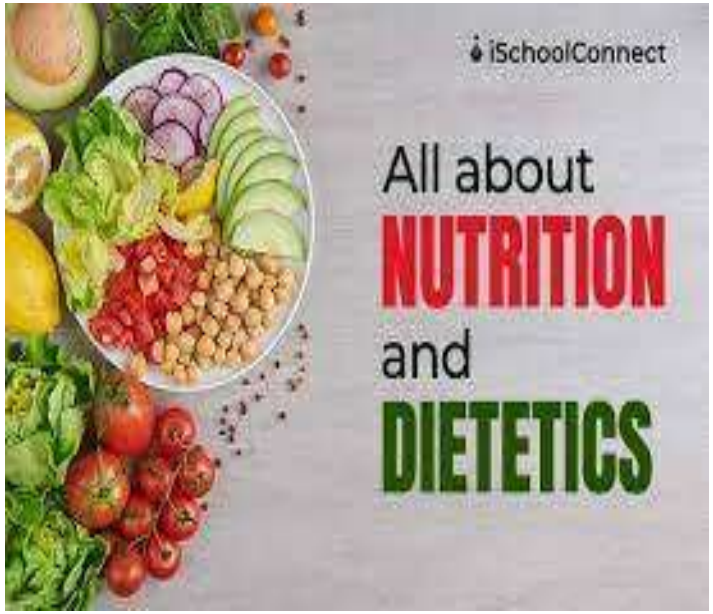
South Indian Children's Education Society's Degree College of Arts, Science and Commerce

DEPARTMENT OF BOTANY

Announces

A Certificate Course in Nutrition And Dietetics



Mode – Offline

Course Duration – 30 hrs Course Credits – 2

Commencing from – August 2023

Lecture - On every Saturday

Fees – Rs. 300

MODULES

- Family Meal Management and Food Preservation
- Quality Food Service , Food Science
- Food Service Management
- Practical Session- preparation of various Diet - dishes
- Diet Fair

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NUTRITION AND DIETETICS

This course consists of 30 hours.

- **20 hours for theory.**
- **10 hours for practicals.**

NUTRITION AND DIETETICS

SYLLABUS

UNIT	COURSE CONTENT
1	**INTRODUCTION, PRINCIPLES OF NUTRITION, COMMUNITY NUTRITION** • Principles of Nutrition • Basic Nutrition Concepts • Classes Of Nutrients • Chemical Composition of Nutrients • Public Nutrition

UNIT	COURSE CONTENT
2.	**FAMILY MEAL MANAGEMENT AND FOOD PRESERVATION** **QUALITY FOOD SERVICE AND PHYSICAL FACILITIES** • **Dietetics and Diet Counseling** • **Food Spoilage** • **Principles of Food Preservation** • **Methods of Food Preservation** • **Food Adulteration**

UNIT	COURSE CONTENT
3.	**FOOD SCIENCE** • **Neutraceuticals** • **Relation Between Good Nutrition And Health** • **Concepts Of Malnutrition – Under Nutrition And Over Nutrition** • **Signs Of A Well Nourished Child As Against Those Of An Ill Nourished Child**

UNIT	COURSE CONTENT
4.	**FOOD SERVICE MANAGEMENT** • **Food Laws And Standards** • **Food Technology – Genetically Modified Foods** • **Need For And Methods Of Assessing Nutritional Status** • **Institutional Food Management** • Practical Session-preparation of various Diet - dishes → **1) Exhibition** **2) Diet Fun fair**

Basic Nutrition Concepts

Nutrition

Nutrition is a scientific discipline with food as the major focus of interest. The discipline can be described thus:

- **The processes by which organisms ingests, digests, absorbs, transports and utilizes nutrients and disposes of their end products;**
- **The science of food, the nutrients and other substances therein; their action, interaction and balance in relationship to health and disease;**
- **Social, economic, cultural and psychological implications of food and eating.**

In hospitals, nutrition may refer to the food requirements of patients, including nutritional solutions delivered via an IV (intravenous) or IG (intragastric) tube.

Dietetics

The interpretation and communication of the science of nutrition so that people can make practical choices about food and lifestyle, in both health and disease.

Nutritionist

A nutritionist focuses firstly on food, and then looks at its effects on people.

Dietitian

A dietitian looks at the human, and then how that human's health is influenced by food.

OBJECTIVES

After studying this unit, you should be able to:

- define nutrient, nutrition and dietetics;
- describe the interrelationship between food, nutrition and health; and
- identify diet as a form of therapy in the treatment of disease.

Foods

The products derived from plants or animals that can be taken into the body to yield energy and nutrients for the maintenance of life and the growth and repair of tissues.

Diet

The foods and beverages a person eats and drinks.

Energy

The capacity to do work. The energy in food is chemical energy. The body can convert this chemical energy to mechanical, electrical, or heat energy.

Nutrients

The chemical substances obtained from food and used in the body to provide energy, structural materials, and regulating agents to support growth, maintenance, and repair of the body's tissues. Nutrients may also reduce the risk of some diseases.

Non-Nutrient Substances

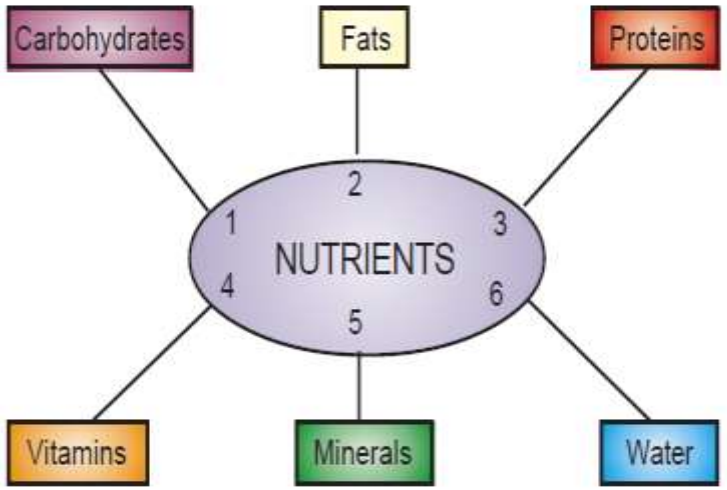
Foods also contain non-nutrient substances as well like fibers, phytochemicals, pigments, additives, alcohols etc.

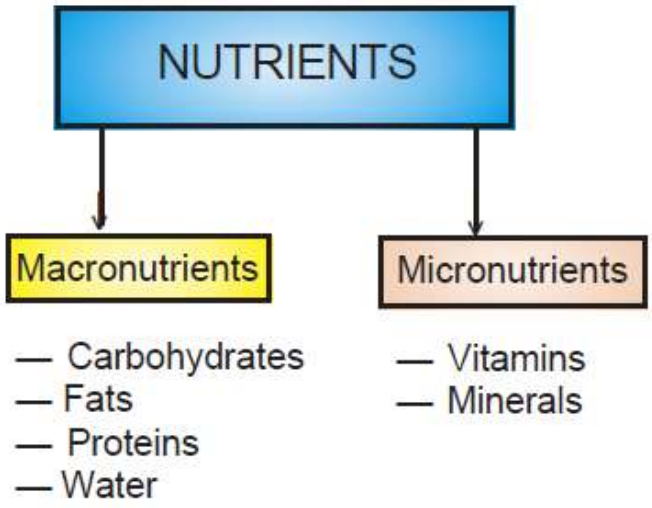
Classes of Nutrients

There are six classes of nutrients:

- Carbohydrates
- Lipids (fats)
- Proteins
- Vitamins
- Minerals
- Water

Nutrient Categories





Nutrient Contribution of Foods

Food Group	Major Nutrient(s) Supplied	Nutrients Supplied
Energy Sources a) Cereals e.g. rice, wheat maize, bajra, ragi, jowar	Carbohydrate	Besides energy gives substantial amount of proteins due to large intakes. However, the protein provided is not a good quality protein but if combined with pulses the protein quality improves B vitamins e.g. niacin, thiamine Minerals e.g. iron (bajra), calcium (ragi)
b) Root vegetables and tubers e.g. tapioca, potato, sweet potato, yam, colocasia	Carbohydrate	Carotene (yellow yam) Vitamin C (potato, sweet potato, tapioca)
c) Sugar and jaggery	Carbohydrate (sugar is almost 100% carbohydrate)	Iron in jaggery
d) Fats and oils e.g. ghee, vanaspati, butter, vegetable oils (mustard, soyabean, groundnut etc.)	Fat	Retinol (Vitamin A) (butter, vanaspati) Vitamin D (butter, vanaspati)

Food Group	Major Nutrient(s) Supplied	Nutrients Supplied
Protein Sources e) Milk and milk products e.g. milk, curd, paneer & processed cheese & khoya	Proteins	Carbohydrate, fat, calcium, riboflavin
f) Pulses	Protein	Carbohydrate B Vitamins (thiamine, niacin) Vitamin C (in sprouted pulses)
g) Flesh foods e.g. fish, poultry, meat	Protein	B Vitamins Retinol (liver) Calcium
h) Eggs	Protein	Retinol (Vitamin A), Fat, Iron.
i) Nuts and Oilseeds e.g. groundnuts, almonds, cashewnuts, til and mustard seeds	Protein and fat	B complex vitamins, calcium and other minerals

Viltamin and Mineral Sources		
j) Green leafy vegetables e.g. spinach, amaranth, fenugreek, mustard and drumstick leaves	Carotene	Iron Calcium B Vitamins Vitamin C Fibre
k) Other vegetables e.g. brinjal, ladies finger, french beans		Supply some amount of vitamins, minerals and fibre
l) Fruits	Specific fruits are major sources of the following Vitamin C (guava, amla citrus fruits) Carotene (mango, apricot, orange, papaya) Iron (dried fruits such as dates and raisins)	
m) Condiments and spices		Carotene (coriander leaves) Vitamin C (green chillies)

Broadly speaking there are three types of functions performed by nutrients. Theseare:

- Supplying energy
- Building body tissues
- Protecting the body from infection and regulating body processes

their major functions.

Nutrients Major functions

- Carbohydrates -Supply Energy
- Fats - Supply Energy
- Proteins - Build new tissues and repair worn out tissues
- Vitamins and Minerals -Protect the body from infection and

regulate body processes

Examples of Nutrient Categories

Nutrient Categories	Examples
Carbohydrates	Glucose, galactose, fructose, sucrose, dextrins, starches
Fats	Triglycerides, fatty acids, cholesterol
Proteins	Casein (Milk protein), albumins (egg, gluten (wheat)
Vitamins	Water-soluble : Vitamin C or ascorbic acid, B_1 or B_2 or riboflavin, B_{12}, niacin, folic acid, B_6
	Fat soluble : Vitamin A (B Carotene, Retinol) Vitamin D (Calciferol), Vitamin E (Tocopherol), Vitamin K
Minerals	Sodium, Potassium, chloride, magnesium, iodine, calcium, phosphorus, iron
Water	Soft water, rain water
Fibres such as	Cellulose, hemicellulose, pectin, lignin are not **nutrients** but needed as roughage and consumed with nutrients

CARBOHYDRATES

- A large class of nutrients, including sugars, starch, and fibers, that function as the body's primary source of energy.
- Sugar is most familiar in its refined forms, such as table sugar and high-fructose corn syrup, which are used in soft drinks, cookies, cakes, candies, jams, jellies, and other sweetened foods. Sugar is also present naturally in fruits and milk.
- Starch is found in breads, breakfast cereals, potatoes, and beans.
- Fiber can't be broken down or digested in the body, and so it is excreted. It therefore does not provide energy for the body.
- **Advantage of Fiber**

  Fiber does a number of good things in the body, such as improve the health of the digestive tract. Good sources of fiber include legumes (dried beans and peas), fruits, vegetables, whole-grain foods such as whole-wheat bread and cereal, nuts, and seeds.

LIPIDS

- A group of fatty substances, including triglycerides and cholesterol, that are soluble in fat, not water, and that provide a rich source of energy and structure to cells.
- The most familiar lipids are fats and oils, which are found in butter, margarine, vegetable oils, mayonnaise.
- Lipids are also found in the fatty streaks in meat, the fat under the skin of poultry, the fat in milk and cheese (except fat-free milk and products made with it), baked goods such as cakes, fried foods, nuts, and many processed foods, such as canned soups and frozen dinners.
- Most breads, cereals, pasta, fruits, and vegetables have little or no fat.
- Triglycerides are the major form of lipids. They provide energy for the body as well as a way to store energy as fat.

PROTEIN

- Major structural component of the body's cells that is made of nitrogen-containing amino acids assembled in chains, particularly rich in animal foods.
- Protein regulates body processes and can be burned to provide energy as well.
- Protein is present in significant amounts in foods from animal sources, such as beef, pork, chicken, fish, eggs, milk, and cheese.
- Protein appears in plant foods, such as grains, beans, and vegetables, in smaller quantities.
- Fruits contain only very small amounts of protein.

VITAMINS

- Noncaloric, organic nutrients found in a wide variety of foods that are essential in small quantities to regulate body processes, maintain the body, and allow growth and reproduction.
- There are 13 different vitamins in food.
- Instead of being burned to provide energy for the body, vitamins work as helpers. They assist in the processes of the body that keep you healthy.
- For example, vitamin A is needed by the eyes for vision in dim light.
- Vitamins are found in fruits, vegetables, grains, meat, dairy products, and other foods.
- Unlike other nutrients, many vitamins are susceptible to being destroyed by heat, light, and other agents.

MINERALS

- Noncaloric, inorganic chemical substances found in a wide variety of foods; needed to regulate body processes, maintain the body, and allow growth and reproduction.
- They are also required by the body in small amounts and do not provide energy.
- Like vitamins, they work as helpers in the body and are found in a variety of foods.
- Some minerals, such as calcium and phosphorus, become part of the body's structure by building bones and teeth.
- Unlike vitamins, minerals are indestructible and inorganic.

Water

- Water plays a vital role in all bodily processes and makes up just over half the body's weight.
- It supplies the medium in which various chemical changes of the body occur and aids digestion and absorption, circulation, and lubrication of body joints.
- For example, as a major component of blood, water helps deliver nutrients to body cells and removes waste to the kidneys for excretion.
- Water is the most plentiful nutrient in the body, accounting for about 60 percent of your body weight.
- Experts rank water second only to oxygen as essential to life.
- In short without water there is no life.

Six Classes of Nutrients

Carbohydrates – A large class of nutrients including sugar, starches, and fibers that are the body's primary source of energy.

Lipids (fats) – A group of fatty substances including triglycerides and cholesterol that are not soluble in water and that provide a rich source of energy and structure to the body's cells.

Proteins – Major structural part of body's cells composed of nitrogen-containing amino acids, particularly rich in animal foods.

Vitamins – 13 noncaloric nutrients found in a wide variety of foods (especially fruits and vegetables)

Minerals – Noncaloric, inorganic chemical substances found in a wide variety of foods

Both vitamins and minerals are essential in small amounts to maintain the body, regulate body processes, and for growth and reproduction.

Water – Inorganic nutrient that plays a vital role in all bodily processes and makes up just over half of the body's weight.

Energy-Yielding Nutrients

Nutrients that can be burned as fuel to provide energy for the body are called energy-yielding nutrients, including

- carbohydrates
- fats
- proteins.

Nutrients	Energy (kcal/g)
Carbohydrate	4
Fat	9
Protein	4

NOTE: Alcohol contributes 7 kcalories per gram that can be used for energy, but it is not considered a nutrient because it interferes with the body's growth, maintenance, and repair.

- One other substance contributes energy—alcohol.
- Alcohol, however, is not considered a nutrient.
- Unlike the essential nutrients, alcohol does not sustain life.
- In fact, it interferes with the growth, maintenance, and repair of the body.
- Its only common characteristic with nutrients is that it yields energy (7 kcalories per gram) when metabolized in the body.

Units of Energy used to measure Food Energy

- **Calories:** units by which energy is measured. Food energy is measured in *kilocalories* (1000 calories equal 1 kilocalorie), abbreviated **kcalories** or **kcal.** One kcalorie is the amount of heat necessary to raise the temperature of 1 kilogram (kg) of water 1°C. The scientific use of the term *kcalorie* is the same as the popular use of the term *calorie*.
- The international unit for measuring food energy is the **joule,** a measure of work energy. To convert kcalories to kilojoules, multiply by 4.2; to convert kilojoules to kcalories, multiply by 0.24.

Basis of Number of Kcalories Body Require

The number of kcalories a body require is based on four factors:

- Basal Metabolism
- Physical Activity
- Thermic Effect of Food
- Environmental Temperature

Basal Metabolism

- The minimum energy needed by the body for vital functions when at rest and awake.
- For example, heart is pumping blood to all parts of the body, and cells are making proteins, and so on. All they need energy to carry out their assigned duties.
- Basal metabolic rate (BMR) depends on the following factors viz., gender, age, growth, height, temperature, fever and stress, exercise, smoking and caffeine and sleep.

1. **Gender.** Men have a higher BMR than women do because men have a higher proportion of muscle tissue (muscle requires more energy for metabolism than fat does).
2. **Age.** As people age, they generally gain fat tissue and lose muscle tissue. BMR declines about 2 percent per decade after age 30.
3. **Growth.** Children, pregnant women, and lactating women have higher BMRs.
4. **Height.** Tall people have more body surface than shorter people do and lose body heat faster. Their BMR is therefore higher.
5. **Temperature.** BMR increases in both hot and cold environments, to keep the temperature inside the body constant.
6. **Fever and stress.** Both of these increase BMR. Fever raises BMR by 7 percent for each 1 degree Fahrenheit above normal. The body reacts to stress by secreting hormones that speed up metabolism so that the body can respond quickly and efficiently.
7. **Exercise.** Exercise increases BMR for several hours afterward.
8. **Smoking and caffeine.** Both cause increased energy expenditure.
9. **Sleep.** Your BMR is at its lowest when you are sleeping.

- The basal metabolic rate also decreases when you diet or eat fewer kcalories than normal.
- The BMR accounts for the largest percentage of energy expended—about two-thirds for individuals who are not very active.

Physical Activity

- The level of physical activity strongly influences how many kcalories you need.
- The number of kcalories burned depends on the type of activity, how long and how hard it is performed, and the individual's size.
- The larger the body is, the more energy is used in physical activity.
- Aerobic activities such as walking, jogging, cycling, and swimming are excellent ways to burn calories if they are enough to raise heart and breathing rates.
- Physical activity accounts for 25 to 40 percent of total energy needs.

Thermic Effect of Food

- The energy needed to digest and absorb food.
- The thermic effect of food is the smallest contributor to your energy needs: from 5 to 10 percent of the total.
- In other words, for every 100 kcalories you eat, 5 to 10 are used for digestion, absorption, and metabolism of nutrients.

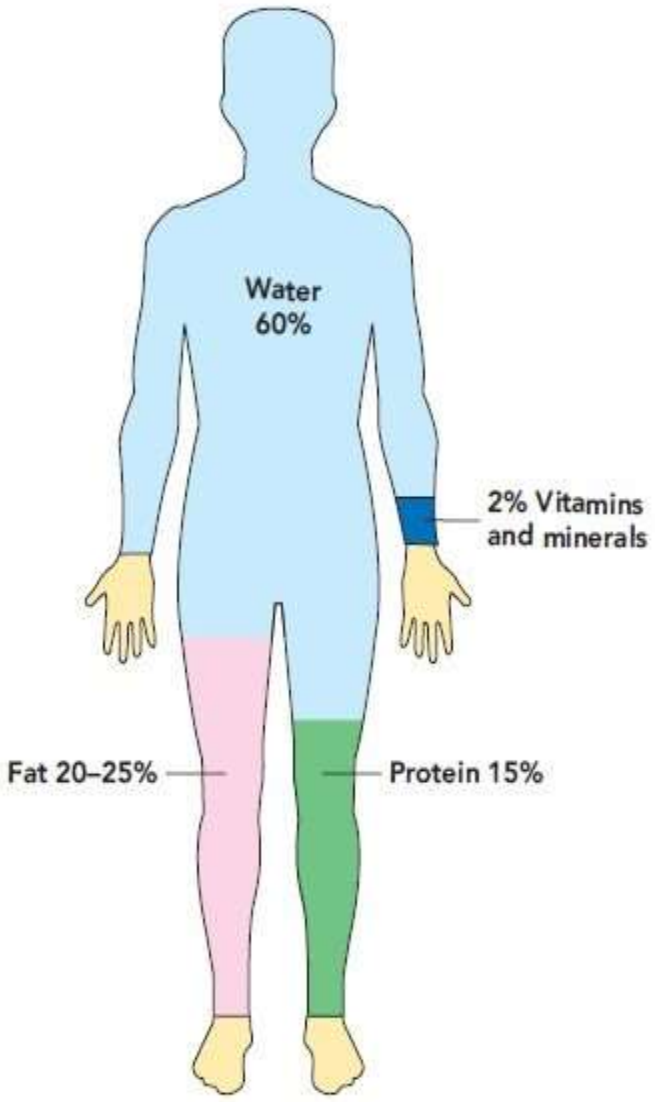
Environmental Temperature

- When environmental temperature is low, it causes increased production of Kcalories to maintain body warm temperature by shivering and non-shivering thermogenesis.
- At temperatures above blood heat, extra energy is expended in cooling.

Nutrient Composition of the Body

- A chemical analysis of your body would show that it is made of materials similar to those found in foods.
- A healthy 150-pound body contains about 90 pounds of water and about 20 to 45 pounds of fat.
- The remaining pounds are mostly protein, carbohydrate, and the major minerals of the bones.
- Vitamins, other minerals, and incidental extras constitute a fraction of a pound.
- Water is the most plentiful nutrient in the body, accounting for about 60 percent of your weight.
- Protein accounts for about 15 percent of your weight, fat for 20 to 25 percent, and carbohydrates for only 0.5 percent.
- The remainder of your weight includes minerals, such as calcium in bones, and traces of vitamins

Body Composition.



Chemical Composition of Nutrients

- The simplest of the nutrients are the minerals.
- Each mineral is a chemical element; its atoms are all alike. As a result, its identity never changes.
- For example, iron may have different electrical charges, but the individual iron atoms remain the same when they are in a food, when a person eats the food, when the iron becomes part of a red blood cell, when the cell is broken down, and when the iron is lost from the body by excretion.
- The next simplest nutrient is water, a compound made of two elements i.e., hydrogen and oxygen.
- Minerals and water are inorganic nutrients, which means they do not contain carbon.
- The other four classes of nutrients (carbohydrates, lipids, proteins, and vitamins) are more complex. In addition to hydrogen and oxygen, they all contain carbon, an element found in all living things. They are therefore called organic compounds (meaning, literally, “alive”).
- Protein and some vitamins also contain nitrogen and may contain other elements such as sulfur as well

Elements in the Six Classes of Nutrients

Notice that organic nutrients contain carbon.

	Carbon	Hydrogen	Oxygen	Nitrogen	Minerals
Inorganic nutrients					
Minerals					✓
Water		✓	✓		
Organic nutrients					
Carbohydrate	✓	✓	✓		
Lipid (fat)	✓	✓	✓		
Protein[a]	✓	✓	✓	✓	
Vitamins[b]	✓	✓	✓		

[a]Some proteins also contain the mineral sulfur.
[b]Some vitamins contain nitrogen; some contain minerals.

NUTRIENT DENSITY

- A measure of the nutrients provided in a food per kcalorie of that food.
- All foods were not created equal in terms of the kcalories and nutrients they provide.
- Some foods, such as milk, contribute much calcium to your diet, especially when you compare them with other beverages, such as soft drinks.
- The typical can of cola (12 fluid ounces) contributes large amounts of sugar (40 grams, or about 10 teaspoons), no vitamins, and virtually no minerals. When you compare calories, you will find that skim milk (at 86 kcalories per cup along with many vitamins and minerals) packs fewer calories than does cola (at 97 kcalories per cup).
- Therefore, we can say that milk is more “nutrient-dense” than cola, meaning that milk contains more nutrients per kcalorie than colas do.
- The more nutrients and the fewer kcalories, the higher the nutrient density and vice versa.

Nutrient Density of Two Breakfast Option Compared

High Nutrient Density

This 450-gram breakfast delivers 500 kcalories, for an energy density of 1.1 (500 kcal ÷ 450 g = 1.1 kcal/g).

Low Nutrient Density

This 144-gram breakfast delivers 500 kcalories, for an energy density of 3.5 (500 kcal ÷ 144 g = 3.5 kcal/g).

Empty-Kcalorie Foods

- Foods that provide few nutrients for the number of kcalories they contain.
- The following foods are often considered to contain mostly empty calories and may lead to weight gain:
  - Sweets, candy, ice cream, soft drinks, fruit flavored beverages and jellies with a low percentage of fruit, and other foods containing added sugars.
  - Refined grains such as white bread or white rice.
  - Butter, lard and other saturated fat.
  - Beer, wine, and other alcoholic beverages
  - High fat foods such as hamburger (Crushed uncooked food), fried chicken, pizza, and French fries.

- Small amounts above the daily requirement do no harm, whereas amounts below the requirement may lead to health problems. When people's nutrient intakes are consistently deficient (less than the requirement), their nutrient stores decline, and over time this decline leads to poor health and deficiency symptoms.
- Therefore, to ensure that the nutrient RDA meet the needs of as many people as possible, the RDA are set near the top end of the range of the population's estimated requirements.

RECOMMENDED DIETARY ALLOWANCE (RDA): the dietary intake value that is sufficient to meet the nutrient requirements of 97 to 98 percent of all healthy individuals in a group.

Thankyou