7 Health Education

Health education : Health education is the process by which individuals and group of people learn to behave in a manner conductive for the promotion, maintenance, and restoration of health.

It is the sum of experiences which favourably influence habits, attitudes and knowledge relating to individual, community and social health.

According to World Health Organization : Health Education comprises of consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge and developing life skills which are conducive to individual and community health.

Importance of Health Education :

1. It provides information about functioning of the body, the rules of health and hygiene.
2. It helps in encouraging people to adopt and sustain health promoting life styles.
3. It helps in promoting the proper use of health services available.
4. It makes people aware of spread of contagious diseases.
5. It makes people aware of immunization programme.
6. It helps children to understand the nature and purpose of health services and facilities.
7. It guides us to promote safe, clean, healthy and hygienic environment.
8. It guides us about good diet and posture.
9. It builds student's knowledge, skills, and positive attitudes about health.
10. It motivates students to improve and maintain their health, and prevent disease.
11. It teaches us the importance of health, health education, recreation and play.
12. It reduces premature deaths.

Nutrition : "Nutrition is the process of taking in food and converting it into energy and other vital nutrients required for life." Nutrients are the substances which provide energy and biomolecules necessary for carrying out the various body functions. All living organisms need nutrients for proper functioning and growth.

Types of nutrients: It is of two types :

1. *Macronutrients :* These are required in large proportion in our diet. They are the main source of energy and body development. *e.g.* carbohydrate, proteins, fats, fiber, water.
2. *Micronutrients :* These are required in small proportion in our diet like vitamins. They act as defensive food and help in proper functioning of various organs of the body.

Balanced Diet : A balanced diet contains all of the essential elements that the human body needs. Carbohydrates, fats (lipids), vitamins, minerals, proteins, fiber, and water are all essential components in a well-balanced diet. A healthy balanced diet should contain different vegetables and fruits every day, starchy food with higher fiber like bread, dairy products or their alternatives, proteins such as meat, fish, beans, or eggs, small amounts of unsaturated fats, and about 6 to 8 glasses of fluids.

Characteristics of a Balanced Diet : A balanced diet contains both plant and animal foods and fulfills following requirements:

1. It meets the nutritional requirements of an individual.
2. It includes foods from all the food groups.
3. It contains a variety of foods consisting of seasonal foods.
4. It is economical.
6. It suits the taste and meets the desires of the individual eating it.

Factors affecting balanced diet : It is influenced by many factors including sex, age, metabolism, physical activity, growth and pregnancy. Body height, weight and size, genetics, hormone levels and any illness can affect how much energy we need. Average daily guidelines recommend around 2500 calories for men and 2000 calories for women.

The basic constituents of balanced diet : Carbohydrates, proteins, fats, vitamins, minerals, water and fiber.

Functions of balanced diet (Importance of Balanced diet) :

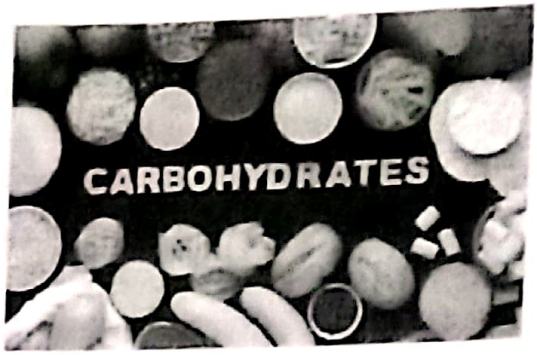
1. It provides sufficient energy for the various activities of an individual.
2. It helps individual to grow and develop to optimum level.
3. It helps various organs and systems of body to function properly.
4. It helps to repair or replace the worn out tissues.
5. It improves the defense of body against various bacteria, virus.etc.
6. It improves the various health problems and diseases.
7. It improves the quality of metabolism process of our body.
8. It prevents individual from various deficiency diseases.
9. It helps individual to maintain proper body weight.
10. It helps to reduce body fat.

A food pyramid : A food pyramid is a representation of the optimal number of servings to be eaten each day from each of the basic food groups. The Food Pyramid organises food into five main shelves - a shelf for each food group. The most important shelf is on the bottom and the least important on the top.

Components of Diet :

1. **Carbohydrates (Carbs) :** Carbohydrates are macronutrients and are one of the three main ways by which our body obtains its energy. They are called carbohydrates as they comprise of carbon, hydrogen and oxygen at their chemical level. Carbohydrates

are essential nutrients which include sugars, fibers and starches. Carbohydrates in food include all sugars (*e.g.* sucrose, glucose) starches and fibers.



Types of carbohydrates :

i. *Monosaccharides (Simple sugars) :* It is the basic unit of carbohydrate. It is usually colourless, water soluble. Examples of monosaccharides include glucose (dextrose), fructose, galactose, xylose and ribose.

ii. *Disaccharides :* A disaccharide is the sugar formed when two monosaccharides are joined by glycosidic linkage. *e.g.* sucrose (table sugar), lactose (milk sugar) and maltose.

iii. *Polysaccharides (Complex Carbohydrates) :* They have a chain of monosaccharides joined together. They are insoluble in water and not sweet in taste. *e.g.* starch, dextrines, glycogen, cellulose.

Sources of Carbohydrates : Bread, oatmeal, cereals, rice, maize, wheat, whole wheat bread, whole wheat pasta, beans, pumpkins, tomatoes, broccoli, cucumber, squash, cookies, bajra, chana dal, moong dal, rajma, corn, sweet potatoes, white potatoes, carrot, jam, sugar sugarcane, honey, apples, oranges, pineapple, Strawberries, blackberries, grapes, cake, milk, ice-cream, milk-products, wild rice and brown rice.

Functions of Carbohydrates :

1. The main function of carbohydrates is to provide energy to the body.
2. It helps in regulation of blood glucose.
3. Carbohydrates also help with fat metabolism.
4. It will prevent the degradation of skeletal muscle and heart, liver, and kidneys.
5. It provides fuel for working organs such as brain.
6. These also help in maintaining a healthy digestive system.
7. The fiber in carbohydrates helps in lowering blood cholesterol.
8. It helps in regulation of blood glucose level.

2. **Proteins :** Proteins are large, complex molecules that play many critical roles in the body. They do most of the work in cells and are required for the structure, function, and regulation of the body's tissues and organs.

Types of proteins :

i. *Essential Proteins :* There are 9 essential amino acids, which are taken only from food and not made in the body. They are called essential proteins. They are histidine, isolucin, leucine, lysine, methionine, phynylalanine, threonine, tryptophan and valine.

ii. *Non-essential Proteins* : An amino acid that can be made by humans and so is not essential to the human diet. There are 12 non-essential amino acids. *e.g.* alanine, arginine, asparagines, asparatic acid, cystenine, glutamic acid, glutamine, glycine, proline, serine, histidine and tyrosine.

Sources of Proteins : The sources of proteins are eggs, milk, meat, poultry, beef, codfish, cereals, oats, millet, rice, wheat, legumes, pumpkin seeds, sunflower seeds, sesame seeds, lupines, walnuts, almonds, cashews, milk-product, beans, corn, pulses, cottage cheese, Greek yogurt, broccoli, quinoa, soyabeen, dry fruits, green leafyvegetables.

Functions of Proteins :

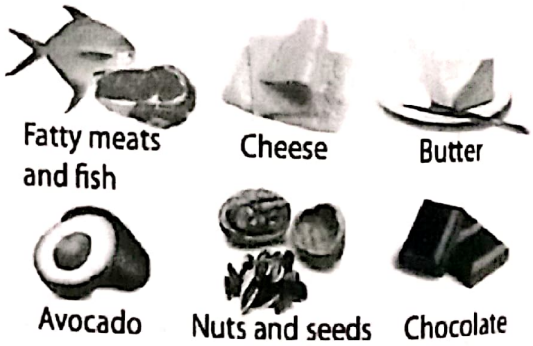
1. It is the main component of muscles, organs and glands.
2. The cell of muscles and ligaments are maintained with proteins.
3. Protein is needed for growth and development of children.
4. Protein is required for the formation of hormones, enzymes, etc.
5. They provide the structural framework in bone, skin and cell membranes.
6. It helps to repair or replace the worn-out tissues.

3. **Fats (Lipids) :** Lipids are oily or greasy nonpolar molecules, stored in the adipose tissue of the body. Lipids are a heterogeneous group of compounds, mainly composed of hydrocarbon chains. Lipids are energy-rich organic molecules, which provide energy for different life processes. Since our body can store fats, they work as energy banks and are called energy foods. If we eat more carbohydrates than required then the body converts the extra amount into fats and stores it under the skin. *e.g.* cholesterol, phospholipids.

Types of fats :

i. *Saturated fats* : It is a fatty acid in which there is a single bond. It is made up of two kinds of smaller molecules: glycerol and fatty acids. *e.g.* Cream, Cheese, Butter.

ii. *Unsaturated fat* : It is a fat or fatty acid in which there is at least one double bond within the fatty acid chain. *e.g.* Olive oil, sunflower oils, maize oil, ground nut oil.



Sources of Fat : Animal products like meat, poultry and dairy products like milk, cream, cheese, butter, ice-cream, peanuts, olive oil, coconut oil, palm oil, peanut oil, soya oil, ghee, Avocado, Macadamia nuts, dark chocolates, margarine, biscuits.

Functions of Fats :

1. It is important for the proper functioning of the body.
2. Fatty acids provide the raw materials, which help to control the blood pressure.
3. Provide protection for the organs and insulation for the body.
4. It provides energy, absorbs certain nutrients and maintains your core body temperature.

5. It helps in proper functioning of glands and other internal organs.
6. It helps during blood clotting, maintenance of skin and hair.

4. **Vitamins :** A vitamin is a nutrient that the body needs in small amounts to function and stay healthy. The sources of vitamins are fruits, green leafy vegetables, carrots, spinach, pumpkin, broccoli, tomatoes. There are 13 vitamins needed by the body.

Types of Vitamins :

i. *Vitamin A (Retinol) : Sources* — Milk and milk products, butter, eggs, carrot, liver, fish oil, papaya, mango and green-leafy vegetables, orange, carrots, tomatoes, spinach.

Diseases caused due to deficiency — Its deficiency leads to night-blindness, keratomalacia, xeropthalmia, Infertility.

Functions of Vitamin A :

1. It helps in maintaining a proper vision
2. It is required for a healthy immune system
3. It helps in the maintenance of epithelial cells
4. It is also essential for the maintenance of skin and the mucous membrane
5. It helps in the development and maintenance of teeth, skeletal and soft tissues

ii. *Vitamin C (Ascorbic acid) : Sources* — Pineapple, apple, guava, amla, soft plum, oranges. tomatoes, potatoes, broccoli, spinach, strawberries, green chillies, bell peppers, Brussels sprouts, fruits and citrus fruits.

Disease due to deficiency — Its deficiency can cause scurvy, anemia, bleeding and inflamed gums, poor wound healing, loose teeth.

Functions :

1. It helps in healing the wounds and contributes to brain function.
2. It is helpful in absorbing calcium.
3. It helps in the repair of bones, skin and connective tissues.
4. It is essential for healthy teeth, gums and blood vessels.

iii. *Vitamin D : Sources* – Sun-rays, milk, butter, fish oils; cod liver oil, some fish such as salmon, tuna, mackerel and shrimp are main sources of vitamin D.

Disease due to deficiency — Its deficiency may cause rickets, dental cavities, osteomalacia, osteoporosis and demineralization of bones, joint pain and muscle spasms.

Functions :

1. It helps in the absorption of calcium and phosphorus.
2. It regulates bone mineralization.
3. It is involved in immune function and heart health.

iv. *Vitamin E : Sources* — The sources of vitamin E are green-leafy vegetables, Pulses, nuts, liver, turmeric, eggs, oil, soyabean, almond, sunflower seeds and whole cereals.

Disease due to deficiency — Its deficiency may cause neurological disease, paralysis, slow growth, skin diseases, anaemia, degenerations of muscles.

Functions :

1. It maintains the normal functioning of reproductive organs.
2. It is essential for blood coagulation.
3. It is used to prevent heart attacks and to treat Alzheimer's disease.
4. It helps keep the immune system strong against viruses and bacteria.

v. *Vitamin K : Sources* — The sources are tomato, potato, spinach, cauliflower, cabbage, soya bean, fish, wheat, eggs and meat, green leafy vegetables.

Disease due to deficiency — Its deficiency may cause anaemia, Hemorrhage.

Functions :

1. It helps in normal blood clotting.
2. It plays a role in bone metabolism, and regulating blood calcium levels.
3. It plays important role in healing of wounds and reversing the harmful effects of blood thinning medicines.

Vitamin B Complex : Vitamin B complex are a class of water soluble vitamins that play important role in cell metabolism. They play a vital role in maintaining good health.

Types of Vitamin B complex : Following are the types of Vitamin B complex.

vi. *Vitamin B_1 (Thaimin) : Sources* — The sources of vitamin B1 are wheat, groundnut, green peas, orange, eggs, pork, liver, sprouted seed and green vegetables, ham, soymilk, watermelon.

Disease due to deficiency — The deficiency of vitamin B1 causes beri-beri, skin-diseases, muscle wasting, weight loss, loss of appetite, cardiovascular problems.

Functions :

1. It helps to release the energy from carbohydrates, proteins and fats.
2. It maintains the health of liver, kidney, intestine, stomach, brain.
3. It helps prevent complications in the nervous system, brain, muscles, heart, stomach, and intestines.
4. It is also involved in the flow of electrolytes into and out of muscle and nerve cells.

vii. *Vitamin B_2 (Riboflavin) : Sources* — Sources of vitamin B2 are egg yolk, milk, yogurt, cheese, fish, pulses, peas, rice, wheat and green-leafy vegetables and cereals.

Disease due to deficiency — The deficiency of this vitamin causes stunted growth, and sore eyes, itching and irritation of lips, eyes, skin.

Functions :

1. It plays an essential role in metabolism by helping convert nutrients into energy.

2. It plays a role in muscle contraction and conduction of nerve signals.

Vitamin B_3 (Naicin or Panthothenic) : Sources — Sources of vitamin B3 are milk, egg yolk, meat, poultry, fish, whole grains, mushrooms, potatoes and dry fruit.

Disease due to deficiency — Its deficiency causes diarrhea, dizziness, depression, insomnia, low blood sugar, indigestion, limb pain, muscular weakness, skin eruption.

Functions :

1. It is helpful in growth of body and maintaining healthy skin and the digestive system.
2. It helps to release energy from carbohydrates.
3. It also prevents constipation and reduces flatulence.
4. It improves blood fat levels.

Vitamin B_5 (Nicotinamide) : Sources — Sources of the vitamin B5 are milk, unpolished rice, nuts chicken, whole grains, broccoli, avocados, mushrooms and yeast.

Disease due to deficiency — Its deficiency causes paresthesia disease, fatigue, insomnia, depression, vomiting, stomach pain, burning feet.

Functions :

1. It helps in maintaining the body weight of an individual.
2. It is necessary for making blood cells and it helps to convert the food into energy.
3. It is a potent antioxidant and a neural compound which helps in boosting the immune system and neural functions.
4. It also aids in metabolising fat and reducing stress levels.

Vitamin B_6 (Pyridoxine) : Sources — The sources of vitamin B6 are meat, fish, egg-yolk, yeast, rice, wheat, green peas, poultry, watermelon and bananas.

Disease due to deficiency — Its deficiency causes skin disorders, poor coordination, abnormal nervous system, confusion and insomnia.

Functions :

1. It is important in the formation of hemoglobin.
2. It helps to reduce the risk of heart diseases.
3. It regulates the metabolism of amino acids and carbohydrates.
4. It is a potent neural compound that is extremely essential for the synthesis of neurotransmitters.
5. It is also required for the proper growth, development and functioning of the brain, nerves, skin, and other parts of the body.

xi. *Vitamin B_7 (Biotin or vitamin H) : Sources* — The sources are raw egg yolk, liver, peanuts, leafy green vegetables.

Disease due to deficiency — Deficiency causes hair thinning, eczema, depression, lethargy.

Functions :

1. It is important in utilization of fats, carbohydrates, and amino acids.
2. It helps in strengthening hair and nails.
3. It promotes appropriate function of the nervous system and is essential for liver metabolism as well.

xii. *Vitamin B_9 (Folate or Folic acid) : Sources* — The sources of vitamin B9 are dark green vegetables, peas, orange juice, liver, yeast, wheat, grains and cereals, spinach, broccoli.

Disease due to deficiency — Its deficiency may cause anemia, diorrhoea, loss of appetite, weight loss, weakness, sore tongue, heart palpitations, behavioural disorders, leucocytes.

Functions :

1. It is important in new cell formation, blood formation, normal mental health.
2. It is helping in rapid cell division and growth, synthesis of RNA and DNA and enhancing brain activities.
3. It also works closely with vitamin B12 to help make red blood cells and help iron work properly in the body.

xiii. *Vitamin B_{12} : Sources* — Vitamin B12 is naturally found in animal products, including fish, meat, poultry, eggs, milk, and milk products and cereals.

Disease due to deficiency — Its deficiency may cause anemia, beri-beri, poor coordination.

Functions :

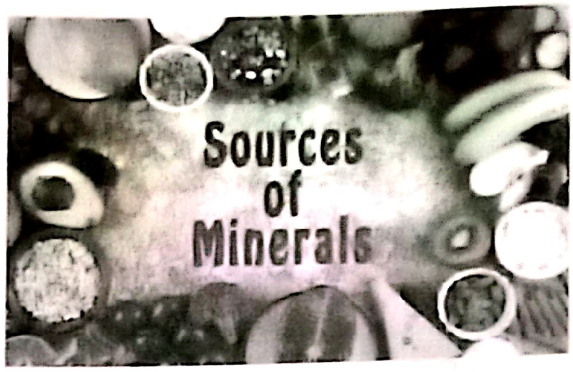
1. It is crucial to the normal function of the brain and the nervous system.
2. It is also involved in the formation of RBC's and helps to create and regulate DNA.
3. It helps to protect the eyes from macular degeneration
4. It helps in cognitive functioning

Functions of Vitamins :

1. They help shore up bones and bolster your immune system.
2. They help in metabolic processes.
3. They also convert food into energy, and repair cellular damage.
4. It helps to repair and maintenance of various tissues.
5. It helps in repair and healing wounds.
6. It helps in proper functioning of an immune system.

5. **Minerals :** Minerals are those elements on the earth and in foods that our bodies need to develop and function normally. Those essential for health include calcium, phosphorus, potassium, sodium, chloride, magnesium, iron, zinc, iodine, chromium, copper, fluoride, molybdenum, manganese and selenium.

i. *Iron : Sources* — The main sources of iron are meat, egg, beans, peas, sea food, prunes, whole grains, cereals, breads, dry fruit and green-leafy vegetables.



Disease due to deficiency — Its deficiency causes anaemia, heart palpitations, insomnia, brittle nails, cracked lips.

Functions :

1. It helps in the formation of haemoglobin,
2. It takes part in metabolism of fat, carbohydrates and proteins.
3. It helps in proper growth and development, reproduction, wound healing.

ii. *Phosphorus : Sources* — It is found in fish, chicken, breast milk, liver, egg yolk, nuts, meat and unpolished rice, dairy products, spinach, broccoli, turnip.

Disease due to deficiency — Its deficiency may cause pain in the bones, rickets, osteoporosis, weakness, and anorexia.

Functions :

1. It helps in the formation of teeth and bones.
2. It is also needed for the body to make protein for the growth, repair of cells and tissues.
3. It plays an important role in how the body uses carbohydrates and fats.

iii. *Calcium : Sources* — Calcium is found in milk, cheese, yolk, rice, almonds, orange and green-leafy vegetables, canned seafood like salmon, fortified cereals, spinach, broccoli, turnip greens.

Disease due to deficiency — Its deficiency causes rickets, asthma, skin-diseases like eczema and scabies, muscle cramps, rickets in children and osteoporosis in adults.

Functions :

1. It helps in formation of teeth and bones.
2. It helps in blood clotting, constriction and relaxation of blood vessels.
3. It helps in hormone secretion, and muscle contraction.

iv. *Sodium : Sources* — Sodium is found abundantly in common salt, milk, meat, egg, soya sauce, etc.

Disease due to deficiency — Its deficiency may cause fatigue, nausea, muscle cramps.

Functions :

1. It maintains the balance of water in the body.
2. It helps in the contraction of muscles.
3. It helps in maintaining blood pressure.

v. *Iodine : Sources* — Iodine is found in rich quantity in sea-fish, iodized salt, breads and cereals, seaweed, potatoes.

Disease due to deficiency — The deficiency causes goiter, enlargement of thyroid gland,

Functions :

1. It is essential for the proper working of thyroid gland.
2. It helps in growth and development, metabolism and reproduction.
3. Promoting memory, concentration, intelligence, rational thinking and myriad other brain operations.
4. Preventing the incidence of hypothyroidism, i.e. an underactive thyroid gland.

vi. *Potassium : Sources* — It is found in carrot, beet-root, onion, tomato, green beans, mushrooms, broccoli, sunflower seeds, orange juice, mango, banana, apples, broccoli.

Disease due to deficiency — Its deficiency may cause weakness in body, nausea, irritability, fatigue, anorexia, hyper-tension, decreased heart rate.

Functions :

1. It is needed for the growth and keeping the cells and body healthy.
2. It helps in balancing fluid in the body, maintaining steady heartbeat.
3. Maintaining normal blood pressure
4. Transmitting nerve signals between organs
5. Balancing pH in the body between acidity and alkalinity

vii. *Copper : Sources* — It is found in fruits, vegetables, egg, fish, meat, cocoa, shell fish, lentils, nuts.

Disease due to deficiency — The deficiency may cause anaemia, hair problem, and dry skin.

Functions :

1. It helps in the metabolism and formation of RBC's.
2. It helps in bone formation, connective tissues formation.
3. It helps in proper functioning of nervous system.

viii. *Sulphur : Sources* — It is found in egg, raddish, pulses, carrot, spinach, tomato, cabbage and cereals.

Disease due to deficiency — The deficiency may reduce protein synthesis in body.

Functions :

1. It helps to build and fix your DNA and protect your cells from damage that can lead to serious diseases such as cancers.
2. It helps in the formation of hair and nails and cells of body.
3. It also assists your body to metabolize food and contributes to the health of your skin, tendons, and ligaments.

ix. *Chloride : Sources* — It is found in lettuce, olives, table salt, tomatoes, celery, seaweeds.

Disease due to deficiency — The deficiency may cause hypochloremia, diarrhea.

Functions :

1. It keeps the amount of fluid inside and outside of your cells in balance.
2. It helps maintain proper blood volume, blood pressure, and pH of your body fluids.
3. It helps to regulate the amount of fluid and types of nutrients going in and out of the cells.
4. It also maintains proper pH levels, stimulates stomach acid needed for digestion, stimulates the action of nerve and muscle cells, and facilitates the flow of oxygen and carbon dioxide within cells.

x. *Fluoride (Fluorine) : Sources* — Its sources are fluoridated water, toothpaste, marine fish, onion, spinach.

Disease due to deficiency — Its deficiency causes dental caries (Tooth decay), weak bones.

Functions :

1. It encourages strong bone formation and avoiding dental cavities.
2. Fluoride plays a key role in forming our teeth.
3. It also helps to improve the density and hardness of bones, making them more stable.

xi. *Chromium : Sources* — It is available in apple, banana, grapes, broccoli, meats, whole grains and garlic.

Disease due to deficiency — The deficiency can affect in regulating sugar balance.

Functions :

1. It helps in insulin function, protein, carbohydrate and fat metabolism.
2. They are important for brain function and other body processes.
3. It stimulates fatty acid and cholesterol synthesis.
4. It also aids in insulin action and glucose breakdown.

xii. *Magnesium : Sources* — It is available in green vegetables like spinach, broccoli, legumes, cashews, sunflower seeds, whole wheat bread, and milk.

Disease due to deficiency — The deficiency may cause poor memory, fatigue, rapid heartbeat, muscle twitching.

Functions :

1. It helps to maintain normal nerve and muscle function, supports a healthy immune system, keeps the heartbeat steady, and helps bones remain strong.
2. It also helps adjust blood glucose levels.
3. It helps in muscle growth and metabolism.

xiii. *Manganese : Sources* — It is available in nuts, legumes, tea, and whole grains.

Disease due to deficiency — Its deficiency causes poor memory, heavy menstrual periods, nervous irritability, fatigue, blood sugar problem, fragile bones.

Functions :

1. It helps to form connective tissue, bones, blood clotting factors, and sex hormones.
2. It helps in fat and carbohydrate metabolism.
3. It plays important role in calcium absorption, blood sugar regulation.

xiv. *Zinc : Sources* — It is available in nuts and seeds, cereals, red meat, poultry, seafood, beans.

Disease due to deficiency — Its deficiency causes poor intestinal absorption, slow healing of wound, loss of taste, delayed sexual development in children, retarded growth.

Functions :

1. It is needed for the body's defensive (immune) system to work properly.
2. It plays a role in cell division, cell growth and the breakdown of carbohydrates.
3. Zinc plays a role in maintaining healthy skin.

Functions of minerals :

1. They help your body grow, develop, and stay healthy.
2. The body uses minerals for building strong bones and teeth.
3. They take part in balancing of fluids.
4. They help in development of enzymes and hormones.
5. They help to maintain a normal heartbeat.
6. They are also components of hormones and enzymes and other biologically active compounds.

6. **Water :** Water is an important element of balanced diet. It makes-up almost 70% of our body weight. An adult needs 2 to 4 liters of water daily for normal life.

Functions of water :

1. Water helps to improve digestion and absorption and prevent constipation.
2. Water transports food, wastes and gases throughout the body.
3. It helps to maintain and regulate the body temperature by sweating.
4. Sufficient water in body helps to keep the skin looking good and beautiful.
5. It helps in lubrication of joints, thus improves flexibility and joint mobility.
6. Water helps to clean kidneys and their function improves.

7. **Fibers (Roughage) :** It is defined to be plant components that are not broken down by human digestive enzymes that promotes elimination of waste from the large intestine. The muscles of digestive system mix food with the digestive juices and push food along the intestines by peristalsis; if there is no fiber in your diet, these movements cannot work properly.

Sources of fiber — It is available in wheat, Cornflakes, bread, cooked pasta, brown rice, dried apricots, orange, banana, strawberries, grapes, green beans, cabbage, carrots, cauliflower, sweet corn, tomato, lettuce, roasted peanuts, almonds, pecans, walnuts,

baked potato along with the skin, bran cereal, oatmeal, sunflower seeds, etc.

Functions of fibers :

1. The fibers help to regulate your digestion.
2. It prevents constipation and helps in stabilizing glucose in the body.
3. It helps to maintain healthy cholesterol and blood sugar levels.
4. It prevents heart disease, diabetes, certain forms of cancer including breast, mouth.

Malnutrition : Malnutrition is a condition that results from eating a diet in which one or more nutrients are either not enough or are too much such that the diet causes health problems. It can lead to stunted growth, eye problems, diabetes and heart disease. The nutrients involved can include calories, protein, carbohydrates, fat, vitamins or minerals.

Symptoms of malnutrition :

1. Lack of appetite or interest in food or drink.
2. Tiredness and irritability.
3. Inability to concentrate, depression.
4. Longer healing time for wounds.
5. Loss of fat, muscle mass, and body tissue.

Causes of malnutrition :

1. An inadequate or unbalanced diet.
2. Low intake of food.
3. Scarcity of suitable food.
4. Digestion problems or other medical conditions, starvation.
5. Natural disasters.
6. Lack of purchasing power of the family.

Under nutrition : Under nutrition occurs when people do not eat enough nutrients to cover their needs for energy and growth, or to maintain a healthy immune system. It is lack of adequate energy, protein and micronutrients (*e.g.* iodine, zinc) to meet basic requirements for body maintenance, growth and development. *e.g.* Iron deficiency causes anaemia, iodine deficiency causes hypothyroidism.

Symptoms of under nutrition :

1. Starvation is the most extreme form of protein-energy under nutrition.
2. Loss of body fat. Loss of appetite.

3. An inability to stay warm.
4. Diarrhea, irritability, and apathy.
5. A lack of Iodine can cause stunted growth, mental decays and goiter.

Causes of under nutrition :

1. Poor diets. Infants may get insufficient breast milk.
2. Family food insecurity, poverty,
3. Unhygienic living conditions (*e.g.* poor water supplies and poor sanitation)
4. Inadequate health services.

Over nutrition (Hyper alimentation) : Overnutrition is a form of malnutrition arising from excessive intake of nutrients, leading to accumulation of body fat that impairs health.

Symptoms of over nutrition :

1. Obesity, cardiovascular diseases like hypertension.
2. Over nutrition may lead to high blood pressure, hair loss.
3. Tingling sensation across the body.

Causes of over nutrition :

1. Genetics, drugs, and other medical conditions may contribute to obesity.
2. It is caused by consuming more nutrients than you need.
3. Sedentary lifestyle.

DIETARY MODIFICATIONS FOR SPORTS PERSONS

Dietary modifications : Dietary modifications are changes made during food preparation, processing, and consumption to increase the bioavailability of micronutrients and reduce micronutrient deficiencies in food at the commercial or individual/household level.

Dietary modification for sportsperson may also depend upon the nutritional needs of athletes before, during, and after competition for achieving optimal sports performance.

Calories : A calorie is a unit used to describe the energy content of foods. When you take in more food calories than you use, those extra calories are stored as fat, and you gain weight. When you take in less calories than you use, those calories are stored in fat are burned, and you lose weight. Generally, the recommended daily calorie intake is 2,000 calories a day for women and 2,500 for men.

1. **Carbohydrate :** The energy for exercise comes mainly from carbohydrates stored in muscle as glycogen. It is necessary for energy needed during exercise, to maintain blood glucose level and replenish muscle glycogen store. It is easier for the body to replenish glycogen in the first two hours after exercise because of changes in insulin sensitivity during and immediately after exercise. If training is continued over long periods feeding after exercise containing glucose polymers can be helpful to assimilate carbohydrates as quickly as possible.

2. **Protein** : The proteins are necessary for muscle growth and repair. The amount of protein an athlete needs depends upon the level of fitness, exercise type, intensity, and duration and carbohydrate intake. It is more efficient for the body to get energy from carbohydrates, but if carbohydrate intake is low, then the body must use protein.

3. **Vitamins** : Vitamins in general regulate metabolic processes and are involved in the transformation of food into energy. Vitamins B, C and E play a role in fat and carbohydrate metabolism and endurance performance. Since Vitamin E is a fat-soluble vitamin and is stored in the body, care must be taken with supplemental ingestion, because toxicity may result.

4. **Minerals and Salts (Sodium)** : Minerals helps to cover increased needs for building, repair and maintenance of body mass in athletes. Sweating often occurs during physical activity, releases water and sodium from the body. To function at their peak, athletes, need to replenish this loss through water and sports drinks. Neglecting to replace both fluid and sodium loss results in dehydration, which causes impaired mental focus, impaired energy metabolism and an imbalance in electrolyte levels. The over consumption of sodium can lead to heart diseases and kidney problems. The under-consumption of sodium may cause muscle cramping, inability to properly rehydrate.

5. **Fluids** : An average adult requires at least 3 - 5 liters of water a day. Sports performance decreases after just dehydration. Greater the level of dehydration, greater the loss of muscle function exercise. Athletes involved in long-term activity, such as running, cycling for more than 30 minutes need periodic fluid intake to reduce dehydration levels. Dehydration invariably leads to diminished stamina, power, speed and strength. Losses of body fluids may result in heat stress, heat stroke and even death.

6. **Fats (Lipids)** : Male and female athletes should possess percentage of body fat scores of no more than 15% and 25% respectively. Fats should provide no more than about 20-30 percent of daily calories. Body needs small amounts of fat for certain critical functions and as an alternative energy source to glucose. Fats helps to regulate balance of water and acid, for transportation of oxygen and nutrients and to makes antibodies.

Meal planning : Meal planning is making a plan of meals with adequate nutrition for every member of the family within the available resources. It helps us to decide what to eat each day and in each meal. We can call it our 'daily food guide'. Planning your own meals will allow you to see how much you're actually eating. This also prevents you from overeating at restaurants, which tend to serve a way bigger portion than you should actually be eating.

Importance of meal planning : Meal planning is important for meeting the nutritional requirements of the family members. It helps us to decide what to eat each day and in each meal. We can call it our 'daily food guide'. Meal planning helps us to:

1. To fulfill the nutritional requirements of the family members.
2. To make the food economical.
3. To cater to the food preferences of individual members.
4. To save energy, time and money.
5. To use leftover food.

Factors affecting meal planning :

1. **Nutritional Adequacy :** This is the most important factor, which means that the nutritional requirements of all the family members are fulfilled. For example, you know a growing child needs more protein, a pregnant or lactating woman needs calcium, etc. While planning meals you will include food items from various food groups, that is, energy giving foods, body building foods and protective and regulating foods.
2. **Age :** People normally eat according to their age. You must have observed in your family that the diet of various members of different age groups differs in quantity. A new born baby drinks only milk, a small child's meal is also of very small quantity, an adolescent eats still more in amount and variety of foods. Similarly, you must have seen your grandfather eating less food and also that they prefer the food to be soft and easy to digest foods.
3. **Sex :** Sex is another factor which determines the dietary intake. Dietary requirement of adolescent and adult males are more than their female counterparts.
4. **Physical Activity :** The kind of work a person does affects the kind and amount of food they need to take. A labourer not only eats more quantity but needs more energy because he is engaged in hard work. His body uses up more energy while performing hard work.
5. **Economic Considerations :** Money available to the family to be spent on food is another major factor. Foods like milk, cheese, meat, fruits, nuts etc. are expensive. However, alternative sources like toned milk, seasonal fruits and vegetables are less costly and at the same time nutritious. You can therefore plan a balanced diet to suit every budget.

Meal planning guidelines for various physical activities with sample menus :

Following guidelines will help in meal planning for various physical activities:

1. The athletes need to consume plenty of carbohydrates, protein.
2. Eating regular meals at constant intervals during the day is ideal for most athletes.
3. Higher protein for breakfast helps to give energy right from the start of the day.
4. Low-calorie meal for lunch consisting of fruits maximizes the amount of nutrients.
5. Dinner should be well-balanced and rich in protein, fiber. Avoid taking dinner late.

Energy allowance recommendations for different categories of sports events:

1. Power events of super heavy category (100 kg and above): 7000 Calories per day.
2. Power events of higher weight category: Boxing, heavy weight lifting, wrestling and throwing events like shot put, discus throw (80 to 90 kg): 6000 Calories per day.
3. Endurance events like marathon, long jump, long distance walking, road cycling, rowing, middle and long distance swimming (60 to 70 kg): 5200 Calories per day.

4. Team events and power events of middle weight categories like hockey, football, volley ball, basketball, lawn Tennis, badminton, Javelin throw, High jump, sprint running, swimming, Boxing, Weight lifting, and Judo (60 to 70 kg.): 4500 Calories per day.

5. Events of light weight categories like Gymnastics, Table tennis, Yachting, Power events of light weight category (50 to 60 kg): 3600 Calories per day.

Menu for an Adult Man :

Early morning : 1 cup tea or milk with 4 biscuits.

Breakfast : Aloo parathas 2, Sprouted pulse raita 1big katori, Boiled egg 2, milk with 2 tbs. sugar (220 ml).

Lunch : Chapatis (4), Rice (1 medium katori), Dal (1 medium katori), Vegetable curry (Medium katori), Curd (1 cup/125 gm), Fruits (2).

Evening : 1 cup tea, suji upma/shira (150 gm)

Dinner : Chapati (2), Rice (Half plate), Dal (50gm), Vegetable curry (1 big katori/ 200gm), Chicken/ mutton boneless (250gm), and for vegetarians: vegetable (50gm), Fruit custard (1 medium katori)

Menu for an Adult Woman :

Early morning : 1 cup tea or milk with 4 biscuits.

Breakfast : Aloo parathas 2, Sprouted pulse raita (1medium katori), Boiled egg 2, milk with 2 tbs. sugar (150 ml).

Lunch : Chapatis (2), Rice (1small katori), Dal (1 small katori), Vegetable curry (Medium katori), Curd (1 cup/100 gm), Fruits (2).

Evening : 1 cup tea, suji upma/shira (100 gm)

Dinner : Chapati (2), Rice (Half plate), Dal (50gm), Vegetable curry (1 small katori), Chicken/ mutton boneless (1 medium katori), and for vegetarians: vegetable (1 medium katori), Fruit custard (1 medium katori)

Modification for an Infant :

i. *6 months baby* : liquid - Juice, soups, milk

ii. *6 to 9 months* : Semi-solid- porridge, kheer, mashed banana or potatoes

iii. *9 to 12 months* : Solid - Khichri, egg, chappati, vegetables and fruits

Types of modification of a normal diet :

The types of modifications that may have to be made are as follows:

1. *Modifications in diet consistency* : In some diseases the thickness of the food has to be changed. The food can then be served in two consistencies: 1) Liquid, ii) Semi-solid.

   Sometimes, it becomes difficult to eat normal food. For example, in diarrhoea and fever you serve a liquid diet. This liquid diet includes milk, fruit juices, coconut water, nimbu-pani, tea, lassi, soups, cold drinks, etc. When one is little better you can serve khichdi, curd, custard, fruits, bread, cooked vegetables, etc.

2. *Modifications in nutrient content :* Depending on the nature of the diseases, modifications may need to be made in one or more nutrients in the diet. The modifications can be in terms of an increase or decrease in amount of the nutrient. For example, salt has to be reduced in high blood pressure, intake of carbohydrates has to be restricted in case of diabetes and fluid intake has to be increased in the case of diarrhoea.

3. *Modifications in interval and frequency of feeding :* Normally you eat 3-4 meals a day, that is, breakfast, lunch, tea and dinner. In sickness, you find it difficult to eat the amount you usually eat at one time. However, your body must get all the nutrients in correct amounts. Small amounts of food at intervals of 2-3 hours and as many as 8-10 small meals in a day instead of 3-4 meals facilitates speedy recovery.

Special diet : A special diet is one that cannot be selected freely from the main choices available. This could be due to an allergy, intolerance or other medical need; or because children are following a religious or cultural diet; or a vegetarian or vegan diet. Someone with lactose intolerance, for example, may need to follow a dairy-free or dairy-limited diet in order to feel well. As another example, someone with a life-threatening nut allergy may need to follow a special diet that is completely void of nuts and foods made from nuts.

Need of special diet :

1. To maintain good nutritional status.
2. To correct nutritional deficiencies
3. To provide a change in the consistency of diet: liquid or semi-solid
4. To bring about change in the body weight, if required.

Therapeutic diet : A therapeutic diet is a meal plan that controls the intake of certain foods or nutrients. It is part of the treatment of a medical condition and are normally prescribed by a physician and planned by a dietician.