

ABSTRACT

Crop production is widely promoted as a solution to food insecurity, but its real impact on household food security has not been measured in South Africa. Small-scale production is a common practice for many rural poor households of South Africa. While agriculture may play a major role in reducing food insecurity, agricultural growth alone cannot solve the problem of food insecurity at household level. South Africa is food secure at the national level, but available data suggest that between 58.5 and 73 percent of South African households experience food insecurity.

This study set out to measure the impact of crop production on household food security among sampled households in two communal regions, Umbumbulu and Maphephetheni, of KwaZulu-Natal, to establish whether participation in food production improved household food security. Household surveys which explored the types of crops produced, food consumed, income obtained from crop sales and the food security situation, were carried out at Umbumbulu and Maphephetheni respectively (n = 200 and n = 68). The types of crops produced were investigated using crop production seasonality charts, while the household food security situation was measured using the Coping Strategy Index tool.

The main findings of the study indicated that household gardens provided food for household members, but did not provide sufficient quantities to meet year-round consumption requirements. Most sampled households relied largely on purchased foods. More than 80% of the food consumed by households came from purchases, 4% and 13% came from own production in Umbumbulu and Maphephetheni respectively. Among the households surveyed, 58% and 89% were below the poverty line for Umbumbulu and Maphephetheni respectively. Umbumbulu and Maphephetheni's largest household income contributions came from wages or salaries. Social grants were the second most important source of household income. As participation in crop production alleviated food shortages somewhat, its contribution to food security cannot be ignored. A study needs to be conducted to investigate whether participation in both farm/non farm activities reduces the number of households below the poverty line. Government should provide extension officers to monitor and evaluate the impact of gardens on household food security. To guide the design and implementation of commercial and home gardens, households need to develop clear and consistent policies, strategies, processes and procedures, and (a sound) monitoring and evaluation framework.

DECLARATION

I, Mjabuliseni S.C Ngidi declare that:

(i) The research reported in this thesis, except where otherwise indicated, is my original research.

(ii) This thesis has not been submitted for any degree or examination at any other university.

(iii) This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from those persons.

(iv) This thesis does not contain other authors' writing, unless specifically acknowledged as being sourced from other authors. Where other written sources have been quoted, then:

a) their words have been re-written but the general information attributed to them has been referenced;

b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced.

(v) This thesis does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, with the source being detailed in the thesis and in the references sections.

Signed:**Date**

Name: Mjabuliseni S C Ngidi

As research supervisor I agree to submission of this dissertation for examination:

Signed:.....**Date**.....

Name: Professor SL Hendriks

ACKNOWLEDGEMENTS

I acknowledge the following people who provided assistance during this study. Without their help this work would have not been possible.

- Professor Sheryl Hendriks for her great supervision, cooperation, keenness to support and enthusiastic motivation. The assistance, knowledge, guidance and ideas that she presented are appreciated.
- My family (mother, all brothers and sisters) for being with me and for giving support.
- My late mother and father, this dissertation is dedicated to you for being there for me when needed.
- Mr and Mrs Breedt and their family for the hand of support and encouragement they extended throughout my high school and university life.
- Mrs Makhanya and Mrs Mngomezulu for arranging meetings with community and home gardeners.
- All the participants (household members) from both Umbumbulu and Maphephetheni for the valuable information they provided.
- The Department of Student Housing for offering me part-time work so I could continue with my studies.
- All my colleagues from the African Centre for Food Security for the encouragement support and ideas offered.
- All my friends for listening to my problems and support and encouragement they have given me through out this research.
- National Research Foundation's (GUN number TTK20070520000011) Thuthuka Programme for a scholarship and field work costs.

- The University Scholarship Awards committee for awarding me the Archbishop Denise Hurley Scholarship.

TABLE OF CONTENTS

ABSTRACT	ii
DECLARATION	iii
ACKNOWLEDGEMENTS	iv
LIST OF FIGURES	ix
LIST OF TABLES	x
LIST OF ACRONYMS	xii
CHAPTER 1 THE PROBLEM AND ITS SETTING	1
1.1 Introduction to the research problem	1
1.2 Importance of the study	3
1.3 Research problem	4
1.4 Sub-problems	4
1.5 Study limits	4
1.6 Study assumptions	4
1.7 Structure of the dissertation	5
CHAPTER 2 REVIEW OF RELATED LITERATURE	6
2.1 The concept of food security and insecurity	9
2.2 The household food security situation in South Africa	11
2.3 Progressive stages of food insecurity and coping strategies	13
2.4 The Coping Strategy Index (CSI)	15
2.5 Crop production as an intervention to mitigate food insecurity and poverty	17
2.5.1 Increasing income to purchase food	22
2.5.2 Increasing food access and availability	24
2.6 Why is it important to evaluate the impact of agricultural interventions?	26
2.7 Summary of the literature review	29

CHAPTER 3 CHARACTERISTICS OF THE STUDY AREAS	30
3.1 Description of the Umbumbulu area	30
3.2 Description of the Maphephetheni area	32
3.3 Crop production in Umbumbulu and Maphephetheni	34
3.4 Coping strategies employed in Umbumbulu and Maphephetheni	35
3.5 Agricultural and crop production potential in Umbumbulu and Maphephetheni	36
CHAPTER 4 STUDY METHODOLOGY	39
4.1 Umbumbulu survey	39
4.2 Maphephetheni survey	40
4.3 Crop production seasonality charts	40
4.4 The Coping Strategies Index tool	41
4.4.1 Estimating the Coping Strategies Index Score	41
4.5 Data analysis and treatment	45
CHAPTER 5 RESULTS AND DISCUSSION	47
5.1 Availability of food crops	47
5.2 What proportion of food consumed is from own crop production?	51
5.3 What income was obtained from own crop production?	56
5.4 Did crop production lead to food security in Umbumbulu and Maphephetheni?	59
5.4.1 The Coping Strategies Index Scores	59
5.4.2 Household consumption coping strategies employed in Umbumbulu and Maphephetheni	60
5.4.3 Relationships between income and CSI scores	63
5.4.4 Analysis of coping strategies	65
5.4.5 Relationships of CSI scores to food consumption per capita	68
CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS	70
6.1 Conclusions	72
6.2 Policy implications and recommendations for improving the impact of crop production in household food security	73

6.3 Recommendations for improvement of the study	74
6.4 Recommendations for further studies	75

REFERENCES	76
-------------------	-----------

APPENDICES	97
-------------------	-----------

APPENDIX A	EFO members' production survey questionnaire -coded
APPENDIX B	Non-EFO members' production survey questionnaire -coded
APPENDIX C	EFO household and consumption questionnaire
APPENDIX D	Maphephetheni household and consumption questionnaire
APPENDIX E	Seasonality production chart
APPENDIX F	Umbumbulu and Maphephetheni combined survey data and code list

LIST OF FIGURES

Figure 2.1: The community needs that development projects in KwaZulu-Natal aimed to address	25
Figure 2.2: The means by which development projects in KwaZulu-Natal aimed to increase food availability and food access	26
Figure 3.1: Map indicating the location of Umbumbulu (Embo) and the Valley of the Thousand Hills	31
Figure 3.2: Regional land potential classification in KwaZulu-Natal	38
Figure 5.1: The crop production seasonality chart for Embo crop producers, 2006	48
Figure 5.2: The crop production seasonality chart for Maphephetheni crop producers, 2006	49

LIST OF TABLES

Table 2.1:	Food security programmes implemented by the government of South Africa	19
Table 2.2:	The percentage of households that farm in order to supply food for the households	21
Table 2.3:	Sources of income and contribution to total household income	22
Table 3.1:	Consumption coping strategies employed in Umbumbulu (n = 200, 2005) and Maphephetheni (n = 68, 2004)	35
Table 3.2:	Crop production potential in Maphephetheni and Umbumbulu areas	37
Table 4.1	Assigning numeric values to relative frequencies	42
Table 4.2:	Severity ranking of coping strategies as per focus group discussions, Umbumbulu March 2005	43
Table 4.3:	Severity ranking of coping strategies as per focus groups discussions, Maphephetheni September 2004	44
Table 4.4:	Showing the sub-problem, data collected and analysis used to answer the study sub-problems, 2006	46
Table 5.1:	The proportion of each crop consumed per capita in Umbumbulu (n = 200) and Maphephetheni (n = 68) respectively, 2006	52
Table 5.2:	Household per capita consumption of food from various food sources at Umbumbulu (n = 200) and Maphephetheni (n = 68) respectively, 2006	54
Table 5.3:	Total income (R) obtained by households per capita per month from own production in Umbumbulu (n = 102) and Maphephetheni (n = 61), 2006	57
Table 5.4:	The percentage contribution of income sources to the total household income of households in Umbumbulu (n = 200) and Maphephetheni (n = 68), 2005	58
Table 5.5:	The distribution of Coping Strategy Index (CSI) scores in Umbumbulu (n = 200) and Maphephetheni (n = 68), 2005 and 2004 respectively	59
Table 5.6:	Frequency of coping strategies undertaken in Umbumbulu (n = 200), March 2005	61
Table 5.7:	Frequency of coping strategies undertaken in Maphephetheni (n= 68), September 2005	62
Table 5.8:	Relationships between income per capita from crop production and Coping Strategies Index scores, 2006	63
Table 5.9:	Spearman's correlation coefficients for sources of income and cumulative	

	CSI scores, in Umbumbulu (n = 200) and Maphephetheni (n = 68), 2007	64
Table 5.10:	Relationships between per capita sources of food consumed and CSI scores at Umbumbulu and Maphephetheni	65
Table 5.11:	Relationship between application of coping strategies and CSI scores at Umbumbulu and Maphephetheni, 2006	66
Table 5.12:	Relationship between application of coping strategies and per capita consumption of food produced from own production at Umbumbulu and Maphephetheni , 2006	67
Table 5.13:	Relationship between frequency of coping strategies and per capita income obtained from sales of produce at Umbumbulu and Maphephetheni, 2006	68
Table 5.14:	Relationship between per capita items of food consumed by households and the cumulative CSI scores, Umbumbulu (n = 200) and Maphephetheni (n = 68) respectively, 2006	69

ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
CFS	Committee on World Food Security
CSI	Coping Strategy Index
CSIS	Coping Strategy Index Score
DFID	Department For International Development
EFO	Ezemvelo Farmers' Organisation
FAM	Food Aid Management
FAO	Food and Agriculture Organisations
FIVIMS	Food Insecurity and Vulnerability Mapping Systems
FNCO	Food and Nutrition Coordinating Office
GIS	Geographical Information Systems
GDP	Gross Domestic Product
HIVAN	HIV/AIDS Networking
HIV	Human Immune Virus
IFAD	International Fund for Agricultural Development
LIFDC	Low Income Food Deficit Countries
MDGs	Millennium Development Goals
NDA	National Department of Agriculture
NFCS	National Food Consumption Survey
PLAAS	Programme for Land and Agrarian Studies
RDA	Recommended Daily Allowance
SPSS	Statistical Package for Social Sciences
UNDP	United Nations Development Programmes
UNICEF	United Nations International Children's Emergency Fund
VIC	Vitamin Information Centre
WFP	World Food Programme
WFS	World Food Summit
WHO	World Health Organisation

CHAPTER 1

THE PROBLEM AND ITS SETTING

1.1 Introduction to the research problem

South Africa is classified as an upper middle-income country with one of the most skewed distributions of income in the world (Machethe *et al.*, 1997). Food insecurity and poverty are realities in rural and peri-urban areas of South Africa (Hendriks and Msaki, 2006a; Labadarios, 2000; Rose *et al.*, 2002). Although South Africa is an upper middle income country, economic inequality has resulted in 37 per cent of households living on less than R1000 per month in 2002 (Woolard, 2002). Hendriks (2005) and Dlamini (2002) explain that South Africa is nationally food secure, but available data in 1999 suggests that between 58.5 and 73 per cent of South African households experience food insecurity and 15.9 per cent consume less than the adequate energy requirements. About 24 to 28 per cent of children under nine years of age are affected by stunting and whilst 3.7 per cent experience wasting respectively. Approximately 30 per cent of rural households in South Africa experience hunger (Woolard, 2002). Statistics South Africa (2006) showed a fluctuating percentage of households who reported having members that ‘always went hungry’, from two per cent in 2002, three per cent in 2003 and two per cent in 2005. These values indicate that, at household level, many South Africans still experience food insecurity and hunger (Rose and Charlton, 2002).

The role of crop production in the economy, although relatively minor, is still generally acknowledged (Food and Nutrition Coordinating Office, 1998; Machethe, 2004). However, there is no consensus on whether agricultural development is the most appropriate vehicle to fight food insecurity and poverty in developing countries. Delgado (1998) argued that smallholder agriculture is simply too essential to employment, human welfare, and political stability to be either ignored or treated as just another small adjusting sector of a market economy. The Food and Agriculture Organisation (2004) argue that agriculture can contribute to food insecurity and poverty alleviation at rural, urban and national levels in four ways:

- Reducing food prices

- Employment creation
- Increasing real wages
- Improving farm income

Delgado *et al* (1998) and Hazell and Haggblade (1993) have proposed that agricultural growth linkages can generate employment opportunities and broaden rural incomes, through expanded and diversified production of both farm and non-farm goods and services.

For more than a decade, South Africa's performance in effectively tackling poverty has been unsuccessful (Machethe, 2004). The number of people living in poverty in South Africa has increased, and the prevalence of malnutrition has remained substantially higher than in developed countries (Aliber, 2003). The poverty rate has increased slightly in sub-Saharan Africa, including South Africa, over the same period (Aliber, 2003; Aliber and Modiselle, 2002). It is clear that more effective poverty and food insecurity alleviation strategies are urgently required. Food security is part of section 27 of the Constitutional Rights of South Africa. The Constitution states that "every citizen has the right of access to sufficient food and water, and that the state must by legislation and other measures, within its available resources, avail to progressive realisation of the right to sufficient food" (National Department of Agriculture, 2002:5).

Increasing the amount of food available through crop production is necessary to feed an increasing population (Adato and Feldman, 2001). A further increase in food production depends on:

- Better integration of traditional knowledge with research
- Improving farming practices through training and use of appropriate technology to increase outputs from current land, without further loss of productive land
- Land reform to provide secure access to land for more people
- Provision of low-cost finance to assist farmer investment in improved seeds, fertilisers and small irrigation pumps (Adato and Feldman, 2001).

Engaging in crop or food production may lead to greater availability of food and economic growth in the domestic and /or national markets (Machethe, 2004). Rural households need to establish production strategies/ interventions that are suitable to local conditions. These strategies use relatively inexpensive production inputs and make efficient use of scarce resources to increase household food security and incomes (FAO, 1998).

1.2 Importance of the study

Small-scale agricultural production is a common practice for many rural poor households of South Africa (Dlamini, 2002). In South Africa, research on the impact of crop production on household food security is limited, yet agricultural crop production may substantially contribute to lives of many rural people. Crop production has the potential to contribute to the reduction of food insecurity and poverty in the form of household income generation and food availability (Machethe, 2004). Crop production as a food security intervention could make more food available for poor South Africans.

According to Hendriks (2005) agricultural production in South Africa is generally sufficient to meet food security needs at national level. However, according to van Rooyen and Sigwele (1998) and the National Department of Agriculture (2002), agricultural production may not successfully address issues of food shortage at the household level. May (1998) and May *et al.* (2000) stated that in 1990, 83 percent of African households in rural South Africa lived below the national poverty line. In this light, Machethe (2004) mentioned that crop production could be the best vehicle to reduce rural food insecurity and poverty. Food production in and around the household is the most ancient form of cultivation. Despite mounting evidence that gardens may yield significant nutritional and economic benefits to households and societies, gardens have been ignored as a legitimate area of research (Makhotla and Hendriks, 2004; Ninez, 1984). This background information serves to consolidate the overall need to study crop production and specifically to investigate its contribution to household food security.

1.3 Research problem

Does participation in crop production improve household food security in Umbumbulu and Maphephetheni?

1.4 Sub-problems

To determine the impact of crop production on household food security in two sampled communities, four sub-problems were developed as presented below.

Sub-problem 1: Which crops are produced over the year?

Sub-problem 2: What proportion of food consumed is from own crop production?

Sub-problem 3: What income is obtained from own crop production?

Sub-problem 4: Did crop production lead to food security in Umbumbulu and Maphephetheni?

1.5 Study limits

The study was carried out among households from communities in Umbumbulu and Maphephetheni, therefore, the results may not be generalised to other communities in and beyond Umbumbulu and Maphephetheni. The study focussed on crop production and did not explore animal production. The study did not assess the nutritional status of household members. The study looked only at food availability and access, and did not look at food utilisation.

1.6 Study assumptions

It was assumed that all households would answer the survey questions honestly, and that people would remember all the foods purchased during the month prior to the survey. It was assumed that all food bought was consumed and that no food was wasted. It was assumed that the Coping Strategy Index measured food (in)security accurately and directly. It was assumed that scale of production is not dependent on the area, and therefore that every person who participated in the survey had an equal opportunity for production.

1.7 Structure of the dissertation

Chapter 1 has outlined the background to the research problem, the importance of the study, the research problem, sub-problems, study limits and assumptions. Chapter 2 reviews relevant theoretical and empirical literature on the concept of food (in)security, the household food security situation in South Africa, progressive stages of food insecurity, coping strategies, crop production as a food security intervention and evaluation of the impact of agricultural interventions. Chapter 3 describes the study areas. Chapter 4 describes the methodology employed. Chapter 5 reports the findings of the study. Finally, Chapter 6 reports conclusions and recommendations of the study.

CHAPTER 2

REVIEW OF RELATED LITERATURE

It is anticipated that the world population will increase from 5285 million in 1990 to 7032 million by the year 2010 (Branckaert and Gueye, 1999). Such growth will take place mostly in developing countries. This is a tremendous challenge to developing countries as they attempt to improve food access and availability, because the demand for food will increase. In an attempt to combat poverty and food insecurity, 186 governments met at the 1997 World Food Summit, and resolved to eradicate poverty through enhancement of agricultural production (United Nations Development Programme, 1997). This mission was re-enforced at the Millennium Assembly 2000, where governments committed to reduce the proportion of people living on less than a dollar a day by half (Scherr, 2003). However, it is disappointing that millions of people around the world are still food insecure and hungry (Leroy *et al.*, 2001). In fact, in most of the least developed countries, particularly in Africa, the number of people living in poverty has increased since government officials met (FAO, 1999).

Food security is defined as a situation where all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Hoddinott, 1999; Hoddinott and Yohannes, 2002 and 2003; National Department of Agriculture, 2002). Clearly South Africa, regardless of its relative wealth and well-developed economy, is still beset with prevalent poverty and food insecurity (Hindson *et al.*, 2003). Many poor South Africans are faced with the challenge of rapidly growing unemployment, and they struggle to fight food insecurity and eradicate poverty (Machethe, 2004).

Food insecurity is a real problem in South Africa, and in order to make an effective contribution to ensuring household food security, households need to realise the need to use various approaches to reduce food insecurity and poverty (Ndlela, 2003). Food security and poverty interventions applied by policy makers include interventions to restore productivity, increase yields through high yielding varieties of maize, improve soil fertility and introduce agricultural subsidies and hand-outs (Arnell *et al.*, 2004;

Misselhorn, 2006). These anti-poverty interventions are considered key tools for combating vulnerability and increasing food security.

The South African government faces several key challenges in the area of food security including:

- Ensuring that enough food is available to all, now and in the future
- Matching incomes of people to prices in order to ensure access to sufficient food for every citizen
- Empowering citizens to make appropriate choices for nutritional and safe food
- Ensuring adequate safety nets and food emergency management systems
- Ensuring adequate analysis, monitoring, evaluation and reporting on the impact of food security programmes on target samples (National Department of Agriculture, 2002)

Machethe (2004) observed that crop production is one of the most important ventures in subsistence agriculture for many rural households. With sustainability and food security in mind, South Africa is required to efficiently utilise every available resource to produce food. Small-scale farmers play a vital role in ensuring long-term household food sufficiency (National Department of Agriculture, 2002). Cousins (2005) proposed that agricultural intensification and commercialisation may offer solutions to food insecurity in rural areas of South Africa through increased income from farm and non-farm sources. However, the potential for smallholder agriculture to address food insecurity through agricultural intensification and increased incomes has not been adequately investigated in South Africa (Aliber and Modiselle, 2002).

The Central Statistical Service (1995) stated that KwaZulu-Natal has the highest rural population (5.4 million) and the second highest urban population (3.2 million) of all South Africa's nine provinces. Moreover, May (1998) explained that food insecurity at household and individual level, is found to some extent within rural households of KwaZulu-Natal. Therefore, programmes to address lack of household food security should provide food with required nutrients for the households. Small-scale crop production could be one of many ways of ensuring that food is accessed by households. FAO (1997) and Machethe (2004) pointed out that small-scale

agricultural production is a potentially important contributor to household food security through increased food access.

Increasing the amount of food available through crop production is necessary to feed an increasing number of South Africa's poor households. Increased food production depends on better integration of traditional knowledge with research, and improved farming practices through training (Adato and Feldman, 2001). Engaging in crop production may lead to a greater availability of food and increased economic growth in domestic and/or national markets (Devereux, 2001; National Department of Agriculture, 2002). Generating income for poor households through crop production may provide access to more and varied foods, and could provide cash for use in other areas of the economy, such as small enterprise development and manufacturing, which in turn could further reduce poverty and food insecurity (National Department of Agriculture, 1993; Smith, 1999).

Martin (1998) reported that if food security interventions are to make visible impacts on households, these interventions should be continually evaluated or measured by food security programme managers. Measuring the impact of food security interventions assists with the provision of information on whether applied strategies achieve objectives or not (Martin, 1998; Reily *et al.*, 1999). However, measuring food security can be costly and complicated (Hendriks, 2005). A wide variety of methodological approaches have been applied to food security studies, determined primarily by the purpose of the analysis and availability of data but the multidimensional character of food security makes measurement complex (Reily, 2000).

Household food security approaches emphasise both availability of food and stable access to it (Dlamini, 2002). This means that food availability at national and regional levels, plus stable and sustainable access at local levels, are critical for household and individual food entitlements (Frankenberger and McCasten, 1998). Dlamini (2002) reported that improvements in purchasing power entitle people to food and correlate positively with the enhancement of food security. Frankenberger and McCasten (1998) observed that most households derive such entitlement to food from their own production, income, gathering of wild foods, community claims, assets and migration.

This means that several socio-economic variables may have an influence on household access to food.

This literature review first develops an understanding of the concept of food (in)security, and then outlines the national (South African) food security situation. Third, the review describes the coping strategies that household members employ when faced with problems of poverty and food insecurity. Fourth, the importance of crop production is discussed as an intervention to mitigate against food insecurity. Here the review outlines crop production as a way of increasing food access and availability, and providing increased income for purchasing food. Lastly, the importance of evaluating the impacts of agricultural interventions as food security strategies is discussed.

2.1 The concept of food security and insecurity

Concern with food security can be traced back to the world food crisis of 1972-74, and beyond that at least to the Universal Declaration of Human Rights in 1948, that recognised the right to food as a core element of an adequate level of living (Olarinde and Kuponiyi, 2005; Saad, 1999). Food security as a concept emerged at the United Nations Food and Agriculture Organisation (FAO) World Food Summit in 1974 (Hoddinott, 1999:2; Saad, 1999). The shift in food security definitions was discussed during the 1996 World Food Summit (WFS) where heads of state and government officials realised that the large increase in global food supply did not improve the food security status of many poor households (Saad, 1999). FAO (1996a) reported that the meaning of food security has shifted from food supply to food availability and access.

Food security is a flexible concept, as reflected in the many attempts at defining the concept in research and policy arenas (FAO, 2003). The continuing evolution of food security as an operational concept in public policy has reflected a wider recognition of the complexities of the technical and policy issues involved (FAO, 2003). The most recent careful redefinition of food security was negotiated in the process of international consultation leading to the World Food Summit (WFS) in November 1996 (FAO, 2003). A comparison of food security definitions highlights considerable shifts in thinking over the past 25 years. These food security definitions also provide a

guide to policy makers, and have re-shaped understanding of food security as a problem requiring international and national responsibility (FAO, 2003; Saad, 1999).

The most widely used definition of food security is the 1996 World Bank definition that defines food security as “access by all people at all times to enough food for an active, healthy life” (Hoddinott, 1999). The term ‘access’ is inclusive of both food supply (availability) and food demand (entitlement) (Hoddinott, 1999:10). Food security is centred on four sub-concepts: food availability, access, entitlement and utilisation (Maxwell, 1995; Saad, 1999). This review focuses on only two sub-concepts of food security, namely food availability and access.

Food availability refers to the supply of food available at local, national or international levels (FAO, 1996a; Saad, 1999). Food availability may refer to a continuous supply of food at both national and household level and it is affected by input and output market conditions, as well as production capabilities of the agricultural sector (National Department of Agriculture, 2002). Riely *et al* (1999) mentioned that the use of the phrase “food availability” may be confusing because it can refer to supply either at a household and/or regional level. In this review, unless used in defining food security, the use of the phrase refers to food available at household level. Food access refers to the capability of individuals and households to obtain food (FAO, 1996a; Saad, 1999). Food accessibility may also refer to the ability of households to obtain sufficient food for all members at all times, either through production for own consumption, or through exchange and addresses the issues of purchasing power and consumption behaviour (National Department of Agriculture, 2002; Saad, 1999).

Household food insecurity refers to lack of access to enough food (Saad, 1999). There are two kinds of food insecurity: chronic and transitory. Transitory food insecurity is a temporary decline in household access to enough food. Chronic food insecurity is a continuously inadequate diet caused by the inability to acquire food (Maxwell and Frankenberg, 1992; Saad, 1999). Chronic food insecurity affects households that persistently lack the ability either to buy enough food or to produce their own food (Hoddinott, 1999; Saad, 1999). When household income sources are continually insufficient to meet food requirements, chronic food insecurity is experienced. The chronically poor (who have low or variable incomes, few assets and few marketable

skills, and who lack powerful advocates) are most vulnerable to chronic food insecurity (Hoddinott, 1999; Saad, 1999). Transient food insecurity, which is often the result of economic or natural disasters, is exacerbated by poverty crises which may give rise to distress sales of assets leading eventually to chronic food insecurity (Hoddinott, 1999; Saad, 1999). Maxwell and Frankenberger (1992) have reported that seasonal or cyclical food insecurity may be experienced when there are regular patterns of food insecurity, for instance, during the lean (hunger) season that occurs before harvest, or during regular dry spells. Food insecurity at the intra-household level may manifest as slow educational development and stunting among children (National Department of Agriculture, 2002). The degree of vulnerability to food insecurity for an individual, household or group of persons, is determined by their exposure to risk factors, and by their ability to cope with or withstand stressful situations (Committee on World Food Security (CFS), 1998).

2.2 The household food security situation in South Africa

Empirical food security research in South Africa is limited. Hendriks (2005) reported that lack of comparative studies and time-series data sets prohibits accurate estimation of food security and food security trends in South Africa. Food insecurity is a problem in both rural and urban poor households in South Africa (de Swart, 2002). Statistics South Africa reported that nearly fourteen million South Africans were vulnerable to food insecurity in 2002 (Statistics South Africa, 2004).

The South African food insecurity situation closely correlates with that of other Southern African countries, despite South Africa being a relatively wealthy and nationally food secure country (National Department of Agriculture, 2002; van Rooyen *et al.*, 1996; World Bank, 1998). In South Africa, food production is sufficient for the total population, so South Africa is not classified as a Low Income Food Deficit Country (LIFDC). However, a large proportion of the total population continues to experience acute problems of malnutrition and hunger. South Africa displays the common features of food insecurity that predominate in developing countries (Mekuria and Moletsane, 1996).

South Africa is food secure at the national level, but at the household level many people are food insecure (Hendriks, 2005; National Department of Agriculture, 2002).

Previous research by Harrison (1995) estimated that between 30 to 40 per cent of South African households did not have assured access to adequate diets. This lack of household food security has been related to a lack of physical availability of food in rural areas. Information regarding energy and nutrient intake and nutritional status in South Africa is also limited (Vink and Kirsten, 2002). A meta-analysis of dietary intake data showed that the mean energy intake of urban and rural households is lower than the recommended daily allowance (RDA) for all groups, except for rural women aged 25-64 years (FAO, 1996b). This indicated that households in South Africa are generally food insecure.

The National Department of Agriculture (2002) showed that in 1996, nearly a third (2.8 million) of poor households spent less than R1000 per month, while only 18% (1.63 million) of households spent more than R3 500 per month on food. These figures disguise the bi-polar mode of income distribution that characterises South Africa, but show that South Africa has many poor, food insecure households and only a few wealthy households. As a result, the distribution of poverty and food insecurity in the country is uneven in its spread and intensity. Gauteng and the Western Cape are the wealthier provinces with the least number of poor households, at less than 12% each (National Department of Agriculture, 2002). On the other hand, the Free State, Eastern Cape and Northern Provinces had the worst poverty in South Africa in 1999 (National Department of Agriculture, 2002). In the middle group of poverty levels are Mpumalanga, KwaZulu-Natal, Northern Cape and Western Provinces.

Stunting is a major nutritional problem in children under five years of age in South Africa, especially among urban-informal settlements and rural households (Coutsoudis *et al.*, 2000; UNICEF, 1998; Vitamin Information Centre, 2001). Labadarios and van Middelkop (1994) reported that the incidence of stunting among South African children was estimated at 24.4% to 28.6%, a rate which, was considered to be high in 1993. In Bloemfontein (South Africa), the highest prevalence of stunting was found among the one to four-year-old children (Dannhauser *et al.*, 1996). Ruel and Levin (2000) and the Vitamin Information Centre (2001) reported that in 1999, one in four children under the age of six years was stunted, and one in ten was underweight due to chronic malnutrition. Deficiencies of micronutrients, vitamins and essential minerals have been shown to have a negative impact on

people's health, social and economic standing, both in South Africa and other countries (Labadarios and Nel, 2000; May, 2000).

The National Food Consumption Survey analysis of 1999 data showed that under-nutrition in South Africa was more concentrated in the Eastern Cape, Northern Province and KwaZulu-Natal (Labadarios and Nel, 2000). Nationally, one in three children had a marginal vitamin A deficiency and its prevalence was reported to be high in rural areas among children with poorly educated mothers (Labadarios and Nel, 2000). Generally, poor dietary intake and nutritional status are of great concern because they have adverse effects on physical and mental development, particularly in children (FAO, 1997, Walker, 2001). One may, due to lack of sufficient information, overlook the nutritional effects on individual child achievement and quality of life.

Attempts to alleviate these micronutrient problems through (household) food security programmes require sustainable approaches, suited to the conditions of the household and individuals (FAO, 1997). FAO (1997) proposed that food-based strategies are sustainable and feasible means to reduce or prevent micronutrient malnutrition. These food-based strategies include food supplementation, fortification, bio-fortification and dietary diversification. Nell *et al* (2000) reported that root vegetables, such as beetroot and carrots, are mostly grown throughout the year to provide vegetables in community and home gardens of South Africa.

2.3 Progressive stages of food insecurity and coping strategies

Households employ various coping strategies when faced with food insecurity (Brink, 2001; Saad, 1999). As reported by van der Kam (2001), people adopt a range of strategies (mechanisms) to cope with reduced access to food. Tulane (1992) reported four progressive stages that households experience when faced with food insecurity. The first stage is marked by the initial shortage of food, or inability to provide sufficient quantities of food to all members of the household. During the first stage, responses developed by the households are reversible, and in principle, do not damage future productive capacity (van der Kam, 2001). Many times, households prepare for a food quantity shortfall, as in the case of seasonal production, by storing quantities of grain or selling small livestock quickly, and using the money to purchase food (Frankerberger, 1992; Tulane, 1992; van der Kam, 2001). These stored quantities of

grain are often referred to as insurance, and are not intended to be a part of main income or an integral part of income generation, but simply crisis insurance (Tulane, 1992; van der Kam, 2001). Households often first adjust consumption patterns by changing diets to reduce portion sizes and the number of meals eaten in a day, borrowing money from relatives, seeking wage labour and gathering wild foods (Tulane, 1992; van der Kam, 2001).

Generally, the most common food security indicators of stage one include dietary changes; reduction of meal frequency; reduction of food consumption; gathering of wild foods; inter-household transfers and loans; looking for credit; increased petty commodity sales (firewood, charcoal) and the seeking of wage labour or selling of labour (Tulane, 1992). People's reactions depend mainly on their perceptions of the severity of the crisis and their economic and social positions (FAO, 1997; van der Kam, 2001).

During the second stage, responses developed by households are less reversible, because households are forced to use strategies that reduce productive assets and threaten future livelihoods (van der Kam, 2001). The second stage of food insecurity is typically marked by the sale of assets, especially non-productive assets (Corbett, 1998; Tulane, 1992). At this point in a food security crisis, food consumption begins to supercede asset preservation as the top priority, but still not entirely. Jewellery, livestock and assets that serve as crisis insurance may be liquidated (Corbett, 1998).

Generally, the assets that are preserved are those that relate to income generation, such as land, farming equipment, oxen and cattle (Tulane, 1992). In addition to the sale of non-productive assets, the second stage also sees the onset of loans or credit from merchants (as opposed to family) which also have serious implications for the future security of the household members. Typical food security indicators of the second stage include sales of non-productive livestock and/or jewellery; insurance assets; temporary migration for work or land (days/weeks, days/month); skipping meals for the entire day (days/weeks) and withdrawing children from school (Tulane, 1992; van der Kam, 2001).

Stage three is characterised by the sale of productive assets and the shift of priorities from asset preservation to ensuring adequate food consumption (van der Kam, 2001;

Saad, 1999; Rugalema, 2000). At this point, all other attempts have either failed to provide sufficient food, or the crisis has been prolonged, leading to a dire situation (Saad, 1999). Remaining livestock and personal items are likely to be sold at this stage, possibly even including the sale of housing material. The pledging and/or sale of land is also likely to occur (Saad, 1999; Tulane, 1992; van der Kam, 2001). This disposal of assets usually ensures survival, but jeopardises future food security (Tulane, 1992). Thus food security indicators of stage three include sale of most livestock and/or productive equipment; sale or mortgage of land; sending children to better-off relatives (rare) and migration (Tulane, 1992).

Stage four is the last stage and represents complete destitution. In this stage, households no longer exist as before, and permanent migration (either whole or part of household) occurs in order to resettle on suitable land, find wage labour or more likely, access food aid assistance (Saad, 1999; Tulane, 1992; van der Kam, 2001). Individuals are generally too weak to work and simply need food and care to survive at this extreme stage. Food security indicators of stage four include permanent migration, begging for food/resources and dependence on external aid (Tulane, 1992; van der Kam, 2001).

In the early stages (1 and 2) of food insecurity, households do not immediately sell excess produce and livestock, but keep it aside for consumption or sale during leaner seasons. In the later stages of the process, coping mechanisms become exhausted so that the priorities of individuals and the community shift towards survival (Saad, 1999; Tulane, 1992; van der Kam, 2001).

2.4 The Coping Strategies Index (CSI)

The Coping Strategies Index (CSI) was designed as a rapid, household food security assessment tool, and is well suited to the World Food Programme's desire to monitor changes in food security status (Collins, 2004; Senefeld and Polsky, 2005). The index provides a quantitative score for each household, which is a cumulative measure of the level of coping and thus, a measure of food insecurity (Senefeld and Polsky, 2005). The importance of the Coping Strategies Index has been observed in its ability/efficacy in monitoring the short term impacts of food aid on household food security in emergencies.

It is a food security early indicator, a food security assessment tool and is used as an indicator of long-term changes in food security status (Maxwell *et al.*, 2003). Monitoring fluctuations in the index can give a rapid indication of whether food security is improving or deteriorating. When used in combination with context monitoring (early warning) indicators, and food aid end-use monitoring tools, the coping strategy index provides an accurate indication of the way in which household food security is responding to food aid interventions (Coates *et al.*, 2003; Maxwell *et al.*, 1999).

The Coping Strategies Index gives a picture of household food insecurity and reflects the degree of accessing food (Maxwell *et al.*, 2003). The Coping Strategies Index, through a score, provides a level of household food security that an intervention could aim to restore. By monitoring the score, the trends in household food security status can be observed (Maxwell *et al.*, 2003). The household food security status gives an idea of whether the desired intervention impact has been achieved or not.

The Coping Strategies Index enumerates both the frequency and severity of coping strategies undertaken by households faced with short-term food insufficiency. The Coping Strategies Index goes beyond commonly used energy indicators to incorporate elements of future vulnerability and deliberate decisions of households faced with food insufficiency (Maxwell *et al.*, 2003). The Coping Strategies Index enumerates common consumption-related coping strategies. Four general categories of coping are measured, with individual strategies defined specifically according to location and culture:

- Dietary change (e.g. eating less preferred but less expensive food);
- Increasing short-term food access (examples: borrowing, gifts, wild foods, and consuming seed stock);
- Decreasing numbers of people to feed (example: short-term migration); and
- Rationing strategies (examples: mothers prioritising children/men, limiting portion size, skipping meals, skipping eating for whole days) (Maxwell *et al.*, 2003 and 1999).

2.5 Crop production as an intervention to mitigate food insecurity and poverty

Halving hunger and extreme poverty by 2015 is the first Millennium Development Goal (MDG) (FAO, 2007). Persistent hunger is prevalent worldwide, slowing progress towards other Millennium Development Goals, particularly in sub-Saharan Africa (FAO, 2007). Agriculture plays an important role in promoting human well-being and sustainable development, but has been insufficiently emphasised, if not largely overlooked. In the light of poverty, hunger and food insecurity prevalence, FAO (2002) reported that crop production could be a key tool to address food poverty and insecurity in developing countries. In developing countries, the most immediately apparent function of agriculture is to provide food for the 800 million children, women and men who are malnourished or starving (FAO, 2007 and 2002).

If properly managed, agriculture can have a positive impact on poverty alleviation, food security, rural/ urban population distribution, and the environment (Fraser *et al.*, 2003). FAO (2007) suggests that agricultural indirect contributions to the welfare and their mechanisms are not well understood, seldom analysed in the context of development, and rarely reflected in national and rural development policy strategies. The ultimate goal of roles of agriculture project is therefore to provide policy makers with the information they need to create agricultural incentives, and make sound investment decisions, conducive to sustainable development (FAO, 2007). In particular, agriculture is linked with positive externalities, some of which have public good elements (FAO, 2002). FAO (2002) stated that an assessment of these contributions would assist in designing more effective policies for broad-based socio-economic development and food insecurity reduction.

Mitigation of income disparities within and between countries, and conservation of national resources could be addressed by Agriculture (FAO, 2002). In low-income countries, agriculture accounts for a sizable share of the Gross Domestic Product (GDP) and employment. The roles of agriculture have often been overlooked in macro and sectoral policies formulation, though recognition of their importance is growing (FAO, 2002). However, for the vast majority of poor people in developing countries, agriculture is a way of life, the basis of rural livelihoods in agrarian societies and a mix of economic, social and cultural dimensions of human existence (FAO, 2007). Since 75% of the world's poor live in rural areas of developing countries, agricultural

activity is crucial for their survival (Chung *et al.*, 1997). FAO (2002) argued that, in developing countries, agriculture plays an important role that goes beyond production of commodities, in providing social cohesion and viability, poverty reduction, environmental services and contributes to making rural and national cultural identities. Ravallion and Datt (1996) reported that agricultural growth is more effective than other sectors' growth in reducing overall poverty and food insecurity.

While agriculture is important in many developing countries, the concept of small-scale agriculture in South Africa is laden with subjectivity, and has been associated with non-productive and non-commercially viable agriculture (Northord, 2004; Simbi, 1998). There are a number of grass-root interventions that aim to reduce food insecurity and poverty, and improve basic community infrastructure and livelihood opportunities. These agricultural interventions impact on people's livelihoods and food security (Misselhorn, 2005). Food production in and around the household is the most ancient form of cultivation. Crop production can contribute a major part to food and nutrition security by ensuring adequate access to supplies of vegetables at all times (Schmidt and Vorster, 1995; Marsh, 1998; Hendriks, 2003). In rural development literature, increased crop production is considered the best vehicle to reduce rural poverty (Machethe, 2004). In most developing countries, agriculture-related activities provide most of the employment in rural areas and hence reduce food insecurity (Machethe, 2004). However, agricultural workers are poorly paid and most of the employees in the agricultural sector are unskilled (Lopez, 2002). This could mean that increasing agricultural growth will have a large positive impact on food insecurity and poverty (Lopez, 2002; Delgado, 1997).

Kallman (2004) reported that 47 per cent of South Africans suffered from food insecurity and poverty, meaning they did not earn enough from any source to be able to afford a basic diet. The South African Government has embarked on programmes to help mitigate food insecurity and poverty. Table 2.1 indicates food security programmes that government departments in South Africa have implemented.

Table 2.1: Food security programmes implemented by the Government of South Africa (Kallman, 2004:8-13)

Implementing National Department	Food Security Programme to mitigate food insecurity and poverty	Purpose of the programme
Department of Agriculture	Agricultural starter pack	To enable recipients to plant some vegetables. To provide food for three months before the food package benefits
	Comprehensive farmer support package	Trains land reform beneficiaries
	Land care programme	Provides funds for community-based projects such as community gardens which can increase food security and create jobs.
Department of Social Development	Social assistance programme	To provide grants for people who are not able to provide for themselves
	Poverty relief	Funds projects such as: The establishment of food production clusters in communities, focusing more on households affected by HIV/AIDS Support for income-generation activities for rural women
Department of Education	National school nutrition programme	Provides funding to primary schools for school feeding programmes
Department of Health	Integrated nutrition programme	Provides nutrition interventions at hospitals and clinics to manage and prevent child malnutrition
	Community-based nutrition programme (Gauteng)	Target learners in early childhood and crèches
	Food security projects	Provide support through local clinics for the establishment of food gardens
Department of land affairs	Land redistribution for agricultural development programme	Provides grants to previously disadvantaged South Africans to access land for agricultural purposes, such as household crop production and production for markets.

About 12 per cent of the land area in South Africa is under cultivation, and about 10 per cent of this is under intensive irrigation (Schmidt, 2005). Most farming households in South Africa are net deficit farmers, producing to supplement purchased food (Schmidt, 2005). Schmidt (2005) reported that only four per cent of South African households indicated agriculture as their primary income source in 1998. Statistics South Africa (2002) in a study of household income and expenditure in 2000, reported that 57 per cent of all households source income primarily from wages/ salaries, 19 per cent from social grants, 14 per cent from agriculture and 10 per

cent from remittances. Statistics South Africa (2002) found that in 2000, the percentage of households involved in farming for cash or food was highest in the lowest income category and then decreased steeply, from 39 per cent of ultra-poor households, to 22 per cent of the poor, to three per cent of the wealthiest income group. This suggests that poor households rely more on subsistence agriculture for cash or food, as opposed to wealthier households.

Many poor South African households (33 per cent) are involved in small-scale farming, but agriculture does not contribute more than four per cent to their total incomes, even though farming requires very high time commitments from family members (Schmidt, 2005; Hendriks and Maunder, 2006). The level of farming depends on access to land, water, seeds and agricultural implements. Since more than 80 per cent of South Africa's population were restricted to less than 13 per cent of the land under apartheid, most black farmland (in so-called homelands) was severely overused, leading to soil erosion and low productivity (Schmidt, 2005). As a result, many black farm families were supported by at least one person engaged in off-farm employment to complement their incomes or diversify their livelihoods. Increasingly, poor subsistence farmers rely on purchased food and are therefore more vulnerable to food inflation (Human Science Research Council, 2004; Schmidt, 2005).

Schmidt (2005) reported, in a randomly selected study of food security in South Africa, that an average of five per cent or 600,000 of South African households engaged in farming to produce staple food for the family, and 10 per cent of the population (over a million households) used farming to supplement food access. In KwaZulu-Natal, five per cent of the households used farming as the main source of food, and 15% of the households used farming for supplementary food (Watkinson and Makgetla, 2002). Watkinson and Makgetla (2002 citing Statistics South Africa 2000), in a study on South Africa's food security crisis, mentioned that in rural areas such as Limpopo, 20 percent of households engaged in subsistence farming and 27 per cent engaged in supplementary farming, for their main source of food. Table 2.2 indicates the nine provinces of South Africa and the percentage of households that used farming as the main source of food.

Table 2.2: The percentage of households that farm in order to supply food for the household (Statistics South Africa, 2000)

Province	Total number of households	Number of households farming for main source of food	Percentage of households farming for main source of food (%)	Number of households farming for supplementary food	Percentage of households farming for supplementary food (%)
Western Cape	1,067,117	3,241	0	12,900	1
Gauteng	3,082,113	17,338	1	51,329	2
Northern Cape	191,289	4,569	2	8,291	4
Free State	693,196	30,219	4	65,450	9
KwaZulu-Natal	2,047,498	111,249	5	315,062	15
Mpumalanga	643,221	54,511	8	85,550	13
Eastern Cape	1,434,280	169,765	12	277,322	19
Limpopo	1,001,423	195,402	20	272,568	27
North West	784,633	14,591	2	52,544	7
South Africa	10,944,76	600,885	5	1,141,016	10

Food insecurity and the prevalence of underweight children are consistently higher on commercial farms, and in rural areas of Northern Cape, Free State, Mpumalanga, North West and Limpopo Provinces than Gauteng, Western Cape, Eastern Cape and KwaZulu-Natal (FAO 2003: 5). Subsistence farming has been a strategy of poor households in South Africa, including KwaZulu-Natal, to ensure livelihoods. Over two thirds of ultra-poor households are located in rural areas, and more than half of the members of these households are pensioners. Poor households spend a very high share of their income on food. Rising food prices are devastating for people who rely on purchased foods, as is common among the majority of South African households, whether rural or urban (Schmidt, 2005).

Crop production may contribute to food insecurity and poverty reduction at rural, urban and national levels in a number of ways (Delgado and Siamwalla, 1997). The contribution of crop production may include: reducing food prices, employment creation, increasing real wages and improving farm income (Kirsten *et al.*, 2007).

Studies by Kirsten *et al.* (2007) indicate that the pro-poor role of agricultural growth can be remarkable, and more effective than other sectors at reducing poverty and hunger in both urban and rural areas. Agricultural growth has strong and positive contributions to make to food security; often significantly greater than that of other economic sectors (Kirsten *et al.*, 2007). With regard to food security, a study by FAO (2004) on socio-economic analyses and policy implications of the roles of agriculture in developing countries, showed that growing crops is the primary channel for achieving household food security (International Fund for Agriculture Development, 2006).

2.5.1 Increasing income to purchase food

Irz *et al* (2001) reported that one way to assess the contribution of agriculture to the alleviation of poverty and food insecurity, is to look at its share of total household income. In a study involving smallholder farmers by Machethe *et al* (2004), in Limpopo, household income sources were divided into two broad categories of farm and non-farm sources. Farm income included income derived from the sale of farm produce (no livestock income is included as the households did not have any livestock). Non-farming sources included pensions, remittances, wages, family business income and other sources. Table 2.3 outlines the various household income sources and the contribution of each to total household income, with a particular emphasis on contribution from farming for South African poor households.

Table 2.3: Sources of income and contribution to total household income (Machethe *et al.*, 2004)

Income source	Average monthly income (R)	Contribution as % of total household income
Farming	545	41.0
Pension	329	24.8
Wages	258	19.4
Remittances	165	12.4
Family business	19	1.4
Other non-farm income	13	1.0
Total	1329	100

Farming is the most important source of income for “poor” rural households in South Africa (Delgado and Siamwalla, 1997; Kirsten *et al.*, 2007). Machethe (2004) reported that agriculture is not only a major contributor to total household income, but the proportion of income from agriculture seems to increase as households become richer. On the other hand, local research studies on small farm households, by Belete *et al* (1999) and van Zyl *et al* (1991) found that demand for food is less responsive to changes in income than the demand for other products. Van Zyl *et al* (1991) also found that increases in rural incomes were roughly twice as likely to be spent on vegetables, fruit, meat, household durables and semi-durables (e.g. clothing) than on maize, the staple food in most rural areas. However, a study by Hendriks and Lyne (2003), conducted in KwaZulu-Natal, confirmed the important role of agriculture in poverty alleviation. The study concluded that households engaging in agricultural activities tend to be less poor than those not participating in agricultural production.

Furthermore, Machethe *et al* (2004) noted that the level of farm income increases relative to total household income, suggesting that agriculture remains an important source of income, even though households derive a significant proportion of their income from non-farm sources. Machethe (2004) found that some households in Limpopo, that engaged in informal activities, moved to agriculture, suggesting that agriculture could be a better option for income generation than informal activities. Improving the contribution of agriculture to poverty alleviation implies raising the incomes of smallholder farmers (Hall *et al.*, 2003). This requires promoting the growth of smallholder agriculture.

The commercialisation of agriculture is occurring rapidly in some countries, while in others there is stagnation, or even a return to subsistence agriculture on a large scale (von Bruan and Kennedy, 1994). The latter has occurred because of economic restructuring and the shift from planned to market-oriented economies, which has resulted in increased income and employment risks (von Bruan and Kennedy, 1994). About 440 million farmers in developing countries still practice mainly subsistence agriculture, forgoing the potential benefits from domestic and international trade. Subsistence crops cover more than 50 percent of land resources in the majority of low-income countries but land constraints, ecological problems, and rapid

urbanization could lead to a call for change of the current subsistence crop situation (Ashley and Maxwell, 2001).

An agricultural survey done by the South African Bureau of Statistics in 2000, found that 41 percent of rural households in Limpopo sourced income mainly from sale of crops, while 31 percent of the total income was from non-agricultural sources (Machete *et al.*, 2004). The proportion of the family income allocated to various basic necessities (for example food, housing and clothing) in rural and urban households, is determined by, among other factors, income, prevailing prices of necessities, social status, and cultural norms (Schmidt, 2005).

Hendriks and Lyne (2003) explained that strong agricultural growth linkages require an increased demand for local demand-constrained products, in order to stimulate a supply response from farm and non-farm production. Delgado *et al* (1994) argued that widespread increases of the types of non-tradable products that rural people consume (for example dairy products, fruits, vegetables, some starches, services and building materials) can mobilise rural resources (land labour and capital) for growth. High rates of unemployment and low productivity indicate underutilisation of local resources that could be tapped through agricultural development. This development would raise the incomes and spending power of large numbers of poor rural households (Hendriks and Lyne, 2003). Previous South African research indicated that changes in rural consumption, due to income increases, are more likely to increase demand for commodities other than food, creating a leakage of rural income to imported, manufactured goods (Hendriks and Lyne, 2003). Agricultural growth leads to changes in households income and, consequently, in household expenditure or consumption patterns.

2.5.2 Increasing food access and food availability

The scope of food availability includes food production (agriculture and fisheries) through processing, delivery, and consumption, including issues of socioeconomic importance such as the affordability and accessibility of food, and the financial vulnerability of food producers and food producing regions (Lopez, 2002). Increasing food production may lead to greater availability of food and economic growth in the domestic and/or overseas markets (Lopez, 2002; Misselhorn, 2006). Generating

income can provide access to more and varied foods, and provide cash for use in other areas of the economy, such as small enterprise and manufacturing, which in turn help reduce poverty and food insecurity (Everatt and Zulu, 2001). The liberalisation of trade is opening up markets slowly, but there are costly barriers to overcome. Work is underway through the Doha Round of multilateral trading negotiations in the World Trade Organisation, to make trade rules fair, encourage trade liberalisation and assist developing countries to participate in the global trade environment (Ashley and Maxwell, 2001).

Misselhorn (2006) in a study of food insecurity in southern Africa, reported that lack of desire to engage in agriculture, and the move amongst rural people towards wanting urban employment, are direct causes of food insecurity. However, despite the perceived orientation by rural people in KwaZulu-Natal towards urban employment, the majority (50 of 97) project interventions in KwaZulu-Natal are aimed directly (28) or indirectly (22) at improving community agriculture to increase food availability and food access (Misselhorn, 2006). Misselhorn (2006) further explained that the distribution of projects amongst the different types of project objectives, the needs projects aimed to address, and the means of addressing needs, also reflected the emphasis placed on improving agriculture in development work in KwaZulu-Natal (Figure 2.1 and 2.2).

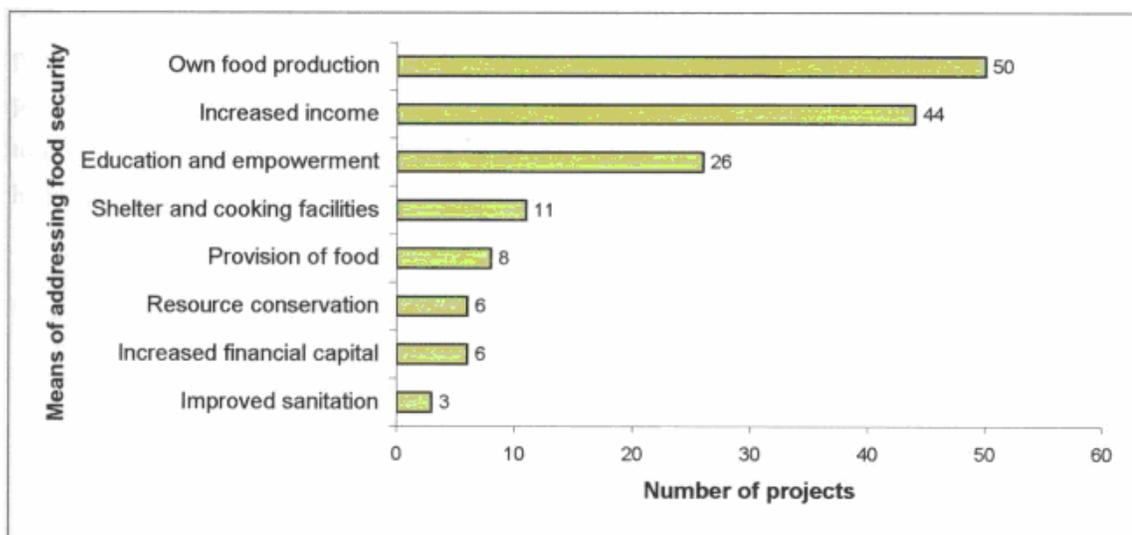


Figure 2.1: Community needs targeted/addressed by projects in KwaZulu-Natal (Misselhorn, 2006:35).

Of the 28 projects surveyed in KwaZulu-Natal by Misselhorn (2006) that directly improved community agriculture, 23 were agricultural crop production projects, three were market garden projects and two were agricultural starter pack projects. The 22 projects that indirectly enhanced agriculture included cattle, rangeland, natural resource management, land reform and land rental projects.

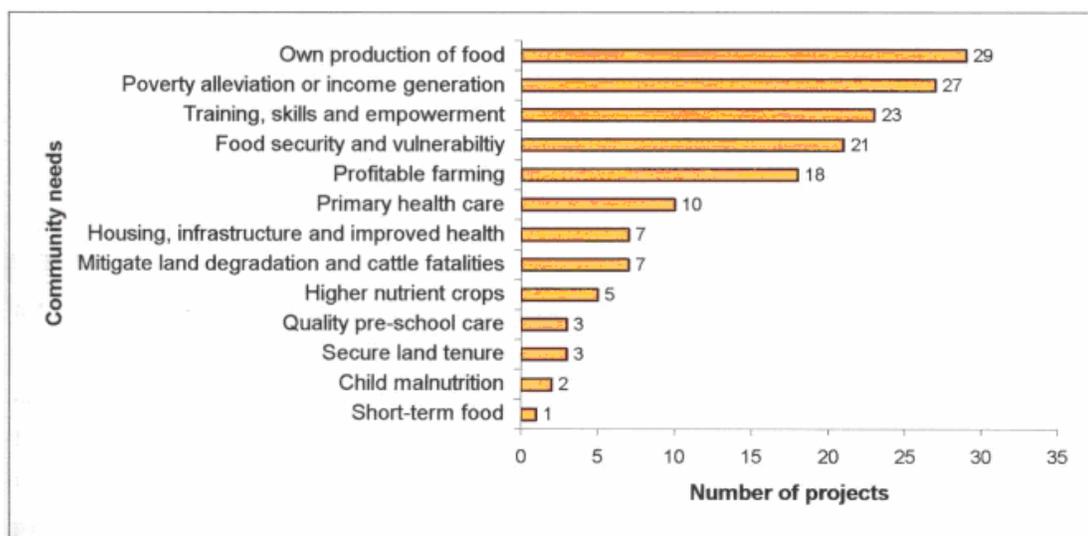


Figure 2.2: The means by which development projects in KwaZulu-Natal aim to increase food availability and food access (Misselhorn, 2006:35).

The targeting of agriculture as a development need in KwaZulu-Natal is comprehensible, if not necessary, given that land as a farming resource is one asset that poor rural communities do have (Misselhorn, 2006). Morris (2002) raised an important question of whether farming interventions can succeed in changing the prevailing sentiments towards agriculture, and whether the underlying causes of the lack of desire to farm need better understanding, if agriculture is to play a more effective role in reducing food insecurity in the province.

2.6 Why is it important to evaluate the impact of agricultural interventions?

In recent years, many development agencies have made intensive efforts to improve efficiency and increase the impact on rural food insecurity and poverty situations (Carletto and Morris, 1999). During the last ten years, the National Department of

Agriculture has initiated many food security project activities, which are designed to improve household food security and the nutrition status of individuals, through improving overall food availability and increasing earning opportunities (Kallman, 2004). With household food and nutritional security now clearly identified as desired outcomes of many development projects (Carletto and Morris, 1999), there is a need to evaluate the performance of investment projects in terms of their impact on household food security and the nutritional status of target groups. Such evaluation seeks to describe the changes in the lives and wellbeing of the final users. In a best case scenario, one tries to compare the situation *ex-ante* and *ex-post* to analyse the positive or/and negative changes (Beerlandt and Huysman, 1999). Often an evaluation contributes to the decision to stop certain programmes or to add others.

Evaluating development/intervention programmes are a critical step in increasing the understanding of the types of interventions that lift people out of food insecurity and poverty, and help to direct resources towards interventions that work. This helps identify successful programmes, and, just as importantly, enables the programmes themselves to learn which particular strategies have the greatest impact, and for which specific clients. Impact evaluations are designed to gauge the extent to which a programme changes food security conditions, such as improvements in nutritional status at the beneficiary-level (Riely *et al.*, 1999). Evaluations also help clarify the impact of the programme itself, and how well it works for outcomes of interest, for example, changes in income, health, and education for women, children and the very poor (Riely *et al.*, 1999; Weiss, 1998). Where a particular intervention is particularly effective, it can be shared and adopted by other programs around the world. Where an intervention fails to deliver the desired impact, it can be retooled (and retested) or dropped in favour of a more effective strategy (Riely *et al.*, 1999).

The first objective of an evaluation exercise is usually to assess service provision (Weiss, 1998). Once the provision of the service has been ascertained, it is important to evaluate the level of utilisation of such services, for example agricultural interventions by the intended beneficiaries, and their coverage (take-up) by the project's target groups (Carletto and Morris, 1999). It is only when the correct service is provided in a timely manner, and properly utilised by a sufficiently large number of beneficiaries, that one can plausibly expect an impact on the indicator of interest (Carletto and Morris, 1999). Only in these cases is an impact evaluation required or justified.

Adequacy assessment determines whether some outcomes actually occurred as expected, for example, did food security/nutritional status improve? (Carletto and Morris, 1999) This type of assessment may be particularly relevant when evaluating process indicators such as the provision, utilisation or coverage of a particular project activity (Carletto and Morris, 1999). Adequacy assessment tends to be of little use for impact evaluation, as these are unable to isolate the effects of the project from those of other concurrent processes, for example, whether an observed improvement in yields is due to provision of improved seed varieties by the project, or instead could be partly or completely attributed to unusually good weather in the area of the project intervention (Carletto and Morris, 1999). Plausibility assessments on the other hand, permit determination of whether a given change can actually be attributed to the project, by isolating its effect from all other confounding factors (Bonnard, 1999; Carletto and Morris, 1999).

By disentangling the project effects from other confounding factors, one can state that the project appears to have had an effect above the impact of non-project influence (Bonnard, 1999). The need to control for the confounding factors arises from the fact that over the project life cycle, it is likely that external factors will contribute, positively or negatively, to changes in the outcomes measured among project participants (Bonnard, 1999). For example, an observed improvement in child nutritional status over the course of a project could be partly due to an inflow of humanitarian food aid, thus increasing the food availability in the area. Similarly, in the context of generalised deterioration, any measurement of project impact would tend to underestimate the true effects, since the project activities may have served as a safety net against concurrent adversity, such as drought or a drop in food aid (Bonnard, 1999).

Finally, probability evaluations can ensure that there is a small, known probability that differences between project and control areas were due to confounding, to systematic bias, or to chance (Bonnard, 1999; Carletto and Morris, 1999). Weiss (1998:4) argued that evaluation is a systematic assessment of the operation and/or outcomes of the programme or policy compared with explicit standards, so that the programme or policy can be improved. Evaluation of agricultural interventions is employed for the purpose of accountability, decision-making, judging the value or

merit of the programme, organisational learning and quality control (Weiss, 1998). The results of evaluation of agricultural interventions are of paramount importance for the use in decision-making, capacity building and empowerment.

2.7 Summary of the literature review

Food security implies that all people, regardless of gender, age, class and race/ethnicity, are at all times guaranteed physical, economic and physiological access to quality foods, to meet both physiological and nutrient requirements. The review of international literature revealed that agriculture is likely to be a vehicle to fight food insecurity in Southern Africa, and that crop production can contribute to food security and poverty reduction at rural, urban and national levels. While South Africa is food secure at the national level, at household level many people are food insecure.

This chapter outlined four progressive stages that households experience when faced with food insecurity. There is a need to evaluate the performance of investment projects in terms of their impact on household food security and on the nutrition status of their targets groups. Overall, different studies used in this chapter present a strong argument that agriculture can be used as a vehicle to fight food insecurity. The following chapter discusses the characteristics of the study area.

CHAPTER 3

CHARACTERISTICS OF THE STUDY AREAS

This chapter briefly describes the study areas of (Embo) Umbumbulu and Maphephetheni respectively. Survey participants from Umbumbulu included: certified Ezemvelo Farmers Organisation (EFO) members, non-certified EFO members and non-EFO members.

3.1 Description of the Umbumbulu area

Embo is a rural community of Zulu-speaking people situated south-east of Durban in the Umbumbulu Magisterial district of KwaZulu-Natal, about 60 km from both Durban and Pietermaritzburg (Modi *et al.*, 2006). Embo is one of five traditional authorities in the region of Umkhambathini and is called Embo-Thimuni and Isimahla Tribal-Authority (HIVAN, 2002; Modi, 2006). Embo is controlled by a traditional authority, which is headed by *Inkosi* (Chief) and a local government representative council. The tribal chief has influence over local institutions and affairs such as tribal courts, land tenure and allocation of land rights. Local governance is enthroned with the tribal authority and the local councillors. The *Induna* (headman) who is appointed by the chief, also performs specific tasks as agreed to by the chief.

A total of 151 Ezemvelo Famers' organisation (EFO) members (48 fully certified and 103 partially certified for organic production) and 49 non-members were interviewed between October and November 2004. The total sample included 200 respondents from 176 households. Forty-five per cent of the household heads were female, of which 80% were *de facto* heads and 20% were widows. In 2005, household numbers ranged from one to 25, with an average of eight members (Hendriks and Msaki, 2006b; Hendriks *et al.*, 2005).

Ndokweni (2002) reported that Umbumbulu had a large rural population with no public services such as post offices and police stations, or infrastructure such as piped water, sanitation, refuse removal, electricity and tarred roads. There are many informal shops, for example spaza shops, that sell basic foodstuffs like milk, bread and soft drinks. The most common mode of public transport is minibus taxis.

Households in the area rely on wood, paraffin, gas and candles for fuel. Solar power provides electricity and telephone services. Water is mainly sourced from streams and springs (Modi, 2003). Subsistence farming activities begin in September/October, depending upon the onset of rains (Modi *et al.*, 2006). Traditional crops, such as maize, beans, potatoes, pumpkins, *amadumbe* (taro) groundnuts and sweet potatoes, are predominant in Umbumbulu. The predominant housing structures are rondavels, with an average of four people per homestead. Many people look for work in Isipingo and Durban because these are perceived as areas with employment prospects. There is an abundance of arable land in Embo. In the face of unemployment, income generation activities such as community gardening could benefit Umbumbulu community. Generally, every household has a garden where traditional crops are grown (Ndokweni, 2002). Figure 3.1 shows the location of Umbumbulu in KwaZulu-Natal.

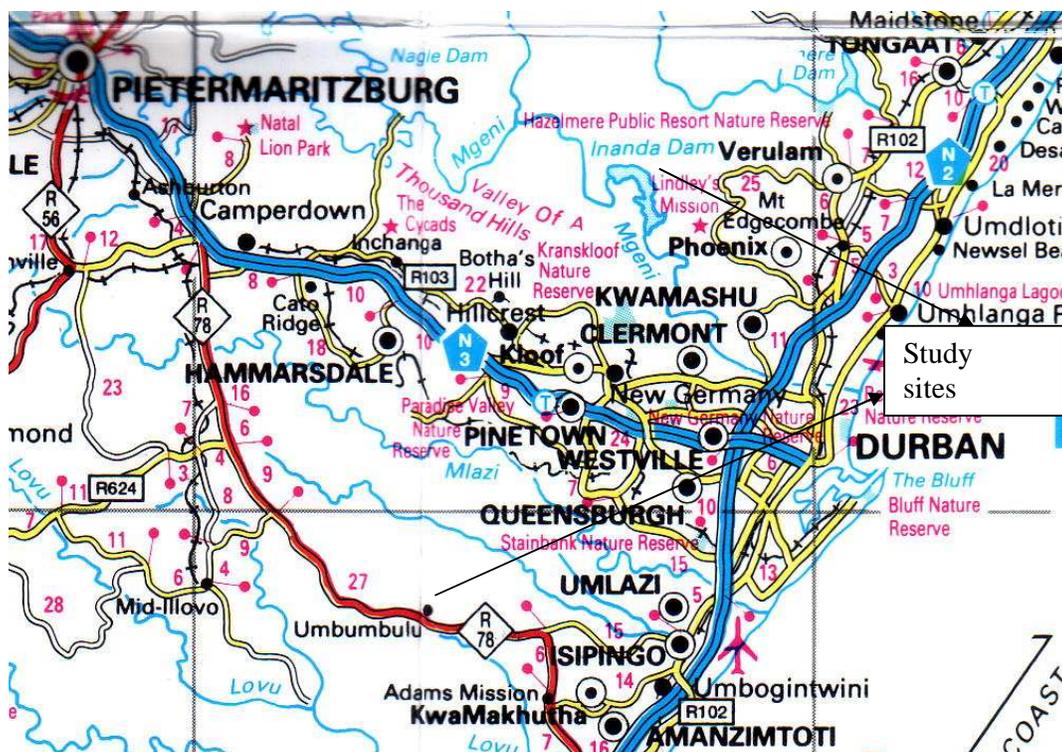


Figure 3.1: Map indicating the location of Umbumbulu and the Valley of the Thousand Hills (Braby, undated).

When Professor Modi, from the University of KwaZulu-Natal, started working with community gardeners in the Umbumbulu area in 2000, they were growing vegetables

using conventional methods (Modi, 2006). Professor Modi and the farmers identified the potential for growing traditional and conventional crops in their homestead gardens for sale to organic outlets. Stefano (2004) stated that “in 2003 and 2004, the areas under production, at Umbumbulu, per household, ranged from half a hectare to five hectares”. In 2001, the farmers formed the Ezemvelo Farmers’ Organisation to facilitate collective marketing and organic certification. The EFO was the first, black, small-scale farmers’ group in the country to gain the status of organic certification. At the time of the study, farmers supplied organic baby potatoes, *amadumbe* (taro) and sweet potatoes to the large retail food chain Woolworths via a commercial packhouse. Apart from *amadumbe* and potatoes, EFO members also grow maize, tomatoes, green beans, fruits, peanuts, carrots, pumpkins and dry beans (Stefano, 2004).

In 2004/2005, during the time of the survey, the EFO had more than 151 members. Hendriks and Msaki (2006) reported that farm size varied from 0.01 to 8.90 hectares, with a mean of 0.70 hectares (0.48, 0.77 and 0.75 hectares each for non-members, partially certified members and fully certified members respectively). The mean monthly household per capita income was R307.79 for the whole sample. The main sources of household incomes for all households were wages/salaries, state pensions and remittances. Hendriks *et al.* (2005) reported that non-farm incomes averaged R2310 per month, and was sourced from employment wages, remittances, hiring out of accommodation, catering services, building of houses, shopkeeping, furniture making, sewing, hair braiding, hawking and taxi operating.

3.2 Description of Maphephetheni area

Maphephetheni forms part of the Valley of a Thousands Hills and is situated in the Ndwedwe magisterial district, falling within the Ilembe regional council, KwaZulu-Natal (Figure 3.1 above). This rural area is situated 50km north of Durban and 80km west of Durban, and is situated near Inanda dam. The terrain is very mountainous and characterised by a despised settlement pattern (Struck, 2002). The Umgeni River forms the southern boundary, the Mqethu River forms the western boundary and the eastern and northern boundaries are formed by plateaus. Geographically, Maphephetheni is divided into two distinctive areas, the uplands and the lowlands (Green and Erskine, 1999; Struck, 2002) each with different geographic and socio-economic characteristics. Maphephetheni upland has an altitude that rises from less

than 200 metres on the edge of Inanda dam to over 600 metres on the plateau above sea level (Green and Erskine, 1999). The uplands are characterised by subsistence farming. The lowlands are on the southern side of the escarpment, adjacent to the dam, and are better off in terms of income than the uplands (Green *et al.*, 2000). The lowlands, as reported by Green and Erskine (1999) have a higher population density than the uplands.

Maphephetheni is controlled by the local traditional authority, which is headed by *Inkosi* (chief) Gwala, and a local representative council. Tribal chief Gwala, like other chiefs in South Africa, has influence over local institutions such as tribal courts, and matters like land tenure and allocation of land rights. He has divided Maphephetheni into eight tribal sub-wards. Local governance is vested with the tribal authority and the local councillors. The headman (*Induna*), who is appointed by the chief, also performs specific tasks when requested by the chief.

Maphephetheni has a comparatively good network of quality gravel roads, which traverse the region and allow access to the lowlands. These roads are used by taxis, private cars, trucks and buses (Green and Erskine, 1998). In 1998, Green and Erskine (1998) found that the average household size in Maphephetheni was 10, including adults and children. In 1999, the same researchers found that the overall population was 16000 people spread over 2000 homesteads (Green and Erskine, 1999). This meant an average of eight people per household. This study also found that the average number of people per household was eight. Each homestead in Maphephetheni consists of an average of four dwellings, typically including housing for extended family members.

Subsistence agriculture, small scale informal economic activities and small commercial enterprises are the main socio-economic activities in the area. Household-owned plots in a community garden were cultivated by family members to produce food for household consumption and sale. The number of households per community garden ranged from seven to twenty six, while the areas of the community gardens ranged from 1600m² to 4500m². The total area under community gardens in Maphephetheni was 25140m².

The Maphephetheni area is characterised by the following socio-economic infrastructure: a number of shops selling a wide variety of lower-order consumer goods; a large number of informal traders who sell mainly 'tuck' to school children during breaks and after lessons; the courthouse (or union building) which serves as a community hall for meetings, a court and a mobile clinic. In the Maphephetheni uplands however, there is only a mobile clinic which attends to the medical needs of the community once a week, whereas in the lowlands, a clinic with permanent nurses has opened near the court house. There are also at least three solar payphones located in Maphephetheni.

3.3 Crop production in Umbumbulu and Maphephetheni

Vegetable gardens are a major activity in Umbumbulu and Maphephetheni, with homestead land in these areas often being used for growing a variety of vegetables. These include *amadumbe (taro)*, beans, beetroot, cabbage, carrots, green peppers, onions, pumpkins, tomatoes and spinach. The major income-generating activities in Umbumbulu include growth of crops such as potatoes, *amdumbe (taro)*, bananas and peanuts, while in Maphephetheni they include:

- crops (peanuts, beans, bananas and cabbage);
- animals (chickens, goats, cattle) and non-farming activities such as selling drinks, snacks, food, beer, clothes, beadwork and doing shoe repairs (Green and Erskine, 1998).

A comparative look at the two areas show that a large number of people living in Maphephetheni travel daily or weekly to Inanda or Durban for employment, while Umbumbulu people travel to Isiphingo or Durban. Most farmers in Umbumbulu practise organic farming, while farmers in Maphephetheni do not necessarily practise organic farming. For both communities, a variety of crops are produced in home or community gardens, with beans, groundnuts, maize and pumpkins produced mainly for household consumption. EFO produces roots and tuber crops, such as *amadumbe (taro)* and have had potatoes sold to Woolworths and informal traders.

3.4 Coping strategies employed in Umbumbulu and Maphephetheni

In Maphephetheni, about 12 coping strategies were practiced while in Umbumbulu households, 9 coping strategies were identified (Chingondole, 2007; Msaki, 2006a respectively). Table 3.1 reveals the coping strategies employed by the sampled households in Umbumbulu and Maphephetheni.

Table 3.1: Consumption coping strategies employed in Umbumbulu (n = 200, 2005) and Maphephetheni (n =68, 2005) (Msaki, 2006a and Chingondole, 2007 respectively)

Coping strategy	Umbumbulu	Maphephetheni
Rely on less preferred and less expensive foods	✓	✓
Borrow food/money for food	✓	
Purchase food on credit	✓	✓
Gather wild food, hunt or harvest immature crops		✓
Consume seed stock held for next season		✓
Rely on help from relatives or friends	✓	✓
Limit portion size at meal times	✓	✓
Limit own intake for children's sake	✓	✓
Reduce number of meals	✓	✓
Ration money to buy street food	✓	
Skip whole day without eating	✓	✓
Feed working members at the expense of non-working members		✓
Beg for food from neighbours or relatives		✓
Send household members to eat elsewhere		✓
Use own cash own savings		✓

KEY: ✓ = Identified as a one of the coping strategies applied by sample households.

3.5 Agricultural and crop production potential in Umbumbulu and Maphephetheni

Information on the physical geography, climate and agro-ecology of the study areas has been obtained from the research of Camp (1999a) and Camp (1999b) for the bio-resource units of Yb11 at Umbumbulu and Wa6 at Maphephetheni in KwaZulu-Natal. The total area is estimated to be about 13920 and 8599 hectares for Umbumbulu and Maphephetheni respectively. The annual mean minimum and maximum temperature in the area is 13.4°C and 24.0 °C in Umbumbulu and 13.3°C and 24.4°C in Maphephetheni. The annual mean rainfall of the areas is about 900 to 1100 mm for Umbumbulu and 600 to 1100mm for Maphephetheni, with the vegetation pattern being a combination of grassland, woodland, bushland, forest and marsh in both communities. The topography of the areas is rolling or broken, with an altitude range above sea level of 450 to 900 metres in Umbumbulu, and 126 and 548 metres in Maphephetheni. The terrain ranges from moderate to steep slopes, with slope gradients of gentle (0-5%), moderate (5-10%) and steep (>12%) for both communities.

The extent of cultivation in these areas is classified as widespread (> 50%), moderate (10-50%) and limited (<10%) for both Umbumbulu and Maphephetheni. Umbumbulu and Maphephetheni have high potential crop ecotopes, with sandy soils making up 12.4% of the areas. Shallow soils account for 37.5% of the bio-resource units, while soils of moderate to poor drainage account for 42.8%. The clay content is not less than 15% while the rooting depths of ecotopes are not less than 500mm and are flat or only gentle sloping with a maximum permissible slope of 12%.

Guy and Smith (1995) showed that Maphephetheni and Umbumbulu have a high potential for agricultural activities (Figure 3.2). However, there are infrequent and/or occasional limitations due to factors such as soil quality, slope gradients, temperature or rainfall. This means that agricultural activities may not be as successful as they could be. In the light of these limitations, appropriate contour protection must be implemented. Table 3.2 shows the agronomic and alternative crops that could potentially be produced in Umbumbulu and Maphephetheni.

Table 3.2: Crop production potential in Umbumbulu and Maphephetheni areas (Camp, 1999a; Camp, 1999b)

Crops agronomic	The following crop/s can be considered in this Bioresource Unit. The list is a first approximation due to variability of micro- climate, slope, rockiness and soils.		
	Bananas: Irrigated	Cabbage	Carrots
	Dry Beans	Eucalyptus	Lucerne : Irrigated
	Maize : Dryland	Maize : Irrigated	Pinus Elliotti
	Pinus Taeda	Potatoes	Sorghum : Dryland
	Sorghum : Irrigated	Soyabeans : Dryland	Soyabeans : Irrigated
	Sugar Cane : Dryland	Sugar Cane : Irrigated	Tomatoes
	Wattle		
Crops alternative	<i>The following crop/s could be investigated for production in these Bioresource Units</i>		
	Agelica	Annatto	Annona cherimolia
	Annona muricata	Annona reticulata	Arnica
	Avocados (Guatamalan)	Avocados (West Indies)	Basil
	Breadfruit	Burdock	Camphor
	Candelilla	carambola	Chickory
	Chinese cabbage	Clementines	coffee
	Cucumber Tree	Dhal	Dill
	Flax	Ginger	Guavas
	Jatropha	Kenaf	Lemons
	Lentils	Lima beans	Litchis
	Macadamias	Mint	Muskmallows
	Mustard	Nutmeg	Okra
	Paprica	Pumpkins	Pyrethrum
	Sage	Sesame Seeds	Sisal
	Stevia	Taro (<i>Amadumbe</i>)	Thyme
	Turmeric	Valencia Oranges	Vetiver Grass

CHAPTER 4

STUDY METHODOLOGY

This study is based on secondary survey data from Umbumbulu and Maphephetheni (Chingondole, 2007; Hendriks *et al.*, 2005). A survey of 200 and 68 households was conducted in Umbumbulu and Maphephetheni uplands respectively. Data sourced from a larger study for this secondary analysis included data about home gardens, community gardens, commercial agricultural information, types of crops grown, income and expenditure, food security coping strategies information, household food consumption information and demographics. A seasonality chart was developed to gather information on crops produced over one season.

4.1 Umbumbulu survey

Hendriks *et al.* (2005) conducted a survey as part of a large multi-purpose study to investigate whether commercial organic production could alleviate food insecurity in Embo, Umbumbulu. Two consecutive household surveys ($n = 200$) were conducted in November 2004 and March 2005 (Hendriks *et al.*, 2005). A list of members was constructed from two lists (certification records held at University of KwaZulu-Natal) and the EFO Executive Committee) of the Ezemvelo Farmers' Organisation (EFO). A questionnaire was used to gather the required information (Appendix A, B and C). At the time of the survey, all EFO members completed a questionnaire for certified or non-certified members. Each respondent for the household consumption questionnaire was the person responsible for household food purchases and preparation (Hendriks *et al.*, 2005). A single household survey was completed per representative household, and one hundred and fifty one (151) EFO members from 127 households were interviewed. Of the 151 EFO members, 48 were certified EFO members, while 103 were non-certified members. A comparative sample was drawn from a list of households whose members did not join the EFO, but resided in the same tribal wards as EFO members (Hendriks *et al.*, 2005). The non-EFO members' study population was stratified into groups of wards, and simple random sampling of ten cases was drawn from each stratum to ensure a good geographical spread of sample households. A total of 49 non-member respondents completed non-member producer

questionnaires, and the same household questionnaire completed by EFO member households. For the second round of data collection, the same households were included and additional production data, household food security coping strategy information and repeated household food consumption section from the first round's survey was collected. In total, two rounds of questionnaires were applied in Umbumbulu twice.

4.2 Maphephetheni survey

Chingondole (2007) conducted a survey in Maphephetheni to determine the impact of morbidity and mortality on households' coping strategies. In this study, 68 community garden members' households, representing 598 household members and ten community garden clubs from a relatively homogenous geographic area, were surveyed in September/November 2003. The survey was repeated in September/October 2004 and March 2005. The surveys by Hendriks *et al* (2005) and Chingondole (2007) collected similar data using comparable survey instruments, thus providing an opportunity to merge data bases and draw comparisons.

Participants in the study were drawn from a population of community gardeners in the Maphephetheni uplands. A total of ten group meetings with community gardens participants were organised. All community gardeners were invited to survey meetings that were held at each community garden. All those present participated in the survey. In total, 68 community gardeners were interviewed (Chingondole, 2007). Individual household representatives were asked to answer a questionnaire (Appendix D) and participate in focus group discussions. The person responsible for household food purchases and preparation was the respondent for the household consumption questionnaire. A single household survey was completed per representative household (Chingondole, 2007).

4.3 Crop production seasonality charts

The seasonality chart indicated the types of crops and the time of the year that particular crops are produced. In addition, the chart indicated the times at which food was abundant, enough, little and absent. Seasonality charts were used to capture the time allocated to different garden activities. Two small focus group discussions were

organised in June 2006 at Umbumbulu and Maphephetheni, to develop a crop production seasonality chart (Appendix E). The objective of this exercise was to address the first sub-problem, namely: Which crops are produced by the communities over a year? Participants were asked to list the crops grown, and next to each crop, participants indicated by marking the appropriate column for the month, when the crops were available for consumption.

4.4 The Coping Strategies Index (CSI) tool

As described by Maxwell *et al* (2003), the Coping Strategies Index was prepared after gaining an understanding of coping behaviours, how often they are used in the recent past, and how severe each coping strategy is considered to be by the community. Umbumbulu and Maphephetheni households were asked about the coping strategies they used. A set of simple questions was developed to capture basic consumption-related coping responses to inadequate access to food. Maxwell *et al* (2003) suggested that the best person to be asked about coping strategies is the person in charge of preparing food and seeing to meals. Strategies that are used locally were taken into consideration, due to the fact that there is no universal set of coping strategies. As recommended by Maxwell *et al* (2003), the list of coping strategies was adapted to local circumstances and practices (see Msaki 2006b and Chingondole 2007 for details). Households were asked how often in the past month a particular strategy had been used or practiced. Food Aid Management (2004); Maxwell *et al* (2003) and Owubah *et al* (2005) reported that it is difficult, however, for households to remember the number of coping strategies used over a long period.

4.4.1 Estimating the Coping Strategies Index Score

The Coping Strategies Index provides a quantitative score for each household, which is a cumulative measure of the level of coping and thus, a measure of food insecurity (Senefeld and Polsky, 2005). According to Maxwell *et al* (2003), the making of a Coping Strategies Index follows underlined steps:

- An understanding of coping strategies behaviour involves finding the main strategies used by people in the local area, checking if these strategies

represent the broad opinion through focus group discussion, and making sure that the strategies are used in times of scarcity.

- The frequency is categorised into: all the time; everyday, pretty often; 3 – 6/week, once in a while; 1 – 2/week, hardly at all; < 1/week and never; 0/week. For the purposes of calculating the Coping Strategies Index, the responses everyday, pretty often, once in a while, hardly at all and never were valued as 7, 4.5, 1.5, 0.5 and 0 (Table 4.1).

Table 4.1: Assigning numeric values to relative frequencies (Maxwell *et al.*, 2003; Msaki, 2006a)

The relative frequency categories		Mid-point value of the range of each category
Every day	Seven days per week	7
Pretty often	3-6 days per week	4.5
Once in a while	1-2 days per week	1.5
Hardly at all	< a day per week	0.5
Never	0 per week	0

- Using different focus group discussions with community stakeholders, the coping strategies are ranked in order of severity. The numbers 1, 2, 3 and 4 represent the least severe coping strategies, intermediate coping strategies, severe coping strategies and most severe coping strategies respectively. The average rank for each coping strategy is obtained and rounded to provide the consensus ranking (Table 4.2 and 4.3).
- The Coping Strategies Index was then calculated. The score for a specific coping strategy was obtained by multiplying its relative frequency by the severity ranking. The Coping Strategies Index Score was obtained by summing the scores for specific coping strategies. An example of this is the household which has only two coping strategies, namely buying food on credit and begging. This household practiced buying food on credit fairly frequently (frequency valued as 4.5) and begged once in a while (frequency valued as 1.5). According to the focus group discussions, the consensus severity ranking for buying food on credit and begging was ranked as 2 and 4 respectively. The Coping Strategies Index for such a household is found to be $(4.5 \times 2) + (1.5 \times 4) = 15$.

Table 4.2: Severity ranking of coping strategies (CS) as per focus groups discussions, Umbumbulu March 2005 (Msaki, 2006a:15)

Coping strategy	Focus group number									Total CSI	Average rank	Consensus Severity Ranking of CS
	M1	M2	M3	M4	M5	M6	M7	M8	M9			
Eat less preferred/less expensive foods	4	1	2	2	1	2	1	1	1	15	1.67	2
Borrow food/money for food	3	2	2	3	2	2	1	2	2	19	2.11	2
Purchase food on credit	2	4	3	1	1	1	1	1	2	16	1.78	2
Help from relatives/friends outside	1	3	3	3	3	3	1	4	2	23	2.56	3
Limit food portions	2	3	3	2	1	2	2	3	4	22	2.44	2
Ration money to buy street food	1	2	2	1	2	1	2	2	1	14	1.56	2
Limit own intake for children sake	1	3	2	2	2	1	1	3	4	19	2.11	2
Reduce number of meals	2	2	2	2	1	1	3	2	3	18	2.00	2
Skip whole day without eating	4	4	4	3	4	4	2	4	4	33	3.67	4

Key: M = Member

1= Least Severe coping strategy

2= Intermediate coping strategy

3= Severe coping strategy

4= Most severe coping strategy

Table 4.3: Severity ranking of coping strategies (CS) as per focus groups discussions Maphephetheni, September 2004, (Chingondole, 2007:44)

Coping strategy	Focus groups numbers										Total	Average	Consensus Severity Ranking of CS
	M1	M2	M3	M4	M5	M6	M7	M8	M9	G10			
Eat less preferred/less expensive foods	1	1	1	2	1	1	1	1	1	1	11	1.1	1
Borrow food, or rely on help from a friend or relative	2	2	3	1	2	3	2	2	2	1	19	2.0	2
Purchase food on credit	1	2	2	3	2	3	1	2	2	2	20	2.0	2
Gather wild food, hunt or harvest immature crops	4	4	4	4	4	4	4	4	3	4	39	3.9	4
Consume seed stock held for next season	4	3	3	4	4	3	2	2	3	4	32	3.2	3
Send household members to eat elsewhere	2	1	2	2	2	1	3	2	3	3	21	2.1	2
Limit portion sizes at meal times	2	1	2	1	1	1	1	1	1	1	12	1.2	1
Restrict consumption of adults in order for small children to eat	3	4	3	3	2	2	3	1	3	2	26	2.6	3
Feed working members at the expense of non-working members	4	3	2	1	4	2	1	3	3	4	27	2.7	3
Reduce number of meals eaten in a day	1	1	1	2	1	1	2	1	1	3	14	1.4	1
Skip whole day(s) without eating	4	4	4	4	3	3	4	4	4	4	38	3.8	4
Beg food from neighbours or relatives	4	1	1	3	4	2	4	3	2	4	31	3.1	3

Key: M = Member

1= Least Severe coping strategy

2= Intermediate coping strategy

3= Severe coping strategy and

4 = Most severe coping strategy

- The higher the Coping Strategies Index Score, the more food insecure a household is.
- The coping strategy score for Umbumbulu was a number out of 38 calculated from 9 coping strategies, while the Maphephetheni was a score out of 28 calculated from 12 coping strategies. For comparative purposes, the scores were adjusted to render a score out of 100 using the formula below. For all comparative figures and tables refer to this adjusted score

$$\frac{\text{CSI per household}}{38 \text{ for Umbumbulu or } 28 \text{ for Maphephetheni}} \times 100 = \text{Adjusted SCI} \quad \text{.....Equation 4.1}$$

4.5 Data analysis and treatment

The seasonality chart was used to answer sub-problem one which investigated which crops are produced over a year in Umbumbulu and Maphephetheni. The Statistical Package for Social Sciences (SPSS) version 13.0 was used to answer sub-problem two which investigated what proportion of food consumed was from own production. The proportion of food obtained from own production, as a percentage of household expenditure versus total income, was found. The proportion of food consumed from own production was obtained by calculating the percentage of own crop production, divided by the total food consumed from different sources. Other sources of food included food obtained through purchases, gifts and payments. To answer sub-problem number three, income and expenditure data were used to determine what income was obtained from crop sales. The mean income from different crops was found and used to determine the total income obtained from crops. The money from crop production was compared with the money spent on food to determine the income from crops that were used to help purchase food. Data on household consumption coping strategies were used to answer sub-problem number four, which investigated whether crop production leads to household food security. Spearman's rank correlation was carried out to compare the coping strategy index with consumption from crop production, and the Coping Strategies Index with income obtained from

own production, in order to determine if crop production led to food security for the sampled households.

A summary of the sub-problems is indicated in this section. The data collected and the analysis of each sub-problem are presented in Table 4.4. Each analysis is then explained in detail in Table 4.4. The next chapter presents a discussion of the findings of the study.

Table 4.4: Showing the sub-problem, data collected and analysis used to answer the study sub-problems, 2007

Sub-problem	Data collected	Analysis
1. Which crops are produced over a year?	Types of crops Quantity	Seasonality chart
2. What proportion of food consumed is from own production?	All kinds of food consumed in the past month, whether it is from <ul style="list-style-type: none"> • own production • received as gift • received as payment • from purchases From the above information, we can then find the percentage of own crop production/total food consumed from other sources.	Comparisons of means and values. Descriptive statistics.
3. What income is obtained from crop production?	Income received from each crop Income spent on crops	Find the mean income from different crops using the descriptive statistics and frequencies.
4. Did food production lead to food security in Umbumbulu and Maphephetheni?	Information on household consumption coping strategies.	Use Spearman's correlations to find: relationships between income, food consumed and CSI.

CHAPTER 5

RESULTS AND DISCUSSIONS

The objective of this study was to measure the impact of crop production on household food security. This chapter presents the findings of the study. The results are discussed in relation to the sub-problems.

5.1 Availability of food crops

Figure 5.1 and 5.2 show that, in 2006, there was an abundance of food crops in Umbumbulu and Maphephetheni, with a variety of crops being grown in both communities. A seasonality chart, developed by household members, shows the crops produced for consumption and sale. Most Maphephetheni households had both home and community gardens, while EFO households practised commercial and home gardening. Some of the Maphephetheni community gardens, however, were no longer in operation for various reasons, including a shortage of labour as a result of sickness and the death of household members (Chingondole 2007).

It was found that households generally had enough maize for consumption during the period January to June. However, as the year came to an end, the level of staple food decreased (Figure 5.1 and 5.2). In October, November and December, households in both communities experienced a shortage of maize. It was found that households purchased maize throughout the year but supplemented consumption with their own food production for a few months of each year. When a shortage of maize was experienced (October to December), both Umbumbulu and Maphephetheni households relied solely on purchased maize, using stored maize for domestic consumption. These findings confirm the findings of Thamaga-Chitja *et al* (2004) in northern KwaZulu-Natal, where they reported that stored maize was used for domestic consumption and that a small, unquantified percentage was sold to local consumers.

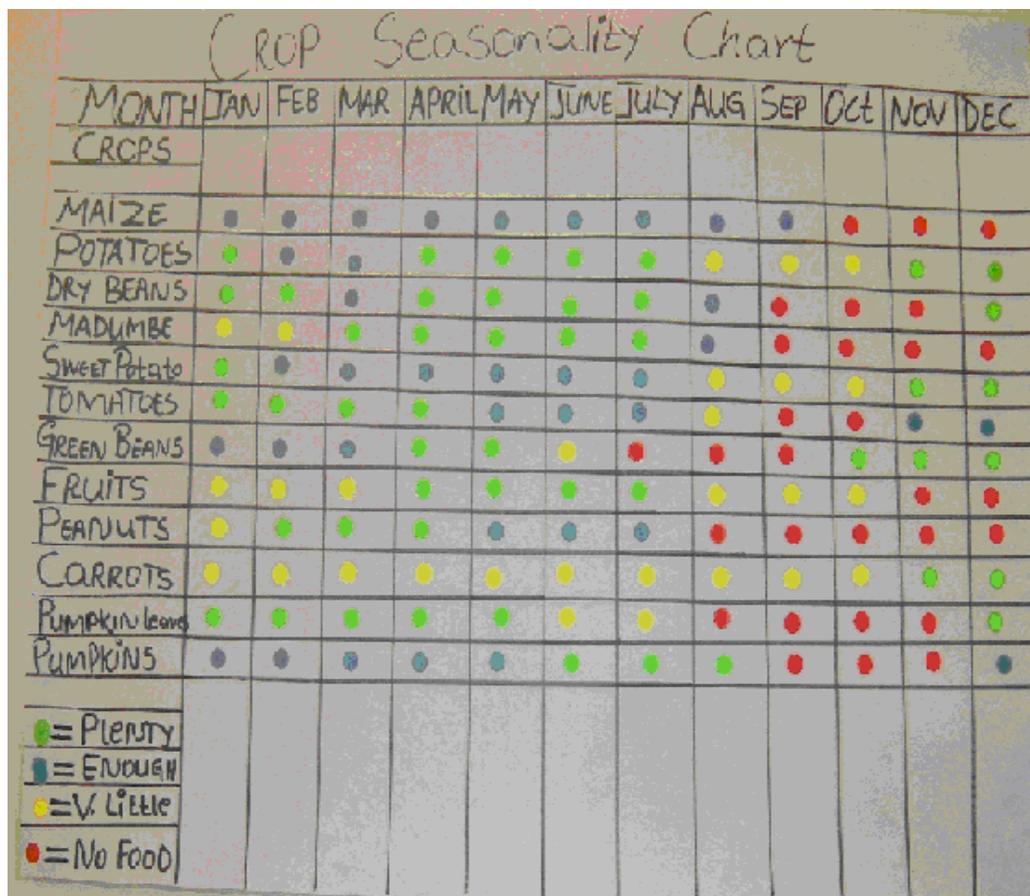


Figure 5.1: The crop production seasonality chart for the Umbumbulu crop producers, 2006.

Potatoes were available at all times in Umbumbulu, but the supply diminished between August and October. Maphephetheni households experienced shortages of potatoes in August and September. Umbumbulu households reported that the reduction in potatoes for consumption occurs because households use some of their potato stock for planting. The diminishment of potato stores in Maphephetheni households could also be a result of their having inadequate storage facilities to store harvested potatoes. Ezemvelo Farmers' Organisation members sold potatoes to supermarkets in exchange for cash to purchase other foods that could not be planted, while Maphephetheni households sold potatoes only to local households who did not engage in crop production.

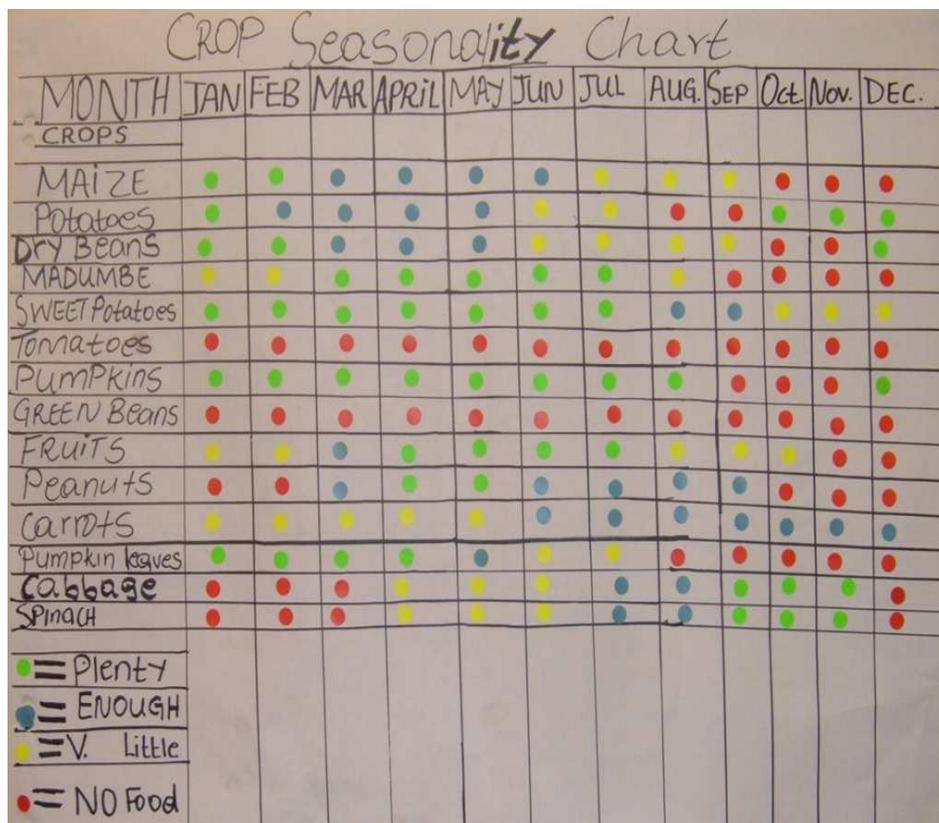


Figure 5.2: The crop production seasonality chart for the Maphephetheni crop producers, 2006.

Sweet potatoes, like potatoes were available for consumption, but stocks are low between August and October in Umbumbulu, while Maphephetheni households had very few sweet potatoes between October and December. On the whole though, there were enough sweet potatoes for household consumption. Ezemvelo Farmers' Organisation households sold sweet potatoes to Woolworths and local consumers, while Maphephetheni households sold sweet potatoes to local consumers only. This is because Maphephetheni households have not yet established a packhouse or market.

Umbumbulu crop producers produced enough green and dry beans for consumption, while Maphephetheni crop producers did not have enough green beans for household consumption. This means that Maphephetheni households relied solely on buying green and dry beans from local shops or supermarkets. In Umbumbulu, dry beans were available from December to August, while green beans were available from October to June in the following year or season. From September to November,

households in Umbumbulu had no dry beans and from July to September, households had a shortage of green beans. Dry beans form part of the staple food in rural areas in KwaZulu-Natal (Marsh, 1998) and these results imply that if households do not have cash to buy these foods, they cannot access them. Households from Maphephetheni and non-EFO members from Umbumbulu sold produce to local consumers, while EFO members sold produce to supermarkets and local consumers.

Overall, the results from Umbumbulu showed that households consumed an insufficient variety of food for most months, especially between August and December, when they experienced a reduction in crop availability. This means that the stored food was used up and that they relied on other means of getting food for consumption, including hunting, gathering wild foods or purchasing foods. Households in Umbumbulu also grow fruits like avocados, bananas, and oranges to complement food obtained from commercial production and home gardens. However, for both Umbumbulu and Maphephetheni fruits were in short supply in November and December even though more of the fruit trees in Umbumbulu and Maphephetheni are mangos and bananas which produce fruit in November/December. This could be because some household members collect fruits before maturity. To a certain extent, the results of this study correspond with those of Modi *et al* (2006) regarding the potential role of wild vegetables in household food security at Embo. They found that during the early months of the year and in December, households in Umbumbulu had an abundance of food, and that wild leafy vegetables complemented staple foods.

In Maphephetheni, the consumption and sale of grown vegetables occurs in January, at the same time as the early-planted green maize is consumed, and the late-planted summer beans are harvested. In February and March, the consumption of beans and green maize, and the planting of beans and potatoes take place (Figure 5.2). Between September and October, there is a shortage of food crops. This could be because little planting takes place at this time of year as land preparation (ploughing) occurs then. Discussions with survey respondents revealed that many crops were destroyed by insects before harvesting, causing food shortages.

5.2 What proportion of food consumed is from own crop production?

The discussions with survey respondents about food consumption and availability revealed that households consumed food from different sources. This food came from purchases, production (home, community and commercial gardens) gifts and payments. This section reports on the proportion of food consumed per capita from each source. Common crops for each community are discussed to show what proportion contributes to household food consumption. Food consumed from production in Maphephetheni and Umbumbulu is presented in Table 5.1.

Respondents were asked how much food from each source was consumed in the 30 days prior to the survey. Per capita per month household consumption of maize showed that Umbumbulu households consumed R 2.72 of purchased maize and R0.48 from own produced maize, while Mphetheni households consumed R 1.72 from purchased maize and R1.56 from own produce. Per capita per month total maize consumed by households in the past 30 days from all sources for Umbumbulu and Maphephetheni was valued at R3.47 and R 3.93 per capita per month respectively. Umbumbulu households consumed less of their own production and thus bought more food than Maphephetheni. This means that the per capita consumption of food crops in Maphephetheni was slightly higher than the per capita consumption of food crops in Umbumbulu. Reasons for this could be that:

- Umbumbulu households had a market and therefore sold their produce and bought what they wanted; and
- Umbumbulu households preferred buying their food as it allowed them to buy what they wanted such as super five white maize meal rather than consuming coarsely ground maize.

The average household in Umbumbulu consumed 14 percent of maize per capita per month from their own produce, while the average household in Maphephetheni consumed 40 percent of their maize from crop production (Table 5.1). This suggests that, in Umbumbulu, about 80 percent of the households preferred to purchase maize rather than producing maize, while in Maphephetheni, about 50 per cent of the households relied on purchased maize rather than produced maize. The findings suggest that households simply did not produce enough food crops, or else preferred not to produce but rather purchase maize.

Table 5.1: The proportion of each crop consumed per capita in Umbumbulu (n= 200) and Maphephetheni (n = 68) respectively, 2006

Sources of food crops consumed in the past month (30 days)	Purchases (R/Cap/Month)		Received as gifts (R/Cap/Month)		<i>Own production</i> (R/Cap/Month)		Received as payments (R/Cap/Month)		Total value for each crop (R/Cap/Month)		Proportion of total consumed from own production (%)	
	Ma	Um	Ma	Um	Ma	Um	Ma	Um	Ma	Um	Ma	Um
Crops												
<i>Amadumbe (taro)</i>	0.89	0.61	0.10	0.00	2.15	0.93	0.00	0.00	3.14	1.54	68.47	60.39
Beans	7.03	5.46	0.26	0.02	2.70	1.22	0.16	0.07	10.15	6.77	26.60	18.02
Carrots/ beetroot	0.64	0.79	0.21	0.00	1.50	0.32	0.00	0.00	2.35	1.11	63.83	28.83
Green vegetables	0.68	0.65	0.00	0.00	2.15	0.35	0.00	0.00	2.83	1.00	75.97	35.00
Maize	1.72	2.72	0.36	0.21	1.56	0.48	0.29	0.06	3.93	3.47	39.69	13.83
Other vegetables	0.67	0.91	0.00	0.00	2.35	1.00	0.00	0.00	3.02	1.91	77.81	52.36
Peanuts	0.56	0.12	0.03	0.00	1.61	0.16	0.13	0.00	2.33	0.28	69.10	57.14
Potatoes	5.16	4.72	0.03	0.00	1.78	0.50	0.02	0.00	6.99	5.22	25.46	9.58
Pumpkin	0.51	0.25	0.18	0.00	1.63	0.35	0.09	0.00	2.41	0.60	67.63	58.33
Sweet potatoes	0.44	0.36	0.03	0.00	0.50	1.17	0.00	0.00	0.97	1.53	51.55	76.47
Tomatoes	2.61	2.57	0.06	0.00	1.02	0.12	0.01	0.00	3.70	2.69	27.57	4.46

KEY:

Ma = Maphephetheni

Um = Umbumbulu

Cap = Per capita

About 78 percent of the households in Umbumbulu consumed beans from purchases compared to 44 per cent in Maphephetheni. Of the R6.77 worth of beans consumed by Umbumbulu households, R5.46 came from purchases and R1.22 came from own food production, while R7.03 of the R10.15 in Maphephetheni came from purchases and R2.70 from own food production per capita per month. Purchases were the most important source of food for households in Umbumbulu and Maphephetheni. Own food production was the second most important source of food.

The results showed that 35 percent of the green vegetables consumed by Umbumbulu households came from their own production, compared with 76 per cent for Maphephetheni households. This means that 65 and 24 percent of the green vegetables consumed in Umbumbulu and Maphephetheni respectively were purchased from markets and/or nearby shops. Households spent R0.65 in Umbumbulu and R 0.68 in Maphephetheni on purchased green beans per capita per month. Maphephetheni households relied more on their own production for green vegetables, while households in Umbumbulu relied more on purchased produce.

About 52 percent of wild/other vegetables consumed by Umbumbulu households came from their own production, while Maphephetheni households consumed 78 percent of wild/other vegetables from their own production. This indicates that about 48 and 22 percent of wild/other vegetables respectively came from purchases, for households in both Umbumbulu and Maphephetheni. As Modi *et al* (2006) reported, this is an important finding as green leafy vegetables (wild vegetables) are good sources of valuable nutrients and are palatable at a young stage of development.

More than 70 percent of the tomatoes consumed by households in Maphephetheni were obtained through purchases, while 30 percent of their tomatoes came from their own production. Umbumbulu households consumed only 5 percent of the tomatoes from their own production. However, it should be noted that Maphephetheni households reported that, in 2006, no tomatoes were produced (Figure 5.2 above). From Table 5.1, it may be noted that 58 percent of the pumpkins consumed in Umbumbulu came from their own production and the remaining 42 percent came from purchases, while for Maphephetheni households, 68 percent of pumpkin consumption came from crop production and 33 percent came from purchases and

other sources. Households in Umbumbulu and Maphephetheni also purchased apples, guavas, peaches and other fruits, eggs, fresh milk, maas, goat meat, chicken, and meat.

Table 5.2 includes all foods, from various sources, consumed in the 30 days prior to the survey, and shows the proportion of food consumed from purchases and own production, and/or as gifts and payments. Table 5.2 also shows the households' per capita consumption of food, from various sources, in the past 30 days.

Table 5.2: Household per capita per month consumption of food from various food sources at Umbumbulu (n = 200) and Maphephetheni (n = 68) respectively, 2006

Sources of food consumed in the past month from various sources		Average value of food consumed from various sources (R/capita/month)	Per capita per month consumption of food from various sources (R/capita/month)	Percentage of food consumed per capita per month (%)
Purchases	Um	752.12	119.39	93.03
	Ma	685.80	122.82	83.30
Own production	Um	33.20	33.20	4.18
	Ma	116.43	20.57	13.95
Received as gifts	Um	18.11	2.92	2.28
	Ma	20.08	2.89	1.96
Received as payments	Um	6.25	0.66	0.51
	Ma	7.15	1.17	0.80
Total value of food consumed per capita per month	Um	809.68	128.33	100
	Ma	829.46	147.45	100

KEY:

Ma = Maphephetheni

Um = Umbumbulu

Households in Umbumbulu and Maphephetheni sourced most of their food from purchases (Table 5.2). The results from Umbumbulu are in line with the findings of Msaki (2006b) that most households obtained foods through purchases, followed by

own food production, then gifts and payments. Maphephetheni households consumed about 14 percent of food per capita per month from their own production, while Umbumbulu consumed only 4 percent of food from own production (Table 5.2). The ratio of contributions from own food production are not too different from the contributions reported by Hendriks and Lyne (2003) in the study of rural household expenditure patterns in the two communal areas of Swayimana and Umzumbe, KwaZulu-Natal) of South Africa. Hendriks and Lyne (2003) reported that home production contributed 6.39 percent to total household expenditure for the entire sample, and 9.66 and 4.21 percent respectively, for Swayimana and Umzumbe households. Table 5.2 showed that households consumed food valued at R809.68 and R829.46 per capita per month in Umbumbulu and Maphephetheni respectively. However, the contribution of gardens was less than half the contribution reported for other rural areas of South Africa by Kirsten *et al* (1998).

Households from Umbumbulu and Maphephetheni did not consume sufficient food from their own production. This could be attributed partly to the sale of produce to purchase other foods or the purchase of other non food goods that are deemed more important by the households, or it could be that households did not produce sufficient for consumption. The latter confirms FAO's (1995) study which indicated that there are few households in developing countries where gardens produce enough food to meet all consumption requirements. Although crop production is the second most important source of food, the results indicate a minimal contribution from own produced crops towards total food consumed by sampled households. Thus only a small case can be made for crop production as a potential contributor to food security in Umbumbulu and Maphephetheni.

Machethe *et al* (2004) have confirmed that agriculture is likely to be an essential tool in reducing poverty and food insecurity, and in promoting rural livelihoods, yet the results of my study show that very little was consumed from own production, despite good agricultural potential in both Umbumbulu and Maphephetheni (Guy and Smith, 1995). Even though Maphephetheni households consumed more than twice as much food from their own production as Umbumbulu households, these households did not consume sufficient variety and quantity of food. Households relied more on purchased food (93 percent and 83 percent respectively, for Umbumbulu and Maphephetheni)

than on crop production. This confirms the findings by HSRC (2004) that a relatively high proportion (57%) of households in South Africa depend on incomes, including wages and grants, for their main source of food supply. Own food production was the second most important source of food for households in Umbumbulu and Maphephetheni. The income obtained from own production is outlined in the next section.

5.3 What income was obtained from crop production?

In this section, the potential of subsistence agriculture as an income contribution to household food security is compared for Umbumbulu and Maphephetheni. This section also looks at other sources of income, for example government social security and remittances, to see if these incomes make a difference to households' food situation. Discussions with respondents over the contributions of subsistence agriculture, particularly home gardens and community gardens (own production) revealed that some households produced food crops for selling to informal traders, while others produced for selling to both supermarkets and informal traders.

To assess the role of own production in the household economy, in this section income from own production is identified. Chingondole (2007) states that one way to assess the role of subsistence agriculture or community gardening in improving sustainable livelihoods, is to look at its contribution to household income (Table 5.3). Income from own production included income derived from sale of produce.

The total average income per capita per month for households in Umbumbulu and Maphephetheni was R307.80 and R113.82 respectively. The income obtained from crop production in Umbumbulu and Maphephetheni was R86.97 and R28.32 per capita per month respectively. Even though some sampled households produced food for selling and consumption, the income obtained from the sale of produce was not enough to meet household needs (Table 5.3). The higher average income per capita per month obtained by households in Umbumbulu confirms the findings from the previous section which showed that households in Maphephetheni consumed more produce than they sold, while households in Umbumbulu sold more produce than they consumed.

However, results from both communities showed that income obtained from own crop production may not be enough to ensure household food security. The shortage of income from own produce could be attributed to insufficient crop production. Income from sale of produce is supplemented with income from non-farm activities such as wages, social grants, household commercial enterprises and remittances.

Table 5.3: Total income obtained by households per capita per month from crop production in Umbumbulu (n =102) and Maphephetheni (n = 61), 2006

	Umbumbulu (R)	Maphephetheni (R)
Minimum income per capita	35.00	10.00
Maximum income per capita	761.90	991.76
Average income obtained per capita per month	86.97	28.32

Why N has changed?¹.

Considering the South African poverty line figures, as reported by May (1998), which were adjusted using six per cent average annual depreciation, poverty lines for 2005 could be estimated as follows: ‘poor’ = per capita incomes of less than R469.00 per month, and ‘ultra poor’ = per capita incomes of less than R258.00 per month. At the time of the study, approximately 33 per cent (n = 30) of the certified EFO members, 37 per cent (n = 75) of the non-certified EFO members, 40 per cent (n = 41) of the non-EFO members and 71 per cent (n = 63) of Maphephetheni households are considered as ultra poor. Eight percent of the certified EFO members, 25 per cent of the non-certified EFO members and 25 per cent of the non-EFO members are considered as poor. When comparing Umbumbulu and Maphephetheni households, results indicated that 37 per cent (n = 146) and 71 per cent (n = 63) of the households are considered as ultra poor, while 21 per cent and 18 per cent of the same households are considered as poor, respectively. This means that 58 per cent and 89 per cent respectively of households in Umbumbulu and Maphephetheni are below the poverty line, and therefore considered as food insecure.

To determine the potential of small-scale agriculture for the sampled households, the study looked at household income from crop production and from non-farm sources.

¹ N in Table 5.3 has changed because households that did not receive income from sales of produce are included.

Household income is divided into farm and non-farm sources. Table 5.4 shows the diverse household income sources and the average monthly contribution of each to total household income. The largest contribution of household income (Umbumbulu 49.78 per cent and Maphephetheni 42.74 per cent) came from wages/salaries. Therefore, sampled households relied on income from wages/salaries. This finding confirms the findings by Machethe (2004) which recognised the contribution of subsistence agriculture but attached more importance to non-farm activities (McIntosh and Vaughan, 1996; Gardner, 2005).

Table 5.4: The percentage contribution of income sources to the total household income of households in Umbumbulu (n = 200) and Maphephetheni (n = 68), 2005

Income sources	Average monthly household income for Maphephetheni (R)	Average monthly household income for Umbumbulu (R)	Contribution of income sources to total household income in Maphephethe (%)	Contribution of income sources to total household income in Umbumbulu (%)
Wages/salary	716.09	1531.65	42.74	49.78
Social grants	714.56	1059.20	42.65	34.42
Remittance	50.0	0.11	2.98	0.0036
Own produce	194.84	486.13	11.63	15.80
Total	1675.49	3077.09	100	100

The second most important source of household income was social grants. The contribution of social grants to the total income of Maphephetheni households was higher than that of Umbumbulu households. Maphephetheni households generated 42.65 per cent of their total household income from social grants, compared with 34.42 per cent for Umbumbulu households. The third most important contribution of income to the total household income was generated from the sale of produce. Households in Maphephetheni generated 11.63 per cent of income from the sale of produce, while households in Umbumbulu generated 15.80 percent of income from produce sales. This confirms the results from the previous section (section 5.2) that households in Maphephetheni consumed (14 per cent) more food from crop production than Umbumbulu households (4 per cent) who preferred to sell most of their crops. The smallest contribution of household income for both Umbumbulu

(0.0036 per cent) and Maphephetheni (0.11 per cent) came from remittances. The results clearly suggest that non-farm incomes contributed more to household income than subsistence agriculture. However, the contributions of subsistence agriculture to total household income have made a difference to sampled households. Although income from agriculture is comparatively low, agricultural production assisted households with savings to buy other types of food that they could not produce. Nevertheless, the amounts (Table 5.4) from production are lower relative to those from other sub-Saharan African countries, where the farm contribution to household incomes is usually larger than the non-farm contribution (Delgado, 1998).

5.4 Did crop production lead to food security in Umbumbulu and Maphephetheni?

The Coping Strategies Index (CSI) is an indicator of household food security, and is relatively quick and simple to use, straight forward to understand, and correlates well with more complex measures of food security (Mzibule, 2004; Maxwell *et al.*, 2003). In this section, the Coping Strategies Index was used to determine levels of food insecurity.

5.4.1 The Coping Strategies Index Scores

The study showed that households did not employ all the coping strategies identified by focus groups. A wide range of scores was established for Umbumbulu and Maphephetheni households. Households that did not employ coping strategies had a Coping Strategies Index of zero. As the score increased, so did food insecurity.

Table 5.5: The distribution of Coping Strategy Index (CSI) scores in Umbumbulu (n = 200) and Maphephetheni (n = 68), for 2005 and 2004 respectively

		Minimum	Maximum	Mean	Std. Deviation
CSI	score	0.0	38.29	11.7928	9.99718
Umbumbulu					
CSI	score	0.0	28.87	13.1298	8.22763
Maphephetheni					

The Coping Strategies Index scores were widely distributed, ranging from 0.00 to 38.29 and 0.00 to 28.87 for Umbumbulu and Maphephetheni respectively (Table 5.5). The trends among scores fluctuated within these ranges without a consistent pattern. Maxwell *et al* (2003) argued that it is possible that households with a score of zero could be food secure, as they did not employ food insecurity coping strategies. Households with a score of zero did not employ coping strategies and had productive resources (for example: land, cows, and other livestock) and were able to produce food for income generation, food availability and accessibility. Umbumbulu and Maphephetheni households had an average CSI score of 11.79 and 13.13 respectively.

The Certified EFO members had the lowest Coping Strategies Index scores of approximately 25 compared to non-certified EFO members and Umbumbulu non-EFO members who had Coping Strategies Index scores of approximately 38 and 32 respectively. Maphephetheni households had the highest average Coping Strategies Index score of about 29. Considering that the food insecurity score increases as the Coping Strategies Index score increases, the certified EFO members, followed by Maphephetheni households had lower Coping Strategies Index scores than non-certified and Umbumbulu non-EFO members and therefore they would be considered less food insecure than the non-certified and Umbumbulu non-EFO members.

5.4.2 Household consumption coping strategies employed at Umbumbulu and Maphephetheni

Umbumbulu and Maphephetheni respondents were asked questions on consumption coping strategies employed by household members (Table 5.6 and 5.7 respectively). In Umbumbulu, relying on less preferred and inexpensive foods was the most employed coping strategy. As illustrated in Table 5.6, relying on less preferred and inexpensive food was practised by about 61 per cent of surveyed households. This means that only 39 per cent of surveyed households in Umbumbulu did not regularly rely on eating less preferred/inexpensive foods. The least employed coping strategy in Umbumbulu was skipping meals for the whole day. This was practised by three per cent of households.

Of the nine coping strategies identified for Umbumbulu, seven were undertaken during the intermediate situations, scoring 2 on the consensus ranking. During this time, households started using basic foods sparingly, so that foods would last until the next pay day or the next pension payout. The two other coping strategies were undertaken during severe and very severe situations, scoring 3 (severe) and 4 (most severe), on the consensus ranking respectively. Skipping meals for the whole day was the only coping strategy undertaken during very severe situations.

In Maphephetheni, the most employed coping strategy was relying on less preferred and inexpensive foods. As displayed in Table 5.7, this strategy was practiced by approximately 92 per cent of surveyed households. Feeding working members at the expense of non-working members was the least employed coping strategy, practised by 13 per cent of the households. The frequency of coping strategies indicated that attempts to cope with food insecurity in Maphephetheni included efforts to make sure that sufficient food was available for households. Management of available food (food economy) was employed when strategies to fulfil household food demands failed.

Table 5.6: Frequency of coping strategies undertaken at Umbumbulu (n = 200), March 2005

Frequency of coping strategies	Numeric values for the relative frequency	Proportion of household using the coping strategy							
		Rely on less preferred /inexpensive food	Borrow food or money	Purchase food on credit	Receive help from relative/friend	Limit portions sizes	Leave food for child	Reduce meal number	Skip meals
Everyday	7	24.90	19.30	12.20	19.00	21.30	10.20	8.60	2.60
3 - 6 days/week	4.5	19.80	25.40	14.20	25.00	8.10	3.60	9.60	1.00
1 - 2 days/week	1.5	10.70	7.60	4.10	7.50	3.00	0.50	2.00	0.00
not more than once / week	0.5	6.10	0.50	3.00	0.50	0.50	0.00	0.00	0.00
Never happened	0	38.60	47.20	66.50	46.50	67.00	85.80	79.7	96.40
Proportion used as a strategy		61.40	52.80	33.50	53.50	33.00	14.20	20.30	3.60

Table 5.7: Frequency of coping strategies undertaken in Maphephetheni (n = 48), September 2005

Frequency of coping strategies	Values for relative frequency	Proportion (%) of household using the coping strategy											
		Rely on less preferred/inexpensive food	Beg from neighbours/friends	Borrow food or rely on help from friend or relative	Purchase food on credit	Limit portion size	Reduce meal number	Leave food for child	Skip meals	Gather wild foods	Feed working members at expense of nonworking	Consume seed stock held for next season	Send members to eat elsewhere
Everyday	7	8.20	0.00	4.90	9.80	21.30	1.60	3.30	0.00	8.20	0.00	9.80	0.00
3-6 days/week	4.5	42.60	6.60	34.40	16.40	8.10	23.00	24.60	3.30	32.80	0.00	50.80	11.50
1-2 Days/week	1.5	32.80	27.90	36.10	6.60	3.00	19.70	13.10	6.60	23.00	6.60	9.80	13.10
Not more than once/week	0.5	8.20	32.80	8.20	1.60	0.50	18.00	8.20	6.60	9.80	6.60	4.90	9.80
Never happened	0	8.20	32.80	16.40	65.60	67.00	37.70	5.80	83.60	26.20	86.90	24.60	65.60
Proportion used as a strategy		91.8	67.3	83.6	34.4	32.9	62.3	49.2	16.6	64.0	13.2	75.3	34.4

The consensus ranking of coping strategies showed that about two of the coping strategies were undertaken during the least severe situation, scoring one (least severe) on the consensus ranking. Two more coping strategies were undertaken during the intermediate situations, scoring 2 (intermediate) on the consensus ranking. Four coping strategies were undertaken during severe situations, scoring 3 (severe) on the consensus ranking, while three coping strategies were undertaken during very severe situations, scoring 4 (very severe) on the consensus ranking of coping strategies. Results suggest that most households in Maphephetheni undertook severe and most severe coping strategies and therefore were still subjected to food insecurity.

5.4.3 Relationships between income and CSI scores

The Coping Strategies Index, as put forward by Mzibule (2004) and Maxwell *et al* (2003) correlates well with more complex measures of food security. In this sub-section, the Coping Strategies Index score was used to determine the contribution of income from different sources to household food security. Table 5.8 and 5.9 showed the Spearman's correlation coefficients for revenue, food sources, and income sources among the sampled households to the CSI scores.

Table 5.8: Relationships between income per capita from crop production and the Coping Strategies Index scores at Umbumbulu and Maphephetheni, 2006

Significant variable	Correlation coefficient	Significant	N
Income from sales of produce	1.000	-.223**	163
CSI	1.000	.007	248

** = Correlation significant at the 0.01 level of significance (2 tailed).

There was a negative significant relationship between household per capita income from crop production and the CSI score ($r = -0.223$, $p < 0.007$). As the income from crop production decreased, the Coping Strategies Index scores increased, indicating increased food insecurity. As income from sales of produce increased, the amount of food for

consumption also increased, showing that food production played a vital role in providing income to buy food. This finding supports Bonnard's (2001) finding that increased income increases household food purchasing power among poor communities.

Table 5.9: Spearman's correlation coefficients for sources of income and the cumulative CSI score, in Umbumbulu (n = 200) and Maphephetheni (n = 68), 2006

Income sources	Spearman's Correlation	
	Cumulative CSI score	
	Umbumbulu	Maphephetheni
Wage/Salary	-.072*	-.067
Social grants	.044	.035*
Remittances	.020	-.016

* = Correlation significant at the 0.05 level of significance (2 tailed).

In Umbumbulu wage/salaries were found to be negative and significantly related to the cumulative CSI score. This suggests that as wages/salaries increased, CSI scores decreased. In Maphephetheni, social grants were found to be positively and significantly related to the cumulative CSI score. Spearman's correlation coefficients for Umbumbulu and Maphephetheni households showed that income from remittances was not significantly related to the cumulative CSI scores (Table 5.9). Incomes from these sources did not make much difference to household food security. This may be because the incomes obtained are not large enough to make a significant difference to household food security. However, section 5.3 of this study showed that wages and social grants contributed 43 per cent each for Maphephetheni households and 50 and 34 per cent for Umbumbulu households respectively. They therefore played an important role in reducing food insecurity among the sampled households.

There was a negative and statistically significant correlation between food obtained through purchases and the CSI scores (Table 5.10). This suggests that a household that possesses high enough purchasing power would have less chance of becoming food insecure because they can purchase food from the market and informal traders. No

significant relationship was found between other sources of food and Coping Strategies Index scores.

Table 5.10: Relationships between per capita sources of food consumed and CSI scores at Umbumbulu and Maphephetheni, 2006

Sources of food	Correlation coefficient	Significant	N
Purchases	-.208**	.002	215
Own production	-.092	.152	243
Received as gifts	-.084	.418	95
Received as Payments	-.037	.789	55

** Correlation significant at the 0.01 level of significance (2 tailed).

Reason for changing N²

5.4.4 Analysis of coping strategies

Spearman's correlation was used to determine whether relationships existed between two applications of coping strategies and the CSI score, and between food consumed from production and income from produce sales. An analysis of these relationships is shown in Table 5.11, 5.12 and 5.13.

There was a positive and significant relationship between CSI scores and the application of consumption coping strategies. These were the following: relying on less preferred/inexpensive food; borrowing food, or relying on help from friends or relatives; gathering wild food, hunting or harvesting immature crops; consuming seed stock held for the next season; sending household members to eat elsewhere; limiting portion size at meal times; restricting adult consumption in favour of small children; reducing the number of meals eaten in a day; skipping entire days without eating and begging from neighbours or friends (Table 5.11). The results indicated that as CSI scores increased,

² N in Table 5.10 varies because not all households obtained food from the same sources. These results are from merged data.

households relied more often on the consumption coping strategies. Households with low CSI scores applied these consumption coping strategies (Table 5.11) less frequently than households with high CSI scores.

Table 5.11: Relationship between application of coping strategies and CSI score at Umbumbulu and Maphephetheni, 2006

Coping strategy method	CSI score ³	
	Rely on less preferred/inexpensive food	Correlation coefficient Sig. 2(tailed) N
Borrow food, or rely on help from friends or relatives	Correlation coefficient Sig. 2(tailed) N	.175** .006 248
Gather wild food, hunt or harvest immature crops	Correlation coefficient Sig. 2(tailed) N	.202** .001 248
Consume seed stock held for next season	Correlation coefficient Sig. 2(tailed) N	.262** .000 248
Send household members to eat elsewhere	Correlation coefficient Sig. 2(tailed) N	.213** .001 248
Limit portion size at meal times	Correlation coefficient Sig. 2(tailed) N	.225** .000 248
Restrict adult consumption in favour of small children	Correlation coefficient Sig. 2(tailed) N	.251** .000 248
Reduce number of meals eaten in a day	Correlation coefficient Sig. 2(tailed) N	.231** .000 248
Skip entire days without eating	Correlation coefficient Sig. 2(tailed) N	.179** .005 248
Beg from neighbours or fiends	Correlation coefficient Sig. 2(tailed) N	.237** .000 248

** = Correlation significant at the 0.01 level of significance (2 tailed).

* = Correlation significant at the 0.05 level of significance (2 tailed).

A negative and statistically significant relationship was observed between per capita consumption of food from production and the application of coping strategies, namely relying on less preferred/inexpensive food; sending household members to eat elsewhere;

³ The adjusted score is used here (refer to equation 4.1). This use of adjusted scores applies for all tables with combined data, including table 5.11, 5.12 and 5.13. N varies because some households did not use other coping strategies.

limiting portion sizes at meal times; restricting adult consumption in favour of small children and reducing number of meals eaten in a day (Table 5.12). The negative relationship between the application of coping strategies and per capita consumption of food from production means that the application of coping strategies was minimised because households consumed food from their own production. There was also a positive and significant relationship between per capita consumption of food from production and application of coping strategies, namely borrowing food; relying on help from friends or relatives; gathering wild food; hunting or harvesting immature crops and begging from neighbours or friends (Table 5.12). A positive relationship means that households continued to apply the coping strategies despite consuming food from their own production.

Table 5.12: Relationship between application of coping strategies and per capita consumption of food produced from own production at Umbumbulu and Maphephetheni, 2006

Coping strategy method		
Rely on less preferred/inexpensive food	Correlation coefficient Sig. 2(tailed) N	-.127* .047 243
Borrow food, or rely on help from friends or relatives	Correlation coefficient Sig. 2(tailed) N	.250** .000 243
Gather wild food, hunt or harvest immature crops	Correlation coefficient Sig. 2(tailed) N	.181** .005 243
Send household members to eat elsewhere	Correlation coefficient Sig. 2(tailed) N	-.180** .005 243
Limit portion size at meal times	Correlation coefficient Sig. 2(tailed) N	-.147* .022 243
Restrict adult consumption in favour of small children	Correlation coefficient Sig. 2(tailed) N	-.172** .007 243
Reduce number of meals eaten in a day	Correlation coefficient Sig. 2(tailed) N	-.149* .020 243
Beg from neighbours or fiends	Correlation coefficient Sig. 2(tailed) N	.216** .001 243

** = Correlation significant at the 0.01 level 2(tailed).

* = Correlation significant at the 0.05 level 2(tailed).

A positive and significant relationship was observed between per capita household revenue and the frequency of application of coping strategies, in this case buying food on credit (Table 5.13). This means that households still applied this strategy frequently, despite income from produce sales. A negative and statistically significant relationship between per capita household income and consumption of the following season's seed stock was observed. The overall indication of the results of this section is that the frequency to apply coping strategies was minimised through income from sales of produce and consumption of food from production. Therefore income from sales of produce and consumption of food from own production buffered households from food insecurity.

Table 5.13: Relationship between frequency of coping strategies and per capita income obtained from sales of produce at Umbumbulu and Maphephetheni, 2006

Coping strategy method	CSI score	
Buy food on credit	Correlation coefficient	.195*
	Sig. 2(tailed)	.016
	N	151
Consume seed stock held for next season	Correlation coefficient	-.168*
	Sig. 2(tailed)	.039
	N	151

* = Correlation significant at the 0.05 level of significance (2 tailed).

5.4.5 Relationship of CSI scores to food consumption per capita

The food consumption patterns employed by households showed that food availability (through own food production) and food preferences were the main determinants of the types of food consumed by households, and the consumption coping strategies households employed. Household food consumption included cheap and inexpensive foods. Food items with higher frequencies of consumption were ones that were cheaper and more available for households to access. The frequency of consumption of food items was dependent on food availability and prices.

Table 5.14: Relationship between per capita items of food consumed by households and the cumulative CSI scores, Umbumbulu (n =200) and Maphephetheni (n =68) respectively, 2006

Food consumed	Pearson's Correlation	
	Cumulative CSI	
	Umbumbulu households	Maphephetheni households
Apples	-.141*	.065
Bananas	-.219**	-.082
Bread	-.094	-.264*
Green mealies	-.147*	-.236
Maize	-.144*	.242
Peanuts	-.167*	-.211
Peanut butter	-.191**	-.240
Tinned fish	-.054	-.393*

** = Correlation significant at the 0.01 level 2(tailed)

* = Correlation significant at the 0.05 level 2(tailed)

For Umbumbulu the per capita per month consumption of foods by households was significantly related to the cumulative CSI score except for tinned fish and bread. For Maphephetheni the per capita per month consumption of foods by households was not significantly related to the cumulative CSI score, except for bread and tinned fish (Table 5.14). As the relationship is negative, it can thus be said that as the CSI score increased the per capita per month consumption of foods decreased. The significant correlations could be attributed to the time when households had income to purchase these foods from supermarkets. For households to be food secure, they needed to obtain food from different sources. These sources included purchases, production, and food received as gifts and payments. The amount of food consumed by households depends on how much income was available. The income obtained from sales of produce was used by households to purchase foods that could not be produced. Food production alone cannot eradicate food insecurity and poverty, but can supplement food obtained through purchases.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Crop production is widely promoted by the Department of Agriculture, but its real impact on household food security has not been measured in South Africa. There is no consensus as to whether agricultural development is the most appropriate vehicle to fight food insecurity and poverty. Crop production could be a key contributor to household food security in KwaZulu-Natal, but its potential contribution is under investigation. Smallholder agriculture is too important to employment, human welfare, and political stability in sub-Saharan Africa to be either ignored or treated as just another small, adjusting sector of a market economy. Engaging in crop or food production may lead to greater availability of food and economic growth in the domestic and national markets. This study set out to measure the impact of crop production on household food security for sampled households in two communal regions, Umbumbulu and Maphephetheni, in KwaZulu-Natal. It also set out to establish if participation in agriculture improved household food security. The following four sub-problems were explored:

- Which crops were produced over a year
- What proportion of food consumed was from own production
- What income was obtained from own crop production
- Did crop production lead to food security in Umbumbulu and Maphephetheni

In this study, the Coping Strategies Index was used to explore the impact of crop production on household food security. Data sourced through questionnaires from two surveys included home gardens, community gardens, commercial agricultural information, income and expenditure, food security coping strategies, household food consumption patterns and demographics. Information on the types of food produced was obtained through focus group discussions. A seasonality chart, drawn up by households, indicated the types of food crops produced in Umbumbulu and Maphephetheni. A total of

200 organic farmers from Umbumbulu and 68 households from Maphephetheni participated in the survey.

The findings indicated that food insecurity persists in Umbumbulu and Maphephetheni. Fifty eight per cent and 89 per cent of households had incomes below the poverty line in Umbumbulu and Maphephetheni respectively. Significant relationships were observed between the application of some coping strategies and income obtained from the sale of produce and per capita consumption of food from production. Production buffered households from food insecurity. Households generally produced similar food crops, but households in Umbumbulu produced more food than households in Maphephetheni.

Sources of food included purchases, food production and food received as gifts and payments. Per capita consumption of food by Umbumbulu and Maphephetheni households was, respectively, 93 and 83 per cent from purchases, 14 and 4 per cent from crop production, 0.8 and 0.5 per cent received as gifts and 1.96 and 2.28 per cent received as payments. Households relied more on purchased food than on their own production. However, the contributions from production cannot be ignored, as crop production was the second most important source of food for households in Umbumbulu and Maphephetheni after purchases.

The largest contribution to household income came from wages/salaries. This was followed by social grants, sales of produce and remittances. The per capita household income obtained from crop production alone was R86.97 and R28.32 per month per capita for Umbumbulu and Maphephetheni respectively. The income generated from crop production was not sufficient to meet the demands of the households, as crop production contributed only minimally to household income. Households then employed various coping strategies in response to food shortages.

The most practiced coping strategy in Umbumbulu and Maphephetheni was relying on less preferred and inexpensive foods. Given that as the Coping Strategies Index increases, food insecurity also increases, the certified EFO members, followed by

Maphephetheni households were found to be relatively more food secure than non-certified EFO members and non-EFO members, but few households were classified as food secure. Most households employed some coping mechanisms to increase food access and availability, and many households have adopted coping strategies as normal ways of obtaining food.

6.1 Conclusions

Generally, households in Umbumbulu were engaged in commercial and/or home production, while Maphephetheni households engaged in community and/or home gardens. The gardens did not provide sufficient food for household consumption to impact positively on food security status. Low production reduced the availability of crops for household consumption and opportunities for income generation. Households did not produce sufficient quantities of crops throughout the year, and they supplemented purchased food with food obtained from production, food received as gifts from relatives, as payments and from non-farm activities.

Although participation in crop production reduced food shortages somewhat, the percentage of food insecure households was still high. Umbumbulu EFO farmers consumed less of their own production because they were able to sell their own produce. This allowed them to use the money to purchase food, however this did not solve their food security problems as they were found to be prone to food insecurity although not as bad as non EFO members and Maphephetheni members. Crop production alone was not sufficient to improve the food security situation among the households. Crop production generated more income for Umbumbulu households to purchase food from markets than for Maphephetheni households. Wild foods and vegetables, and non-farm activities also played a significant role in ensuring household food security.

Although gardens provided food for household members, they did not provide sufficient quantities of crops to meet year-round consumption requirements. Crop production did not impact sufficiently on household food security in both communities. While farm

income was reported to be useful for the procurement of food that could not be produced, it cannot be conclusively stated from the findings of this study, that the production levels currently practiced can solve food insecurity. Per capita income from the sales of produce was not sufficient for household food demands and, by and large, did not change the household food security situation. However, per capita income from sales of produce, and per capita consumption of food from production, buffered households from food insecurity.

6.2 Policy implications and recommendations for improving the impact of crop production on household food security

The results of this study showed that households do not produce enough food to meet consumption requirements or significantly improve food security. This raises the need for appropriate agricultural and nutritional advice or programmes, championed by the Department of Agriculture and Non Governmental Organisations, to maximise food production to benefit households in and around the study areas. For example, educational programmes could assist households to grow crops that are suitable to seasonal conditions, choose vegetables that are rich in micronutrients, and grow sufficient quantities of vegetables using low-cost production methods. Provision of supplemented irrigation is important to extending production seasons thus increasing production. For the improvement of household nutrition, nutrition education programmes should facilitate and promote both food diversity and increased intake of fruits and vegetables. Households need to take ownership of food security programmes.

It is recommended that Government Departments and Non-Governmental Organisations (NGOs) should implement capacity building programmes so that households have the necessary skills to ensure increased efficiency in the use of agricultural inputs. It is also crucial to ensure that agricultural inputs are available and affordable for the poor farmers. Local Municipalities should assist with establishing markets so that households can sell produce. Government should supply market information to households so that they understand how the market system works. The number of extension officers should be

increased to ensure that households/gardens are visited frequently for monitoring and evaluation purposes. Appropriate training of extension officers is key in organic farming. South African extension officers do not receive organic farming training in their mainstream training and therefore find it difficult to support organic farmers. There is a need for government institutions to be aware of the production problems faced by the households so that interventions are directed to meeting these needs.

While agriculture may play a major role in the reduction of food insecurity, the food insecurity problem in South Africa cannot be solved by promoting agriculture alone. Attention should also be given to the promotion of non-farming activities, particularly those that are associated with the smallholder agricultural sector. A strategy that pays attention to the strengthening of farm/non-farm linkages is likely to yield better results in terms of employment and income generation. To guide the design and implementation of commercial and home gardens, households need to develop clear and consistent policies, strategies, processes and procedures, and (a sound) monitoring and evaluation framework.

6.3 Recommendations for improvement of the study

Household food security data was collected at a time when gardens already existed. It would have been better had household food security data been collected before and after the existence of gardens as this would have given a clearer picture of what the contribution of crop production to household food security was. It was assumed that the households practiced appropriate vegetable production techniques. The study could have assessed the vegetable production methods applied by the households to investigate whether households applied measures that allow maximised production. The study assumed that the scale of production was not dependent on the area and that everyone who participated in the survey therefore had an equal opportunity. The study could have investigated the contribution from each (i.e. large, middle and small) scale of production.

6.4 Recommendations for further study

The study investigated the impact of crop production on food availability and access and did not explore other components of food security, such as food utilisation. Further study should be conducted to investigate the impact of crop production with a focus on food utilisation. Further research is needed to investigate whether combined production (animal and crop) yields better results than the ones obtained in this study. Further investigation of appropriate gardening practices and crops is required, and diversification of income sources should be promoted to ensure food security.

The results of the study revealed that households did not produce sufficient quantities and varieties of food crops and vegetables. Further research is needed to investigate why this is the case. There is a need for a comparative study between households involved in crop production, and those who are not involved, so that the contribution of crop production to household food security can be clearly determined.

REFERENCES

ADATO, M, AND FELDMAN, S, 2001. Empowering women to achieve food security. [WWW document] URL: <http://ifpri.org/2020/focus06.htm>. (Accessed 2006, April 13).

ALIBER, M, 2003. Chronic poverty in South Africa: Incidence, causes and policies. *World Development*, 31(3): 473-490.

ALIBER, M, AND MODISELLE, S, 2002. Pilot study on methods to monitor household-level food security for the National Department of Agriculture. Pretoria: Human Sciences Research Council. [WWW document] URL: <http://www.sarpn.org.za/documents/d0000274/index.php> (Accessed 2006, May 20).

ARNELL, A, FURTADO, A, GHAZOUL, J, AND DE SWARDT, C, 2004. Perceptions of informal safety nets: A case study from a South African informal settlement. *Development Southern Africa* 21(3): 445-457.

ASHLEY, C, AND MAXWELL, S, 2001. Rethinking rural development. *Development Policy Review*, 19(4): 395-425.

BELETE, A, IGODAN, CO, M'MARETE, C, AND VAN AVERBEKE, W, 1999. Analysis of rural household consumption expenditure in South Africa: The case of food plot holders in the Tyefu irrigation scheme in the Eastern Cape Province. *Agrekon*, 38(2): 194-201.

BERRLANDT, H, AND HUYSMAN, S, 1999. Manual for a bottom-up-approach in food security interventions: Analysis of target groups. [WWW document] URL: <http://www.ifad/hfs/tools/bsf/bsfpub/bsf-7.pdf> (Accessed 2006, August 15).

BONNARD, P, 2001. Improving the nutrition impacts of agricultural interventions: Strategy and policy brief. Connecticut: Food and Nutrition Technical Assistance Project.

BONNARD, P, 1999. Impacts of Agricultural Interventions. Greater Horn of Africa initiative regional workshop: Agricultural Policy, Resource Access and Human Nutrition. Addis Ababa, Ethiopia, November 3-5.

BRABY (UNDATED), KwaZulu-Natal: A beach-burg-and-bush-bonanza. Pietermaritzburg: Braby's maps.

BRANCKAERT, RDS, AND GUÈYE, EF, 1999. FAO's programme for support for family poultry production: Poultry as a tool in poverty eradication and promotion of gender equality. Proceedings of an animal poultry workshop, March 22-26. Tune Landboskole, Denmark [WWW document] URL: <http://www.fao.org/docrep/004/AC154E/AC154E00.htm> (Accessed 2006, April 20).

BRINK, S, 2001. Lack of food security: Focussed literature review and research framework. Hull: Applied Research Branch. [WWW document] URL:<http://www.hrsdc.gc.ca/en/cs/sp/sdc/pkrf/publications/research/2001-000187/SP-454-08-01E.pdf>. (Accessed 2007, February 21).

CAMP, K, 1999a. *Guide to the use of the Bioresource Programme*. Cedara Report number N/A/99/11, KwaZulu-Natal Department of Agriculture, Pietermaritzburg.

CAMP, K, 1999b. *The Bioresources Groups of KwaZulu-Natal*. Cedara Report number N/A/99/12. KwaZulu-Natal Department of Agriculture, Pietermaritzburg.

CARLETTO, C, AND MORRIS, SS, 1999. Designing methods for monitoring and evaluation of household food security and rural development projects. Washington DC: International Food Policy Research Institute.

CENTRAL STATISTICAL SERVICE, 1995. October household survey 1994: KwaZulu-Natal. Statistical Release P0317.5, 8 May. Central Statistical Service, Pretoria.

CHINGONDOLE, S, 2007. The impact of morbidity and mortality on women's coping strategies in Maphephetheni. Unpublished PhD (Food Security) thesis. African Centre for Food Security, University of KwaZulu-Natal, Pietermaritzburg.

CHUNG, K, HADDAD, L, RAMAKRISHNA, J, AND RIELY, F, 1997. Alternative approaches to locating the food insecure: Qualitative and quantitative evidence from south India. Discussion Paper No. 22. Washington DC: Food Consumption and Nutrition Division, International Food and Policy Research Institute.

COATES, J, WEBB, P, AND HOUSER, R, 2003. Measuring food insecurity: Going beyond indicators of income and anthropometry. Washington DC: Food and Nutrition Technical Assistance (FANTA) Academy.

COLLINS, G, 2004. The Coping Strategies Index (CSI) baseline survey. World Food Programme (WFP) Assisted Refugees in Western Tanzania. WFP [WWW document] URL: http://www.refugees.org/data/warehousing/tanzania/docs/sci_wfp_tanzania (Accessed 2007, August 20).

COMMITTEE ON WORLD FOOD SECURITY (CFS), 1998. Information note on possible modalities for NGO participation in the work of the committee on world food security [WWW document] URL: <http://www.fao.org/docrep/meeting/W8327e.htm> (Accessed 2006, May 20).

CORBETT, J E M, 1988. Famine and household coping strategies. *World Development* 16 (9): 1099-1112.

COUSINS, B, 2005. Agrarian reforms and the "two economies": Transforming South Africa's countryside. In: Hall, R and Ntsebeza, L (Eds.). *The Land Question in South Africa: The challenge of transformation and redistribution*. Cape Town Programme for

Land and Agrarian Studies (PLAAS), School of Government, University of Western Cape.

COUTSOUDIS, A, MAUNDER, EMW, ROSS, F, NTULI, S, TAYLOR, M, MARCUS, T, DLADLA, A, AND COOVADIA, H, 2000. A qualitative study on food security and caring patterns of vulnerable young children in South Africa. WHO multi-country study on improved household food and nutrition security for the vulnerable: South Africa [WWW document] URL: http://whqlibdoc.who.int/hq/2000/WHO_NHD_00.4.pdf (Accessed 2006, September 20).

DANNHAUSER, A, JOUBERT, G, AND NEL, M, 1996. Nutritional status of preschoolers in the Bloemfontein district. *South African Journal of Food Science and Nutrition*, 8(1):14-22.

DELGADO, CL, 1998. Sources of growth in smallholder agriculture in sub-Saharan Africa: The role of vertical integration of smallholders with processor and marketers of high value-added items. Paper presented at the Inter-Conference Symposium of the International Association of Agricultural Economists, Badplaas, South Africa, August 10-16 [WWW. Document] URL: <http://www.fao.org.DOCREP/Y0434T/Y0434t05.htm> (Accessed 2007, July 20).

DELGADO, C, 1997. Promoting growth in smallholder farming areas of South Africa through agricultural diversification [WWW document] URL: <http://www.ifrpi.org/themes/mpo7/sa/sa.htm>. (Accessed 2006, August 03).

DELGADO, C, HAZELL, P, HOPKINS, J, AND KELLY, V, 1994. Promoting inter-sectoral growth linkages in rural Africa through agricultural technology and policy reform. *American Journal of Agricultural Economics*, 76(4):1166-1171.

DELGADO, CL, HOPKINS, J, AND KELLY, VA, 1998. Agricultural growth linkages in Sub-Saharan Africa. Concepts, prior work and issues pertaining to agricultural growth linkages. Washington, DC: International Food and Policy Research Institute, pp 5-24.

DELGADO, CL, AND SIAMWALLA, A, 1997. Rural economy and farm income diversification in developing countries. Paper presented at the plenary session of the XXIII International Conference of Agricultural Economists, August 10-16, Sacramento [WWW. Document] URL: http://www.sarpn.org.za/documents/d0001005/P1125-Agriculture_Poverty.pdf (Accessed 2007, February 10).

DE SWART, C, 2002. Unravelling chronic poverty in South Africa: Some food for thought. Paper presented at the International Conference, staying poor: Chronic poverty and development policy, University of Manchester, 7 to 9 April [WWW document] URL: <http://idpm.man.ac.uk/cprc/Conference/conferencepapers/deswardtpaper.pdf>. (Accessed 2006, August 20).

DEVEREUX, S, 2001. Livelihood insecurity and social protection: An emerging issue in rural development. *Development Policy Review* 19(4): 507-519.

DLAMINI, SO, 2002. Family poultry studies in KwaZulu-Natal. Unpublished Master of Science in Agriculture (Animal Science) dissertation. Discipline of Animal and Poultry Sciences, University of KwaZulu-Natal, Pietermaritzburg.

EVERATT, D, AND ZULU, S, 2001. Analysing rural development programmes in South Africa, 1994-2000. *Development Update (Quarterly Journal of South African National NGO Coalition and INTERFUND)* 2 (4): 1-38.

FOOD AID MANAGEMENT (FAM), 2004. Guide for measuring food access. [WWW document] URL: http://www.foodaid.org/worldocs/moneval/Food_Access_Indicators_Guidelines_Final.pdf (Accessed 2006, July 30).

FOOD AND AGRICULTURE ORGANISATION (FAO), 2007. The Millennium Development Goals: The road ahead [WWW document] URL: <http://www.fao.org/mdg/> (Accessed 2007, March 20).

FOOD AND AGRICULTURE ORGANISATION (FAO), 2004. Socio-economic analysis and policy implications of the roles of agriculture in developing countries. Summary Report. Roles of Agriculture Project, FAO, Rome.

FOOD AND AGRICULTURE ORGANISATION (FAO), 2003. Trade reforms and food security. [WWW document] URL: http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/005/Y4671E/y4671e06.htm (Accessed 2006, June 06).

FOOD AND AGRICULTURE ORGANISATIONS (FAO), 2002. The state of food insecurity in the world. [WWW document] URL: <http://www.fao/decprep/005/y7352e05.htm> (Accessed 2006, December 20).

FOOD AND AGRICULTURE ORGANISATION (FAO), 1999. Food insecurity, when people must live with hunger and fear starvation: The state of food insecurity in the world. Rome: FAO.

FOOD AND AGRICULTURE ORGANISATION (FAO), 1998. Village chicken production systems in rural Africa: Household food security and gender issues. Animal Production and Health Paper 142. Rome: Desktop Publishing Management Group.

FOOD AND AGRICULTURE ORGANISATION (FAO), 1997. Food, nutrition and agriculture [WWW document] URL: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/W5849T/w5849t00.htm (Accessed 2006, June 15).

FOOD AND AGRICULTURE ORGANISATION (FAO), 1996a. Rome declaration on world food security. World Food Summit. 13-17 November. Rome: FAO.

FOOD AND AGRICULTURE ORGANISATION (FAO), 1996b. Food security and nutrition: World food summit technical background documents. Volume 1. [WWW document] URL: <http://www.fao.org/wfs/final/e/volume1/t5sum-e.htm>. (Accessed 2006, June 18).

FOOD AND AGRICULTURE ORGANISATION (FAO), 1995. Improving nutrition through home gardening: A training package for preparing field workers in southern Asia. Rome: FAO.

FOOD AND NUTRITION COORDINATING OFFICE (FNCO), 1998. Crop production. *Food and Nutrition Information Bulletin*, 1(18): 22(3).

FRANKENBERGER, TR, 1992. Indicators and data collection methods for assessing household food security. In: Maxwell S. and Frankenberger T.R. (Eds.). *Household Food Security: Concepts, indicators and measurement. A technical review*. New York and Rome: UNICEF and IFAD. pp 73-134.

FRANKERNBERGER, RT, AND MCCAUSTEN, MK, 1998. The household livelihood security concept. In: Parnwell, M (Ed.). *The concept of sustainable livelihood. Food, nutrition and agriculture: Food and Nutrition Division*. pp 280-290.

FRASER, G, MONDE, N, AND VAN AVERBEKE, W, 2003 Food security in South Africa: A case study of rural livelihood in the Eastern Cape. In: Nieuwoedt K. and Groenewaldt J. (Eds.). *The Challenge of Change: agriculture, land and the South African economy*. Pietermaritzburg: University of KwaZulu-Natal Press. pp 171-183.

GARDNER, B, 2005. Causes of rural economic development, In: Colman, D. and Vink, N. (Eds.). *Reshaping Agriculture's contribution to society, proceedings of the 25th*

international conference of Agricultural Economists, Durban. Blackwell publishing, Washington DC.

GREEN, JM, WILSON, M, AND CAWOOD, W, 2000. Maphephethe rural electrification (photovoltaic) programme: The constraints on the adoption of solar home systems. *Development Southern Africa*, 18(1): 19-30.

GREEN, JM, AND ERSKINE, SH, 1999. Solar (photovoltaic) systems, energy use and business activities in Maphephetheni, KwaZulu-Natal. *Development Southern Africa*. 16(2): 221-237.

GREEN, JM, AND ERSKINE, S, 1998. An energy audit of Maphephethe: Assessing present energy usage patterns as a precursor to the introduction and expansion of the alternative energy resources. Final unpublished report. Discipline of Community Resources. University of KwaZulu-Natal, Pietermaritzburg.

GUY, RM, AND SMITH, JMB, 1995. *A land potential classification for KwaZulu-Natal*. Cedara Report No. N/A/95/2. KwaZulu-Natal Department of Agriculture, Pietermaritzburg. pp 01-11.

HALL, R, JACOBS, P, AND LAHIFF, E, 2003. Evaluating land and agrarian reform in South Africa: Final unpublished report. Programme for Land and Agrarian Studies (PLAAS), School of Government, University of Western Cape, Bellville.

HARRISON, D, 1995. Nutrition. In: Harrison, D. and Nielson, M. (Eds.). *South African health review*. Health systems Trust and Henry J Kaiser Family Foundation, Durban.

HAZELL, PBR, AND HAGGBLADE, S, 1993. Farm-non-farm growth linkages and the welfare of the poor. In: Lipton, M. and Van der Gaag, J. (Eds.). *Including the poor: Proceedings of a symposium organised by the World Bank and the International Food Policy Institute*. Washington, DC: World Bank, pp190-204.

HENDRIKS, SL, AND MAUNDER, EMW, 2006. Identification of food security indicators for FIVIMS.ZA. Unpublished paper prepared for World Food Programme, May. African Centre for Food Security, University of KwaZulu-Natal, Pietermaritzburg, South Africa.

HENDRIKS, SL, AND MSAKI, MM, 2006a. Small holder commercialisation: The impact on dietary diversity and adequacy at Umbumbulu. Project Brief No. 9. African Centre for Food Security. University of KwaZulu-Natal, Pietermaritzburg, South Africa.

HENDRIKS, SL, AND MSAKI, MM, 2006b. The influence of small holder commercialisation on dietary diversity and consumption patterns in KwaZulu-Natal, South Africa. Contributed poster paper presented at the International Agricultural Economics Association Meeting, Gold Coast, Australia, 12-18 August. Abstract published in the proceedings, p 166.

HENDRIKS, SL, LYNE, M, DARROCH, M, MODI, A, CHITJA, J, STILWELL, C, MORRIS, C, BOWER, J, FERRER, S, SIWELA, M, GUBBA, G, GADZIKWA, L, KATUNDU, M, LWAYO, M, MOYO, Z, MUSHAYANYAMA, T, PHIRI, N, AND STEFANO, L, 2005. Ensuring food security through farm and non-farm enterprises. Food Security Programme Project Brief No 1. Food Security programme, University of KwaZulu-Natal, Pietermaritzburg.

HENDRIKS, SL, 2005. The challenges facing empirical estimation of food (in) security in South Africa: *Development Southern Africa*, 22(1): 1-21.

HENDRIKS, SL, AND LYNE, M.C. 2003. Expenditure patterns and elasticities of rural households sampled in two communal areas of KwaZulu-Natal. *Development Southern Africa*, 20(1): 105-127.

HENDRIKS, SL, 2003. The potential for nutritional benefits from increased agricultural production in rural KwaZulu-Natal. *South African Journal of Agriculture Extension*, (32): 28-44.

HINDSON, V, MCINTOSH, A, XABA AND ASSOCIATES, 2003. Tackling poverty: South Africa's biggest challenge. [WWW document]. URL: <http://www.hologram.org.za/newsletter>. (Accessed 2003, November 18).

HIV/AIDS NETWORKING (HIVAN), 2002. Embo summary report of HIV/AIDS initiatives. [WWW document] URL: <http://www.hivan.org.za/arttemp.asp?id=1029> (Accessed 2004, June 20).

HODDINOTT, J, AND YOHANNES, Y, 2003. Dietary diversity as a food security indicator. Discussion Paper 136. Washington DC. Food Consumption and Nutrition Division of the International Food Policy Research Institute.

HODDINOTT, J, AND YOHANNES, Y, 2002. Dietary diversity as a household food security indicator. Washington DC: Food and Nutrition Technical Assistance Project.

HODDINOTT, J, 1999. Choosing outcome indicators of household food security. Technical Guide No7. International Food Policy Research Institute. [WWW document] URL: <http://www.ifpri.org> (Accessed 2006, April 19).

HUMAN SCIENCE RESEARCH COUNCIL, 2004. Food security in South Africa: Key policies issues for the medium term [WWW document] URL: <http://www.sarpn.org.za/documents/d0000685/Food-security-SA> (Accessed 2005, February 30).

INTERNATIONAL FUND FOR AGRICULTURE DEVELOPMENT (IFAD), 2006. Household food security. [WWW document] URL: <http://www.ifad.org/hfs/approach/hfs/index.htm> (Accessed 2006, August 28).

IRZ, X, LIN, L, THIRTLE, C, AND WIGGINS, S, 2001. Agriculture productivity growth and poverty alleviation. *Development Policy Review*, 19(4): 449-466.

KALLMAN, K, 2004. Knowing and claiming your right to food. Bellville: Tandym Print.

KIRSTEN, J, MAY, J, HENDRIKS, S, LYNE, M, MACHETHE, CL, AND PUNT, C, 2007. South Africa: The extent, distribution and nature of poverty in post-apartheid South Africa. In: Bresciani, F. and Valdés, A. (Eds.). *Beyond Food Production: The Role of Agriculture in Poverty Reduction*. Edward Edgar Publishing, Inc. Northampton.

KIRSTEN, J. TOWNSEND, R. AND GIBSON, C, 1998. Determination of agricultural production to household national status in KwaZulu-Natal, South Africa. *Development Southern Africa* 15(4): 73-587.

LABADARIOS, D, 2000. Executive summary. In: Labadarios, D. (Ed.). The National Food Consumption Survey (NFCS): Children aged 1-9 years, South Africa, 1999. [WWW document] URL: <http://www.sahealthinfo.org/nutrition/foodsummary.htm>. (Accessed 2006, September 20).

LABADARIOS, D, AND NEL, JH, 2000. Chapter 4 : Anthropometric status. In Labadarios, D. (Ed.). *The National Consumption Food Survey (NFCS) : Children aged 1-9 years, South Africa, 1999*. Pretoria. [WWW document] URL : <http://www.Sahealthinfo.org/nutrition/foodtittle.htm>. (Accessed 2006, May 15).

LABADARIOS, D, AND VAN MIDDELKOP, A, 1994. Children aged 6 to 71 months in South Africa: The anthropometric, vitamin A, iron and immunisation coverage status. The South African Vitamin A Consultative Group (SAVACG), Johannesburg.

LEROY, JLP, VAN ROOYEN, J, D'HAESE, L, AND DE WINTER, A, 2001. A quantitative determination of the food security status of rural farming households in the Northern Province of South Africa. *Development Southern Africa*, 18(1): 5-17.

LOPEZ, R, 2002. Agricultural growth and poverty reduction. Socio-economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries. Roles of Agriculture Project. Rome. Food and Agriculture Organisation. [WWW document] URL: http://www.fao.org/es/esa/roa/pdf/3_poverty/poverty_dr.pdf. (Accessed 2006, July 25).

MACHETHE, CL, 2004. Agriculture and poverty in South Africa: Can agriculture reduce poverty? Paper presented at the Overcoming Underdevelopment Conference in Pretoria, 28-29 October.

MACHETHE, CL, MOLLEL, NM, AYISI, K, MASHATOLA, MB, ANIM, FDK, AND VANASCHE, F, 2004. Smallholder irrigation and agricultural development in the Olifants River Basin of Limpopo Province: Management transfer, productivity, profitability and food security issues. Report to the Water Research Commission on the Project Sustainable Local Management of Smallholder Irrigation in the Olifants River Basin of Limpopo Province. Pretoria. Water Research Commission.

MACHETHE, CL, REARDON, T, AND MEAD, DC, 1997. Promoting farm/non-farm linkages for employment of the poor in South Africa: A research agenda focussed on small-scale farms and agro-industry. *Development Southern Africa*, 14(3).

MAKHOTLA, LA, AND HENDRIKS, SL, 2004. Do household gardens improve the nutrition of preschoolers in Lesotho? *Development Southern Africa*: 21(3): 576-581.

MARSH, R, 1998. Building on traditional gardening to improve household food security. *Food, Nutrition and Agriculture*: (22): 4-13.

MARTIN, TM, 1998. Survey Research: Conducting surveys. [WWW document] URL: <http://www.azplansite.com/survey.htm> (Accessed 2006, July 22).

MAXWELL, S, FRANKENBERGER, TR, 1992. *Household food security: Concepts, indicators, measurements: A technical review*. Rome. International Fund for Agriculture Development and World Food Programme.

MAXWELL, DG, 1995. Measuring food security: The frequency and severity of “coping strategies”. FNCD discussion paper (8). Washington DC: Food Consumption and Nutrition Division, International Food Policy Research Institute (IFPRI).

MAXWELL, D, WATKINS, B, WHEELER, R, AND COLLINS, G, 2003. The Coping Strategies Index: A tool for rapidly measuring food security and the impact of food aid programmes in emergencies. Paper from the Food and Agriculture Organisation (FAO) International Workshop on Food Security in Complex Emergencies: Building policy frameworks to address longer-term programming challenges, 23-25 September, Tivoli. Rome: FAO.

MAXWELL, D, AHIUDEKE, C, LEVIN, C, AMAR-KLEMESU, M, ZAKARIAH, S, AND LAMPTEY G, 1999. Alternative food security indicators: Revisiting the frequency and severity of coping strategies. *Food Policy* 21(3): 411-429.

MAXWELL, S, 1999. The evolution of thinking about food security, In: Devereux, S. (Ed.). Food security in Africa: [WWW document] URL: <http://www2.dfid.gov.uk/pubs/files/agriculture-food-security.pdf>. (Accessed 2006, June 02).

MAY, J, 2000. The nature and measurement of poverty and inequality. In: May, J. (Ed). *Poverty and inequality in Southern Africa: Meeting the challenge*. Cape Town; David Philip, pp19-48.

MAY, J, 1998. Poverty and inequality in South Africa: poverty and inequality report to the office of Deputy President. Praxis Publishing, Durban.

MAY, J, CARTER, M. AND POSEL, D. 2000. The structure of rural poverty and livelihoods in South Africa, In: Cousins, B. (Ed.). At the Cross Roads: Land and agrarian reform in South Africa into 21st century. Bellville, David Philip. pp 01-78.

MCINTOSH, A, AND VAUGHAN, A, 1996. Enhancing rural livelihoods in South Africa: Myths and realities. In: Lipton, M. Ellis, F. and Lipton, M. (Eds.). Land, Labour and Livelihoods in Rural South Africa. Volume Two: KwaZulu-Natal and Northern Province. Durban: Indicator Press.

MEKURIA, M, AND MOLETSANE, NP, 1996. Initial findings of rural household food security in selected districts of the Northern Province. *Agrekon*, 35: 309-312.

MISSELHORN, AA, 2006. Food insecurity in South Africa. Causes and responses options from evidence at regional, provincial and local scales. Unpublished PhD Thesis. University of Witwatersrand, Johannesburg.

MISSELHORN, AA, 2005. What drives food insecurity in southern Africa? A meta-analysis of household economy studies. *Global Environmental Change*, 15(2005): 33-43.

MODI, M, MODI, AT, AND HEDRIKS, SL, 2006. Potential role for wild vegetables in household food security: A preliminary case in KwaZulu-Natal, South Africa. *African Journal of Food Agriculture Nutrition and Development* 6(1)1-14.

MODI, AT, 2006. Personal Communication. Associate Professor in Crop Science, School of Agricultural Sciences and Agribusiness, University of KwaZulu-Natal, Pietermaritzburg, March 2006.

MODI, AT, 2003. What do farmers know about indigenous crops and organic farming? Preliminary experience in KwaZulu-Natal. *Development Southern Africa*, 20(4): 675-684.

MORRIS, JT, 2002. Report of the first Mission to Lesotho, Malawi, Mozambique, Swaziland, Zimbabwe and Zambia, 3-15 September, 2002. Rome. United Nations Development Programmes.

MSAKI, MM, 2006a. Coping strategies index: A convenient indicator to assess household food security? Unpublished PhD Paper. African Centre for Food Security. University of KwaZulu-Natal, Pietermaritzburg.

MSAKI, MM, 2006b. Measuring household food security using food intake indicators in rural KwaZulu-Natal. Unpublished (Food Security) paper. University of KwaZulu-Natal, Pietermaritzburg.

MSAKI, MM, 2006c. Determining household food security: Does sufficiency in food intake mean more dietary diversity and better food quality? Unpublished PhD paper. African Centre for Food Security. University of KwaZulu-Natal, Pietermaritzburg.

MZIBULE, C, 2004. Community and Households Surveillance Systems (CHS) in Malawi. Food Security and Livelihood In-depth Trend Report. Lilongwe. Consortium for Southern Africa Food Emergency and World Food Program.

NATIONAL DEPARTMENT OF AGRICULTURE, 1993. Vegetable production: Spinach beet. Pretoria: National Department of Agriculture.

NATIONAL DEPARTMENT OF AGRICULTURE, 2002. The integrated food security strategy for South Africa. Pretoria: National Department of Agriculture.

NDLELA, P, 2003. Framework as an Aid to Promoting Cooperation in Urban Agriculture. Unpublished MSocSc. (Community Resources) dissertation, Discipline of Community Resources, University of KwaZulu-Natal. Pietermaritzburg.

NDOKWENI, MF, 2002. Evaluation of the Potential for Sustainable Livelihoods from Organic Production: the Ezemvelo Farmer's Organisation. Unpublished MSocSc. (Community Resources) Dissertation. Discipline of Community Resources, University of Natal, Pietermaritzburg.

NELL, W, WESSELS, B, MOKOKA, J, AND MACHEDI, S, 2000. A creative multi-disciplinary approach towards the development of food gardening. *Development Southern Africa* 17(5): 807-819.

NINEZ, V, 1984. Household gardens: Theoretical considerations on old survival strategy. Food systems research series, No. 1. Lima. International Potato Centre.

NORTHORD, BW, 2004. Improving the Productivity and Competitiveness of Small-scale Sugarcane Contractors in KwaZulu-Natal. Unpublished Master of Agriculture (Agricultural Economics) Dissertation, Department of Agricultural Economics. University of KwaZulu-Natal, Pietermaritzburg.

OLARINDE, LO, AND KUPONIYI, FA, 2005. Rural livelihood and food consumption patterns among households in Oyo State, Nigeria: Implications for food security and poverty eradication in a deregulated economy. *Journal of Social Sciences* 11(2): 127-132.

OWUBAH, C, GREENBLOTT, K, AND ZWIER, J, 2005. Food availability, access and utilization and achieving food security. Top 10 C-SAFE Initiatives in Monitoring & Evaluation, Johannesburg. Paper prepared for DFID (SA). [WWW document] URL: http://www.wfp.org/food_aid/doc/Food_Assistance_Context_of_HIV_sept_2007.pdf. (Accessed 2007, March 20).

RAVALLION, M, AND DATT, G, 1996. Is targeting through a work requirement efficient? Some evidence for rural India. In: van der Walle, D. and Nead, K. (Eds.). *Public Spending and the Poor: Theory of evidence*. Washington DC: The World Bank.

RIELY, F, 2000. FIVIMS synthesis document: A comparison of vulnerability analysis methods and rationale for their use in different contexts. [WWW document] URL: <http://www.fivims.net/documents/RielyVGProfilingMethodsAnnex.doc>. (Accessed 2006, September 20).

RIELY, F, MOCK, N, COGILL, B, BAILEY, L, AND KENEFIC, E, 1999. Food security indicators and framework for the use in the monitoring and evaluation of food aid programmes. Washington DC: United States Agency for International Development (USAID).

ROSE, D, AND CHARLTON, KE, 2002. Quantitative indicators from a food expenditure survey can be used to target the food insecure in South Africa. [WWW document] URL: <http://jn.nutrition.org/cgi/content/full/132/11/3235> (Accessed 2006, May 18).

ROSE, D, BOURNE, L, AND BRADSHAW, D, 2002. Food and nutrient availability on South African households: Development of a nationally representative database. Technical Report. Health and Development Research Group, World Health Organisation Collaborating Centre for Urban Health Burden and Disease Research Unit. Cape Town: Medical Research Council.

RUEL, M, AND LEVIN, C, 2000. Assessing the potential for food based strategies to reduce vitamin A and iron deficiencies: A review of recent evidence. Washington DC: International Food Policy Research Institute.

RUGALEMA, G, 2000. Coping or struggling? A journey into the impact of HIV/AIDS in southern Africa. *Review of African Political Economy* 28 (86): 537-545.

SAAD, MB, 1999. Food security for food insecure: New challenges and renewed commitments. CSD NGO Women's Caucus Position Paper for CSD-6, 2000. Dublin: Centre for Development Studies, University of Dublin.

SCHERR, S, 2003. Halving global hunger. Background paper of the millennium project task force on hunger. Rome. Paper Commissioned by United Nations Secretary General and supported by the United Nations Development Group. [WWW document] URL: http://www.ris.org.in/abdr_mar042.pdf. (Accessed 2007, April 15).

SCHMIDT, MI, AND VORSTER, HH, 1995. The effects of communal vegetable gardens on nutritional status. *Development Southern Africa*: 12(5): 713-724.

SCHMIDT, K, 2005. Food security in South Africa: Crop production as an intervention, the case of subsistence fishers. [WWW document] URL: <http://www.aidc.alternativedevelopmentinformationcentre.fssa>. (Accessed, 2006, September 04).

SENEFELD, S, AND POLSKY, K, 2005. Chronically ill households, food Security, and coping strategies in rural Zimbabwe. Christian Relief Services, Lilongwe.

SMITH, W, 1999. Safety nets in Malawi: how much? For how many? Lilongwe, World Bank.

SIMBI, T, 1998. Agricultural policy in South Africa. A discussion document. Ministry for Agriculture and Land Affairs. Pretoria [WWW document] URL: http://www.colostate.edu/dept/Anthropology/theses/thesis_Jerry_hudson.pdf (Accessed 2006, May 21).

STATISTICS SOUTH AFRICA, 2006. General household survey, July 2005. Pretoria: Statistics South Africa.

STATISTICS SOUTH AFRICA, 2004. Gross domestic product. Statistical Release P0441. Pretoria: Statistics South Africa.

STATISTICS SOUTH AFRICA, 2002. Income and expenditure of households 2000; South Africa. Statistical release P0111. Pretoria: Statistics South Africa.

STATISTICS SOUTH AFRICA, 2000. The Labour Force Survey 2000. Pretoria: Statistics South Africa.

STEFANO, L, 2004. Printed information access, preferences and values by farmers with potential for small-scale organic production, KwaZulu-Natal. Unpublished MAgric. (Food Security) Dissertation. African Centre for Food Security, University of KwaZulu-Natal, Pietermaritzburg.

STRUCK, RE, 2002. The potential use of rural schools in the Maphephetheni lowlands as community resource centres. Unpublished MSocSc. (Community Resources) Dissertation. Discipline of Community Resources, University of KwaZulu-Natal, Pietermaritzburg.

THAMAGA-CHITJA, JM, HENDRIKS, SL, ORTMANN, GF, AND GREEN, M, 2004. Impact of maize storage methods on rural households food security in northern KwaZulu-Natal. *Journal of Family Ecology Consumer Science* 32: pp 8-15.

TULANE, 1992. Livelihood security. [WWW document] URL: <http://www.tulane.edu/panda2/FS/introduction/FS%20Introduction.htm>. (Accessed 2006, July 11).

UNITED NATIONS INTERNATIONAL CHILDREN'S EMERGENCY FUND, 1998. Stunting linked to impaired intellectual development. [WWW document] URL: <http://www.unicef.org/sowc98/panel3.htm> (Accessed 2006, April 02).

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP), 1997. Millennium Development Goals. [WWW document] URL: <http://www.undp.org> (Accessed 2006, April 17).

VAN DER KAM, S, 2001. Stages of food insecurity process: Household-level coping mechanisms. [WWW document] URL: <http://www.enonline.net/fex/10gu21.html-20k-Cached-Similar> pages (Accessed 2006, March 23).

VAN ROOYEN, CJ, AND SIGWELE, HK, 1998. Towards food security in Southern Africa: New roles for agriculture. *Food Policy* 23(6): 491-504.

VAN ROOYEN, CJ, 1998. Food security in the Southern African Development Community (SADC) region. [WWW document] URL: http://www.ciea.ch/documents/s01_sout_stroebe1.pdf. (Accessed 2006, October 10).

VAN ROOYEN, CJ, NGQANGWENI, S, AND FROST, D, 1996. Some considerations for South African food policy. *Agrekon*, 35: 301-308.

VAN ZYL, J, MACHETHE, C, SARTORIUS VON BACH, H, AND SINGINI, R, 1991. The effects of increased earnings from traditional agriculture in Lebowa. *Agrekon*, 30(4): 276-278.

VINK, N, AND KIRSTEN, J, 2002. Pricing behaviour in the South African food and agricultural sector. Report to National Treasury. Pretoria: National Department of Agriculture.

VITAMIN INFORMATION CENTRE (VIC), 2001. National Food Consumption Survey in children aged 1-9 years: South Africa 1999. Medical Updated Number 37. [WWW document] URL: <http://www.nutrivit.co.za/profesionals/medical-updates/nfcs-37.pdf>. (Accessed 2006, September 20).

VON BRUAN, J, AND KENNEDY, E, 1994. Agricultural commercialisation, economic development, and nutrition. Food Policy Statement No.19. Washington DC. International Food Policy Research Institute.

WATKINSON, E, AND MAKGETLA, N, 2002. South Africa's food security crisis. [WWW document] URL: www.naledi.org.za/pubs/2002/watkinson1.pdf (Accessed 2006, November 20).

WEISS, CH, 1998. Evaluation: Methods for studying programmes and policies. Second edition: New Jersey: Prentice Hall, pp1-19.

WORLD BANK, 1998. Nutritional status and poverty in sub-Saharan Africa. [WWW document] URL: <http://www.worldbank.org/arf/findings/english/find108.htm> (Accessed 2006, March 07).

WOOLARD, I, 2002. An overview of poverty and inequalities in South Africa. Working Paper prepared for Development Fund for International Development. Department for International Development. [WWW document] URL: <http://www.sarp.org.za/CountryPovertyPapers/SouthAfrica/july2002/woolard/Poverty-Inequality-SA.pdf>. (Accessed 2006, March 12).