

Further Reading

NUTRITIVE VALUE OF FOODS

Food is any substance, liquid or solid, that can be taken into the body in order to maintain life and growth.

Food Nutrients are elements found in food which when absorbed into the body, perform different functions. These include carbohydrates, fats and oils, proteins, vitamins, mineral salts and water.

Nutrition refers to the processes in the body of making use of food. These processes include:

- Eating the correct kind of food.
- Food provides essential nutrients that help our bodies grow, repair, and function
- Digestion of food so that the body can use the nutrients.
- Absorption of the nutrients into the bloodstream.
- Use of the individual nutrients by the cells in the body for the production of energy, and maintenance and growth of cells, tissues and organs.
- Elimination of wastes.

Classification of food Nutrients, their sources and functions in the body.

Food nutrients are classified as Macronutrients and Micronutrients.

Macronutrients

These are nutrients required by the body in large amounts. They include carbohydrates, protein and lipids, (fats and oils).

a) Carbohydrates

Carbohydrates are made up of carbon, hydrogen and oxygen. The ratio of carbon to hydrogen to oxygen in carbohydrates is always 1:2:1. In the body, excess carbohydrates are converted to fats for storage. Carbohydrates are found almost exclusively in plants, with milk being the only animal-derived food that contains significant amounts.

Classification of Carbohydrates.

Monosaccharides/Simple carbohydrates

These are single or simple sugars. During digestion, carbohydrates are broken down by digestive enzymes into monosaccharides sugars, which are easily absorbed into the small intestine.

Examples of Monosaccharides.

Glucose which is found in sweet fruits and sweet potatoes. It is also formed in the body from starch digestion.

Fructose is found in honey and some fruit juices.

Galactose is formed when lactose (milk sugar) is broken down by digestive enzymes during digestion.

Mannose is found in certain nuts,

Disaccharides.

These are made up of two monosaccharides. During digestion, disaccharides are broken down into monosaccharides, which are absorbed into the body through the wall of the small intestines.

Examples of Disaccharides.

Sucrose: Sucrose or common/table sugar is present in sugarcane, beetroot, carrots and pineapples. During digestion, sucrose is broken down by digestive enzymes into glucose and fructose.

i.e glucose + fructose = Sucrose.

Lactose: It is found in milk, and is not as sweet as sucrose. Lactose is broken into glucose and galactose during digestion.

i.e glucose + galactose = Lactose.

Maltose: It is found in germinating /fermenting cereals. During digestion, maltose is broken into two molecules of glucose.

i.e glucose + glucose = Maltose.

Polysaccharides/Complex carbohydrates.

They are made up of many monosaccharide units.

Examples of Polysaccharide

Starch: This is the most important polysaccharide in human nutrition. It is broken down during digestion into simple sugars (monosaccharides) before absorption.

Glycogen: Excess glucose in the body is converted into glycogen which is stored in the liver and muscles.

Cellulose/roughage/dietary fibre: This is the fibrous material in plant cell walls. Cellulose is not digested by the body, but it is important in preventing constipation.

b) Proteins

Proteins comprise of carbon, hydrogen, oxygen and nitrogen. A few proteins contain sulphur in addition to these other elements. A protein molecule is made up of smaller building units known as amino-acids. Amino acids are grouped into essential and non-essential amino acids.

Essential amino acids cannot be made by the body and have to be obtained from foods. Non-essential amino acids can be made by the body, therefore do not have to be supplied by the diet.

Classes of Proteins.

i) Complete (first class) proteins

Complete proteins contain all essential amino acids in relatively similar amounts as required by human beings. They may or may not contain all the non-essential amino acids. All proteins from animal sources are complete proteins, except gelatin.

Soya beans are considered a complete protein as they contain all the essential amino acids.

ii) Incomplete (Second class) proteins

Proteins from plants (with exception of soya beans) are incomplete proteins. They lack one or more essential amino acids. Plant proteins are of a lower quality and offer less proteins for every measure of food, therefore they need to be combined in order to provide the full range of essential amino acids in the diet.

c) Lipids.

The common lipids in the body are fats and oils. They are made up of fatty acids and glycerol. Fats are solids while oils are liquid at room temperature. Oils are converted to fats by the addition of hydrogen in a process referred to as hydrogenation of oils. Lipids are made up of three elements, carbon, hydrogen and oxygen. Fat is more of a concentrated source of energy than carbohydrates.

Micro-nutrients.

These are nutrients required by the body in smaller amounts. They include vitamins and mineral salts.

a) Vitamins

Vitamins are found in all living tissues. They are complex organic compounds made up of carbon, hydrogen and oxygen. The body needs vitamins in small amounts in order to function properly.

Vitamins are classified into two groups according to their solubility:-

- Water Soluble.
- Fat Soluble

Water Soluble Vitamins

These are vitamins that are soluble in water. They are vitamin B and C. They are found in watery sections of foods and are distributed into water-filled sections of the body. They are easily absorbed and excreted. As a result, they are unlikely to reach toxic levels.

Fat soluble Vitamins.

These are found in fats and oils in foods. They are stored in liver and fatty tissues until such a time when needed by the body. They are not readily excreted and can build up to toxic levels. Examples of fat soluble vitamins are Vitamin A, D, E and K.

b) Mineral salts

They are inorganic substances present in many foods. They are required in very small amounts in the body. They build and regulate body processes. There are two classification of minerals.

Major/Macro Minerals

They are those present and needed in large amounts in the body. e.g Calcium, Phosphorus, Sodium, Chlorine, Sodium and Potassium.

Minor Minerals

They are referred to as trace minerals or elements. They play a vital role in body processes. Examples of minor elements are iron, zinc, iodine, fluorine and chromium.

Other food Components.

Water

It is crucial for the human body. No chemical reaction can take place in the absence of water. It acts as a solvent. Water is constantly lost in the body, therefore should be constantly replenished.

Functions of Water.

- Helps regulate body temperature.
- It transports nutrients to every part of the cell
- Helps maintain a constant body pH
- Aids in removal of waste e.g urine, sweat, faeces.
- Acts as a solvent for various substances in the body.
- Lubricates part of the body fluid found in joints, saliva.
- Source of minerals e.g fluorine, zinc, copper.

Water requirements are influenced by factors such as age, environment, and occupation.

Dietary fibre.

They are structural parts of plants .They are found in all foods obtained from plants.

Functions of dietary fibre.

- It aids in digestion and movement of waste products through the colon .
- Assist in bowel movement by softening and increasing stool weight and size,thus preventing constipation
- Preventing and managing disease conditions such as diabetes, heart disease, high cholesterol, overweight and obesity.
- Enhances satiety of food by increasing bulk .

Examples of sources are whole grains, fruits and vegetables.

Food Nutrients: Functions and sources.

Nutrient	Function	Sources
Proteins	-Body building . -Repair of damaged worn out tissues. -Provision of heat and energy in the absence of carbohydrates.	- <i>Animal sources:</i> Beef,poultry,eggs,fish,milk and milk products. <i>plant sources:</i> legumes.
Carbohydrates	-Provision of heat and energy. -Glycogen stores. -Protein -sparing action. -Roughage prevents constipation.	<i>Plant sources:</i> Cereals grains,potatoes,bananas,ar-rowroots,yams,cassava.
Fats and Oils	-Energy provision. -Fat deposits act as energy stock. -Fat deposited under the skin acts as an insulator.	<i>Animal sources:</i> Fatty meat,oily fish,milk,eggs yolk,cheese,bacon,cream,batter. <i>Plant sources:</i> Vegetable oils,salad dressing,olives,avocados,nuts,seeds.
Vitamin A (Retinol)	-Essential for growth in children. -Maintains healthy mucous membranes.	<i>Animal sources:</i> Oily fish,liver,milk,cheese,kidney,eggs and fatty meat.
Vitamin D (Cholecalciferol)	-Formation of strong bones and teeth.	<i>Animal sources:</i> Oily fish,milk,milk products,fatty meats ,egg yolk.
Vitamin E (Tocopherols)	-Necessary for normal body processes. -Important in human fertility.	<i>Animal sources:</i> Beef,liver,butter,egg yolk. <i>Plant sources:</i> Wheat germ,vegetable oils,- fruits,nuts,grains.
Vitamin K (Phylloquinone)	-Helps in normal clotting of blood. - Essential for normal liver functioning.	<i>Animal sources:</i> Poultry,fish,liver,egg yolk,produced by bacteria in the small intestine. <i>Plant sources:</i> Green leafy vegetables.
Vitamin B ₁ (Thiamin)	-Release energy from carbohydrates. -Stimulates growth. -Promotes appetite for food. -Aids in digestion. -Proper functioning of the nervous system.	<i>Animal sources:</i> Milk,liver,lean meat,fish <i>Plant sources:</i> Whole cereal grains and their prod-ucts,green leafy vegetables,legumes.

Vitamin B ₂ (Riboflavin)	-Maintains healthy skin. -Helps in the use of carbohydrates and proteins. -Promotes growth. -Maintains good appetite.	<i>Animal sources:</i> Liver,kidney,eggs,meat,fish <i>Plant sources:</i> Green leafy vegetables.
Niacin or nicotinic acid.	-Assist the release of energy from carbohydrates. -Proper functioning of the nervous and digestive system. -Promotes growth.	<i>Animal sources:</i> Eggs,Liver,meat,yeast,and milk. <i>Plant sources:</i> Green vegetables,Whole cereal grains ,wholemeal bread.
Vitamin B ₁₂ (Cyanocobalamin)	Promotes the production of healthy red blood cells.	Mostly animal sources:Meats,fish.
Vitamin C (Ascorbic acid)	-Aids in absorption of iron in the body. -Prevents iron deficiency anaemia. -Maintains normal growth rate in children. -Helps the body resist infection. -Formation of scar tissue after an injury.	Mainly plant sources:Fruits,tangerines,oranges,lemons,pineapples,gua-vas,strawberries,lime and plums. Vegetables:green leafy vegetables.
Iron	-Develops and utilises haemoglobin. -Transports oxygen. -Gives blood its colour.	<i>Animal sources:</i> Liver,lean meat,egg yolk. <i>Plant sources:</i> Dark green vegetables.
Calcium	-Builds bones and teeth . -Maintains a healthy nervous system. -Assist in the normal functioning of muscles.	<i>Animal sources:</i> Milk and milk products (cheese,yoghurt),meat,fish, eggs. <i>Plant sources:</i> Green leafy vegetables.
Phosphorus	-Formation of bones and teeth. -Important in chemical reactions including proteins,fats and carbohydrates. -Maintains the correct acid base(PH)balance.	<i>Animal sources:</i> Kidney,liver,eggs,fish,milk and milk products.
Sodium	-Maintains the correct acid base(PH)balance. -Proper functioning of nerves and muscles.	<i>Animal sources:</i> Sea foods,salted meats and butter. <i>Other sources:</i> Table salt.
Iodine	-Helps in the formation of thyroxine. -Essential for growth.	Sea foods,iodized table salt,vegetables and food grown in iodine -rich soils.

Nutritional Requirements for Different groups.

Nutritional requirements of individual family members vary at different life stages .This is influenced by the body,size ,age ,sex,state of health ,physical activity, occupation among others..To meet the needs of these individuals ,the normal family diet needs to be modified accordingly.

Life stages covers :

- Fetal stage
- Infancy stage

- Early childhood
- Adolescence
- Adulthood
- Old age.

Other Special groups include:-

- Manual workers
- Vegetarians.
- Invalids.
- Convalescents.

1.Nutritional Requirements at fetal stage.

This is nutrition during pregnancy.

The expectant mother must be given a balanced diet so that the baby can grow well and ensure that her health is not endangered.

Points to Consider.

- i) The meals should be balanced with slightly increased intake of:-
 - Proteins for the growth of the foetus.
 - Iron to help red blood cells to deliver oxygen to the baby.to ensure the foetus stores iron to last it for six months after birth.
 - Calcium for proper formation of the foetu-s bones and teeth .
 - Mother should eat enough energy giving food to enable her to increase weight of about 10-12 kg during the whole period of pregnancy and for proper development of the foetus.
 - Iodine for healthy brain development.
 - Folate to reduce birth defects in the brain and spinal cord.
 - Roughage to prevent constipation.
- ii) Provide plenty of water for proper digestion unless she has oedema.
- iii) An expectant mother who has a craving for specific foods should not forget to eat other foods to get a balanced diet.

2.Nutritional Requirements at infancy stage.(0-59 months)

Good nutrition at this stage plays a foundation role in enabling a child to grow.

- i) Exclusive breastfeeding is recommended during the first six months of life.
- ii) At six months weaning begins in order to meet the child's nutritional requirements This should be gradual from basic weaning dish to multi-mix weaning dish.
- iii) Limit intake of sugar.
- iv) During weaning ,provide finger foods ,this is necessary for growth of strong teeth and bones ,and to assist during the teething process.
- v) The diet should be balanced.It should consist of proteins, carbohydrates and vitamins.provide enough energy foods as children spend a lot of time playing. Calcium and phosphorus for building strong bones and teeth.

3.Nutritional Requirements at early childhood.

Small children are individuals growing rapidly and are learning to appreciate various foods and tastes.At seven years growth spurts in both height and weight.

They play a great deal and therefore ,need a lot of energy -giving foods for growth and proper development.

Points to Consider.

- i) The diet should be balanced.It should consist of proteins ,carbohydrates and vitamins.provide enough energy foods as children spend a lot of time playing.Calcium and phosphorus for building strong bones and teeth.
- ii) Give vegetables and fruits to provide roughage which prevents constipation.
- iii) Provide a variety of foods from which a child can choose.
- iii) Foods should require plenty of chewing.It should be crunchy and crispy.This is necessary for growth of strong teeth and bones.vary the texture of dishes.
- iv) Give fluids such as clean boiled water and fresh juices to aid digestion and to replace fluids lost during play.
- v) Decreased requirements of iron.

4.Nutritional Requirements for Adolescence.

This is a stage of rapid growth and changes in the body.Girls experience blood loss through menstruation. Adolescence generally tends to have a healthy appetite and consume large amounts of food.

Points to Consider.

- i) Provide balanced meals to provide plenty of proteins ,and minerals such as iron,calcium,phosphorus and vitamin C.In particular,adolescent girls require additional supply of iron to compensate for the amount lost during menstruation.
- ii) Provide plenty of energy rich food such as fatty foods to reduce the bulk of the food consumed ,e.g bread with butter.Energy giving food will also provide enough energy as they are active at this stage.
- iii) Give an adequate amount of food as teenagers have a healthy appetite .
- iv)Increase calcium due to increase in skeletal and endocrine growth.
- v) Provide plenty of green vegetables and fresh fruits for roughage.
- vi) Fluids should be given to compensate for the loss during sports or other physical activities.

5.)Nutritional Requirements for Adults.

This is a stage of slowed growth.The energy requirement has reduced at later stages of adulthood.

Most adults are working and have part of their meals eaten away from home.

This is also a stage whereby one is affected by Non Communicable Diseases.

- i)Adults should have balanced diets .
- ii)This is a productive stage for women ,therefore additional requirements for calcium and iron to cater for loss of blood during menstruation and delivery.and foetal/maternal needs during pregnancy.
- ii)Provide healthy packed meals when eating away from home .
- iii)Take appropriate energy food according to the level of activity.sedentary or manual.
- iv)Avoid intake of meals, snacks and beverages high in salt, sugar and fat to prevent Non -Communicable diseases.

6.Nutritional Requirements for old age.

The diet for elderly persons is affected by the physiological changes, which occurs in the body at this stage. **These changes are**

- i) Decreased rate of absorption.
- ii) Loss of teeth which hinders the person from eating foods which require chewing.
- iii) A low rate of metabolism.
- iv) Reduced sense of taste and smell resulting in low appetite.
- v) Reduced physical activity.

Points to Consider.

- i) Provide normal amounts of body-building foods and protective foods and less energy-giving foods.
- ii) The food should be well cooked so that it is easy to digest. Avoid fatty and greasy foods.
- iii) The food should be soft, palatable and easy to chew.
- iv) Consider their likes and dislikes to ensure that they get what they are willing to eat.
- v) Provide foods which are rich in calcium, phosphorus, iron, iodine and vitamins A, B, C and D

Other special Groups.

Nutritional Requirements for Invalids.

These are individuals suffering from illness/sickness. Good diet is an important part of treatment and quickening recovery. There are two types of invalids: those who have to follow Doctor's dietary orders strictly, e.g. persons suffering from diabetes and gout, and those who follow the doctor's general advice. In the latter case, a few foods may be prohibited.

Points to Consider.

- i) Meals should be balanced and contain plenty of body-building and protective foods.
- ii) The doctor's dietary order should be followed.
- iii) Serve meals punctually and at regular intervals.
- iv) Meals should be prepared and served under hygienic conditions. Personal, food and kitchen hygiene should be observed. This is to protect the patient from further infections.
- v) The food should be soft and easy to digest. Avoid reheated and fatty foods which the patient may not digest. Use methods of cooking which will make the food easy to digest such as steaming, boiling and steaming.
- vi) Avoid foods which have strong flavours and smells. Care should be taken when seasoning the food.

Nutritional Requirements for Convalescents.

Convalescents are people who are recovering from illness. When preparing their meals, observe the same points and procedures as for invalids but make the following modifications:

- i) Serve slightly larger portions.
- ii) Serve more energy-giving foods as the person becomes active.
- iii) Use a variety of cooking methods such as frying, roasting, and grilling.
- iv) Encourage the person to join the other members of the family at the table.
- v) Build a healthy eating pattern comprising at least 4-5 food groups a day

- vi) Ensure each meal is of good quality by varying the foods from different groups.
- vii) Carry healthy packed meals when eating away from home
- viii) Maintain appropriate energy intake according to the level of activity for each day
- ix) Avoid intake of meals, snacks and beverages high in salt, sugar and fat
- x) Engage in adequate and appropriate physical activity

Nutritional Requirements for the Manual Workers.

Manual Workers are people involved in heavy work, for example, masons, farmers and mechanics. These people spend a lot of body energy in their work. Their muscles are also very much exercised. Their diet should provide enough calories and proteins to build the muscles.

Points to Consider.

- i) The meals should be balanced; however, they should have extra amounts of energy-giving foods such as carbohydrates and fats.
- ii) Provide foods with vitamins B to facilitate the release of energy in the body.
- iii) Serve adequate amounts of food.
- iv) The foods should be well flavoured.
- v) Give lots of fluids to replace what is lost through sweat.

Nutritional Requirements for Vegetarians.

A vegetarian is a person who does not eat meat.

Vegetarians can be:

- a) Lacto-Vegetarians: These people will eat sources of animal proteins, e.g. eggs, milk and milk products.
- b) Strict vegetarian (Vegans): These will only eat food from plants and their sole sources of proteins are pulses, cereals, vegetables, soya beans and nuts of all kinds.

Points to Consider.

- i) The meals should be balanced.
- ii) The diets of vegetarians should be well flavoured. To achieve this the following ingredients should be added: herbs, seasonings, strong flavoured vegetables such as onions, celery, parsley and mixed herbs.
- iii) The foods cooked must be varied to avoid monotony.
- iv) A vegetarian diet should contain a good amount of vegetables.
- v) Vegetable fats and oils should be used in preparing vegetable meals.