The contribution of food access strategies to dietary diversity of farm worker households on Oranje farm in the Fouriesburg district (RSA)

Moratwa Tsholofelo Hope Matla

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By

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Dedicated to my beloved baby boy

Molau Oratile Matla!

I love you with all my heart

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Abstract

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Dietary diversity is an indicator of the access dimensions of household food security as it relates to income, area, and seasonality. Dietary diversity refers to the number of different individual food items (food variety) and food groups (food group variety) consumed over a given reference period (Ruel, 2002:3). This may accurately predict individual nutrient adequacy and thus household food security. Inability to access enough food for a sustainable and healthy life indicates food insecurity. Food accessing refers to obtaining food for all household members at all times through own production, exchange and/or purchase. Food access depends on an adequate, stable, local food supply, and includes the availability

and utilization of food (Steyn, Labadarios & Huskissom, 1999: 32). Lack of food resources often leads to food insecurity due to, among other, limited dietary diversity (different foods items or food groups) (Bellamy, 1998:24). Emphasis on dietary diversity can eliminate nutrient deficiency by increasing individual food and food group variety, thereby improving health.

The aim of this research is to identify and describe the contribution of food access strategies to dietary diversity of farm worker households by identifying their dietary diversity level and its contribution to household food security. A cross-sectional research design was used to collect data from all the adult women (18-65 years) (N=21) responsible for the food in a complete community of farm worker households on a farm (Oranje farm) in the Free-State province of South Africa. A structured questionnaire was used to gather data on demographics, food access strategies with special reference to food production, purchasing, bartering, gathering and payment in kind, as well as dietary diversity.

The two most common food accessing strategies used were purchasing (general dealers) and gathering (wild leaves, hunting, and fishing). Most people depended on own food production (86%) such as the cultivation of vegetables (spinach, green beans, pumpkin, turnip, tomatoes, cabbage) and fruit (apricots, peaches). Food bartering is seldom practiced (19%) due to customs and lack of knowledge. Food received as payment in kind (maize meal) was common (76%). The choice method of food access was buying (76%), gathering (19%) and producing (4%). People seldom ate outside their own home (76%), except children receiving food at school from the school feeding scheme (90%). Dietary diversity was limited for cereals consisting mainly of maize meal porridge, bread, vegetables such as wild leafy vegetables, tomatoes, onions, and potatoes, fruit (apples), unpasteurised milk, protein (eggs, chicken) and other (tea, sugar, oil, curry powder).

The mean for the food variety score of the 109 food items per day varied from 23.0 to 27.9 between five seasons which relates to three to four different food

items per day. Food variety score were thus lower in all the seasons when considering nutritious food. The food group diversity score was also calculated over nine nutritious food groups used over seven days. The food group diversity scores was high in almost all the seasons. The mean food group diversity score of the nine food groups varied from 7.9 to 8.8 between five seasons which relates to one and almost two food groups per day. Although most food groups were consumed in seven days, resulting in “high” dietary diversity, the numbers of food items (individual food variety) eaten within the various food groups was low. This study showed that it was possible to predict household food security of household members by simply calculating the food variety score and food group diversity score of a household as an indication of dietary diversity. The result revealed which households was food secure on insecure, and provided an overall picture of the dietary diversity of the whole community.

Overall this results indicated that limited food access strategies were utilized or that many of the strategies were not used optimally, resulting in limited dietary diversity, ultimately affecting the household food security status of farm worker households. This information can be used to formulate strategies and develop interventions to increase the number of food access strategies utilized and to food improve utilization thereof in order to improve dietary diversity and household security.

Key words: household food security, dietary diversity, food variety, food group, food access, commercial farm

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Chapter 1

GENERAL ORIENTATION OF THE STUDY

1.1 INTRODUCTION

Household food insecurity exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain (Derrickson, Sakai & Anderson, 2001: 155). The concept “household food security” refers to a household’s ability to access (procure or produce) adequate food at all times for all members in the household (Kennedy & Haddad, 1992:3; Bellamy, 1998: 23; Sayed, 2002:3). Understanding household food insecurity and knowing its consequences is an essential and important step in determining effective interventions. The measurements of household food insecurity is essential for planning, targeting, monitoring and evaluating interventions, but existing measures often are inadequate (Budlender, 1993:2).

Household food security is therefore an important dimension of the health of individuals within a household. There are three distinct variables essential to the attainment of food security, which are food availability, food utilisation and food access. This research study will be focusing on the food accessing strategies in addressing household food security. Food access refers to individuals having

adequate incomes or other resources to purchase or barter to obtain levels of appropriate food needed to maintain consumption of an adequate diet (Latham in Sayed, 2002:7). The inability of households to access enough food for a sustainable and healthy life is an important indicator of the level of poverty that may be present in food insecure households. Appropriate measurement for household food access is useful to:

- identify the food insecurity,
- assess the severity of the food shortfall,
- characterize the nature of the food insecurity (seasonal versus chronic),
- monitor changes over time,
- assess the impact of intervention (Hoddinott & Yohannes, 2002:1).

A recent Food and Nutrition Technical Assistance (FANTA) project has shown that dietary diversity is a good indicator of the access dimensions of household food security in a variety of settings, including poor and middle-income countries, rural and urban areas, as well as across seasons. Dietary diversity is defined as the number of individual foods or food groups consumed over a given period (Hoddinott & Yohannes, 2002:1). The inability of households to access enough food for a sustainable and healthy life is an important indicator of the level of poverty that may be present in food insecure households.

In Southern Africa, food insecurity, hunger and malnutrition are closely linked with poverty. The prevalence of poverty varies substantially across countries ranging from 15% in Botswana to 85% in Zambia (Babu & Qian, 1996 in Lado, 2001: 144). Generally, poverty is a rural phenomenon in Southern Africa and more than 75% of the poor are rural people who obtain their livelihoods from agricultural or non-farming activities (Lado, 2001:144). In a study in the Hammanskraal area, mothers were perceived as being food insecure (57), with children's hunger being the highest (60) and household hunger (46) the lowest (Kruger, 1999:144).

The need to focus on both national and household food security levels is important in the promotion of food security in a broad context. While South Africa is food secure at the national level, household food insecurity still exists in South Africa, especially in rural areas. Once food security is met at the national level, a person cannot assume that all individuals and households will automatically also experience food security. A country may be food secure to such an extent that it exports food to other countries while some of its own citizens are suffering from hunger and malnutrition (Kgaphola & Boshoff, 2002: 65).

1.1.1 Access to food

Access to food depends on an adequate, stable, local food supply. This is influenced by many interacting factors, which play a role in determining the extent of food security. The most frequently cited factors include:

- access to land,
- livestock ownership,
- food garden availability,
- safe, accessible water supply,
- stable climate conditions,
- access to food shops,
- access to alternative food supplies e.g. school feeding,
- cash (income) to buy food(Steyn, Labadarios & Huskisson, 1999:31).

Access to food is closely related to poverty and economic growth: the poor usually do not have adequate means to gain access to food in the required quantities (Lado, 2001:142). Lack of access to food is a major contributor to malnutrition, which has an effect in a person‘s life. It is self evident that poverty and malnutrition are well linked, but the mechanisms through which this relationship is likely to operate, need to be considered.

1.2 BACKGROUND TO THE INVESTIGATION

The research problem for this study, formed part of a larger project that developed a food based model to improve household food security on commercial farms in South Africa". Various post graduate students from the Department of Consumer Science of the University of Pretoria (UP) were involved. This project was completed and documented with the support of the Center of Nutrition, UP. The research problem of the larger focus project (Green, 2004:7) was formulated in question format as follows: How can household food security on commercial farms be improved through the implementation and evaluation of community- based nutrition programs and other supplementary interventions?

To fulfil the particular aim of addressing the food access component of household food security on commercial farms in South Africa, baseline data from a selected community have been obtained and analyzed specifically with the intention to identify needs and problems concerning household food security that may precipitate in rural communities. Identified nutritional needs and nutrition/food related problems were used from the national food consumption survey to focus on the design and implementation of related food-based programs. Evaluative research was conducted in the larger project in terms of process and outcome/impact, to construct a generic model or guideline. This model will be of significant to understand the relevant factors that should be considered to address aspects or components of household food insecurity in order to contribute to the improvement of health. It will further be used as a baseline to design effective and sustainable interventions on commercial farms in South Africa (Green, 2004:7).

This research study was undertaken as one of the few in South Africa that established a tool for measuring dietary diversity as a simple measurement of the household food security status in communities. Additionally, the association

between food variety, food group diversity and weight status was also considered. The researcher was involved in the initial stages of establishing a dietary diversity tool, suitable in the South African context, to determine dietary diversity in these communities. The sample was taken from the community of farm worker households living on a farm situated in the Fouriesburg district in the Free State province in South Africa (SA).

1.3 MOTIVATION FOR THE STUDY

The interest in this type of study was further stimulated when the researcher observed the people in this community while working as a fieldworker for the larger project on the same farm. Lack of dietary diversity was obviously a problem, because their diets were dominated by starchy food intake (mainly from maize meal porridge provided by the farmer as part of payment). Infrequent protein consumption was observed as little or no animal products (mainly chickens available) were consumed. Few fruits and vegetables were consumed, depending on seasons and availability. Most of the adult women in the community were unemployed, therefore contributing to poverty and poorly diversified diets.

The researcher observed that there were many people who just eat what is available at the time. The people living in this community lacked knowledge about food and nutrition, and were generally ignorant regarding the value of food in their lives. In the South African context, food accessing refers to obtaining food for all members of a household at all times. This can be attained; through own production of food for consumption, exchange of food between households, or through purchasing of food within a household or a combination (Food Security Working Group, 1997:4). Household food security includes the availability, accessibility and utilization of food in a household (Food Security Working Group, 1997:4). Both definitions emphasize the importance of household food

accessibility through a number of food accessing strategies. The household is regarded as a system that is responsible for food accessing and also for using the available resources to meet the demands amongst others, such as the food and nutritional needs of its members. The resources needed and used for producing, purchasing and utilizing food, originate within the household or from the environment in which the household functions and with which it interacts (Kgaphola & Boshoff, 2002:67).

Food security emphasizes permanent access to sufficient food by all people at all times for an active, productive and healthy life (World Bank, 1988 in Sayed, 2002:2). It is therefore important to develop strategies that will facilitate the accessibility of food at individual and household levels. In addition, it is important to know how the different food accessing strategies contribute to the dietary diversity of a specific community. It is particularly important to understand whether dietary diversity has an effect on the weight status of the individuals in a household. This information will help program managers and policy makers to understand what levels of reductions in malnutrition they can achieve from poverty alleviation and dietary diversification interventions, and whether they can expect a synergistic effect between the two approaches. The consumption of diversified diets has been proven to improve health as well as preventing malnutrition (Onyango, 2003:61). The researcher was thus motivated to investigate and describe the food access strategies and subsequent dietary diversity level resulting from the access strategies utilized by the women in this farming community to assess their level of household food security and to provide suggestions to improve the dietary diversity in this community.

1.4 LAYOUT OF THE STUDY

This thesis will be introduced by summarising each consecutive chapter.

Chapter 1 explains the general orientation of the study. The theoretical and conceptual frameworks were specifically taken into consideration highlighting the relationship between household food security, food access, food supply and dietary diversity. The background to the investigation of the study has also been summarised. This was done in order to focus on the originality as well as the motivation of the researcher of the study.

Chapter 2 focuses on the literature review within a sound theoretical framework. The literature review focused on household food security as well as dietary diversity and its associations with nutrient adequacy, nutritional status, nutrient density and the effects of food accessing strategies. The UNICEF Conceptual framework (Kavishe 1995:370) was used as a theoretical framework for this study. This model illustrated the important factors affecting the nutritional status of adult women and children in a community and how these are linked to household food security and subsequently food accessing strategies and their impact.

Chapter 3 focuses on the research methodology used in the study. The problem statement and sub-problems are addressed. A conceptual model illustrating all the relevant concepts was designed and conceptualised thoroughly to define all the important concepts in the model used. The study population, and sample, data collection methods, procedures and analysis are discussed

Chapter 4 focuses on presentation of the data, which is done through the use of tables. Findings and trends that emerged are presented. This chapter focuses on the discussion of major findings. Results presented are discussed in relation to the literature review and other related factors.

Chapter 5 focuses on the conclusion of the study. It also presents the study's recommendations and limitations of the study.

Chapter 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 INTRODUCTION

The UNICEF Nutrition Strategy aims to empower families, communities and governments to improve the nutrition of women and children on the basis of adequate and sound analysis (See Figure 2.1). The two most important elements in this strategy, are the processes of assessment, analysis and action (the "Triple–A" approach) and a conceptual framework for the analysis of the determinants of malnutrition in a specific context (Engle, Lhotska & Armstrong, 1997:4).

The immediate determinants of good nutrition and survival are adequate dietary intake and health. These are determined by underlying conditions that affect household food security, health services, and the care of women and children. Food, health, and care are in turn determined by the basic determinants of political, ideological, historical and economic structures (Engle *et al,* 1997:4).

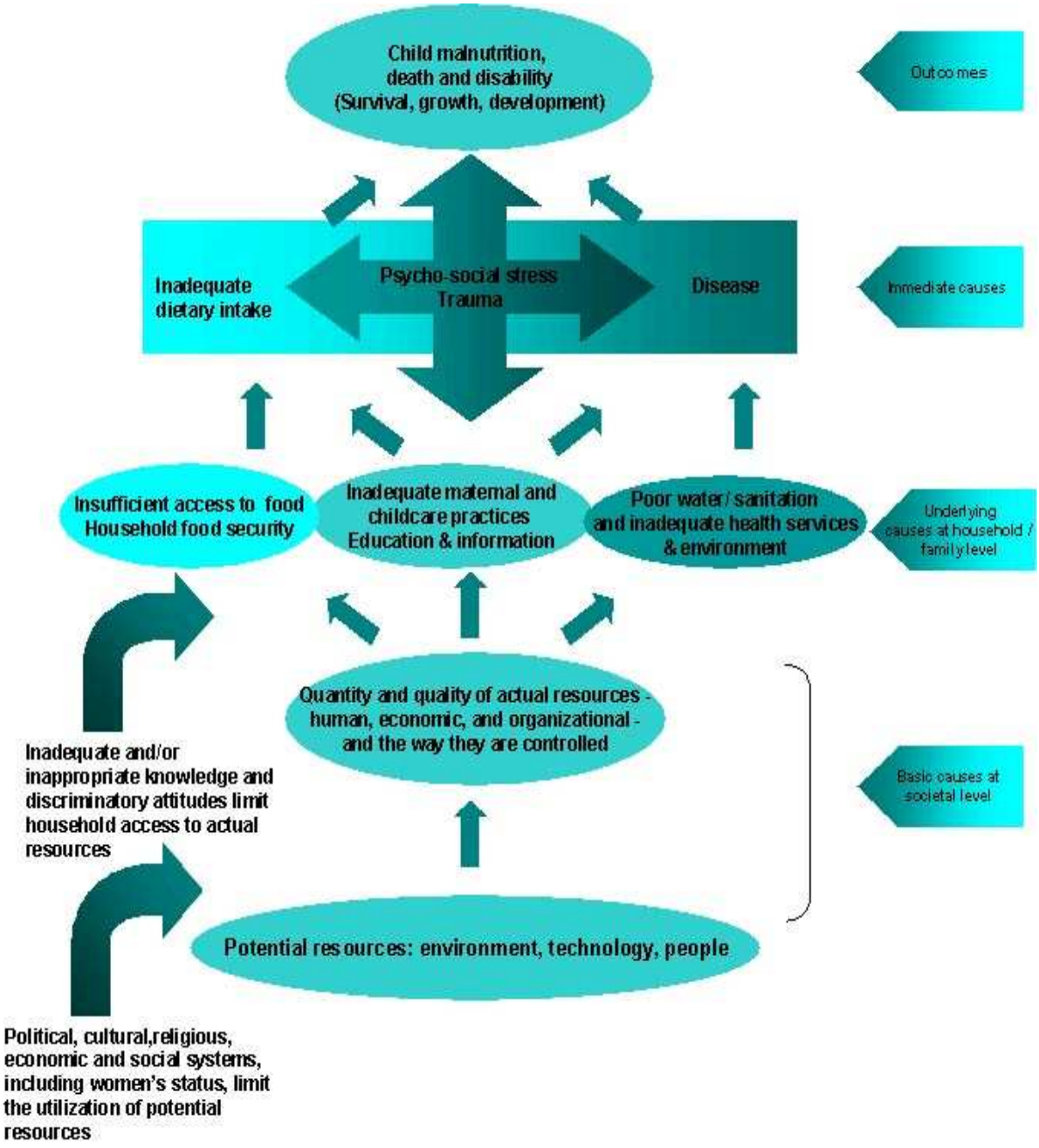

FIGURE 2.1: UNICEF CONCEPTUAL FRAMEWORK OF MALNUTRITION (Bellamy, 1998:24)

2.2 THE UNICEF CONCEPTUAL FRAMEWORK OF MALNUTRITION

The theoreticall framework for this research study is based on a part of the nutrition strategy approach consisting of a conceptual framework and the triple-A cycle process of assessment, analysis and action (Kavishe, 1995: 370). To solve problems, causes must be discovered! Before community nutrition problems, like chronic malnutrition, can be alleviated or solved, it must be ascertained which factors in the community are causing or contributing to the nutrition problem (Terry in Kruger, 1999:19). According to Naidoo, Padayachee and Verburgh (1993: 20) there is a universal awareness that under nutrition is largely the result of poverty, which arises from:

- underemployment or unemployment,
- the pressure of a growing population.
- low productivity of agriculture,
- uneven distribution of income and consumption,
- poor environment sanitation,
- Illiteracy, and/ or
- cultural deprivation.

Nutrition problems found among groups are usually determined not by one factor only, but by a variety of interrelated factors that play a role in influencing the nutritional status of the individual, (in this case the women) negatively. Actual food behaviour is the result of the synergistic relationship among ecological, socio-cultural, economic and political environments. Multiple and interrelated determinants are involved in the development of malnutrition, and a similar series of approaches (multifaceted and multisectoral) are needed to deal with it (See Figure 2.1). The model illustrates the important factors that affect the nutritional status of adult women and children in a community, ultimately leading to malnutrition, disability and/or death on the negative side, and survival, growth and development on the positive side (Bellamy, 1998:24). This model explains all the health and welfare of communities.

2.2.1 Basic causes at societal level

Basic causes of malnutrition relate to the allocation of and control over resources in the society, and thus to the structural causes of poverty and inequality. The depth and distribution of poverty in South Africa is a stark reminder of the ways in which economic and social policies under the “apartheid” system combined to disadvantage African people. Policy measures to improve poor people’s access to productive resources, incomes, and opportunities to enhance their capabilities, are central to the eradication of malnutrition (Mclachlan & Kuzwayo, 1997: 25).

The achievement of the abovementioned necessary condition for nutritional security – food, health, care and information – requires human, economic and organizational resources. Most underlying causes are the result of unequal distribution of resources in society. Causes at this level are basic or structural causes ((INP, 1997: 3.1-4).

The availability and control of resources strongly influence the final nutritional outcome. Resources and their control, at various levels of society, is the result of social, economic, political and cultural factors (INP, 1997: 3.1-4)
Social factors include aspects such as existing poverty relations, the division of labor, and power structures. Political factors primarily reflect the structure and function of the state and include income/tax policies, price and subsidization policies, the legal system, and the role and power of national institutions. External economic dependency and economic restructuring programmes, together with maldistribution of productive assets, particularly land, are common basic economic causes. Ideological factors cover even broader aspects of society such as religion, culture, tradition and beliefs (INP, 1997: 3.1-4).

The following care resources include the major activities performed on a day to day basis and are affecting the nutrition of women and their families:

- **Potential resources**

Food production practices and the environment

Most rural communities still depend on subsistence farming and they do not produce a variety of foods. Maize is the most produced food in our (SA) communities (Engle *et al,* 1997: 24).

Food storage

After harvesting, food storage facilities are either not available or inadequate. The unhygienic food storage methods e.g. food stored at room temperature, uncovered, as well as insects and rodents coming into contact with foods There are no food processing plants and a lot of food is wasted through spoilage. Women are responsible for farming and they have other responsibilities too in the family (Engle *et al,* 1997: 24). It is therefore clear that lack of resources have an effect in lowering the dietary diversity of some communities.

Food purchasing

Due to lack of nutrition knowledge, people may buy non-nutritious foods or food with low nutritious value. Due to a lack of income people may only buy staple foods such as maize meal, resulting in undiversified diets (Engle *et al,* 1997: 24).

Food preparation

More time is spent in preparation and cooking, and the effort and skill involved in these activities affect the nutrition. This can be reduced by improving cooking resources (e.g. providing fuel-efficient stoves) or by encouraging other family members to share the work. (Engle *et al*, 1997: 24). In addition by changing the use of incorrect cooking methods and overcooking and destroying nutrients in food, or discarding excess water after cooking vegetables.

- **Economical resources**

  Low incomes are mainly due to a lack of education, and it affects the purchasing power of communities. Most underprivileged societies have large families and low incomes. Low incomes and household food insecurity are directly related (Engle *et al*, 1997: 30).

- **Political resources**

  The policies from the state government on employment, prices, incomes, subsidies, health education, and agriculture and the legal system, can influence the resources for care. For example, since women education plays an important role in child nutrition, support for a girl education as well as adult education can improve human resource and decreasing the incidences of malnutrition (Engle *et al,* 1997:33).

  Cultural food beliefs

  Cultural factors include habits, beliefs, preferences, customs and ideas that legitimize actions in society. Malnutrition is likely to increase when these when these factors do not support care for women. (Engle *et al,* 1997:34).

2.2.2 Underlying causes at household/family level

Three clusters of underlying causes lead to inadequate dietary intakes and infectious disease. These include inadequate access to food in a household; insufficient health services and unhealthful environments; and inadequate care for children and women (Bellamy, 1998: 23). These causes relate to a failure to meet the basic needs of children and women. Food, health, and care are all necessary, but not sufficient conditions for good nutrition outcomes. Adequate care alone will not result in optimal health and nutrition for women and children. All three elements must be satisfactory for good nutrition (Engle *et al,* 1997:4).

2.2.2.1 Household food security

Household food security is defined as sustainable access to safe food of sufficient quality and quantity including energy, protein and micronutrients, to ensure an adequate intake and a healthy life for all members of the family (Bellamy, 1998:23). In rural areas, household food security may depend on access to land and other agricultural resources to guarantee sufficient domestic production. In urban areas a range of foods is available at accessible prices to ensure food security.

In order to achieve food security, both at national level and in the household, it is necessary to ensure that there is a safe and nutritionally adequate food supply from one year to the next and also during the year. It is also important to encourage the equal distribution of food within the household among all its members. If the household is food insecure it may be from a lack of production, inadequate purchasing power, inadequate supply of food, inadequate storage, and poor food hygiene. The World Food Summit Plan in 1995 describes food security as the situation where all people, at all times, have physical and economic access to sufficient food to meet their dietary needs & preferences for an active and healthy life (Food & Agricultural Organization of the United Nations, 1998: ix).

The majority of people in South Africa depend on purchasing food to ensure household food security. With the rising food prices and high cost of transport, poverty has contributed toward food insecurity. In a recent survey of health inequalities in South Africa, hunger was used as an indicator of the health impact of poverty. According to the study, perceptions of hunger are closely associated with low incomes, with 88% of households reporting that members often went hungry, falling below the minimum living level. Urban provinces, such as Gauteng and Western Cape, had comparatively lower levels of “hunger” than rural provinces (Mclachlan & Kuzwayo, 1997:23). This clearly indicates that low

incomes especially in rural areas affects the utilisation /eating patterns thereby affecting the dietary diversity of some communities.

2.2.2.2 Maternal and childcare practices

Children can still become malnourished even when there is adequate food in the house, and a family lives in a safe and healthful environment, and has access to health care services. Care is manifested in the ways a child is fed, nurtured, taught and guided. Nutritionally, care encompasses all the measures and behaviours that translate available food and health resources into good child growth and development (Bellamy, 1998:27).

Nutrition during pregnancy is one of the most important factors in determining the course and outcome of pregnancy for both mother and infant. A good diet that provides adequate amounts of kilojoules and essential nutrients are necessary for the support of the maternal body tissues and the growth and development of the foetus (Obert, 1986:49).

The quality of healthy women‘s diets during pregnancy and lactation is very important for themselves and their children. Children born to anaemic mothers are often stunted and ill. Children born to iodine deficient mothers may be apathetic, retarded, or have congenital abnormalities. Poorly nourished mothers have higher rates of miscarriages, stillbirths, and maternal mortality. The mother’s vitamin A status directly affects the infant’s intake through breast-milk consumption, and affects the child’s resistance to diseases such as measles (Engle *et al,* 1997:12).

Women need to have adequate dietary intakes of vitamin A during pregnancy and lactation to ensure optimal vitamin A status in the young infant. Although family food may be limited, families can care for women by making sure that they receive an extra amount of family food. Families also need to be aware of the

possible negative impact of beliefs about food restrictions on women's diets during this period. The health and nutritional status of the pregnant and lactating mother are critical for the outcome of pregnancy and subsequently for children's growth and development. Pregnancy, childbirth, and lactation are demanding on women's health and therefore a family should give them support and care during this time. Even small changes by the family can influence birth outcomes (Engle *et al*, 1997:13).

Children may still become malnourished due to the limited quantity and poor quality of food (in terms of energy and nutrient density). This is particularly the case during weaning (between the ages of 4 & 18 months) when small children are especially susceptible to Protein Energy Malnutrition brought on by insufficient breastfeeding or inadequate supplementary feeding. This might also be due to lack of dietary knowledge or the fact that parents have too little time available to prepare food for their children (Engle et al, 1997:11).
The feeding situation may also influence the food intake of young children. Some children are fed on a regular basis each day, sitting in a prescribed place with food easily accessible, whereas other children are fed while wandering around, or at a time that the caregiver finds convenient (Guldan *et al* in Engle, Bentley & Pelto, 2000: 27). These practices translate food security and health into a child's well being (Engle *et al,* 2000: 27).

Care practices also differ very much according to the age of the child, or the child's developmental period. The prenatal period and the first three years of life (0-2) are the most important for growth and development. Mortality is highest during the first year of life. In the first six months of life, malnutrition tends to be less common if the mother is exclusively breastfeeding. During this period, the most important care practices are centered on the lactating women and her breastfeeding (Engle *et al*, 1997:11).

Care that is appropriate at one age may not be appropriate at another age. For example, regular mealtimes are probably helpful in the second or third years of life but scheduled times for breastfeeds in the first year usually lessen intake or shorten breastfeeding durations. Active spooning of food is appropriate for a seven -month-old but inappropriate for a normal two-year old who wants to feed himself (Engle *et al*, 1997:11).

These care practices and resources for care are not only important for children's good nutritional status, but also for their growth and development. They also had been recognized as building blocks of Early Childhood Care for Survival, Growth and Development, UNICEF's integrated approach to young children (Engle *et al*, 2000: 27). Different aspects of care necessary for good growth and development links with household food security and can be determined such as care for women, breastfeeding hygiene practices, home health practices and psycho-social care.

Education and information

An important cause of poverty, disease and malnutrition is inadequate educational services. Limited and sub-standard education greatly reduces life chances. Low educational levels among women correlate strongly with the incidence of malnutrition among children. This is because poor education not only limits the chances of women being able to acquire wage employment or improved productive skills – both of which will generate resources for improved nutrition, but it also limits their knowledge of the nutritional and hygienic needs of a healthy family (Engle *et al,* 1997:29).

Lack of freedom and mobility, and excessive workload often limits their access to education both as children, and as adults. Education is one of the most important investments that can be made in children's growth and development. Mothers with more education have better nourished children. More educated mothers may be more assertive and make better use of health services, provide better child

care such as feeding, have more hygienic household practices and personal habits. They have an increased knowledge of appropriate child rearing, or have higher status in the family and thus more control of family resources (Engle *et al*, 1997:14).

2.2.2.3 Poor water/sanitation & inadequate health services & environments

Access to curative and preventative health services that are affordable and of good quality, play the most important role in a person's good health and nutritional status (Bellamy, 1998:25). Without these services people are at a high risk of contracting diseases. Availability of health services, sanitation systems and clean water, but most importantly, immunization against childhood diseases, reduces the risk of malnutrition.

In terms of environmental health, the lack of access to a safe water supply, proper sanitation practices, and the unhygienic handling of food, have significant implications on the spread of infectious diseases. These are also the most common causes of childhood diarrhoea. If the environment is unhealthy and littered with animal and human wastes, young children are also more prone to infection by intestinal parasites, thereby contributing to poor growth and malnutrition. People who are usually responsible for fetching water for domestic use are the women and children in a household. This is a very hard task that drains considerable time and energy, depending on the distance to the water source (Bellamy, 1998: 27).

Rural people have limited access to water and sanitation, proper housing and energy. A quarter of rural African households state that available water is insufficient to their needs, and a third has to walk more than 500m to the water source. In general, households using water from unprotected sources use less water on a per capita basis (Mclachlan & Kuzwayo, 1997: 21).

In respect of communal water supplies schemes in certain areas in South Africa, soak-away facilities have not been installed, which have the potential for elevating the transmission of disease associated with pools of stagnant water. Those who use water are not always educated in the safe handling, storage and disposal of water, despite evidence from several quarters of rapid deterioration of water quality between the supply point and end use (Genthe *et al*, 1997, Thomas *et al*, 1999 in Thomas, Seager & Mathee: 2002:5).

The South African Constitution, adopted in 1996, contains within it a Bill of Rights, including specific mention of health and environmental rights. The Bill of Rights states that '… everyone has the right to an environment that is not harmful to their health or well being, and to have the environment protected'. This is not a true case because in terms of industrial pollution, poorly managed industrial processes have led, for example, to increased exposure to asbestos in a number of South African asbestos mining towns. This is associated with increased incidence of asbestos-related diseases such as TB and asbestosis (Mathee, 2000b in Thomas *et al*., 2002: 3). The use of solid, and to a lesser extent, liquid fuels, indoors has been shown to contribute to elevated levels of indoor air pollution and respiratory ill health (Thomas *et al,* 2002: 3).

2.2.3 Immediate causes

The model clearly addresses the most significant immediate determinants of malnutrition that include inadequate dietary intake and disease. Dietary intake that is inadequate may also include inadequate total energy, protein, vitamin or mineral intakes, while infectious diseases such as measles, gastro-enteritis and respiratory infections are mostly linked with malnutrition. Poor nutritional status reduces immune responses and thus increases susceptibility to infections, thereby clearly indicating the interaction between dietary inadequacy and infections. Conversely, the presence of infectious disease reduces dietary intake through the loss of appetite and impairs nutrient utilization through reduced

digestion and absorption (Mclachlan & Kuzwayo. 1997: 6). The immediate causes of malnutrition are inadequate dietary intake, disease, and psychological stress together with trauma.

2.2.3.1 Inadequate dietary intake

Inadequate dietary intake and illness (disease) are the most significant immediate causes of malnutrition and tend to create a vicious circle. Inadequate dietary intake and infection operate in a vicious cycle that accounts for much of the high morbidity and mortality seen in developing countries. When children do not eat enough or well enough, their immune system defenses are lowered, resulting in greater incidence, severity and duration of disease. Disease speeds nutrient loss and suppresses appetite – so sick children tend not to eat as they should and the cycle continues (See Figure 2.2) (Bellamy, 1998: 25).

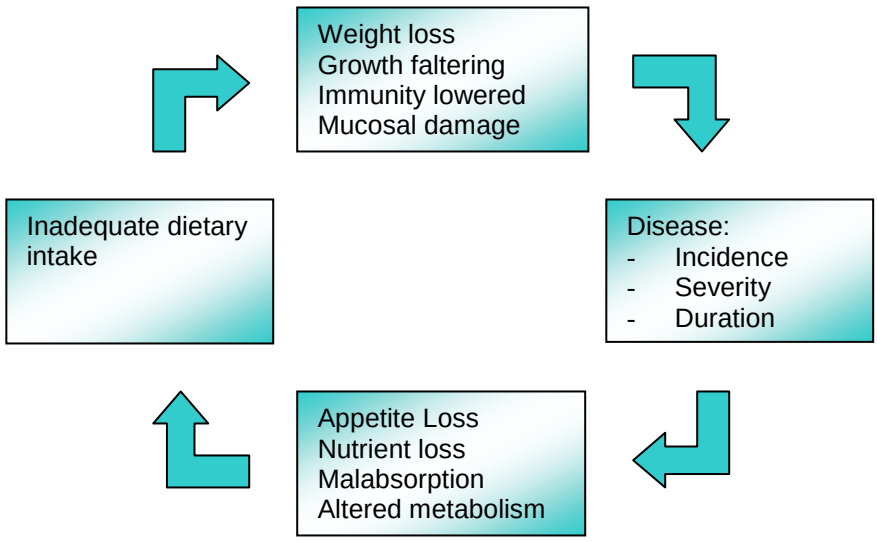

FIGURE 2.2: INADEQUATE DIETARY INTAKE / DISEASE CYCLE (Bellamy, 1998: 25)

Its application in South Africa shows that anemia is also a significant problem among children. Twenty percent of children were found to be anemic and 10% to be iron deficient. Iron deficiency anemia was diagnosed in 5% of young children

(SAVACG, 1996: 356). The mean intake of iron was also found to be consistently low in all age groups and all provinces (Labadarios, 1999: 4; Steyn & Labadarios, 1999:242).

2.2.3.2 Illnesses

Malnutrition lowers the body's ability to resist infection by undermining the functioning of the main immune response mechanisms. This leads to longer, more severe and more frequent episodes of illness. Infections cause loss of appetite, malabsorption and metabolic and behavioral changes. These in turn increase the body's requirements for nutrients, which further affects young children's eating patterns and how they are cared for (Bellamy, 1998:23).

2.2.3.3 Disease patterns

When the infections become more frequent accompanied by poor health they predispose children to malnutrition. In rural areas, poor health status of women and children is clearly shown among poor populations. This can be seen in those areas where there is inadequate water and sanitation, people living in informal housing, in families where mothers have no education (INP, 1998: 3.1-2).

The most common infectious diseases in South Africa affecting growth of children and which may lead to malnutrition are measles, diarrhea, acute respiratory infections and tuberculosis. In such cases women are the ones taking care of the children. Infections increase malnutrition due to one of the following reasons:

- The child may have a poor appetite
- If the child has a fever, the body needs more energy and may use the body's stores to provide energy
- The child may have diarrhoea and, therefore, nutrients are not absorbed; or
- Local beliefs of the appropriate diet for a sick child may lead to inadequate nutrient intake (INP, 1998: 3.1-2).

Also a high prevalence of parasitic infections (round worms, whip worms, tape worms) have been observed in micro-studies conducted in Mpumalanga, KwaZulu-Natal and Western Cape (Vorster *et al* in Mclachlan & Kuzwayo, 1997:21)

An additional cause of poor physical and mental health in children relate to the poor psychosocial development of children. In S.A as in other countries, which have experienced sustained periods of social disorder and violence, many children are severely traumatized through exposure to violence and brutality as witnesses and victims. Under such circumstances, post-traumatic stress and other forms of emotional and psychosocial scarring encumber their normal development as human beings. Such trauma has a direct impact on young children's health, dietary intake and consequently increases their vulnerability to malnutrition and illness (INP, 1998: 3.1-2).

This study will only address issues on the underlying causes pertaining to insufficient access to food (household food security) as it influences the care practices of women. Other studies contributing to the larger project will address other issues of the model. All the information found would be used to conclude or to make recommendations on household food security in farm worker households on commercial farms. The consumption of diversified diets in has been proven to improve health as well as preventing malnutrition (Onyango, 2003:61). This study will only address issues underlying causes pertaining to insufficient access to food (household food security) as it influences the care practices of women.

2.3 FOOD SECURITY

2.3.1 Introduction and definitions

Food security is defined (USAIDS, 1992 in Hodinnott & Johannes, 2002:3; World Bank, 1988 in Sayed, 2002:2) as when all people at all times have both physical

and economic access to sufficient food to meet their dietary needs for a productive and healthy life. Food security is probably too complex to ever be adequately captured by a single indicator. In brief, measuring household food security in valid and reliable ways is a major challenge, and the search for good, cost-effective alternative indicators continues (Maxwell, Ahiadeke, Levin, Armar-Klemesu, Zakariah & Lamptey, 1999: 412). Three distinct variables are mentioned as being essential to the attainment of food security; these include the following:

- food availability – refers to sufficient quantities of appropriate, necessary types of food from domestic production, commercial imports or donors that are consistently available, within reasonable proximity or within their reach (USAIDS,1992 in Hoddinot & Johannes, 2002:3;Sayed, 2002: 6),

- food access – refers to the individual having adequate income or other resources to purchase, barter or obtain levels of appropriate food needed to attain consumption of an adequate diet or to attain an acceptable level of nutrition (USAIDS,1992 in Hoddinot & Johannes, 2002:3; Latham, 1997 in Sayed, 2002: 7).

- food utilization – refers to food that is properly used; proper food processing and storage techniques that are employed; adequate nutrition knowledge and child-care techniques that exist and is applied; and adequate health and sanitation services that exist (USAIDS,1992 in Hoddinot & Johannes, 2002:3).

Food security of young children depends on power relationships within the household. Children may be poorly fed if this relationship is unequal. The power relationships are very dependent on the status of the women in the house. If only the husbands makes decisions regarding buying of food, the needs of children may be neglected. (Steyn *et al*, 1999: 31). Therefore this indicates the important

role played by women in a household in terms of nutrition or their dietary diversity.

2.3.2 Household food security

Household food security refers to a household's ability to access (procure or produce) adequate food at all times for all members in the household (Bellamy, 1998:23; Hoddinott, 1999:7; Sayed, 2002:3). There are various other forms of food security applicable on household level namely:

- individual food security – refers to the individual's ability to access food in a household (Sayed, 2002:4).
- nutrition security – refers to a diet that is adequate not just in terms of quantity, that is total energy (kilojoules) intake, but also adequate in terms of the quality and variety, that is protein, vitamin and mineral requirements (Sayed, 2002: 4). This diet should also meet the specific food and nutrient needs of the individual (e.g. an infant versus the elderly – each having different nutritional requirements).

The achievement of nutrition security at the household level involves the fulfilment of two essential requisites, namely adequacy of food supply at the overall national level and equitable distribution of food among the population in accordance with their physiological needs. It is apparently the latter requirement that has often proven the more difficult to fulfil (Gopalan, 2001:S4).

Nutrition security cannot be achieved by reliance on just one staple food. Diets exclusively based on rice and wheat will be deficient in a range of micronutrients, apart from being relatively poor in protein quality. Diversification of household diets is necessary and a national food production policy should aim at the achievement of balanced production and availability of a range of basic essential foods (Gopalan, 2001:S6).

Lack of nutrition security is a manifestation of a poverty syndrome, mutually reinforcing attributes which include illiteracy, poor vocational skills and consequently poor family income, poor access to food, poor housing and environmental sanitation, poor access to basic health services and a lack of self-esteem and consequent poor motivation for individual or collective action for socio-economic advancement (Gopalan, 2001:S8).

Internationally, research has been conducted on dietary diversity and household food security amongst a variety of communities (Drewnowski, Henderson, Shore, Fischler, Prezioski & Hercberg, 1996: 663; Fernandez, Negri, La cchecia & Franceschi, 2000: 11; Ruel, 2002: 23; Hoddinott & Yohannes, 2002: 4). However, little data is available in South Africa (Kgaphola & Boschoff, 2002:65; Kgaphola,2003: 218).The concept of household food security is useful in emphasizing the possible (and likely) unequal distribution of food, as well as other resources, which allow the household to produce and acquire food, within a country or community. Food, water and fuel are all resources, which are essential for household security, and all involve activities in which women play a predominant role (Budlender, 1993: 2).

Various researchers have investigated links between food variety, improved health and nutritional status (Onyango *et al,* 1998:484; Hatloy, Hallund, Diara & Oshaugh, 2000:57; Oyango, 2003:1). Several researchers have also investigated the relationship between dietary diversity and the causes of mortality, or the protective function of diversified intakes of fruits and vegetables in some forms of cancer (Fernandez *et al*, 2000:11; Ogle, Hung & Tuyet, 2001:21). The nutritional benefits of fruits and vegetables are mostly argued on the basis of the contribution it makes to intakes of known minerals and vitamins. It is therefore important to identify those foods that will improve dietary diversity in a specific location. This can be possible by identifying and compiling a list of foods consumed by the community in order to develop a dietary diversity score

2.3.3 Dietary diversity

Dietary diversity refers to the number of individual foods or the number of food groups consumed over a given period of time. It is a useful indicator of household food security for four reasons. Firstly, questions on dietary diversity can be asked at the household or individual level, and this makes it possible to examine food security at the household and intra-household levels. Secondly, the participants find questions easy to answer and it does not take a long time. Thirdly, eating a variety of foods is a valid outcome in its own right. Fourthly, a higher variety of food is associated with a number of positive outcomes such as improved birth weight and child anthropometric status, improved haemoglobin concentrations and reduced risk of mortality from cardiovascular disease and cancer (Hoddinott & Yohannes, 2002:5).

Nutritionists have long recognized dietary diversity as the key element of high quality diets. Increasing a variety of foods across and within food groups is recommended by most dietary guidelines in the United States as well as internationally and locally (Maunder, Matji & Moleo, 2001:s7). This is thought to ensure adequate intake of essential nutrients and thus promote good health (Ruel, 2002:1).

With regard to nutrition education of the public at large, South Africa is in process of developing Food Based Dietary Guidelines. The International Conference on Nutrition in 1992 identified the development of Food Based Dietary Guidelines as one important strategy in the promotion of nutritional improvement and healthy lifestyles (Maunder & Labadarios, 1999:518). Among the core features that countries have emphasised in recent guidelines are the recommendations to consume a wide variety of foods and to eat plenty of fruits and vegetables (Gibney & Vorster, 2001:s24). However, while a diversified diet often is associated with a healthier diet, it is a very diffuse term to use. Several researchers have noted that there are little guidelines for measurement of dietary

diversity and suggested that a count of different foods or food categories consumed may be a useful indicator. Some have analyzed the association between the number of individual foods or food groups and the nutrient adequacy (Hatloy, Torheim & Oshaug, 1998:891; Ruel, 2002:12).

Common measures of dietary diversity that are used in developing countries include measures based on a simple count of foods or food groups, while others take into consideration the number of servings of different food groups in conformity with dietary guidelines (Ruel, 2002:6). Food variety will be measured by counting all the different individual food items consumed over a specific period, and calculating a food variety score (FVS). Another measure of dietary diversity is the dietary diversity score (DDS), in this research it will be considered as the food group diversity score (FGDS), which will be calculated and measured by counting the number of food groups consumed over a specific period.

2.3.4 Association of dietary diversity and nutrient adequacy

A goal for many existing nutrition intervention programs is to increase the nutritional adequacy of diets on the assumption that this will result in improved nutritional status and health of target populations (Guthrie & Scheer, 1981: 240). Single foods or food group counts have been the most popular measurement approach for dietary diversity in developing countries, probably due to their simplicity. The number of servings based on dietary guidelines was not considered in any of the developing country studies reviewed. In China, Ethiopia and Niger researchers used food group counts, while those in Kenya, Ghana and Malawi used the number of individual foods consumed (Ruel, 2002:7).

Studies in Mali (Hatloy *et al,* 1998:891), and VietNam (Ogle *et al,* 2001:21) used both single food counts called food variety scores (FVS) and food group counts called dietary diversity scores (DDS). A useful contribution of the study in Mali

showed that DDS (based on food groups) was a stronger determinant of nutrient adequacy than the FVS (based on individual foods).

Increasing the number of food groups has a greater impact on nutrient adequacy than increasing the number of individual foods in the diet. This is because the nutrients essential to meet nutritional requirements are not all found in a single food item (with the exception of human breast-milk in the first month of life) but come from a diet composed of a number of food groups (Hsu-Hage & Wallqvist, 1996: 53). Diverse diets have shown to protect against chronic diseases such as cancer (Vecchia *et al,* 1997 in Hatloy *et al*. 1998: 891; Fernandez, *et al*. 2000:11). Different food groups consist of different nutrients from each food item it contain. A varied diet will therefore consist of all the essential nutrients and energy (Hatloy *et al.* 1998: 891).

A diet may have all of the virtues just described and still lack variety if a person eats the same foods day after day. Variety (dietary) refers to eating a wide selection of foods within and among the major food groups (the opposite of monotony). People should select foods from each of the food groups daily and vary their choices within each food group from day to day for several reasons. Firstly, different foods within the same group contain different nutrients. Fruits such as strawberries are especially rich in vitamin C while cantaloupes are rich in vitamin A. Secondly, variety is the spice of life. Even if a person eats beans frequently, the person can enjoy pinto beans in Mexican burritos today and garbanzo beans in Greek salad tomorrow, and baked beans with barbecued chicken on the weekend. Eating nutritious meals needs never be boring (Whitney & Rolfes, 2002:34).

Foods that are notably low in nutrient density – such as potato chips, candies, and colas are sometimes called empty-kilojoule foods. The kilojoules these foods provide are empty in that they deliver only energy (from sugar, fat, or both) with little or no protein, vitamins, or minerals. Therefore, when eating these foods, a

person may not consume enough nutrients required according to the Dietary Reference Intakes (DRI's). It is thus very important to eat a variety of foods in order to get enough nutrients. Foods rich in fat and sugar provide enjoyment and energy but relatively few nutrients. In addition they promote weight gain when eaten in excess and can lead to malnutrition (Whitney & Rolfes, 2002:34).

Monotony in the diet has been described as the hallmark of poverty and poor nutrition (Golden, 1991; 95) and indeed, typical child diets in communities and households with high rates of malnutrition are monotonous and bulky. Cereals, roots and tubers account for more than three-quarters of energy intake and in some cases similar proportions of proteins and micronutrient intakes (Onyango *et al*, 1998: 486; Hatloy *et al*, 1998:893; Tarini, Bakari, Delisle, 1999:24).

The importance of emphasizing dietary diversity in developing countries stems mainly from a concern related to nutrient deficiency and the recognition of the importance of increasing individual food and food group variety to ensure nutrient adequacy. Lack of dietary diversity is a particularly severe problem among poor populations in the developing world, because their diets are predominantly based on starchy staples and often include little or no animal products and few fresh fruits and vegetables. These plant-based diets tend to be low in a number of micronutrients, and the micronutrients they contain are often in a form that is not easily absorbed. Although other aspects of dietary quality, such as high intakes of fat, salt, and refined sugar have not typically been a concern in developing countries, recent shifts in global dietary and activity patterns resulting from increases in income and urbanization are making these problems increasingly relevant for countries in transition as well (Popkin, 1994; WHO/FAO, 1996 in Ruel: 2).

2.3.5 Association of dietary diversity and nutritional status

A study done in Mali documents a strong association between dietary diversity and children's growth (Hatloy *et al,* 2000:57). In urban areas of Mali, lower FVS or DDS were associated with twice the risk of being stunted or underweight, controlling for socioeconomic factors. No association between diversity and growth was found in rural areas (Ruel, 2002:2).

Data from the South African National Food Consumption Survey (NFCS) (Labadarios, 1999) showed that the majority of South African households live in poverty with a limited variety of foods (mainly staples) available in the home. Findings from the NFCS indicate that one out of two children had an energy intake less than two thirds of their energy needs and many children consumed a diet with poor nutrient density in order to meet their nutrient (macro and micro) requirements. Stunting and underweight is the most severe in children 1-3 years of age, especially those living on commercial farms. Mean intakes of the following nutrients are low compared to the Dietary Reference Intakes (DRI): calcium, iron, zinc, vitamins A, D, E, C, B6, riboflavin and niacin (Steyn & Labadarios, 1999:242).

2.3.6 Association of dietary diversity and nutrient density

The study in Vietnam, which included adult women, used similar methodology to validate the same dietary measures (FVS and DDS) against nutrient intake and nutrient density. Both the FVS and DDS were derived from a seven-day food frequency questionnaire and included more than one hundred and twenty foods and twelve food groups respectively. These findings confirm a positive association between the two measures of diversity and the intake of a variety of nutrients. Women who had a high score in the FVS, (thus consuming 21 or more different foods in 7 days) had a significantly higher intake of most of the nutrients studied, than those from the lowest tercile FVS(consuming 15 or fewer foods).

Similarly, women with a food group diversity greater or equal to eight foods (out of a maximum of 12 groups) had significantly consumed higher nutrient ratios for energy, protein, niacin, vitamin C and zinc than women with lower food group diversity (Ogle *et al*, 2001: 21). This indicates that the more diversified a diet is, the more nutrients will be available in an individual's body.

2.3.7 The effect of food accessing strategies on dietary diversity

Socio-economic factors such as income and access to land, determine the ability of households to obtain food either by their own production, or through purchasing (Kgaphola & Boshoff, 2002:66). Home gardening can contribute to household food security by providing households with direct access to food that can be harvested, prepared and consumed by the household members, often on a daily basis (Marsh, 1998 in Faber & Benade, 2003:24). It also has an effect on dietary intake, as it will provide their diet with micronutrients essential for their health. The local production of fruits and vegetables could potentially provide households with direct access to foods rich in beta carotene and other various nutrients such as calcium, iron, riboflavin, vitamin C, thereby improving the overall quality of the diet (Faber & Benade, 2003:25). These nutrients are found in vegetables and fruits and may help protect against diseases. Deficiencies of iron, iodine and vitamin A are the most widespread forms of micronutrient malnutrition with public health consequences. Other micronutrients have been shown to play a role in preventing specific disease conditions (e.g. folic acid and calcium) or in the promotion of growth (e.g. zinc). The reason that deficiencies occur, is when the habitual diet lacks diversity or is overly dependent on a single staple food, as is the case of monotonous cereal or tuber based diets (WHO/FAO 2002 in Kennedy, Nantel & Shetty, 2003: 9).

The natural environment can also determine what kinds of food can be produced by influencing the food made available for consumption, while the behavioural environment determines which foods will be chosen from the variety available.

The natural environment will also determine the types of animals and plants available in the area (Sims & Smiciklas-Wright, 1978: 174). Finding all the types of food obtained from the environment and determining whether they are utilized properly, is essential in order to determine if they contribute to dietary diversity.

Food utilization is the final use of food by individuals at household level. This includes storage, selection, preservation, preparation and the intake of food. These activities rely on the allocation and use of a household's personal and material resources (e.g. knowledge, equipment available and financial means) and it may be influenced by values, attitudes and norms held in the household or by the individual concerned (Kgaphola & Boshoff, 2002:68). A study in Vietnam explains the significance of wild vegetables in micronutrient intakes of adult women in Vietnam. The nutrient contribution of wild vegetables was generally found to be high. The use of a greater variety of wild vegetables was found parallel to a higher dietary diversity (Ogle *et al,* 2001:29). Rural people in many countries continue to include wild foods in their diets, but the role of this food category is still difficult to capture in conventional dietary assessment. This poses a problem because the wild vegetables are known only by their local vernacular names, they vary with ethnicity, users are often illiterate, and there is sometimes a social stigma attached. In addition, data on composition is often missing or outdated (Ogle *et al,* 2001: 21). It is therefore important in these situations to analyze the individual foods or food groups included in the diet. People eat what they like, what is available and what they can afford. When traditional foods become scarce and expensive, and when time and labour are no longer available for their production, then processing and domestic preparation and their contribution to the family diet is reduced (FAO, 1997: 178).

Investigations into micronutrient nutrition and traditional food systems of indigenous peoples were recently carried out by FAO collaborators in the five case studies of indigenous peoples in rural areas of Asia. It was found that, out of 716 species of traditional food reported by five community areas, 93 traditional

foods still required scientific identification, and for approximately 147 species there were not even the most basic nutrient data on file (Kuhnlein, 2001 in Kuhnlein, 2003: 33). Therefore it is equally important to take into consideration the traditional food of rural people.

2.3.8 The effect of micronutrients to dietary diversity

Many nutritionists and social scientists believe that the integration of food rich in micronutrients into the diet is the only sustainable way to improve micronutrient status in the human. Micronutrient deficiency is the most prevalent in areas where the diet lacks variety, as is the case for many individuals in developing countries. When people cannot afford to diversify their diets with adequate amounts of fruits, vegetables or animal-source foods that contain large amounts of micronutrients, deficiencies are inevitable. In addition, a minimum amount of fat or vegetable oil is required in the diet for adequate absorption of the fat-soluble vitamins A, D, E and K (Kennedy *et al,* 2003:8). Micronutrient malnutrition is also a public health problem of considerable significance in South Africa. One in three children has serum retinal levels that are low, which indicates a marginal vitamin A status. Children in rural areas and those of mothers with limited education are the worst off. There is a strong correlation between vitamin A status and protein-energy malnutrition. Forty percent of stunted children have a marginal or deficient vitamin A status. As with protein energy malnutrition, the problem is most severe in the Northern Province (Steyn *et al,* 1999:29).

Anaemia is also a significant problem among young children in South Africa. Twenty percent of children were found to be anaemic and 10% to be iron deficient. Iron deficiency anaemia was diagnosed in 5% of young children (SAVACG, 1996:354). Micronutrients are the essential vitamins and minerals required by human beings to stimulate cellular growth and metabolism. Micronutrient deficiency results when populations do not have enough food to eat. Iron, vitamin A & iodine deficiencies are of the greatest public health

significance contributing to malnutrition (Kennedy *et al,* 2003:9). According to Maunder et al, 2001: 7), lack of dietary variety is thought to contribute to:

- Low micronutrient intakes
- Low energy intakes
- Chronic diseases of lifestyle.

For both consumers and nutritional scientists, variety is conceptualized as including different foods and different food groups as part of the diet, as well as altering the method of food preparation. Enjoying a variety of foods is the first of ten South African Food Based Dietary Guidelines (FBDG) adopted in 2004 by the government for implementation in the community. This guideline emphasizes the problem of poor dietary variety and the need for change. It also encourages people to eat a variety and to enjoy their foods (Maunder *et al*, 2001:s7).

Chapter 3

RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

A quantitative research approach was implemented in an attempt to answer the research problem. This research study was designed as a survey, employing quantitative measures supplemented with qualitative techniques. An empirical research design was used to collect primary data about a community living on a commercial farm. Data was gathered through face-to-face interviews and observations. Due to the exploratory and descriptive nature of the research purpose, various measuring instruments were used to collect data. A cross sectional research design was implemented as this was based on observations representing a single point in time (Babbie & Mouton, 2001: 641). The conceptual framework will indicate the trail to follow during the process of data gathering to attempt to answer the research problems of this study (See Figure 3.1).

3.2 RESEARCH PROBLEM

To identify and describe the different food access strategies employed by farm worker households on Oranje Farm and how that contributes to dietary diversity.

3.2.1 Sub problems

The sub-problems for this study are as follows:

- Which foods were accessed through food production to contribute to dietary diversity of farm worker households on Oranje Farm?

- Which foods were accessed through food purchasing to contribute to dietary diversity of farm worker households on Oranje Farm?

- Which foods were accessed through food bartering to contribute to dietary diversity of farm worker households on Oranje Farm?

- Which foods were accessed through food gathering to contribute to dietary diversity of farm worker households on Oranje Farm?

- Which foods were accessed through payment in kind to contribute to dietary diversity of farm worker households on Oranje Farm?

- Which foods were accessed through other strategies to contribute to dietary diversity of farm worker households on Oranje Farm?

- To determine the dietary diversity (food variety and food group diversity scores) of farm worker households on Oranje Farm.

- How do all the food access strategies contribute to dietary diversity of farm worker households on Oranje Farm?

- How does the dietary diversity of adult women of farm worker households on Oranje Farm relate to their body mass index?

3.2.2 Conceptualisation

Figure 3.1 provides the theoretical and conceptual frameworks for this research study. The blue highlighted area indicates the concepts relevant in this research study.

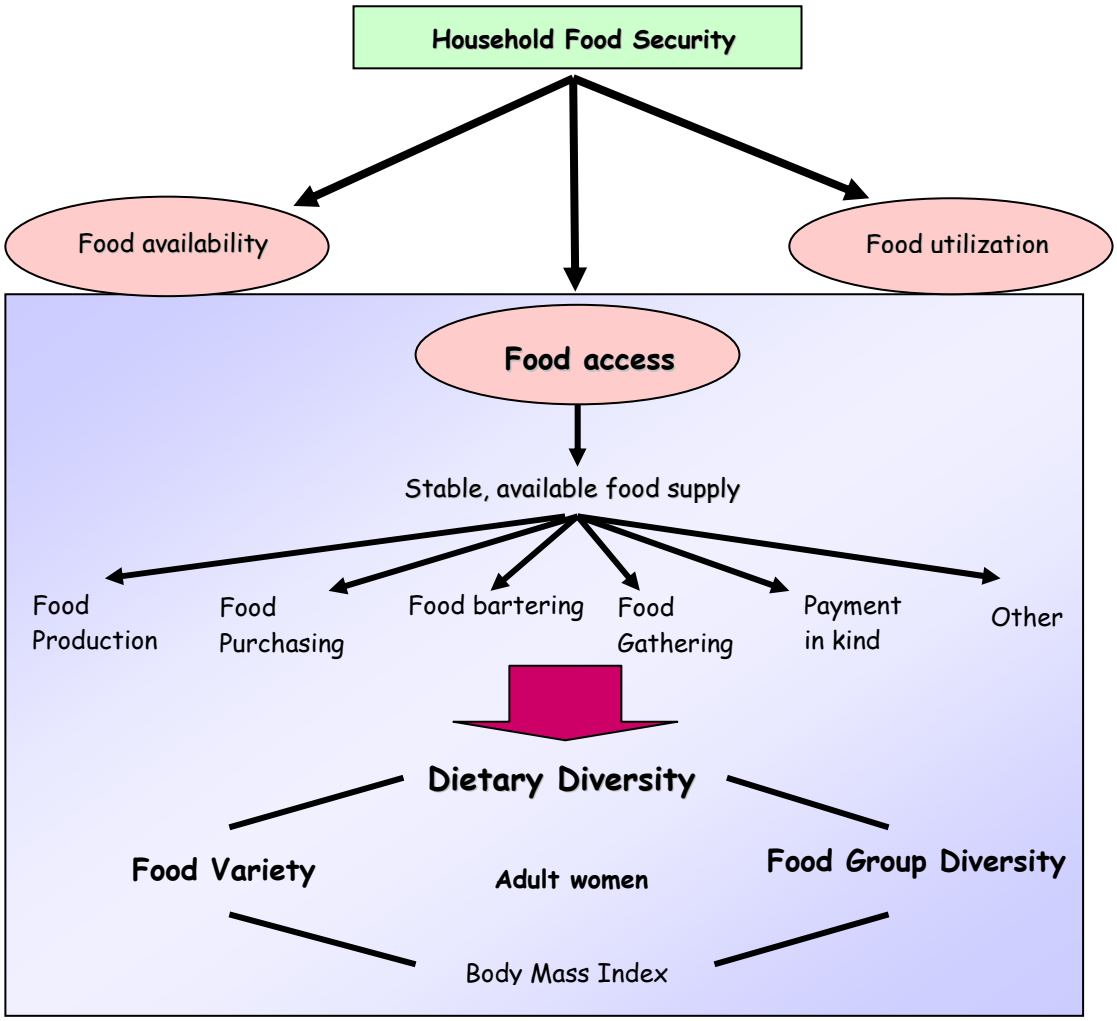

FIGURE 3.1: THEORETICAL AND CONCEPTUAL FRAMEWORKS HIGHLIGHTING THE RELATIONSHIP BETWEEN FOOD ACCESS, FOOD SUPPLY AND DIETARY DIVERSITY

3.2.2.1 Definitions of components in the conceptual framework

The definitions are as follows

- **Food access** - refers to whether the available food can be approached or "got to" and includes people having the resources, ability and knowledge to produce or procure food (Latham, 1997 in Sayed: 7).

- **Food production** - refers to what food are produced by the household and it involves those techniques by which the food supply ideally is increased, and controlled, at least to some extent (McIntosh, 1995:28) for example:
  - horticulture that refers to the cultivation of domestic plants for food and other purposes without the use of a plow (McIntosh, 1995:29).
  - animal husbandry that refers to the raising of animals for food (McIntosh, 1995:29).
  - agriculture that refers to all types of cultivation including horticulture and raising the plants with the use of a plow (McIntosh, 1995:31).

- **Food purchasing** - in this study refers to what and how much food is purchased with money from any dealer.

- **Food gathering** - refers to all kinds of "food-getting" activities in the surrounding environment in which there is an attempt to increase the amount of food available in the household. These activities can be aimless, random or goal-oriented for example hunting, fishing and collecting (McIntosh, 1995:19).

- **Food bartering** - in this study refers to exchanging resources for food.

- **Payment in kind** - in this study refers to any food given freely or food that forms part of payment. It includes food bought at a subsidized price specifically on commercial farms e.g. milk bought at one Rand for a litre.

- **Other** - in this study refers to anything that can be unknown and can be revealed by the community in terms of the methods of food access.

- **Dietary diversity** - refers to the number of different individual food items (or thus food variety) and food groups (or thus food group variety) consumed over a given reference period (Ruel, 2002:3). This may accurately predict the individual nutrient adequacy and thus household food security.
  - Nutrient adequacy – refers to the achievement of daily-recommended intakes of energy and other essential nutrients (Ruel, 2002:4).

- **Food variety** – refers to a number of different individual food items consumed over a specific period (Hatloy *et al,* 1998:891).
  - Variety (dietary) – refers to eating a wide selection of foods within and among the major food groups (the opposite of monotony) (Whitney & Rolfes: 2002: 34).

- **Food group diversity** - refers to the number of food groups consumed over a specific period (Hatloy *et al.* 1998:891).

3.3 OPERASIONALISATION

3.3.1 Biographic information

A questionnaire was specifically designed to gather biographic information regarding the participant's age, house number, marital status, level of education and socioeconomic status and employment status.

3.3.2 Anthropometric measurement

Only one measure of weight status was included in this research study, namely body mass index (BMI). The height and weight of all adult women were measured and used to calculate their body mass index (BMI), which was then compared to their dietary diversity scores to establish a relationship, if any.

- **Weight**

  Body weight was measured in kilograms (kg) and rounded to the nearest gram using an accurately calibrated electronic scale.

- **Height**

  Body height was measured in meter (m) and rounded to the nearest millimetres (mm). A measurement of standing height was being measured using a measuring tape, affixed to the wall.

- **Body mass index**

  This was calculated using weight and height measurements. This was calculated as weight divided by height squared and the sum taken to be the body mass index which was then compared to standard values (Lee & Nieman, 2003:172).

3.3.3 Dietary diversity

One of the aims of the research was to compile a list of individual foods to calculate scores for food variety and food group diversity (Addendum B). A list was compiled of different food items typically consumed by these communities and verified with the various foods access methods (See Addendum A). The different types of foods and food groups consumed over a 7-day period in this specific community, was compared to the list of foods and food groups (See Addendum B) to determine a food variety score (FVS) and a food group diversity

score (FGDS). Various international researchers (Hatloy *et al*. 1998: 891; Ogle *et al*, 2001:21) had used this method.

3.3.3.1 Food variety

All the individual foods consumed over a seven-day period were used to calculate the score (FVS): firstly, 151 individual foods from twelve groups and, secondly, the food list was again adapted to omit foods never used and by adding those that were left out before thereby 109 nutritious individual foods from nine groups were used. (For its calculations see 4.3.6.1 & 4.3.6.2).

3.3.3.2 Food group diversity

Various food group quantities were used for calculations of the food group diversity score (FGDS). Firstly, twelve varied food groups (nutritious and non-nutritious food) and, secondly, nine nutritious food groups were calculated (nutritious food only) consumed over a seven-day period (FAO working group). This was classified according to nine food groups as recommended by FAO. Other remaining items such as tea, sugar, sweets were not used in (FVS) and (FGDS) calculations (Steyn, Nel, Nantel, Kennedy & Labadarios, 2006:645). (For its calculations see 4.3.6.1 & 4.3.6.2).

3.4 POPULATION AND SAMPLING

The study population is farm worker households on commercial farms. The sample for this study is a community of farm worker households living as a small community on a commercial farm (Oranje Farm) situated between the towns of Clarens and Fouriesburg in the North Eastern Free State. All the available twenty one adult women that were responsible for the food in these households (between the ages of 18 and 65years) that were on Oranje Farm were the data

sources in the study. On average there were between two to four women living in one of these households. For this research study an adult woman will be considered as a woman, aged between 18 and 65 years, living in farm worker households on a commercial farm.

3.5 PROCEDURE AND DATA COLLECTION METHODS

3.5.1 Procedure

Permission was obtained from the farm owner to gather information and implement training programmes on his farm. The researcher first offered an explanation of the research and informed participants of the purpose of the research and allowed questions to be asked regarding the study. Confidentiality was assured and the issue addressed by the researcher and those not comfortable participating in the study were excused. A consent form was given and signed by each participant to show that they confirmed that they were participating out of their own free will. Privacy and anonymity were ensured. Participants were encouraged to be as honest as possible when answering questions. These aspects were used to describe the community and their socio-economic backgrounds. The Ethics committee of the University of the Pretoria approved the research study prior to the commencement of the study.

3.5.2 Data collection techniques

Data was collected during four seasons, which included early summer, late summer, autumn, winter and spring. The results were collected twice during summer in order to evaluate the variety of food consumed and to find a true reflection of their dietary diversity since Christmas time. In addition, fruits and vegetables are harvested more often during late summer. These periods was therefore divided into two seasons which is early summer and late summer.

The data was collected during early December 2003 (early summer), late January 2004 (late summer), late April 2004 (autumn), July 2004 (winter) and early November 2004 (spring). Data was collected by means of a structured questionnaire, which elicited information regarding food access, with special reference to food production, purchasing, bartering, gathering, purchasing in kind, others and dietary diversity (See Addendum A). During the interviews, the researcher used food models, books, posters showing drawings or photographs of different fruits, vegetables and herbs to help participants to recognise these foods easily. Also, wrappings and packaging of different food items and beverages were used to help identify various foods eaten by the community.

FIGURE 3.2: INTERVIEWS AND DATA COLLECTION IN CONNECTION WITH DIETARY DIVERSITY

Due to the relatively low level of literacy of the participants, individual face-to-face interviewing was used as a method in gathering data. This aided the researcher to obtain information directly from each respondent. Although this method was time consuming, as the researcher had to interview the respondents individually, it was important in that it enabled the researcher to have reliable and valid information. It gave the researcher an opportunity to probe for answers when necessary.

The researcher's presence might only slightly have affected a respondent's answers given that the researcher was of the same culture and spoke the same language. Some simple observations while asking questions were recorded to aid in enriching the data. The interviewer was also able to observe the respondent's general reaction to the study. Secondary data and field notes were taken during data collection. In this case secondary data was the existing research results from additional research studies conducted on the same group.

3.6 DATA ANALYSIS

The SAS and BMDP statistical packages were used in analysing data, mainly using frequency and means procedures, and calculating standard deviations. Other inferential statistical procedures included the Mann-Whitney test and Friedman parametric tests. Mann-Whitney test is used for comparing mean of two groups. It is a non parametric test. In this study it was used due to the two comparing groups being small and the data was not normally distributed. The Friedman parametric test is used to test for differences between more than two matched or paired variables (BMDP, 1993; SAS, 1999; Steyn, Smith, Du-tuit & Strasheim, 1999).

Also, the measure of dietary diversity (DD) namely the food group diversity score (FGDS) and food variety score (FVS) was calculated. The FGDS was measured by allocating foods into 12 different food groups and 9 nutritious food groups. Participants' responses were coded in the following manner: 1 point was allocated for each positive response, i.e., 1 for "Yes" response, and 0 for a "No" response.

Data was used to determine if any relationships could be found between:

- Food variety scores and Food group diversity scores
- Body mass index and diversity scores

Scores were compared between the seasonal periods to find which foods were consumed most frequently in the different seasons. The methods and regularity of usage and how often each food accessing strategy was used were also investigated. Ranking of the food accessing strategies was also done to check which method is used as the main accessing strategy. Data was further used to find the most commonly consumed food items per season in order to assess the meal patterns and usual eating patterns.

The results were presented in tables and discussed accordingly with regard to the information obtained and the trends that emerged, or any unexpected findings that emerged. The data was presented in numerical terms and calculated findings in percentages.

3.7 THE QUALITY OF THE RESEARCH

The quality of the research was evaluated against the validity framework of Mouton (1996:111). The framework was based on the stages of the research process, sources of error and the methodological strategy that was being taken to ensure a specific validity related criterion.

3.7.1 Validity

3.7.1.1 Theoretical and content validity

Concepts were defined and conceptualised in the conceptual framework well (See 3.2.2.1) against the body of existing theory and research (Babbie & Mouton, 2001:109). This process clarified the main concepts and their relationship within the conceptual framework, and the dimensions and indicators of both concepts (i.e. the scope of the concepts) were specified. The study leaders and other experts in the field approved this process.

3.7.1.2 Measurement/construct validity

Construct validity was based on the logical relationship among variables (Babbie & Mouton, 2001:123), as was shown in the conceptual framework. Therefore, the measurement for body mass index of adult women was used as an external criterion for diet diversity.

3.7.1.3 Internal validity and transferability

This research can claim internal validity, since the sample was not representative of the larger population of commercial farm worker households in South Africa. This study is part of a larger research focus area, which has, as its aim, the construction of a model for addressing household food security. Therefore, this research was concerned about the transferability of its findings to another receiving context (Babbie & Mouton, 2001:277).

3.7.1.4 Inferential validity

The analysis was done with the research question as point of departure and a thorough understanding of related literature. The researcher was aware of rival explanations for the conclusion that dawned from the research findings.

3.7.2 Reliability

Reliability was maximised by minimising error during data-collection. The interviewer was familiar with the research setting, had good rapport with the research participants, was of the same ethnical group and had been assured on numerous occasions that the participants did give her honest information. Participants were treated with dignity and answers recorded and observations made accurately. Two fieldworkers were involved in data gathering.

Chapter 4

RESULTS AND DISCUSSION

4.1 DESCRIPTION OF ORANJE FARM

The study was conducted on a commercial farm in the North Eastern Free State, called Oranje Farm (See Figure 4.1). Oranje farm is considered rural, as it does not have the basic resources such as municipal water, sewerage and garbage removal system.

FIGURE 4.1: ORANJE FARM SURROUNDINGS

Oranje farm is situated between two other towns known as Fouriesburg and Clarens. Fouriesburg is ±14km away from Oranje farm and people spend R10 for

a return trip from this town. Clarens however is ± 20km away and people spend R20 for a return trip. The community of Oranje farm thus prefers to go to Fouriesburg, as it is nearer and less expensive to get there. A guesthouse is available on the farm (See Figure 4.2).

FIGURE 4.2: THE GUEST HOUSE SITUATED ON ORANJE FARM

Due to poverty, most people cannot afford money for the transport, and therefore rely on lifts from cars passing by. Clarens and Fouriesburg are not large towns themselves, as they have few shops such as cafes, general dealers, butchery and no supermarkets. These shops do not provide a variety of food, clothes and other basic necessities. For people to get basic necessities, they have to travel to Bethlehem, which is another town situated ± 100km away. Due to costs involved in travelling, people only can afford to travel to Bethlehem during special occasions such as weddings, funerals and Christmas.

4.1.1 Available food found in the spaza shop on the farm

The community of Oranje farm depend on the two spaza shops found in the village. These shops sell foods such as sugar, eggs, minced meat, sunflower oil, artificial cold drinks, spices (curry powder), sunlight bath soap, matches as well as candles. The spaza shops do not have a wide variety of foods but only the basic requirements. This affects the food variety of the community living on this

farm as they depend on what is available. They also depend on what they produce on the farm, which is then subsidized by the farm owner, e.g. milk and eggs. This therefore results in the same eating pattern among different families. Most of the households purchase the same groceries from the general dealer in Fouriesburg and from the spaza shop in their community (See Figure 4.3).

FIGURE 4.3: THE SPAZA SHOP FOUND ON ORANJE FARM

4.1.2 Environment of the farm worker village

The village has a borehole approximately 200m away from the houses that are situated up on the hill behind the main farm buildings (See Figure 4.4).

FIGURE 4.4: WATER SOURCE AND HOUSING AREAS

This is the only source of water for these households. People have to move down the hill a distance of about 200 metres on a return trip to go and fetch water for their families. They also wash their clothes near the tap and, that way, they do not have to carry the water up the hill back to their houses (See Figure 4.5). A small dam is also available near the tap water. The community members use the dam for fishing, depending on the season and the water level. More fish are caught during summer.

FIGURE 4.5: A WOMAN CARRYING WATER FROM THE WATER SOURCE

There is one primary school in the village (See Figure 4.6), which serves 48 children from other surrounding farms (Oranje, Mooidam, Tuinplaas, Joelsnet).

FIGURE 4.6: THE PRIMARY SCHOOL SITUATED ON ORANJE FARM

There is another school building across the main road, which is used as a high school, grade 7-9 (See Figure 4.7).

FIGURE 4.7: THE HIGH SCHOOL SITUATED ON ORANJE FARM

The children normally use the back road leading to school which is outside the village (See Figure 4.8). The rest of the children go to school in Fouriesburg and Clarens.

FIGURE 4.8: BACK ROAD LEADING TO HIGH SCHOOL

4.2 RESEARCH RESULTS

The study group consisted of twenty-one women (N=21), aged 18-65 years old living in a community of farm worker households on Oranje Farm. The results will be discussed in five parts, namely, biographic information including employment

status and income level, age, marital status, educational status and anthropometry, food-accessing strategies, dietary diversity issues, food variety and food group diversity scores.

4.2.1 Biographic information

These results are based on a description of the respondents in this study, including their ages, marital status, number of children, socioeconomic status, and their educational status. Some of these factors played an important role in identifying certain factors or circumstances that hindered the women in having diversified diets in their family. Additionally, their socio-economic status, as well as educational status, makes an important contribution in understanding their food security level. The age, marital status and level of education of the women in the farm worker households are presented in Table 4.1.

TABLE 4.1: AGE, MARITAL STATUS AND LEVEL OF EDUCATION

	FREQUENCY (N=21)	PERCENTAGE (%)
Age (years)		
18-25	7	34
26-33	3	14
34-41	3	14
42-49	4	19
50-57	3	14
58-65	1	5
Marital status		
Single	12	57
Married	9	43
Level of education		
None	1	5
Grade 1 & 2	4	19
Grade 2- 6	7	33
Grade 7	1	5
Grade 8	1	5
Grade 9	0	0
Grade 10	2	9
Grade 11	4	19
Grade 12	1	5

About one third of the respondents (34%, n=7) in this study are aged between 18 and 25 years old. Most of the respondents (57%, n=12) are not married, but live with their extended families in these households. Most of the respondents (62%, n=13) in this study were only educated up to primary school level of grade 7 and only one woman had matriculated.

The employment status and income levels of the women living in these households are presented in Table 4.2.

TABLE 4.2: EMPLOYMENT STATUS AND INCOME LEVEL

	FREQUENCY (N=21)	PERCENTAGE (%)
Occupation		
Unemployed	15	71
Employed	6	29
Self- employed	0	0
Monthly income	**(n=6)**	**%**
R100-200	1	17
R200-500	3	50
R500-1000	2	33
R1000-2000	0	0

Nearly all the respondents (71%, n=15) living in these households were unemployed, and only six (29%) women were working and earning an income at the time of the study. Four of the respondents (67%, n=4) earned five hundred rand or less while two of the respondents earned more, but less than one thousand rand per month. Various family members and their extended family living together were contributing to the incomes of these households. The sources of income are presented in Table 4.3.

TABLE 4.3: SOURCES OF INCOME

CONTRIBUTORS TO THE FARM WORKERS HOUSEHOLD'S INCOMES	RESPONSES FROM FARM WORKER HOUSEHOLDS (N=21)			
	Yes	%	No	%
Friends	0	0	21	100
Relatives	3	14	18	86
Child's father or husband	12	57	9	43
Mother	3	14	18	86
Father	1	5	20	95
Sister	0	0	21	100
Brother	1	5	20	95
Pension/child grant	6	28	15	72.
Children (son & daughter)	4	19	17	81

Contributions of money to purchase food in a household mainly came from family members or close relatives. Most households depended on the women's husbands or the fathers of the children (57%, n=12) to support their families. A few (28%, n=6) depended on state money, either being pensions or children's grants. None of the respondents received money from their friends or sisters.

Table 4.4 is about the composition of farm worker household and their employment status. What is indicated in that table is the total number of children and adults in the household and the employment status of the adults in the household. Household number 12 and 13 were empty houses and there was nobody staying in them. Neighbours used household number 12 as a storeroom to store maize meal and other equipment. Household number 13 was previously used as a crèche for smaller children in the farm. The total number of household members in the family and the number of children living in a household might have an effect on their food consumption. It was to be expected that, in households where less members were employed, a lower variety of food would be available.

TABLE 4.4: COMPOSITIONS OF FARM WORKER HOUSEHOLDS AND EMPLOYMENT STATUS OF MEMBERS

HOUSE NUMBER	NUMBER OF ADULTS	NO OF CHILDREN IN A HOUSEHOLD	NO OF ADULTS WORKING	NO OF ADULTS NOT WORKING	TOTAL NUMBER OF PEOPLE IN THE HOUSEHOLD	PENSION/ CHILD GRANT
1	1	0	0	1	1	1 Disability grant
2	5	6	4	1	11	1 Child grant
3	2	3	1	1	5	0
4	2	None	1	1	2	0
5	3	8	2	0	11	0
6	2	3	1	1	5	0
7	2	1	1	1	3	1 Child grant
8	2	3	1	1	5	0
9	3	1	1	2	4	0
10	5	2	3	2	7	1 Pension
11	1	0	0	0	1	1 Pension
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	3	6	0	0	9	2 Pensions, 3 Child grants
15	1	3	0	0	4	0
16	2	1	1	1	3	1 Pension, 1 Child grant
17	4	1	1	3	5	1 Pension
18	1	0	0	0	1	1 Pension
Total	*39*	*38*	*17*	*15*	*76*	

No 15* Two children under the age of 12 years old were not yet receiving child grant because the mother never went to social welfare.

Most households depend on either pensions and/or child grants in order to have food in the house. At least one member of the household earned income or received a pension or social grant except for household number 15, where the mother was neither working, nor receiving a grant for her children.

4.2.2 Anthropometric measurement

The weights and heights of all the women were measured and recorded to assess their weight status (See Figure 4.9).

FIGURE 4.9: WOMAN BEING WEIGHED

The body mass index (BMI) of each woman was calculated to assess their weight status, which is an important measurement of their physical health as well as their health status (See Table 4.5).

TABLE 4.5: BMI's OF THE WOMEN IN FARM WORKER HOUSEHOLDS

BMI	NO OF WOMEN (N=21)	RESULTS	%
>=30	10	Obese	48
25-29.9	4	Overweight	19
18.5-24.9	4	Normal	19
17-18.4	1	Possible underweight	5
16-16.9	2	Underweight	9

The respondents (67%, n=14) were above the normal or expected weight for their ages & height. Most of them were obese (48%, n=10). Their weights varied between 73kg and 120kg. Their mean BMI was 29.4 ranging from a minimum of 16 to maximum of 48.

4.2.3 Dietary diversity

4.2.3.1 Food variety and food group diversity

The variety of foods eaten by the households was investigated by calculating the number of foods consumed over a period of seven days. A list of foods and food groups was used to investigate which food items were normally eaten and bought (See Addendum B). The list was compiled during a pilot study when the various households had to list the food items that they normally used or consumed. One hundred and fifty one foods were identified and used to compile the dietary diversity questionnaire that was used to calculate the individual food variety scores of the community on Oranje farm. The different foods that were accessed through the various food accessing strategies, and that contributed to dietary diversity of farm worker households on Oranje farm, are shown in Table 4.6.

The two staple foods most often consumed, were identified as maize meal and brown bread, as households consumed these regularly. Staple foods were accessed through either purchasing (bread), or payment in kind (maize meal), which means that all the households regularly buy bread and receive maize meal flour as payment in kind. The relishes or accompaniments used most often with the staple food – in this instance stiff maize meal porridge – included chicken, milk, eggs and vegetables like spinach. These foods were mostly self-produced, gathered or bought, depending on their availability, as well as on availability of money.

TABLE 4.6: VARIETIES OF FOODS ACCESSED FROM VARIOUS FOOD GROUPS THROUGH DIFFERENT FOOD STRATEGIES

FOOD GROUPS	INDIVIDUAL FOOD ITEMS
Cereal diversity	**Purchased items** Brown bread/maize-meal
	Payment in kind Maize-meal
Vegetable diversity	**Gathered from the veldt** **Wild vegetables (Green leafy vegetables) such as.** thepe (pigweed), sebitsa (pepper plant), seruwe (lambs quarter), sempaile (mustard), papasane (horse radish), tlhaku ya kgomo (lion tooth), tenane (harebell leaves), sewediwetla (wild carrot), selae (lettuce)
	Cultivated vegetables (Production) Cabbage, spinach, onions, green beans, carrots, tomatoes, sugar beans, pumpkin, potatoes
Fruit diversity	**Cultivated fruits (production)** Apple ***(or bought),*** apricots, peaches
	Wild fruit gathered from the veldt Prickly-pear
Proteins diversity	**Own livestock** Chicken, chicken runners & heads, chicken livers, eggs
	Purchased items Tinned fish, malana & mogodu (tripe).
	Fishing & hunting Fresh fish (sardines)
	Animals Guinea fowl (Kgaka), rabbits (mmutla), pela (hare), letsa(steenbok), phuthi (springbok), rooikat (caracal)
Milk products diversity	**Purchased or own or subsidized** Cow's milk
Beverages diversity	**Purchased items** Imitation drinks such as foro, drink-o-pop, tea
	Home preparation Traditional beer
Miscellaneous diversity	**Purchased items** Sugar, salt, soups, tomato sauce, curry powder
Fats, oil & sweets diversity	**Purchased items** Sunflower oil, Lard (home made)

Other vegetables used as relishes were cabbage, spinach, onions, tomatoes, sugar beans, pumpkin, green-beans and potatoes. Those who did not plant or did not have a garden mainly purchased fruits and vegetables from Fouriesburg. Cultivated fruits such as peaches and apricots were accessed freely from the farmyard. Their garden plots had some fruit trees.

Their favorite fruit consumed throughout the whole year was apples. Other foods that provided variety in food choice were mostly purchased. These were however considered to be expensive such as sunflower oil, spices (curry powder), tomato sauce, soups, sugar and salt. Traditional beer made from sorghum was seen as a form of entertainment for some of the households. It was prepared at any time or during funerals, rituals, parties and at Christmas when sorghum was available.

4.2.4 Food accessing strategies

All the households (90%, n=18) had access to a garden plot specifically allocated to them, which was mostly used for the purpose of cultivating fruits and vegetables. Few households (10%, n=2) had garden plots but did not plant vegetables or grow fruits. Only one respondent (5%, n=1) from all the households did not cultivate vegetables and fruit in her garden plot due to her illness. All the plots were freely used land found next to each house. The lengths of the plots ranged from 5.1m to 15.4m and the widths ranged from 4m to 12.7m. Most (90%, n=18) of the households used their plots for planting. People living in rural areas generally used different food accessing strategies in order to prevent household food insecurity. The different food accessing strategies that were used by this farm worker community on Oranje farm are presented in Table 4.7.

TABLE 4.7: FOOD ACCESSING STRATEGIES USED ON ORANJE FARM

FOOD ACCESSING STRATEGIES (N=21)	YES	%	NO	%
Cultivation* (n=20)	18	90	2	10
Vegetables*(n=20)	16	80	4	20
Fruits*(n=20)	15	75	5	25
Livestock	18	86	3	14
Purchasing	21	100	0	0
Bartering	4	19	17	81
Gathering from the environment	21	100	0	0
Collecting (See 3.2.2.1)	21	100	0	0
Hunting	10	48	11	52
Fishing* (n=20)	11	55	9	45
Payment in kind	16	76	5	24

***n=20 –** One person did not plant vegetables or fruit in her garden or engaged in fishing, due to ill health.

Cultivation – most of the households (90%, n=18) living on Oranje farm cultivated fruits and vegetables for household food consumption. Most of the households grew their own vegetables such as spinach, pumpkin (80%, n=16) and fruits such as peaches, apricots (75%, n=15) in their gardening plots. Most of the vegetables are grown all year round, but fruits were mostly cultivated during summer only, due to seasonality. Many of the households (86%, n=18) also had livestock such as chickens, cattle and few pigs. However, the livestock was used more as an asset than day-to-day food.

Purchasing – all people access food by purchasing either from spaza shops or shops in town.

Bartering – due to a lack of knowledge and understanding, most of the women do not use the method of food bartering (81%, n=17) as a way of getting food or of having larger variety of foods in the house.

Gathering – all households depend on gathering food from the veldt, such as green leafy vegetables such as. thepe, sebitsa, seruwe and fruit (prickly pears). They use these wild vegetables as a relish and consume it accompanied with maize meal porridge (See Table 4.8). When food is scarce or money is limited, some of these households (48%, n=10) hunted animals such as guinea fowls, rabbits or springbok, and caught fish (55%, n=11) as a source of fresh meat.

Payment in kind – several households (76%, n=16) depended on food provided by the farmer as part of payment to his employees – specifically maize meal flour. Few of the households (24%, n=5) did not receive foodstuffs as payment in kind because none of their household members worked for the farmer.

The households living on Oranje farm used a variety of different foods accessed through the different food accessing strategies identified in their community – either through the farm itself, from their garden plots and from the veldt / environment. The investigation into the food diversity the food

accessing strategies practised revealed that the following foods were utilized through the various identified food accessing strategies (See Table 4.8).

TABLE 4.8: FOOD TYPES ACCESSED THROUGH DIFFERENT FOOD ACCESSING STRATEGIES

FOOD ACCESSING STRATEGIES	FOOD KINDS PRODUCED RANKED FROM MOST TO LEAST
Food production	
Cultivation	**Vegetables** Spinach, green beans, pumpkin, tomatoes, turnip, cabbage, beetroot, swiss chard, carrots, potatoes, maize on the cob, lettuce (See Table 4.9). **Fruits** Peaches, apricots and grapes (See Table 4.9)
Livestock	**Animals: chickens, cattle, pigs** 86% - own livestock 92% - cattle only for milk products 100% - chickens 17% - own pigs for financial purpose
Food purchasing	
Retail	**Household grocery items (Table 4.6 & 4.18)** Bread, tea, imitation drinks, apples, sugar, salt, sunflower oil, spices (curry powder).
Subsidized by the farmer	Milk and eggs
Food bartering	Maize meal, eggs, milk, sugar-beans, wild leaves, tomatoes, carrots, mealies, tea, sugar, cake flour, meat
Food gathering	
Animals	Hunting: Rabbit (mmutla), kgaka (guinea fowl), phuti (springbok), pela (hare), Letsa (steenbok), rooikat (caracal) Fishing: Sardines, fresh waterline fish (See Figure 4.12).
Plants	Wild leaves such as thepe, sempaile, papasane, sebitsa, seruwe, tlhako ya kgomo, tenane, seshwabohloko, tenane (See Table 4.11 & Figure 4.11). Wild fruits like prickly pear
Payment in kind	Maize meal: 60-80kg every month, Other: eggs, milk, flour, dried corn kernels, mutton

n*=3 **did not own livestock**

4.2.4.1 Food production – cultivation - most common vegetables crops cultivated in their garden plots were spinach, green beans, pumpkin, tomatoes, turnip and cabbage (See Table 4.8 & 4.9). In addition different vegetables and fruits were produced during the various seasons, mainly due

to availability and the difference in weather condition. Most vegetables were cultivated during spring and summer, and the least during autumn.

Approximately 30 food items were planted during spring and summer respectively by all the households on the farm, and only three items during autumn. However, the variety of food items planted was limited, as only 11 different items were planted in spring and nine in summer. The vegetables cultivated mainly in summer, were green beans, pumpkin and turnip; in spring it was spinach, green beans and tomatoes, while cabbage was popular in winter. In autumn, cabbage, swiss chard and tomatoes were popular to plant.

Most households (75%, n=15) grew their own fruit trees in their gardens while few (25%, n=5) did not have any. In addition, the most common fruit available was peaches, which were harvested during the summer, although this was mostly from the farmer's orchard. The other fruits were also harvested during summer. However, there was one household that harvested grapes in autumn When vegetables and fruit were planted in the gardens, it improved the dietary diversity and was very accessible and available to the households (See Table 4.9).

TABLE 4.9: THE DIFFERENT TYPES OF VEGETABLES AND FRUITS PRODUCED BY SEASON

ITEM	SEASONS					
Vegetables	**Summer**	**Autumn**	**Winter**	**Spring**	**All year round**	**Total**
Spinach	4	0	1	**5**	**3**	**13**
Green beans	**6**	0	1	**5**	0	**12**
Pumpkin	**8**	0	0	3	0	**11**
Tomatoes	0	**1**	0	**6**	0	7
Turnip (Raap)	**5**	0	1	0	1	7
Cabbage	0	**1**	**3**	2	0	6
Beet root	2	0	0	2	0	4
Swiss chard	0	**1**	0	2	0	3
Potatoes	1	0	0	2	0	3
Carrots	2	0	0	1	0	3
Radish (rateisi)	0	0	0	1	0	1
Perm	0	0	0	1	0	1
Peas	1	0	0	0	0	1
Lettuce	1	0	0	0	0	1
Corn on the cob	0	0	1	0	0	1
Planting activities in community	30	3	7	30	4	74
Planting variety in community.	9	3	5	11	2	15
Peaches	17	0	0	0	0	**17**
Apricots	3	0	0	0	0	**3**
Grapes	2	1	0	0	0	**3**
Planting activities in community	22	1	0	0	0	***23***

*The respondents reported planting on specific seasons and not all year round except for spinach and turnip which was good for their soil. Fruits were Only available during summer.

The owner of household number 1 planted different vegetable crops such as spinach, green beans, pumpkin, tomatoes, turnip and cabbage (See Figure 4.10).

FIGURE 4.10: LENETA'S GARDEN

Food production – livestock - most households (86%, n=18) owned livestock – cattle, chickens or pigs. Most of the households (92%, n=12) utilized their cattle only for their milk products, while few households (8%, n=1) utilized their cattle for both meat and milk products. This livestock was also used in times of food shortage to add to their food supply. In addition all of the households (100%, n=18) had chickens, which were used for both eggs and meat. Only one household (17%, n=3) raised pigs and sold them in order to increase their income (See Table 4.8).

4.2.4.2 Food purchasing - All the women in the farm worker households used food purchasing as their main food accessing strategy. They purchased foods from a limited number of shops or retailers (See Table 4.10).

TABLE 4.10 SOURCES AND FREQUENCY OF FOOD PURCHASING

SOURCE WHERE FOOD MOSTLY BOUGHT RANKED FROM MOST TO LEAST	FREQUENCY N=21	PERCENTAGE (%)
General dealer (small)	19	90
Spaza shop	1	5
Commercial farm	1	5
Frequency of purchasing	**N=21**	**%**
Everyday	0	0
3 times a week	1	5
1-2 times a week	3	14
Three times a month	3	14
Twice a month	4	19
Once a month	9	43
Once a year	1	5

Most respondents (90%, n=19) purchased their food from the small general dealer. The general dealer had limited stock with little variety of foods available. Some of the households depended mostly on spaza shops and commercial farm. The respondents (62%, n=13) did their shopping at Fouriesburg, once a month after payday, or every second week when money was available. Other household depended on subsidized food items sold by their farmer.

4.2.4.3 Food bartering - Few people bartered with foods (See Table 4.7). Only a few respondents (19%, n=4) practised food bartering, but the three most common foods they bartered with were maize meal, milk and eggs. These foods were mostly obtained with the aid of food subsidies (milk, eggs), or given as part of payment in kind by the farmer (maize meal). One litre of milk was sold for one Rand, and was therefore a suitable product to barter with among farm workers and those not employed on the farm (See Table 4.8). Most respondents reported that they did not know anything about food bartering and were therefore not practising it.

4.2.4.4 Gathering – collecting - They gathered large quantities of wild leaves during summer by picking it from the veldt as an addition to what they had available in their houses. A variety of different wild leaves and fruits were collected from the veldt during the different seasons. These were found in abundance for use in their homes, thereby increasing the household food variety (See Table 4.11).

TABLE 4.11: DIFFERENT TYPES OF WILD LEAVES GATHERED IN THE VELDT PER SEASON

WILD VEGETABLES	FREQUENCY OF COLLECTION					
	Summer	Autumn	Winter	Spring	All year round	TOTAL
Thepe (pigweed)	15	0	0	6	0	21
Sempaile (mustard)	5	1	6	4	0	16
Papasane (horse radish)	10	0	1	3	1	15
Sebitsa (pepper plant	2	0	12	0	0	14
Seruwe (lambs quarter)	8	0	2	4	0	14
Tlhako ya kgomo (lions tooth)	3	0	0	0	0	3
Seshoa-bohloko (black nightshade)	1	0	1	1	0	3
Tenane (harebell leaves)	2	0	0	0	0	2
Sewediwetla (wild carrot)	2	0	0	0	0	2
Selae (lettuce)	0	0	1	0	0	1
Total	*48*	*1*	*23*	*18*	*1*	*91*

*Large quantities wild vegetables were gathered during specific reasons and not all year round.

All household members gathered food in the veldt in order to have fresh vegetables. The four most common wild leaves that were gathered and eaten by the community on Oranje farm were thepe, sempaile, papasane and sebitsa. The other wild vegetables gathered are tlaku ya kgomo and seruwe. These wild leaves are generally known as merogo. They are all wild green leafy vegetables mostly found during summer. The wild vegetable leaves were usually gathered in the mornings and then dried in the sunlight. They were dried in order to preserve them for use/consumption in the seasons when they are scarce and not easily available (See Figure 4.11).

a - Sempaile

b - Tlhako ya kgomo

c - Thepe

d - Seruwe

FIGURE 4.11: TRADITIONAL WILD VEGETABLES

4.2.4.4.1 Gathering – hunting/fishing

The animals and birds that were hunted were ranked in order, rabbits (mmutla), springbok (phuthi), guinea fowl (kgaka), hare (pela), steenbok (letsa) and rooikat (caracal), which, are hunted all year round. They also gathered fish during summer. Fresh-water fish was found mostly during summer in the nearest small dam on the farm. Once caught, the fish is gutted and hung in the open air to dry for later use (See Figure 4.12).

FIGURE 4.12: DRIED FRESH-WATER FISH

4.2.4.5 Payment in kind – maize meal was the main product monthly received as payment in kind. Payment in kind is practiced by the farmer to the farm workers and their families living on the farm. These farm workers receive food monthly that forms part of their payment, usually in the form of maize meal (See Table 4.8). Each household receives a large bag (60kg-80kg) of maize meal depending on their work status and on the number of people employed per family. Some of the household members use the maize meal to barter with others purely because of the large quantities involved.

4.2.4.6 Ranking of food accessing strategies

Households that utilize most of the food accessing strategies several times per month were asked to rank their food accessing strategies according to frequency of use (See Table 4.12, 4.13 & 4.14).

TABLE 4.12: FIRST CHOICE METHODS TO ACCESS FOOD IN THE HOUSE

ACCESSING STRATEGIES	FREQUENCY						
	Everyday	**1-2 a week**	*3 times a week*	*Every fortnight*	**Once a month**	*Thrice a month*	**N=21 100%**
Purchase	0	4	0	5	5	2	16 76
Produce	1	0	0	0	0	0	1 5%
Gather, hunt, fish	1	1	2	0	0	0	4 19
Total	2	5	2	5	5	2	21 100

The data indicates that (76%, n=16) of the households use food purchasing as a strategy of acquiring food for consumption. The respondents usually purchase their groceries at least once or twice a month from the small shops available to them. Few of the respondents (19%, n=4) gathered food almost everyday or at least 1-2 times a week. One respondent (5%, n=1) used food from her own garden on a daily basis.

The respondents were asked to rank their second choice method for accessing food in the house (See Table 4.13).

TABLE 4.13: SECOND CHOICE METHODS TO ACCESS FOOD IN THE HOUSE

FREQUENCY	*EVERYDAY*	**1-2 WEEK**	*3 TIMES A WEEK*	**ONCE A MONTH**	**% N=21**
Purchase	0	0	0	3	14
Produce	0	5	3	0	38
Gather, hunt, fish	3	4	2	0	43
Beg	0	1	0	0	5
Total	3	10	5	3	100

After purchasing, the second most frequently used method of acquiring food in the house, is gathering from the veldt (43%, n=9,). Food is usually gathered daily; once or twice a week; and sometimes three times a week. The respondents were asked to rank their third method for accessing food in the house and the findings are illustrated in Table 4.14.

TABLE 4.14: THIRD CHOICE METHODS FOR ACCESSING FOOD IN THE HOUSE

ACCESSING STRATEGIES	EVERYDAY	1-2 TIMES A WEEK	3 TIMES A WEEK	FORT-NIGHTLY	ONCE A MONTH	% N=18
Purchase	0	0	0	0	1	1 6
Produce	3	4	0	0	0	7 38
Receive	1	0	0	0	0	1 6
Gather, hunt and fish	0	5	3	0	0	8 44
Beg	0	0	0	1	0	1 5
Total	4	9	3	1	1	18 100

*Three people reported to have no third choice

The third method of choice for food accessing used by the farm worker households was again gathering (44%; n=8) as well as producing (38%; n=7). These methods were used at least once or twice per week.

4.2.5 Dietary diversity issues

This included their meal patterns, venues of eating, meal supplies from home and the most common foods consumed throughout the whole seasons.

4.2.5.1 Food variety

The eating habits of the different farm worker households were mostly the same except for a few individuals who were employed in the guesthouse. These respondents had more varied intakes due to their exposure to food prepared in the guesthouse.

4.2.5.1.1 Meal pattern

The respondents indicated that three meals were consumed per day. The three meals included breakfast, lunch and supper. Their children were consuming at least four meals per day. In between meals snacking was a common practice. This pattern was seasonal and included different food items. The meal patterns of the households are presented in Table 4.15.

TABLE 4.15: MEAL PATTERN OF FARM WORKER HOUSEHOLDS

NUMBER OF DAILY MEALS (N=21)	FREQUENCY	PERCENTAGE
Number of meals by household adults		
One	1	5
Two	3	15
Three	17	80
Number of meals by children (N=20*)		
One-two	0	0
Three	6	30
Four	13	65
Five	1	5
Number of meals eaten by the respondents (N=21)		
One	4	19
Two	5	24
Three	12	57
Number of snacking times (N=20)		
One	4	20
Two	5	25
Three	6	30
Four	2	10
Five	1	5
Six	2	10

N=20* only one respondent was living in the house without children.

Most (80%, n=17) of the adults ate three times a day, whereas, (65%, n=13) of the children ate at least four times a day, i.e. breakfast in the morning before going to school, feeding scheme products during break time, ate a meal after school and lastly, supper at night. Only (57%, n=12) of the respondents ate meals three times a day.

Most respondents snacked two to three times (55%, n=11) a day (with tea, bread, soft porridge, milk, drinks and fruits). Most households (52%, n=11) ate their meals together at supper time. Almost half (48%, n=10) of the households ate breakfast and lunch meals individually due to other commitments such as work and children normally are at school during that period.

4.2.5.1.2 Venues of eating and their frequency of purchasing

Most of the household members living in this community never eat their food at places other than their homes (See Table 4.16).

TABLE 4.16: VENUES OF EATING AND FREQUENCY OF PURCHASING OF FARM WORKER HOUSEHOLDS

VENUES	FREQUENCY (N=21)	%
Eating outside home (n=21)		
Yes	5	24
No	16	76
Type of venue (n=5)		
Restaurant	0	0
Shop	0	0
Café	4	80
Fast Food (Kentucky Fried Chicken)	1	20
Utilization (n=5)		
Once a month	5	100

Most 76% (n=16) of the respondents ate their meals at home, whereas (24%, n=5) ate outside their home at least once a month such as cafés in Fouriesburg. Only one respondent visited a fast food outlet such as Kentucky Fried Chicken.

4.2.5.1.3 Meal supplies from home

Most of the respondents are unemployed and therefore did not have to prepare lunch boxes for themselves. They did, however, prepare some for their husbands or partners (See Table 4.17).

TABLE 4.17: LUNCH BOX OF EACH INDIVIDUAL IN A FAMILY

INDIVIDUAL	FREQUENCY (N=21)	%
Husbands/partner		
Yes	11	52
No	10	48
Mothers/women		
Yes	0	0
No	21	100
Children		
Yes	2	10
No	19	90

N=8* Women were not staying with their husbands or partners at home while only two women's husbands were pensioners and ate at home.

Some of the respondents (52%, n=11) prepared lunch boxes for their husbands or partners to take to work, while half (48%, n=10) did not, as they were either unmarried or not staying with their partners/husbands. Some of them were pensioners and did not need a lunch box. Of the six respondents (29%) who were currently employed, three ate at work as they were employed in the guesthouse on the farm. The other three had the following reasons for not preparing lunch boxes when going to work. One respondent worked half days, i.e. until 12 o'clock and was able to eat her lunch at home. Another respondent reported to be too lazy to prepare the lunch box, while the last woman reported that she normally ate before going to work.

Most of the respondents (90%, n=19) did not prepare school lunch boxes for their children. Various reasons were given for not preparing lunch boxes for the children. Seven respondents reported that their children were eating from a feeding scheme that was available at school. Food offered by the feeding scheme at school was, however, only a dry biscuit and powdered drink (that was not reconstituted), which was not really enough for the children. Two respondents reported to prepared lunch boxes often but sometimes given their children money to buy food due to travelling a long distance to school at Clarens. Those

respondents that prepared lunch boxes for their children mostly provided stiff maize meal porridge with fried eggs.

4.2.5.2 Common foods accessed through different food accessing strategies

The most common food consumed by the community was the same for each household. They followed the same routine everyday. Every morning the women went to collect some wild leaves in the veldt, which they then prepared upon their return. The preparation method was similar for all the women. They normally cooked their traditional merogo with water and towards the end added a little bit of sunflower oil and curry powder for some flavour. Table 4.18 shows seasonal data collected from 2003 and 2004 at different periods during the year. A dietary diversity list of individual foods and food groups was used (See Addendum B). This list was compiled during a pilot study from the foods that they usually ate in a period of seven days.

TABLE 4.18: MOST COMMON FOODS CONSUMED DURING EARLY SUMMER, LATE SUMMER, AUTUMN, WINTER AND SPRING ON ORANJE FARM

FOOD GROUPS	COMMON FOOD (CORE FOODS)	EARLY SUMMER (LATE NOVEMBER - DECEMBER)	LATE SUMMER (JANUARY-FEBRUARY)	AUTUMN (MARCH-MAY)	WINTER (JUNE-AUGUST)	SPRING (SEPTEMBER-EARLY NOVEMBER)
Cereals	Maize meal porridge Brown bread	Maize meal stiff porridge Soft porridge Brown bread Rice	Maize meal stiff porridge Brown bread Rice Samp Mageu	Maize meal stiff porridge Brown bread Dumpling	Maize meal stiff porridge Soft porridge Mabela soft porridge Brown bread	Maize meal stiff porridge Soft porridge Brown bread
Vegetables	Potatoes **Onions** Tomatoes Cabbage Wild vegetables(Merogo)	Potatoes Onions Tomatoes Cabbage Wild vegetables(Merogo)	Potatoes Onions Tomatoes Cabbage Green-beans Wild vegetables(Merogo)	Potatoes **Onions** Tomatoes Cabbage Carrots Pumpkin Corn on the cob Spinach Rapp Sugar beans Wild vegetables(Merogo)	Potatoes **Onions** Tomatoes Cabbage Sugar beans Wild vegetables(Merogo)	Potatoes **Onions** Tomatoes Cabbage Spinach Sugar beans Wild vegetables(Merogo)
Fruits	Apple Peaches/Apricots	Apple Peaches/Apricots	Apple Peaches/Apricots	Apple	Apple Orange	Apple Banana

FOOD GROUPS	COMMON FOOD (CORE FOODS)	EARLY SUMMER (LATE NOVEMBER - DECEMBER)	LATE SUMMER (JANUARY-FEBRUARY)	AUTUMN (MARCH-MAY)	WINTER (JUNE-AUGUST)	SPRING (SEPTEMBER-EARLY NOVEMBER)
Proteins	Chickens Eggs Cow's milk	Chicken Eggs Cow's milk Sausage (wors)	Chicken Eggs Cow's milk	Chicken Eggs Cow's milk	Chicken Eggs Cow's milk Tinned fish	Chicken Eggs Cow's milk Russians
Sauce diversity					Soups Atjhaar	
Beverages	Tea Imitation drinks	Tea Imitation drinks(foro,sixzo)	Tea Soft drinks(Coke, fanta etc)	Tea Imitation drinks, (foro,sixzo)	Tea Imitation drinks(foro,sixzo)	Tea Soft drinks(Coke, fanta etc)
Miscellaneous	Sugar and salt	Sugar and salt Jam (home-made)	Sugar and salt Peanut-butter	Sugar and salt Jam (home-made)	Sugar & Salt	Sugar & Salt
Fats and Oil	Sunflower oil	Sunflower oil	Sunflower oil	Sun flower oil	Sun flower oil	Sun flower oil
Herb diversity						Peanut
Spices	Curry powder	Curry powder	Curry powder	Curry powder	Curry powder	Curry powder

Autumn* A bit of variety of vegetables were eaten during this time due to their garden were not plotted therefore purchasing it. During winter soup was consumed and atchaar eaten with fat cakes and tea

All the households consumed maize meal stiff porridge and bread most frequently as their staple food. The same vegetables were consumed in every household (See Table 4.18). The preferred fruit reported to be affordable was apples, while the other fruits were eaten mostly during harvesting time in summer. The proteins consumed came from chicken, eggs and cow's milk. The milk and eggs were also purchased from the farmer at a subsidized price. The most affordable drink was tea and the cheap imitation cold drinks that they purchased from the spaza shop, for example foro, sixo, drink o'pop and cool-aid sweet. They used sugar and salt for cooking, or in their tea etc. For flavour, curry powder was used.

4.2.6 Dietary diversity scores

4.2.6.1 Interpretation of dietary diversity data

The variety of foods eaten by the households was investigated by calculating the number of foods consumed over a period of seven days, similar to previous research done (Hatloy *et al*, 1998: 893). A list of food items from various identified food groups, as specifically those that are indicative of dietary diversity (Hatloy *et al,* 1998:893), was compiled and used to investigate what food the farm worker households consumed and normally purchased (See Addendum B). The list was compiled from a basic food list and additions were made to complete the list to include those food items typically consumed in this area and by this cultural group. The list was then tested out in a pilot study conducted in this community of all the types of foods that they typically consumed over a period of seven days. The food list was again adapted to omit foods never used and by adding those that were left out before.

Investigations were done using these compiled lists in the four different seasons in order to describe seasonal variation. During summer, the investigations were done twice because of the longer duration of the summer season in South Africa. Therefore five seasonal periods were used, namely early summer, late summer, autumn, winter and spring. During the early

summer, most of the people still consumed a limited variety of food as most foods produced only delivered products that were available to consume later in summer. Late summer therefore tended to be a period with a higher variety in diet.

To evaluate the food variety scores it would be unfair to expect all the members of the community to consume all possible food items. Therefore, the utilization of foods in normal diets was considered. A summary of food intake with complete menu items (gained from 24 hour-recall data from Moopa – research report in progress) consumed by household members on Oranje farm was used to compile a scoring system for low, medium and high intakes of various food items, in order to analyze the food variety scores (FVS) and food group diversity scores (FGDS).

The actual number of different food items used was counted to give full details of food consumed by household members in seven days. These included their breakfasts, lunches, suppers and the types of food that they snacked on between meals. Three different sample menus were used to calculate low, medium and high individual food variety. For high variety, a normal diet with a highly varied meal plan was used to generally recommend a varied food intake that considered all basic food groups. For medium variety, a highly varied diet for food availability, as observed on Oranje farm was used, and for low variety, the standard diets as observed on Oranje farm, as compared with very low numbers of food, was used.

Sample menus of these examples will be reported in Tables 4.19 to 4.21 and subsequently discussed. The variety was calculated in a similar way as with the scoring system – each food type is counted only once in a day. In other words the variety does not concern the number of portions consumed, but only the types of food mentioned. Maize meal would therefore only count once. The current menu of low-income households as observed from 24h-recall data included a low variety of food items (See Table 4.19).

TABLE 4.19:CURRENT MENU OF LOW-INCOME HOUSEHOLD MEMBERS ON ORANJE FARM (LOW VARIETY)

MENU	VARIETY OF FOODS CONSUMED IN 7 DAYS
Breakfast	
3 cups of soft porridge with sugar	1
3-4 Slices of brown bread with	1
home made jam	1
Tea with sugar	
Milk	1
Snack	
2 cups of mageu (home made) or sometimes bought	1
Lunch	
300g Stiff maize meal porridge/ bread	1
Eggs/ chicken feet & heads/ chicken liver/ dried beans	4
Traditional merogo	1
Spinach/cabbage/pumpkin/tomatoes/onions	5
Snack	
Bread with home made jam	
Tea with sugar and milk	
Apple	1
Supper Same as lunch	
Total count of consumed items	17

*Tea and sugar are not considered as nutritious foods. Every food item is counted once and not repeated.

Firstly the above meal pattern (menu) was used/ consumed by household members on Oranje farm in seven days (See Table 4.19). It included all the common foods that were consumed by household members in this community on a daily basis. Secondly, a menu that represented a family utilizing medium variety compared to those with limited income was constructed from the 24h-recalls of this community (See Table 4.20).

TABLE 4.20: TYPICAL MENU CONSUMED BY HOUSEHOLD MEMBERS ON ORANJE FARM (MEDIUM VARIETY)

MENU	VARIETY OF FOOD CONSUMED IN 7 DAYS
Breakfast	
Soft maize meal porridge with	1
milk and sugar	1
Brown bread with	1
Home made jam or	1
Peanut butter	1
Tea with sugar and	
Cow's milk (unpasteurized)	1
Snack	
Tea with milk and sugar	
Brown bread with	
Home made jam or	
Peanut butter	
Mageu	1
Lunch	
Pap/ Rice /Bread /Dumpling /Stamp	5
Eggs/ Cow milk/Tinned fish/ Chicken feet &heads/ chicken pierces/ chicken livers/ meat bones	3
	3
Soya beans/ Russians/ Wors	3
Traditional merogo	1
Other vegetables: Spinach/ onions/tomatoes/ pumpkin/ cabbage/ potatoes/ green beans/ carrots	8
Supper	
Similar to lunch	
(They prepare more food for supper during lunch time)	
Fruits in between meals	
Apples/ Bananas/Orange	3
Peaches and Apricots and grapes (specially during summer)	3
Total amount of foods consumed	36

*Tea and sugar are not considered as nutritious foods. Every food item is counted once and not repeated.

Thirdly, a recommended (or ideal) normal menu with very high variety (according to the guidelines under ideal circumstances) was compiled to use in comparison with the menu consumed by the household members on Oranje farm in order to calculate the ideal number of foods to be eaten by an individual in seven days. This menu served as an example of a balanced meal or a recommended menu that included all the different food items which must be eaten each daily by an individual. This is a menu that could be used by an

individual despite their race, or culture, with a greater variety of food and higher income levels (See Table 4.21).

TABLE 4.21:NORMAL RECOMMENDED MENU CONSUMED BY AN INDIVIDUAL PERSON (HIGH VARIETY)

MENU	VARIETY OF FOOD CONSUMED IN 7 DAYS
Breakfast	
Cereals	7
Milk	1
Proteins	7
Snack	
Starch	7
Fillings	7
Lunch	
Starch	7
Protein	7
Vegetables	7
Snack	
Fruits	7
Supper	
Starch	7
Protein	7
2 vegetable A & B	14
Total count of foods	84

7 items indicate a different food item used every day of the week

These menus were used in interpreting the data, in order to calculate a food variety score that have a greater variety of foods providing nutrients needed by the body. It was concluded that less than 30 food items consumed over a period of seven days would indicate low variety. More than 30 foods, but less than 60 (30-60) foods would indicate medium variety, while more than 60 foods would indicate a high variety of foods consumed over seven days.

4.2.6.2 Dietary diversity from 12 mixed food groups

The number of food groups used in the analysis of dietary diversity data varied throughout the reported research (Ruel, 2002:29). The food variety scores over 151 individual food items and food group diversity scores were

therefore calculated over 12 all-inclusive food groups, including non-nutritious food items

4.2.6.2.1 Food variety scores – 151 food items

The list of foods that was used to compile a dietary diversity score consisting of one hundred and fifty one foods from 12 mixed food groups was identified as being used regularly by the Oranje farm community over a period of seven days. This was used to calculate the food variety scores and food group diversity scores of farm worker households living on Oranje farm. These food groups and food lists included both nutritious foods and all the miscellaneous items that did not contribute any nutrients to the diet (See Addendum B). During early summer (n=20) one respondent was very ill and was therefore excluded from the interviews. Only twenty respondents remained as a result. During late summer only twenty respondents (n=20) were available as one respondent died after a short illness. During autumn (n=20), all twenty respondents were available to be interviewed. Lastly, during spring (n=16*), four respondents were not available on the farm during the interview period. Food variety scores were calculated to check if the household members consumed a greater variety of food in their diets at that time (See Table 4.22).

TABLE 4.22: FOOD VARIETY SCORES -151 FOOD ITEMS (N=20)

PERIOD	RANGES	MEAN	STD DEVIATION
Early Summer	6-54	30.2	12.36
Late Summer	14-67	36.2	17.95
Autumn	21-54	34.15	10.49
Winter	18-81	36.5	17.86
Spring (n=16*)	24-54	35.8	8.54

(n=16*) – four respondents were not available during the interview period

(n=20) – one respondent passed away during late summer.

Cut-off points: <30 low; 30-60 medium & >60 High

According to Hatloy et al. (1998:893), the food variety score (FVS) is defined as the number of different individual food items consumed over a seven-day period. The food variety score was calculated using one hundred and fifty one food items – these were the number of different mixed food items mentioned by the whole community for the particular time period researched. The least number of food items consumed in seven days varied from six to twenty four food items, which relates to a variety of only one to three different food items per day.

The highest number of food items consumed varied between 54 and 81, which relates to seven to eleven different items per day. The mean intake for all the seasons varied between 30.2 and 36.5 which relate to 4 to 5 different food items per day. During both early summer and late summer, similar results were found. Half of the respondents (n=10) had low scores as they consumed less than 30 different food items in seven days. The remaining half (n=10) consumed more than 30 foods but less than 60, thus achieving a medium food variety score. During the winter it seemed as if the respondents had tried to eat a better variety of foods, as they consumed 18-81 food items, however, more than half (n=11) still consumed less than 30 foods in seven days. Seven respondents had medium scores and consumed more than 30 foods, while only two respondents (n=2) actually qualified as having high scores, as they consumed more than 60 foods in seven days. Only one person consumed 81 food items in seven days. This could be attributed to the high variety of foods that the two full time employees ate at the guesthouse on the farm during working hours. During autumn (55%, n=11) and spring (n=81.25%, n=13), most respondents had medium scores, as they consumed more than 30 foods but less than 60 foods in seven days.

4.2.6.2.2 Food group diversity scores – 12 food groups

Once the food variety scores had been calculated, the food group diversity scores were calculated to assess whether the household members consumed an adequate variety of the twelve different groups of foods in their diets (See Table 4.23).

TABLE 4.23: FOOD GROUP DIVERSITY SCORES – 12 FOOD GROUPS (N=20)

PERIOD	RANGES	MEAN	STD DEVIATION
Early Summer	4-12	9.3	1.980
Late Summer	8-12	9.55	1.225
Autumn	8-11	9.6	0.882
Winter	9-12	10.65	0.745
Spring (n=16*)	8-12	10.62	1.024

(n=16*) – four respondents were not available during the interview period

(n=20) – one respondent passed away during late summer.

Cut-off points: Low=1-4; Medium= 5-7; High= 8-12

The food group diversity score (FGDS) was defined by Hatloy (1998:893) as the number of food groups consumed over a period of seven days. The maximum score that could be achieved was twelve, from all the food groups utilized in seven days (See Addendum B). The food group diversity score was calculated from all the individual mixed food items used during the seven days from the identified twelve food groups. The food group scores were high in all the seasons, indicating good variety with regard to utilization of the different food groups. All the respondents consumed eight to twelve food groups in seven days. The lowest intake occurred in early summer when only four food groups were used, and it was only in autumn where they did not consume all the food groups. The mean Dietary diversity score varied between 9.3 to 10.65 between the five seasons

4.2.6.3 Dietary diversity from nine nutritious food groups

The food variety scores and food group diversity scores were calculated over nine (9) nutritious food groups(See Addendum C) in order to determine if the variety of nutritious food items consumed would be different to the variety of food items including non-nutritious food items like beverages and spices actually consumed. In previous research it was apparent that twelve (12) mixed food groups, including all possible food items, were used widely. During 2004-2005 a working group of the FAO came together and decided to use only the nine nutritious food groups to indicate variety (Steyn, Nel, Nantel, Kennedy, & Labadarios 2006: 645). This was used to assess the following:

- the effect of miscellaneous food items
- nutritious foods eaten more often or not.

4.2.6.3.1 Food variety scores – 109 food items

A second analysis was done using only the nine (9) nutritious food groups, in order to determine if the variety of nutritious items consumed would be different to the variety of items including non-nutritious food items, such as beverages and spices. This analysis used only the nine food groups contributing nutrients to the diet from the established food variety list and therefore only utilized 151 food items. These 151 food items consumed by this community were thus re-allocated to the new grouping and re-evaluated. The variety of food items eaten by the households was investigated in the same manner by calculating the number of foods consumed (from these nine groups) over a period of seven day days (See Addendum C). These new groups did not include all the miscellaneous food items that do not contribute nutrients to the diet. The list was compiled similar to the first list, but due to the lowered number of food groups, only one hundred and nine foods were used to calculate the new food variety and food group diversity scores of the community on Oranje farm. The calculations were done for the same periods as before (early summer, late summer, autumn, winter and spring).

These food variety scores were calculated to assess the variety of nutritious foods consumed by the household members (See Table 4.24).

TABLE 4.24: FOOD VARIETY SCORE – 109 NUTRITIOUS FOOD ITEMS (N=20)

PERIOD	RANGES	MEAN	STD DEVIATION
Early Summer	6-43	23.0	9.50
Late Summer	10-51	27.9	13.4
Autumn	15-38	25.5	7.47
Winter	14-57	26.5	12.02
Spring (n=16*)	18-41	26.5	6.46

(n=16*) – four respondents were not available during the interview period

(n=20) – one respondent passed away during late summer.

Cut-off points: <30 low; 30-60 medium and >60 High

The least number of food items consumed in seven days varied from six to 18 food items, which relates to a variety of only one to two different food items per day. The highest number of food items consumed varied between 38 and 57, which relates to five to eight different items per day. The mean intake for all the seasons varied between 23.0 and 27.9 which relate to three to four different food items per day.

The food variety scores were thus much lower in all the seasons when considering nutritious food items only. During autumn and winter similar results were found, as most of the respondents (70%, n=14) consumed less than 30 foods in seven days. Only six people (30%) consumed more than 60 foods. During spring, many respondents (62%, n=10) also consumed less than 30 foods, while only six respondents, (30%) consumed more than 30 foods. The six respondents who probably ate more than 30 foods were those who were employed and worked at the guesthouse on the farm.

The guesthouse serves food daily and is a venue for function such as weddings and large receptions and guests are always visiting. These respondents have to cook and prepare beds for them. They have the opportunity to taste different types of foods prepared for the guests. During winter, the ranges were high due to the fact that a funeral was catered for on the farm, and the respondents working in the guesthouse had the time and opportunity to eat more foods.

During early summer, more respondents (80%, n=16) consumed less than 30 foods and the remaining three (20%) consumed less than 30 foods with only one who consumed 43 foods in seven days. This might be due to most of the respondents reported to be saving money for Christmas in order to purchase good food items for Christmas. This explains why the average mean for early summer was lower than the overall scores for the other seasons.

This was in contrast with late summer where more respondents consumed more food items because of Christmas time. Most of the households prepared and bought a greater variety of foods. Almost half of the respondents (45%, n=8) consumed 30-50 foods, and only one consumed 51 foods in seven days.

4.2.6.3.2 Food group diversity scores – nine food groups

Food group diversity scores were calculated to assess whether the household members consumed food items from different nutritious food groups to have a greater variety in their diets (See Table 4.25).

TABLE 4.25:FOOD GROUP DIVERSITY SCORE - NINE NUTRITIOUS FOOD GROUPS (N=20)

PERIOD	RANGES	MEAN	STD DEVIATION
Early Summer	4-9	7.9	1.21
Late Summer	6-9	8.1	1.02
Autumn	7-9	8.45	0.605
Winter	8-9	8.8	0.410
Spring (n=16*)	8-9	8.62	0.50

(n=16*) – four respondents were not available during the interview period

(n=20) – one respondent passed away during late summer.

Cut-off points: Low= 1-4; Medium= 5-6 ; High= 7-9

The food group diversity score was calculated over nine nutritious food groups used over seven days. The FGDS was high in almost all the seasons. During autumn, winter and spring similar results were found. During autumn most respondents (95%, n=19) consumed from eight to nine food groups, while all the respondents that were available during spring (100%, n=16) consumed eight to nine food groups in seven days. These indicate high diversity scores. During early summer most respondents (90%, n=18) also consumed seven to nine groups in seven days. During late summer, most respondents (90%, n=18) consumed seven to nine food groups and only two people (10%) had a medium score as they consumed six food groups in seven days. The mean dietary diversity scores varied between 7.9 to 8.8 between the five seasons.

4.2.7 Food variety scores from the nine nutritious food groups

Although most food groups were consumed in seven days, resulting in “high” dietary diversity, it was clear in this community that the numbers of food items (individual food variety) eaten within the various food groups were low. To provide a better understanding of the variety experienced within the various groups, the number of food items eaten in seven days per group by each respondent were calculated and compared with one another.

The diet was classified according to nine food groups as recommended by FAO (Steyn *et a*l, 2006:645). The number of respondents who had consumed similar quantities of food items in the groups could be grouped together to show how many items were mostly consumed per group (See Table 4.26, 4.27 & 4.28).

TABLE 4.26: FOOD VARIETY SCORES – GROUP ONE TO THREE

FOOD VARIETY SCORES	GROUP 1 (PROTEINS)	NO OF FOODS EATEN N=18	NO OF RESPONDENTS	GROUP 2 (EGGS)	NO OF FOODS EATEN N=1	NO OF RESPONDENTS	GROUP 3 (DAIRY PRODUCTS)	NO OF FOODS EATEN N=17	NO OF PEOPLE
Early summer **N=20**	(Fv=18)	0 1 2 3 4 5	1 3 7 3 4 2	(Fv=1)	0 **1**	6 **14**	(Fv=17)	0 **1** 2 3	2 **13** 2 3
Late summer **N=20**		0 1 2 3 5 6 7 8 9	3 3 3 3 1 1 2 3 1		0 **1**	4 **16**		0 **1** 2 3 4 5	1 **9** 4 3 2 1
Winter **N=20**		1 2 3 4 5 6 7 8	1 4 4 2 2 4 1` 2		0 **1**	1 **19**		0 **1** 2 3 4 7 8	1 12 2 3 1 1
Autumn **N=20**		**1** **2** **3** **4** **5** **7** **8**	**5** **2** **4** **4** **1** **2** **2**		0 **1**	5 **15**		0 **1** 2 3 4 5	2 **10** 3 1 3 1
Spring **N=16***		**1** **3** **4** **5** **6** **7** **8**	**1** **3** **4** **4** **2** **1** **1**		**1**	**16**		**1** 2 3 4	**7** 4 3 2

(n=16*) – four respondents were not available during the interview period

TABLE 4.27: FOOD VARIETY SCORES (CONTINUED) – GROUP FOUR TO SIX

FOOD VARIETY SCORES	GROUP 4 (CEREALS, ROOTS & TUBERS)	NO OF FOODS EATEN (N=22)	NO OF RESPONDENTS	GROUP 5 (LEGUMES & NUTS)	NO OF FOODS EATEN (N=7)	NO OF RESPONDENTS	GROUP 6 (VIT A RICH VEG & FRUIT)	NO OF FOODS EATEN (N=12)	NO OF PEOPLE
Early summer **N=20**	(Fv=22)	2 3 5 6 7 8 9 10 11 15	1 2 5 1 2 3 1 1 3 1	(Fv=7)	0 1 2 3	5 10 3 2	(Fv=12)	**0** **1** **2** **3** **4** **6**	**1** **4** **3** **3** **8** **1**
Late summer **N=20**		4 5 6 7 8 9 10 11 13	2 5 2 2 1 2 2 2 2		0 1 2 3	4 7 7 2		0 1 2 3 4 6	2 6 2 6 2 2
Winter **N=20**		3 4 5 6 7 9 10 13	3 1 5 2 3 1 4 1		0 1 2 3	1 15 3 1		0 1 2 3 5	1 7 7 2 3
Autumn **N=20**		3 5 6 7 8 9 10	2 5 5 1 2 3 2		0 1 2 3	2 12 5 1		2 3 4 5	6 7 6 1
Spring **N=16**		4 5 6 7 8 9 10 11 12	1 1 3 4 1 1 3 1 1		0 1 2 3 4	2 5 4 4 1		1 2 3	1 11 4

(n=16*) – four respondents were not available during the interview period

TABLE 4.28: FOOD VARIETY SCORES (CONTINUED) – GROUP SEVEN TO NINE

FOOD VARIETY SCORES	GROUP 7 (OTHER FRUITS & JUICES)	NO OF FOODS EATEN N=14	NO OF RESPONDENTS	GROUP 8T (OTHER VEGETABLES)	NO OF FOODS EATEN N=11	NO OF RESPONDENTS	GROUP 9 (OILS, FATS & ANIMAL FATS)	NO OF FOODS EATEN N=5	NO OF PEOPLE
Early summer	(Fv=14)	0	2	(Fv=11)	0	2	(Fv=5)	0	3
		1	5		1	1		1	7
N=20		2	2		2	2		2	9
		3	7		3	4		3	1
		4	2		4	5			
		5	1		5	5			
		7	1		6	1			
Late summer		0	4		1	3		1	8
		1	1		2	2		2	9
N=20		2	2		3	4		3	3
		3	3		4	4			
		4	3		5	2			
		6	2		6	2			
		7	1		8	2			
		8	1		10	1			
		9	2						
		11	1						
Winter		1	4		1	1		1	8
		2	6		2	3		2	5
N=20		3	4		3	6		3	7
		4	1		4	5			
		5	1		5	1			
		6	1		6	3			
		7	2		8	1			
		9	1						
Autumn		0	1		1	2		0	1
		1	7		2	3		1	6
N=20		2	6		3	2		2	10
		3	3		4	3		3	3
		4	1		5	2			
		7	1		6	7			
		10	1		7	1			
Spring		0	4		1	1		**1**	**7**
		1	2		2	3		**2**	**9**
N=16		2	5		3	3			
		3	2		4	5			
		4	1		5	3			
		5	2		6	1			

(n=16*) – four respondents were not available during the interview period
Total numbers of food items per group are indicated as (Fv=)
Group 1= Flesh foods (meat, poultry, fish) Group 2 =Eggs Group 3 =Dairy products
Group 4 =Cereals, roots & tubers Group 5 =Legumes and Nuts Group 6 =Vit A rich vegetables & fruits
Group 7 =Other fruits (and juices) Group 8 =Other vegetables Group 9 =Oils, Fats & Animal fats

Most of the respondents consumed a poor variety of protein foods from group one in their meals. For example during early summer seven respondents each consumed only two protein foods while only two respondents consumed five different food items in seven days. In late summer, six respondents consumed seven to nine food items from group one in seven days. From group one only one respondent consumed no protein foods in early summer while in late summer they were three respondents.

In winter, six, three and two items respectively, were consumed by four respondents each; in autumn, most respondents (five) consumed only one food item, while four to five different food items were consumed by four respondents each in spring. In most seasons, three to five different proteins were consumed in seven days.

Almost all respondents consumed eggs from group two in all the seasons, as all had chickens in the yard – thus eggs were readily available. For example, during early and late summer, as well as autumn, fourteen to sixteen respondents consumed eggs.

Out of the seventeen dairy products mentioned in group three, most respondents consumed only one item (cow‘s milk) in all the seasons. This indicates a poor variety of dairy foods consumed probably resulting in low Calcium intakes and low intake.

Most of the respondents consumed a poor variety of cereals from group four throughout the seasons. In this study, maize meal, bread and, sometimes rice, were consumed daily by household members, resulting in poor variety. Two to three respondents (most likely those employed in the guest house) consumed a maximum of ten to fifteen cereals.

One to three legumes and nuts were consumed during all the seasons. This included sugar beans, cowpeas and jugo beans. In all the seasons, fourteen respondents consumed nothing from group five. Vitamin A rich green leafy

vegetables & fruits were consumed in limited amounts from group six by most respondents.

A maximum of one to three items from group six were consumed in a week in all the seasons. This included spinach, pumpkin, and wild leafy vegetables (fresh and dried).
In all the seasons, most of the respondents consumed low variety of fruits (and juices) from group seven in their meals. Only two to five respondents consumed seven to eleven varieties of fruits (and juices) from all the seasons, except during spring, when only two respondents consumed five food items. For example, one respondent consumed eleven food items from group seven during late summer and ten items during autumn – other fruits (and juices). These were probably respondents who were working at the guesthouse cooking and cleaning. Additionally, summer fruits were generally harvested in this period.

From group eight, which included vegetables, one to five different vegetables were consumed by most respondents, leading to a low variety. The vegetables consumed included onions, cabbage, turnips, tomatoes and green beans. Most of the respondents consumed two to three items from group nine, including oil, fats & animal fats, like butter, sunflower oil, and lard. This indicates a better variety of fats used by the women. This links with the respondent's body mass indicators that were greater than 30, indicating obesity.

In addition, the anthropometric measurements of the respondents were assessed to determine if dietary diversity of adult women living in farm worker households on Oranje farm correlated to their body mass index. The data was investigated in all five seasons to get clear information about the dietary diversity.

The food variety and food group diversity scores per season were used as a comparison. The food variety scores will be compared first, and then the food group diversity score will be compared (See Table 4.29).

TABLE 4.29:CORRELATION OF BODY MASS INDEX AND DIETARY DIVERSITY PER SEASON

FOOD VARIETY	N	MEAN	STD DEV	MEDIAN	PEARSON CORRELATIO COEFFICIENTS
SEASONS	**(21)**	**29.41**	**9.05**	**29**	
Early summer	20	23.05	9.50	23	-0.031
Late summer	20	27.95	13.5	23	0.165
Autumn	20	25.50	7.47	26	0.013
Winter	20	26.50	12.03	21	-0.152
Spring.	16	26.50	6.46	25.	-0.211
FOOD GROUP DIVERSITY	**N**	**MEAN**	**STD DEV**	**MEDIAN**	**PEARSON CORRELATION COEFFICIENTS**
Early summer	20	7.90	1.21	8.0	0.049
Late summer	20	8.10	1.02	8.0	0.210
Autumn	20	8.45	0.60	8.5	0.453
Winter	20	8.80	0.41	9.0	-0.304
Spring.	16	8.63	0.50.	9.0	-0.215

The results in all the seasons indicated no correlation between dietary diversity and body mass index of the respondents. No relationship was found. The reason might be kilojoules and energy expenditure affects BMI more so than diet diversity. Dietary diversity tool were found not to be good measurements.

4.3 DISCUSSION OF RESULTS

4.3.1 Biographic information

Under biographic information five aspects were reported, namely age, marital status, number of children, socioeconomic status and educational status. For this research study adult women were interviewed. This study formed part of a larger study where models for nutritional intervention in rural communities in South Africa were developed (Green, 2004:7). The women were seen as the gatekeepers for access to the households and their activities on the farm. For

this research study, adult women from various households were chosen as the unit of analysis and spokespersons for the community, mainly because women were the ones that mostly prepared food and bought groceries. The women in this study were aged between 26 and 57 years.

4.3.1.1 Poor educational status affecting their purchasing

Most of the respondents (62%, n=13) in this study were not educated and did not have adequate knowledge on nutrition. Due to lack of education on nutrition, they bought food for the sake of eating and did not take into consideration the nutrition requirements of food by checking the quality or variety of such food. During observations, it was clear that most of the households require education or skills on nutrition due to a way they purchase their food, which was found to be the same. This was verified through observing their shelves during interviews. In addition it was also clear that most respondents did not have extensive knowledge about different types of food. This was seen during interviews when food models and pictures of food were shown to them, in order to indicate the food items that were eaten at home. Therefore by improving family nutrition, women can improve the quality of life in rural communities. Investing in women's education increases women's capabilities, expands opportunities available to them and empowers them to exercise choices (Green, 2004:44).

These findings also indicate a link between a lack in education and dietary diversity leading to poor nutrition. Lack of education in this study is in line with the findings of Steyn *et al* (1999:28) that states that the educational status (level of schooling) of the mother has a direct relationship with the nutritional status of the child. Therefore, if you educate the women, you save the children. Empowering women is also a key issue in achieving household food security and increasing women's education is the key ingredient for women's empowerment (Green, 2004:44).

4.3.1.2 Employment status and income level

Socio-economic factors such as income, access to arable land, and the availability to generate income, determines the ability of the households to obtain food, either by their own production, or through purchasing (Steyn *et al*, 1999: 37; Kgaphola & Boshoff, 2002:66). This relates to this study in that the majority of the respondents living in these households were unemployed (See Table 4.2), thus affecting their dietary diversity. Those who were employed (n=6), were earning lower salaries and only a small percentage of their income could be used to buy food. Salaries were generally R1000.00 or less per month, which was not enough to allow people to purchase enough resources to satisfy their basic needs, thus leading to poverty. Most households were dependent on the women's husbands or partners (57%, n=12) to support their families with money in order to have food in the house, while few (28.5%, n=6) depended on state money; these being either being pensions or children's grants.

These findings are not surprising, since the employment status of the parents normally determines whether sufficient economic resources will be available at household level, including cash to purchase food (Steyn *et al,* 1999:37). The level of income will determine the quantity and quality of food purchased. The findings in this study therefore confirm those of the Department of Social Services, Population and Development (2001: 8) indicated that rural households are affected by poverty the most. The reason for that is their inability to command sufficient resources to satisfy their basic needs, invariably also leading to poor dietary diversity.

4.3.2 Anthropometric measurement

To prevent and treat obesity in black women, more should be known about the underlying causes of obesity among these women in order to develop appropriate and culturally accepted interventions. In a study by Kruger, Venter, Vorster and Margetts, (2002:422) it was found that women with higher incomes and lower physical activity were at the greatest risk of an increased

BMI. Physical inactivity showed the strongest association with measures of obesity. This information supports the findings in this study in that most women on the farm were unemployed, with low incomes and lower physical activity levels. They were, however, also at the greatest risk of an increased BMI. Half of the women (n=10) living in the farm worker households on the farm were obese. Their body mass index (BMI) ranged from 31 - 48kg/m2, indicating extreme obesity. Four of the women were overweight, with BMI's ranging from 26 to 29 (See Table 4.5). During observations it was revealed that all the women who were unemployed mostly spent their time at home doing nothing. They sat in the sunlight and waited for their husbands to come back home from work, which contributed to the obesity problem. Therefore factors such as higher parity and lower level of physical activity may contribute to the tendency of black women to gain weight. In South Africa, in a study done in a remote area KwaZulu Natal with poor women, 40.0% were found to be overweight and 31.6% were obese (Walker, Adam & Walker, 2001: 370).

Researchers from Tufts University (Harvard Women's Health Watch, 1999: 7) determined that people who ate a wide variety of foods from any food group tended to consume a greater number of kilojoules from that food group. Moreover, consuming a large variety (and a large number of kilojoules) from certain food groups —sweets, snacks, condiments, entrees, and carbohydrates -were linked to increased body fat. However, the results from this study show that the majority of the respondents consumed a poor variety of most food groups, but also that they consumed extremely large quantities of one or two staple foods, which together with poor activity levels, might have had an effect on their increased body mass index (See Table 4.28).

4.3.3 Dietary Diversity

The variety of foods eaten by the households from different food groups was investigated in this study and compared with other studies in order to understand their contribution to dietary diversity. After an indepth

investigation, a list of food items and food groups was compiled to assess foods normally eaten and bought in this community (See Table 4.6).

4.3.3.1 Food variety and food group diversity

Cereal diversity group

In this study on Oranje farm, most of the food items used in the group of cereal diversity, including rice, bread and mageu were bought, with the exception of maize meal – the staple food in the village. The farmer gave this staple food, as part of payment to his employees. The maize meal supply was ample for households – even to share among family and friends. An amount between 60-80kg maize meal flour (bags from the miller) was given per farm employee. Due to the large maize meal quantity received, it was therefore possible to share among those households who did not receive anything, as they were not working for the farmer. This is similar to other South African data indicating that purchased maize meal is the staple food in many SA households. Similar findings were apparent in the National food consumption survey, indicating that on average the majority (94%) of households used and purchased maize meal as a staple food. Maize meal flour and brown bread were consistently procured and consumed by all households in all the provinces irrespective of income. The percentage of households that did not buy any of these food items, was small (<3%) (Maunder & Labadarios, 1999: 497).

Fruit & vegetable diversity group

In the Thusa study, dietary intakes of the African population in different stages of transition in the North West Province were investigated. It was reported that fruit and vegetable consumption was low in rural areas and only a bit higher in urban areas (MacIntyre, Kruger, Venter & Vorster, 2002:252). Their reasons for low intakes of fruit and vegetable were similar to this study of Oranje farm which was because of harsh climates, poor soil quality, lack of water, loss of land and migration of men to urban areas. These factors may make cultivation

difficult and wild fruit and vegetables do not grow readily everywhere. In the urban areas, fresh vegetables and fruit were expensive and space for cultivation limited (MacIntyre *et al,* 2002: 252). In this farm worker community on Oranje farm, fresh fruit and vegetables were also expensive and inaccessible due to distance from shops, and although they had gardening plots available, this was mountainous terrain with no natural or other water sources readily accessible to maintain a garden. It required hard work, a lot of water carrying and dedication to cultivate vegetables in these harsh conditions. This is in contrast to the traditional African diet, in which a variety of wild and cultivated vegetables and fruit contributed to the diet (Ladzani, Steyn & Nel, 1992: 60).

Protein diversity group

Food items in the group of protein diversity of farm worker households included chicken runners (feet) and heads, tripe (mala-mohodu) or organ meat, and tinned fish (pilchards or sardines) as the main protein-rich food items bought. Chicken and eggs were the most common protein source eaten by all the families, but it was mainly from their own stock accessed – which they did not sacrifice very often – rather than through purchasing. Milk, (unpasteurized cow's milk) was bought from the farmer for an amount of R1 per liter while some households used milk from their own stocks. Although they did not eat a large quantity of red meat, they did consume other protein sources (milk, eggs, and chicken) available to them (See Table 4.26). They also hunted and went fishing at times. Similar to findings of the Thusa study, the rural and farm strata indicated that more than half of the protein intake was consumed from plant sources. Since this is a poor source of protein, it thereby could put people at risk for a lack of essential amino acids in the diets, i.e. intakes of legumes and cereals that are not balanced (Mclntyre *et al,* 2002:250).

Miscellaneous, fats and beverages diversity group

In this study, selected food items were sometimes bought when extra money was available – these included tomato sauce, mayonnaise and atchaar. Miscellaneous items bought on a more regular basis, were sugar, tea, salt, sunflower oil, curry powder and sometimes peanut butter. This links with the Thusa study, whereby the most popular form of fat used for food preparation was sunflower oil, similar to rural, farm and informal settlements. The respondents living on the farms did not have regular access to shops and due to their low-income levels; they could only afford the most basic food items. The use of sweets, cakes and cold drinks was lowest in rural areas and these reflected both the lack of variety in the diets of rural and farm dwellers and the availability and affordability of these products in different areas. They also could not afford to purchase the most basic foods (McIntyre *et al,* 2002:253).

Similar results were found at the national level, since the data from the 24-hour recall indicated that the same food items were purchased and consumed regularly (tea and sugar) (Steyn & Labadarios, 1999:221).

With regard to beverages, respondents in farm worker households also bought imitation cold drinks & coffee regularly. Traditional beer was brewed from sorghum or maize meal and consumed often as part of entertainment. Alcoholic beverages that were purchased, included beer and wine. On the national level the mean reported alcohol intakes for the women in urban strata were low compared to the high alcohol intake in the rural, farm and informal settlement strata (McIntyre *et al,* 2002:253).

4.3.4 Food accessing strategies

Five food accessing strategies were identified in this community namely food production, purchasing, bartering, gathering/hunting/fishing wild sources, subsidizing and payment in kind (See Table 4.7). Different households used different strategies and did not depend only on one strategy. These strategies were used interchangeably, depending on different circumstances. The food

accessing strategies will be discussed individually as indicated in the conceptual framework.

4.3.4.1 Food production strategy

Food production depends upon natural environmental factors like climate, water resources, topographical and soil characteristics present. These factors determine which food items can be produced; and the man-made environment (including technological developments for processing, storage and distribution of food) affects which food items will be made available for consumption (Sims & Smcikiklas-Wright, 1978: 174). The environment of the household system includes the environment both at the macro-and micro levels (Kgaphola & Boshoff, 2002: 69). The macro environment includes the natural & structured systems. The natural/structured systems are the physical, biological and man-made surroundings within which the societal system functions. These include the geographical / natural environment accompanied by biological systems, such as plants and animals and man-made structures, such as buildings, roads and dams. The natural environment will also determine the types of animals and plants available in given geographical areas (Jerome, Pelto & Kandel, 1980:15; Sims & Smiciklas-Wright, 1978:174).

On Oranje farm, on average, rainfall during the months of October until March is 780mm. The climate is very moderate and the farm is considered the warmest in the district. Constraints to farming are either droughts or hail, while frost never occurs. It snows every year during June, July and August (Green, 2004: 88).

The results showed that most of the farm worker households on Oranje farm had home food gardens where they cultivated vegetables such as spinach, green beans, pumpkin, tomatoes, cabbage, beetroot, potatoes, and grew fruit trees such as peaches and apricots (See Table 4.8). This shows that these household members depended more on their natural and technological environment in order to have a variety of food in the house, rather than

purchasing. According to Jerome *et al*, 1980:14 the technological environment also determines the extent to which a given natural environment can be exploited to produce food. Improved cultivation and mechanization practices, for example, have influenced the agricultural potential in some areas.

Findings in this study also show that most of the farm worker households on Oranje farm owned livestock such as cattle, chickens and some respondents also owned pigs. Pigs were mostly sold when they did not have money in the house. Many households kept chickens in their yards for their products (eggs) rather than for their meat. Few who owned cattle only slaughtered them for traditional reasons like rituals and funerals, and not for general use as daily food. Similarly the case study by Kgaphola and Viljoen (2000:71), reported that people did not traditionally keep the cattle for food purposes, but only slaughtered on religious and ceremonial occasions. In addition, most of the household members on Oranje farm believed in keeping their cattle as a symbol of wealth, and not to use them to relieve hunger.

Food production by households on Oranje farm was identified as the third most important choice of food accessing strategies used. All the households had access to gardening plots (land was available but had to be prepared and used by each household by free choice). Only one household did not utilize this privilege mainly due to illness and because of being a single mother. She promised to cultivate her plot later when her health had improved. These gardening plots were freely used land given by the farmer and all the families made vegetable gardens close to their houses – either in front and/or at the back of the houses. Most of the households cultivated vegetables and fruit for food consumption purposes (See Table 4.9).

4.3.4.2 Food purchasing strategy

The physical aspects of the structural system in the micro environment will determine the infrastructure and facilities available to the households. This includes water, electricity supply, roads, transport and market places

available, that may influence food availability (Sims & Smiciklas-Wright, 1978: 174; Kgaphola & Boshoff, 2002: 69). In their macro environment, food could be purchased from a limited number of shops or suppliers only.

The political, technological, economic and sociocultural subsystem can influence the accessibility and availability of food in the household (Sanjur, 1982: 38; Deagon & Firebaugh, 1988: 28-38; Sims & Smiciklas-Wright, 1978: 174).

The majority of women living in farm worker households on Oranje farm were unemployed. They did shopping once a month after payday. The result of the study are similar to the findings of Kgaphola and Viljoen (2000: 70), whereby food was also purchased mainly once per month. They usually made a trip to purchase food from either of the two closest towns, namely Fouriesburg or Clarens, which were the nearest towns to the farm. Other factors that influenced their food purchasing, were a lack of transport, high food prices, a limited variety of shops, lack of knowledge of nutritious food or good food choices, and utilizing their limited resources optimally. Lack of transport was found to be one of the most severe problems among the household members living on the farm, as they had to rely on others for traveling (passers-by) as no public transport was available close to the farm to take them to the nearest towns. However, all transport was seen as very expensive for them. Most respondents purchased their food at the small general dealer in Fouriesburg only once a month after payday, and at the spaza shop on the farm daily, as well as from the commercial farm they lived on, on a weekly basis. All the farm worker households used food purchasing as a strategy for accessing food items in a house.

4.3.4.3 Food bartering strategy

Food bartering was the least used strategy by farm worker households on Oranje farm. Few people used this strategy as an additional way of accessing a variety of different foods in their households. Reasons for not bartering were the same for all the households in this study, namely that they were not used

to exchanging food items amongst families or individuals, as this was a foreign method in their culture.

In this study, most respondents did not practice food bartering and said, “I do not believe in bartering and in fact I am not even used to it. People only want to receive and never give back; I will never try this method”. According to Sims & Smiciklas-Wright, (1978:174), the individual’s choice of food will always be influenced by personal factors such as values, attitudes, beliefs and knowledge – the so-called internal or endogenous factors influencing food behavior. Oranje farm community’s attitude towards bartering was negative. The respondents did not believe in bartering at all and were not interested in trying it even after it was suggested.

4.3.4.4 Food gathering strategy

In addition to the other mentioned food accessing strategies, the entire groups of farm worker households on Oranje farm depended on gathering food from the veldt in order to have a larger variety of food in their houses. Gathering of plant foods, hunting small animals and fishing played an important role in accessing a larger variety of food for the household members and the community. Of these, the gathering of the wild leaves was the most common method of food gathering used in these households, as these were abundant in the rural area around the farm. This strategy was chosen by this community as their second choice method to help in accessing food.

Some wild vegetables were collected almost everyday by some households. When gathering wild leaves from the veldt, the women would wake up early in the morning to collect wild leaves (merogo) consisting of many varieties of green leaves. This was done almost everyday or at least two to three times in a week. Corbett (1988:1110) also identified the collection of wild foods as one of the coping responses employed by households that are at risk of household food insecurity. The community of Oranje farm gathered some wild green leaves known as thepe, seruwe, tjhaku ya kgomo, sempaile, sebitsa, papasane, tenane, seruwe, and seshwabohloko.(See Table 4.11) to use as a

relish to enjoy with their staple food (stiff maize meal porridge). The traditional leaves were dried in sunlight and could then be stored and eaten after some days. Unfortunately, the names of these wild leaves were known only by their traditional names and their dietary contribution was therefore unknown.

These findings confirmed that rural people continued to depend on wild food in order to have food in the house. This is further confirmed by Ogle *et al* (2001:21), who reported that rural people in many countries also continued to include wild foods in their diets, but the role of this food strategy is still difficult to capture in conventional dietary assessment. According to Kuhnlein (2003:36), the traditional food systems of indigenous peoples contain a wealth of micronutrients that have been poorly described and reported in scientific literature. This lack of scientific coverage prevents the information from being included in health training programmes and public-health promotion programmes (Kuhnlein, 2003:36). All the data from this study, however, indicated that wild foods played an important role in the dietary diversity of rural people and must be taken into consideration when assessing their nutrient intakes and planning nutrition intervention programmes.
Jones, 1963 in Kgaphola and Viljoen, 2000:69, in her study on Swazi nutrition, indicated that food availability was seasonal and the seasons consequently dominated the life and food habits of rural Swazis. This was also apparent in this research study done on Oranje farm. Food gathering, hunting and fishing played an important role in the access of the household food supply. All the respondents indicated that they gathered food from the veldt, depending on the seasonal availability (See Table 4.11).

Food was more plentiful during summer, when most of their cultivated vegetables and fruits were available, with different wild vegetables in the veldt and more fishes were available from dams. Wild animals were hunted all year round, but especially when food was scarce. When food was scarce, the men and children in the community normally hunted animals or fished in the dam nearby their houses on the farm, and the women mainly gathered the leaves from the veldt. The men hunted rabbits with dogs, but these and other wildlife had become scarce. Guinea fowls (kgaka) are present on the farm and eaten

during dry and hungry seasons. Kgaphola and Viljoen (2000: 70), reported similar findings in their study on the food habits of rural Swazi households, namely, that the Swazi traditionally also supplemented their diet of cultivated food with leafy vegetables and fruit from the veldt. From these results it was clear that the natural environment still had an extensive influence on food access and the choice of food supplementing the staple food in low-income rural households.

A study in Vietnam showed that wild vegetables contributed significantly to the overall micronutrient intakes, mostly carotene, vitamin C and calcium intakes, but in this study, only the contribution to carotene intake was significantly higher in the high FVS group. Overall, it was concluded that a food variety analysis is a useful tool in capturing the dietary role of wild vegetables (Ogle *et a*l. 2001:21). In contrast to this study, wild vegetables were not analysed but were consumed in large quantities, therefore contributing to the respondent's diets. Food gathering was chosen by this community as the second method used to have access to food items. This food accessing strategy was used by the entire household.

4.3.4.5 Payment in kind strategy

What was further indicated by this study was that most farm worker households depended on this strategy (receiving of food from employer) in order to have food in the house. Only farm employees benefited from this strategy. Each employee was given the amount of 60kg or 80kg maize meal flour, depending on the number of people working for the farmer. Mutton was also given during the December period as a Christmas present to employees. A sheep would be slaughtered and shared among employees. This strategy was found to be unique in the context of South Africa, as this is common practice on farms. Payment in kind was therefore identified as a new food accessing strategy in this rural community.

4.3.4.6 Ranking of food accessing strategies

On Oranje farm, the household members used four food-accessing strategies, namely food production, purchasing, gathering and payment in kind. Food purchasing was identified as the main food accessing strategy for farm worker households on Oranje farm. Food purchasing, gathering/fishing/hunting of wild sources of food and own production were the main food accessing strategies chosen by this community and were ranked in that order. The NFCS confirmed that food purchasing was the major household food procurement method in South Africa (Maunder & Labadarios, 1999:511). In the case of Manhaar Ward, the households employed five similar strategies, namely own production, purchasing, food gathering, food borrowing and using food grants. Food purchasing, own production and gathering of wild food, especially leafy green vegetables, were identified as the main food accessing strategies ranked in that order (Kgaphola, 2003:221). The only difference being that food gathering was practiced before food production on Oranje farm in South Africa.

Gobotswana (1988:140) mentioned similar strategies practiced in the Chobe District of Botswana, where production, purchasing, grants, and gathering of food from the wild, including game, were mentioned as food access methods used by rural households to meet their needs.

The findings from Maanhaar (Kgaphola, 2003:220) suggested that households used a combination of these food-accessing methods as one long-range master plan. It was only the extent of usage of different methods that differed from household to household depending on the socio-economic conditions of the household. This is supported by Corbett (1988:1102), who indicated that, even among a group of households with the same basic means of livelihood, there might be tremendous differences between options open to the strategies chosen by each household. Therefore, this links to the study, since different food accessing strategies were used in each household.

4.3.5 Dietary diversity issues

4.3.5.1 Food variety

4.3.5.1.1 Meal patterns

Most adults in farm worker households on Oranje farm ate three times a day, while their children normally ate four times a day. Adult women specifically ate three prepared meals per day namely breakfast, lunch and supper. The case study of Swazi reported similar results in their study on the food habits of rural Swazi households, namely, that three meals were consumed daily (Kgaphola & Viljoen, 2000:19). Other studies among other ethnic groups also confirmed this tendency to consume three meals per day instead of two meals per day. This is the eating pattern traditionally followed by most of the other black ethnic groups (Oudkerk, 1965:1148; Crous & Borchardt, 1982:29; Brink & Boshoff, 1983:9; Crous & Borchardt, 1984:41; Crous & Borchardt, 1986:44, Kgaphola & Viljoen, 2000:19; Marugkar & Pal, 2004:268). Therefore, this finding indicates that rural meal patterns are similar to the western meal patterns. The Swazi's also ate their evening meal together as families, because they were all at home at that time. The evening meal was considered the main meal of the day and was served at sunset. The evening meal was eaten together and the different age and gender groups all gathered at the great hut for the meal (Jones, 1963:82). Similar patterns were found in this study, as the evening meal was eaten around seven o'clock with all the family members together because they were all at home at that time.

4.3.5.1.2 Venues of eating and their frequency of purchasing

Most of the members of the farm worker households ate meals that had been prepared at home, and they hardly ever ate outside their homes. The reason was affordability, as it is expensive to eat at restaurants, shops or cafés. Secondly, distance was a factor, as the farm was far away from the two towns where they could go to eat. Only four respondents indicated that they

occasionally ate at cafés and one respondent ate at take-away venues such as Kentucky Fried Chicken. These places were visited only once a month.

All the respondents reported purchasing their food from the general dealers and the local spaza shop on the farm. Similar results were found in the study by Kgaphola and Viljoen, (2000: 71) on the food habits of rural Swazi households at Ka-Mantsho in the Badplaas district who reported that they bought food most frequently at the supermarkets and local shops only. From a total of ten household investigated most households (n=8) bought their food once a month, while only two households bought their food twice a month. The results found from the Swazi clearly indicate that the rural households in this area did not have access to a variety of stores to purchase their food, thus resulting in a poor variety of food availability in their households.

4.3.5.1.3 Meal supplies from home

Good community resources are known to have a beneficial effect on the nutritional status of the young children. Preschool facilities, which cater for children's needs during the absence of a working mother, as well as feeding programmes targeted at feeding young children, provide additional nutritional support (Steyn *et al,* 1999:38). In this community of farm worker households, no preschool facilities were available to mothers. However, a feeding scheme was present and implemented in the primary school within this community where children received some nutritional supplements at school namely nutritious biscuits and a powdered energy drink. This added to the nutritional intake of the children, but did not really add to the variety in the diet, as it was only cereal-based products that were given. The drink was not reconstituted and the children had to consume the dry powder if they wanted it (See Figure 4.13). Therefore in this community most of the respondents did not prepare lunch boxes for their children when going to school. They rather depended on the national school feeding scheme supplying food for the children during break time.

FIGURE 4.13: SUPPLEMENTS FROM THE SCHOOL FEEDING SCHEME

4.3.5.2 Common foods accessed through different food accessing strategies

The twelve food groups included cereals, vegetables, fruits, proteins, milk products, fats and oils, sweets, drinks, sauces, herbs, spices, miscellaneous items and beverages (See Addendum B). The total numbers of one hundred and fifty one foods were used to calculate the final scores.

However, only nine nutritious groups contributed essential nutrients to the diet and were thus included because of their nutritional value. All the miscellaneous items and food items that did not contribute nutrients to the diet were not used. The nutritious groups included cereals, roots and tubers, vitamin A rich fruits and vegetables, other vegetables, other fruits, flesh food (meat, poultry & fish), legumes and nuts, dairy products, eggs as well as oil & fats (See Addendum C). A total number of one hundred and nine foods were used to calculate this score.

Cereals – the pattern of consumption of cereals in this study was the same throughout the whole year, and during all the seasons. The most commonly consumed staple cereal was maize meal, followed by bread. The other sources of starch in their daily diet were soft maize meal porridge, soft mabela

porridge and rice (See Table 4.18). Kgaphola and Viljoen (2000: 70) reported similar findings, that maize and bread formed an integral part of the rural Swazi diet. The ten rural household in the case study also reported maize as their staple cereal. They also included rice in their diet occasionally. Similar results were reported at the national level in that the most commonly consumed cereal items were maize and brown bread (Maunder & Labadarios, 1999: 497, 500).

Vegetables – the farm worker households on Oranje farm depended on cultivated vegetables in order to have food in the house. Maize meal porridge was mostly accompanied by vegetables such as potatoes, onions, tomatoes and cabbage (See Table 4.18). More vegetables were eaten during spring and summer. Few vegetables were cultivated during winter and autumn, although they still used preserved products (See Table 4.9). Food shortages were common during the winter season. During some observations in this period their gardens were very dry and most did not plant any vegetables at all. At this stage they rather depended on gathering wild leaves in the veldt.

These gathered wild vegetables contributed to dietary variety and quantity of food intake. More wild vegetables were collected during late summer and winter as they were readily available in this period (See Table 4.11). This might occur due to the fact that their gardens were not cultivated during winter months, and therefore they depended more on gathering food from the veldt. Jones (1963:69) reported similar results, where several varieties of wild roots and tubers were collected and eaten at the end of summer and during winter months.

Jones (1963:69), as well as Ogle and Grivetti (1985:31) reported similar findings, where certain European vegetables, for example onions, cabbage and tomatoes, were becoming a popular part of the Swazi cuisine. Their research revealed that most of the Swazi households cultivated vegetables such as carrots, cabbage, spinach, beetroot, chillies, okra and a pumpkin, which was similar to the findings on Oranje farm, where it was found that most households cultivated spinach, green beans, pumpkin, tomatoes, cabbage,

and beetroot (See Table 4.9). Similar results were found in the NFCS where the most commonly eaten vegetables were onions, tomatoes and cabbage, although they were consumed in low amounts (Macintyre *et al*, 2002:245).

Fruit – the favourite and most commonly consumed fruit that could be afforded in this community was apples. Most household members reported that fruit generally was too expensive to purchase. However, cultivated few fruit on the farm (peaches, apricots and few grapes) were freely available during summer. Consumption of large quantities of fruit was observed more during summer than any other seasons (See Table 4.18). In contrast to the case study by Kgaphola and Viljoen (2000: 71) the participants cultivated fruit such as oranges, guavas, bananas, and apples and were consuming a variety of fruits.

Protein rich foods – the respondents ate the same protein rich foods throughout all the seasons. These included chicken, eggs and cow's milk. When more money was available they could afford to purchase additional food items, like russians and sausages (See Table 4.18). Similar to the case study by Kgaphola and Viljoen (2000: 72), the participants ate the same protein food items such as eggs, chicken and cow's milk.

Miscellaneous, beverages, fats & spices – the respondents on Oranje farm mostly consumed the same items throughout all the seasons. They used sunflower oil, sugar, salt and curry powder as their flavourings and spice. All the respondents drank tea and imitation drinks on a daily basis (See Table 4.18). A slight change was observed during winter, when they consumed food such as soups and achaar. Traditional beer was made from sorghum and was drunk almost every day. MacIntyre *et al* (2002:253) reported that in the North West province the most popular form of fat was sunflower oil used for preparation purposes.

4.3.6 Dietary diversity scores

Various pictures, examples and containers of foods that might be available were used during interviews to confirm the types of food written on the compiled list. One hundred and fifty one food items of mixed origin were initially selected, from which 109 nutritious food items were identified, and compiled in a second list. Both were used to calculate the individual food variety and food group diversity scores of the community on Oranje farm (See Table 4.22, 4.23, 4.24 & 4.25).

Food variety and food group diversity scores

Single food or food group counts have been the most popular measurement approaches for dietary diversity in developing countries by different researchers, probably because of their simplicity (Guthrie & Scheer, 1981:240; Kant, Schatzkin, Harris, Ziegler & Block, 1993: 434; Drewnoski, *et al,* 1996:663; Hatloy *et al*. 1998: 891; Ogle *et al*. 2001:21; Hoddinott & Yohannes, 2002: 1). This relates to the Oranje study in the South African context, where measuring dietary diversity took place by using single food or food group diversity.

Studies in both developed and developing countries have used a variety of food and food group classification systems, different numbers of food items and food groups, and varying reference periods (Ruel, 2002: 7). According to Ruel (2002; 8), developed countries measure the dietary quality range from simple indicators such as the percentage of energy from animal sources to complex indices that combine both nutrients and food components. In developing countries, dietary quality has often been equated to nutrient adequacy ratios (Hatloy, *et al*, 1998: 892).

In this study in South Africa, the food variety score (FVS) was defined as the number of individual food items consumed over a period of seven days. The total number of foods included in the food variety scores was 151 items (See Addendum B) from the twelve food groups including (non nutritious &

nutritious) food items. Also, the total number of food items included in the second investigation of the food variety scores was one hundred and nine from the nine nutritious food groups (See Addendum C). The total mean of the food variety scores of the first investigation was 18.6 and 8.62 for the second investigation of food variety scores in seven days. With both of these investigations different results were found. The food variety score was between low and medium for the first investigation using the 151 food items, but low in the second investigation using only the 109 nutritious food items. The results from both investigations indicated that, with the food variety scores that counts all the food items consumed, even miscellaneous items used can therefore contribute to a false impression of the quality of the diet. The food variety scores for the twelve food groups indicated that some of the household members had medium scores while, for the nine nutritious groups (second investigation), almost all the households' members were consuming a lower variety of food items, confirming that fewer nutritious food items were consumed on a daily basis (See Table 4.26, 4.27, 4.28).

Different results were found in the Vietnam study, which included adult women, and used the same method to validate the same diversity measures (FVS and DDS). In contrast to this study food variety scores and dietary diversity scores (DDS) was measured against nutrient intake and nutrient density (Ogle *et al,* 2001:21). The food variety score (FVS) and dietary diversity scores (DDS) were investigated from a seven day food frequency questionnaire and included 120 food items and twelve food groups, respectively.

The results indicated a positive association between the two measures of diversity and the intake of a variety of nutrients (Ruel, 2002:17). In this study, the food variety (FVS) and food group diversity scores were investigated against the access respondents had to food and calculated with reference to international standards in order to develop a dietary diversity score (DDS) to be used in the South African context to be able to assess household food security in the community. The results indicated a positive association between the two measures of diversity and proved that the tool was a good

indicator of household food security. The Oranje farm community was found not to be food insecure, since food was readily available but could not be utilized properly.

In addition to the findings of the Oranje farm study about the weight status of the respondents, no correlation was found between dietary diversity and body mass index. Food variety and food group diversity scores were used in comparing the body mass index groups for the respondents per season (See Table 4.29). In other studies investigating dietary diversity and nutritional status similar findings were found. The findings were found to be inconsistent, showing either positive or non-significant relationships, highlighting the lack of standardization in study methodology and measurements of dietary diversity (Onyango *et al*, 1998:485; Tarini *et al,* 1999:23; Hatloy *et al,* 2000: 891).

Chapter 5

CONCLUSION

5.1 SUMMARY

It is important to determine household food security, because it gives an indication of the unequal distribution of food and resource. This plays a role in household's ability to produce and acquire food. Lack of food and resources often leads to food insecurity due to, among others, limited dietary diversity (in different food items or food groups). Formulation of strategies to increase access to food to ensure appropriate and adequate food and micronutrient intake is essential to improve dietary diversity and subsequently also HHFS. Developments of various HHFS measurements are essential for planning, targeting, monitoring and evaluating interventions. Multiple and interrelated determinants are involved. It is known that inadequate dietary intake is one of the primary immediate determinants of malnutrition (Bellamy, 1998: 25).

The underlying determinants of adequate food intake are household food security and adequate and appropriate care for women and children. In order to determine the most important causes of poor dietary intake in women and children and to propose an effective intervention strategy, a conceptual framework was developed with the aim of highlighting and ensuring that all the most important causal factors need to be investigated. The UNICEF Conceptual framework of malnutrition (Bellamy, 1998:24) was used to

illustrate the important factors that affect the nutritional status of adult women and children in a community which ultimately lead to malnutrition.

The aim of this research was to describe the contribution of food accessing strategies to dietary diversity of farm worker households with the aim of identifying their dietary diversity level and its contribution to HHFS. A cross-sectional survey design was used. The sample included adult women (18-65 years) (N=21) responsible for the food in a full community of farm worker households on a farm (Oranje farm) in the Free State Province of South Africa. A structured questionnaire was used to gather data on demographics and food accessing strategies, with special reference to food production, purchasing, bartering, gathering, and payment in kind, as well as dietary diversity. Due to the sample size, the findings of the research cannot be generalized to all farm worker households. However, valuable information was collected on current food accessing strategies among households that can serve as a foundation for other larger studies to be conducted in SA.

Since this study is transferable, the diversity tool established can be used on other commercial farms in the Free State Province or in similar rural SA communities. This tool can assist in determining household food security problems in other areas in SA. The SAS and BMDP statistical packages were used in analysing data, mainly using frequency and means procedures, and calculating standard deviations. Other inferential statistical procedures included the Mann-Whitney test and Friedman parametric tests. The food variety and food group diversity scores were calculated. Scores were also compared between the four seasonal periods to find which foods were consumed most frequently in the different seasons.

5.1.1 Motivation of the study

The researcher‘s interest in this study started while working as a fieldworker for the larger project on this farm. Their sample was at the time also taken from the community of farm worker households living on Oranje Farm. A poor variety of food and obvious limitations in nutrition knowledge and application

of food distribution were particular problems that were observed in this community. Their diets were very monotonous, dominated by starchy food intake (mainly from maize meal given by the farmer as part of payment). Infrequent protein consumption was also observed as little or no animal products (mainly chickens available) were consumed, and few fruits and vegetables were consumed, depending on seasons and availability (Green, 2004). Most of the adult women in the community were unemployed which contributed to poverty and poorly diversified diets. The researcher was thus motivated to investigate and describe the food access strategies and, in the process, test a simple tool for measurement of food variety and food group diversity. Subsequently, the DD levels of these women were evaluated against their anthropometric measurement (BMI) in an attempt to assess household food security in this community.

5.1.2 Results

The results revealed that five food-accessing strategies were used, namely purchasing, production, gathering (wild vegetables, hunting, and fishing), bartering and payment in kind. These findings are consistent with other studies in showing that food purchasing, food gathering and food production are the main food accessing strategies that were used and no household depends solely on one food accessing method. The research study found that the two most common food accessing strategies used were purchasing (general dealer) and gathering (wild vegetables, hunting, and fishing). Since gathered food items like wild vegetables and fruit played the most important role in the dietary diversity levels on commercial farms, nutritionists will have to identify and promote the nutritious food items that also form part of the food based dietary guidelines in South Africa. More research is needed on this matter. Most people also depended on food production (86%) by cultivating vegetables (spinach, green-beans, pumpkin, tomatoes, and cabbage) and fruit (peaches and apricots). Agricultural researchers must intervene by providing agricultural skills, to farm worker households to help in improving their gardening skills in order to have a higher variety of food items available to

them. This was further investigated and implemented on Oranje farm in order to improve their DD status.

Despite all the food accessing strategies used by the women, the bartering strategy was hardly ever used. Food bartering was seldom practised (19%), mainly due to customs and lack of knowledge. Therefore, this indicated that more interventions are still needed to help people in rural areas to gain knowledge about the different food accessing strategies and how employing these strategies could help them to have more varied diets in order to alleviate household food security. Food received as payment in kind (maize meal) was common (76%). It is evident from the research findings that, in order to alleviate poverty or household food insecurity in rural areas, especially on commercial farms, the owners of the farms should be involved to combat this problem. This can be in the form of subsidizing food items and giving food items that will form part of payment.

The first choice method of food access in these households was purchasing (76%), followed by gathering (19%) and producing (4%). People seldom ate outside their own homes (76%), except for children receiving food at school from feeding schemes (90%). The meals of the children from the feeding scheme were not meeting the requirements of the nutritional status of the children, therefore, food policies must be available to specifically will deal with feeding schemes. Dietary diversity was limited for cereals (maize meal porridge, bread), vegetables (spinach or wild vegetables (green leaves), green beans, pumpkin), fruit (apples), milk (cow's milk), proteins (eggs, chicken), and other miscellaneous products (tea, sugar, salt, curry powder, sunflower oil).

The weight status (weight and height) of the adult women was measured in order to check correlation between body mass index and their dietary diversity. Although most of the women were found to be overweight and obese despite their poor diversity in the households. No relationship was found. The reason might be calories and energy expenditure affects BMI more so than diet diversity. This links with the previous research where dietary

diversity was linked with nutrient adequacy. It was found that improved dietary diversity will result in improved BMI (Hatloy, 1998: 894). This study might be attributed to the fact that most of the respondents were unemployed and normally spent their time without any activities. In addition, they consumed large quantities of carbohydrates, for example maize meal porridge, while their physical activity levels were very low, resulting in poor energy output that could not balance their huge energy intakes from the starchy staple foods. This limited energy output might have leaded them to being overweight.

All the different strategies played an important role in the dietary diversity of farm worker households on Oranje farm. Although their first method of choice was to purchase food in order to have food in the house, they also depended on what they got from their natural environment (gathering, hunting and fishing).

The results indicated that limited food accessing strategies were utilised or that many of the strategies were not used optimally resulting in limited dietary diversity, ultimately affecting household food security status of farm worker households. The contribution of food accessing strategies was found to be positive in a sense that farm worker households were not found to be food insecure. The negative contribution was that all of the households did not know how to utilize the food. Their meals were found to lack variety and were very monotonous. This information can be used to formulate strategies and develop interventions to increase the number of food access strategies utilized and to improve utilisation thereof in order to improve dietary diversity and household food security.

Overall, this study showed that it was possible to predict household food security of household members by simply calculating the food variety scores and food group diversity scores of households as an indication of their dietary diversity. These results revealed which households were food secure and insecure, and provided an overall picture of the dietary diversity of the whole community.

5.2 FINAL CONCLUSION

Conclusions that were drawn from the research were formulated according to the sub-problems as stated in chapter 3 (See page 36).

5.2.1 Food accessing strategies

- The first sub-problem formulated for this research study was:

"Which foods were accessed through food production to contribute to dietary diversity of farm worker households on Oranje farm?"

Foods that were accessed through food production contributing to dietary diversity of farm worker households on Oranje farm were identified by different methods of cultivation used by the community. This included producing vegetables, fruit as well as livestock in order to have access to food. Different types of cultivated vegetables consumed by this community were found (See Table 4.9) and were normally planted during summer and spring. In this community fruit was not consumed in large quantities except during summer, when fruit consumption was plentiful (See Table 4.9). During other seasons such as autumn and spring, the community indicated that they did not cultivate any vegetables or fruit, thereby contributing negatively to their dietary diversity. The only fruit eaten during harvest time were peaches and apricots which were from their trees and those on the farm that they were given access to. Therefore this clearly indicates that the community of Oranje farm depended on what food they got from their natural environment. This statement is supported by Jerome *et al* (1980: 15) and Kgaphola & Boshoff (2002: 69) indicating that the natural environment determine the types of animals and plants available in a geographical area and that the man-made structures such as buildings, roads and dams as well are determined by the natural environment. The livestock that they owned included chickens, cattle and pigs. Chickens were used both for meat and eggs while a cattle was used only for its milk products.

♦ The second sub-problem formulated for this research study was:
"Which foods were accessed through food purchasing to contribute to dietary diversity of farm worker households on Oranje farm?"

The foods accessed through food purchasing to contribute to dietary diversity were also identified by the different venues used to purchase their groceries (See Table 4.10 & 4.8). They purchased food items only at three venues (See Table 4.16), but most foods were purchased at the general dealer (n=19). Several factors, including lack of transport, limited nutrition knowledge, limited variety of shops and not utilizing their food properly, influenced their food purchasing behaviour. All the farm worker households used this food accessing strategy.

♦ The third sub-problem formulated for this research study was:
"Which foods were accessed through food bartering to contribute to dietary diversity of farm worker households on Oranje farm?"

The foods accessed through food bartering to contribute to dietary diversity were also investigated. Very few of the households used this strategy, and thus it could be concluded that food bartering was seldom used. Most of the respondents did not use this strategy regularly and most did not know how to use it. They felt uncomfortable about the principles involved in food bartering and were mostly afraid that people would not reciprocate once they start using this type of food access method. People generally thought that it would be like loaning food and that they would never receive food back. This strategy seems to be one of the most logical strategies to use and employ in communities such as this one, and need to be included in a nutrition education program.

♦ The fourth sub-problem formulated for this research study was:
"Which foods were accessed through food gathering to contribute to dietary diversity of farm worker households on Oranje farm?"

The foods accessed through food gathering to contribute to dietary diversity were also identified by three different methods used by this community (See Table 4.7). Different types of wild vegetables were consumed by this community (See Table 4.8 & 4.11) and were gathered during summer and spring. Different animals were hunted and fishes were caught as a source of protein (See Table 4.8). Wild vegetables continued to play an important role in dietary diversity of rural people (Jones, 1963:48; Corbet, 1988: 1099; Ogle *et al,* 2001: 21; Kuhnlein, 2003: 33), as was confirmed by this research study.

- The fifth sub-problem formulated for this research study was:

"Which foods were accessed through payment in kind to contribute to dietary diversity of farm worker households on Oranje farm?"

The foods accessed through payment in kind that contribute to dietary diversity were also identified as those being food products received by those individuals working on the farm or subsidized by the farmer. Households received monthly rations of maize meal but also sporadically other products specifically linked to the festive season or holidays. They were also able to purchase food at a subsidized price from the farmer (See Table 4.8). Only the farmer's employees benefited from this strategy.

- The sixth sub-problem formulated for this research study was:

"Which foods were accessed through others means to contribute to dietary diversity of farm worker households on Oranje farm?"

No other strategies were found.

5.2.2 Dietary diversity

- The seventh sub-problem formulated for this research study was:

"To determine the dietary diversity (food variety and food group diversity scores) of farm worker households on Oranje Farm"

The food variety and food group diversity scores were determined by compiling a list of individual food items and food groups in order to investigate the dietary diversity of this community. Firstly, a list was compiled with 151 food items and twelve food groups including non-nutritious food items (Hatloy *et al,* 1998:893). Secondly a list was compiled containing 109 food items and nine food groups this time only including nutritious food items and food groups (Steyn *et al,* 2006: 645). This helped to assess the effect of miscellaneous food items and the amount of nutritious foods The food variety and food group diversity scores for both the two investigations were calculated for farm worker households in order to check if the household members consumed a variety of food in their diets. The food variety scores were found to be low mean 151 food varieties (30.2 to 36.5)) and 109 food varieties (23.0 to 27.9)). The food group diversity scores were found to be high mean twelve food groups (9.3 to 10.65) between the five seasons and nine food groups (7.9 to 8.8)) between the five seasons. This finding therefore indicates that these households were not experiencing hunger and had some household food security, as they had food available to consume even though they had to employ a number of food accessing strategies to obtain their food. However diversity within the various food groups was limited, resulting in poor dietary diversity and poor nutritional diversity. This would be the main focus of any nutrition education program that aims to alleviate the broader problems of food security.

- The eighth sub-problem formulated for this research study was:

”How does all the food access strategies contribute to dietary diversity of farm worker households on Oranje Farm?

Different food accessing strategies were identified and described in order to find out how all the strategies contributed to dietary diversity (See Figure 5.1 mind map). Different strategies contributed differently.

- The ninth sub-problem formulated for this research study was:

"How does the dietary diversity of adult women of farm worker households on Oranje Farm relate to their body mass index?"

The height and weight of all the adult women were taken and recorded to calculate their body mass index. The majority of the women were obese (See Table 4.5). Correlations of body mass index and their dietary diversity per season were calculated (See Table 4.29). No relationship was found. In conclusion more diversity does not always links with higher weights. In this study the majority of women were obese but consuming poor variety of diet.

5.3 RECOMMENDATIONS

5.3.1 Recommendations from this research study

The results and conclusions were used to compile a mind map of the dietary diversity issues and related food access problems (See Figure 5.1).

From the mind map it was possible to identify which strategies were utilized most and least in various seasons (See Table 5.1).

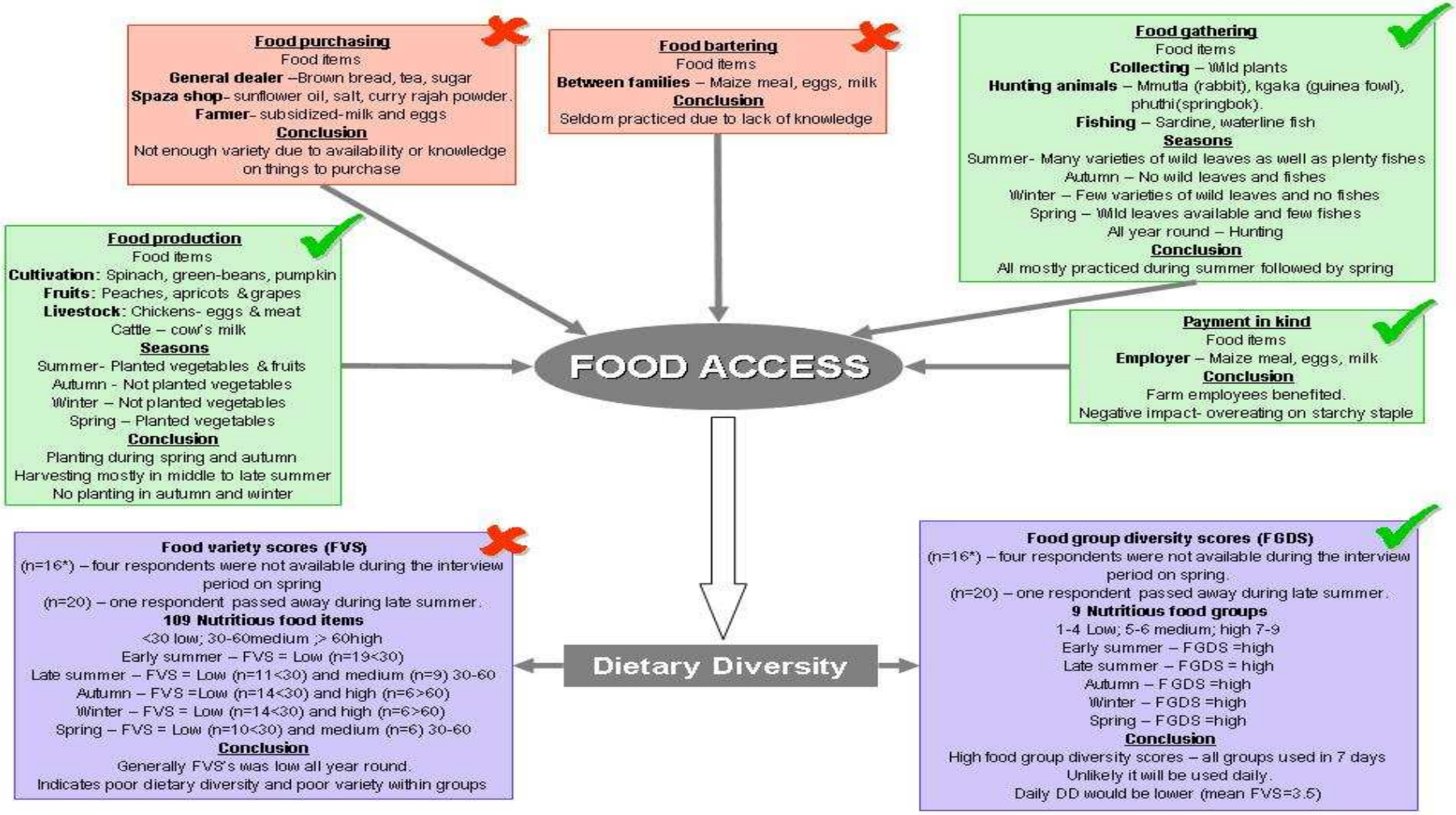

FIGURE 5.1: MIND MAP OF THE DIETARY DIVERSITY ISSUES

TABLE 5.1: SUMMARY OF LEVELS OF UTILIZATION OF FOOD ACCESSING STRATEGIES IN THE SEASONS

SEASONS	FOOD ACCESSING STRATEGIES				
Periods	Production	Purchasing	Gathering	Bartering	Payment in kind
Summer	***	**	***	?	***
Autumn	-	*	-	?	**
Winter	-	*	-	?	**
Spring	**	*	**	?	**

* Less frequently; ** Frequently; *** More frequently;? Not really practiced; - Not done

It is clear from table 5.1 and mind map (See Figure 5.1) that almost all the strategies were practiced and utilized during the summer season. Second on the list was spring. The reason for this was that food is plentiful during these two seasons, especially the summer period, when most of their cultivated vegetables and fruits were available. The different wild vegetables, as well as fish, were highly available. The festive season also affected their dietary diversity, since a variety of food was purchased and spared in pre-preparation for Christmas day. Different events such as weddings and parties held on the farm and for the guest house on the farm impacted on the variety of food available to the women working there. Most of the foods accessing strategies were not practiced during autumn and spring, leading to poor dietary diversity. Interventions need to be done during these two seasons to improve their dietary diversity as well as their accessing strategies. The intervention can include preserving variety of fruits and vegetables that are harvested during summer in-order to be used on seasons where food is not plenty. This can be used during autumn and winter period (See Table 5.1).

Education should focus on the following:

- Season – agricultural skills about crops cultivated and harvested during autumn and winter should be improved. This can also include preservation skills about fruit and vegetables.
- Strategies – education about other different food accessing strategies as well as teaching them about bartering, or other known food accessing strategies, should be taught in order for them to practice these during

autumn and winter. Improved practices would also aid in improved dietary diversity and household food security.

5.3.2 Recommendations for future research

The following is recommended in light of the findings of this study and the summary in Figure 5.1.

- It is recommended that the dietary diversity tool used in this study be used with a large population group from different farms or other rural communities to enhance generalisability of the findings.

- A “three day recall” investigation of household dietary diversity should be conducted as a “seven day recall” is too long and therefore not easily remembered.

- National food based dietary guidelines should include indigenous plants as they play an important role in dietary diversity. This will help nutritionists to identify and promote the indigenous nutritious food items most prevalent in each area of the country.

- Only women were interviewed in this study. However, in order to have a better idea of the comprehensive dietary diversity of a family, it would be ideal if men are included as part of a study as well.

- More research should be done to identify different food accessing strategies and to provide agricultural skills to farm worker households to help in improving their gardening skills, in order to have a variety of food items in their households.

Since the community on Oranje farm already used some gardening (although limited) to improve their food intake, it was decided to improve their knowledge and skills by educating them particularly on vitamin A-rich

vegetable gardening**.** With the help of the Agricultural Research Council (Pretoria), the production of orange-fleshed sweet potato and other vitamin A rich vegetables, like spinach, carrots, and butternut was promoted and demonstrated, and daily consumption of these crops was strongly recommended.

Certain different varieties of orange-fleshed sweet potato have sufficient beta-carotene content to be considered a good source of provitamin A. Orange – fleshed sweet potato helps in addressing vitamin A deficiency. Strategies focusing on food diversification to address vitamin A deficiency aim to increase the availability of, access to, and subsequently the consumption of vitamin A – rich foods. Foods of plant origin are affordable and many households have to rely on orange-fleshed fruit (e.g paw-paw and mango) and vegetables (e.g. carrots, orange sweet –fleshed sweet potato, butternut, pumpkin) as well as dark green leafy vegetables as their sole source of vitamin A (Faber, Laurie & Venter, 2006:14).

This project was specifically focused on the relationship between vitamin A and the identification of foods rich in vitamin A. Part of the education was also to show the community the importance of home gardens as a source of foods high in vitamin A. All the households were given seed, fertilizer, sweet potato cuttings and even measuring sticks to plant in their own home gardens. A nursery garden was also planted for the community to care for themselves, so that everyone could have products and get seedlings continuously for their home gardens. It was found to be a positive strategy to use. However, close monitoring is required when introducing new strategies in communities until they have adopted these as part of their food accessing methods (See Figure 4.14).

FIGURE 5.2: TEACHING THE COMMUNITY ABOUT VITAMIN A (GARDENING)

5.4 LIMITATIONS OF THE STUDY

Some limitations in this study were found in the use of food variety analysis that relied on the seven-day recall method for adult women. Recalling the number of food items consumed over a period of seven days was difficult, because most participants reported that it was a too long period. The food variety scores (FVS) were found to be low in all the seasons when counting the scores; however, it was clear that the community consumed an even less varied diet during the season of early summer. This was due to the fact that there was not enough food in the house together with the fact that they were making arrangements for saving money for Christmas. Therefore, the number of food items eaten over seven days was even less than during other periods.

The methodology used in this study can be transferred to other studies in the Southern African context. The findings cannot be generalized based on the information found, as the sample used was small. The tool used to calculate the score was designed / focused specifically with the South African low-income community in mind and the focus of the research project was to test the instrument and to determine the viability of a DD and FV measure in a scoring system that would be easy to implement and quick to calculate, especially in an illiterate community.

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Addendum A

DIETARY DIVERSITY QUESTIONNAIRE

BIOGRAPHIC INFORMATION

Please answer each of the following questions as best you can by placing a cross (x) in the appropriate space. All your answers are strictly confidential and anonymous.

NAME:_____

HOUSE NUMBER:_____

Weight of the participant

Height of the participant

1. How old are you?

MARITAL STATUS

2. What is your marital status?

Single	
Married	

NUMBER OF CHILDREN

3. Do you have children?

Yes	
No	

3.1. If yes how many children do you have living in the household?

One	
Two	
Three	
Other	
None	

SOCIOECONOMIC STATUS

4. Are you currently employed?

Unemployed	1
Employed	2
Self- employed	3

If unemployed answer question number 4.3

4.1. If employed how much do you earn per month?

R100 –200	
R200 – 500	
R 500 – 1000	
R 1000 –2000	
Other amount	

4.2. If self-employed how much money do you have per month?

R100 –200	
R200 – 500	
R 500 – 1000	
R 1000 –2000	
Other amount	

4.3. If unemployed where do you get money to buy food for the household?

Friends	
Relatives	
Child's father or husband	
Mother	
Father	
Sister	
Brother	
Pension	
Other	

If given money, who is receiving it?

……..

4.3.1. How much total amount coming into the household per month?

R100 –200	
R200 – 500	
R 500 – 1000	
R 1000 –2000	
Other amount	

EDUCATIONAL STATUS

5. What level of education do you have?

Less than standard 1	1
Standard 1-4	2
Standard 5	3
Standard 6	4
Standard 7	5
Standard 8	6
Standard 9	7
Standard 10	8
Other	9

FOOD ACCESS AND DIETARY DIVERSITY

Access strategies

- **FOOD PRODUCTION**

6. Does any member of your household have access to any agriculture land or garden plot?

Yes	1
No	2

7. What is the area of the plot? Enter size

Length

Height

8. How did your household acquire access to this plot?

Inherited	1
Purchased	2
Freely used land	3
Other	4

9. Do you use this plot?

Yes	1
No	2

If no, why? ……..

.....……

10. Do you cultivate any food products (vegetable & fruits) for household food consumption?

Yes	1
No	2

10.1 Do you produce (grow) your own vegetables?

Yes	1
No	2

10.2 If yes, what do you grow? Name the 5 items you grow throughout the different seasons.

Vegetables	Summer, winter, spring, autumn

10.3 Do you produce (grow) your own fruits?

Yes	1
No	2

10.4 If yes, what do you grow? Name the 5 items you grow throughout the different seasons.

Fruits	Summer, winter, spring, autumn

11. Do you have livestock (animals)?

Yes	1
No	2

If no, proceed to number 12

11.1 If you have livestock (yes answered to question 9), why do you have livestock?

……..

11.2 If yes, which do use as food or their products (you may mark more than one).

LIVESTOCK	YES/NO (1 / 2)	END USE
Cattle	1 / 2	
Chicken	1 / 2	
Goats	1 / 2	
Sheep	1 / 2	
Pigs	1 / 2	
Other (specify)		

- **FOOD GATHERING**

12. Do you gather food from the veldt?

Yes	1
No	2

If no, proceed to 13

12.1 If yes, what do you gather? Name the 5 items you gather and the season in which you gather the food?

Gathered food	(Summer, spring, winter, autumn)

13. Do you hunt animals?

Yes	1
No	2

13.1 If yes, what animals are hunted as food? Give 5 items and season.

Animals	Season

14. Do you fish?

Yes	1
No	2

If yes, give 5 items what and when (Season) do you fish?

Fish	Season

- **FOOD PURCHASING**

15. Where do you buy most of your food? (Mark only one).

Hypermarket	1
Supermarket	2
Local shops	3
Spaza shops	4
Café	5
Street hawkers	6
Commercial farm (subsidized)	7
Market	8
Other	9

15.1 How often do you buy food (Mark only one).

Everyday	1
Once a week/everyday	2
3-4 times a week	3
Every second week	4
Once a month	5
Other	6

- **FOOD BARTERING**

16. Do you practice food bartering?

Yes	1
No	2

If no, why? ……

16.1 If yes what do you barter with? Name 3

Food

16.2 With whom do you barter?

Friends	1
Neighbours	2
Relatives	3
Other	4

- **PAYMENT IN KIND**

17. Do you receive any food products that you can use in your household from the farm?

Yes	1
No	2

17.1 If yes what and when do you get those products? List 5 of them and their frequency

Food	Daily, weekly, monthly, yearly

QUESTIONS TO TRIANGULATE PREVIOUS QUESTIONS

- **EATING HABITS/PATTERNS**

18. What method do you <u>mostly</u> use to get food in the house? (Name one).

Buy it	1
Produce it/ grow it myself	2
Receive it	3
Gather it from veldt/hunt it	4
Bartering	
other	5

18.1 How often do you use the method?

Everyday	1
Once a week/everyday	2
3-4 times a week	3
Every second week	4
Once a month	5
Other	6

18.2 What <u>second</u> method do you use to get food in the house?

.....

……

18.3 How often do you use the method?

Everyday	1
Once a week/everyday	2
3-4 times a week	3
Every second week	4
Once a month	5
Other	6

18.4 What third method do you use to get food in the house?

.....

……..

18.5 How often do you use the above method?

Everyday	1
Once a week/everyday	2
3-4 times a week	3
Every second week	4
Once a month	5
Other	6

19. How many meals do adults in the household normally eat per day?

One	1
Two	2
Three	3
Other	4

20. How many meals do your children normally eat per day?

One	1
Two	2
Three	3
Other	4

21. How many prepared meals (plate of food) do you personally eat per day?

One	1
Two	2
Three	3
Other	5

22. How many times do you snack (eat and / or drink) “in between” these meals?

TIME	FOOD OR BEVERAGE
One	
Two	
Three	
Other	

23. Does your household eat meals together?

Yes	1
No	2

23.1 If no, how do they eat their meals?

……

……

24. What is the most commonly eaten food in your family? List three and **RANK THEM**.

- **FOOD PREPARATION**

25. Do you sometimes eat anywhere else than your own home?

Yes	1
No	2

25.1 If yes, where do you mostly eat? Choose one.

Restaurant	
Shop	
Café	
None	
Other	

25.2 How often do you visit the above mentioned?

Everyday	1
Once a week/everyday	2
3-4 times a week	3
Every second week	4
Once a month	5
Other	6

25.3 Do you always prepare lunch box for your husband when going to work?

Yes	1
No	2

25.4 If no, where does he eat?

……

……

25.5 Do you always prepare lunch box for yourself when going to work?

Yes	1
No	2

25.6 If no, explain.

……

……

25.7 What do you normally prepare for lunch box? Name 3

25.8 Do you also prepare lunch box for your children to carry to school?

Yes	1
No	2

25.9 If no, where and what do they eat?

……

……

25.10 If yes what do they eat? Name 3 & **RANK THEM**.

Food

Addendum B

LIST OF FOODS AND FOOD GROUPS DIVERSITY

NON – NUTRITIOUS AND NUTRITIOUS FOOD ITEMS

GROUP 1: CEREALS DIVERSITY	YES	NO
Rice		
Pap		
Macaroni/pasta/spaghetti		
Maize rice (mieliers)		
Samp (stampmielies)		
Bread (white or brown)		
Whole wheat bread		
Dumpling		
Fat cakes		
Scones		
Biscuits		
Buns		
Mabela (soft porridge)		
Maize meal porridge		
Corn flakes		
Oats		
Wheat bix		
Mageu		
Other		
Other		
Other		

GROUP 2: VEGETABLES DIVERSITY	YES	NO
Onions		
Cabbage (red / green)		
Beet root		
Pumpkin (boerpampoen)		
Rhubarb		
Potatoes		
Turnips (raap)		
Gem-squash (lemoenpampoen)		
Tomatoes		
Green beans (fresh)		
Sugar beans (dried)		
Peas (fresh – green)		
Peas (dried)		
Cow peas		
Jugo beans		
Sweet potato		
Carrots		
Merogo		
Spinach		
Butternut		
Cauliflower		
Chili (red/green)		
Lettuce		
Mushroom		
Baby marrow		
Green pepper		
Sweet-corn (baby)		
Corn-on-the-cob (white)		
Garlic		
Other		
Other		
Other		

GROUP 3: FRUITS DIVERSITY	YES	NO
Deciduous fruits		
Apple		
Peaches		
Pears		
Apricots (Appelkoos)		
Peach (yellow cling)		
Grapes (black/green)		
Plum		
Sub- tropical fruit		
Lemon		
Orange		
Naartjie		
Banana		
Pine apple		
Avocado		
Mango		
Other		
Blue berry		
Cherry		
Kiwi fruit		
Raspberry		
Watermelon		
Wild watermelon (tsamma)		
Guava		
Other		
Other		
Other		

GROUP 4: PROTEINS DIVERSITY	YES	NO
Chicken		
Beef		
Pork		
Tinned fish (Pilchards)		
Fish (fresh / whole)		
Lekgotlwane (finely chopped, cooked meat)		

Mutton		
Tinned fish (Tuna)		
Chicken runners & heads		
Chicken livers		
Goat (meat)		
Mogodu & malana (Tripe)		
Dried meat (biltong)		
Viennas		
Russians		
Sausage (wors)		
Steak		
Tuckey		
Polony		
Eggs		
Other		
Other		
Other		

GROUP 5: MILK PRODUCTS DIVERSITY	YES	NO
Milk, unpasteurized (cow)		
Evaporated milk (unsweetened)		
Maas/ inkomasi		
Powdered milk		
Skim or low-fat milk (pasteurized)		
Full cream milk (pasteurized)		
Cheese		
Custard		
Ice cream		
Yoghurt		
Ultramel		
Yogisip		
Other		
Other		
Other		

GROUP 6: DRINKS DIVERSITY	YES	NO
Juice (100% pure juice e.g. Ceres / Liquifruit)		
Juice (<100% pure / imitation juice)		
Imitation drinks (sweeto,sixo,oros etc)		
Soft drinks (Coke, Fanta etc.)		
Milo / hot chocolate		
Tea (Joko, rooibos etc)		
Coffee (instant e.g. Frisco)		
Other		
Other		
Other		

GROUP 7: SAUCE DIVERSITY	YES	NO
Tomato sauce		
Mayonnaise		
Chutney		
Chakalaka		
Atchar		
Salad dressing		
Soups		
Other		
Other		
Other		

GROUP 8: MISCELLANEOUS DIVERSITY	YES	NO
Sugar		
Jam		
Jam (home made)		
Liver pate		
Peanut butter		
Salt		
Jelly		
Marmite		
Fish paste		
Syrup (golden)		

Other		
Other		
Other		

GROUP 9: FATS, OIL & SWEETS DIVERSITY	YES	NO
Butter		
Sunflower oil		
Margarine		
Lard		
Salad oil		
Chappies		
Chocolates		
Chips (Simba)		
Cheese curls		
Other		
Other		

GROUP 10: HERBS DIVERSITY	YES	NO
Pumpkin herbs		
Pecan nut		
Peanut		
Mint		
Other		
Other		
Other		

GROUP 11: SPICES DIVERSITY	YES	NO
Chicken		
Barbecue		
Garlic		
Pork		
Curry powder (Rajah)		
Paprika		
Chili powder		
Nutmeg		
Turmeric		

Parsley		
Other		
Other		
Other		
GROUP 12: BEVERAGES DIVERSITY	YES	NO
Beer		
Wine (red or white)		
Umqombothi		
Traditional beer		
Other		
Other		
Other		

Addendum C

LIST OF FOODS AND FOOD GROUPS DIVERSITY

NUTRITIOUS FOOD ITEMS

GROUP 1: FLESH FOODS (MEAT, POULTRY, FISH) DIVERSITY	YES	NO
Chicken		
Beef		
Pork		
Tinned fish (pilchards)		
Fish (fresh/ whole)		
Lekgotlwane (finely chopped, cooked meat)		
Mutton		
Tinned fish (tuna)		
Chicken runners & heads		
Chicken livers		
Goat (meat)		
Mogodu & malana		
Dried meat (biltong)		
Viennas		
Russians		
Sausage (wors)		
Steak		

GROUP 2: EGGS DIVERSITY	YES	NO
Eggs		

GROUP 3: DAIRY PRODUCTS DIVERSITY	YES	NO
Milk, unpasteurized (cow)		
Evaporated milk (unsweetened)		
Maas/ inkomasi		
Powdered milk		
Skim or low-fat milk (pasteurized)		
Full cream milk (pasteurized)		
Cheese		
Custard		
Ice cream		
Yoghurt		
Ultramel		
Yogisip		

GROUP 4: CEREALS, ROOTS & TUBERS DIVERSITY	YES	NO
Rice		
Pap		
Macaroni/pasta/spaghetti		
Maize rice (mieliers)		
Samp (stampmielies)		
Bread (white or brown)		
Whole wheat bread		
Dumpling		
Fat cakes		
Scones		
Biscuits		
Buns		
Mabela (soft porridge)		
Maize meal porridge		
Corn flakes		
Oats		

Wheat bix		
Mageu		
Potatoes		
Sweet potatoes		
Umqombothi		
Traditional beer		

GROUP 5: LEGUMES AND NUTS	YES	NO
Sugar beans		
Peas (dried))		
Cow peas		
Jugo beans		
Peanut butter		
Peacan nut		
Peanut		

GROUP 6: VITAMIN A RICH FRUITS & VEGETABLES DIVERSITY	YES	NO
Pumpkin		
Carrots		
Wild leafy vegetables (morogo) Fresh and dried		
Spinach		
Butternut		
Apricots (Appelkoos)		
Peach (yellow cling)		
Mango		

GROUP 7: OTHER FRUITS (AND JUICES) DIVERSITY	YES	NO
Deciduous fruits		
Apple		
Peaches		
Pears		
Grapes (black/green)		
Plum		

Sub- tropical fruit		
Lemon		
Orange		
Naartjie		
Banana		
Pine apple		
Avocado		
Blue berry		
Cherry		
Kiwi fruit		
Raspberry		
Watermelon		
Wild watermelon (tsamma)		
Guava		
Juices		
Juice (100% pure juice e.g. Ceres / Liquifruit)		

GROUP 8: OTHER VEGETABLES DIVERSITY	**YES**	**NO**
Onions		
Cabbage		
Beetroot		
Rhubarb		
Turnips (raap)		
Gem-squash (lemoenpampoen)		
Tomatoes		
Green beans (fresh)		
Peas (fresh – green)		
Cauliflower		
Chili (red/green)		
Lettuce		
Mushroom		
Baby marrow		
Green pepper		
Sweet-corn (baby)		

Corn-on-the-cob (white)		
Garlic		

GROUP 9: OILS AND FATS DIVERSITY	YES	NO
Butter		
Sunflower oil		
Margarine		
Lard		
Salad oil		