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“शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्तमान विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।”

— इन्दिरा गांधी

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*"Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances."*

— Indira Gandhi

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Block

# 1

## **FOOD GROUPS, NUTRIENTS AND THEIR FUNCTIONS**

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## COURSE INTRODUCTION

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*Course 1*, you and your food is divided into four blocks. Each block gives specific information about the food you eat, its functions and how to make best possible use of various foodstuff available to you.

In *Block 1* we will be discussing what food is in terms of food groups, nutrient composition and functionality. You will learn to make a wise choice of a variety of foods, to prepare them in the best manner to retain nutrients, to make them safe, and to enhance their taste and flavour.

In *Block 2* you will also learn about food preservation so that when there is plenty of certain types of food during certain seasons of the year, they can be preserved.

In *Block 3* we will discuss convenience foods and how they save time and energy.

In *Block 4* we will focus on how to prepare and process foods in a variety of ways so that the meals in your home are nourishing, attractive and full of flavour.



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## **BLOCK 1 FOOD GROUPS, NUTRIENTS AND THEIR FUNCTIONS**

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Your journey to the exciting world of food and nutrients starts from here. *Block 1* will equip you with key concepts, facts and principles you need to know for comprehending the whole course. So pay attention!

Let us now open the Pandora box of food and nutrients through *Block 1*.

Food is so much a part of our lives that we tend to take it for granted. However, we need to learn about what food is, what to do with it, what it can do to our body, and what could happen if we do not eat food in the right manner and in the right amounts.

In *Unit 1* of *Block 1* we introduce you to the concepts of food, nutrients, nutrition, and factors which influence food acceptance.

In *Unit 2* we proceed to explain the functions of food. Our concern is to help you to understand the importance of food in our lives and lead you on to learn more about food in the Blocks to follow.

In *Unit 3* the macronutrients-carbohydrates, fats, proteins and water are discussed.

In *Unit 4* the micronutrients-vitamins and minerals are discussed.

In *Unit 5* the presentation is about three basic food groups. Each nutrient is important for keeping the body healthy. We, therefore, need to provide the body with all the nutrients in adequate amounts through a judicious combination of foods chosen from the three food groups.

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# UNIT 1 FOOD AND FOOD ACCEPTANCE

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In this Unit you are going to learn the definition of food, nutrients and nutrition. You will also learn the physiological and socio-cultural aspects that influence our food acceptance.

## Structure

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Definitions of Food and Nutrition
- 1.3 Socio-cultural Aspects of Food
- 1.4 Factors Determining Food Acceptance
  - 1.4.1 Physiological Factors Influencing Food Acceptance
  - 1.4.2 Socio-cultural Factors Influencing Food Acceptance
  - 1.4.3 Psycho-social Factors Influencing Food Acceptance
- 1.5 Let Us Sum Up
- 1.6 Glossary
- 1.7 Answer to Check Your Progress Exercises

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## 1.0 OBJECTIVES

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After studying this unit you will be able to :

- define food, nutrients, nutrition, health and nutritional status;
- list the nutrients derived from food;
- describe socio-cultural aspects of food; and
- list factors determining food acceptance.

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## 1.1 INTRODUCTION

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Food is an integral part of our lives. We cannot live without food for more than a few days. Our body needs certain substances called nutrients, which are essential for its proper functioning and for maintaining a healthy nutritional status. The only source of obtaining these nutrients is food which we eat. Food comprises a variety of edible substances but we have to make a wise selection to get proper nourishment for our body. So let us begin by first understanding the definitions of food and nutrition.

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## 1.2 DEFINITIONS OF FOOD AND NUTRITION

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You all know what we mean by food. Food is something we eat and which can be utilised by our body. The need for food begins with the beginning of life itself because it is only through food that we get essential chemical components for life and growth. The process by which the body utilises food is called nutrition. The food consumed by us is utilised by the processes of digestion, absorption, transport, storage, metabolism and elimination for the purpose of maintenance of life, growth, and normal functioning of organs and production of energy. Nutrition is thus a sum total or a combination of all these processes by which living beings receive and utilise materials necessary for the maintenance of their functions and growth and renewal of their components. So food plays an important role in maintenance of health. Health is defined by World Health

Organisation as “a state of complete physical, mental and social well being and not merely the absence of disease or infirmity”. You will learn more about nutrition in this course.

**FOOD IS WHAT WE EAT  
WHILE  
NUTRITION IS THE COMBINATION OF PROCESSES  
BY WHICH WE UTILISE FOOD**

You must now be wondering what it is in food that is utilised by our body. Well, while a variety of foods may be available, the basic constituents of all food are only six. These constituents are collectively called nutrients and include water, proteins, fats, carbohydrates, minerals and vitamins. Our body requires these nutrients in adequate amounts to promote good health. Our body’s need for nutrients depends on many conditions/factors such as activity, climate, daily stresses of living, disease, etc.

**NUTRIENTS ARE CONSTITUENTS OF FOOD AND INCLUDE:**

- WATER
- PROTEINS
- FATS
- CARBOHYDRATES
- MINERALS
- VITAMINS

The condition of our health as influenced by the utilisation of nutrients is called our nutritional status. Hence the ultimate benefits of good nutrition to everyone of us are health, happiness, efficiency and longevity. You will learn in more detail about nutrients in Units 3 and 4 of Block 2.

**Check Your Progress Exercise 1**

- 1) How are the terms “food” and “nutrition” different from each other?  
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- 2) How do you understand the term “nutritional status”?  
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- 3) What do you understand by nutrients?  
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- 4) List the six nutrients.  
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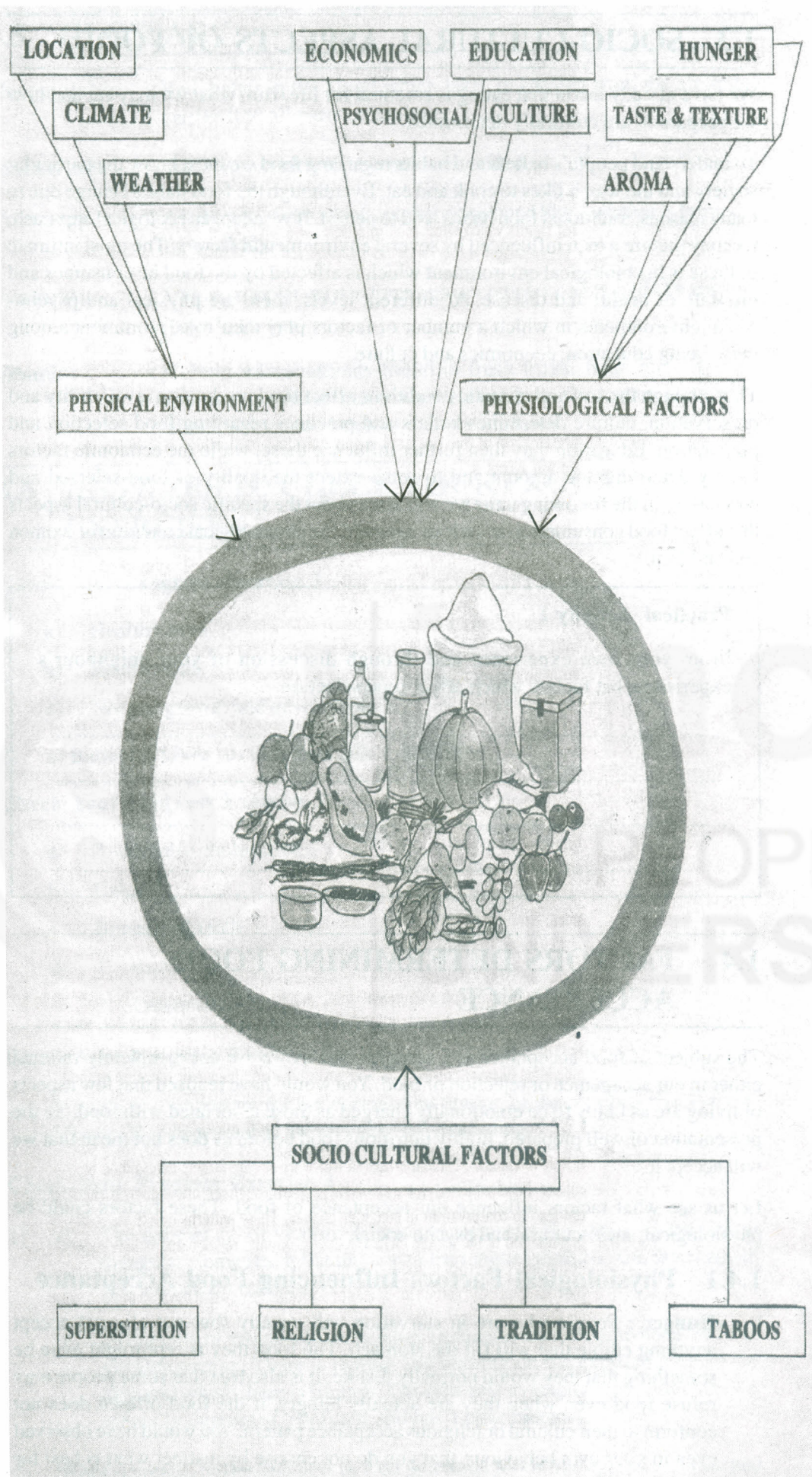


Figure 1.1: Factors influencing food selection

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## 1.3 SOCIO-CULTURAL ASPECTS OF FOOD

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We have already learnt that eating is essential for life. But, what we may eat and how we prepare it, are culturally determined.

To understand people's beliefs and habits regarding food we must know the particular society and the way it likes to cook and eat. Eventhough the food habits change due to many reasons, traditional food habits tend to persist. If we adopt an ecological approach, we may picture a man influenced by several environmental factors. The most intimate of these is his biological environment which is affected by the food he consumes and his state of health and disease. At different levels, there are physical and psycho-social environments in which a number of factors play their role, prominent among these being education, economics and culture.

Thus, though the soil and climatic conditions affect food production, availability and preservation, culture determines beliefs and practices regarding food selection and preparation. Education may then further influence these, while the economic factors largely determine the amount and to some extent the quality of food selected and purchased. In the following units we will learn about the specific socio-cultural aspects that affect food consumption at various ages and the physiological condition of women and children.

### Practical Activity 1

From your own experience and through discussion of your neighbour's experience, list factors which affect food selection.

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## 1.4 FACTORS DETERMINING FOOD ACCEPTANCE

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The subject of food acceptance is a complex one as we are not completely rational either in our acceptance or rejection of food. You would have realised that few aspects of living are as likely to be emotionally charged as those associated with food. So the presentation of well prepared, highly nutritious food before us does not mean that we will accept it.

Let us see what factors influence our acceptance of food. These factors could be physiological, socio-cultural and psycho-social.

### 1.4.1 Physiological Factors Influencing Food Acceptance

- i) **Hunger** : People who are in starvation will usually (but not always) accept anything edible that will fill the stomach. The food they accept might even be something that they would normally dislike. It is also true that some people may refuse food even when they are actually hungry, if the food offered does not conform to their cultural or religious acceptance pattern. You would have observed even in your own behaviour, that you do not choose by instinct what is best for you. You eat what is available and learn through experience that some foods are better for you than others. You also learn how to make several preparations and enjoy eating them.

- ii) **Sensations produced by food:** The palatability of food is a combination of taste, aroma, texture and temperature. It is also conditioned by the surroundings in which we eat. We often accept or reject food because of its tempting aroma or repulsive smell. However, it is also true that there are some smells which we enjoy while others dislike them. The sense of touch is highly developed in our tongue. Our tongue enjoys a variety of textures, temperature and taste. Some persons like dry, crisp food, while others may enjoy soft and creamy food. Adults may enjoy steaming hot food while children may enjoy lukewarm food. Similarly, some of us may enjoy hot, sour and salty food whereas others may enjoy bland and salty or sweet and creamy food. These, individual likes and dislikes of food govern our acceptance or rejection of food.
- iii) **Age:** Age influences our choice of food to a large extent. For example, peanut chikki, cake, milk, etc. are considered foods for children while tea and coffee are considered to be adult foods. While the younger age group enjoys rich food the older age group prefers light meals.

#### 1.4.2 Socio-cultural Factors Influencing Food Acceptance

- i) **Role of culture:** Circumstances in which we eat are largely determined by our culture. Food habits may have existed in people through centuries and such a heritage can lead to conservatism in accepting change. These patterns reflect the social organisation of the people including their economy, religion and beliefs about the health and properties of food. You must have noticed that an emotional reaction to the consumption of certain foods may be so deeply rooted that developing acceptance of them is almost impossible. However, it is not just certain foods but even our meal patterns that are dictated by cultural and occupational patterns. Because of the change in our working schedules, some of us have a light breakfast before going for work, while others have a heavy meal. Similarly, when we return from work, some of us prefer a heavy dinner, while others prefer a light one.
- ii) **Social value of food :** Do you enjoy eating food alone? Certainly not, not always. We usually enjoy eating food in company. Whatever be the occasion, eating together always provides a friendly atmosphere and enjoyable conversation as we invite people to our homes and go out to the houses of our friends. You must have noticed that certain foods like meat, fish, chicken, or cheese, kofta and rich curries or expensive fruits and vegetables, fancy dessert preparations and a variety of cereal preparations like pulao, naan, paranthas form regular items of the menu on the table for any festive occasion. This is due to the social value attached to such foods. Costly foods like apples, cashewnuts, biscuits are considered prestige foods while green leafy vegetables and ragi are considered poor man's food.
- iii) **Religious and moral values of food :** Almost all religions place some regulations on the food we consume. Certain foods are forbidden by religious regulations. For example, Hindus do not generally eat beef; similarly, Buddhists and Jains do not eat flesh foods or eggs while Islam forbids consumption of pork. Fasting again is common to all religions and certain foods are considered as fasting foods.
- Again, foods such as milk, cheese, etc. are accepted as "good" foods while papaya is considered a taboo in some communities. In tribal and hill regions, alcohol is a festive offer. Certain foods like sweets are regarded as rewarding foods or foods for celebration, while depriving a person of food is an accepted form of punishment.

#### 1.4.3 Psycho-social Factors Influencing Food Acceptance

Food is a symbol of security for all of us. Milk, the first food we take, is usually associated with security. Have you noticed that when you were ill and away from home, you liked to drink milk because it reminded you of the loving care your mother

provided you? or, do you remember refusing milk in preference to tea or coffee just because you felt you are an adult? We also at times refuse food because we are angry with our parents or friends or when we are in sorrow. When we are happy we enjoy food. Occasionally, in order to gain attention, when we are sick or lonely, we impose unreasonable demands for food on parents, siblings or friends who are looking after us. Children are reported to have refused food when they are in a state of shock due to a disaster, as in war time.

**Practical Activity 2**

- 1) List those foods which you enjoy eating and state reasons if any.

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- 2) List three foods that you do not like and give reasons.

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- 3) List the foods that are taboo in your religion.

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- 4) List two foods that you do not consume when you are fasting.

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**Practical Activity 3**

- 1) List the foods commonly consumed in your family during the previous week along with the frequency of consumption of each food.

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2) What foods are generally associated with the following occasions/situations/ and prepared in your home?

- a) Guest meal
- b) Wedding
- c) Introduction of first solid food for a baby (annaprasana)
- d) Pregnancy (7th month)
- e) Festivals – Diwali, Sankranti, Baisakhi, Onam

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3) a) Try to analyse the factors which influence your acceptance of a particular food (take one food for example) and your rejection of another food (one example here also).

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b) List these factors in order.

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### 1.5 LET US SUM UP

We have seen that food plays a very important part in our life. Various foods that we eat are utilised by our body through a number of processes like ingestion, digestion, absorption, transport and metabolism. A combination of all these processes by which the ingested food is utilised by our body is called nutrition and the state of nutrition of our body is called nutritional status.

Food that we eat is made up of nutrients which include water, proteins, fats, carbohydrates, minerals and vitamins and they are required by the body in specific amounts depending upon age, sex, activity, climate, etc. What we eat is governed by our socio-cultural environment, educational level and economic conditions. All foods are not acceptable to everyone. There are individual variations in acceptance or refusal

of food. The basic factors determining the acceptance of food are physiological ones which include hunger and sensations produced by food; and social and psychological factors which include role of culture, social values, religious and moral values, age and sex and also the emotional outlet or security provided by food.

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## **1.6 GLOSSARY**

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- Absorption** : Process by which nutrients are taken into the blood stream.
- Culture** : Accepted practice in a community.
- Digestion** : Break down of a food in the body by digestive juices, so as to convert it to such a form which can be absorbed in the body.
- Health** : Physical, mental and social well-being.
- Hunger** : Desire to eat food.
- Metabolism** : Process of utilisation of food for internal body processes.
- Puberty** : Period when secondary sexual characteristics develop and sexual reproduction becomes possible.
- Psychological** : Pertaining to the mind.
- Social** : Pertaining to human relations.

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## **1.7 ANSWERS TO CHECK YOUR PROGRESS EXERCISES**

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### **Check Your Progress Exercise 1**

- 1) Food is something we eat and which can be utilised by our body while nutrition is the process by which we utilise food.
- 2) State of our body as influenced by the kind of food we consume and utilise is called nutritional status e.g. weight or height.
- 3) Nutrients are basic constituents of food which promote good health.
- 4) Carbohydrates, fats, proteins, minerals, vitamins and water are nutrients.

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## UNIT 2 FUNCTIONS OF FOOD

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We eat food daily. Have you ever questioned why we eat food and what it does to our body? In this Unit, the primary concern is to help you understand the functions of food.

### Structure

- 2.0 Objectives
- 2.1 Introduction
- 2.2 Food and Its Functions
- 2.3 Physiological Functions
  - 2.3.1 Energy Giving
  - 2.3.2 Body Building (Growth and Development)
  - 2.3.3 Regulation of Body Processes and Body Protection
- 2.4 Psychological Function
- 2.5 Social Function
- 2.6 Let Us Sum Up
- 2.7 Glossary
- 2.8 Answers to Check Your Progress Exercises

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### 2.0 OBJECTIVES

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After studying this unit you will be able to :

- state the reasons for eating food;
- state the role of food in our body;
- describe the physiological role of food;
- describe the psychological significance of food; and
- explain the social aspects of food.

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### 2.1 INTRODUCTION

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You know the definitions of food, nutrient and nutrition. You would have realised that one of the important functions of food is to provide various nutrients for meeting the physiological requirement of body. However, food is much more than just a carrier of nutrients. It has several functions. This unit will focus on the various functions of food.

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### 2.2 FOOD AND ITS FUNCTIONS

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Food is one of our basic necessities. It may include rice, chapaties, dal, curries, curd, milk, fruit, etc. We may live without food perhaps for a few days but if we do not get it for long, our working capacity goes down and we feel weak. You must have noticed this while fasting, especially when you fast for a long time.

This indicates that food is important for maintaining our general health and it helps us in performing various activities.

In this unit, you will thus become familiar with the various functions of food. When you have studied it, you will be able to understand:

- the physiological function of food which includes release of energy for performing various activities;
- how food helps in our body growth/development; and
- how food helps in regulating our body processes and protects our body from infectious diseases and injuries. You will also become familiar with the psychological and social aspects of food. Thus we can say that food performs the following three major functions:
  - i) Physiological function.
  - ii) Psychological function.
  - iii) Social function.

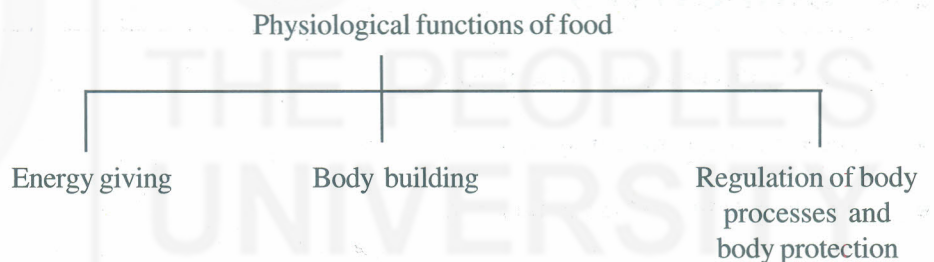
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## **2.3 PHYSIOLOGICAL FUNCTIONS**

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We know that our food provides us various nutrients such as carbohydrates, fats, proteins, vitamins and minerals. All these nutrients along with water present in the food help in the normal functioning of our body processes. Either deficiency or excess of one or more of these can very often result in the malfunctioning of our body.

Now we shall see how the food and the nutrients present in it help in carrying out the physiological functions. These can be grouped into three categories.



### **2.3.1 Energy Giving**

Food is utilised in our body to give us energy. Our body requires energy for performing physical activities like sitting, standing, walking, running, climbing up and down. We also spend energy for activities like cooking, stitching, gardening, etc. You must have experienced that you feel hungry after heavy work.

This indicates that during physical activity, energy is used up by our body. Apart from these, energy is also required for some of the involuntary on going processes in our body, such as blood circulation, respiration, digestion and absorption of nutrients, excretion of waste products and the maintenance of our body temperature.

All these processes are of utmost importance in our lives.

**FOOD GIVES US ENERGY FOR MAINTENANCE  
OF LIFE AND TO DO WORK**

Our food contains carbohydrates, fats and proteins which provide us energy to do work. Of these, we usually meet most of our energy needs from carbohydrates and

fats. However, when these two nutrients are present in inadequate amounts and cannot meet our body demands, then proteins are also metabolised to give us energy. Just as we measure the weight in grams and length in centimetres, energy value of food is measured in Kcal. You would like to know what a Kcal is. Isn't it?

The amount of heat required to raise the temperature of one litre of water by one degree centigrade is commonly known as Kcal.

If you take the same weight of each of the carbohydrates, fats and proteins, fats give us twice the amount of energy as compared to carbohydrates and proteins.

In other words we can say that:

1 gm. of Carbohydrate gives us approximately 4 Kcal

1 gm. of Fat gives us approximately 9 Kcal

1 gm. of Protein gives us approximately 4 Kcal

**Check Your Progress Exercise 1**

- 1) Describe briefly the energy giving function of food.

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**Check Your Progress Exercise 2**

- 1) Calculate the energy value of the following food-stuffs in Kcal
  - a) 25 gm of carbohydrates ( ).
  - b) One tea spoon of sugar containing five grams of carbohydrates ( ).
  - c) 10 gm of protein food ( ).
  - d) One large spoon of oil containing 14 gm of fat ( ).
  - e) One glass of milk containing 12 gm of carbohydrate, 10 gm of fat and 11 gm of protein ( ).

**2.3.2 Body Building (growth and development)**

You have seen a child growing up. He gains both in weight and height. This can only be possible if he eats the right type and right amount of food. This particular function of food is known as the body building function of food.

In our body, not only are new cells and tissues being formed every moment but also the old ones are continuously disintegrating. Food helps in the repair of worn out

tissues and in the formation of new tissues, resulting in body growth. Although all the nutrients help in this function, the major ones are **PROTEINS, MINERALS AND WATER**.

Water is one of the chief components of each body cell and it forms about 65% of our total body weight. This indicates how important water is in building our body. Similarly proteins are also present in each and every cell of our body. For minerals, a very good example is that of bones. However, small amounts of all the other nutrients are also present in each cell.

So we can say that:

**PROPER TYPE AND AMOUNT OF FOOD, IF TAKEN, CAN ASSURE US OF BODY GROWTH AND DEVELOPMENT.**

**Check Your Progress Exercise 3**

- 1) Explain the body-building function of food in 7 or 8 lines.

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**2.3.3 Regulation of Body Processes and Body Protection**

In our body various processes are on going and food helps in regulating these. Food also helps in protecting our body from various infections and diseases.

- i) The major nutrients involved in body regulation are: Proteins, Vitamins, Minerals and Water.

A number of reactions and processes go on with the help of enzymes such as Pepsin, Rennin, Trypsin. Now, would you like to know what enzymes are? Well, enzymes help in facilitating various reactions in our body. Their role is more like a catalyst and they participate in various processes like respiration, digestion, absorption and metabolism of food.

All the enzymes are proteins. Thus we can say that these proteins help in regulating various processes in our body. Similarly, vitamins especially the vitamins of the B-group and minerals also help in regulating our body processes.

Water is the most important constituent of our body. It not only forms 65% of our body weight but also regulates all the body processes. From the body, waste material is sent out in the form of perspiration, urine and faeces which is all possible due to water.

These are only a few examples to indicate how food helps in regulating our body processes. You can think of some other similar examples.

- 1) Explain briefly how food helps in regulating our body processes.

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ii) In our body particular proteins are present which fight against diseases. We can say that these proteins known as antibodies (gamma-globulins) act as soldiers and fight back the enemies i.e. the disease organisms and thus we are saved from a number of diseases and infections.

Similarly, the vitamins keep our body and skin healthy and protects us from diseases. Think of cracks in an unhealthy skin which may occur due to the deficiency of some of the vitamins. Through such cracks disease organisms can enter the body and make us sick.

You must have at some time or the other cut your finger. Have you noticed that the blood which starts coming out stops after some time? Why does that happen? This is because the formation of blood clots after some time and thus prevents further flow and loss of blood. This can happen in the presence of calcium and vitamin K. Therefore, we can say that calcium and vitamin K participate in protecting our body.

You know that water is there in our body, surrounding all our delicate organs like heart, brain, etc. This water around these organs protects them from any jerks and external shocks. In the same way we have fat just below the outer layer of the body i.e. skin which protects us from any damage when we happen to fall.

Thus we can say that:

**FOOD PROVIDES US VARIOUS NUTRIENTS TO REGULATE OUR BODY PROCESSES AND TO PROTECT US FROM DISEASES**

**Check Your Progress Exercise 5**

- 1) How does food help in protecting our body from infections, diseases and external injuries? Describe briefly.

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- 2) Discuss the three categories of physiological functions of food.

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## 2.4 PSYCHOLOGICAL FUNCTION

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Food not only provides various nutrients but it also satisfies our hunger needs and gives us psychological satisfaction. You must have experienced that the food that you like gives you added pleasure. For instance, if you like rice, pakoras or halwas and you get them in your meal, you experience joy in eating these. Similarly the food cooked by the person you love adds to your joy of eating.

Very often food may be used as a reward for achievement. A child on his good performance may be given sweets, ice-cream, etc. Similarly, withdrawal of food may be used as a punishment in some cases. This is known as the psychological aspect of food and we can say that food gives us a sense of psychological satisfaction.

### Check Your Progress Exercise 6

- 1) Explain the psychological function of food.

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

---

## 2.5 SOCIAL FUNCTION

---

Apart from the functions mentioned above i.e. the physiological and psychological functions of food, it is also very important from the social point of view. You have already learnt about socio-cultural factors affecting food selection in Figure 1.1.

Food creates an atmosphere where the social relations can be developed and it helps in bringing the people from different classes, communities and religions closer. You must have often seen that each of our social gatherings and functions are followed by some type of food. At a birthday party, engagement party or a marriage party, food helps in sharing the joy and happiness of each other.

You must have often invited your friends or relatives for dinner or tea, etc. Here food helps in expressing your hospitality towards them i.e. how much you care for them. In the same way exchange of sweets at festivals like Deepawali, Eid, Christmas is one of the ways of sharing your joy with other people.

These are some of the examples to express the social aspects of food. You can now list some more of such examples showing the importance of food in building social relations.

### Check Your Progress Exercise 7

- 1) State the social aspect of food. Give three examples to show how food helps in building social contacts.

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

**Check Your Progress Exercise 8**

- 1) State whether true or false:
  - a) We eat food to get energy for performing the day to day activities. ( )
  - b) Food provides us proteins which help us in our body growth and development. ( )
  - c) Food contains iron, which helps in coagulation of blood. ( )
  - d) Food gives us psychological satisfaction. ( )
  - e) Fats do not protect our body from injuries. ( )
  
- 2) Fill in the blanks:
  - a) ..... forms 65% of our body.
  - b) Proteins help in building our .....
  - c) Our bones are made up of ..... and phosphorus.
  - d) Vitamins help in .....our body processes.
  - e) When the carbohydrates and fats in our diet are lower than the amounts required by our body, the .....present in our food are utilised to give us energy.

**Check Your Progress Exercise 9**

- 1) Explain with example how the following nutrients help in regulating our body processes and in body protection.
  - a) Water .....  
.....
  - b) Proteins .....  
.....  
.....
  - c) Minerals .....  
.....
  - d) Vitamins .....  
.....

---

**2.6 LET US SUM UP**

---

Food is very important for us. It not only satisfies our apparent need of hunger but also provides us all the nutrients to maintain our life and help in the growth of our body. It also gives us protection against different diseases and infections and gives us psychological satisfaction. Besides, food helps us in making our social contacts and strengthening relationships.

We can thus say that food is of utmost importance for all of us.

---

## 2.7 GLOSSARY

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- Enzymes** : The organic catalysts which regulate our body processes.
- Involuntary processes** : A system which cannot be controlled or regulated by human beings as per their wish.
- 

## 2.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

---

### Check Your Progress Exercise 1

- 1) Our body requires energy for performing physical activities like sitting, standing and walking. We also spend energy while carrying out work like cooking, stitching, gardening, etc. Apart from these, our body requires energy for the involuntary processes such as blood circulation, respiration, digestion of food, etc.

Our food contains carbohydrates, fats and proteins which are metabolised to give us energy. Thus we can say that food gives us energy for performing the above functions.

### Check Your Progress Exercise 2

- 1) a) 100 Kcal  
b) 20 Kcal  
c) 40 Kcal  
d) 126 Kcal  
e) 182 Kcal

### Check Your Progress Exercise 3

- 1) Food helps our body to grow. In our body, not only the new cells and tissues are being added every moment but also the old ones are continuously being broken down and repaired. This results in body growth. Although, all the nutrients present in our food help in this function, the major role is played by proteins, minerals and water. This is known as the body building function of food.

### Check Your Progress Exercise 4

- 1) Proteins, vitamins, minerals, water and the other nutrients help in regulating various reactions going on in our body. Since we derive these nutrients from food, we can say that food helps in regulating our body processes.

### Check Your Progress Exercise 5

- 1) Various nutrients like proteins, vitamins, minerals, fat and water, help in protecting our body from infections, diseases and external injuries. The antibodies (special type of proteins) present in our body act as soldiers and fight back the disease producing organisms and thus we are saved from a number of diseases and infections. Similarly, the other nutrients play their role in protection of body. Since we get these nutrients through food, we can say that food helps in protecting our body.
- 2) Physiological function of food can be grouped into three categories: Energy giving, body building and regulation of body processes.

**Check Your Progress Exercise 6**

- 1) Food satisfies our hunger and gives us a sense of psychological satisfaction. This is known as the psychological function of food.

**Check Your Progress Exercise 7**

- 1) Food creates an atmosphere where social relations can be developed and helps in bringing them close. Food has a special significance in various cultures and festivals in the society. Food is an integral part of birthdays, weddings and langars and a reason for people to come together.

**Check Your Progress Exercise 8**

- 1)
  - a) True
  - b) True
  - c) False
  - d) True
  - e) False
- 2)
  - a) water
  - b) body cells and tissues
  - c) calcium
  - d) regulating
  - e) proteins

**Check Your Progress Exercise 9**

- 1) 

Water	- Regulates body temperature, surrounds all delicate organs and protects the body from shocks.
Proteins	- As enzymes, proteins regulate the body processes but as antibodies they protect against diseases.
Minerals and Vitamins	- Calcium and Vitamin K help in clotting blood.

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## UNIT 3 MACRONUTRIENTS AND THEIR FUNCTIONS

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In *Unit 2* you have already learnt that nutrients perform several important functions in our body. In this unit, you will study about macronutrients and their functions.

### Structure

- 3.0 Objectives
- 3.1 Introduction
- 3.2 Definitions of Macronutrients and Micronutrients
- 3.3 Carbohydrates
  - 3.3.1 Functions of Carbohydrates
  - 3.3.2 Sources
  - 3.3.3 Effects of Deficiency and Excess on the Body
- 3.4 Fats
  - 3.4.1 Functions of Fats
  - 3.4.2 Sources
  - 3.4.3 Effects of Deficiency and Excess on the Body
- 3.5 Proteins
  - 3.5.1 Functions of Proteins
  - 3.5.2 Sources
  - 3.5.3 Effects of Deficiency and Excess on the Body
- 3.6 Water
- 3.7 Let Us Sum Up
- 3.8 Glossary
- 3.9 Answers to Check Your Progress Exercises

---

### 3.0 OBJECTIVES

---

After studying this unit you will be able to :

- state the functions and importance of each macronutrient in our diet;
- list the important food sources of each of these nutrients; and
- describe the effects of deficiency of these different nutrients.

---

### 3.1 INTRODUCTION

---

By now you know that carbohydrates, proteins, fats, vitamins, minerals and water are the nutrients present in the food. But these nutrients are not present in the same amount in various foods. Some of these are present in larger amounts and others in smaller amounts. All these nutrients are important as they have varied functions in the body. In this unit you will learn about definitions of macronutrient and micronutrient, and the functions and sources of macronutrients.

## 3.2 DEFINITIONS OF MACRONUTRIENTS AND MICRONUTRIENTS

In Unit 2, you have studied the functions of food. In order to perform these functions, food contains a number of essential constituents known as nutrients which help in the performance of functions of body. Each nutrient has its own specific function to perform. You know that the nutrients are divided into six different categories. These are:

- |                  |   |                |
|------------------|---|----------------|
| i) Carbohydrates | } | Macronutrients |
| ii) Fats         |   |                |
| iii) Proteins    |   |                |
| iv) Water        |   |                |
| v) Vitamins      | } | Micronutrients |
| vi) Minerals     |   |                |

*The macronutrients are present in larger amount in any food while the micronutrients are present in much smaller amounts.* For example, a food like rice (raw, milled) has 78.2 gm per cent carbohydrates, 6.8 gm per cent proteins, and 0.5 gm per cent fats, while it has only .06 mg per cent of vitamin B<sub>1</sub>, and 10 mg per cent of calcium. Green leafy vegetables like spinach contain 92 gm per cent water while the amount of vitamin C is only 28 mg per cent. Our body's quantitative need for the macronutrients is higher than the need for the micronutrients.

In this unit we will be learning about each of the macronutrients; their sources, functions and their effects on the body, if these nutrients are not present in adequate amounts in our diet.

## 3.3 CARBOHYDRATES

Most foods that we eat contain some amount of carbohydrates. Carbohydrate is the nutrient that we consume daily in the maximum amount. These, therefore, make up the bulk of our diet. Carbohydrates are either naturally present as in rice, wheat, fruits, potato, honey, etc., or added in the form of sugar to food such as ice-cream, cold drinks, tea, coffee and so on.

There are some carbohydrates which are complex like starches which the body has to digest in order to use them. There are others which are simpler in nature like glucose, which can be used by the body directly. Sugar which is so commonly used is also an easily digestible carbohydrate.

### 3.3.1 Functions of Carbohydrates

Given below is a brief description of five important functions of carbohydrates:

- i) **Energy giving action:** Carbohydrates are the main source of energy. Each gram of carbohydrate gives four Kcal of energy to the body. Although fats and proteins also provide energy, the intake of carbohydrates is much greater and so it is the most important source of energy to us.
- ii) **Protein-sparing action:** Proteins about which you will be studying in the Section 3.4 in this unit, are required by the body mainly for body-building purposes. At the same time, they can also provide energy to the body when there is a short supply of carbohydrates and fats. However, if proteins are used exclusively to give energy it is wasteful, because they are mainly derived from expensive foods and their function is body building. It is, therefore, important that we should have

sufficient amount of carbohydrates and fats in our diets. This will spare the proteins for their main task of body-building which carbohydrates and fats cannot perform.

- iii) **Fat utilising action :** Carbohydrates when present in adequate amounts in the diet help in the proper utilisation of fats in the body.
- iv) **Flavour enhancing action:** Carbohydrates like sugar, honey and jaggery give flavour to the food, making it tasty and acceptable.
- v) **Digestive action:** There are some forms of carbohydrates called fibre or roughage which are not digested by the body and therefore do not provide any energy. These are however, important to us. They give bulk to the diet and so help in normal movement of the food in the gastro-intestinal tract. This helps to prevent constipation. These are present in coarse grains, and green leafy vegetables.

**CARBOHYDRATES ARE THE MAIN AND  
EASILY DIGESTIBLE SOURCE OF ENERGY.**

### 3.3.2 Sources

Sugar, jaggery and honey are pure carbohydrates. Cereals, pulses, roots and tubers like potatoes, sweet potatoes, beet root and yam, are very rich sources of carbohydrates. Fruits especially bananas, mangoes, pineapples and grapes are also a good source of carbohydrates.

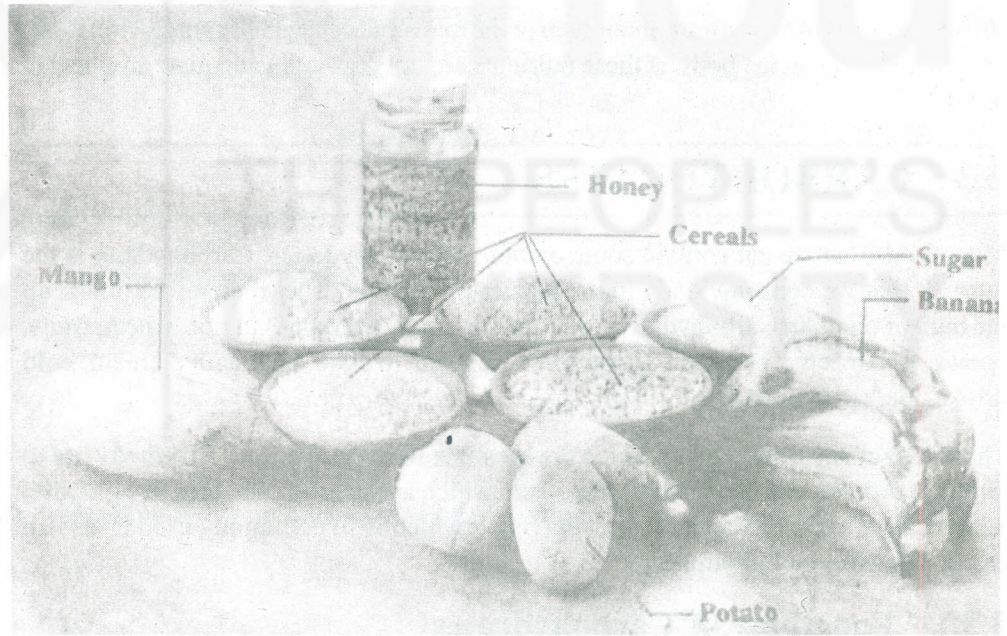


Figure 3.1: Carbohydrate-rich foods

### 3.3.3 Effects of Deficiency and Excess on the Body

The effects of carbohydrates on the human body can be related to their deficiency or excess in diet. Lack of carbohydrates in the diet basically causes lack of energy. This leads to underweight, tiredness and poor work efficiency.

**Excess of carbohydrates in diet:** If our diet has excess carbohydrates, it is converted into fat and stored in our body. Therefore, an increased intake of carbohydrates leads to overweight. This in turn can be one of the causes for other diseases like diabetes, high blood pressure, etc.

### Practical Activity 1

List five good sources of carbohydrates that you commonly consume.

.....  
.....

## 3.4 FATS

Fats are the concentrated sources of energy in our diet. They form an important part of our daily food. Though we mainly consume fats in the form of butter, ghee, oils, etc. some amount of fat is also present in foods like milk, nuts and meat.

### 3.4.1 Functions of Fats

We will discuss six major functions of fats:

- i) **Source of energy** : Fats are the richest sources of energy. One gram of fat gives 9 Kcal which is more than double the amount obtained from equal amounts of carbohydrates and proteins
- ii) **Carrier of fat soluble vitamins**: Some fat-soluble vitamins like A, D, E and K need fat for their proper absorption and utilisation in the body. The body can suffer from deficiency of these vitamins, if enough fats are not present in the diet.
- iii) **Insulation**: The layer of fat under the skin helps in maintaining body temperature.
- iv) **Protection**: Fats act as a cushion to important organs in the body and protect them from shocks and external injuries.
- v) **Palatability**: Fats are used for cooking and frying and so make the food tasty and acceptable.
- vi) **Satiety value**: They take longer time to be digested in the body. This gives us a feeling of fullness and satisfaction.

**FATS ARE CONCENTRATED SOURCE OF ENERGY  
AND MAKE YOUR FOOD TASTY.**

### 3.4.2 Sources

Fats are obtained from vegetable as well as animal sources. What constitutes these two sources?

**Vegetable sources**: Vegetable cooking oils are extracted from oil seeds and nuts such as groundnut, mustard, sesame (til), soyabean, cotton seed and coconut.

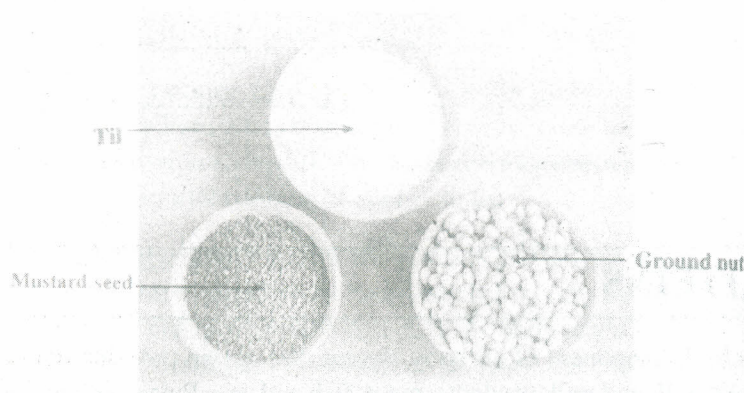


Figure 3.2: (a) Source of vegetable fats

**Animal sources :** Milk, egg yolk and fats like ghee, butter, cream, fish liver oils are some of the fats of animal origin.

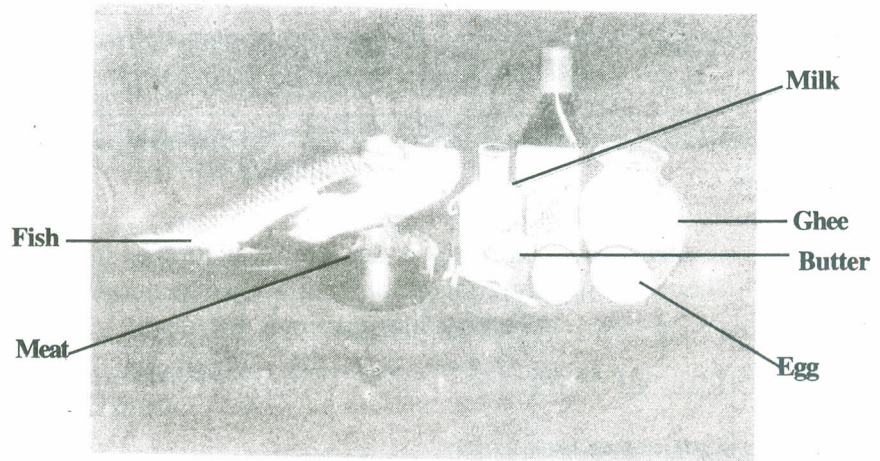


Figure 3.2: (b) Sources of Animal fats

### 3.4.3 Effects of Deficiency and Excess on the Body

**Deficiency of fat:** Fats affect the body when either they are deficient or in excess. Lack of fats in the diet basically causes lack of energy. This leads to underweight, tiredness and reduced work efficiency. The body can suffer from deficiency of vitamins like A, D, E, and K if enough fat is not present in the diet.

**Excess of fat:** Excess of fat in our diet leads to overweight. This in turn can be one of the causes of diseases like diabetes, heart disease and high blood pressure.

**EXCESS OF FAT IN DIET  
LEADS TO OBESITY.**

#### Check Your Progress Exercise 1

- 1) List three function of fats.
  - a) .....
  - b) .....
  - c) .....
- 2) Mention five good sources of plant and animal fats.
  - a) .....
  - b) .....
  - c) .....
  - d) .....
  - e) .....

---

## 3.5 PROTEINS

---

Protein is the chief component of all body tissues. We obtain proteins mainly from animal foods like milk and milk products, meat, fish and egg. Pulses and nuts are also good sources of protein.

### 3.5.1 Functions of Proteins

There are three important functions of proteins.

- i) **For growth and maintenance:** Proteins are required for growth and maintenance of the body tissues. More protein is required by the body during periods of growth for it is needed to build up new tissues. Therefore, children need more proteins per unit body weight to grow normally. Pregnant mothers need more protein for the growth of the foetus. Also, lactating mothers need extra proteins to help them in the secretion of milk.

**INCLUDE PROTEIN RICH FOODS FOR INFANTS,  
CHILDREN, PREGNANT AND NURSING MOTHERS.**

- ii) **Regulation of body processes:** Many body processes are controlled by the presence of proteins in the body. For this, proteins present in the form of enzymes and hormones help to regulate a number of important body processes. Proteins also give resistance to the body to protect itself against infections.
- iii) **Proteins as a source of energy:** One gram of protein provides four Kcal. But protein foods are expensive sources of energy. As already explained under carbohydrates, it is preferable to use proteins for body building only, by providing enough carbohydrates and fats in the diet so that proteins are spared. This is called protein sparing action.

### 3.5.2 Sources

Protein is obtained from the following two sources:

**Animal protein sources:** These include milk, egg, meat, fish, poultry and milk products like cheese, curd, khoa. These foodstuffs have good quality proteins or complete proteins as they are completely used up by the body.

**Vegetable protein sources:** Pulses like whole and split, soyabeans, nuts and oil seeds like peanuts, almonds and cashewnuts are rich sources of vegetable protein. Cereals like wheat and rice also provide some amount of protein. The proteins of these foodstuffs are not of good nutritional quality. If anyone of these foods is the only source of protein in the diet, the protein is not completely used. However, a combination of these foods or their combination with any animal protein food improves their protein quality and they are used better. It is nutritionally better to use a mixture of cereals and pulses at a meal rather than using either cereals or pulses alone. Khichri, rice and dhal, missi roti (wheat flour + besan), idli, and dosa are some good examples of cereal and pulse combinations. Similarly addition of even a small amount of milk, curd or other animal protein like meat, fish improves utilisation of plant proteins, for example rice kheer, khichri with curd.

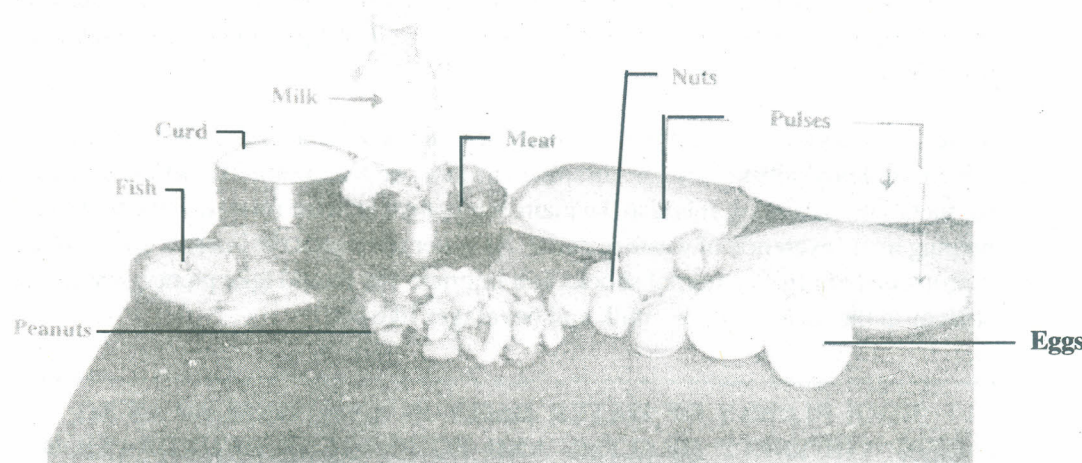


Figure 3.3: Protein-rich foods

**MIXTURES OF CEREALS AND PULSES  
ARE GOOD FOR GROWTH OF CHILDREN**

**3.5.3 Effects of Deficiency and Excess on the Body**

Protein deficiency generally affects the children adversely and this condition is called 'Kwashiorkor'.

This leads to retardation in normal growth pattern. In severe cases there is oedema as well as changes in the hair and skin. It can lead to a lowering of resistance to infections, and children often suffer from diarrhoea.

In pregnant mothers, deficiency of protein in the diet retards the growth of the foetus. In lactating mothers it could lead to less production of milk.

**Check Your Progress Exercise 2**

- 1) Write three functions of protein.
  - a) .....
  - b) .....
  - c) .....

**Practical Activity 2**

List four dishes which you prepare at home using combination of cereals and pulses.

.....

.....

.....

.....

.....

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**3.6 WATER**

---

Water is the abundantly distributed nutrient in our body. It constitutes about two-thirds of our total body weight. It is present in every cell of the body tissues. Its basic functions are that of giving structure to the cell and participating in metabolic activities.

Water is important to maintain our body temperature. It also acts as a medium in which the body substances can dissolve and thus be transported to different tissues for metabolic activities. It is also the main component of urine formed in the body, thus helping in the excretion of waste material. As water surrounds the internal body tissues, it protects them from external shocks and injuries. We should take plenty of water as such or in the form of juices, milk and beverages like tea.

**TAKE PLENTY OF WATER DAILY IN ANY FORM SO AS TO  
KEEP YOURSELF HEALTHY AND TO PREVENT DEHYDRATION.**

- 1) Why is water considered important for our body? Write your answer in about five lines.

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

**Practical Activity 3**

List three common foods rich in the following two nutrients and indicate the cost (per 100 gm)

- a) Energy
- b) Protein

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

---

**3.7 LET US SUM UP**

You have just read that food contains various nutrients which have very specific functions to perform. Macronutrients are present in larger amounts in food while micronutrients are present in smaller amounts. Carbohydrates, fats, proteins and water are macronutrients.

Carbohydrates mainly provide energy and form the bulk of the diet. They are found in cereals, roots and tubers, sugar, jaggery, fruits, etc. Fats are concentrated sources of energy and are present in our diet in the form of ghee, vanaspati and oils, nuts and oilseeds, milk and egg yolk. Protein is the chief component of all tissues and is responsible for body building and repair of tissues. Milk and milk products, meat, fish, egg, pulses, nuts and oilseeds contain a good amount of protein. Water performs many different functions in the body. It is important to take plenty of water as such or in the form of different beverages.

---

**3.8 GLOSSARY**

- Gm per cent** : Grams of particular nutrient in 100 gm of food.
- Enzyme** : A protein substance produced by living cells which controls chemical changes without undergoing any change in itself.
- Foetus** : The young embryo (child) growing in the womb of the mother.

- Gastro-intestinal tract** : The tract extending from the mouth to the rectum through which food passes during the process of digestion and absorption.
- Hormone** : Secretion of an internal body gland which regulates various body processes.
- Lactating Mother** : A mother who is breastfeeding the child.
- Resistance** : Ability of the body to resist diseases in the body.
- 

### **3.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES**

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#### **Check Your Progress Exercise 1**

- 1) a) Energy giving  
b) Absorption and utilisation of fat-soluble vitamins  
c) Maintenance of body temperature
- 2) a) Groundnut oil  
b) Mustard oil  
c) Coconut oil  
d) Ghee  
e) Cream

#### **Check Your Progress Exercise 2**

- 1) a) Growth and maintenance  
b) Regulation of body processes  
c) Protection from infections

#### **Check Your Progress Exercise 3**

- 1) Water is needed for giving structure to the body, metabolic activities, maintenance of body temperature, as medium for transport, and utilisation of body substances. It also helps in excretion of waste products. It protects us from external shocks.

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## UNIT 4 MICRONUTRIENTS AND THEIR FUNCTIONS

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In Unit 3 you have learnt about macronutrients and their functions. In this unit you will learn about micronutrients i.e. vitamins and minerals, their importance in our body regulating processes and protection against diseases.

### Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Vitamins
  - 4.2.1 Vitamin A
  - 4.2.2 Vitamin D
  - 4.2.3 Vitamin E
  - 4.2.4 Vitamin K
  - 4.2.5 Vitamins of the B-complex Group
  - 4.2.6 Vitamin C
- 4.3 Minerals
  - 4.3.1 Calcium
  - 4.3.2 Iron
  - 4.3.3 Iodine
- 4.4 Let Us Sum Up
- 4.5 Glossary
- 4.6 Answers to Check Your Progress Exercises

---

### 4.0 OBJECTIVES

---

After studying this unit, you will be able to :

- state the functions and importance of each micronutrient in our diet;
- list the important food sources of each of the nutrients; and
- describe the effects of deficiency of these nutrients.

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### 4.1 INTRODUCTION

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In Unit 3 you have learnt that all nutrients are placed in two subgroups: micronutrients and macronutrients. We will now read about micronutrients. The dictionary meaning of word micro is minute or small, but here it means that even though they are essential for the body, their requirement is very small.

There are two categories of micronutrients – vitamins and minerals. In this unit we will be discussing the sources, functions and the effect of the deficiency of these nutrients on the body (if these nutrients are not present in adequate amounts in our diet).

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### 4.2 VITAMINS

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Vitamins are nutrients which are very important for good health. They are required in small amounts. Our body cannot synthesise them on its own; therefore, they must

be provided by food. The lack of vitamins in the diet leads to various deficiency diseases. Vitamins are divided into two groups:

- i) **Fat soluble vitamins:** This group includes vitamins A, D, E and K. They require the presence of fat in diet for their proper absorption. As they are fat soluble, the excess amounts of these vitamins present in food are stored in the body along with the fats, especially in the liver.
- ii) **Water soluble vitamins:** These are vitamins of the B-complex group and vitamin C. They are soluble in water and therefore, the excess amounts of these are excreted through urine. As they cannot be stored in the body for long, we must include them in adequate amounts in our daily food.

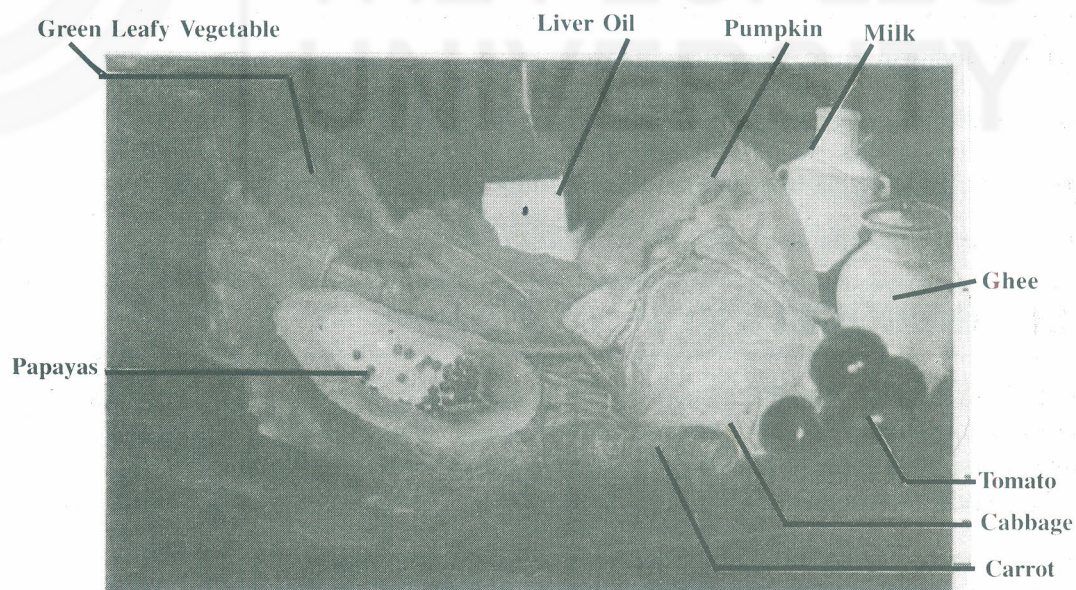
Let us first discuss the sources, functions and effects of inadequate and excess intake of fat-soluble vitamins.

### 4.2.1 Vitamin A

We get vitamin A from foods in two forms:

- i) **Retinol** which is also commonly called vitamin A, is the form in which the vitamin is utilised by the body. It is present mainly in animal foods.
- ii) **Beta carotene** which is the precursor of retinol or vitamin A is present in plant foods. In the body this gets converted to retinol or vitamin A and is then used. Eight parts of beta carotene would be converted to one part of vitamin A in the body.

**Sources :** Foods which are a good source of retinol or vitamin A are butter, milk, ghee, curd and eggs; liver and fish liver oils are very rich sources of vitamin A. Carotene is present in green leafy vegetables like radish leaves, bathua, spinach and methi etc. It is also obtained from yellow and red vegetables like carrots, tomatoes, pumpkin and fruits like papayas and mangoes. Some carotene is also present in milk, eggs and butter along with retinol.



**Figure 4.1: Vitamin A – rich foods**

**Functions:** Vitamin A is very important for our eyes. You must have noticed that we can see even when the light is dim, e.g., in a slightly darkened room. This is made possible by the presence of vitamin A. Vitamin A also keeps the eyes healthy, moist, clear and protected from infections.

Vitamin A is important for the healthy development of the skin and of the mucous lining of the gastro-intestinal tract and genito-urinary tract. It is also necessary for normal growth and development of the body.

**Effects of deficiency/excess:** How does the deficiency of vitamin A affect the human body adversely?

If the diet is lacking in vitamin A or if there is poor absorption of fats, deficiency of vitamin A occurs. The first symptom of this deficiency is inability to see in dim light. This is known as night blindness. If this condition is not treated, it slowly leads to drying of the eyelids and the eye becomes dull. If still untreated, the eyes become soft and get infected. This finally leads to permanent blindness. The deficiency of vitamin A also affects the skin in that it becomes dry and wrinkled.

**GIVE YOUR CHILD FOODS RICH IN VITAMIN A  
TO PROTECT HIM FROM BLINDNESS.**

To overcome deficiency of vitamin A, children are given a concentrated dose of vitamin A every six months as it can be stored in the body. This dose is administered in the Public Health Centres in our country. Excessive amount of vitamin A if taken as a medicine is also harmful. It leads to headache and vomiting. In such a case, the intake should be stopped.

**Check Your Progress Exercise 1**

1) Vitamin A is important for our:

- a) .....
- b) .....
- c) .....

2) List foods rich in vitamin A

- a) .....
- b) .....
- c) .....
- d) .....

**4.2.2 Vitamin D**

We get vitamin D mostly from a precursor (7-dehydro cholesterol) which is present under our skin. When the sun's rays fall on the skin, this precursor gets converted to vitamin D. We also obtain it in small amounts from some foods.

**Sources :** We mainly depend on action of sunlight on the precursor present in our skin to meet our needs of vitamin D. We also get the vitamin from foods like liver, fish, egg yolk, milk, butter and ghee. Fish liver oils are a very good source of the vitamin D. Like vitamin A, vitamin D is also added to vanaspati.



Figure 4.2: Sources of vitamin D

**Functions:** Vitamin D is important for the proper absorption of calcium in our body and its deposit in the bones and teeth. It helps in the formation of strong bones and healthy teeth.

**Effects of deficiency:** The deficiency of vitamin D is common in children and women living in dark, damp places where there is no sunlight. This causes a disease called rickets in children. In this, the calcium and phosphorus are not absorbed properly in the body and so the bones and teeth remain soft and weak. This leads to poor growth of the child. The child finds it difficult to bear his weight. The legs get bowed. The ends of bones of hands and legs get enlarged. The child starts to walk late and bones fracture easily on falling. The teeth also do not develop normally and may decay. In young girls, deficiency of vitamin D leads to improper formation of the bones of the pelvis, which later on cause difficulty in delivery of a baby.

At a later stage the bones of the pelvis of a woman become weak due to lack of vitamin D. As the bones cannot bear the weight of the body, they bend or break. This causes pain in walking and difficulty in child birth. This condition is known as "Osteomalacia".

**EXPOSURE TO SUNLIGHT FOR SOME TIME EVERYDAY PROMOTES HEALTHY BONES AND TEETH.**

**Check Your Progress Exercise 2**

- 1) Fill in the blanks:
  - a) The main source of vitamin D for our body is .....
  - b) Vitamin D helps in the absorption of.....
  - c) Vitamin D is important for the healthy growth of..... and.....
  - d) The deficiency of vitamin D causes the condition of :  
..... in children.  
.....in women.

### 4.2.3 Vitamin E

This is also a fat soluble vitamin. It is important in the healthy functioning of the reproductive system in the body. A deficiency of this vitamin therefore, can lead to problems related to the reproductive system. However it is very rare that deficiency of this vitamin is seen because it is present in many foods that we commonly eat. Also, it is required by the body in small amounts and so the need can be easily met. Whole grain cereals, soyabean, peanuts, coconut, etc. are good sources of vitamin E.

### 4.2.4 Vitamin K

This helps to bring about clotting of blood and thus prevents or stops the loss of blood from our body whenever there is an injury or cut.

A little amount of vitamin K is synthesised in our body by some microorganisms present in our intestines.

The food sources are green leafy vegetables like spinach, methi, radish leaves, etc.

When there is deficiency of vitamin K, the body loses a lot of blood due to a cut or injury. Pregnant mothers and new born babies are often given a dose of vitamin K to check bleeding during child birth and brain hemorrhages, respectively.

#### Check Your Progress Exercise 3

- 1) List the importance of vitamin E and vitamin K.

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Now let us discuss the water-soluble vitamins.

### 4.2.5 Vitamins of the B-complex Group

These are a group of vitamins which are present in some types of food. As they are soluble in water, they are easily lost by throwing the water in which food has been soaked or cooked. There are a number of vitamins in this group and the most important ones are:

- Vitamin B<sub>1</sub> or Thiamine
- Vitamin B<sub>2</sub> or Riboflavin
- Vitamin B<sub>3</sub> or Niacin
- Folic Acid
- Vitamin B<sub>12</sub>

**Sources :** Whole cereals, pulses and nuts are good sources of thiamine and niacin; fermented and sprouted foods like dosa, idli, sprouted pulses, etc., are also rich in these vitamins. Animal foods like eggs, liver, brain and kidney are very good sources of B-complex vitamins. Milk and its products are especially important for riboflavin.

They also have a precursor which gets converted in the body to niacin. Green leafy vegetables like methi, spinach and bathua are a good source of riboflavin and folic acid.

**Functions:** The B-complex vitamins are essential for normal growth and development. They are important for the healthy functioning of vital organs, like the heart, nerves and brain and also for healthy skin, eyes and gastrointestinal tract. Vitamins B<sub>12</sub> and folic acid are important in the normal formation of the red blood cells in our body.

**Effect of deficiency:** The deficiency of Vitamin B<sub>12</sub> or thiamine leads to a disease called Beri-Beri. It also leads to weakness, loss of appetite and poor movement of the muscles. There is also heaviness and weakness of the legs and a burning sensation in the body. If not treated the disease also affects the heart which can finally lead to death.

Deficiency of B<sub>2</sub> or riboflavin leads to lesions at the angles of the month (angular stomatitis) inflammation of the tongue (glossitis) and dry chapped lips with ulcers (cheilosis).

The deficiency of Vitamin B<sub>3</sub> or niacin leads to a disease called Pellagra. The person gets diarrhoea and the tongue is swollen and red. There is itching and burning of the skin especially on those portions which are exposed to the sun and where there is friction at the elbows and neckline. The skin on these areas get dyspigmented. Also, the person is mentally depressed, confused and has a poor memory. If the disease is not treated in time, it can cause death. In the deficiency of folic acid and vitamin B<sub>12</sub> the red blood cells are not formed normally and this causes anaemia.

The person becomes pale and gets tired and breathless even on walking for a short duration.

**B-COMPLEX VITAMINS KEEP YOUR HEART, SKIN AND MIND HEALTHY. THEY ALSO PREVENT ANAEMIA.**

**Check Your Progress Exercise 4**

1) Describe the deficiency symptoms of the following:

- a) Vit. B<sub>2</sub> or riboflavin
- b) Vit. B<sub>3</sub> or niacin.

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2) What are the important sources of B-complex vitamins in our diet?

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**4.2.6 Vitamin C**

It is also known as ascorbic acid. It is easily destroyed on exposure to heat and light. We mainly get it from fruits and vegetables.

**Sources:** Vitamin C is often called the fresh food vitamin. This is so because it is very easily destroyed on cooking. Citrus fruits like oranges, sweet lime and lemons are a very good source of vitamin C. Sprouted grams, guava and pineapple are also rich in vitamin C. Other good sources are vegetables like cabbage, green chillies, tomato and green leafy vegetables like spinach, methi, radish leaves, amaranth and cholae. Amla is a cheap and very rich source of vitamin C.

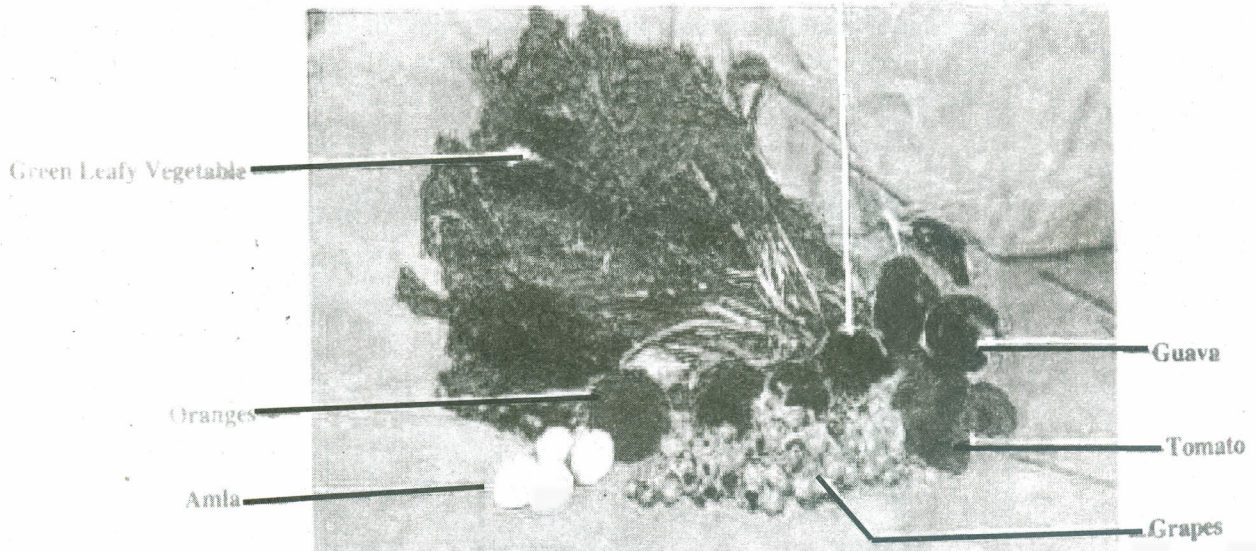


Figure 4.3: Vitamin C rich foods

**Functions:** Vitamin C is important in the body for the healthy development of our teeth, gums and skin. It also gives us the ability to protect ourselves against infections.

**Effect of deficiency:** The deficiency disease of vitamin C is called Scurvy. There is pain, swelling, bleeding of the gums. The teeth get loose and may fall off. There is also swelling, pain and tenderness in the joints.

**EAT PLENTY OF FRESH FRUITS AND VEGETABLES  
TO GET A GOOD SUPPLY OF VITAMIN C.**

#### Check Your Progress Exercise 5

- 1) Vitamin C is important for  
a. .... b. .... c. ....
- 2) The deficiency of vitamin C is called .....

### 4.3 MINERALS

Besides the nutrients already discussed, food has certain other essential constituents called minerals. They are also important for growth and development and various regulatory functions of the body. Like vitamins, the minerals are also needed in small amounts. There are a number of minerals required by the body. We are, however, going to study only about calcium, iron and iodine, which are considered most important because their deficiency is commonly seen in our population.

### 4.3.1 Calcium

Compared to other minerals, calcium, is present in a large quantity in our body. It is present in almost every cell of the body. But the maximum amount is in the bones and teeth along with the mineral phosphorus.

**Sources:** Calcium can be obtained in our diet from milk and milk products, except butter and ghee. Green leafy vegetables such as spinach and methi are also rich sources of calcium. Animal foods such as meat, fish and eggs also provide some amount of calcium. Cereals are only a fair source of calcium with the exception of ragi, (commonly consumed in the South) which is an excellent source of calcium. Among the oilseeds, til seeds are very rich in calcium.

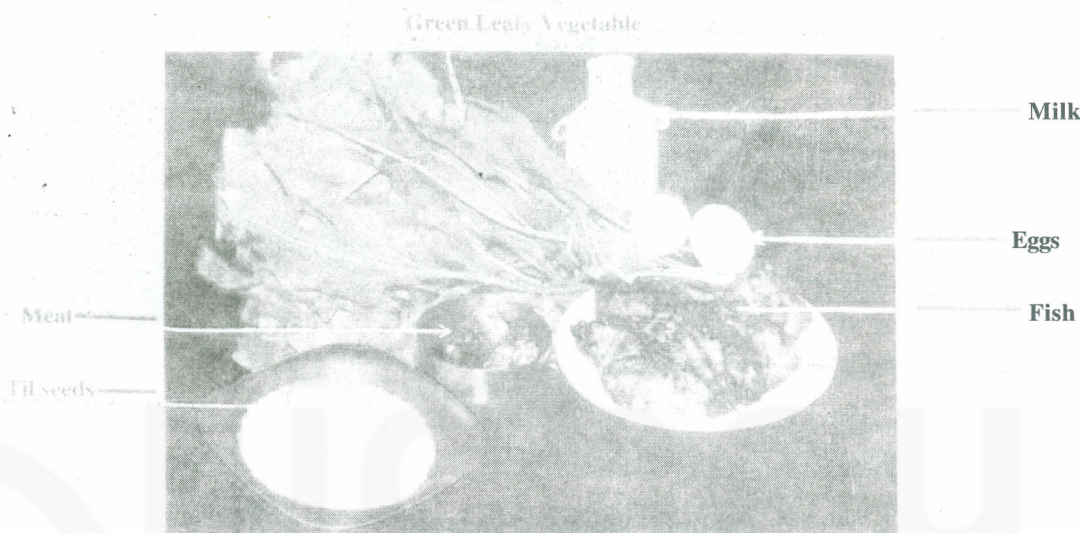


Figure 4.4: Calcium rich foods

**Functions:** The major role of calcium is to build our bones and teeth and keep them healthy. This function is performed in combination with phosphorus in the presence of vitamin D. Besides this, calcium also helps to regulate various body processes, for example, clotting of blood.

**CALCIUM IS IMPORTANT FOR BUILDING HEALTHY BONES AND TEETH.**

**Effect of deficiency:** Calcium deficiency is most commonly seen in pregnant and lactating mothers and in children. In children this leads to symptoms like that seen in the case of Rickets as already described under vitamin D. Similar symptoms are seen in women as in the case of osteomalcia which has been described earlier.

**Practical Activity 1**  
List the various calcium rich foods which you have consumed yesterday in your diet.

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### 4.3.2 Iron

Another important mineral for the body is iron. It is required in very small amounts by the body and is therefore also called a trace element.

**Sources:** Whole grain cereals contribute a major share of iron to our diet. Other sources are green leafy vegetables, egg yolk, liver and meat. Jaggery, though a sweetener, is also a good source of iron. Hence we should prefer jaggery to sugar to sweeten our foods.

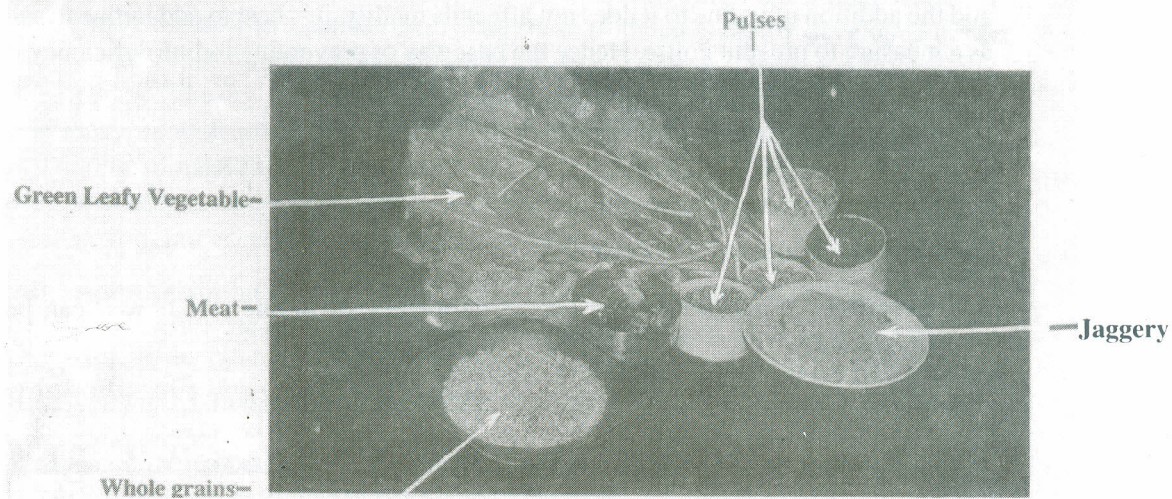


Figure 4.5: Iron rich foods

**Functions:** Iron plays a major role in the synthesis of haemoglobin which is the red coloured pigment present in our red blood cells. It is this haemoglobin which carries oxygen from the lungs to the tissues and carbon-dioxide back from the tissues to the lungs.

**IRON MAKES YOUR BLOOD RED AND HEALTHY.**

**Effect of deficiency:** Iron deficiency is known as Anaemia. It is most commonly seen in children and women of reproductive age. In case of anaemia, the working capacity of a person decreases due to insufficient supply of oxygen to the tissues. Person becomes breathless very soon and gets tired easily. Person appears pale. Tongue and finger tips become pale. All these symptoms are due to lack of production of haemoglobin.

**Check Your Progress Exercise 6**

- 1) Fill in the blanks
  - a) Iron is an important component of .....
  - b) Iron deficiency causes .....
  - c) In an Indian diet iron comes mainly from .....

**4.3.3 Iodine**

Another trace element whose deficiency is commonly found is iodine. Iodine is an important constituent of the thyroid hormone thyroxine in our body which controls the various body processes. The deficiency of iodine leads to a condition called Goitre. In this there is an enlargement of the thyroid gland in the neck region. As the body processes are affected, the person becomes inactive and also puts on weight. This deficiency is very commonly seen in the Himalayan regions of our country. It is also widespread in cities like Delhi and Hyderabad.

Iodine is present in the soil from where it is taken up by the plants. So if the soil is rich in iodine, the crops grown on it are a good source of iodine in the diet. In hilly areas

where the soil is easily washed off by rains and melting snow, the deficiency of Iodine is more commonly seen. Sea-foods are very rich in iodine. To prevent its deficiency the Government has launched a National Programme of producing and distributing Iodised Salt. Since salt is a universally used cheap food additive or taste enhancer and the addition of iodine to it does not affect its quality, it is best to add iodine to salt as a measure to prevent goitre. Hence the best way of preventing iodine deficiency is to use iodised salt in our diet.

**USE IODISED SALT TO PREVENT GOITRE.**

**Check Your Progress Exercise 7**

- 1) Describe the disease caused by the deficiency of iodine and how it can be prevented?

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**Practical Activity 2**

List three common foods each rich in the following nutrients and indicate the cost (per 100 gm)

a) Vitamin A

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b) Vitamin C

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c) Iron

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**4.4 LET US SUM UP**

The micronutrients present in foods are vitamins and minerals. The vitamins are classified into fat-soluble and water-soluble. The fat-soluble vitamins are vitamins A,D,E and K, while the water soluble ones are vitamins of the B-complex group and vitamin C. They are important in our body for regulating various body processes and they help in normal growth and development. Amongst the minerals, calcium, iron and iodine are important for various functions in the body. As iron and iodine are required in very small quantities, they are also known as trace elements.

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## 4.5 GLOSSARY

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- Haemoglobin** : Red matter in the blood which takes in oxygen from the air and carries it to all parts of the body.
- Iodised salt** : The salt to which iodine has been added.
- Precursor** : A substance from which another compound like a vitamin is formed by the body.
- Synthesis** : Uniting simpler units to form a more complex compound like amino acids to protein.
- Vitamins** : Certain micronutrients found in fresh fruits, fresh milk, green leaves, etc. These materials are necessary for health and their absence from food causes various illnesses.

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## 4.6 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

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### Check Your Progress Exercise 1

- 1) a) Healthy eyes  
b) Healthy skin  
c) Normal growth and development.
- 2) a) Butter b) Liver c) Fish liver oils d) Milk

### Check Your Progress Exercise 2

- a) 7-dehydro cholesterol
- b) Calcium
- c) Bones and teeth
- d) 1. Rickets  
2. Osteomalacia

### Check Your Progress Exercise 3

- 1) Vitamin E is important for the normal functioning of the reproductive system. Vitamin K is important to prevent excessive bleeding.

### Check Your Progress Exercise 4

- 1) a) The deficiency of vitamin B<sub>2</sub> leads to lesions at the angles of the mouth (anagular stomatitis, inflammation of the tongue (glossitis) and dry chapped lips with ulcers (cheilosis).  
b) Symptoms of vitamin B<sub>3</sub> deficiency (pellagra) include diarrhoea, red and swollen tongue. There is itching and burning on the exposed parts of the skin and where there is friction. The skin gets dyspigmented. The person is mentally depressed, confused and has a poor memory.
- 2) Whole cereals, pulses and nuts as well as animal foods like egg, liver, brain and kidney.

**Check Your Progress Exercise 5**

- 1) a) Teeth b) Gums c) Skin
- 2) Scurvy

**Check Your Progress Exercise 6**

- 1) a) Haemoglobin  
b) Anaemia  
c) Cereals & green leafy vegetables

**Check Your Progress Exercise 7**

- 1) The deficiency of iodine is called goiter. There is an enlargement of the thyroid gland in the neck region. The person becomes inactive and puts on weight. The consumption of iodised salt helps to prevent this deficiency.



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## UNIT 5 BASIC FOOD GROUPS

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In this unit you are going to learn about different kinds of foods, which are classified as energy giving, body building and protective foods and are termed as Basic Food Groups.

### Structure

- 5.0 Objectives
- 5.1 Introduction
- 5.2 Basic Food Groups
  - 5.2.1 Energy - giving Foods
  - 5.2.2 Body -building Foods
  - 5.2.3 Protective Foods
- 5.3 Let Us Sum Up
- 5.4 Glossary
- 5.5 Answers to Check Your Progress Exercises

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## 5.0 OBJECTIVES

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After studying this unit you will be able to :

- classify foods into separate food groups; and
- state the importance and nutritive contribution of each of these food-groups.

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## 5.1 INTRODUCTION

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We have just read about the various nutrients present in food and the importance of consuming them in adequate amounts in our diet. If our diet is lacking in any of these nutrients, symptoms of different deficiency diseases are seen. Since the different nutrients are present in a variety of foods, it is important to include various foods in our diet. Only then would our diet be a balanced one. A balanced diet should contain all nutrients in sufficient amounts to meet our body's requirements as well as provide a little extra for any emergency like an illness. It is easier to select a balanced diet if these foods nutrients are divided into some categories. These categories are called food groups. There are various ways of dividing food into various groups. One of the simplest ways is on the basis of functions. You will learn about the basic food groups in this unit.

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## 5.2 BASIC FOOD GROUPS

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You know that food performs three main functions in our body. Therefore, we should make sure to include such foods in the diet which are able to perform these three main functions. On the basis of these functions, foods may be divided into three food groups.

### 5.2.1 Energy-giving Foods

This group includes foods rich in carbohydrates and fats. Foodstuffs which provide energy in our diet are:

- i) Cereals like wheat, rice, jowar, bajra, etc. Besides energy these provide good amounts of thiamine, niacin and iron.
- ii) Root vegetables like potato, sweet potato, arbi, etc.
- iii) Fats and oils like groundnut oil, ghee, vanaspati, butter etc. Some fats like ghee are fortified with vitamins A and D.
- iv) Sugar, jaggery and honey. Jaggery also contains a good amount of iron. You will be studying about all these foods in detail in Units 11, 12 and 13.

### **5.2.2 Body-building Foods**

Food is also required for body building and repair of tissues. Foods rich in protein will perform this function. During periods of growth like childhood when body building is going on, it is important to include larger amounts of these foods in our diet. Body building foods which are rich in protein include:

- i) Milk and milk products like curd, paneer, cheese, khoya, etc. These foods are also a good source of vitamin A, riboflavin and calcium.
- ii) Meat, fish, poultry, liver, etc.: Besides protein, these foods provide iron and B-complex vitamins.
- iii) Eggs : Eggs are rich in iron, vitamin A and riboflavin.
- iv) Pulses, nuts and oilseeds: These are also good sources of thiamine, niacin and iron. You will be studying about all these foods in detail in Units 14, 15 and 16.

**EAT AT LEAST ONE BODY BUILDING FOOD IN EACH MEAL.**

### **5.2.3 Protective Foods**

You have read in Unit 2 that foods have a protective function i.e., they prevent diseases. Certain foods build up our body resistance to disease. This function is performed mainly by minerals and vitamins. As vegetables and fruits are rich in vitamins and minerals, they should, therefore, be included in sufficient amounts in our daily diet. Protective foods which are commonly eaten are:

- i) Green leafy vegetables like methi, spinach, etc.
- ii) Yellow or orange vegetables and fruits like mango, papaya, carrot, etc.
- iii) Vitamin C rich fruits like orange, lemon, guava, amla, etc.

You will be studying about all these foods in detail in Units 17 & 18.

**FOR PROTECTION AGAINST DISEASES EAT SOME  
VEGETABLES AND FRUITS DAILY.**

Let us now plan a meal which includes foods from these three groups. Energy giving foods may be included as chapatis or rice, potatoes in any form like sabzi, raita, cutlets, etc. Fat is generally used for cooking vegetables, dhal, rotis and so on. If a sweet dish is included, sugar would also be present in the meal.

Body building foods are also important. Milk may be incorporated in the meal as curd or paneer or in the preparation of a dessert like custard. Animal food may also be included in a variety of ways or eggs may be used in some form. Pulses may be eaten as such or in combination with vegetables, flour, etc.

Vegetables and fruits can be eaten as salads, or cooked in various ways, added to raitas, or as stuffings in rotis.

**Check Your Progress Exercise 1**

- 1) List some energy giving foods.

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- 2) Explain why children need more body building foods. Which are the foods that perform the body building function?

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- 3) What do you understand by the term protective foods? List some of the common food items that protect us.

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**Practical Activity 1**

List what you have eaten yesterday for breakfast, lunch and dinner. See whether you have eaten foods from all the three food groups in each meal. Suggest improvements in the menu, if any.

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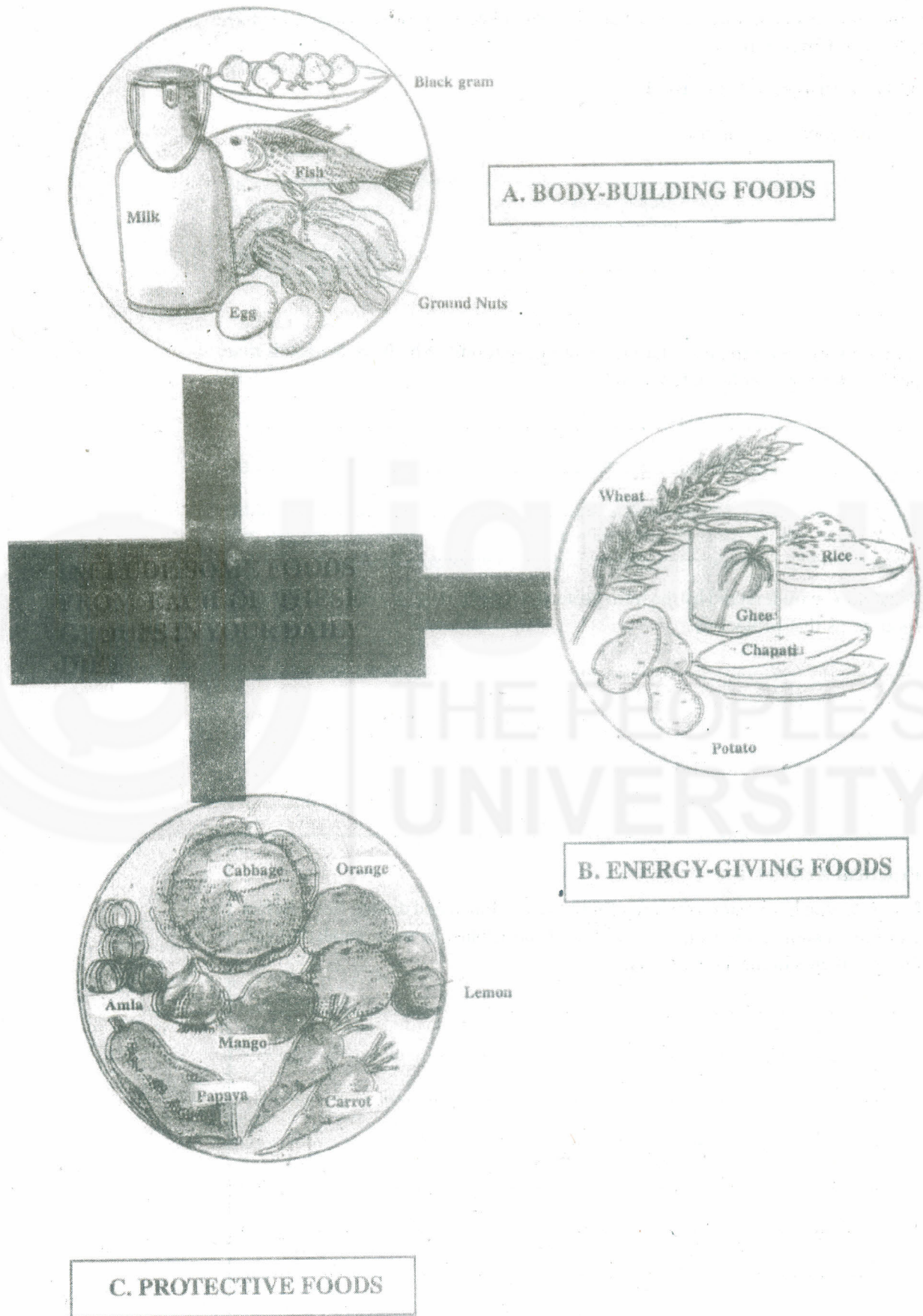


Figure 5.1: Basic food groups

**Practical Activity 2**

- 1) Identify five common foods from each of the three food groups.

Energy giving	Body building	Protective/Regulatory
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

**5.3 LET US SUM UP**

Let us sum up what we have said in this unit. We get the various nutrients needed by our body from a variety of foods. The foods have been classified into three groups depending on their functions and nutrient content. Therefore, in order to ensure an adequate amount of all the nutrients in our diet, we must eat at least some foods from each of these three groups in each meal daily.

**5.4 GLOSSARY**

**Dessert** : Sweet preparation (hot/cold) served after dinner/lunch.

**Resistance** : Ability to oppose.

**5.5 ANSWERS TO CHECK YOUR PROGRESS EXERCISES****Check Your Progress Exercise 1**

- 1) Wheat, rice, bajra, potato, ghee, groundnut oil, sugar, honey, etc.
- 2) During childhood, (period of growth), body building is going on, so it is important to include larger amounts of these foods in their diet. The foods which perform the body building function are:
  - a) Milk and its products like curd, paneer, cheese, etc.
  - b) Meat, fish, poultry, liver, eggs, etc.
  - c) Pulses, nuts and oil seeds, etc.
- 3) Protective foods are those foods which have a protective function i.e. they prevent diseases. Some of the common foods that can protect us from diseases are methi, spinach, papaya, carrot, orange, mango, lemon, guava, etc.

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