UNIT 1:
Challenges for food and nutrition security

Introduction

We must ensure that vulnerable households become less vulnerable to food and nutrition insecurity so as to save lives in the short term and strengthen lives in the longer term. Household interventions need to be carried out in a way that will assist households to maintain their right to food. Despite threats and challenges to livelihoods and the food security status of households, each household should be able to ensure nutritional well-being for all the household members continuously and into the future.

This means that households need to have or build the capacity to withstand future threats and shocks that may put their livelihoods and nutritional well-being at risk of being lost or damaged.

> *"Disease and disasters come and go like rain, but health is like the sun that illuminates the entire village."* - *African Proverb*

It is true that food is essential for nutritional well-being, but to secure an adequate nutritious food intake the nutritional health and livelihoods assets of poor or disadvantaged people need to be protected, promoted and secured. Within a rights-based approach there are two areas to focus on.

- The first focus is on **building the capacity of households** and the people so that they can strengthen themselves to protect and promote their own nutritional well-being with dignity.
- The second is a focus on all **service providers to support communities** and create an enabling environment and opportunities to overcome threats to their livelihoods and nutritional well-being.

In Module 1 we focused on the concepts and language used in working as a household food security facilitator. We need to refer back and refresh our minds to be able to continue with this module on promoting improved food behaviour and nutrition.

Specific and learning outcomes

The table below shows the learning outcomes and list of assessment activities for this unit. A time estimate is shown for each activity. This will help you to plan the use of your time. When you have completed the activities write down the actual time you spent.

Learning outcomes	Assessment Activities	Actual time spent hours
What is involved in protecting household food security for purposes of improving nutrition and livelihoods? What are the threats to food security and nutritional health? What are the roles of food nutrients in nutritional health? What is nutritional health as opposed to being malnourished? Why are a healthy environment, food safety and hygiene important?	**Workbook activities** 1.1 Identify the food security dimensions and nutritional health issues using a case study. (0.5hr) 1.2 Meaning of the concepts used in household food security life situation (1hr) 1.6 Apply the information on Vitamin nutrient deficiency of children (0.5hr) 1.8 Factors affecting the nutritional health of households in Ndunakazi village (0.5hr) **Portfolio activities** 4.1 Understanding the terms and concepts relating to malnutrition. **Assignment** Assignment 1 - Information for this assignment is contained in Tutorial Letters 101. (Spend 2 hrs on the Assignment)	

Key concepts

Coping strategies	**Micronutrients**	**Resilience**
Food security	**Nutritional health**	**Risk**
Hunger	**Nutrients**	**Shocks**
Macronutrients	**Nutrition security**	**Under-nutrition**
Malnutrition	**Over-nutrition**	**Vulnerability**

Start-up activity

Complete this activity in your study guide

Many African proverbs carry messages about food and nutrition. These are messages that the household food security facilitator can use. Give your own interpretation for each of the following proverbs in terms of food and nutrition and add one of your own.

1. The food that is in the mouth is not yet in the belly. - Kikuyu Proverb
   .....
   .....
   .....
2. The chicken that digs for food will not sleep hungry.
   .....
   .....
3. Water is colourless and tasteless but you can live longer on it than eating food. - African Proverb
   .....
   .....
4. The hyena with a cub does not consume all the available food. - Akamba Proverb
   .....
   .....
5. My proverb
   .....
   .....
   .....

1.1 Protecting household food security, nutrition and livelihoods

For Module 4 the emphasis is on household food security and nutrition security and their influence on the health and well-being of individuals as members of their households and the community they live and work in. Refresh your memory with regards to the conceptual framework introduced to you in Module 1 as Figure 1.1 below.

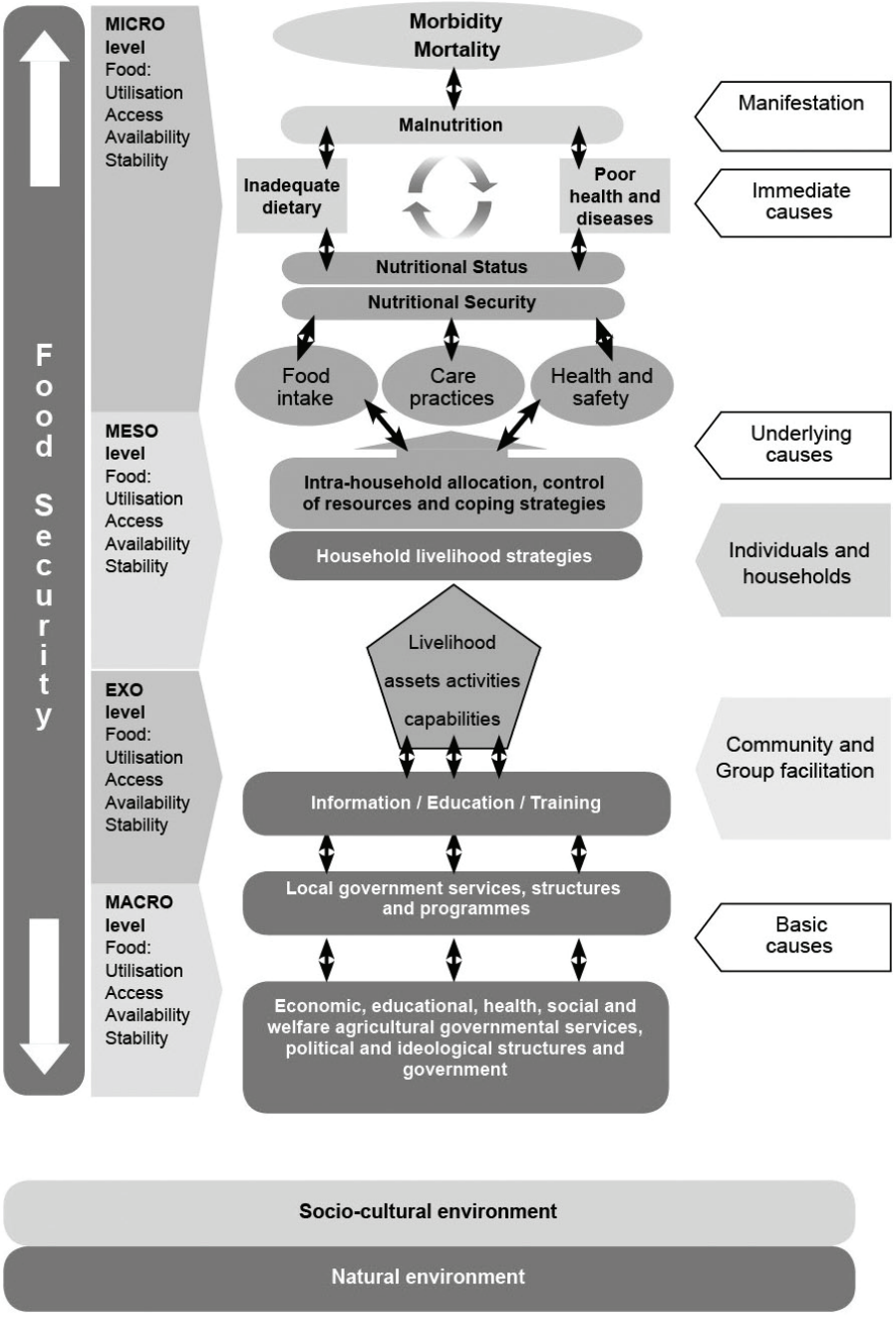


Figure 1.1 **The conceptual framework with building blocks for household food security**

1.1.1 The building blocks for household food security, nutrition and livelihoods.

In this module we will mostly concentrate on the top half of the framework and the building blocks directly related to nutritional well-being. It is at the same time important to see the bigger picture on food security and livelihoods. To refresh our learning from Module 1 the building blocks of food security that need to be taken into consideration when vulnerable groups are at risk are outlined below.

Activity 1.1 Identify the food security dimensions and nutritional health issues using a case study

Complete this activity in your workbook

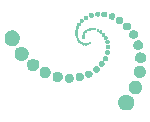
Aim: Identify the food security dimensions and its impact on health in the case study below.

Family life of households in a rural village in Limpopo

This is the reality of family life in a rural village in Limpopo, situated about 30km from the nearest town. The people in this village are poor, with the unemployment rate as high as 52%. About 48% are dependent on social grants and migrant labour. Most of the young people have migrated to urban areas in search of work and many of the grandmothers are now caring for their grandchildren. The average size of the households is 6 and the number of houses in the village is 450.

There are no large shops or supermarkets and most food is bought in town at the end of the month. Health services at the village are poor, with a mobile clinic only visiting the village once a month and therefore sick people have to travel to the hospital in town at great expense.

Very few of the households have livestock, but up to 95% try to plant vegetable gardens. The vegetable harvest from these gardens is very limited. The vegetables that are planted provide enough vitamin A and vitamin C only if the garden produce is combined with purchased food. In fact, 48% of the households purchase foods from town and the money for that is primarily from income generated outside the village.



The main limitation for successful production of vegetables is the lack of a reliable source of water for irrigation and for drinking water. The village does have a community borehole with a diesel pump that transfers water into a small cement dam, which then supplies water to stand pipes or house taps. However, on many occasions the taps and some of the standpipes were stolen or there is no water since the diesel pump is either without fuel or is broken. The community has not been able to organise a system or a water committee who can make suggestions on how diesel can be bought and paid for and also to select someone to be trained to maintain the pump.

There are other water sources such as a river and a spring, but both are contaminated by animals and humans and therefore not safe for drinking. To access this source, the women have to walk quite a distance and carry heavy 25 litre containers. Therefore sometimes women have to buy water from others who have their own bore holes, paying up to R15 for 25 litres (in 2006). Not all women understand that this water is not safe for drinking or food preparation and many do not cover the buckets of water. Although some of the women have heard about grey water and try to use grey water for irrigating their gardens, even this is not enough.

The vegetable harvest from these gardens is very limited. The vegetables that are planted provide enough Vitamin A and Vitamin C only if the garden produce is combined with purchased food. In fact, 48% of the households purchase foods from town and the money for that is primarily from income generated outside the village.

The women in this village are very unhappy and see no short or long-term solutions to solving the real life issues in their community. A new and better future for the village looks hopeless.

However, if the community can be mobilised to work together and support each other, solutions can be found. The drilling of more bore holes, may be paid for by government and will make a huge difference.

This picture of how households in a rural village have to cope with so many problems illustrates how difficult it can be to live a healthy life with limited money and clean water.

Identify the different food security dimensions and link them to the related nutrition and livelihood issues and describe them in the spaces provided in your workbook.

Comments on the activity

- ***Natural and socio-cultural environment***

The conceptual framework considers both the natural and socio-cultural environments and the context within which food security and nutrition security are influenced on the different levels namely the macro, exo, meso and micro-levels. The resources in the natural and socio-cultural environments are responsible for the basic causes affecting livelihoods. Food security and nutritional health on the community (meso-level) are responsible for the intermediate causes and the household or micro-level is responsible for the immediate causes.

- ***Availability of sufficient and nutritious food***

Such food must grow or come from various sources in reasonably close proximity to households and should be consistently available to them such as land, good soil, water, and fences. Food can be available from sources such as household production, cooperatives, retail outlets and donors.

- ***Access to food sources***

Households should have access to food sources that are sustainable to enable them to obtain consistent levels of appropriate foods which can maintain the consumption of an adequate diet and nutritional level. Such food sources can be accessed through agricultural endeavours such as household gardens subsistence farming, adequate income or other resources to buy or barter (exchange).

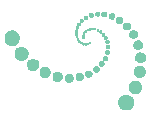
- ***Utilization of food***

Food needs to be used properly through safe food processing, storage and preparation practices. Households must have the knowledge and be able to apply nutrition and care for all members but especially for children. Health and safe sanitation practices contribute to the nutritional and overall health of households.

- ***Stability of food***

The household is able to eat nutritious food on an ongoing basis because there is a stable supply of food. The household practises good food management strategies. These include food preservation and storage practices and finding and drawing from diverse food sources.

Nutrition security is linked to household food security on the micro-level that can ensure immediate and underlying nutrition security. This occurs through the implementation of proper **food intake, care practices, health** and **environmental practices** so as to ensure adequate and sufficient intake for good nutrition and health.



Food security and nutritional well-being cannot be ensured just by buying nutritional foods as these foods must also be eaten in adequate amounts. In very simple terms, households need to take decisions regarding food that is within reach of their livelihood earnings. Such resources will determine which nutritious foods will be eaten or consumed.

We will therefore make you aware of the challenges that make people vulnerable to malnutrition so that you can help promote nutrition by encouraging them to change behaviours that put them at the risk malnutrition. You will also learn how to help them improve their nutrition using a minimum of resources.

Let us see if we can recall the other concepts we learnt in Module 1.

Activity 1.2 Meaning of the concepts used in the household food security life situation

Complete this activity in your workbook

Revise the concepts you learnt in Module 1. Later on in the module you will need to assist households to explain in their own words their situation and their issues related to food security and nutritional risk. You can practice this in your class groups by asking each other the following questions. Answer the questions in your own words. You can also use the Glossary to help and use your Logbook to make notes.

1. What is the meaning of food, security and food insecurity?

2. What is the meaning of good nutrition, malnutrition and hunger?

3. What is the meaning of a livelihood, livelihood strategies and assets?

4. What is the meaning of risk, vulnerability and shocks?

1.1.2 The right to food

One of the most important human rights is the ability to feed oneself and one's family adequately and with dignity. The approach to household food security in the programme is to ensure that the right to adequate food can realised when

> “every man, woman and child, alone or in the community with others, have physical, and economic access at all times to adequate food or means for its procurement”.
>
> This implies that “the availability of food in a quantity and quality sufficient to satisfy the dietary needs of the individuals, free from adverse (harmful) substances, and acceptable within a given culture”,
>
> and the “accessibility of such food in ways that are sustainable and that do not interfere with the enjoyment of other human rights”. (FAO, 2005)

The right to food is more than a right to be fed, but also one of fed without loss of dignity. States and the international community are obliged to respect, protect and fulfil these rights by supporting individuals’, households’ and communities' capacities and efforts to achieve and sustain food security in the long term. In order to respect people and ensure that their right to food is protected and fulfilled it becomes necessary to make sure that any assistance and intervention moves away from a welfare approach.

A humanitarian approach has to be taken that takes into consideration why people are in need of food and why their right to food has been violated. It has been realised that it is not all about food availability or employment with income. The identification of the associated problems and situations should serve to create an awareness of responsibilities and accountability with all stakeholders, individuals, households and communities. (FAO, 2005)

1.1.3 Linking food security and nutrition to livelihoods

In Modules 1 and 2 the nutrition and livelihood frameworks have been combined into one framework for the household food security facilitator to understand poverty, hunger, food insecurity and malnutrition as concepts that are linked. In the real world these concepts cannot be separated and form one complex whole.

Household food security has been described in terms of the four dimensions, food availability, food accessibility, food utilization and food stability. These dimensions are a prerequisite for adequate and nutritious food. Food is but one of a range of range of needs that influence a households decision-making and its choice of activities so as to maintain its subsistence over the short and longer term.

A livelihood in simple words refers to ways in which people make a living. This takes into consideration the variety of ways of making a livelihood with some ways being good and others not so good for well-being. The definition of the term of livelihood has been given in Module 1 and can be repeated here. A livelihood “comprises the capabilities, assets, and activities required for a means of living: a livelihood is sustainable when it can cope with and recover from stress and shocks (threats), maintain or improve its capabilities and

assets, and provide sustainable livelihood opportunities for the next generation (Chambers and Conway, 1992). Assets also include what the household has in store, resources, claims and access to resources.

Household assets include:

- Natural resources: that it has access to or control over;
- Physical assets: such as equipment, infrastructure, houses, buildings, roads;
- Economic assets: include productive resources as well as stores, savings, and all things with monetary value;
- Social assets: reflect the claims or interactive responsibilities among households, neighbours, kin, the community and the state;
- Human assets: in terms of labour power, health and nutritional status, skills and knowledge, beliefs and values.

Lately political assets (decision-making capacity) and technological assets are also added to the list.

For households and household food security facilitators it is important to understand how households are combining their assets and resources in making decisions and planning (strategies) to meet a variety of needs. Food is only one of a range of interrelated needs influencing household decisions which are balanced and weighted for competing needs and risks.

- **Risk of exposure to hazards and shocks**

Livelihoods include a selection of strategies and activities to respond to influences from within the household and outside the household. All negative influences from outside the households are referred to shocks to the household and often due to exposure to a hazard which could be drought, losing a job, a flood or a motor accident. Each household has the potential to be exposed to risks. If you drive to work every day with a taxi you are exposed to potential road accidents. A household could to be exposed to a shock if one of its members is involved in a serious accident that impacts on household income while he/she is in hospital or maybe he /she never recovers.

- **Vulnerability and coping strategies**

Vulnerability refers to all those factors that put a household at risk of becoming food insecure. We can use an example from Tanzania where vulnerability developed a distinct pattern. A household's food insecurity depends on its ability to engage in various coping strategies. A coping strategy is a short term strategy used when access to food decreases. Successful coping strategies are reversible. The ability of households to cope during food

insecurity and to return to food security after a shock is referred to as resilience. Resilience means how successful households can be at getting out of situations of risk when they are exposed to shocks.

Some strategies are related consumption, to the amount of food eaten and how regularly the food is eaten. Consumption strategies which are very common are people would prefer to prepare less food than normal, to skip meals or to go hungry to preserve their assets and resources. Some people, most mothers, may also choose to go hungry to preserve their assets and future livelihoods. Food may also be refused to some family and given to those that can help the family in the future. Children will be taken from school to assist with vendor goods, begging on the street, herd the animals or work on the fields (FAO, 2005).

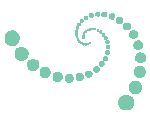
Activity 1.3 Coping strategies of households and their effect on nutritional health

Complete this activity in your study guide

What to do

With your group discuss the following coping strategies and their effects or consequences on nutritional health. Use your answers to complete the table below.

Food strategy description	Who does it affect?	What is the nutritional effect?
Eating food you would not prefer to eat		
Borrowing or buying food on credit, because has no money		
Relying on wild foods or harvest immature roots		
Consuming seed stock		
Leaving children to beg, scavenge or feed themselves		
Cutting portion sizes because not enough food or money		
Restricting your own consumption to leave enough for the children when not enough money		
Staying the whole day without eating		
Sending children to school without food		



Comment on activity

Other strategies are livelihood strategies that affect the resources and assets of the households in such a way that they could result in more permanent change and deterioration of the household livelihood. This is the case when serious shocks and hazards strike the household from inside or outside the household. Please revise Unit 2 and 3 of Module 1 again. Households are different and therefore have different short term food consumption strategies or long term livelihood strategies that they use to try and cope and lift them out of cycles of poverty and hunger.

Households always try and cope in a way that will not make them become more vulnerable. It is important to look at the root causes of household vulnerability and to consider how household food security links to the entire food system from micro to macro level. If the livelihood strategies are irreversible and involve the selling off of assets, the strategy forces the household into a new way of life in order to adapt to the new circumstances. These adaptive strategies, deterioration of livelihoods may end in the cycle of poverty and food insecurity that is difficult to escape. Factors that make households either vulnerable or resilient to food security shocks and stresses include:

- income and access to food;
- assets such as land and livestock;
- social safety nets such as food assistance, social grants and social security;
- access to basic services such as water, health care, electricity, etc.;
- households' adaptive capacity which is linked to education and diversity of income sources; and
- the stability of all these factors over time.

Most of the factors listed refer to livelihoods. If one wants to see how households can be strengthened and made food secure then one needs to consider the assets and resources the household can use to improve the households capacity. This requires using a livelihood assets based approach to help strengthen households and protect them from being vulnerable so that they can withstand the different challenges they are exposed to in their daily life and environment.

Remember that there is an overlap between household food security, nutrition security and nutritional well-being. We will from now on focus on the top half of the conceptual framework.

A question often asked is, what is the difference between food security and nutrition? Very often the answer indicates that the one is dependent on the other.

1.2 Threats to food security and nutritional health of households

To be well nourished and healthy, we need a healthy diet (an adequate dietary intake) and to be free from diseases (see Figure 1.2). We can achieve an adequate dietary intake by eating enough of the right kind of foods. It therefore follows that an inadequate dietary intake can result from meals that are too small, poor variety of food, and low concentrations of energy and nutrients (nutrient density) in meals.

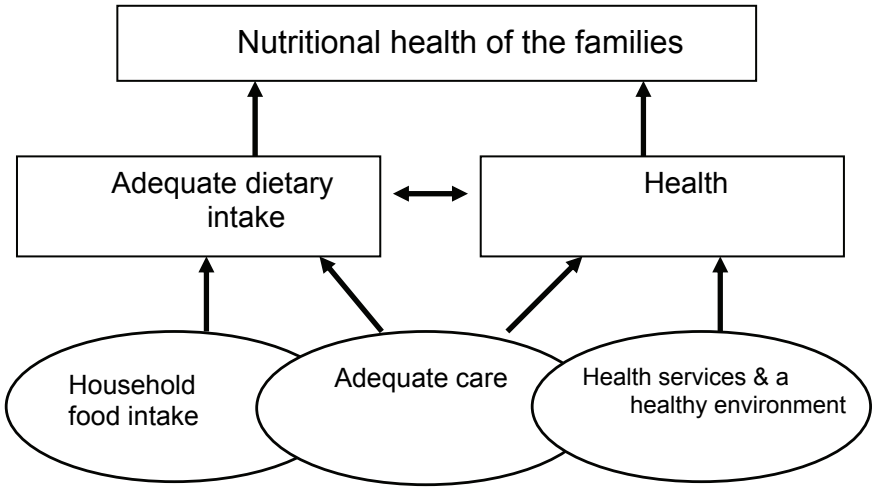


Figure 1.2 Factors affecting dietary intake and health of households

To be able to consume a healthy diet and be free of disease, we need to consider three *underlying* factors. The underlying factors needed for an adequate dietary intake and health can be grouped under three headings, namely, (i) adequate dietary intake (see Module 1), (ii) adequate care, and (iii) access to health services and a healthy environment. Figure 1.2 shows these three factors as overlapping circles.

This means that often food intake, adequate care for women and children, health services and access to a healthy environment are present together and affect one another. It is specifically the care for women and children right in the middle that acts as the main link.

From the above it is therefore clear that there are many factors affecting the nutritional health of families. In this section we will focus on the role of food, care and health. All three of these factors are equally important, but could have varying impact depending on the situation.

1.2.1Threats to food security impact negatively on dietary intake

To be healthy, families need to be food secure at the household level. This means that they need enough nutritious and safe food to eat regular meals, and the meals must have enough energy, protein and micronutrients for all the family members. To obtain the full range of nutrients needed by their bodies we need to consume a variety of foods.

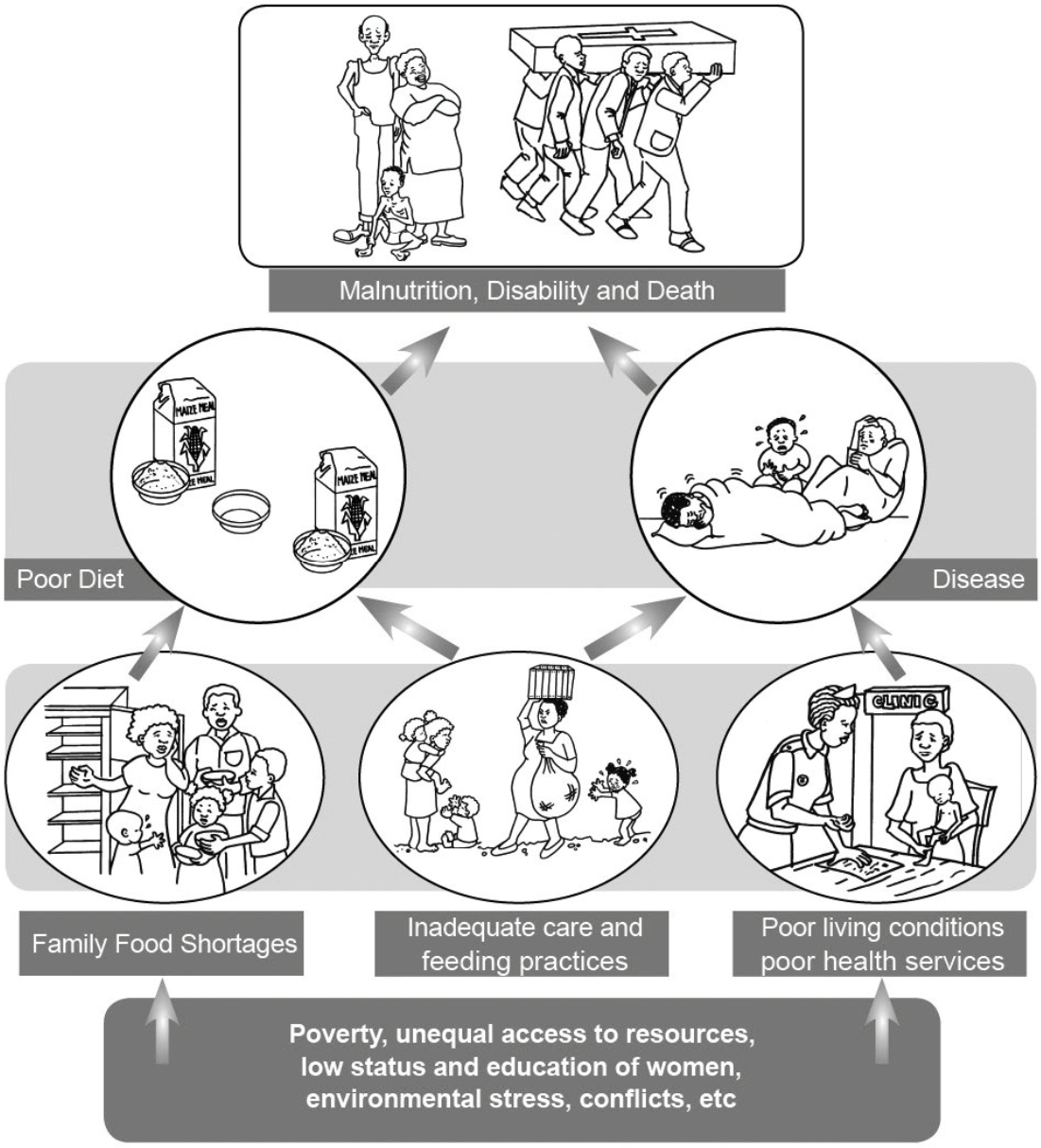


Figure 1.3 Causes and threats relating to malnutrition

Food eaten must be socially and culturally acceptable, and it is important that all family members enjoy the food they eat. Families will be food secure only if there is a regular and sustainable supply of enough good quality food throughout the year.

- **Changes in household food availability and access**

Although it is essential that food is available, the availability of food does not necessarily mean that the families will be food secure. It is important that that the families have access to the food that is available. Access refers to **financial access** (this means that the family must have **enough money** to buy the food) as well as **physical access** (this means that they **can easily get to the site** where the food is available, for example, transport to get to the shop). The food families eat can be bought, grown by themselves, collected from the wild, or be food that was stored at household level. Usually it is a combination of these food resources. The key aspects of food security are displayed in Figure 1.4.

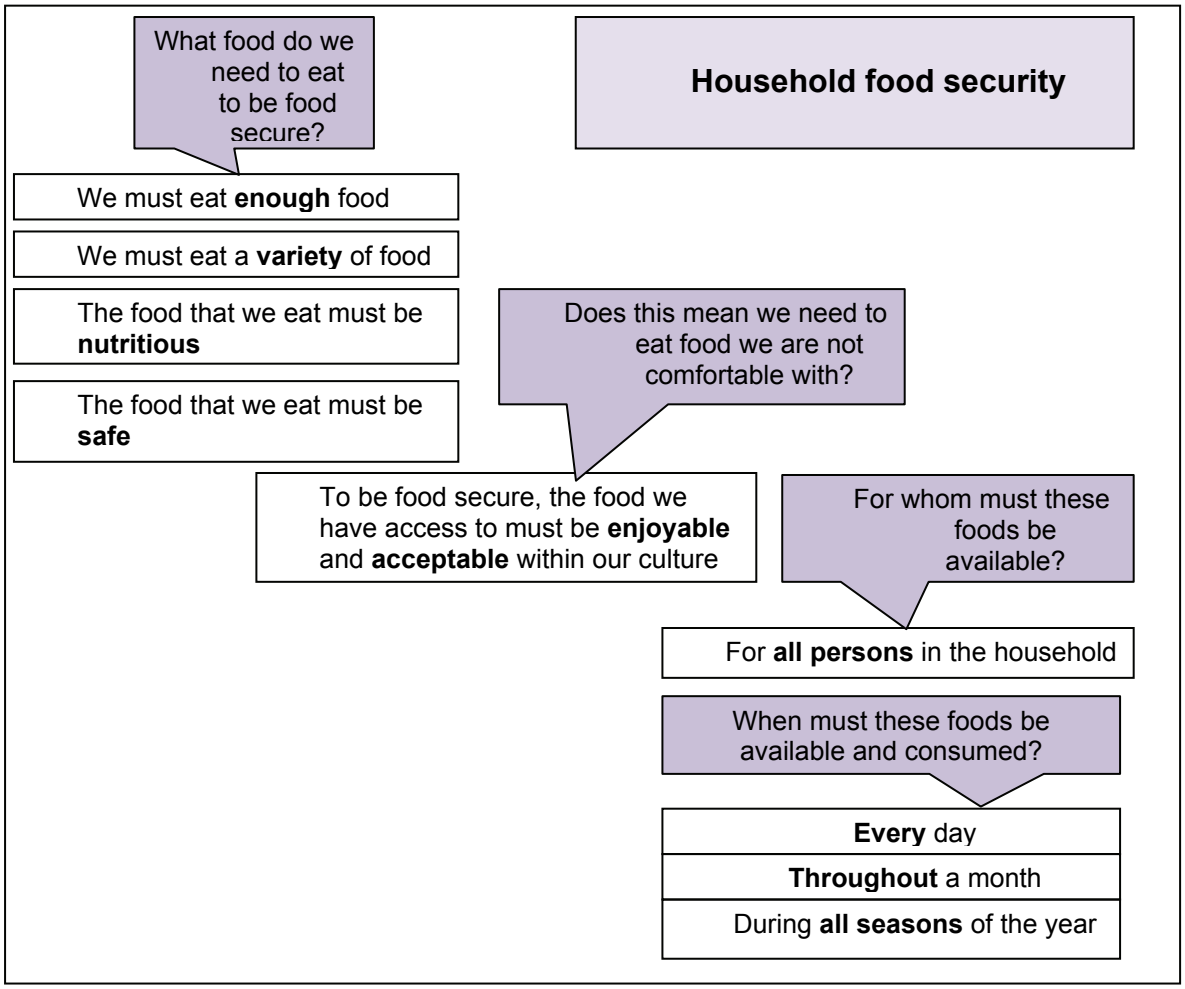


Figure 1.4 Key aspects of food that need to be available to ensure household food security

Often families struggle to buy enough food because the money that they have available is not enough. Families can increase their access to a variety of foods by growing various foods in their home-gardens throughout the year. However, families need to know which

foods to grow for a healthy diet, and how to grow these foods. They also must have time available to work in their garden.

Families need to be food secure to enable them to have an adequate dietary intake. However, household food security will not always result in good nutritional health. As you learnt earlier in module 1 there are families that have enough food to eat but because of other factors such as lack of care, people can suffer from malnutrition.

- **Changes in household food access: habits and practices**

Some practices are related to social and human access practices to food which determines what is seen as food and who may consume the food and how it should be used according to culture and believes.

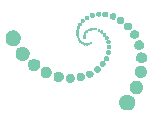
- **Changes in food utilization: preparation and allocation practices**

The way in which available food is utilized and prepared can affect the nutrition content of foods. Also in some households the way the available food is allocated to individuals can determine whether or not they are receiving adequate amounts on nutritious food on a regular basis.

1.2.2 Threats to adequate maternal and child care feeding practices

Adequate care especially for young children and other at-risk household members (such as the sick and the elderly) is important to achieve nutritional health. The role of women is very important in this regard. The care that a woman can give her family depends on many factors, including her workload, social role and status within the family. The following are important aspects of care:

- *Knowledge*: To be able to prepare and serve nutritious food to the family, the mother must have **knowledge of the different foods and their role** in a healthy diet (see table 1.1 in Unit 1), as well as the **nutritional needs** of the family members).
- *Time available:* The mother must have **enough time to care** for her family members. If the mother is overworked, tired, abused or undernourished she cannot take proper care of her family.
- *Control over money:* Often mothers have **low levels of education** and have **little or no control** over how the family's money is spent. This **limits her ability to buy and serve nutritious food** to the family.
- *Feeding of children:* Young children should not be left to eat on their own. It is important for **adults to supervise children's meals** and encourage them to eat.



- *Food preparation:* Foods need to be prepared and served in a **hygienic** manner.
- *Treatment of sick people:* The way in which families prevent and treat illnesses at home, and their **access to and use of available health facilities** will affect their nutritional health.

Adequate care is important to ensure that food availability and the presence of health care services result in nutritional health of the family. Without adequate care, family members can become malnourished even in situations where adequate food and health care services are available. Aspects of care are dealt with in more detail in Module 1

- **Changes in breast feeding and complementary feeding practices**

These breast feeding and complementary feeding practices will be discussed more in depth in Unit 2.

Activity 1.4 Identify the factors that impact on the caring practices of mothers

Do the activity in the study guide

What to do

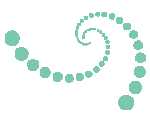
Read Part 1 of the Ndunakazi case study and answer the question below.

Ndunakazi case study Part 1

Ndunakazi is a rural village in The Valley of a Thousand Hills in KwaZulu-Natal. It consists of two-hundred households that are scattered over a large mountainous area. There are on average eight persons per household.

For many years families in the village consumed a cereal-based diet that lacked variety. Animal foods as well as vegetables and fruit were not frequently consumed, and as a result the diet did not have enough of the micronutrients that our bodies need. The people in this village realised that they should improve the nutritional quality of the diet consumed by the family members. This was however not an easy task for several reasons.

Twenty-four percent of the mothers were 19 years or younger and 84% were not married. Maternal education level was low as 36% of the mothers never went to school and only 14% had some high school education. Unemployment in the area



was high, and the families could therefore not afford to frequently consume animal foods because of the cost of these foods. Their high cost was also one of the main reasons for not consuming vegetables and fruit regularly. All these factors affected the caring capacity of the mothers.

What is the main message obtained from the case study above?

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Comment on activity:

Unemployment, education and availability of animal foods and vegetables and fruit impacted on the caring capacity of the mother can have an effect on nutritional health of the family.

- **Disruptions to child care and feeding practices**

In addition to household food security and care, people have to be healthy to get the nutritional benefits from the food they eat. For people to be well-nourished and healthy they must have access to **health services** as well as a **clean environment** and access to **safe water**. Any disruptions to these aspects can have a negative impact on children in a household.

- **Changed psycho-social context**

Mothers and caregivers need a consistent and more or less stable environment in order to properly care for the household and especially children. If there are any changes these tend to affect the caregiver/mother psychologically and socially. The more traumatic the change the more serious is the effect on the mother. This effect on the mother and caregiver can lead to apathy, depression and an inability to provide proper care for the family. This behaviour becomes a part of the cycle of events affecting nutrition and health negatively.

- **Challenges to women's roles, status and rights**

The women's role, women's status in the household and community and her rights to ownership and decision-making are challenges to women in regard to food provision nutritional care and providing a healthy environment. This is not always the same for women in the different cultural and religious groups and may vary according to age and position in the household or family. If women fail in their role, their status and rights are even more affected by the blame and shame of the wider family and community. Women therefore need to be self-confident with a healthy self-image to enable them to fulfil their productive, community and care-giving roles. The empowerment of women to enable them to take decisions in areas concerning their roles and expectations to deliver becomes very important in terms of nutritional health.

1.2.3 Threats to adequate health, water, sanitation and shelter protection

All people need to have access to affordable health care services providing both curative and preventative health care. Curative health care refers to the treatment of sick people. If family members become sick, they should visit the nearest health care facility (e.g. local clinic) or seek advice from the community health worker, if available. Preventative health care refers to health care that will prevent people from becoming sick. This includes, for example, immunisation, growth monitoring, and family planning.

- **Infection and ill health**

Immunization of small children helps to prevent conditions such as measles. Children suffering from measles have a much bigger chance of developing severe diarrhoea, which could lead to malnutrition. The South African childhood immunisations schedules are given in Unit 2. It is important that mothers take their children to a health facility for immunisation at the different ages indicated in the table. The vaccines are given free of charge at local clinics and community health centres in South Africa.

1.2.4 Interaction between inadequate dietary intake and infection

Infections may interfere with nutrition as sick people often do not absorb enough nutrients. They may lose nutrients from the body (for example through diarrhoea), or their body may use up nutrients more quickly (e.g. during fever).Sick people often have a poor appetite and therefore do not eat enough food. Sometimes sick people find eating difficult, particularly when they have sores in the mouth.

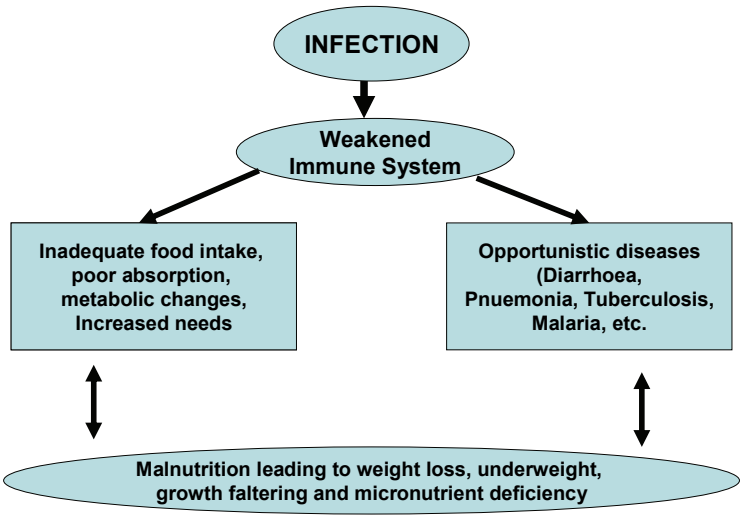


Figure 1.5 The relationship between infection and malnutrition

There is a vicious cycle between a poor diet and disease. Frequent infections and diseases cause under-nutrition, and, in turn, undernourished people are more likely to become ill because they are less able to resist or fight infections. In malnourished people the infection is more likely to become serious, and they may take longer to recover from the infection.

1.3 The food nutrients needed for adequate food intake

What are nutrients and why are they important? Nutrients are the substances in food which our bodies need for a number of reasons outlined below.

Food contains nutrients – substances which the body uses for growing and functioning. Food gives us energy to move, think and work. Food also contains important substances that keep our bodies strong and healthy, help to boost our immune system and protect us from infections.

When we eat, our bodies absorb useful nutrients into the blood where they are transported to areas where they are needed. These areas include the bones, the muscles, the brain and the organs such as the heart, liver and kidneys. The waste material is removed from the body when we go to the toilet.

Figure 1.6 shows you that we need the nutrients in food to **build body tissues** such as muscle, bone and skin; **to produce energy** so that we can grow and be active; and **to protect us** from disease and **keep us healthy**.

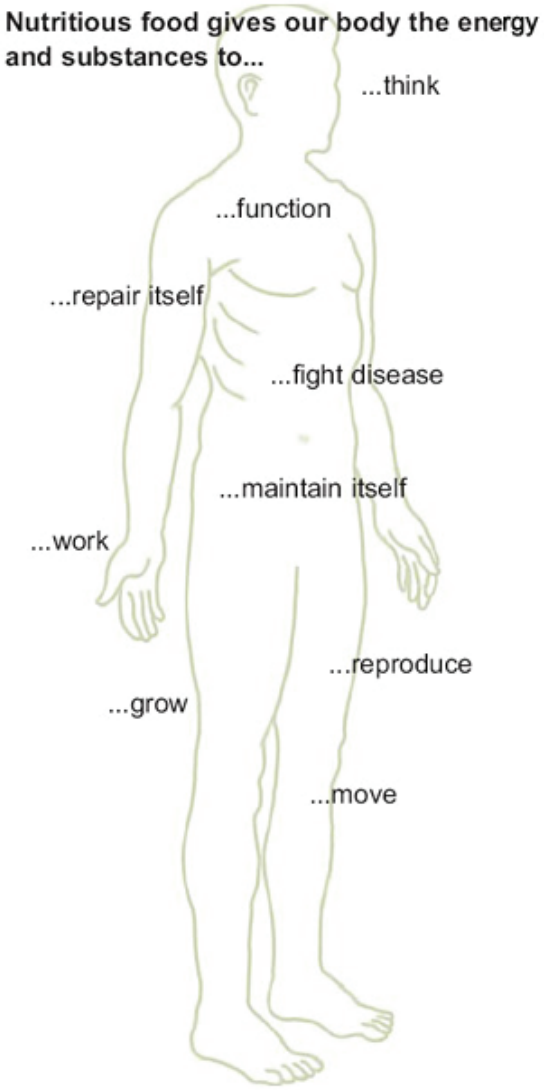


Figure 1.6 Why our bodies need adequate nutritious food
(Adapted from Healthy Harvest Manual)

Different types of food contain different nutrients. In order to be able to give advice and guidance with regards to making food choices for the purpose of improving household nutrition we need to know about the different foods and food choices. This will be discussed in Unit 3. Before we examine the food nutrients in more detail, familiarize yourself with the names of the various nutrients by reading the names in the Figure 1.7 and each nutrient will then be briefly discussed.

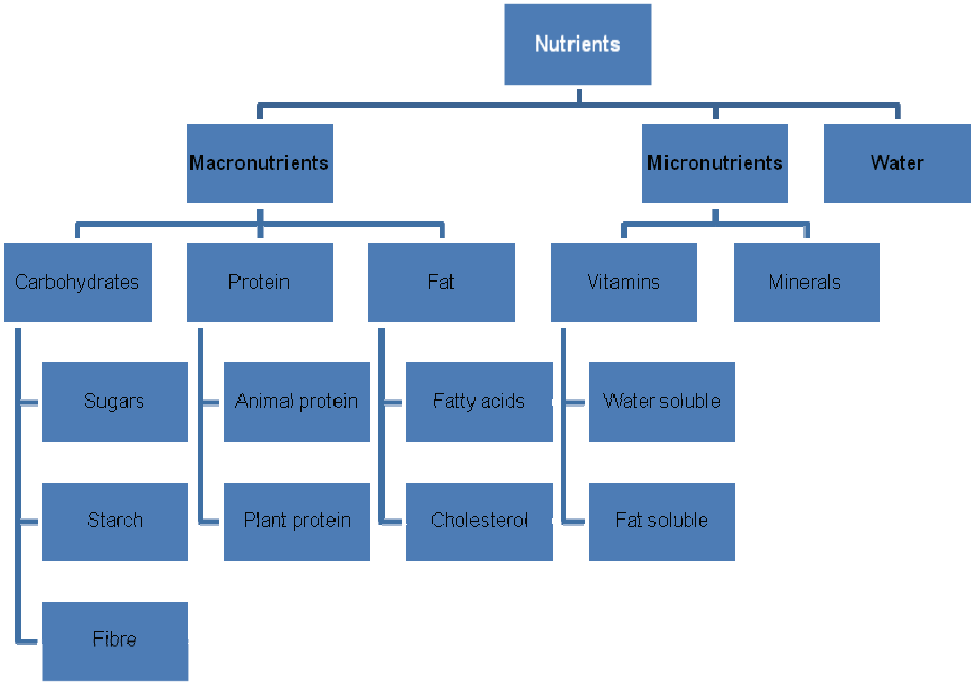


Figure 1.7 A summary of the food nutrients that are grouped as macronutrients, micronutrients and water

We can distinguish between **three groups of nutrients**: macronutrients, micronutrients and water.

Macronutrients are needed in large amounts by the body (macro means large) and include carbohydrates, protein and fats:

- **Carbohydrates** include starch and sugars. These foods give our bodies energy to move, work and think. They also help to keep us warm. We get most carbohydrates from grain crops such as wheat, maize, sorghum, millet and rice, and root crops such as potatoes and sweet potatoes.

- **Fats** can come from animal products such as milk (butter) meat and fish or processed plant products such as seeds and nuts (sunflower oil and peanut butter). They provide the body with energy.

- **Proteins** help our bodies to grow, maintain and repair themselves. They are also called body-building foods. They come from plants (beans and other legumes), processed plant products (peanut butter and soya mince), processed animal products (cheese, sour milk and yoghurt) and animals (eggs, meat, milk).

- **Micronutrients** are needed in very small amounts by the body (micro means small) and include the vitamins and minerals. Our bodies need small amounts of these substances to help different parts such as the blood, eyes, bones, skin and hair work properly. Many of these substances help to strengthen the body's immune system and keep us strong and healthy so that we resist infection. We get most vitamins and minerals from eating fresh fruit and vegetables.

- **Water** is essential for life as it provides the medium in which all of the body's chemical reactions take place.

1.3.1 Carbohydrates and their importance

What are carbohydrates? Why do we need to include them in our diets and make other people aware of their importance? The different types of carbohydrates are sugars, starch and fibre. The body uses the sugars and starches for energy. If we eat more starch or sugar than we need for energy, the body stores this as fat (the body cannot store much carbohydrates, and therefore changes most of the excess carbohydrates into fat).

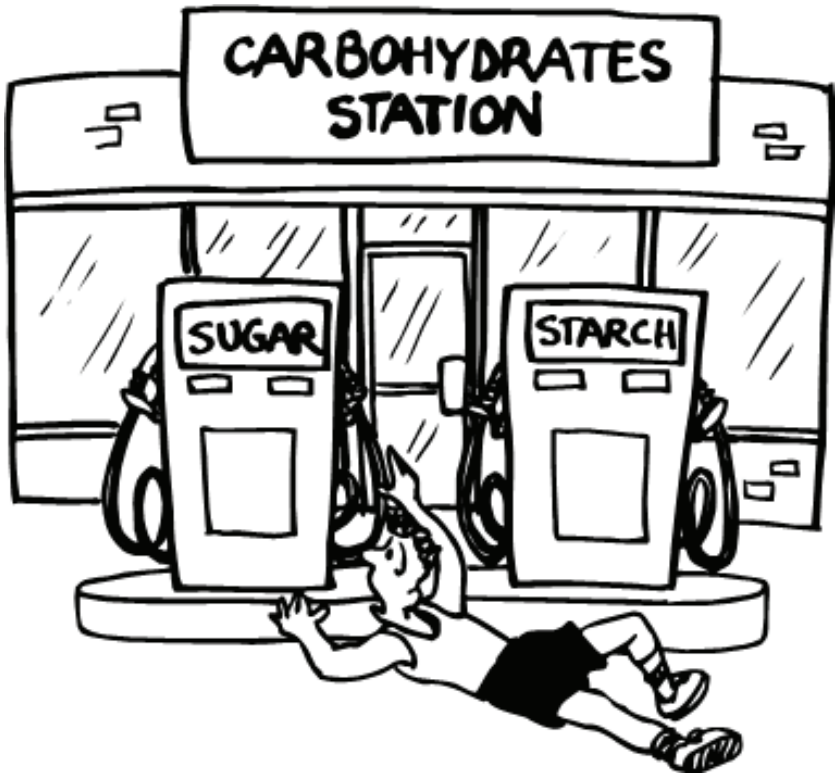


Figure 1.8 We need carbohydrates as fuel for energy, how much?
http://www.clipartoday.com/_thumbs/034/C/Carbohydrates_tns.png

Carbohydrates are found in a variety of food sources as you can see from the table below.

Table 1.1 Functions of the different carbohydrates: sugar, starch and fibre

Type of carbohydrate	General comments
Sugars	Note that there are nutrients called sugars and a food called sugar (which comes from the sugar cane plant). There are different types of sugars in food: • **Glucose** and **fructose** is the sugar in fruit • **Lactose** is the sugar in milk • **Sucrose** is the sugar in food sugar**.**
Starch	Starches are the major carbohydrate in cereals and starchy roots. Starch is made of a chain of glucose molecules. When a starchy food is cooked with water it absorbs a lot of water and swells up. When cooked, starchy foods therefore become *bulky* (because of the water it absorbs). To be easily digested, starchy foods must be cooked.
Fibre	The fibre we need in our diets (dietary fibre) can be found only in the cell walls of plants. All unprocessed plant foods contain dietary fibre, but processing may break down the cells and remove some or all of the fibre. The two types of fibre are: • **soluble fibre** (mostly in legumes, fruits and oats) which may protect us again heart disease • **insoluble fibre** (most cereals *except* oats) is not absorbed by our gut; as a result the stool is soft and bulky, which prevents constipation. Fibre is good for you for a number of reasons. It makes food bulky, and therefore makes us feel full and satisfied. Also, if we eat food that contains fibre, the food stays longer in our mouths (we need to chew the food) and stomachs and so it is digested slower. We will therefore not feel hungry again so quickly. Having enough fibre in our diet will therefore help us to maintain a normal weight. It can also help an overweight person to eat less. However, small children should not have too much fibre in their diet, as the diet will become too bulky and (because of their small stomachs) they will not be able to eat enough food.

1.3.2 Proteins and their importance

What are proteins? Why do we need to include them in our diets, and make other people aware of their importance? Proteins are needed to build and maintain healthy and strong muscles, bones, skin and blood. They are especially necessary for the growth of children and for pregnant and breastfeeding women.

Proteins are made up of different building blocks called **amino acids**. There are two types of amino acids, namely **non-essential amino acids** and **essential amino acids.** The body can make the non-essential amino acids it needs but cannot make essential amino acids. We therefore need to get the essential amino acids our bodies need from the food we eat. The protein that we get from animal foods contains enough of the essential amino acids we need and we therefore refer to these proteins as **complete proteins**. The proteins we get from plant foods often lack some of the essential amino acids, and are therefore these are referred to as **incomplete proteins**.

1.3.3 Fats and their importance

What are fats? Why do we need to include them in our diets and make other people aware of their importance? Fat is an important source of energy for our bodies. In fact, fat is the most concentrated form of energy. One gram of fat provides double the amount of energy provided by 1 gram of carbohydrate.

Fats contain mostly **fatty acids.** There are different types of fatty acids, namely **saturated fatty acids**, **mono-unsaturated fatty acids** and **poly-unsaturated fatty acids**. Foods contain a mixture of these different fatty acids. The body can make most of the fatty acids from carbohydrates, however, there are two fatty acids that the body cannot make and we need to eat enough of them – they are called the **essential fatty acids**. These fatty acids that the body cannot manufacture may cause nutritional deficiency if they are not supplied. Essential fatty acids can be found in vegetable oils such as canola, flaxseed, walnut, corn, soybean, safflower oil, fish, and fish oil supplements.

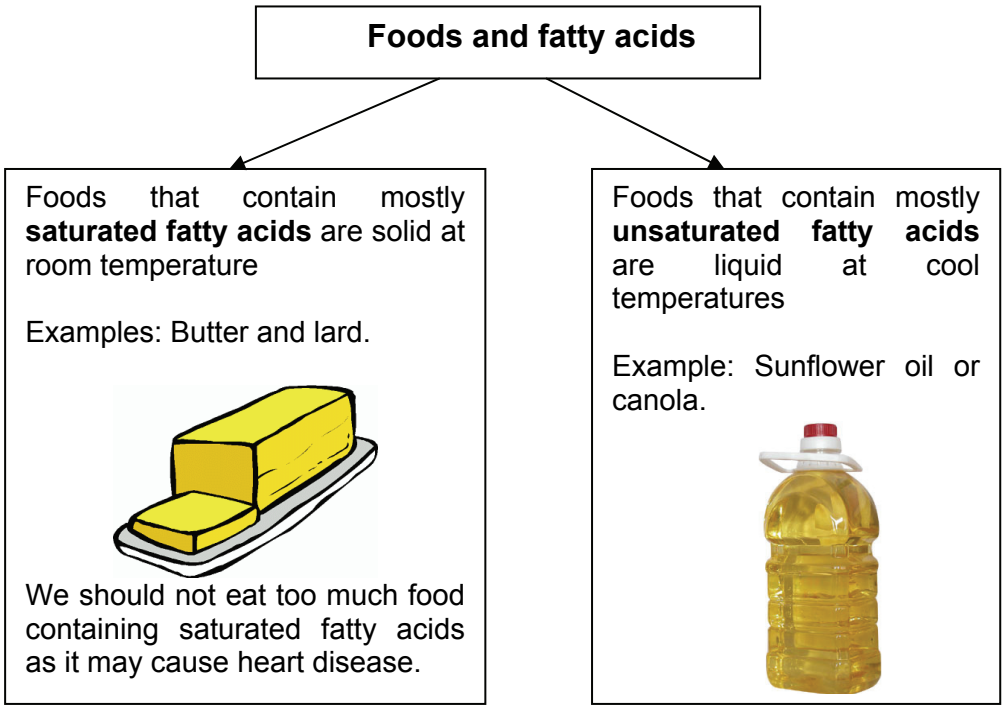


Figure 1.9 Foods containing fatty acids

Foods of animal origin may contain various amounts of another type of fat called **cholesterol.** Foods of plant origin do not contain cholesterol. Although the body needs cholesterol to build cells, and to make hormones and body fluids, too much cholesterol may be harmful as it can cause heart disease.

Because fat is such a concentrated source of energy, eating too much fat can lead to a person becoming overweight. We should however eat some fat as we need fat, for example, to absorb the fat soluble vitamins.

We measure the energy content of food in either **kilocalories (kcal)** or **kilojoules (kJoules).** In South Africa we use kilojoules. [1kcal = 4.2 kJ]

- Fats usually contain 9 kcal in a one milligram
- Carbohydrates contain 4 kcal in one milligram
- Proteins contain 4 kcal in one milligram

You can see that one gram of fats provides more energy than carbohydrate and protein foods. It also contains less of the other nutrients essential for the body. Food containing a high amount of fat can therefore contribute to obesity and the associated western diseases.

1.3.4 Vitamins and their importance

What are vitamins? Why do we need to include them in our diets and to make other people aware of their importance? We need vitamins to fight infections, for healthy eyes, and to help children to grow properly.

There are two groups of vitamins, namely water soluble vitamins and fat soluble vitamins.

- **The water soluble vitamins** are the B vitamins (thiamine, riboflavin, niacin, folate, vitamin B_6, pantothenic acid, biotin and vitamin B_{12}) and vitamin C. Note that vitamin B_{12} is present in animal foods only. People who do not eat food of animal origin are called **vegetarians** and they are at risk of suffering from vitamin B_{12} deficiency. Preparation methods can have an effect on the amount of water soluble vitamins available in cooked food. For example, much of the folate is destroyed when foods are stored or cooked for a long time. Vitamin C dissolves easily in water and is lost when food is cut into pieces, heated or left standing after cooking.
- **The fat soluble vitamins** are vitamin A, vitamin D, vitamin E and vitamin K. In South Africa, vitamin D deficiency (lack of), is not a big problem as our skin makes vitamin D when the sun shines on it. However, many people in South Africa do not have enough vitamin A in their diets. You will discover the importance of vitamin A as you work through this module.

It is possible to increase your vitamin intake by using vitamin tablets that can be bought from the shops. However they are expensive and it is better to get most of the vitamins your body needs through eating the right foods.

1.3.5 Minerals and their importance

What are minerals and why do we need to include them in our diets and make other people aware of their importance? There is a wide range of minerals that our bodies needs in small amounts. We will only highlight the ones that are of biggest concern in many communities in South Africa.

- **Calcium** is needed for healthy teeth and bones, and is therefore of particular importance for young children.
- **Fluoride** is also important for healthy teeth and bones. Food is however not a major a major source of fluoride; we get most of our fluoride from water and fluoridated toothpaste.
- **Zinc** is needed for normal growth and development of children. Zinc is also needed for wounds to heal.
- **Iron** are available in two types, of iron in food, namely heme iron and non-heme iron. How much of the iron in the food can be used by the body depends on the type of iron. **Heme iron** (found in foods of animal foods such as meat, liver, poultry and fish) is well-absorbed by the body. However, **non-heme iron** (found in milk, eggs and plant foods, mostly the dark-green leafy vegetables) is not as easily absorbed.

Flours, cereals, and grain products that are enriched or fortified with iron are also good dietary sources of non-heme iron. Addition of vitamin C to the diet can help improve absorption of non-heme iron.

1.3.6 Water and its importance

We need to take in about 2500 ml (2.5 litres) of water each day. You need to drink about 1.5 litres of water .The rest can be obtained from the foods we eat. Water is an essential nutrient, as our bodies contain large amounts of water. We need water to help keep cells and other body systems working properly. It is also needed to keep the lining of many parts of our body moist and healthy; for urine; and for sweat to cool down our bodies. If we do not take in any water, we will be able to survive for only a few days.

We also need to be aware that nutrients on their own do not determine nutritional health and you can go back to the conceptual framework to identify more factors.

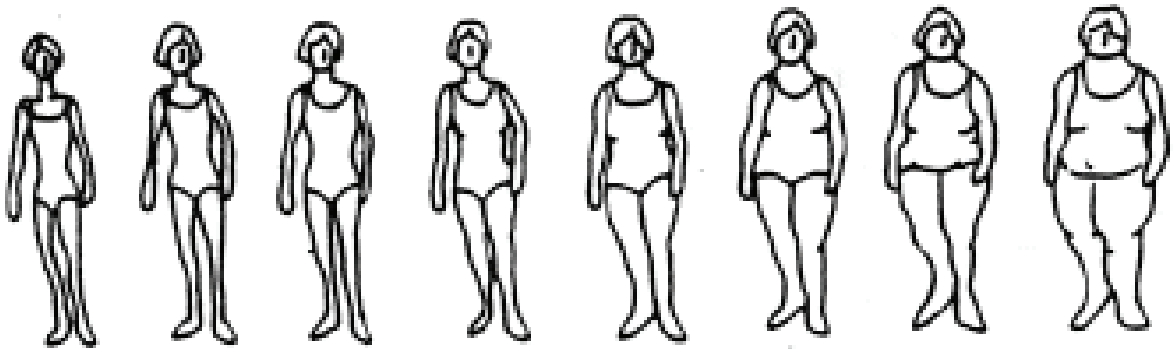
1.4 Nutritional health versus being malnourished

A healthy person is well-nourished and free from illness. The opposite of a well-nourished person is a malnourished one. Malnutrition refers to a diet in which certain nutrients are

lacking or are in excess. The extent of malnutrition also depends on the age of the person and how long they have suffered from the lack or an excess of those nutrients. Malnutrition can be considered to be chronic or acute. It can also be caused by: over-nutrition, under-nutrition or due to micronutrient deficiencies.

1.4.1 Over-nutrition

Over-nutrition is a type of malnutrition where there are more nutrients than required for normal growth. If we eat more food than our bodies need over a long period of time, especially foods that contain a lot of fat and/or sugar, we become fat. People who are too fat are said to be overweight. The figure below illustrates the various weight classifications.



Underweight Normal weight Overweight Very overweight

Figure 1.10 Underweight, normal weight and overweight females

Although being overweight is culturally acceptable in many communities in South Africa, it is not healthy to be overweight as there are associated health risks. Being overweight increases the risk of various chronic diseases such as high blood pressure, heart disease, stroke and diabetes (high blood sugar). This means that people who are overweight have a bigger chance of suffering from these chronic diseases. These diseases are also often referred to as lifestyle diseases and some are described in the textbox below.

- ***High blood pressure*** is the condition when the pressure of the blood in the arteries (blood vessels) is too high. The medical term for high blood pressure is hypertension. When the blood pressure is too high, the heart needs to work too hard to pump the blood. People with high blood pressure have a bigger chance of suffering from heart disease or a stroke than people with normal blood pressure.

- ***Heart disease*** is the condition where there is hardening or narrowing of the blood vessels. Heart disease can lead to people having a heart attack.

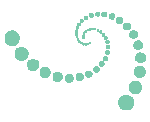
- ***Stroke*** is the condition when a blood vessel in the brain becomes blocked and the blood supply to a part of the brain is stopped. When this happens that part of the brain that receives no blood becomes damaged and begins to die. In some cases the blood vessel in the brain can burst, causing bleeding on the brain. If a person has a stroke, he may become paralysed down one side of the body and maybe even unable to speak properly.

People that are overweight also tend to suffer more from back pain and sore knees and hips. They may also find it difficult to walk or do work in the house and/or garden; making it difficult to adequately care for their family. It is important that we try to reach and maintain a normal weight.

Following a healthy lifestyle will help prevent us from experiencing these problems. For a healthy lifestyle we should eat a healthy diet (eat lots of fruit, vegetables and low-fat foods), reduce our salt intake, maintain a healthy weight, be physically active, limit our alcohol intake and should not smoke. There are several reasons why people become overweight. Table 1.2 shows the reasons why people become overweight, and also what we need to do if we need to lose weight.

Table 1.2 Reasons why people become overweight and what they need to do to lose weight

Reasons why people become overweight	**What we need to do to lose weight**
We eat **too much food**, with other words, more food than what our body needs.	**Eat smaller amounts** of food at each meal. Eat more bulky foods, i.e. starchy foods (wholegrain if possible), as well as fruit and vegetables
We eat **too much fatty foods**, such as foods fried in oil.	Eat **less fatty foods**: - use less oil when preparing food - cut the visible fat of the meat - spread margarine thinly on bread - avoid foods such as chips and NikNaks
We eat **too much sweet foods** such as sweets and cold drinks.	Eat **less sweet foods**: - add less or no sugar to tea and coffee - use less sugar when preparing food - drink fewer sweetened cold drinks - avoid sweets and cakes
We **do not do enough exercise**, or we are not physically active.	**Be physically active** every day.



Activity 1.5 Identify actions people can engage in to lose weight\

Do this activity in your study guide

What to do

A study that was done in 2005 showed that many adult women in South Africa are either overweight or obese. Answer the following questions in the spaces provided.

What do you think people should do to lose weight?

.....
.....
.....
.....
.....

List 10 things people can do to lose weight.

.....
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Comment on activity 1.5

If we need to lose weight, we do not have to eat special or expensive foods, and we also do not need to starve ourselves. We can maintain a normal weight by eating moderate amounts of food and being physically active every day. It is important that there is a balance between how much food we eat and how active we are. People who are very active need more food than people who are not active.

What does it mean to be physically active?

To be physically active, we do not necessarily need to go to the gym or take part in sporting activities. Our body will get physical exercise if we, for example, walk fast, work in the garden or do housework. Working in the garden keeps us active, and at the same time we

can grow vegetables that can keep us healthy. For children to be active they need to be able to play and run around.

1.4.2 Under-nutrition

People become undernourished if they eat too little food, or if they are sick. Adults who are undernourished become too thin (underweight). In children we can distinguish between three types of under-nutrition namely **stunting** (meaning the child is too short for his or her age), **underweight** (meaning the child weighs too little for his or her age), and **wasting** (meaning the child is too thin). In South Africa stunting is the biggest problem with approximately 18% of 1-9 year old children being stunted (Labadarios, 2007). Wasting, or energy-protein-energy malnutrition is not widespread and less than 5% of the children in South Africa are wasted, with 1% being severely wasted (NFCS-BF 2005). Can you still remember the case study of Thandi the other six children described in Module 1 Unit 2?

The information in the box below refers to the findings of the National Food Consumption Survey done in 2005.

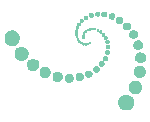
National Food Consumption Survey (2005)

In 2005, children 1 to 9 years of age from all over South Africa were surveyed to determine their nutritional status. The number of children who participated in this study was 2469. These children were weighed and their height was measured. A little bit of blood was taken from each child, and the blood was analysed in the laboratory. Of these children

- 18% were stunted *(too short for their age)*
- 9% were underweight *(weighed too little for their age)*
- 4.5% were wasted *(too thin for their height)*
- 1% were severely wasted *(extremely thin)*
- 14% were overweight *(too fat)*
- 64% were vitamin A deficient *(too little vitamin A in their blood)*
- 28% were anaemic *(too little haemoglobin in their blood)*
- 45% were zinc deficient *(too little zinc in their blood)*

Children who had an infection were found to have a lower vitamin A status. KwaZulu-Natal had a particularly high prevalence or occurrence of vitamin A deficiency.

Women between the ages of 16 and 35 in the same household as the children were



also included in the survey. The number of women who participated in the survey was 2450. Of these women

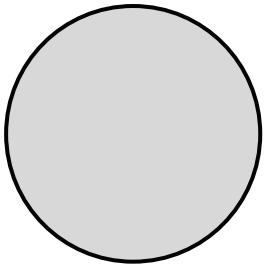
- 52% were overweight or obese
- 29% were anaemic

Source: Labadarios D (ed), 2007

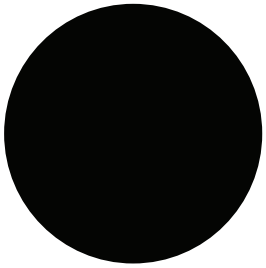
- **How to interpret malnutrition information using a pie-chart**

Communities sometimes find it difficult to understand the extent of malnutrition as a problem, particularly because sometimes the children/people do not look sick. We can make the problem of malnutrition more visible to the community by using different types of graphic presentations. For example, we can use a circle (or pie chart) to show how much of the population is malnourished.

Look at the circles below, and imagine that a circle represents the entire population or all the people in a specific community. We can use different colours to identify different groups within the population. For example, we can use grey to represent the people who are well nourished, and black for the people who are malnourished. Note: we can use any colour, it does not have to be grey and black. If none of the people are malnourished i.e. 0%, then the whole circle will be grey. If all the people in the population are malnourished i.e. 100%, then the whole circle will be black.



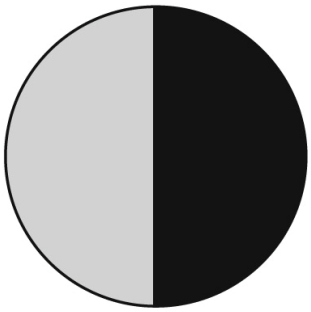
100% well nourished people (0% malnourished)



100% malnourished people (0% well nourished)

Now look at the next circle. You will see that half of the circle is grey and the other half is black. Do you know what this means? Remember we said that grey represents the section of the population who is well nourished, and black represents the section of the population that is malnourished. If half of the

circle is grey, and half is black, it therefore means that half of the people (50%) are well nourished and the other half (50%) are malnourished.



Half the population (50%) is well nourished and half malnourished (50%)

Now let's do it using the information from the National Food Consumption Survey that was done in 2005 (see box above). The three circles below show the proportion of 1-9 year old children in South Africa that are stunted, underweight or wasted. It is clear that stunting is a bigger problem than wasting.

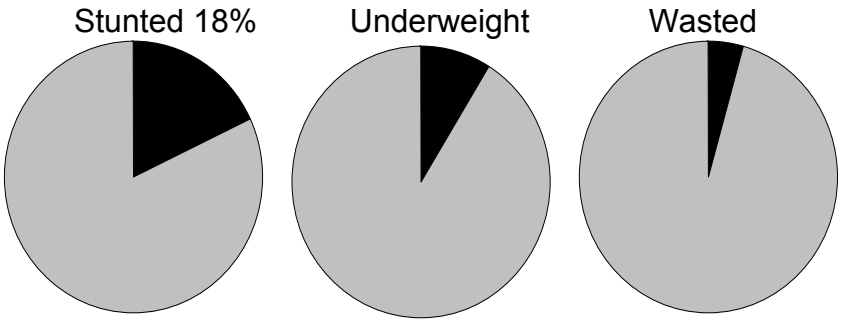


Figure 1.11 A graphic presentation of the prevalence of under-nutrition for 1-9 year old South African children (stunted= 18% underweight = 9%, wasted = 4.5%)

- **Stunting**

A child who is stunted is too short for his or her age. However, in order to determine that stunting has occurred you have to take measurements over a period of time. A child that is stunted will show uneven growth over a long period of time. Figure 1.12 shows two children that are both 24 months old and both look healthy. The only difference is that the one child is much shorter than the other child. Child A is well-nourished and has grown normally. Child B has not grown normally and is too short because of a poor diet. Stunting is an indicator of past or chronic malnutrition, i.e. under-nutrition over a long period of time. Stunting may be the result of too little energy intake (not eating enough food) or certain micronutrient deficiencies (not eating the right kind of foods).

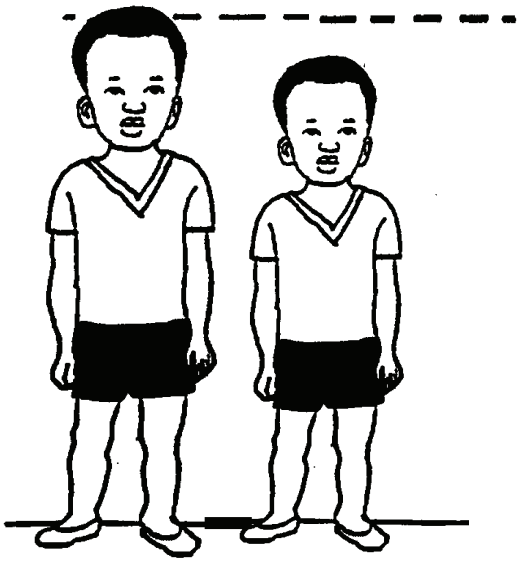


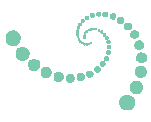
Figure 1.12 Differences in growth of two 24 month old children – one is normal (A) and one is stunted (B). (Adapted from.....)

- **Underweight**

A child who is underweight weighs too little for his or her age. Underweight can be the result of both past (chronic) and current (acute) under-nutrition. However we cannot use underweight to decide whether a child is undernourished because of chronic or acute under-nutrition. Generally one cannot tell whether a child is underweight by just looking at them. The child's weight needs to be plotted on a growth chart. It is difficult to decide whether a child is undernourished from just one weight measurement – the direction of the growth curve is important. Babies and small children should therefore be taken to the clinic regularly to be weighed, even if they are not sick. When the child is weighed at the clinic, the clinic staff will plot the child's weight on the child's Road-to-Health card (also known as the child's clinic card) and compare it with the child's previous weight. This allows the clinic staff to see whether the child is gaining or losing weight. This is called **growth monitoring**. Growth monitoring is an easy way to check the nutritional well-being of babies and small children.

- **Wasting**

A child who is wasted weighs too little for his or her height, and therefore is too thin. A child becomes wasted if he does not gain weight or if he loses weight. Wasting is an indication of current or acute malnutrition or rapid onset (starts suddenly) malnutrition. Children become wasted if they do not eat enough food, or when they have frequent infections. Often wasting is the result of a combination of inadequate food intake and frequent infections. A



child's weight can change quickly and wasting in children is sensitive to changes in food availability and illnesses.

A child who is severely wasted is very thin, has no fat, looks like skin and bones, the ribs are visible, and the stomach may be large or distended. Severe childhood malnutrition (also called protein-energy-malnutrition) in South Africa occurs in approximately 1% of the population. There are two forms of severe malnutrition, namely **marasmus** and **kwashiorkor.** (See figure 1.13)

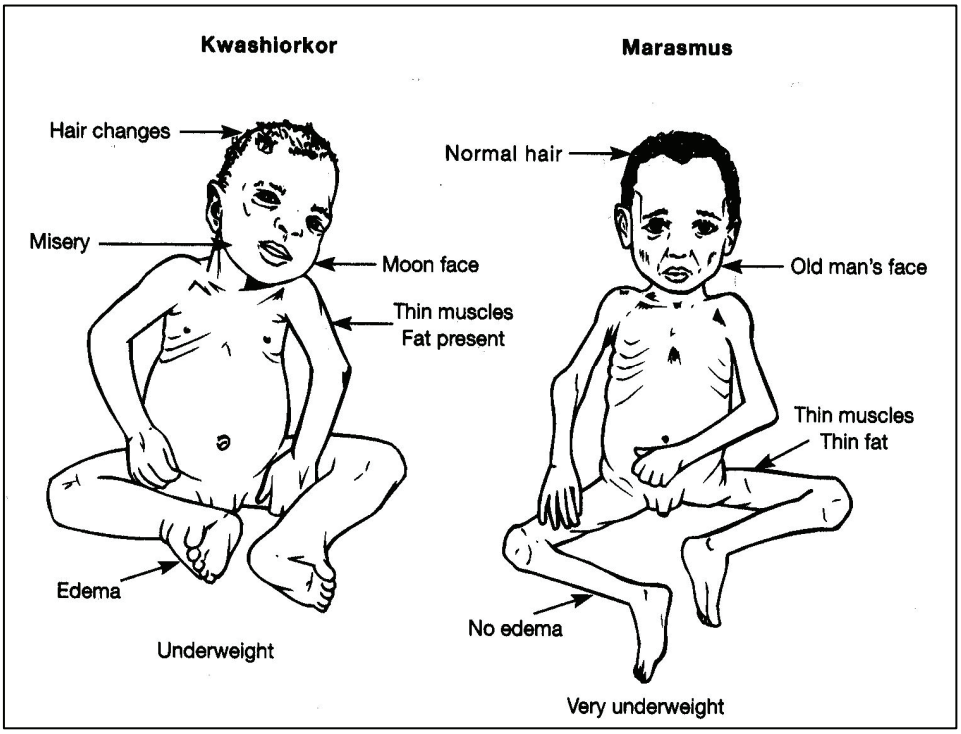


Figure 1.13 Clinical signs of kwashiorkor and marasmus
(Adapted from Lee & Nieman 2003)

- **Marasmus** is the result of a very low energy intake (not enough food). A child with marasmus is severely wasted. Marasmus usually occurs in the first two years of life, and often follows severe illness or a period of frequent infections.

- **Kwashiorkor** is mainly a protein deficiency. A child with kwashiorkor has oedema; thin, sparse and pale hair that easily falls out; dry, scaly skin especially on the arms and legs; a puffy "moon" face; apathy; and poor appetite. The most severe grade of malnutrition is when a child is severely wasted and has oedema (we call this marasmic kwashiorkor).

- **Oedema** refers to the condition where large amounts of fluid are present under the skin (in the intracellular tissue). To determine whether the child has oedema, press with your thumb on the back of the foot or ankle (do this for both feet). If the dent made by the thumb remains for some time after you have taken your thumb away for both feet, oedema is

present. Children with oedema are classified as severely malnourished, regardless of whether they are wasted, stunted or underweight.

It should be noted that patients with HIV/AIDS also can suffer from wasting but the cause of this is not necessarily the same as that due to kwashiorkor or marasmus because other factors come into play.

1.4.3 Micronutrient deficiencies

Micronutrients (vitamins and minerals) in food keep us healthy. People may eat diets that do not provide enough of a particular micronutrient. If people lack certain micronutrients we say that they are **micronutrient deficient**. Deficiency means "having too little" of something. People often look healthy (they are not overweight or underweight), but they may lack certain micro-nutrients because they do not eat enough of the right foods. Micronutrient deficiencies can impact on one's health in a number of ways that will be discussed later in the unit. We can improve the micronutrient content of the diet by growing a variety of fruits and vegetables in our own garden. The information below shows the findings of the 1999 National Food Consumption Survey that looked at the types of food eaten.

National Food Consumption Survey (1999)

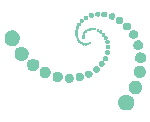
In 1999, children 1 to 9 years of age from all over South Africa were surveyed to determine the type of foods consumed by children in that age group. The number of children who participated in this study was 2894. Both urban and rural areas were represented, as well as children on commercial farms.

Analysis of the food intake showed that South African children do not frequently consume foods of animal sources, fruits and vegetables. As a result, on average, 1 out of 2 children had an intake of less than half the recommended amount that they need each day for a number of important nutrients, such as vitamin A, vitamin C, riboflavin, niacin, vitamin B6, calcium, iron and zinc. The nutrient intake of children living in rural areas was overall considerably poorer than that of children in urban areas.

This national survey also showed that the five most frequently consumed food items for South African children were maize, white sugar, whole milk and brown bread.

Based on the fact that maize meal and bread were among the foods that are eaten most often by the children, the government then decided that all maize meal and bread flour in South Africa should be fortified with specific nutrients.

(Adapted from Labadarios et al, 2000.)



There are several micronutrients but in terms of malnutrition, four micronutrients are of great importance, not only in South Africa, but worldwide. These four micronutrients are vitamin A, iron, zinc and iodine. The functions and food source of each of these micronutrients is described below.

- **Vitamin A**

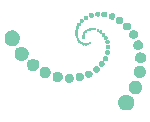
We need vitamin A for healthy eyes, to fight infections and for normal growth and development of children. Vitamin A deficiency occurs when a person is not eating enough vitamin A to cover his body's vitamin A needs. Vitamin A deficiency is most common in young children because they grow quickly (and therefore need a lot of nutrients) and they often have infections. Frequent infections can lead to vitamin A deficiency because of the following reasons:

- Children who are sick often do not have an appetite, and as a result they do not eat enough food
- During diarrhoea most of the vitamin A is lost in the watery stools
- If the child has worms the vitamin A is not properly absorbed by the body
- There is an increased need for vitamin A during infections.

Children and adults who are vitamin A deficient have an increased risk for infections, they are more likely to become sick and, in severe cases, they are more likely to die from illnesses like measles and diarrhoea. The effects of Vitamin A deficiency are seen in the mucous layers of the body. Very severe vitamin A deficiency may lead to blindness, but this is not common in South Africa.

Food sources that are rich in vitamin A are breast milk, liver (excellent source), egg yolk, milk and milk products. Yellow fruit and vegetables and dark-green leafy vegetables also contain vitamin A (in the form of beta-carotene).

Generally, approximately half of South African children eat less than 50% of the recommended amount of vitamin A that their bodies need for normal growth and health (Labadarios et al., 2000), and in 2005, 2 out of 3 (64%) South African children were found to have too little vitamin A in their blood (Labadarios, 2007). The Ndunakazi case study findings are in the box below read them and then answer the questions in the spaces provided below.



Ndunakazi findings on Vitamin A

Families in this village consumed a diet of poor nutritional quality, the caring capacity of the mothers was compromised, the environment was not optimal for health, and they had poor access to health services. All these had an impact on the children's nutritional health.

Dietary intake of vitamin A-rich foods was very low and half of the children in the village were vitamin A deficient (too little vitamin A in their blood). Although many of the children had micronutrient deficiencies, most children looked healthy and protein-energy-malnutrition was not common. However, 25% of the children were too short for their age (a condition called stunting) because of a poor diet and frequent infections over a long period of time. Most of the mothers were overweight – in fact, two out of three women in the village were overweight.

How many children had a low intake of Vitamin A -rich foods?

.....

Why were 25% of children stunted?

.....

.....

How many women were overweight?

.....

.....

- **Iro**n

We become iron deficient if the food that we eat does not have enough iron. An inadequate iron intake is however not the only reason why people become iron deficient. Children who have worms and people who have lost a lot of blood because of, for example, an injury can also become iron deficient. Pregnant mothers and growing children are the most vulnerable to iron deficiency because their bodies have higher iron needs. Iron deficiency often leads to anaemia. Iron deficiency is not the only reason why people become anaemic. In some cases malaria and worms can also lead to anaemia.

Anaemia means there is too little haemoglobin in the blood. Haemoglobin is the substance in blood which gives blood the red colour and helps carry oxygen around the body. If we do not have enough haemoglobin in our blood, we will look pale and lack energy. The tonue, eyes and hands of an anaemic person look very pale.

People who are iron deficient do not have a lot of energy and are always tired. Children who are iron deficient have less energy for playing and learning, and they may learn and develop more slowly than children who have enough iron in their blood. Anaemic pregnant women have a bigger chance of dying during and after giving birth. Signs of iron deficiency are paleness of the tongue and the inside of the lips and under the eyelids.

Foods that are good sources of iron are meat, chicken and fish. Liver is an excellent source of iron. Although dark-green leafy vegetables provide some iron, plant foods are generally not a good source of iron.

- **Zinc**

Children need zinc to grow and develop normally. Children and adults need zinc to heal wounds and to fight infections. A zinc deficiency may result in poor healing of wounds and an inability to effectively fight infections. Foods that are good sources of zinc are meat, chicken, fish, wholegrain cereals and legumes.

- **Iodine**

Iodine intake is not really a big problem in South Africa, as all salt is iodised. A shortage of iodine in the diet will result in goitre, which is an enlarged thyroid gland in the neck.
If a pregnant woman is iodine deficient, particularly in early pregnancy, she has a high risk of having a child who is mentally and physically handicapped. For example, the child may have a low IQ or be deaf.

Figure 1.14 is a graphic (visual) presentation of the prevalence of vitamin A deficiency, anaemia and zinc deficiency for 1-9 year old South African children using the data from the National Food Consumption Survey that was done in 2005. In the pie charts below the black colour represents the percentage of people that suffer from a deficiency. It is clear that vitamin A deficiency is a major problem in the country.

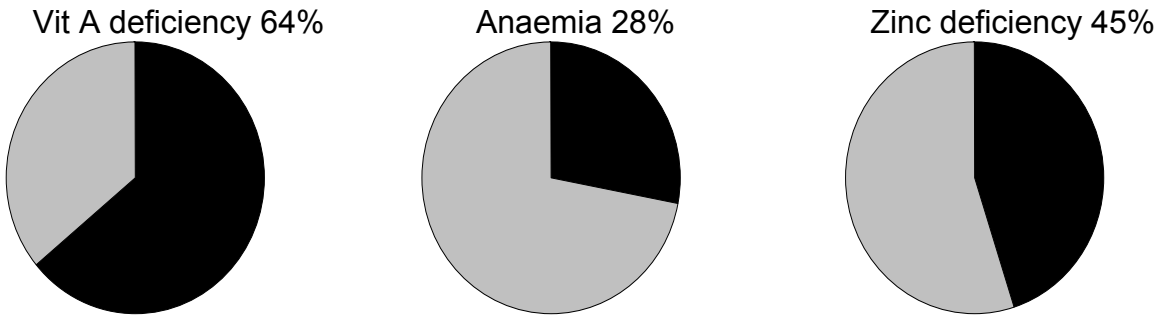


Figure 1.14 Pie charts showing the prevalence of vitamin A deficiency, anaemia and zinc deficiency for 1-9 year old South African children

We can present the same information differently, by using bar graphs. If the bar represents the section of the population that is malnourished it will mean that the taller/longer the bar, the higher the prevalence of malnutrition. This is shown in Figure 1.15 Can you see that the information presented in Figure 1.14 and Figure 1.15 is the same? The x-axis (horizontal) of the graph represents the deficiencies. The y-axis (vertical) represents the percentage of children suffering from each deficiency.

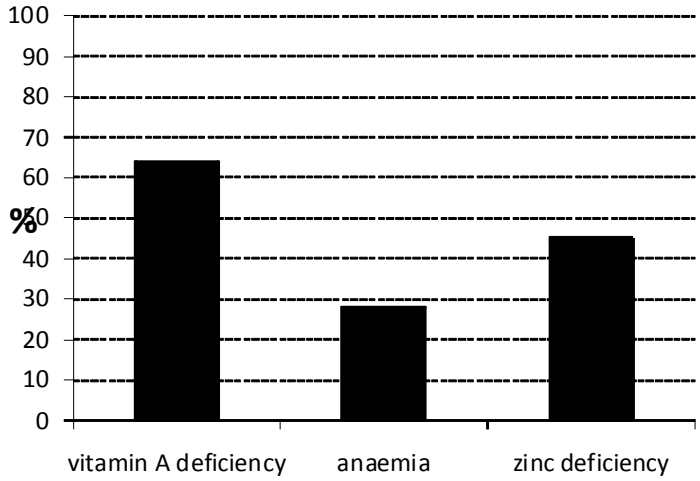


Figure 1.15 Bar graph showing the prevalence of vitamin A deficiency, anaemia and zinc deficiency in South African children (1 to 9 years of age)

Activity 1.6 Apply the information on Vitamin A nutrient deficiency of children

Do this activity in you workbook

Carefully study section 1.4 and then answer the following questions in the space provided in your workbook.

A large study that included 2469 South African children was done in 2005.

1. How many of these children were vitamin A deficient?
2. Why do you think these children were vitamin A deficient?
3. Do you think children are negatively affected if they are vitamin A deficient? Give a reason(s) for your answer.
4. Which foods would you encourage mothers to feed these (vitamin A deficient) children? Explain your answer.

1.5 Healthy environment, food safety and hygiene

1.5.1 Healthy environment

The environment we live in can affect our nutritional health. We have already looked at infections as an **immediate cause of malnutrition** and with a direct relationship with the adequacy of nutrients and efficient use in the body. The **underlying causes of malnutrition** related to the environment are unsafe water for drinking, poor sanitation, air pollution, poor housing conditions and overcrowding all increase the risk of people getting sick. All family members should therefore drink safe water, practice good personal and environmental hygiene, and keep food safe and clean. There are several deeper causes of malnutrition (we call them the **basic causes of malnutrition**). These include:

- poverty and lack of jobs;
- control of resources at community, district, provincial, national and international level;
- education and low status of women;
- natural disasters, e.g. floods, drought;
- political unrest and conflict, e.g. people living in countries that are torn apart by war suffer more from malnutrition;

Activity 1.7 Factors affecting the nutritional health of households in Ndunakazi village

Do the activity in your workbook.

Aim: The aim of this activity is to make you aware that different factors affect people's nutritional health

What to do

Carefully read part 1 and part 2 of the Ndunakazi case study respectively and then carry out the tasks that follow.

Ndunakazi case study: Part 2

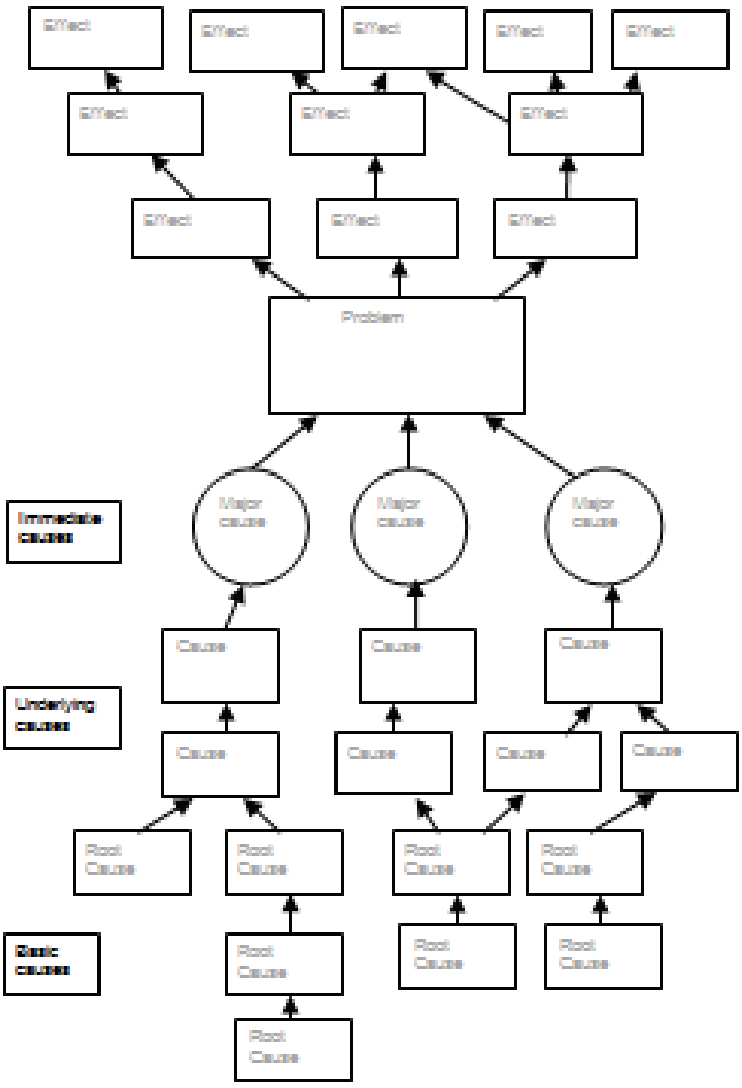
In part 1 of the Ndunakazi case study we described how the caring capacity of the mothers was compromised. The environment in which they lived and their access to health care services further compromised the children's nutritional health.

In 1994, the living condition and access to health care services in Ndunakazi were as follows:

- There were no taps in the area. Drinking water was obtained mostly from the Umgeni River, which was badly polluted at times.
- Approximately one-third (38%) of the households had access to a pit toilet, while 62% had no toilet facilities.
- Garbage was usually dumped and then burned.
- Because of the lack of adequate toilet facilities and limited access to safe water, diarrhoea was one of the biggest health problems affecting children in the area.
- There were no fixed health facilities in the area. A mobile clinic was scheduled to serve the area once a month. Some people had negative feelings towards the mobile clinic because of the irregularity of the service, the impatience of the clinic staff, and the long distances they had to walk to reach the service point.
- The poor transport system and poor condition of the road made it difficult for the people to attend the nearest clinic that was approximately 18 km away.
- Children attended the clinic mainly for immunisation, and most children were weighed on immunisation dates only.

- In this village, 78% of children below the age of six months and only one-third of children aged three years and older were in possession of a Road-to-Health (RTH) card.

1. Use the outline of a problem tree provided in the workbook and fill in the causes and consequences (effects) of malnutrition into each box. Use the information from the case study to help complete this task.
2. What is the main problem?
3. Which factors relate to the immediate causes of malnutrition?
4. Which factors relate to the underlying causes of malnutrition?
5. Which factors relate to the basic causes of malnutrition?



Consult the food security mal nutrition framework. Use a similar framework format to arrange causes and effects identified.

Tips:

To find the causes: Ask but why?

To find the effect or consequence: Ask if then?

Comment on activity 1.7

An unhealthy environment and poor access to health care services can have an effect on nutritional health.

1.5.2 Food and water safety for healthy households

Being healthy does not only involve eating adequate amounts of healthy nutritious foods but also is dependent on our food and water safety practices.

Protecting our food is only one of the ways that we can guarantee and support the health of a family. If food and water is not clean and safe, any member of the family can for example become ill with diarrhoea. Diarrhoea is even more serious among the vulnerable such as babies, children and the elderly. If you are already malnourished the consequences of diarrhoea can be quite severe.

Micro-organisms, such as bacteria, that can contaminate or 'infect' water and food are too small to see but are present in the air and water, and on the hands and body. If safety measures are not in place, food that becomes contaminated will spoil and rot and not be safe for humans to eat. In severe cases, this contamination can lead to food poisoning, an illness that is extremely dangerous.

The following *case study* will provide some understanding of the complex and difficult issues that households in poorly serviced rural and peri – urban areas have to cope with daily.

1.5.3. Food contamination and food spoilage

Spoilage of food takes place if the food is damaged e.g. by bruising, or if it is attacked by insects or other pests or by the growth of harmful bacteria or moulds or yeasts. Spoiled food has an unpleasant smell, taste, colour and often becomes soft and watery in texture. This spoilage can happen at any point between the time the food is planted, to when it is consumed (eaten). Food can also be contaminated by a variety of other things such as: fertilizers, pesticides, herbicides, industrial chemicals and other environmental pollutants. This means that in order to keep our food safe we must take extra care in handling the foods through the various stages of planting, harvesting, transporting, processing and preparation (See Figure 1.16)

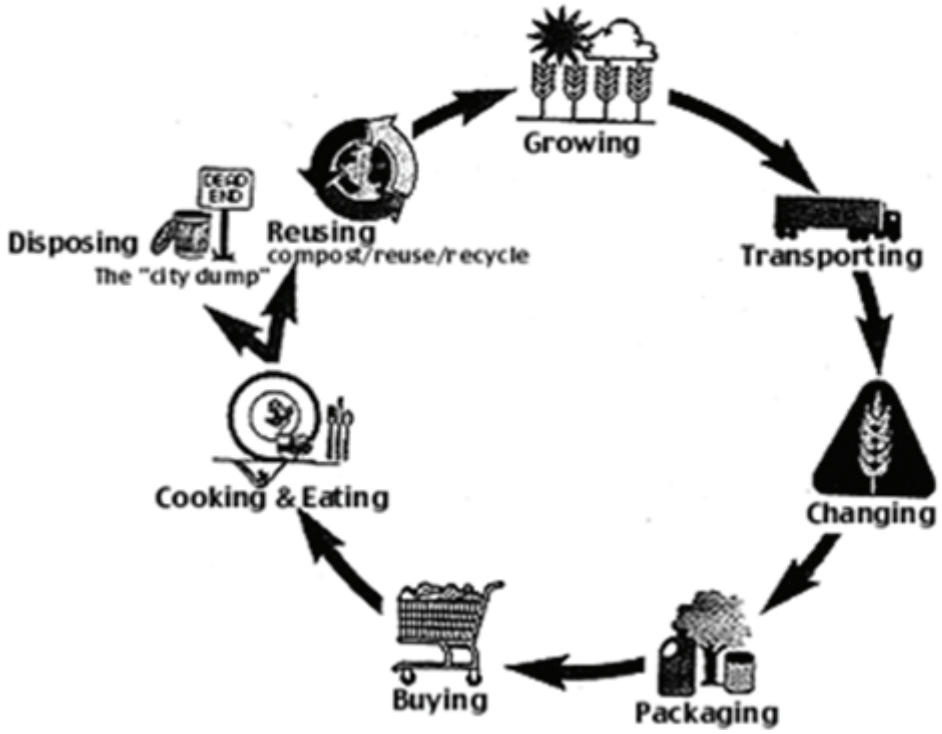
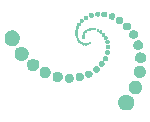


Figure 1.16: Preventing food contamination through food handling in the food chain

One of the main causes of food spoilage in the handling is the contamination or attack of foods by micro-organisms in the handling of food in the food chain. (See Figure 1.16) Micro-organisms are all around in the air, in water and in and on the body, but they are too small to see. Under ideal circumstances such as a moist environment and a moderate temperature, micro-organisms will grow and multiply quickly in millions and cause spoilage of foods and infections in humans. If these contaminated foods are consumed, the millions of micro-organisms can lead to ***food-borne diseases*** such as ***diarrhoea*** and in some cases can result in food poisoning, which can be extremely dangerous.

Food-borne disease is defined as the process whereby toxic or infectious diseases develop after these have entered the body through consuming contaminated foods. It can be spread through person-to-person contact through a faecal-oral route, for example, transmitted by drinking contaminated water and by poor personal, household and agriculture hygiene practices. Vulnerable groups who are most at risk for food-borne disease are the young children, pregnant women, the elderly and HIV/AIDS infected, who are all immune-compromised, and thus not able to effectively fight infections. Food-borne diseases are not only a serious problem in developing countries where contamination is more frequent, but it is also a problem in developed countries.

There are many ways in which food and water can become contaminated and this is shown in Figure 1.17 below. If each step is controlled or prevented, food contamination can be prevented.



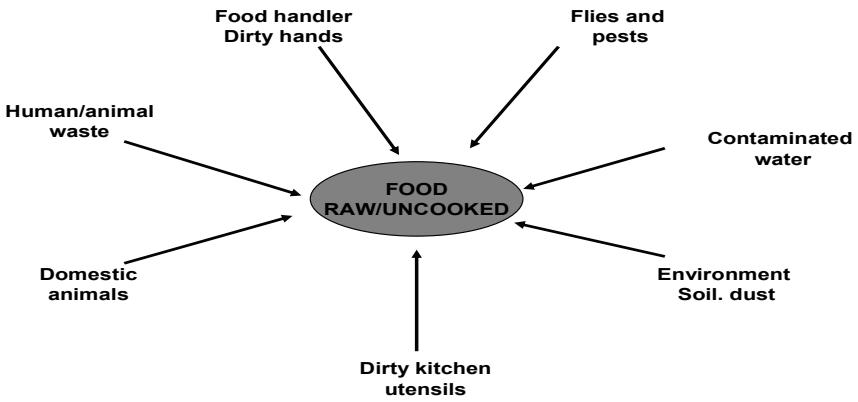


Figure 1.17 Sources of contamination of raw and uncooked food

Primarily, food can spoil and become rotten if micro-organisms come into contact with food and water through poor care and hygiene practices.

- **Micro-organisms**

Micro-organisms such as bacteria, moulds and yeasts can be either useful or harmful. Some of these micro-organisms are *useful or harmless*, such as yeast, which is used to produce sour milk, yoghurt and cheese, and drinks such as beer and wine. In contrast, *harmful or disease* micro-organisms, such as bacteria and moulds, can spoil and rot food, making it unfit for human consumption and cause food-borne diseases.

Micro-organisms can contaminate food by:

- Cross-contamination between hands or food or water
- Insects and rodents that carry harmful micro-organisms
- Contact of food with dirty utensils, such as plates, pots, spoons and knives and forks
- Unclean cooking facilities
- Chemical contamination, when pesticides or fertilizers are stored with or near food
- Food handlers who are themselves infected by micro-organisms

Micro-organisms are able to survive and multiply in food due to:

- Inadequate cooking of food
- Inadequate storage of leftovers for an extended period
- Not reheating leftover food at a high enough temperature

- Inadequate cooling after cooking
- Long periods of keeping food warm because it was prepared too far in advance

The three most important micro-organisms that can affect food safety food are bacteria, moulds and yeasts. Figure 1.18 shows examples of micro-organisms that are harmful and cause spoilage of food and those micro-organisms that are harmless or useful.

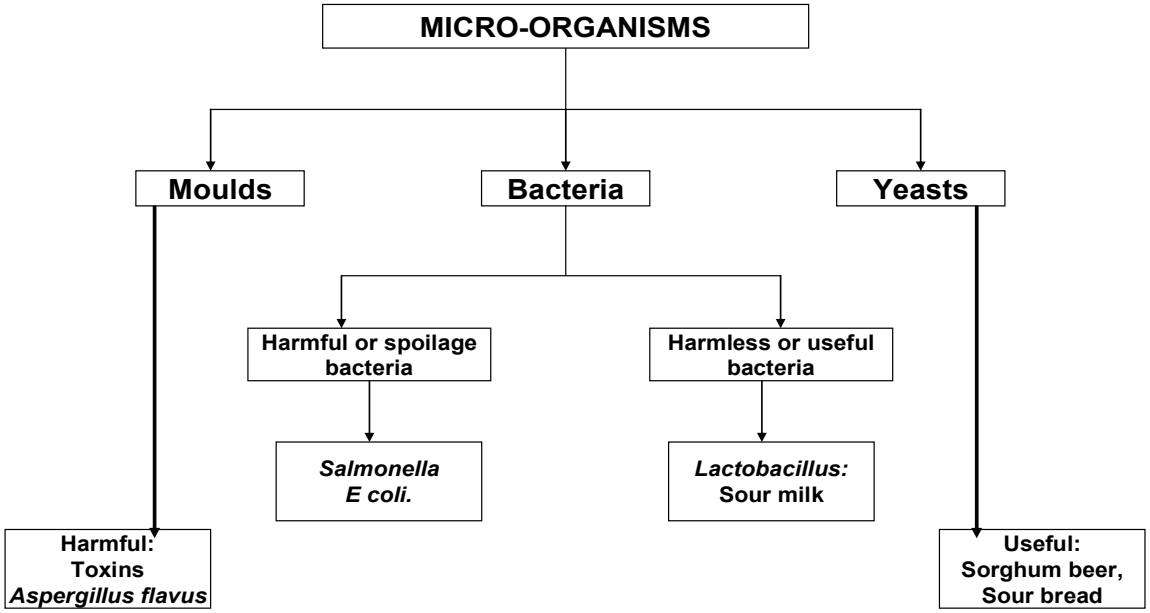
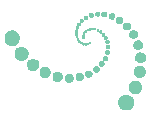


Figure 1.18 The three major groups of micro-organisms that are in food

- **Bacteria:**

Harmful and harmless bacteria are found everywhere, on hands, animals and plants, and in water and soil. These bacteria cannot multiply outside the body the food and drink eaten serves a way in which they are carried into the human body. In order to grow, micro-organisms mainly need a supply of suitable food, such as carbohydrates such as sugars and starch, and fairly warm temperatures and moist conditions.

Under ideal conditions, bacteria grow extremely rapidly and produce millions of bacteria within hours. This fast and uncontrolled bacterial growth could theoretically result in incredibly large numbers within a few hours or days. This fast growth of bacteria therefore takes place when food is kept moist and wet and fairly warm for long periods of time. For



example, fresh milk will become spoiled and smelly if kept at room temperature for a few days.

- **Harmful or spoilage bacteria**

Information about the 2 most common harmful or disease-causing bacteria is shown in the box below. Raw foods such as meat, chickens, milk, eggs, fruit and vegetables, are the most likely to be contaminated by these bacteria. If food containing these bacteria is eaten it can cause severe infection and ultimately food poisoning and even death.

Salmonella

Salmonella are pathogenic or disease causing bacteria, that when eaten, pass through the stomach, into the intestine and are transported to the liver and spleen. It is here that they can cause dangerous and even fatal diseases in humans and animals.

Populations that are at higher risk are again the immune-compromised, vulnerable groups such children, pregnant women, the elderly and HIV/AIDS patients. Hours after infection, severe symptoms such as fever, abdominal cramps, and even bloody diarrhea can develop. If not treated immediately, this infection can result in death. Most infections with *Salmonella* have been reported to be from contaminated dairy, poultry and meat products, with chickens and raw eggs being particularly high risk foods. However, if care is not taken when fruit and vegetables are stored or prepared they too can be contaminated.

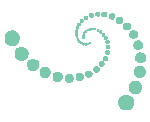
E. coli

E. coli is the abbreviated name for *Escherichia coli* a bacterium which makes up approximately 0.1% of the total bacteria in an adult's intestines*. E coli* can be transmitted if food, hands and water comes into contact with raw meat or unpasteurized milk or even infected fruit and vegetables. This bacterium can cause severe damage to intestinal cells, resulting in massive loss of body fluids and salts, and in blood vessels being damaged resulting in dangerous internal bleeding. Infection with *E coli* is particularly dangerous to vulnerable groups such as children and the elderly

Bacterial growth can be controlled or prevented if food is stored in a dry, cool place and if food is consumed soon after cooking. Some of the safe food handling practices that ensure the production of safe food are:

- heating: cooking, boiling, steaming or frying food at high temperature
- removing water, for example when food is dried: fruit, fish, meat
- preservation of foods by adding sugar or acids like vinegar
- fermenting the food to produce acids, for example: fermented sour milk

These methods of extending shelf-life are of particular importance in rural areas where cooling and freezing facilities are not available or just too expensive. All of the above methods are simple, inexpensive and efficient.



Severe food poisoning can develop when large amounts of food are kept or stored at a warm temperature for a long period of time before eating. Some examples would be food served at weddings and funerals where food is cooked early in the day but only eaten much later. Food poisoning can be prevented by cooking food at high temperature and eating it as soon as possible, or if a refrigerator is available, storing the food at a very low temperature.

- **Harmless or useful bacteria**

One type of useful bacteria is the *Lactobacillus* (lactic acid bacteria) which produces sour milk, sour porridge, yoghurt and cheese by fermentation. These lactic acid bacteria produce acids that prevent the growth of harmful bacteria and instead produce a healthy food product that has a longer shelf-life.

- **Moulds**

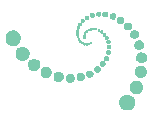
Mould is a fluffy, slimy micro-organism that grows on warm, moist surfaces. Moulds grow and can be seen on bread, grains, legumes or fruit and even on jam if the conditions for growth are right. Moulds require a high moisture content and high temperature in order to survive.
Cereals and legumes can become contaminated with a toxic or poisonous fungus called *Aspergillus flavus* that produces a toxic substance called aflatoxin. This mould can grow on maize and the husks of beans and ground nuts before they are harvested and also when they are stored in moist and warm conditions. These toxin-contaminated grains and legumes are highly dangerous and should not be consumed by humans or animals. If consumed over many years, this poisonous toxin can cause liver cancer. This micro-organism not only affects health but also has an economic effect as it spoils produce that could have been sold or stored to later use.

- **Yeasts**

Yeast is generally a harmless micro-organism that has been used for thousands of years in the alcohol brewing and bread baking industries. Yeast is able to ferment sugars and produce maize or sorghum beer and wine if left for 1 or 2 days. This brewing process will inhibit the growth of harmful bacteria.

1.5.4 Food safety and personal hygiene

We all carry bacteria on our skin, nose and mouth and in our intestines, but only some of these bacteria can be harmful. Because harmful bacteria are found not only inside the



body, but also outside on the surface of the skin, infection can be spread from the food handler when they come in contact with food.

The harmful bacteria that can cause diarrhoea or food poisoning are also spread when hands are not washed before and after food preparation. Food can become contaminated by bacteria from human faeces and urine if hands are not washed after using the toilet, changing a baby's nappies or handling an animal. Harmful bacteria from the nose and mouth can also be spread if an infected person sneezes or coughs when handling food. If a person is ill, even more caution must be taken to prevent bacteria being spread through coughing and sneezing. If there are cuts or scratches on the skin, these must be covered to prevent contaminating the food. Whenever possible, clean clothes should be worn when cooking.

- **Food safety**

There a number of factors that need to be considered with regards to activities associated with food safety:

- **Food buying** - if there are no cooling facilities, fresh food such as milk and meat should be bought every day or two to prevent spoiling. In the rural and in some informal urban settlements, with no refrigerators for cooling, fresh food should be bought in small quantities that will be just enough to serve the household for one day. Vegetables and fruit will of course stay fresh for a week or more without cooling.

- **Food preparation - a**ll aspects of food preparation must be well controlled to ensure safe foods. This includes purchasing, storing, handling and preparation. We can call this the Food Preparation Safety Chain, which includes all aspects of safely handling food in a clean kitchen, with clean cooking and eating equipment, with safe cooking at a high temperature and safe storing at a low temperature. (See Figure 1.19) If there is only one break in the chain, this can result in food spoilage and harmful bacterial growth.

In the developed world, food and water contamination is minimal because the people usually have access to clean running water, refrigerator and freezer facilities. In contrast, clean water and food hygiene is far more difficult to achieve when there are no fridges, water is collected from distant and often contaminated water sources, and where food is prepared over an open wood fire.

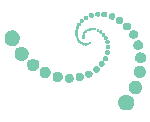
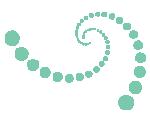


Figure 1.19 ***The food preparation safety chain***

This is particularly true in rural and in informal urban settlement areas in developing countries. However there are precautions that can be taken to overcome these challenges:

- A clean kitchen or food preparation area is essential
- Clean water,
- Hands must be washed before touching food
- Work surfaces, kitchen cloths and kitchen utensils such as knives, spoons and chopping boards must be washed before and after food preparation.
- Do not put cooked food in contact with raw food.
- Utensils used for working with raw food must not come in contact with other
- Fruit and vegetables can be washed before eating and cooking

- **Food storage -** We now know that if food is kept for a long period in moist and warm temperatures, the food will spoil and harmful bacteria or moulds will start growing. This means that:
    - Harvested and prepared food should be stored in dry and cool to cold temperatures.
    - in cold weather, food such as milk and meat can be kept outside a refrigerator for only a day or more
    - In warm and hot weather, food should be cooled immediately after cooking and placed in a refrigerator or a cool place.
    - If a fridge is not available, food should be cooked in small portions, just enough for the family to eat at one meal or not more than 24 hours.
    - Food should not be stored for excessively long periods of time even if you have a fridge or freezer.



It should be noted that food that is dried contains far less water and therefore it dried foods can be stored for long periods of time. With hardly any water, these foods are protected from the growth of moulds and bacteria. The foods that are primarily dried are maize, legumes and fish or meat. The drying process in rural areas is usually in the sun. Dried products must then be stored in clean and sealed containers.

- **Serving of food -** food should be served and eaten as soon as possible after preparation. Leftover foods should be stored at a cool temperature and eaten the same day if a refrigerator is not available. If stored in a refrigerator, leftover foods are usually safe for up to no more than 2-3 days.

Infants and young children do not have a well developed immune system. They are therefore very vulnerable to any contamination that may be transmitted through poor personal hygiene or food practices by the mother. Food safety for infants and young children will be discussed later on in this module.

- **Food safety and Infants and children**

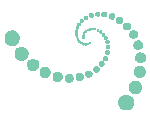
Weaning foods that are provided with breast milk and food to small children should be served as soon as possible after cooking. It is also preferable that these foods are not stored for longer than a day, especially if no cooling facilities are available. If foods are stored for a day, the food must be re-heated thoroughly before feeding.

Activity 1.8 Preparing safe bottle feeding for infants (Optional)

Do this activity in a your logbook if it is relevant to your situation

What to do

1. Ask mothers or caregivers in a groups to discuss ways in which bottle for feeding infants are prepared in their village or community
2. Keep field notes on:
    - Source of water
    - Storage of water
    - Process of boiling of water and of bottles and teats
    - Storage of bottles between feeding.
3. Identify areas of concern regarding safety of both water and kitchen utensils.
4. Discuss with the mothers and caregivers how they could prevent contamination that will be practical and feasible in households.



If the baby is fed with baby or formula milk, extra care should be given to washing bottles and teats. If a spoon or cup is used for preparation and for feeding the infant, these utensils must be washed immediately after use. Bottles and teats should be washed and boiled before re-using.

If unsafe water is used without boiling or bleaching in any of the above processes, the potential for bacterial growth is further increased and can result in diarrhoea, vomiting and fluid loss, all being dangerous symptoms in a young vulnerable child.

- **Street foods**

In developing countries such as in Africa and Asia, street foods provide convenient, quick and relatively inexpensive access to snacks and meals. Street foods are defined by Latham as '*ready-to-eat foods and beverages, prepared and/or sold by vendors and hawkers, especially in streets and other similar public places".* This is particularly true in urban areas, where street food vending is an important sector of the informal economy, since it requires little financial investment.

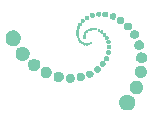
Street food vending provides women an opportunity to enter the informal sector. In developing countries, especially in Africa, women are the main providers of street food. In South Africa, the majority of street vendors are women, who either prepare these foods at home and then sell them on the street or cook them on the street under difficult and non-hygienic conditions.

Although these foods are convenient, the lack of safe food preparation and vending facilities are of major concern. The foods can be contaminated due to poor hygiene and unsafe preparation practices when food is prepared on the street where access to waste disposal and clean water is limited.

Food safety of street foods can be increased if food is cooked at high temperatures and sold as soon as possible. Examples of this would be meat cooked on an open fire or grill as customers are waiting. Leftover foods should not be transported home and sold the next day. Foods should not be prepared well in advance and kept at room temperature throughout the day

1.5.5 Water safety and health

In most of the worlds' developing countries, and specifically in rural and informal settlement areas, the availability of safe and clean water is a serious problem. Often the only sources are rivers and streams that are not protected from animal and human contact. Cholera is an example of a water-borne disease that affects many people.



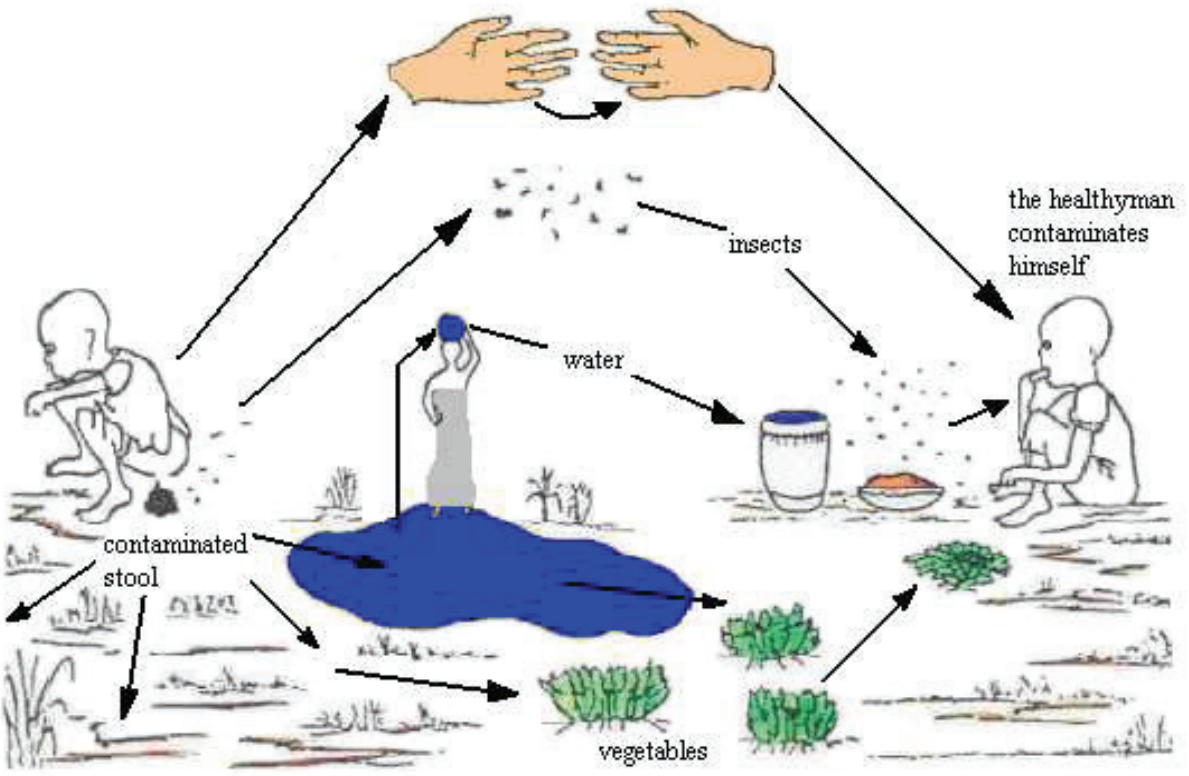


Figure 1.20 The cycle of waterborne diseases and healthy food practices (Adapted from.....)

Cholera is a very serious and dangerous disease and, if not treated, can lead to death. The bacteria that causes cholera is transmitted by water that is unprotected from human and animal waste/faeces. Cholera can also be spread by contaminated foods such as thin porridge, rice, seafood and vegetables.

Activity 1.9 Identify the clean and unsafe water sources households use

Do this activity on your own in the logbook

In a group meeting discuss with households the water resources they have access to and the safety of the water. The water resources in use and their safety can be discussed also with individual household visits. Follow the instructions below.

What to do

- Ask the households to identify the water resources in the village the household have access to.
- Draw a simple map to indicate all sources of water
- Mark in different colours clean and unclean water sources.
- Identify water sources which are problematic.
- Discuss how the unsafe water sources become contaminated.
- Discuss what households do to be able to identify clean sources?
- Discuss how households clean dirty or unsafe water.
- Discuss what households do to ensure there is clean drinking water in the house.
- Discuss from whom the households can seek advice to prevent using contaminated water in the community

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Cholera and other water borne diseases are often found in rural areas where water, poverty, low socio-economic and poor sanitation facilities force households to use unprotected water for drinking purposes. Cholera epidemics are in fact an indicator for poverty. Millions of South Africans still do not have access to safe drinking water making them susceptible to getting water-borne diseases such as cholera. During 2000/2001 at least 265 people died from and more than 100 000 were infected with cholera in 5 provinces of South Africa. (Water Wheel, Sept/Oct 2006).

In poor, overcrowded communities such as in urban informal settlement areas, cholera spreads fast due to:

- Lack of safe drinking water.
- Poor sewage/waste disposal
- Poor control at sewage plants – untreated waste spills into rivers
- No chlorination of water at sewage plants
- Poor personal hygiene with food preparation
- Food contaminated by bacteria – cross-infection from contaminated hands
- Lack of knowledge regarding the basic principles of food hygiene

Not all people exposed to cholera bacteria become ill and in some they have only mild symptoms. But in a small group of maybe 5-10% of cases, especially among vulnerable groups such as people with HIV/AIDS, the elderly and infants and children, the symptoms of severe diarrhoea, vomiting and fluid loss can appear in 1-5 days and death can occur within hours.

- **Treating unsafe water**

Fetching water and collecting wood add an enormous burden of time and physical energy to the already full workload of rural women. This is also true for women and children who have to collect water from stand pipes in urban, informal settlement areas. The water from these sources is usually unsafe and must be treated by either bleaching or boiling before drinking. However, research in KwaZulu-Natal showed that only 10% of the women actually boiled river water, despite them knowing that this water was not safe to drink.

There are two quick and easy methods of treating river or any other unsafe water.

1. Boiling

- Unsafe water can be boiled for as little as one to two minutes, cooled and then stored in a clean, covered container. All harmful bacteria would be killed in this very short time. This quick boiling would also save on fuel such as wood and electricity

2. Bleaching

- Contaminated water can also be treated by bleaching, by adding about ten drops of household bleach to one liter of water. The water is then stirred and left to stand for 30 minutes.

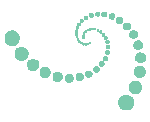
It is most important to remember that when unsafe water has been boiled or bleached, the clean, safe water must be kept safe and free from further contamination.

- **Grey water and food garden irrigation**

Grey or waste water from the house can be recycled for use in the vegetable garden. This grey water is particularly important in rural areas of South Africa, since it is often the only source of water available for the garden other than drinking water. Even when water is provided in peri-urban and urban areas, re-use of household grey water can be of enormous value when growing vegetables. This practice ensures that there is more clean water available for personal hygiene.

Research at the Agriculture Research Centre in Stellenbosch tested the growth of plants using only grey water and surprisingly found that the vegetables grew better and the harvest was increased. The most effective method of watering is by drip irrigation which directs the water to the roots of the vegetables and not the leaves, thus conserving water.

However, there is a potential non-acceptance of the use of grey water for irrigation. In some communities in Limpopo, the women were not convinced of the benefit of this type of water. To change this attitude, explanation, education and training would be required. (*Water Wheel July/August 2005)*



- **Clean environment: disposal of food and human waste products.**

All food that is spoiled or rotten should be disposed of in a safe manner. Spoiled food should be removed from the kitchen as soon as possible so that it does not attract flies. Waste material from food preparation such as vegetable peelings and spoiled or rotten foods are of course ideal to add to a compost heap, where micro-organisms will break down the rotten plant material and so provide important nutrients that can go back into the soil to improve soil quality. Compost provides an inexpensive fertilizer for the food garden. Do not use human or domestic animal waste on the compost heap. Human waste and that from non-water toilets must be disposed of by burying in the veld.

Concluding remarks

Now that you have completed this unit, can you describe the most common nutritional disorders in South Africa? What factors do you think affect the nutritional health of South Africans the most? Do you think we can change these factors? If yes, how can we improve the situation?