigated in this study

Specific study variables:	House-hold income	24HR energy intake	24HR vitamin A intake	QFFQ energy intake	QFFQ vitamin A intake	Dietary diversity	Stunting	Under weight	Hunger
Household income		X	X	X	X	X	X	X	X
24HR energy intake			X	X	-	X	X	X	X
24HR vitamin A intake					X	X	X	X	X
QFFQ energy intake					X	X	X	X	X
QFFQ vitamin A intake						X	X	X	X
Dietary diversity							X	X	X
Stunting								X	X
Underweight									X

CHAPTER 5: METHODOLOGY

5.1 About the National Food Consumption Survey

Table 5.1 below summarises pertinent information about the National Food Consumption Survey.

Table 5.1: Summary of information about the National Food Consumption Survey components relevant to this study[7]

Information on:	**Details:**
Survey design	observational community survey cross sectional survey of children aged 1 to 9 years in South Africa
Time / duration of study	February – July 1999
Study population	A household in South Africa with at least 1 child aged 1 –9 years Data collected on only one child in the household, randomly chosen
Sampling procedure	Initial survey sample (national probability sample with provincial representation based on Census 1996 data) adapted by means of 50% over-sampling to allow for a defined drop out rate (children not at home at time of survey), an overrepresentation of children living in high risk areas (oversampled by 25%), and the defined requirements for the dietary questionnaires in the survey
Sample size	156 Enumerator Areas included in survey, of which 82 were urban and 74 non-urban 3120 children included in the survey 93% response: data obtained for 2894 children
Training and Pilot studies	Pilot studies conducted in 3 randomly drawn provinces out of a potential 9 provinces

[7] *For further details on the National Food Consumption Survey, please refer to: Labadarios D (ed.) (2000). The National Food Consumption Survey: Children aged 1 – 9 years, South Africa, 1999. (full report available at www.sahealthinfo.org website)*

Information on:	Details:
	Nine provincial co-ordinators (the heads of Dietetic and Nutrition Departments at Universities in each province) were appointed to manage the fieldwork. These provincial co-ordinators were trained and standardised to recruit and train fieldworkers.
Data collection	Mother / caregiver in the household responded to the questions asked. Questionnaires used in the NFCS are detailed below. Anthropometric data - heights, weights, mid-upper arm circumference, and head circumference (0-3 year olds) were also collected.
Validated questionnaires	1 - Socio-demographic questionnaire 2 - Migration Questionnaire 3 - 24 hour recall questionnaire 4 - Quantified Food Frequency Questionnaire 5 - Food Procurement and Household Inventory Questionnaire 6 - Hunger scale questionnaire
Some notes on data analysis	Data was entered in double and cross checked. All questionnaires were tested for validity and reliability. The South African food composition database (1999) was used to quantify nutrient intakes. Stratification of results: by each province, urban and rural area, and by age group 1-3, 4-6 and 7-9 years old.

5.2 The study sample

The NFCS study sample (n=2894), which was the sample for this study, has been described in Table 5.1 above. The exact sample size used for each analysis may be slightly different due to different exclusion criteria. The exclusions as described in the NFCS report apply to this study sample. All statistical analyses were conducted on the full, unweighted NFCS dataset.

5.3 Details on the study variables

All analyses were conducted on the national dataset (children aged 1-9 years old) and by province and urban/rural area (urban formal and urban informal; rural tribal and rural commercial farm). Table 5.2 below details further on the study objectives and variables.

In this study, a household was regarded as food insecure when (according to the criteria described in Table 5.2) it had:

- low income, OR
- low energy intake of the selected child in the household, OR
- low vitamin A intake of the selected child in the household, OR
- low dietary diversity of the selected child in the household, OR
- stunting of the selected child in the household, OR
- underweight of the selected child in the household, OR
- experienced hunger.

Table 5.2: Details on the study variables by specific study objective

SPECIFIC OBJECTIVES TO ADDRESS RESEARCH AIMS	NFCS STUDY DATA SOURCE	SPECIFIC STUDY VARIABLES	CUT OFF POINT
1. To determine the number and percentage of low income households [low income = income < R12000/ year]	Socio-demographic questionnaire	* Low income	income < R12000/ year[8]
2. To determine (from 24 Hour Recall data) the number and percentage of children not receiving adequate nutrient intakes [< 2/3 of RDA for energy and vitamin A].	24 hour recall questionnaire	* Energy (kJ/day) consumed by child * Vitamin A (ug RE / day) consumed by child	< 2/3 of RDA[9] for child's requirement for energy and vitamin A[10]

[8] *From Socio-demographic questionnaire: Question number 24: Household income per month – Options were: "None; R100-500; R500-1000; R1000-3000; R3000-5000; Over R5000, Don't know". Low income = <R12000 cut off point as used in NFCS report (based on 1996 Census data – where low income was defined as annual income <R9600 (Hirschowitz 2000), 1999 low income estimated at = R9600 + inflation) = ~R12000.*

[9] *Energy intake is widely used as an indicator of food security, with varying cut off points, e.g. <80% (Haddad, Kennedy and Sullivan 1994) versus <70% of recommended energy intake (Chung, Haddad, Ramakrishna and Riely 1997). Rose and Oliviera (1997) use a conservative cut off point of <50% of the RDA for energy and other nutrients in determining low intakes due to underreporting in dietary surveys and variability involved in one day recall data. A cut off point of < 2/3 of the RDA was selected for this study. The cut off point of less than 2/3 of the RDA for the specified nutrient intake was also used in the National Food Consumption Survey report (Labadarios, ed. 2000).*

[10] *Energy intake is widely used as an indicator of food security. Yet adequate energy intake does not guarantee adequate intake of other nutrients. For this study, Vitamin A intake was also selected as an indicator of food security. One in three children in South Africa had marginal vitamin A status (SAVACG 1996) and the NFCS also showed low dietary intake of vitamin A (Labadarios, ed. 2000).*

Reference standards for energy and vitamin A intake were: Energy: RDA male 1-2 year olds: 4393kJ/day, female 1-2 year olds: 4166kJ/day, male 3-8 year olds: 7316kJ/day, female 3-8 year olds: 6896kJ/day, male 9-13 year olds: 9572kJ/day, female 9-13 year olds: 8698kJ/day; Vitamin A: RDA 1-3 year olds: 300ug/day, RDA 4-8 year olds: 400ug/day, RDA 9-13 year olds: 600ug/day (Institute of Medicine (2001). Dietary reference intakes: Vitamin A; Institute of Medicine (2002). Dietary reference intakes:Energy.).

SPECIFIC OBJECTIVES TO ADDRESS RESEARCH AIMS	NFCS STUDY DATA SOURCE	SPECIFIC STUDY VARIABLES	CUT OFF POINT
3. To determine (from Quantified Food Frequency data) the number and percentage of children not receiving adequate nutrient intakes [< 2/3 of RDA for energy and vitamin A]	Quantified Food Frequency questionnaire	* Energy (kJ/day) consumed by child * Vitamin A (ug RE / day) consumed by child	< 2/3 of RDA for child's requirement for energy and vitamin A
4. To determine the number and percentage of children with low dietary diversity [estimated by less than 6 food groups consumed by the child in the household in 1 day (24 Hour Recall data]	24 hour recall	* Low dietary diversity	<6 food groups consumed [11]
5. To determine from the age and height measurement taken, the number and percentage of children that are stunted [Height-for-age Z score < -2 SD from median reference]	Socio-demographic questionnaire	* child's height-for-age Z score	Height-for-age Z score < -2 SD from median reference[12]

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[11] *Dietary diversity = number of different foods or food groups consumed over a given reference period (Ruel 2002). Food group diversity is a stronger predictor of nutrient adequacy than a simple count of food (Ruel 2002). Cut off points above which better nutrient intakes were seen (Ruel 2002): Vietnam: >8/11 food groups, Kenya: >6/11 food groups (~½ of food groups). The dietary diversity food group cut off selected for this study was exploratory. The decision for this study was to use the 16 food groups as in MRC food composition tables (Sayed, Frans and Schönfeldt 1999, Appendix C) and exclude food groups "Baby foods" (mainly commercial infant cereal and jar foods), "Therapeutic/Special/Diet products" (mainly powdered enteral products) and "Miscellaneous" (mainly alcoholic beverages). Using the remaining 13 food groups, the cut off point for low dietary diversity was set at < 6 food group out of a possible 13 (~½ of food groups).*

[12] *The reference for median height- and weight-for-age was the 1977 growth curves for children from the National Centre of Health Statistics of the US (as used in the NFCS). The cut off point of < -2 SD was selected as it is commonly used to report anthropometric statistics in South Africa e.g. SAVACG report. Different countries use different cut off points e.g. in India <-3SDs is used as a cut off point (Chung et al 1997).*

SPECIFIC OBJECTIVES TO ADDRESS RESEARCH AIMS	NFCS STUDY DATA SOURCE	SPECIFIC STUDY VARIABLES	CUT OFF POINT
6. To determine from the age and weight measurement taken, the number and percentage of children that are underweight [Weight-for-age Z score < -2 SD from median reference]	Socio-demographic questionnaire	* child's weight-for-age Z score	Weight-for-age Z score < -2 SD from median reference[12]
7. To determine the number and percentage of households that experience 'household and child hunger' [qualitative questionnaire]	Hunger scale questionnaire (CCHIP)	* Household and child hunger experience	Yes responses to 5 or more questions[13]
8. To compare the estimates of the prevalence of household food security made by the different indicators above	-	-	-
9. To determine the **overlap** in the identification of food insecure households by the different indicators of household food insecurity (i.e. how many of the same households are identified)	-	Each indicator of household food insecurity as outlined in objectives 1 to 7 preceding	-
10. To investigate whether there is any **correlation**	-	-	-

Two anthropometric indicators were used as stunting may be a better indication of chronic food insecurity, while underweight may better reflect transitory/acute food security.

[13] *According to the CCHIP questionnaire: 5 positive responses out of the 8 questions reflected household hunger with the child in the household also being affected – childhood hunger was not analysed separately in this study.*

[14] *It is assumed that with greater household income, household members will buy and consume more food.*

SPECIFIC OBJECTIVES TO ADDRESS RESEARCH AIMS	NFCS STUDY DATA SOURCE	SPECIFIC STUDY VARIABLES	CUT OFF POINT
between the indicators selected			
Specifically, whether:			
With increasing household income:[14]			
Energy and vitamin A intake increases			
(from 24HR and QFFQ data)			
Dietary diversity increases			
Stunting decreases			
Underweight decreases			
Household and child hunger decreases			
With increasing energy intake:[15] (24HR data)			
Energy intake increases (QFFQ data)			
Vitamin A intake increases (24HR data)			
Dietary diversity increases			
Stunting decreases			
Underweight decreases			
Household and child hunger decreases			

[15] *Increasing energy intake is assumed to be indicative of consuming more food.*
[16] *Increasing Vitamin A intake is assumed to be indicative of consuming a better quality diet.*
[17] *A greater dietary diversity is assumed to be indicative of consuming a better diet (both in terms of quality and quantity).*

SPECIFIC OBJECTIVES TO ADDRESS RESEARCH AIMS	NFCS STUDY DATA SOURCE	SPECIFIC STUDY VARIABLES	CUT OFF POINT
With increasing energy intake: (QFFQ data)			
Vitamin A intake increases (QFFQ data)			
Dietary diversity increases			
Stunting decreases			
Underweight decreases			
Household and child hunger decreases			
With increasing vitamin A intake:[16] (24HR data)			
Vitamin A intake increases (QFFQ data)			
Dietary diversity increases			
Stunting decreases			
Underweight decreases			
Household and child hunger decreases			
With increasing vitamin A intake: (QFFQ data)			
Dietary diversity increases			
Stunting decreases			
Underweight decreases			
Household and child hunger decreases			
With increasing dietary diversity:[17]			
Stunting decreases			

SPECIFIC OBJECTIVES TO ADDRESS RESEARCH AIMS	NFCS STUDY DATA SOURCE	SPECIFIC STUDY VARIABLES	CUT OFF POINT
Underweight decreases Household and child hunger decreases With increasing stunting Underweight increases Household and child hunger increases With increasing underweight Household and child hunger increases			

5.4 Statistical analysis

All analyses were conduced on the full unweighted NFCS dataset (the variables were not captured as bivariates). The statistician involved in the NFCS analyses conducted the analyses using the SAS package (2001, Release 8.02).

The prevalence (number and percentage) of food insecure households for each indicator was determined for the national sample, each province and rural (tribal areas and commercial farms) and urban (formal and informal) areas.

To simplify the comparison, the prevalence data of household food security in various rural and urban areas and for each province in South Africa was depicted as an average prevalence score. The score was calculated as follows: sum of prevalence estimates (%) for each rural or urban area (or province) divided by nine (number of indicators).

The overlap of indicators was determined for the national sample and for urban and rural areas. The overlap was determined in two ways:

(i) The number and percentage overlap of households commonly identified as food insecure when two indicators prevalences were grouped.
(determined for the national sample and urban and rural areas.)

If Indicator A identified 1708 households as food insecure and Indicator B identified 1337 households as food insecure, and if 1024 households were identified by both indicator A and B as food insecure (common set of households identified as food insecure).

The pooled sample of the 2 indicators is (1708-1024) + 1024 + (1337-1024) = 2021 households.

The percentage overlap of the 2 indicators = 1024 divided by 2021 (pooled sample of households) = 51% overlap.

(ii) For the number of households identified as food insecure in South Africa by one specific indicator, the number and percentage overlap with each of the other indicators in identifying households as food insecure.
(determined for the national sample only.)

If Indicator A identified 1708 households as food insecure. Of that set of 1708 households, 1024 households were also identified by Indicator B as food insecure. The percentage overlap = 1024 divided by 1708 = 60% overlap.

The relationship between indicators (for the national sample and for urban and rural areas) was determined by Pearsons correlation and the significance thereof tested.

CHAPTER 6: RESULTS

6.1 The prevalence of household food insecurity using different indicators of household food security

Table 6.1 sets out the abbreviations for the various indicators of household food security in this study as used in the Figures and Tables that follow.

Table 6.1: Abbreviations of indicators used in Figures and Tables

Description of indicator	Abbreviations
Low household income	Low income.....HI
Low energy intake (24HR) of child in household	24HR low energy.....RE
Low vitamin A intake (24HR) of child in household	24HR low vitamin A.....RA
Low energy intake (QFFQ) of child in household	QFFQ low energy.....FE
Low vitamin A intake (QFFQ) of child in household	QFFQ low vitamin A.....FA
Low dietary diversity (24HR)	Low dietary diversity.....DD
Stunting in child in household	Stunting.....ST
Underweight in child in household	Underweight.....UW
Hunger experienced by child and household	Hunger.....HU

The prevalence of household food insecurity using different indicators is summarised in Table 6.2 on the next page, and the main results elaborated on in the Figures (6.1 to 6.5) that follow. All data reported on in the text has been rounded off to the nearest whole number.

Table 6.2: The number (n) and percentage (%) of households classified as food insecure by the different indicators

	Indicator		Provinces*									Areas						South Africa	Total sample (n)
			EC	FS	GT	KN	ML	NC	NP	NW	WC	Rural	Rural Comm farm	Rural Tribal	Urban	Urban Formal	Urban Infor mal		
1)	Low income	n	330	161	212	343	80	98	184	180	120	1000	190	810	708	503	205	1708	[2441]
		%	**89.0**	**89.4**	**61.1**	**76.6**	**59.7**	**71.5**	**65.5**	**85.7**	**36.0**	**81.9**	**71.4**	**84.8**	**58.0**	**52.3**	**79.5**	**70.0**	
2)	24HR: Low Energy	n	165	128	190	158	80	94	181	108	64	671	161	510	497	380	117	1168	[2817]
		%	**39.2**	**62.1**	**45.4**	**29.8**	**52.0**	**61.8**	**52.0**	**47.2**	**17.9**	**47.0**	**53.0**	**45.4**	**35.8**	**34.9**	**38.9**	**41.5**	
3)	24HR: Low Vitamin A	n	273	147	250	312	117	113	157	179	110	930	202	728	728	544	184	1658	[2816]
		%	**64.9**	**71.4**	**59.7**	**58.8**	**76.0**	**74.3**	**45.1**	**78.5**	**30.8**	**65.2**	**66.5**	**64.8**	**52.4**	**50.0**	**61.1**	**58.9**	
4)	QFFQ: Low Energy	n	65	89	62	86	65	77	130	63	11	405	88	317	243	193	50	648	[2712]
		%	**15.9**	**46.4**	**15.3**	**16.6**	**43.9**	**49.7**	**40.3**	**27.6**	**3.3**	**29.6**	**30.1**	**29.4**	**18.1**	**18.4**	**17.0**	**23.9**	
5)	QFFQ: Low Vitamin A	n	151	83	71	236	62	72	124	71	20	574	107	467	316	236	80	890	[2703]
		%	**36.9**	**43.9**	**17.5**	**45.6**	**42.2**	**46.5**	**38.9**	**31.1**	**6.0**	**42.1**	**36.6**	**43.6**	**23.6**	**22.6**	**27.2**	**32.9**	
6)	Low dietary diversity	n	307	153	198	295	89	110	257	138	68	1005	182	823	610	436	174	1615	[2816]
		%	**72.9**	**74.3**	**47.3**	**55.6**	**57.8**	**72.4**	**74.1**	**60.3**	**19.1**	**70.5**	**59.9**	**73.4**	**43.9**	**40.0**	**57.8**	**57.4**	
7)	Stunting	n	75	60	83	83	35	40	72	57	47	336	88	248	216	161	55	552	[2553]
		%	**20.0**	**29.9**	**20.7**	**18.7**	**25.7**	**30.1**	**23.1**	**25.2**	**14.5**	**26.4**	**31.1**	**25.1**	**16.9**	**16.1**	**19.5**	**21.6**	
8)	Underweight	n	26	29	35	25	6	32	46	35	27	163	52	111	98	77	21	261	[2553]
		%	**6.9**	**14.4**	**8.7**	**5.6**	**4.4**	**24.1**	**14.7**	**15.5**	**8.3**	**12.8**	**18.4**	**11.2**	**7.6**	**7.7**	**7.5**	**10.2**	
9)	Hunger	n	326	77	167	235	68	89	170	138	107	829	139	690	548	379	169	1337	[2645]
		%	**83.6**	**37.6**	**41.9**	**47.1**	**52.3**	**63.6**	**53.6**	**61.9**	**31.3**	**62.1**	**47.4**	**66.2**	**41.9**	**36.7**	**61.0**	**52.1**	

* EC: Eastern Cape; FS: Free State; GT: Gauteng; KN: KwaZulu-Natal; ML: Mpumalanga; NC: Northern Cape; NP: Northern province, NW: North West; WC: Western Ca

6.1.1 Prevalence of household food insecurity in South Africa and Urban and Rural areas:

The prevalence of household food insecurity as determined by different indicators (Figure 6.1) **ranged widely** from 10-70% for South Africa, 13-82% for rural areas and 8-58% for urban areas. For South Africa as a whole, low income, 24HR low vitamin A intake, low dietary diversity and hunger gave the **highest prevalence** of household food insecurity (70%, 59%, 57% and 52% respectively) (Figure 6.1). Underweight, stunting and QFFQ low energy intakes gave the **lowest prevalence** of household food insecurity (10%, 22% and 24% respectively) (Figure 6.1). A similar pattern emerged for the percentage of households classified as food insecure in rural and urban areas (Figure 6.1).

Urban areas consistently had a lower prevalence of household food insecurity than **rural areas**; e.g. 58% of urban households and 82% of rural households were classified by low income as food insecure, and 44% of urban households and 71% of rural households were classified by low dietary diversity as food insecure (Figure 6.1).

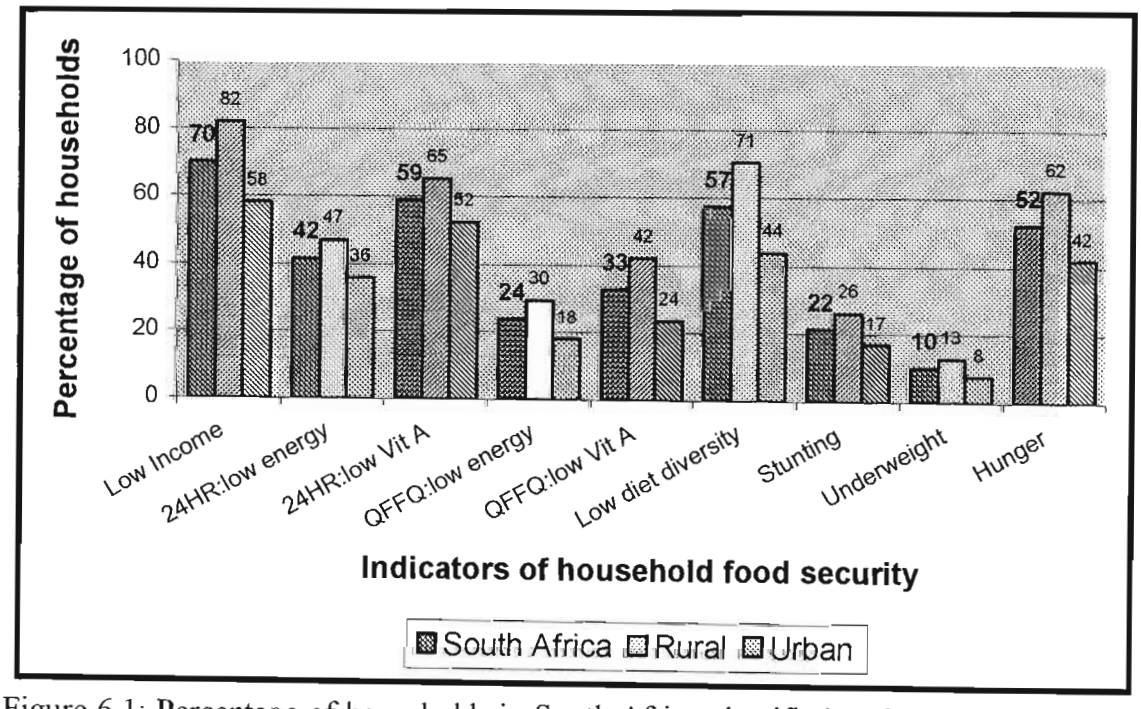

Figure 6.1: Percentage of households in South Africa classified as food insecure by the different indicators

The prevalence of household food insecurity in rural areas was higher than all the national estimates (Figure 6.1).

The prevalence of household food insecurity as determined by **low vitamin A intakes** was higher than the prevalence determined by **low energy intake** (Figure 6.1). This was true for both 24HR and QFFQ data.

QFFQ low energy intakes yielded a lower prevalence of household food insecurity than **24HR low energy intake**, and **QFFQ low vitamin A** intake yielded a lower prevalence of household food insecurity than **24HR low vitamin A** intake (Figure 6.1). Overall, **24HR** data estimates of the prevalence of household food insecurity were higher than **QFFQ** estimates (Figure 6.1).

When the data for South Africa and rural areas in South Africa was examined, at a glance it seemed that the prevalence of household food insecurity determined by **24HR low vitamin A intake, low dietary diversity** and **hunger** had a close/**similar range of estimate** (Figure 6.1). Likewise, **QFFQ low energy intake** estimates and **stunting** estimates of the prevalence of household food insecurity seemed to be similar (Figure 6.1).

6.1.2 Prevalence of household food insecurity in Rural Tribal areas and Commercial farms:

Within the rural sector, there was no clear trend of either **rural tribal areas** or **rural commercial farms** having a greater percentage of households that are food insecure (Figure 6.2).

The estimates of the prevalence of household security in rural tribal areas ranged from 11 to 85% and in rural commercial farms from 18 to 71% (Figure 6.2).

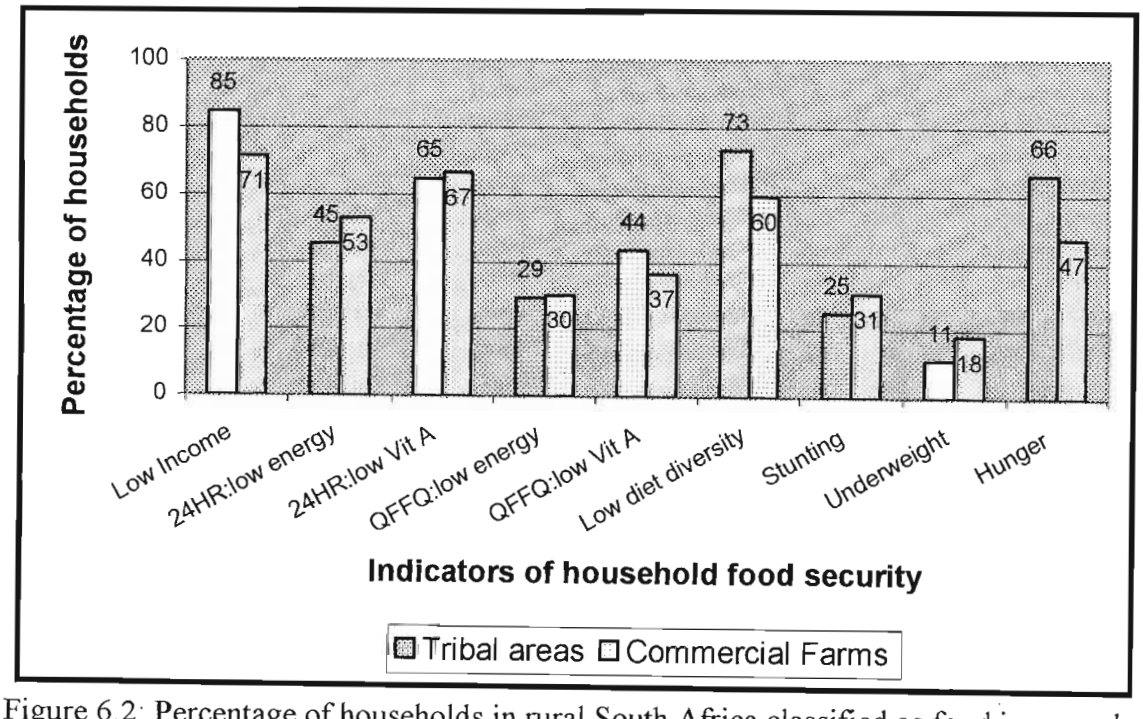

Figure 6.2: Percentage of households in rural South Africa classified as food insecure by the different indicators

6.1.3 Prevalence of household food insecurity in Urban Formal and Informal areas:

Except for QFFQ energy intake and underweight, there was a clear trend that **urban informal areas** have a greater percentage of households that are food insecure than **urban formal areas** (Figure 6.3).

The estimates of the prevalence of household food security in urban formal areas ranged from 8 to 52% and in urban informal areas from 8 to 80% (Figure 6.3).

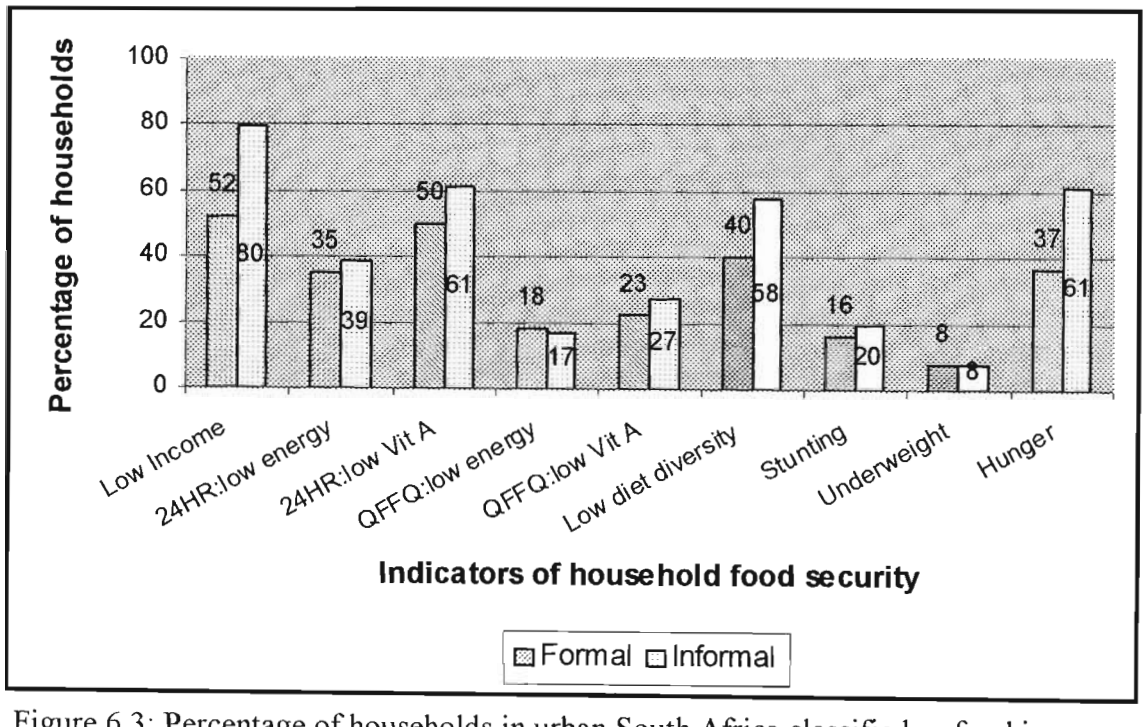

Figure 6.3: Percentage of households in urban South Africa classified as food insecure by the different indicators

6.1.4 Prevalence of household food insecurity in various Rural and Urban areas:

Figure 6.4 below depicts the average prevalence score for each area in South Africa. The score was calculated as follows: sum of prevalence estimates (%) for each province divided by nine (number of indicators).

Rural areas and particularly **rural tribal areas** had the highest prevalence score (49) and appeared to be the areas with a greater percentage of households that are food insecure (Figure 6.4). **Urban** and particularly **urban formal areas** appear to have a lower percentage of households classified as food insecure by the different indicators (scores of 31 and 33) (Figure 6.4). South Africa had a score of 41 (Figure 6.4).

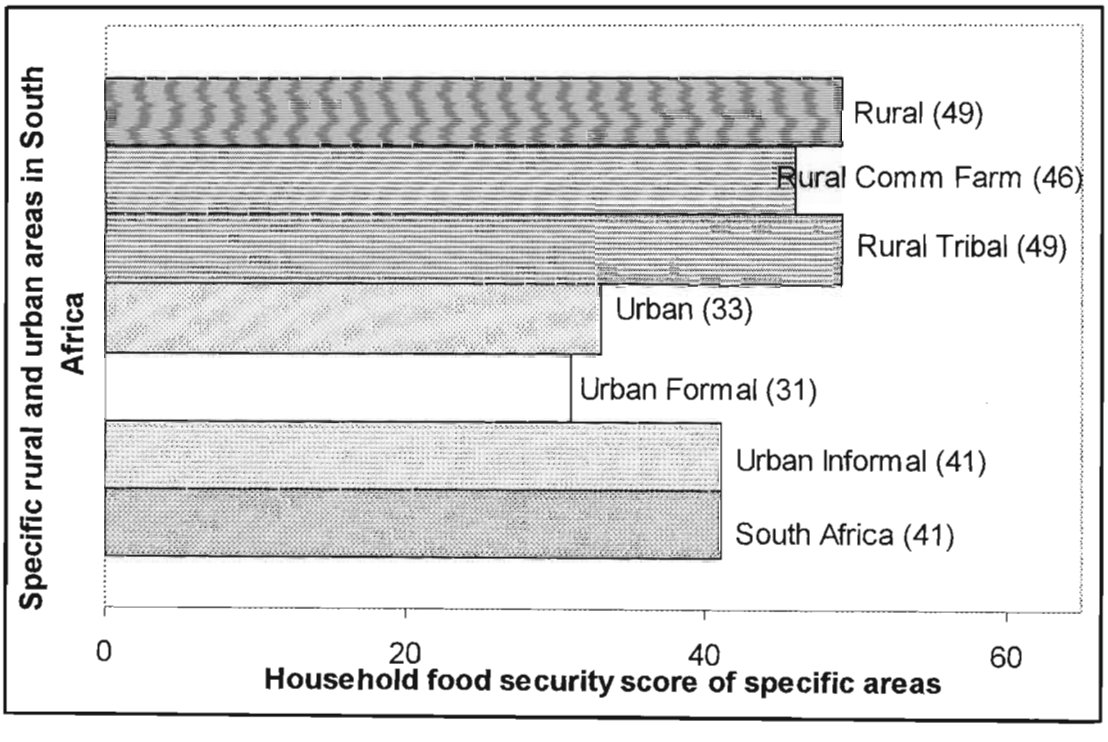

Figure 6.4: Score* of household food insecurity for the various rural and urban areas in South Africa

(*The score was calculated as follows: sum of prevalence estimates (%) for each area divided by nine (number of indicators).)

6.1.5 Prevalence of household food insecurity in each Province in South Africa:

No one province was clearly distinguishable as the province with the highest prevalence of food insecurity (Table 6.2).

Figure 6.5 below depicts the average prevalence score for each province. The score was calculated as follows: sum of prevalence estimates (%) for each province divided by nine (number of indicators).

The **Northern Cape** and **Free State** had the highest scores for the prevalence of houseold food insecurity (scores of 55 and 52) and appeared to be the provinces with the higher prevalence of household food insecurity (Figure 6.5). The **Western Cape** appeared to have the lowest prevalence of household food insecurity in comparison to all other provinces (score of 19) (Figure 6.5).

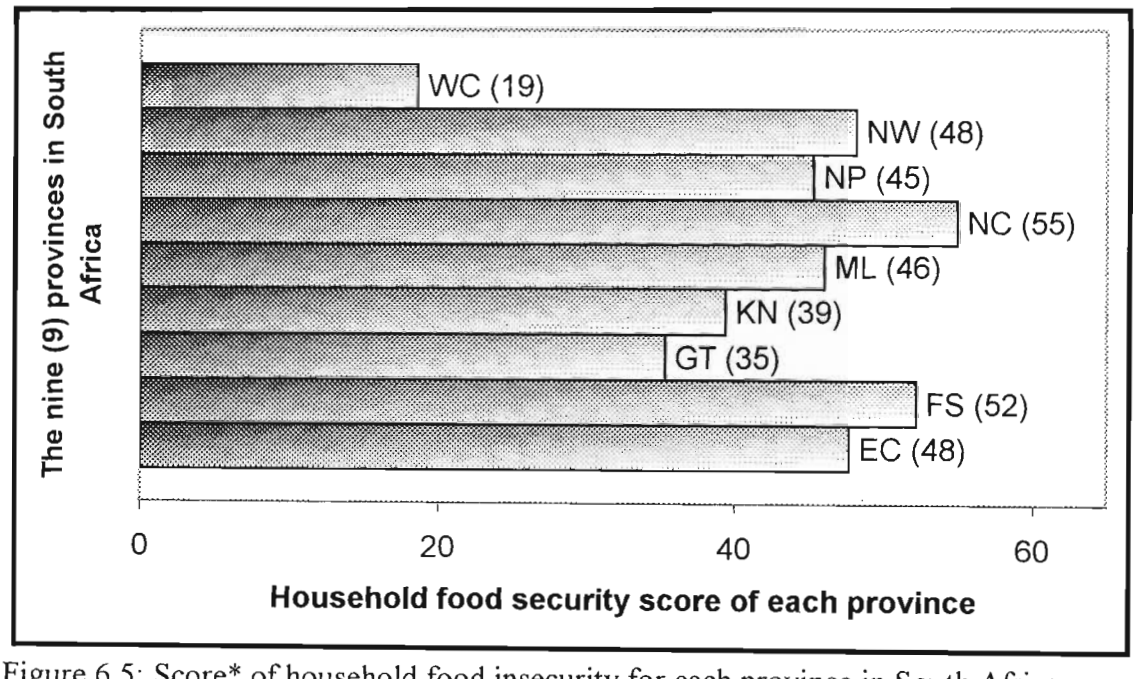

Figure 6.5: Score* of household food insecurity for each province in South Africa (*The score was calculated as follows: sum of prevalence estimates for each province divided by nine (number of indicators).)

6.2 Overlap of households identified as food insecure by the different indicators

Only 12 households in the study sample of 2816 (0.4% of the sample), were classified by all nine indicators as food insecure (details not shown).

Overall, **Low dietary diversity, low income** and **hunger** had a greater overlap with the other indicators (Table 6.3). These overlaps ranged from 49% to 52%. **Low income** and **low dietary diversity**, and **low dietary diversity** and **24HR low vitamin A intake** had the greatest overlap in comparison to all other indicators, i.e. 52% (Table 6.3). **Underweight**, followed by **stunting**, consistently yielded the lowest overlap with the other indicators (9 – 20%) (Table 6.3).

The overlap was also investigated for **rural** and **urban** areas in South Africa (Table 6.4), and the results yielded a similar pattern. There was a greater overlap with the indicators in the rural areas, and a slightly smaller overlap in urban areas when compared to the national results.

Table 6.3: The number and percentage overlap of households commonly identified as food insecure in South Africa when two indicator prevalences were grouped $*

Indicators:		HI	RE		RA		FE		FA		DD		ST		UW		HU	
Low income	HI		793	38%	1106	49%	444	23%	611	31%	1142	52%	381	20%	173	10%	1024	51%
24HR low energy	RE				849	43%	441	32%	468	29%	889	47%	270	19%	140	11%	675	37%
24HR low vitamin A	RA						450	24%	657	35%	1114	52%	354	19%	172	10%	914	44%
QFFQ low energy	FE								403	36%	492	28%	152	15%	79	10%	394	25%
QFFQ low vitamin A	FA										661	36%	196	16%	96	9%	514	30%
Low dietary diversity	DD												351	19%	182	11%	969	49%
Stunting	ST														186	30%	298	19%
Under weight	UW																146	10%
Hunger	HU																	
Number classified as food insecure by each indicator:		1708	1168		1658		648		890		1615		552		261		1337	

$ The percentage overlap was calculated as in the example that follows: Indicator HI identified 1708 households as food insecure and Indicator HU identified 1337 households as food insecure (see last row). 1024 households were identified by both indicator HI and HU as food insecure (see end of first row). The percentage overlap = 1024 divided by 2021 (pooled sample of households) = 51% overlap of the 2 indicators.
* The top five overlapping indicators are circled.

Table 6.4: The number and percentage overlap of households commonly identified as food insecure in rural and urban areas in South Africa when two indicator prevalences were grouped

RURAL SOUTH AFRICA:

Indicators & abbreviation:		HI	RE	RA	FE	FA	DD	ST	UW	HU
Low income	HI		480 **40%**	666 **53%**	284 **25%**	412 **35%**	740 **58%**	249 **23%**	108 **10%**	640 **54%**
24HR low energy	RE			486 **44%**	287 **36%**	319 **34%**	551 **49%**	181 **22%**	85 **11%**	421 **39%**
24HR low vitamin A	RA				288 **28%**	433 **40%**	687 **55%**	225 **22%**	109 **11%**	556 **46%**
QFFQ low energy	FE					267 **38%**	330 **31%**	106 **17%**	54 **11%**	268 **28%**
QFFQ low vitamin A	FA						455 **40%**	136 **18%**	67 **10%**	358 **34%**
Low dietary diversity	DD							229 **21%**	118 **11%**	644 **54%**
Stunting	ST								121 **32%**	194 **20%**
Under weight	UW									97 **11%**
Hunger	HU									
Number classified as food insecure by each indicator:		**1000**	**671**	**930**	**405**	**574**	**1005**	**336**	**163**	**829**

URBAN SOUTH AFRICA:

Indicators & abbreviation:		HI	RE	RA	FE	FA	DD	ST	UW	HU
Low income	HI		313 **35%**	440 **44%**	160 **20%**	199 **24%**	402 **44%**	132 **17%**	65 **9%**	384 **44%**
24HR low energy	RE			363 **42%**	154 **26%**	149 **22%**	338 **44%**	89 **14%**	55 **10%**	254 **32%**
24HR low vitamin A	RA				162 **20%**	224 **27%**	427 **47%**	129 **16%**	63 **8%**	358 **39%**
QFFQ low energy	FE					136 **32%**	162 **23%**	46 **11%**	25 **8%**	126 **19%**
QFFQ low vitamin A	FA						206 **29%**	60 **13%**	29 **8%**	156 **22%**
Low dietary diversity	DD							122 **17%**	64 **10%**	325 **39%**
Stunting	ST								65 **26%**	104 **16%**
Under weight	UW									49 **8%**
Hunger	HU									
Number classified as food insecure by each indicator:		**708**	**497**	**728**	**243**	**316**	**610**	**216**	**98**	**548**

The overlap of indicators was also expressed for each indicator (Table 6.5). Investigating each of the nine indicators (Table 6.5) the following pairs yielded the greatest overlap:

- Low income and Low dietary diversity: 67% of households classified as food insecure by "low income" were also classified as food insecure by "low dietary diversity".
- 24HR low energy and Low dietary diversity: 76% of households classified as food insecure by "24HR low energy" were also classified as food insecure by "low dietary diversity".
- 24HR low vitamin A and Low dietary diversity/Low income: 67% of households classified as food insecure by "24HR low vitamin A" were also classified as food insecure by "low dietary diversity" and also by "low income".
- QFFQ low energy and Low dietary diversity: 76% of households classified as food insecure by "QFFQ low energy" were also classified as food insecure by "low dietary diversity".
- QFFQ low vitamin A and 24HR low vitamin A/Low dietary diversity: 74% of households classified as food insecure by "QFFQ low vitamin A" were also classified as food insecure by "low dietary diversity" and also by "24HR low vitamin A".
- Low dietary diversity and Low income: 71% of households classified as food insecure by "low dietary diversity" were also classified as food insecure by "low income".
- Stunting and Low income: 69% of households classified as food insecure by "stunting" were also classified as food insecure by "low income".
- Underweight and Stunting: 71% of households classified as food insecure by "underweight" were also classified as food insecure by "stunting".
- Hunger and Low income: 77% of households classified as food insecure by "hunger" were also classified as food insecure by "low income".

Low dietary diversity, **low income** and **24HR low vitamin A** are the 3 indicators that constantly overlapped the most with the other indicators (64 to 77%) (Table 6.5). (Overlap refers to the common/same households being identified as food insecure.) Low dietary diversity clearly had the highest overlap with the other indicators, as it had either the highest or second highest overlap with each of the other 8 indicators (Table 6.5). **Hunger** also had good overlap with the other indicators (55 to 58%) (Table 6.5).

Table 6.5: For the households identified as food insecure in South Africa by one specific indicator, the number and percentage overlap with each of the other indicators in identifying households as food insecure [$*]

Indicators & abbreviation:		HI		RE		RA		FE		FA		DD		ST		UW		HU		
Low income	HI			793	68%	1106	67%	444	69%	611	69%	1142	71%	381	69%	173	66%	1024	77%	HI
24HR low energy	RE	793	46%			849	51%	441	68%	468	53%	889	55%	270	49%	140	54%	675	50%	RE
24HR low vitamin A	RA	1106	65%	849	73%			450	69%	657	74%	1114	69%	354	64%	172	66%	914	68%	RA
QFFQ low energy	FE	444	26%	441	38%	450	27%			403	45%	492	30%	152	28%	79	30%	394	29%	FE
QFFQ low vitamin A	FA	611	36%	468	40%	657	40%	403	62%			661	41%	196	36%	96	37%	514	38%	FA
Low dietary diversity	DD	1142	67%	889	76%	1114	67%	492	76%	661	74%			351	64%	182	70%	969	72%	DD
Stunting	ST	381	22%	270	23%	354	21%	152	23%	196	22%	351	22%			186	71%	298	22%	ST
Underweight	UW	173	10%	140	12%	172	10%	79	12%	96	11%	182	11%	186	34%			146	11%	UW
Hunger	HU	1024	60%	675	58%	914	55%	394	61%	514	58%	969	60%	298	54%	146	56%			HU
Number classified as food insecure by each indicator:		1708		1168		1658		648		890		1615		552		261		1337		

$ The percentage overlap for each indicator (read in columns) was calculated as in the example that follows: Indicator HI identified 1708 households as food insecure. Of that, 793 households were also identified by Indicator RE as food insecure. The percentage overlap = 793 divided by 1708 = 46% overlap, i.e. 46% of low income households that were classified as food insecure, also had low energy intake according to the child's 24HR.
* The top 3 overlapping indicators is colour coded (a darker colour denotes a greater percentage overlap).

6.3 Correlation between the indicators selected

The data revealed a large number of correlations, many of which were statistically significant (Table 6.6).

The **strongest statistically significant ($p<0.0001$) correlations** (circled in Table 6.6) were between:

Low income and Low dietary diversity ($r = 0.43$),
Low income and Hunger ($r = -0.46$),
24HR low energy intake and QFFQ low energy intake ($r = 0.47$),
Low dietary diversity and 24HR low energy intake ($r = 0.43$),
QFFQ low energy intake and QFFQ low vitamin A intake ($r = 0.41$),
Low dietary diversity and Hunger ($r = -0.39$), and
Stunting and Underweight ($r = 0.65$).

Overall, **Low income, Low dietary diversity, 24HR low energy intake** and **Hunger** had the greater correlations with the other indicators (Table 6.6).

The pattern of correlations observed in the national dataset was consistent when the urban and rural dataset was examined on its own (Table 6.7). Overall, the correlation of indicators in the urban dataset was stronger than the indicator correlations in the rural dataset.

Table 6.6: Correlations of the different indicators of household food insecurity (r values with p values below in brackets)

Indicators:		RE	RA	FE	FA	DD	ST*	UW*	HU
Low income	HI	0.20 (<0.0001)	0.08 (<0.0001)	0.18 (<0.0001)	0.16 (<0.0001)	0.43 (<0.0001)	0.19 (<0.0001)	0.18 (<0.0001)	-0.46 (<0.0001)
24HR low energy	RE		0.15 (<0.0001)	0.47 (<0.0001)		0.43 (<0.0001)	0.16 (<0.0001)	0.15 (<0.0001)	-0.17 (<0.0001)
24HR low vitamin A	RA				0.23 (<0.0001)	0.15 (<0.0001)	0.04 (0.074)	0.03 (0.116)	-0.05 (0.009)
QFFQ low energy	FE				0.41 (<0.0001)	0.31 (<0.0001)	0.14 (<0.0001)	0.14 (<0.0001)	-0.18 (<0.0001)
QFFQ low vitamin A	FA					0.20 (<0.0001)	0.06 (0.006)	0.05 (0.010)	-0.12 (<0.0001)
Low dietary diversity	DD						0.16 (<0.0001)	0.16 (<0.0001)	-0.39 (<0.0001)
Stunting	ST*							0.65 (<0.0001)	-0.12 (<0.0001)
Underweight	UW*								-0.14 (<0.0001)
Hunger	HU								

* Stunting and Underweight: Correlation is with Z scores for H/A and W/A

- The strongest correlations are circled

Table 6.7: Correlations of the different indicators of household food insecurity in rural and urban South Africa (r values with p values below in brackets)

RURAL SOUTH AFRICA:

Indicators:		RE	RA	FE	FA	DD	ST*	UW*	HU
Low income	HI	0.06 (0.029)	0.0003 (0.992)	0.06 (0.040)	0.08 (0.007)	0.29 (<0.0001)	0.06 (0.035)	0.02 (0.609)	-0.31 (<0.0001)
24HR low energy	RE		0.13 (<0.0001)	0.45 (<0.0001)		0.35 (<0.0001)	0.12 (<0.0001)	0.15 (<0.0001)	-0.09 (0.002)
24HR low vitamin A	RA				0.29 (<0.0001)	0.05 (0.048)	0.02 (0.580)	-0.005 (0.871)	-0.01 (0.689)
QFFQ low energy	FE				0.37 (<0.0001)	0.28 (<0.0001)	0.12 (<0.0001)	0.13 (<0.0001)	-0.11 (<0.0001)
QFFQ low vitamin A	FA					0.12 (<0.0001)	0.03 (0.258)	0.02 (0.460)	-0.07 (0.019)
Low dietary diversity	DD						0.04 (0.195)	0.07 (0.011)	-0.30 (<0.0001)
Stunting	ST*							0.63 (<0.0001)	-0.001 (0.963)
Underweight	UW*								0.01 (0.728)
Hunger	HU								

URBAN SOUTH AFRICA:

Indicators:		RE	RA	FE	FA	DD	ST*	UW*	HU
Low income	HI	0.26 (<0.0001)	0.07 (0.009)	0.22 (<0.0001)	0.15 (<0.0001)	0.44 (<0.0001)	0.23 (<0.0001)	0.22 (<0.0001)	-0.49 (<0.0001)
24HR low energy	RE		0.15 (<0.0001)	0.48 (<0.0001)		0.49 (<0.0001)	0.17 (<0.0001)	0.12 (<0.0001)	-0.21 (<0.0001)
24HR low vitamin A	RA				0.19 (<0.0001)	0.16 (<0.0001)	0.03 (0.343)	0.02 (0.378)	-0.03 (0.267)
QFFQ low energy	FE				0.43 (<0.0001)	0.31 (<0.0001)	0.14 (<0.0001)	0.12 (<0.0001)	-0.19 (<0.0001)
QFFQ low vitamin A	FA					0.19 (<0.0001)	0.04 (0.131)	0.04 (0.217)	-0.10 (0.006)
Low dietary diversity	DD						0.21 (<0.0001)	0.17 (<0.0001)	-0.37 (<0.0001)
Stunting	ST*							0.67 (<0.0001)	-0.17 (<0.0001)
Underweight	UW*								-0.20 (<0.0001)
Hunger	HU								

* Stunting and Underweight: Correlation is with cores for H/A and W/A

- The strongest correlations are circled

CHAPTER 7: DISCUSSION

The aim of this study was to use the data from the 1999 National Food Consumption Survey to:

- Determine and compare the prevalence of household food insecurity using different indicators of household food security;
- Determine the overlap of households identified as food insecure by the different indicators; and to
- Investigate whether there was any correlation between the indicators selected.

7.1 Summary of main findings of study

Some of the main findings of this study, which is discussed in the following sections, were as follows:

- The prevalence of household food insecurity ranged from 10% (underweight) to 70% (low income).
- It was surprising that so few of the same households were being identified by the different indicators.
- Only 12 households (0.4% of 2816) were classified by all nine indicators as food insecure.
- Rural areas had a higher prevalence of household food insecurity than urban areas.
- The Free State and Northern Cape province had higher levels of household food insecurity, with the Western Cape and Gauteng being the provinces with lower levels of household food insecurity.
- Food frequency data yielded lower prevalences of household food insecurity estimates than 24HR data.
- Household food insecurity as determined by low vitamin A intakes was higher than that determined by low energy intakes for both the 24HR and QFFQ data.
- Low dietary diversity, Low income, 24HR low vitamin A intake and Hunger had greater overlaps with the other indicators.
- The dataset revealed a large number of significant correlations.

- Overall, Low dietary diversity, Low income, 24HR low energy and Hunger had the stronger correlations with the other indicators.

7.2 Limitations of current study

Before discussing the findings of this study, it would be useful to look at some of the limitations of this study.

By making use of secondary data (NFCS), this study is restricted to the variables in the NFCS and the limitations of this study are based on the limitations of the NFCS.

The NFCS was a cross-sectional study and provides a snapshot of the household food security situation. Even though household food security is not a stable situation and may vary within the year or in particular seasons, this analysis nevertheless adds to the existing knowledge on the definition and assessment of household food security.

Only households with children aged 1 to 9 years old were included in this study sample; households with no children and homeless people were not included. Single parent and child headed households were not documented by the NFCS and are thus not considered in this study. HIV infection of household members and any illness in the child was also not documented.

The NFCS sample was over sampled for lower socio-economic areas and the sample is not truly representative of the household food security situation in South Africa.

There may be another indicator that gives a better estimate of a food insecure household in South Africa, which was not measured in this study. A further limitation is that there was no benchmark indicator of the number of households that are food insecure.

7.3 Different prevalence estimates of household food insecurity by the different indicators

Food security has many definitions, reflecting the multiple dimensions of the food security concept. Each indicator of household food security measures a different aspect of food security. This is reflected by the large variation in food security prevalence in South Africa found in this study in which nine indicators of household food security status was used. Food insecurity is rampant in South Africa and all indicators reflect this.

The information on the prevalence of household food insecurity as reported by household income, stunting, underweight and hunger gave similar or higher estimates than other existing national information described in Chapter 1 (income: CASE 1995, Statistics South Africa 1996, May et al 2000, stunting and underweight: SAVACG 1996; hunger: CASE 1995).

When interpreting the different prevalence of household food insecurity as determined by the selected indicators, consideration must be given to: the error structure of each indicator, the fact that so many indicators used in this study (seven out of nine) were based on the child in the household, and the cut off points for each indicator in this study. It should also be noted that a slightly different sample size was used in determining the prevalence for each indicator. The cut off point selected essentially determined the findings in this study, and different findings can be expected by exploring different cut off points for each of the indicators.

Low income gives the highest prevalence of household food insecurity. This may be because it is a broad indicator and is related to the poverty experience of households. The other indicators give a lower estimate because not all households in poverty (poor households) are food insecure (Rose 1999). There may be some households in the low income category that have coping mechanisms to evade household food insecurity - that means they are not classified as food insecure by the other indicators.

Although information on household income may not be very reliable because people could lie about earnings, questioning a household on its income is still asked in national surveys and the information on household income is generally available. It would be useful to explore the prevalence of household food insecurity using another cut off for "low income" and to also explore using other related indicators, such as expenditure of the household on food as a percentage of total household income. The low income indicator in this study could have been improved by determining household income per capita to control for household size.

Rose (1999) described food insecurity as a 'causal chain that begins with economic considerations and ends with nutritional outcomes.' The high prevalence of food insecurity identified by low household income further substantiates this statement as many more households are vulnerable to food insecurity but this may not always manifest in, for example, a low food intake or poor growth in the child in that household.

QFFQ results (low energy intake and low vitamin A intakes) gave lower estimates of the prevalence of household food insecurity when compared to the same indicators from **24HR** data (low energy intake and low vitamin A intakes). There are many possible reasons for this. As generally expected from food frequency data, the NFCS QFFQ data gave higher estimates of nutrient intakes when compared to the 24HR data (Labadarios, ed. 2000), and therefore yield lower prevalence of household food insecurity. 24HR data may be over-reported or altered (Lee and Nieman 1993, p52). The 24HR only asked about the previous day's intake, while the QFFQ asked about the past 6 months. QFFQ may be more representative of usual intake of energy and nutrients than one day's diet record (Lee and Nieman 1993, p58). It could be that QFFQ is indicative of long term food security status, and 24HR of immediate / current food security status. In terms of assessing a situation or monitoring or evaluation of a food intake situation, the current food security situation would need to be ascertained, i.e. using 24HR data instead of QFFQ data.

The cut off point selected for the **dietary diversity** indicator for this study (less than 6 out of 13 food groups) was guided by the literature, but was still very exploratory. This indicator yielded good results in terms of the households being identified by low dietary

diversity having high overlap with food insecure households identified by all other indicators. Furthermore, dietary diversity correlated well with the other indicators. Hatloy *et al* (1998) also reported on the association between better dietary diversity and nutrient intake. Further research investigating the cut off point used to describe low dietary diversity in South Africa, and comparing dietary diversity by food group count to dietary diversity by number of items consumed is required. It would also be useful to calculate the dietary diversity of not only the child in the household, but to also calculate and compare it to the dietary diversity of the mother / caregiver in the same household, and see if food security assessment of the household differs.

The **child** is a vulnerable member of the household and therefore justifies being used as an indicator person of the household food security situation. However, the child in the household may be given protection. In South Africa, the majority of children ate from the family pot, and the NFCS report concluded that the low dietary intake of children reflected the intake of other household members (Labadarios, ed. 2000). Cristofar and Basiotas (1992) and Rose (1999) suggested that children in food insecure households may be protected and given the available food to consume at cost to the caregiver's own food consumption. If this holds true in South African households, this could mean that the household food insecurity prevalence rates, which was measured by the child's reported food intake (**24HR and QFFQ**), was lower than the actual food insecurity situation in the household (other household members possibly food insecure). This prevalence estimates could also be lowered if the caregiver, perhaps due to bias or embarrassment, inflated the food consumption of children (Cristofar and Basiotas 1992). The NFCS analysis of the hunger prevalence at household, individual, and child level (estimated at 66%, 56% and 30% respectively), seems to suggest that children are afforded protection as suggested by Cristofar and Basiotas (1992) and Rose (1999).

Stunting and **underweight** gave the lowest prevalence of household food insecurity, but this could be significantly affected by the cut off point of less than –2 standard deviations (SDs) used. These prevalence estimates could be lower than the real number of stunted and underweight children because the median reference value used for comparison may be higher than the median heights and weights of the South African study population. Consequently, many more children may have heights and weights for their ages lower than the reference median but they are not classified as stunted or

underweight by the criteria used in this study (less than –2SDs). Despite Shetty's (2002) arguments for the use of anthropometry in assessing household food security status, stunting and underweight as indicators in this study has very poor overlap and correlation with the other indicators.

In this study, hunger, along with 24HR low vitamin A intake and low dietary diversity gave among the highest prevalence of household food insecurity. The reporting of **hunger** is a sensitive issue, which is believed to be more likely underreported than over-reported (Derrickson 1999 and 2001, and Chee 1999, both cited by Derrickson, Fisher, Anderson and Brown 2001). Another possible reason for the high prevalence of household food insecurity by the hunger indicator is that the CCHIP questionnaire was used unmodified. It may be that a modified questionnaire may have given more valid results. Hunger as an indicator still had very good overlap and correlation with the other indicators. Although the hunger questionnaire asks subjects about their experience in the last 5 and 30 days, this information was not analysed because there was a lot of data missing.

The experience of hunger could be seen as the tip of the iceberg of the problem of household food insecurity and reflective of the extreme cases of food insecurity experienced by households (Rose's causal chain – Rose (1999)). However, in the South African context, this finding of a high prevalence of hunger experienced by households, further confirms the many households who experience overt undernutrition and hunger.

7.4 Rural/urban and provincial variation in the prevalence of household food insecurity

Rural areas in South Africa, with their limited resources and many disadvantages have a consistently higher prevalence of household food insecurity than **urban** areas. **Urban informal** areas have a higher prevalence of household food insecurity than **urban formal** areas. Whereas the rural household in South Africa is well recognised as vulnerable and susceptible to household food insecurity, the urban informal household may well be a neglected/overlooked target group which needs greater attention in terms

of understanding the household dynamics and problems that contribute to household food insecurity.

The Free State and Northern Cape province seem to have the higher prevalence of household food insecurity when compared to other provinces in South Africa, while the Western Cape and Gauteng province have among the lowest prevalence of household food insecurity. This tallies well with other evidence: the poverty rates was noted to be highest in the Free State (and Northern Province) (May *et al* 2000, pp30-31); and the Northern Cape (and Eastern Cape) are the provinces with the largest rural populations (Makhura 1998). Gauteng and the Western Cape are the economically richer provinces in South Africa with largely urbanised households.

7.5 Comparison of the different indicators

One of the main problems encountered in comparing the different indicators of household food security status is that there is **no gold standard** for comparison, and this makes comment on the various measurements somewhat limited/partial. Comparison to other studies is difficult as the selection of a benchmark indicator by these studies assumes that the benchmark indicator is correctly identifying food insecure households. A similar problem arises with the issue of determining the sensitivity and specificity of indicators – this study did not assume any one indicator to be more valid in correctly identifying food insecure households and consequently could not comment on how sensitive and specific each of the indicators were. Each indicator is valid only for what is measured by the selected cut off – one specific aspect of the household food security situation.

The national prevalence estimates (%) of household food insecurity of the five better performing indicators (determined by their larger overlap and stronger correlation with other indicators) was: 42% for 24HR low energy intake, 53% for hunger, 56% for 24HR low vitamin A intake, 57% for low dietary diversity, and 70% for low income. Overall, the **prevalence estimates** for household food insecurity in South Africa made by the nine indicators of household food security were too varied (10 – 70%) to compare to other existing data. May *et al* (2000, p48) concluded that 40-50% of households in

South Africa are poor. Rose and Charlton (2000), using the food poverty indicator, found that 45% of households in South Africa were food insecure, and in 2002, Rose and Charlton estimated the prevalence of 'food poverty' in South Africa to be 43%.

24HR low vitamin A intake, low dietary diversity and **hunger** had a close/**similar range of estimate** and this could be due to some common dimension to the aspect of household food security they are measuring. The dietary diversity indicator is based on 24HR data and this may explain the similarity to the 24HR low vitamin A intake indicator estimate. There is however no link observed with 24HR energy intake. This may be because both dietary diversity and 24HR low vitamin A intake are better measures of the quality (micronutrient intake) of the diet, and this aspect may not be measured by the energy intake measurement. Ruel (2002) highlights that food group diversity is a strong predictor of nutrient adequacy and this seems to be the case here. Similarly, it may be that the subjective hunger measure is also sensitive and able to assess the quality of the diet, and so concedes a comparable estimate.

The finding that **low vitamin A intakes** (24HR and QFFQ) give higher estimates than **low energy intakes** (24HR and QFFQ) argues against the sole use of energy intake for determining food security as suggested by Ferro-Luzzi (2002) and Shetty (2002). Although energy intake may be sufficient, micronutrient malnutrition is a critical dimension of nutrition and food security, and merits attention and measurement to highlight the greater number of households affected.

In this study there was no support for the arguments put forward by Ferro-Luizzi (2002) for the use of the Food Frequency method to assess household food security status, as there is no evident advantage of the QFFQ to the 24HR. The 24HR is quicker to administer, has lower respondent burden, is relatively inexpensive and relies less on memory and judgement (Lee and Nieman 1993, p52).

Although the comparison of the prevalence of household food insecurity in South Africa looked promising, in that some indicators yield what looked like quite similar results, the actual overlap in identifying the same households as food insecure is dismally poor.

QFFQ low energy intake and **stunting** which seemed to have similar prevalences of household food insecurity, had an overlap of only 15% of commonly identified households. **24HR low vitamin A intake, low dietary diversity** and **hunger** had a close/**similar range of estimate** and in this occasion the overlap was: 52% for 24HR low vitamin A intake and low dietary diversity, 44% for 24HR low vitamin A intake and hunger, and 49% for low dietary diversity and hunger. These were among the highest overlaps.

The greater overlap with the indicators in the rural areas may be attributed to the greater sensitivity of the indicators in rural households or the fact that there was a higher prevalence of household food insecurity in the rural areas.

Low income, low dietary diversity, 24HR low vitamin A intake and hunger predominantly had a greater overlap with the other indicators. This augurs well for the use of these indicators above the others in the measurement of household food security.

Only 12 households in the sample of 2816 (0.4%) are classified by all nine indicators as food insecure. With this small number, it was not feasible to analyse the main areas or characteristics of household food insecurity in South Africa. This small overlap could be because of the selected cut off for each indicators, and it is possible that more households would be identified as food insecure by all nine indicators when different cut offs are used. Another reason is the wide range of prevalence estimates made by the nine indicators – the lowest prevalence (by the underweight indicator) limits the number of households to overlap with the other eight indicators.

Investigating each of the nine indicators the following pairs yielded the greatest overlap and are reasoned below:

- Low income and Low dietary diversity: Households with low incomes more likely to purchase and consume fewer types of foods, and have less variety in the diet.
- 24HR low energy and Low dietary diversity: It is possible that by including food from other food groups, the energy intake of the diet is improved.
- 24HR low vitamin A and Low dietary diversity / Low income: This reflects a low intake of foods. It is possible that by including food from other food

groups, the micronutrient intake of the diet is improved. With increased incomes, the household will be able to purchase a greater variety of foods and improve the micronutrient content of the diet.

- QFFQ low energy and Low dietary diversity: As observed with 24HR data, it is possible that by including food from other food groups, the energy intake of the diet will be improved.
- QFFQ low vitamin A intake and 24HR low vitamin A / Low dietary diversity: As observed with 24HR data, it is possible that by including food from other food groups, the micronutrient intake of the diet is improved.
- Low dietary diversity and Low income: Households with better incomes will be able to afford a more diverse diet.
- Stunting and Low income: Households with low incomes suffer the consequence of a chronic deficit of food intake, resulting in stunting in children.
- Underweight and Stunting: This high overlap reflects the higher incidence of stunting in South Africa compared to underweight in children. Not all children underweight were stunted as weight may have been affected by diarrhoea or disease.
- Hunger and Low income: Households who have less income, are able to purchase and consume less food, and so are hungry. In the US, Rose (1999) found that the hunger rate declined with rising incomes.

As can be expected, the correlation pattern mirrors the overlap of the indicators (reasoned above), i.e. where there is greater overlap, there is greater correlation. The **strongest statistically significant ($p<0.0001$) correlations** were between those listed below with possible rationale for their association:

- Low income and low dietary diversity: reason as above.
- Low income and Hunger: reason as above.
- 24HR low energy intake and QFFQ low energy intake: These two methods of measuring energy intake in the diet are associated and corroborate each other.
- Low dietary diversity and 24HR energy intake: reason as above.
- QFFQ energy intake and QFFQ vitamin A intake: As the energy intake of the diet increases, the reported vitamin A intake increases. This association is not observed with 24HR data however.

- ❖ Low dietary diversity and Hunger: As diversity of the diet improves, hunger declines. This may be due to more foods being eaten overall.
- ❖ Stunting and Underweight: These 2 methods of measuring poor growth of the child are associated and validate each other to some extent. The positive association between dietary diversity and child growth (Ruel 2002), was not observed in this dataset possibly due to the cross sectional nature of the study.

Overall, **income, dietary diversity, hunger** and **24HR vitamin A intake** had the strongest correlations with the other indicators. This gives further impetus for the use of these indicators in measuring household food security.

7.6 Advantages and disadvantages of the different indicators

Each indicator of household foods security status has its advantages and disadvantages. In this study, there were some indicators that performed better in terms of overlap with other indicators and correlation with other indicators, and this merits their use over the other indicators.

Overall, low household income, 24HR low energy intake, 24HR low vitamin A intake, low dietary diversity and hunger had the best overlap and correlation with each other and with the other indicators.

Table 7.1 assesses these five indicators against key criteria outlined in Chapter 2 as integral to the selection of food security indicators. These criteria were: cost of collection, ease of collection, resource availability, sustainability, timeliness, credibility, reliability, validity, accuracy and relevance, and simplicity, ease of interpretation and use.

In summary: Household income data possibly has the lowest cost of collection as national data may already be available, e.g. collected by household income and expenditure surveys or demographic/census surveys. Due to the possible availability of data, selecting income as an indicator may be more sustainable as it makes use of existing resources. Selecting indicators based on detailed dietary intake using

quantitative 24 hour recall, and QFFQ would have the highest cost in terms of training people to collect the data, the time taken to collect data, and the intricacies of analysing the data – making them less sustainable. Dietary diversity and hunger have the advantage of being easier to understand, and quicker to administer. If they are incorporated into an existing national survey, then they have the potential of being sustainable. Dietary diversity and hunger data may be more credible as people may not be truthful about their incomes. Along with income, dietary diversity and hunger data are quicker to analyse than dietary data and resulting information disseminated more rapidly.

Table 7.1: Select indicators assessed against key criteria for food security indicators

	HOUSEHOLD LEVEL INDICATORS		CHILD LEVEL INDICATORS		
Criteria	**HI** Household income	**HH** Household hunger	**RE** 24HR low energy intake	**RA** 24HR low vitamin A intake	**DD** Low dietary diversity
Cost of collection	*	-	-	-	-
Ease of collection	-	*	-	-	*
Resource availability	*	-	-	-	-
Sustainability of monitoring	*	(*)	-	-	(*)
Timeliness	*	*			*
Credibility	-	*	-	-	*
Reliability, validity, accuracy and relevance	*	*	-	-	*
Simplicity, ease of interpretation and use	*	*	-	-	*

* = Advantage

(*) = Possible advantage

- = No advantage evident

7.7 Suitable indicators for household food insecurity measurement in South Africa

In light of the advantages and disadvantages of the five better performing indicators assessed in Table 7.1 above, three indicators, namely household income, household hunger, and dietary diversity have the greater advantage over the other two indicators assessed (24HR energy intake and 24HR vitamin A intake).

The ultimate suitability in selecting and using an indicator depends also on the purpose of measuring food security status and what is actually being measured, e.g. availability of food at household level versus access to food. Once again Rose's "causal chain" (Rose 1999) provides a useful depiction of first clarifying what is intended to be measured.

Income data is routinely collected in household income and expenditure surveys in South Africa e.g. the income and expenditure survey conducted by Statistics South Africa. If income is selected as a food security indicator, it may best serve in determining the prevalence of food security (assessment of food security situation), but it may not be responsive to changes in the household food security situation and may not be suitable for monitoring and evaluation purposes. The income of the household may remain unchanged, but the dietary intake of vulnerable members may be improved by other factors, e.g. planting a vegetable garden at home or making better food choices.

The hunger questionnaire deals with the subjective perception of household food security, but is an easily understood and less technical indicator. The data on hunger experienced by households would be a strong tool in advocacy and policy making.

Dietary diversity has the further advantage in being more sensitive to monitoring the impact of interventions/programmes. Dietary improvement is the long term goal of interventions to improve food security, and the use of a food based indicator like dietary diversity would reflect whether the desired effect is transpiring.

The good overlap and correlation of indicators also means that we can use fewer indicators. It is prudent to suggest that a national food security monitoring system in South Africa chooses to use more than one indicator:

1) income from already existing national data,
2) the hunger questionnaire when the census is conducted, and
3) once further researched and validated, dietary diversity could also be used in national surveys.

7.8 Recommendations for further research

Dietary diversity emerges as a potentially simple and very useful indicator of household food security status. Further research is needed on how dietary diversity should be determined, i.e. by count of food groups (as in this study) or by count of food items available or consumed. In each instance, the cut off point used to describe low dietary diversity needs to be investigated, as well as who should be assessed for household dietary diversity (child in household, or child and one adult/caregiver in the household).

Although the CCHIP hunger questionnaire performed well in this study, further qualitative research on the understanding of terminology in the questions asked (especially when translated into different languages in South Africa), would enable modification of the questionnaire to be more relevant to the South African situation.

It would also be interesting to conduct this same analysis on a weighted sample of the NFCS (the NFCS was oversampled for low socio economic areas in South Africa), and explore the use of different cut off points for some of the other indicators (e.g. anthropometric indicators). However, a recent anthropometric analysis on the weighted sample of the NFCS (n=2200) showed little difference in the estimate of stunting in South Africa: 19.3% compared to 21.6% stunting in the unweighted sample (Steyn, Labadarios, Maunder, Nel and Lombard 2005).

CHAPTER 8: CONCLUSIONS

Food security is a complex, multi-dimensional concept and it is expected that different indicators, each measuring different aspects of the concept, will yield differing results in terms of how many households are affected. Food security draws on many different disciplines, e.g. economics, agriculture and nutrition. Different disciplines often use other indicators to assess household food security status and base their decisions and actions on this assessment. It is crucial that different indicators are interpreted correctly by involving experts from the different disciplines.

A surprising finding in this study is that so few of the same households are being identified by the different indicators. This result erodes the widely held assumption that it does not matter what indicator is selected for use because they all are measuring household food security status.

Although no one indicator stands out from the others as 'best' in measuring household food security status. The three indicators with consistently better results are income, dietary diversity and hunger.

Household income, although yielding the highest prevalence of food insecurity, nevertheless has good overlap and correlation with the other indicators. Furthermore, it is also likely for household income data for South Africa to be available on a national scale annually from many research bodies. This saves time, money and effort greatly, and makes monitoring activities achievable and timely – all very important considerations in the selection of an indicator/s.

Dietary diversity and Hunger are simple to understand by both policy makers and 'people on the ground', and would also be better indicators than income for long term surveillance of the food security situation. They both have good overlap and correlation with other indicators. They have the added advantage of being more specific than household income, and are quicker and easier to administer and analyse.

Further research on these two indicators (dietary diversity and hunger) in South Africa would be clarifying. Although the CCHIP questionnaire works well in the South African context, further adjustment could make it more sensitive. Dietary diversity assessment remains an appealing and potentially revealing and useful area of research.

The development of appropriate food security policies depends not only on the measurement (quantitative aspect) of the prevalence of household food insecurity and identification of who is affected. Central is a more complete and detailed understanding of this dilemma (qualitative research), e.g. intra-household food distribution and coping mechanisms of households in South Africa.

The purpose of measuring household food security needs to be revisited. Researchers cannot get so lost in the numbers so as to forget the application and use to help people in need. If the main purpose is identification for intervention and monitoring, then we possibly already have the indicators that guide us (albeit imperfectly) in this regard.

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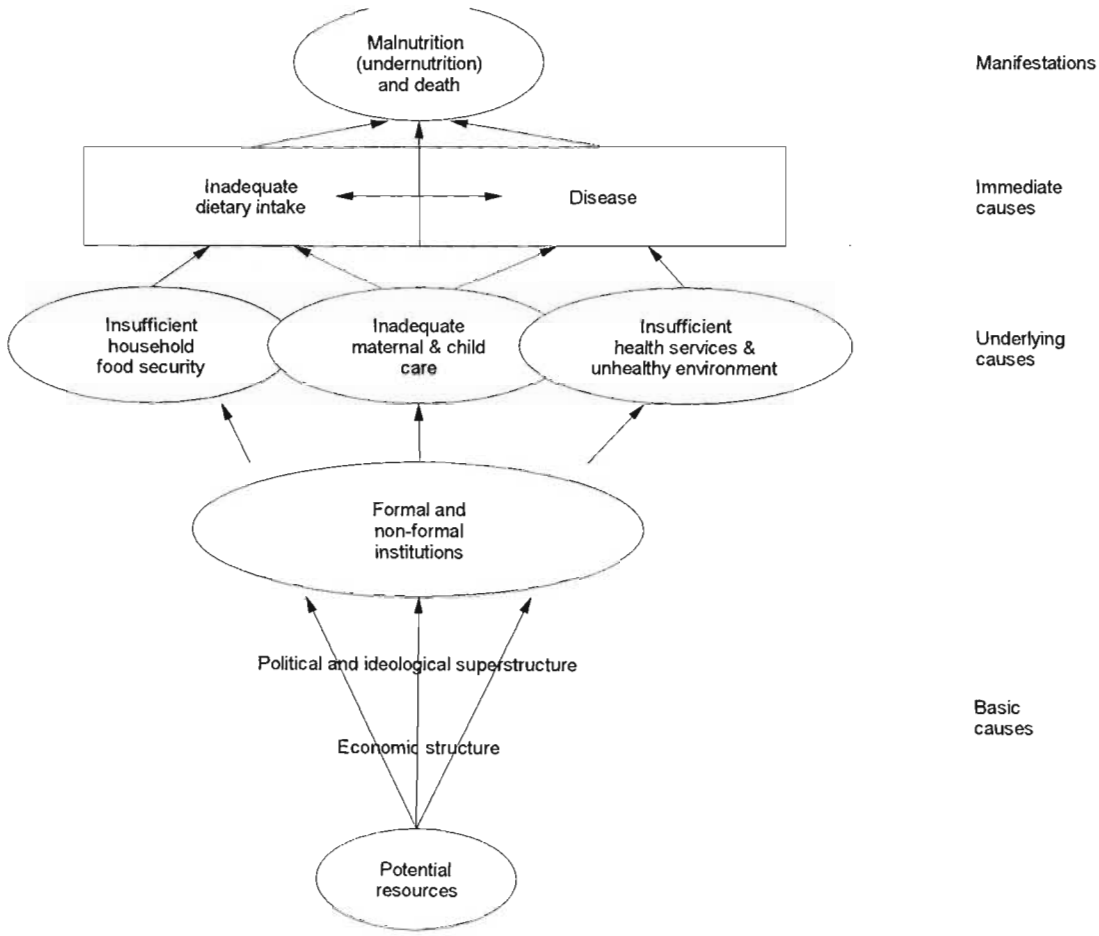
APPENDICES

Appendix A: The UNICEF conceptual framework for malnutrition



(UNICEF 1998)

Appendix B: Glossary of terminology related to food security

Chronic food insecurity:

This refers to the continuous inability to meet food needs by either production or buying or sharing. In its' most overt form chronic food insecurity manifests as famine, but in many instances the households experiencing chronic food insecurity are not identified and survive unnoticed.

Transitory food insecurity:

This is the temporary inability to access enough food e.g. due to high food prices or loss of a source of income. Sometimes mention is made of emergency food insecurity (another form of transitory food insecurity): this is the lack of access to food brought on by a specific emergency situation e.g. flood or drought. These are the hunger stories that make news headlines. Policy options may include stabilizing food prices and assisting vulnerable groups directly (e.g. through targeted food aid). Many households who experience transitory food insecurity put specific coping mechanisms in place e.g. looking for employment, growing foods or asking their neighbours for assistance, but transitory food insecurity can lead to chronic food insecurity.

Individual food security:

This refers to the individual's ability to access food in a household. A household may be food secure but this not does guarantee an individual in that household their food security, e.g. due to unfavourable intra-familial food distribution where the male head of the household is given the preferential food portion size.

Nutrition security:

Roetten and Krawinkel (2000) emphasise that to guarantee nutrition security, food supplies need to meet the specific nutrition requirements of individuals. Nutrition security refers to a diet that is adequate not just in terms of quantity – that is - total energy (kilocalorie or kilo-Joule) intake, but adequate in terms of quality and variety - protein, vitamin and mineral requirements. This diet should also meet the specific food and nutrient needs of the individual (e.g. an infant versus a pregnant woman versus the elderly- each have different nutritional requirements). When an individual has access to

the household food supply, nutrition security is not guaranteed. For nutrition security the individual needs to be able to properly digest, absorb and utilise nutrients from food. Therefore an individual in a food secure household can still be nutrition insecure e.g. due to an illness or diarrhoea affecting the absorption of nutrients. Another consideration is that the nutrients in food be bioavailable so the body is able to utilise them efficiently.

Livelihood security:

A livelihood is made up of 'the capabilities, assets (material and social resources), and activities required for living. A livelihood is sustainable when it can cope and recover from stresses and shocks, maintain or enhance its capabilities or assets, while not undermining its natural resource base' (Scoones 1998, cited by Swift and Hamilton 2001, p82). Food security is one important element of sustainable livelihoods. Households become food insecure when the livelihood system changes or fails to adapt to challenges and shocks from the external environment (Swift and Hamilton 2001, p90).

Appendix C: MRC food composition table food grouping system

	Food Group Name:
1	Cereal and cereal products
2	Vegetables
3	Fruit
4	Legumes and legume products
5	Nuts and seeds
6	Milk and milk products
7	Eggs
8	Meat and meat products
9	Fish and seafood
10	Fats and oils
11	Sugar, syrups and sweets
12	Sauces, seasonings and flavourings
13	Beverages
14	Baby foods
15	Therapeutic/Special/Diet products
16	Miscellaneous

(Sayed, Frans and Schönfeldt 1999)