Unit 1: Introduction to Nutrition

1. Meaning and Scope of Nutrition

Nutrition is one of the most fundamental sciences concerned with human life, health, growth, and survival. Every living cell of the human body requires a continuous supply of energy and specific chemical substances in order to perform its normal functions. The science that studies how food is consumed, digested, absorbed, transported, utilized, stored, and excreted in the body is known as **nutrition**. In simple words, nutrition explains what happens to food after we eat it and how that food supports life.

For beginners, it is important to understand that nutrition is not just about eating more or eating less. It is about **eating appropriately**. Two individuals may consume the same amount of food, yet one may remain healthy and energetic while the other may develop weakness, obesity, or deficiency disorders. This difference arises because nutrition depends not only on the quantity of food but also on its quality, balance, digestibility, and the body's ability to use it properly.

Nutrition is deeply connected with all major aspects of human physiology. The food we eat becomes the source of body heat, physical strength, mental activity, tissue repair, hormone production, immune defense, and reproductive function. Without proper nutrition, even the most normal physiological mechanisms begin to fail gradually. Thus, nutrition forms the very basis of health and is closely linked with growth, disease prevention, recovery from illness, work efficiency, and longevity.

The field of nutrition is broad and multidisciplinary. It includes knowledge from physiology, biochemistry, food science, medicine, community health, microbiology, agriculture, and even psychology and sociology. Nutrition does not only study nutrients in isolation; it also examines food habits, cooking practices, cultural choices, economic factors, and public health measures that influence the nutritional status of a person or a community.

---

2. Food, Nutrients and Nutrition: Understanding the Relationship

A beginner often hears the terms **food**, **nutrients**, and **nutrition** used together, but these words do not mean exactly the same thing. Their meanings are closely related, yet distinct.

Food refers to any edible substance consumed by humans for nourishment. It may be in solid or liquid form and may be natural, processed, cooked, or raw. Food is what we eat daily in the form of cereals, pulses, milk, fruits, vegetables, nuts, oils, and other items.

Nutrients are the specific chemical components present in food that the body needs for various functions. For example, rice contains carbohydrates, milk contains protein, fat, calcium, and vitamins, and green leafy vegetables provide minerals, vitamins, and fibre. Nutrients are therefore the active nourishing principles contained within foods.

Nutrition is the entire biological process by which the body takes in food and uses its nutrients for energy, maintenance, growth, repair, and regulation. Thus, food is the source, nutrients are the useful components, and nutrition is the process by which these components are utilized by the body.

This relationship may be understood in a simple sequence:

Food → Nutrients → Digestion and absorption → Utilization in the body → Health outcomes

When a person eats a wholesome meal, the digestive system breaks it down into absorbable molecules. These nutrients enter the blood, reach various tissues, and participate in metabolic activities. If the diet is proper and the body uses nutrients efficiently, health is maintained. If food intake is poor, unbalanced, excessive, or deficient, nutritional disorders gradually appear.

---

3. Definition of Nutrition

Nutrition may be defined as the science and process by which living organisms obtain and utilize food substances for energy production, growth, tissue repair, maintenance of body functions, resistance to disease, and regulation of physiological processes.

This definition highlights two dimensions of nutrition:

1. **Nutrition as a science** – the academic study of food and nutrients and their effects on the body.
2. **Nutrition as a physiological process** – the actual events occurring inside the body after food consumption.

The subject therefore includes not only dietary intake but also digestion, absorption, metabolism, storage, and excretion. A person may consume nutrient-rich food, but if digestion or absorption is impaired, proper nutrition may still not occur. Hence, nutrition is not merely what is eaten; it is what the body actually receives and uses.

---

4. Importance of Nutrition in Human Life

Nutrition is essential at every stage of life. From the moment of conception up to old age, the human body continuously requires nutrients for construction, maintenance, and functioning. The significance of nutrition can be understood under the following broad roles.

4.1 Nutrition for growth and development

In infancy, childhood, and adolescence, nutrition supports rapid growth of bones, muscles, blood, nerves, and internal organs. Deficiency of essential nutrients during these critical periods can permanently affect height, brain development, immunity, and work capacity.

4.2 Nutrition for energy

All voluntary and involuntary activities of the body require energy. Walking, speaking, studying, breathing, digestion, circulation, and maintaining body temperature all depend upon energy derived from food. Carbohydrates and fats are the main energy-yielding nutrients, while proteins may also provide energy when required.

4.3 Nutrition for repair and maintenance

The body is not a static structure. Cells are constantly wearing out and being replaced. Muscles, skin, blood cells, enzymes, and tissues all require continuous renewal. Protein, minerals, and vitamins play a major role in this process.

4.4 Nutrition for regulation of body processes

Nutrients help regulate vital processes such as heartbeat, nerve conduction, hormone secretion, digestion, muscle contraction, blood clotting, and water balance. Vitamins and minerals are especially important in this regulatory role.

4.5 Nutrition for disease prevention and immunity

A well-nourished body is more resistant to infection and recovers faster from disease. Deficiency of certain nutrients such as protein, vitamin A, vitamin C, iron, zinc, and others can weaken immunity and increase susceptibility to illness.

4.6 Nutrition for mental efficiency and productivity

Proper nutrition affects attention, concentration, memory, mood, and work performance. Poor nutrition often leads to weakness, irritability, reduced learning ability, and low productivity. Therefore, nutrition is important not only for physical health but also for mental and social well-being.

5. Scope of Nutrition as a Subject

Nutrition is not limited to learning the names of nutrients. It is a comprehensive subject with theoretical, practical, clinical, and public health dimensions.

5.1 Nutrition and physiology

Nutrition is closely related to physiology because nutrients support all body functions. To understand nutrition properly, one must know how digestion, absorption, circulation, metabolism, and excretion occur.

5.2 Nutrition and biochemistry

Biochemistry explains how carbohydrates, proteins, fats, vitamins, and minerals are metabolized in cells. It helps us understand why certain deficiencies cause characteristic symptoms and how the body converts nutrients into energy and tissue components.

5.3 Nutrition and health

The quality of nutrition directly influences health status. Nutritional science studies both deficiency diseases such as anaemia, rickets, and scurvy, as well as overnutrition-related disorders such as obesity, diabetes, hypertension, and cardiovascular disease.

5.4 Nutrition and meal planning

In practical life, nutrition helps in planning meals according to age, sex, occupation, health condition, economic level, and personal preference. This applied aspect is especially important in homes, hospitals, schools, hostels, and community feeding programs.

5.5 Nutrition and public health

At community level, nutrition is essential in combating malnutrition, promoting maternal and child health, preventing micronutrient deficiencies, and designing food supplementation and fortification programs.

5.6 Nutrition and clinical care

In hospitals and therapeutic settings, nutrition becomes a part of treatment. Special diets are required for diabetes, kidney disease, liver disorders, hypertension, gastrointestinal diseases, and recovery from surgery or trauma.

Thus, nutrition is both an academic science and a practical life skill.

6. Types of Nutrition

From a biological point of view, living organisms obtain food in different ways. Broadly, nutrition may be classified into two major types.

6.1 Autotrophic nutrition

In autotrophic nutrition, organisms prepare their own food from simple inorganic substances. Green plants are the best example. Through photosynthesis, they convert carbon dioxide and water into carbohydrates in the presence of sunlight and chlorophyll.

6.2 Heterotrophic nutrition

In heterotrophic nutrition, organisms depend on external food sources for nourishment. Humans belong to this category. We cannot synthesize food from inorganic substances and therefore depend on plant and animal sources for nutrients.

Since humans are heterotrophic, the quality, variety, and adequacy of dietary intake become extremely important for survival and health.

---

7. Nutrients: Definition and Broad Classification

Nutrients are the chemical substances present in food that are necessary for the body to perform its various functions. Some supply energy, some help form tissues, and others regulate metabolism.

Nutrients are broadly classified into the following categories:

7.1 Macronutrients

These are nutrients required in relatively large amounts. They include:

- Carbohydrates
- Proteins
- Fats

Water is also required in large quantity and is functionally indispensable, though it does not provide energy.

7.2 Micronutrients

These are needed in small amounts but are equally essential. They include:

- Vitamins
- Minerals

7.3 Non-nutrient yet essential food components

Some components do not provide energy in the usual sense but are important for health, such as:

- Dietary fibre
- Water
- Certain phytochemicals and bioactive substances

The body requires all these components in proper amounts. A diet rich in one nutrient but lacking another cannot be considered satisfactory.

---

8. Functions of Nutrients in the Body

One of the most useful ways to understand nutrition is to study what nutrients actually do in the body. Though every nutrient has multiple roles, their functions can be grouped under three major headings.

8.1 Energy-giving function

The body needs energy for all physical and metabolic activities. This energy comes mainly from carbohydrates and fats, while proteins can also contribute under certain conditions. Energy is measured in kilocalories.

8.2 Body-building function

The body requires materials to form and repair tissues. Proteins are the major body-building nutrients. Minerals such as calcium and phosphorus are essential for bones and teeth. Water also supports the structure and function of tissues.

8.3 Protective and regulatory function

Vitamins and minerals are required for proper regulation of metabolism. They help enzymes function, support immunity, maintain fluid balance, assist in blood formation, and regulate nerve and muscle activity. Fruits, vegetables, milk, pulses, and nuts play a major role in this regard.

Thus, food is often traditionally grouped as:

- **Energy-giving foods**
- **Body-building foods**
- **Protective foods**

This functional classification is very useful for beginners because it simplifies understanding of why dietary variety is necessary.

---

9. Nutritional Status

The term **nutritional status** refers to the condition of the body as influenced by the intake, absorption, and utilization of nutrients. It reflects whether a person is receiving adequate nourishment according to bodily needs.

A person’s nutritional status may be judged by:

- Body weight and height
- Growth pattern
- Clinical appearance
- Laboratory tests
- Dietary history
- Functional capacity

Nutritional status is not determined only by food intake. It is also influenced by digestion, absorption, infections, socioeconomic conditions, health status, and lifestyle.

Broadly, nutritional status may be of the following types:

9.1 Good or optimal nutrition

When nutrient intake is adequate and body functions are normal, growth is appropriate, immunity is strong, and the person appears healthy and active.

9.2 Undernutrition

When intake is insufficient or nutrient losses are excessive, the body begins to show signs of deficiency, weakness, poor growth, low immunity, and reduced work capacity.

9.3 Overnutrition

When intake, especially of calories, fats, sugars, or certain nutrients, exceeds requirement for a long period, obesity and metabolic disorders may develop.

10. Malnutrition: Concept and Forms

The term **malnutrition** means faulty or improper nutrition. It does not refer only to lack of food. It includes both deficiency and excess, as well as imbalance of nutrients.

10.1 Undernutrition

Undernutrition occurs when the diet does not provide enough energy, protein, or micronutrients. It may present as:

- Underweight
- Stunting
- Wasting
- Protein-energy malnutrition
- Anaemia
- Vitamin and mineral deficiencies

This is common in children, pregnant women, and economically deprived populations, but it may also occur in hospitalized patients and the elderly.

10.2 Overnutrition

Overnutrition results from excessive intake of calories or certain food components, usually combined with low physical activity. It may lead to:

- Overweight and obesity
- Type 2 diabetes
- Hypertension
- Fatty liver
- Dyslipidemia
- Cardiovascular disease

10.3 Imbalanced nutrition

Sometimes a person may get enough calories but poor quality nutrients. For example, a diet rich in refined flour, sugar, and fried foods may satisfy hunger but still lead to vitamin, mineral, and fibre deficiency. This condition is often referred to as **hidden hunger**.

Thus, malnutrition is a wide concept that includes **deficiency, excess, and imbalance**.

11. Factors Affecting Nutrition

Nutrition in real life is influenced by many biological, social, economic, and environmental factors. For a beginner, this is important to understand because dietary behavior is not determined by knowledge alone.

11.1 Age

Nutrient requirements change with age. Infants and adolescents need more nutrients for growth, whereas adults need them mainly for maintenance. In old age, energy requirement may decrease, but the need for high-quality protein and micronutrients remains important.

11.2 Sex

Males and females differ in body composition, hormonal profile, and physiological demands. Females, especially during

menstruation, pregnancy, and lactation, may have increased requirements for iron, calcium, folate, and protein.

11.3 Physical activity

A sedentary office worker and a manual laborer do not require the same amount of energy. Activity level greatly affects calorie needs.

11.4 Physiological state

Pregnancy, lactation, illness, surgery, infection, and recovery periods change nutritional needs significantly.

11.5 Climate and environment

In cold climates energy requirement may be higher, while in hot climates water and electrolyte needs become more critical.

11.6 Economic condition

Income influences food availability, food quality, meal frequency, and dietary diversity. Economic constraints often force people to depend on cheap but nutritionally poor foods.

11.7 Food habits and culture

Religious beliefs, traditions, taste preferences, family customs, and regional cooking methods all influence dietary choices.

11.8 Education and awareness

Even when food is available, poor food selection, faulty cooking, and lack of nutrition knowledge can result in malnutrition.

11.9 Health and digestion

Diseases affecting appetite, digestion, absorption, or metabolism can alter nutritional status even if food intake appears adequate.

---

12. Balanced Diet: Introductory Concept

A **balanced diet** is a diet that provides all essential nutrients in the right amounts and proper proportions according to the needs of an individual. It should supply adequate energy, enough body-building nutrients, sufficient vitamins and minerals, proper fibre, and water.

For beginners, the idea of a balanced diet should not be reduced to a few food items. A balanced diet is based on:

- Variety
- Adequacy
- Moderation
- Proportion
- Suitability

No single food can provide everything the body needs. Therefore, different food groups must be included regularly in the daily diet.

A balanced diet should also be practical, affordable, culturally acceptable, and digestible. It should suit the individual's age, sex, health condition, activity level, and physiological state.

13. Nutrition Across the Life Cycle

Nutrition is not constant throughout life. The needs of the body change from one stage to another.

13.1 Infancy

This is the period of fastest growth. Breast milk is the ideal food in early life because it provides energy, protein, fat, water, immunity, and easy digestibility.

13.2 Childhood

During childhood, nutrition supports steady growth, skeletal development, immunity, and learning ability. Poor nutrition at this stage may impair physical and mental development.

13.3 Adolescence

This stage is marked by rapid growth, hormonal changes, and increased nutritional demand. Protein, calcium, iron, and energy needs are particularly high.

13.4 Adulthood

Nutritional focus in adulthood shifts mainly toward maintenance, productivity, and prevention of lifestyle disorders.

13.5 Pregnancy and lactation

These are physiologically demanding states requiring additional energy, protein, iron, calcium, folic acid, and other nutrients to support fetal growth and milk production.

13.6 Old age

In elderly individuals, appetite may decrease, digestion may become slower, and energy requirement may fall. However, the need for protective nutrients, high-quality protein, fibre, and hydration remains crucial.

Understanding life-cycle nutrition helps in planning diets more scientifically.

14. Public Health Importance of Nutrition

Nutrition is not only an individual matter; it is also a major public health concern. Poor nutrition in a population affects productivity, immunity, maternal health, child survival, educational achievement, and economic development.

Public health nutrition focuses on improving nutritional status at community and national levels through measures such as:

- Nutrition education
- School meal programs
- Maternal and child nutrition services
- Food supplementation
- Food fortification
- Control of deficiency disorders
- Community-based dietary guidelines

Problems such as anaemia, vitamin A deficiency, iodine deficiency disorders, stunting, and obesity are addressed through public health nutrition programs.

Thus, nutrition has both personal and societal importance.

---

15. New and Emerging Areas in Nutrition

Modern nutrition has expanded beyond classical deficiency diseases. Today, researchers also study how nutrition interacts with genes, gut microbiota, hormones, and chronic disease patterns.

Some emerging concepts include:

- **Functional foods** that provide additional health benefits beyond basic nourishment
- **Nutrigenomics**, which studies how nutrients influence gene expression
- **Personalized nutrition**, where diet is tailored to individual metabolic characteristics
- **Gut microbiome science**, which explores the role of intestinal bacteria in digestion, immunity, obesity, and mental health
- **Preventive nutrition**, which aims to reduce risk of chronic disorders through long-term dietary patterns

These modern developments show that nutrition is a living and evolving science.

---

16. Summary of the Unit

Nutrition is the science and process by which the body receives and uses food for energy, growth, repair, protection, and regulation. Food provides nutrients, and nutrients support all essential body functions. Good nutrition is necessary for normal growth, efficient work, mental alertness, strong immunity, and disease prevention. Poor nutrition may appear as undernutrition, overnutrition, or imbalance. Nutritional needs vary according to age, sex, activity, physiological state, health status, and environmental conditions. The concept of a balanced diet and the understanding of nutritional status form the foundation for all further study in nutrition and meal management.

---

17. Review Questions

1. Define nutrition and explain its significance in human life.
2. Differentiate between food, nutrients, and nutrition with suitable explanation.
3. Discuss the scope of nutrition as a science.
4. Explain the major functions of nutrients in the human body.
5. What is nutritional status? Describe its types.
6. Define malnutrition and explain its major forms.
7. Discuss the various factors affecting nutrition.
8. Explain why nutritional needs change at different stages of life.
9. Write a detailed note on the public health importance of nutrition.
10. Describe the basic concept of a balanced diet.
