
UNIT 1 INTRODUCTION TO FOOD SCIENCE

Structure

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Food and its Functions
 - 1.2.1 Functions of Food
- 1.3 Discovery of Nutrients
- 1.4 Nutritional Classification of Food
- 1.5 The Concept of Health
- 1.6 Let Us Sum Up
- 1.7 Key Words
- 1.8 Some Useful Books
- 1.9 Answers to Check Your Progress

1.0 OBJECTIVES

After reading this unit, you will be able to:

- define food, nutrient and health;
- enlist the functions of food;
- describe the social, psychological and economic aspects of food; and
- explain the concept of health.

1.1 INTRODUCTION

The word "food" nourishes and brings many images to our mind. It is associated with worship and divinity, celebration and mourning, social and family gathering and to community kitchens. So, food plays a crucial role in our lives.

Food is the most basic need of man. Food is intimately woven into the physical, economical, psychological, intellectual, social and cultural life of man. Food furnishes the body with the energy required for all human activities. It provides adequate nutrients for the body's growth, maintenance, repair and reproduction. It provides materials required for the building and renewal of body tissues and substances that are necessary to regulate the body processes. Man has exhibited much thought and foresight in cultivating a variety of grains, fruits, vegetables, nuts, oilseeds and in rearing birds and animals for use as food. The selection of foods best suited for promoting good health has been found out by various researchers. Food is composed of different kinds of substances "nutrients" which when consumed in adequate amounts, fulfil all the functions of body. Food also plays important role besides that of nutrition. Wars have been won by blockading food supplies to the enemy. Power of food may be exerted in society and in the family, through its use as a reward or punishment.

1.2 FOOD AND ITS FUNCTIONS

The term "food" refers to anything, which we take to nourish our body. It includes solids, semisolids and liquids that are consumed by us to maintain our body and keep it healthy. It is our basic necessity because it contains substances, which

perform important functions in our body. These substances are called “nutrients”. It may also contain some non-nutritive substances such as colours and flavour. Hence, food is a complex mixture of different nutrients and non nutrients that can be metabolized by an organism to give energy and build tissue. Food is any substance normally eaten or drunk by living organism and provides mental stimulus for thinking.

1.2.1 Functions of Food

Food is an essential prerequisite for the life and as such the primary goal of eating and drinking is to enable the body to function normally. Food consists in part of various nutrients. There are over forty essential nutrients, which are supplied by food we eat. These nutrients can be classified into five major categories based on their similar features, proteins, carbohydrates, fats, vitamins and minerals. Water is important as a nutrient as well as a food.

Each nutrient category has a specific physiological role, refers to role of food in maintaining certain specific body functions. Since food contain nutrients, it has physiological functions too, as social and psychological functions. “We are what we eat” is an old proverb. Our nutritional status, health, physical and mental facilities depend on the food we eat and how we eat it. Functions of food are listed in *Table 1.1*.

Table: 1.1: Functions of food

Sl. No.	Characteristics
1)	Physiological function <ul style="list-style-type: none"> • Energy giving • Body building • Protection • Regulation of reproduction, emotional equilibrium, memory, excretion.
2)	Social function
3)	Psychological function

i) Physiological Functions

The physiological functions performed by food are the energy giving, body building, protection and regulation of body processes. Energy is required for performing various types of activities such as sitting, standing, walking, running and performing all our house hold and other works. It is also required for carrying out various activities within the body e.g., beating of heart, contraction of the intestines, expansion and contraction of the lungs. Activities performing within the body also require expenditure of energy. The energy giving function of food is performed by two important nutrients i.e., carbohydrates and fats which are known as body “fuel”. When these are burnt, the energy is released in the form of heat which is trapped in high energy compounds of biological system such as ATP. At the time of need, body utilize these compounds to release energy. The process of energy production similar to combustion of coal in air. Food is also needed for growth and repair. Our body is made up of millions of structural and functional units called cells. When growth takes place, new cells are added to the existing ones, which increase in size, get worn out and die and are being replaced by new cells. This process is called as “repair”. For both growth and

repair, proteins are necessary. Increase in height and weight from infancy to adulthood is possible only by the process of growth.

The other major physiological functions which are performed by food are for protection and regulation of body processes. Protection refers to role of food in preventing infection by ensuring proper functioning of the body systems responsible for fighting infections i.e., if person develop infection or any other type of illness, food and the nutrients it contain, facilitate rapid recovery. A person eating poor diet takes more time to recover.

The regulatory function mentioned earlier refers to the role of food in controlling the body processes. Several processes take place in the body such as the beating of heart, maintenance of body temperature and contraction of muscles. Temperature is maintained at 98.4°F or 37°C. This is achieved by specific nutrients. Similarly, water is also having important regulatory role. Several chemical reactions take place in the body. With the aid of these chemical reactions, simpler substances are used to build more complex ones. Similarly, complex substances are broken down in to their simpler unit. Rate of reaction are controlled according to need of the body. Vitamins, minerals and proteins play major role in controlling these reactions and they act as regulators.

You are being provided with all the components of food in a way similar to medication such as injection or intravenous administration etc. even then, you need food to satisfy yourself. It means our body is having stretch receptor and only the food stuff can satisfy the satiety centre. This is another physiological utility of food. Food is the substance behind production. A mother deprived of food can not produce milk. Similarly, a sheep can not produce wool without proper food.

ii) Social Functions

Food and eating has significant social meaning. Sharing food with other person is a symbol of hospitality and friendship throughout the world. We express our hospitality to our guest through an offer of food or a drink. In times of disaster or sorrow, we take food to the affected persons. In our country, offering a cup of coffee or tea is a symbol of friendship.

Food is an integral part of festivity. Joyous occasions such as the birth of child or marriage are celebrated by having feasts and serving delicacies. Festivals like Diwali, Christmas, Eid, Lohri, Dussehra, Pongal, Onam and Holi are celebrated by having special and prescribed menu. So, food serves the function of bringing people together.

Food has also got significance in the religious context. Certain food items such as fruits, sweets and coconuts are offered in the temples. Sweets and “prasad” distributed at the end of religious functions. Different religious communities share common eating pattern. This is because religious texts and practices strongly recommend some foods while rejecting others. So, food has become an integral part of social and religious life of people.

Food is also a good indicator of the state of the environment in which it is produced. Monitoring of environmental contaminants in food, therefore, not only assist in ensuring food safety but can also give early warnings about the state of environment such as level of heavy metal contaminate on to enable appropriate action.

iii) Psychological Functions

Food is a source of security. An infant learns security from the way his mother feeds him. His behavioural patterns will be influenced by the extent to which he feels secured as regards to his food supply. Similarly, a growing child gains confidence and a feeling of belonging when he knows there is food in the house and he will be fed. People feel reasonably secure when they have enough food stored up, to take care of them during periods of scarcity. Familiar foods give a sense of security when one has to eat away from house.

Food is a status symbol. It is prestigious to use polished white rice instead of unpolished rice. The same is true white flour and white bread which have replaced "black bread." The status factor associated with certain foods used by so called upper class makes other prefer them, to easily available less expensive and offer more nutritious foods. We serve certain foods for family and different special foods when we have guests.

Food is an outlet for emotion. As a relief from tension one may eat or not eat. For some people continuous nibbling of food relieves loneliness and boredom. Anger and frustration may turn one against food. Specific foods are associated with unhappy experiences. Food consumed by some people is unacceptable and even revolting for others. Such concepts have no rhyme or they related to nutritive value. They are just emotional reaction. Thus for an average man, food is much more than substances supplying nutrients for health. It is the sum of his culture and traditions, emotional outlet, gratification of pleasure and a relief from stress, a means of communication expressed in food likes and dislikes. The psychological and emotional reactions to food do not yield easily to reasoning or scientific facts about nutrition.

Check Your Progress 1

1) Define Food.

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

2) List the three important functions of food.

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

3) Food is necessary for regulation of

.....
and.....
.....



1.3 DISCOVERY OF NUTRIENTS

Studies carried out by many scientists have shown that foods contain several chemical constituents, which are known as nutrients. These include (i) proteins, (ii) carbohydrates (iii) fats (iv) minerals and (v) vitamins (*Table 1.2*). The importance of these nutrients is briefly discussed below:

i) Proteins

Proteins are required for growth in children and maintenance of body weight in adults. Proteins also provide energy to a small extent. Proteins constitute about 20 per cent of the body weight. Body proteins are derived from the dietary proteins. The body losses continuously some quantity of proteins and this loss has to be made up by dietary proteins. Proteins are made up of simpler chemical substances known as amino acids. The amino acid contents of proteins have been found to differ from one protein to another. The nutritional value of proteins depends on their amino acid contents. As a result of studies carried out by several scientists, a large amount of information is available on the nutritive value of dietary proteins and the protein requirements of human beings.

Table 1.2: Nutrients present in foods

Sl. No.	Nutrients	Importance in Nutrition
1)	Proteins	Essential for growth, formation of tissue proteins for the growth of foetus during pregnancy and for formation of milk proteins.
2)	Fats	Concentrated source of energy, supplies essential fatty acids (Linoleic, linolenic and arachidonic acids) and vitamin E essential for the absorption of fat-soluble vitamins.
3)	Carbohydrates a) Available carbohydrates b) Non-available carbohydrates (Fibre)	Source of energy. Prevents constipation and reduces blood cholesterol level.
4)	Vitamins (About 14 vitamins are essential for human nutrition).	Essential for growth and maintenance of good health. Deficiency causes specific deficiency diseases.
5)	Minerals (About 24 minerals are essential for human nutrition).	<ol style="list-style-type: none"> 1) Calcium and phosphorus essential for formation of bone and teeth. 2) Iron and copper essential for haemoglobin formation. 3) Sodium and potassium essential for maintaining water balance in the body. 4) Trace elements are essential for various functions. Iodine is a constituent of the hormone insulin and cobalt is a constituent of vitamin B₁₂. 5) Iodine is also responsible for the normal function of thyroid gland.

ii) Carbohydrates

Carbohydrates are the main sources of energy for doing work. The carbohydrates commonly occurring in foods are starch, cane sugar, glucose, fructose and milk

sugar (lactose). About 50-70 per cent of energy value (calorie value) in the average diet is provided by carbohydrates. They are the cheapest source of energy in the body. Glucose derived from the digestion of carbohydrates is used as a main source of energy in the body. Hence, the diets should contain adequate amounts of carbohydrates to meet a greater part of the energy needs.

iii) Fats

Oils and fats serve mainly as the source of energy and they contain some essential nutrients like essential fatty acids and fat-soluble vitamins. Fat is essential for maintaining good health, as absence of fat leads to the development of a deficiency diseases affecting the skin known as phrenoderma.

iv) Minerals

The body contains about 24 minerals, all of which are derived from the diet. The important minerals are calcium, phosphorus, potassium, sodium, chloride, magnesium, iron, copper, iodine, cobalt, fluorine and zinc.

v) Vitamins

Studies carried out by several pioneers have shown that foods contain certain essential chemical substances in small amounts which are now called vitamins. About 14 different vitamins have so far been discovered. All of them are essential for normal functioning of the human body. Inadequate intake of vitamins will lead to the development of deficiency diseases. Vitamins have been grouped under two heads (i) fat-soluble vitamins such as vitamins A, D, E and K and (ii) water-soluble vitamins, e.g., vitamin B₁, riboflavin, vitamin B₆, niacin, pantothenic acid, folic acid, biotin, vitamin C and vitamin P. A large amount of information is available on the functions of vitamins, vitamin content of foods and vitamin requirements.

1.4 NUTRITIONAL CLASSIFICATION OF FOOD

Since foods vary widely in their contents of various nutrients, they have been broadly grouped under three heads from the nutritional point of view: (i) Energy yielding food (ii) Body building food and (iii) Protective food. These are briefly discussed below:

Energy yielding food: Foods rich in carbohydrates and fats are called energy yielding foods. Cereals, roots and tubers, dried fruits, sugars and fats are included in this group. Cereals contain, in addition, fair amounts of proteins, minerals and certain vitamins and form the important sources of the above nutrients in poor dietaries.

Body building food: Foods rich in proteins are called body building foods. Milk, meat, fish, eggs, pulses, oilseeds and nuts and low-fat oilseed flours are included in the group of body building foods.

Protective food: Foods rich in proteins, vitamins and minerals are termed as protective foods. Milk, eggs, liver, green leafy vegetables and fruits are included in this group. Protective foods are broadly classified into two groups: (a) foods rich in vitamins, minerals and proteins of high biological value, e.g., milk, eggs and liver and (b) foods rich in certain vitamins and minerals only, e.g., green leafy vegetables and fruits.

Check Your Progress 2

1) Define the following:

a) Body building food

.....

b) Protective food.

.....

2) i) Food contain

.....
 and constituents.

ii) Protein are required for

iii) For energy requirement we depend on

iv) Protective food is rich in and

1.5 THE CONCEPT OF HEALTH

World Health Organization has defined the term health “as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.

According to this definition, the health is a positive state. In other words, health is a state of complete well-being and not just the absence of disease and yet may not enjoy complete well-being. A person is healthy if he or she enjoys good health most of the time. Health can be classified into different dimensions.

Physical health: The physical dimension of health is easy to detect and describe. A person is physically healthy if s/he looks alert, is responsive, energetic and vigorous. Signs of good health are given in *Table 1.3*.

Mental health: Mental health refers to freedom from internal conflicts, a good capacity to adjust to situations and people, sensitivity to the emotional needs of others, capacity to deal with other individuals with consideration and courtesy, good control over one’s own emotion without constantly giving into strong feeling of fear, jealousy, anger or guilt.

Mental health is more complex concept than physical health. It is much more difficult to measure. Interrelationship between physical and mental health can be explored with the help of specific examples, i.e., high blood pressure which is a physical ill health can be caused by constant stress and poor ability to handle situations. Physical ill health can also lead to mental ill health. For example, a child who suffers from polio and can not run, feels inferior to other children. This may lead him to mental disturbances and mental ill health.

Table 1.3: Signs of good health

Body part/characteristics	Signs of good health
Hair	Shiny, lustrous, healthy, scalp.
Neck glands	Not enlarged.
Skin	Smooth, slightly moist, good colour.
Eyes	Bright, clear, no fatigue circles.
Lips	Good colour, moist.
Tongue	Good pink colour, no lesions.
Gums	Firm, good, pink colour, no swelling or bleeding.
Teeth	Straight, no crowding, no discolouration.
Abdomen	Flat.
Legs, feet	No tenderness, weakness or swelling.
Skeleton	No malformations.
Weight	Normal for height, age and body build.
Posture	Erect, arms and legs straight, abdomen in, chest out.
Muscles	Well developed, firm.
Nervous control	Good power of concentration, not irritable or restless
Appetite	Good.
Digestion and absorption	Normal.
Sleep	Good, sound.

Source: Adapted from Table 1.1: In essentials of Nutrition and Diet Therapy by Sue R Williams 4th edn. (1986).

Social health: Social health relates to how a person behaves socially and recognizes his or her obligations towards other members of society. It is impossible to realize the goal of social health if mental health has not been achieved. Any type of mental ill health will influence interaction with others and therefore, diminish one's ability to be a useful member of society. Similarly, a person who does not enjoy physical health would find it difficult to achieve social health. Physical ill health often makes one irritable and depressed and unable to reach out to other normally.

Spiritual health: Spiritual health is the most difficult to define. In Indian society spirituality is more easily observable because our society is religious and some moral codes are observed. A healthy individual observe these codes most of time. Spiritual health is little difficult to attain. Following the religious practices and customs does not necessarily make a person spiritually healthy but spiritual health is attained by one good quality.

Check Your Progress 3

- 1) Define health.

.....

.....

.....

.....

2) List the four dimensions of health.

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

1.6 LET US SUM UP

Food has been described as anything which nourishes the body. Food has many specific functions. It provides energy, helps to build the body, protects it against disease and regulates body processes.

Food is an essential prerequisite for the life and as such the primary food of eating and drinking is to enable the body to function normally and keep it healthy. Food contains nutrients by which it can perform physiological, social and psychological functions. The nutrients like proteins, carbohydrates, fats, minerals and vitamins are various constituents of food. They provide energy and build the body and keep it healthy.

1.7 KEY WORDS

Blocking	:	Stopping
Emaciated	:	Deprived
Gratification	:	Satisfaction
Growth	:	Changes such as increase in size and number of cells
Malnourish	:	Under-nourishing
Nutritious	:	Nourishing
Psychological	:	Mind set up
Stunted	:	Low growth

1.8 SOME USEFUL BOOKS

Khader, V. (2003). *Foods-Nutrition and Health*. 1st Ed. Kalyani Publishers, New Delhi.

Robinson, C.H. (1978). *Fundamentals of Normal Nutrition*. 3rd Edition. Mac Millan Publishing Co. inc New York.

Swaminathan, M. (1985). *Essentials of Food and Nutrition*. Vol.I. 2nd Edition. The Bangalore Printing and Publishing Co. Ltd., Mysore Road, Bangalore.

1.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Food is anything taken to nourish our body. It provides adequate nutrients for the body growth, maintenance, repair and reproduction.

- 2) (i) Physiological function (ii) Social function and (iii) Psychological function.
- 3) Reproduction, emotional equilibrium, memory and excretion.

Check Your Progress 2

- 1) a) Body building foods: Foods rich in proteins are called body building foods like milk, meat, fish, eggs, pulses, oilseeds, nuts etc.
b) Foods rich in proteins, vitamins and minerals are termed as protective foods. e.g., milk, egg, fruits and vegetables.
- 2) i) Proteins, carbohydrates, fats, minerals and vitamins
ii) Growth
iii) Carbohydrates
iv) Proteins, vitamins and minerals.

Check Your Progress 3

- 1) Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.
- 2) i) Physical health
ii) Mental health
iii) Social health
iv) Spiritual health