RTB | RWANDA TVET BOARD

RQF LEVEL 3

FOHLU301

FRONT OFFICE AND HOUSEKEEPING OPERATIONS

Maintain Food Nutrients in Cooking

TRAINEE MANUAL

MAINTAIN FOOD NUTRIENTS IN COOKING

2023

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FOREWORD

Welcome to the world of Technical and Vocational Education and Training (TVET) in the hospitality and tourism sector. In an era of constant evolution and growing demand for skilled professionals, the importance of specialized training cannot be overstated. As the global hospitality and tourism industry continues to flourish, the need for competent individuals equipped with relevant knowledge and practical skills has become crucial. This collection of TVET training manuals serves as a comprehensive resource for those seeking to embark on a fulfilling career or further their expertise within the hospitality and tourism sector. Developed with meticulous attention to detail and in collaboration with industry experts, these manuals offer a wealth of knowledge, practical insights, and hands-on training exercises.

The manuals cover a wide range of topics, ranging from essential foundational concepts to specialized areas within the industry. Whether you are interested in hotel management, culinary arts, event planning, travel and tourism, or any other facet of this vibrant sector, you will find invaluable guidance within these pages. At the heart of the TVET approach is the belief that learning should be both practical and relevant. These manuals have been carefully crafted to ensure that they reflect the real-world challenges and requirements of the hospitality and tourism industry. They are designed to empower learners with the skills, competencies, and confidence needed to excel in their chosen field.

Furthermore, the manuals adopt a learner-centered approach, encouraging active participation, critical thinking, and problem-solving. Throughout each module, learners are encouraged to engage in practical exercises, case studies, and interactive activities that simulate real-world scenarios. This hands-on approach allows learners to apply theoretical concepts and develop the necessary skills that are highly sought after in the industry.

We understand that education is a lifelong journey, and these manuals have been designed to cater to learners at various stages of their professional development. Whether you are a student taking your first steps in the industry, a working professional seeking to enhance your skills, or an instructor guiding aspiring individuals, you will find the manuals to be a valuable asset.

I would like to express my sincere appreciation to the authors, industry experts, and educators who have contributed to the creation of these TVET training manuals. Their dedication and expertise have ensured that the manuals are of the highest quality and relevance.

I encourage you to embrace the opportunities presented within these pages, to explore the dynamic world of hospitality and tourism, and to unlock your potential in this exciting industry. By investing in your education and acquiring the skills offered in these manuals, you are taking a significant step towards a rewarding and successful career.

Best wishes on your journey of discovery and growth in the hospitality and tourism sector.

Dipl.-Ing. Paul UMUKUNZI

Director General/ RTB

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ACRONYMS

BMR: Basal Metabolic Rate

CHOs: Carbohydrates

DG: Dietary Guidelines

DNA: Deoxyribonucleic acid

DRI: Dietary Reference Intake

GMO: Genetically Modified Organism

KCAL: Kilocalories

PLP: Pyridoxal Phosphate

RDA: Recommended Dietary Allowances

RNA: *Ribonucleic acid*

TVP: Textured vegetable protein

USDA: United State Department of Agriculture

ADHD: Attention-Deficit / Hyperactivity Disorder

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INTRODUCTION

Welcome to the training manual focused the front office and housekeeping operations. This manual, titled "Maintain Food Nutrients in Cooking," aims to provide extensive training for individuals who wish to comprehend the significance of preserving food nutrients while cooking.

The manual is composed of five units that delve into crucial aspects of preserving food nutrients during cooking. These include identifying nutrients, recognizing food groups, sustaining a balanced diet, conserving nutrients while cooking, and understanding the effects of cooking on nutrient content.

The manual provides an interactive learning experience consisting of discovery activities that allow learners to discover and explore concepts, problem-solving activities that challenge learners to think critically and find solutions, guided practice activities that offer step-by-step instructions, and application activities that motivate learners to apply their newly acquired knowledge in real-world situations.

The manual also features assessment activities that provide feedback to learners regarding their progress and assist them in identifying areas where they can improve.

Upon completion of this manual, learners will have an extensive understanding of preserving food nutrients during the cooking process and possess the necessary skills to prepare healthy and nutritious meals. Let's get started!

Units:

Unit 1: Identify nutrients

Unit 2: Identify food groups

Unit 3: Maintains balanced diets

Unit 4: Conserve Nutrients In Cooking

UNIT 1: IDENTIFY NUTRIENTS

Figure 1: Illustration of Sources of nutrients

Unit summary:

This unit describes the knowledge, skills and attitudes required to identify nutrients, food groups, maintains balanced diets. At the end of this unit, trainees will be able to conserve nutrients in cooking.

Self-Assessment: Unit 1

1. Look at the illustration. What is happening? What do you think this learning outcome will be about?

2. Fill in the self-assessment below.

   There are no right or wrong ways to answer this survey. It is for your own use during this course. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this learning outcome, we'll take this survey again.

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Different tools in washing process					
Different tools in drying process					
Different tools in finishing					
Categories of different laundry equipment					
Description of dry-cleaning equipment used in Laundry					

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Pressing and steaming laundry equipment					
Select types of laundry products					
Identify form of Laundry Products					

Key Competencies

Knowledge	Skills	Attitudes
1.Identify nutrients.	1. Describe the sources of nutrient.	1. Sources of nutrient are well described
2. Identify nutrients functions in the human body	2. Describe sources of nutrient.	2. Sources of nutrients are properly described.
3. Identify nutrition deficiency in the human body	3. Describe nutrition deficiency in the human body.	3. Nutrition deficiency in the human body is stored safely are properly described.

Discovery activity

Task:1.

1. Discuss the following questions with your partner (pair):
    a. What does nutrition mean?
    b. Identify the sources of nutrients?
    c. Identify the factors influencing food choice?
    d. What are types of types of vitamins?
    e. Describe the types of minerals?
2. Discuss with your pair all the questions (a., b., c)
3. Share your findings on the questions (d and e) with the rest of the class. Compare and discuss your ideas.

TOPIC 1.1: DESCRIBING MICRO-NUTRIENTS

Figure 2: Source of micro-nutrients

Activity 1: Discovery

Farufaru hotel manager is expecting to receive a group of people with nutrition concerns. So, he requests you to plan a menu by considering all basic nutrients needed for human body.

Activity 2: Problem Solving

1. In group of 5 discuses on the following situation:
   a. Identify the types of vitamins that you will consider for menu planning
2. Take a time to brainstorm and discuss the questions in your respective groups.
3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Describing micro-nutrients**
  - ✓ **Definition of Nutrients**

    Nutrients are chemical compound (such as protein, fat, carbohydrate, vitamin, water, and mineral) contained in foods. These compounds are used by the body to function and grow.

  - ✓ **Definition of Nutrition**

    Nutrition is the art of balancing your intake of food in relation to your body's requirements for energy, growth, and repair.

  - ✓ **Definition of Malnutrition**

    A condition caused by not getting enough calories or the right amount of key 11nutrients, such as vitamins and minerals that are needed for health. Malnutrition may also refer to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers 2 broad groups of conditions. One is **'undernutrition'**—which includes stunting (low height for age),

wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is **Over nutrition—**which includes overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes, and cancer).

✓ **Factors influencing food choice**

- Biological determinants such as hunger, appetite, and taste
- Economic determinants such as cost, income, availability
- Physical determinants such as access, education, skills (e.g. cooking) and time
- Social determinants such as culture, family, peers and meal patterns
- Psychological determinants such as mood, stress and guilt
- Attitudes, beliefs and knowledge about food

Definition of micro- nutrients

Micronutrients are nutrients that are required by the body in lesser amounts for its growth and development. They play a major role in the metabolic activities of the body. These include vitamins and minerals. However, their impact on a body's health are critical, and deficiency in any of them can cause severe and even life-threatening conditions.

Types of micro nutrients

Micronutrients can be divided into four groups—water-soluble vitamins, fat-soluble vitamins, macro minerals and trace minerals.

Micronutrients, i.e., vitamins and minerals can be divided into the following types:

✓ **Water-Soluble Vitamins**

Most of the vitamins can be dissolved in water. They are difficult to store in the body and get flushed out in urine when consumed in large quantities. They play an important role in producing energy. Since they are not stored in the body, it is important to take them enough from different food sources.

✓ **Fat-Soluble Vitamins**

These vitamins do not dissolve in water. These are stored in the liver and fatty tissues for future use. Vitamins A, D, E, and K are important fat-soluble vitamins. They play a major role in the proper functioning of the immune system, proper bone development, proper vision, and protection of cells from damage.

✓ **Macro minerals**

These are required in higher amounts as compared to the trace minerals. The important macro minerals and their functions include:

- **Calcium-** For the proper structure and function of bones.
- **Phosphorus** – Cell membrane structure
- **Magnesium-** Enzyme reactions
- **Sodium-** Fluid balance and maintenance of blood pressure
- **Chloride-** Maintains fluid balance and formation of digestive juices.
- **Potassium-** Nerve impulse transmission and muscle function.
- **Sulphur-** present in all the living tissues

✓ **Trace Minerals**

These are required in very small amounts, but perform various important functions in our body. Iron, manganese, copper, zinc, iodine, fluoride, and selenium are some of the important trace minerals required by the body.

✓ **Micronutrients in Plants**

There are seven essential micronutrients in plants. Some nutrients control the permeability of a cell membrane and some other control the osmotic pressure, buffer action, etc.

Boron (B), Zinc (Zn), Manganese (Mn), Iron (Fe), Copper (Cu), Molybdenum (Mo), Chlorine (Cl) are some of the important micronutrients in plants. Lack of any of these nutrients affects growth and development.

✓ **Boron (B)**

Boron is found in tourmaline- a highly insoluble mineral and it is essential for proper forming and strengthening of the cell wall. Boron plays an important role in flowering, fruiting, cell division and pollen germination. Deficiency of boron

results in reduced seed and grain production. Boron deficiencies generally occur during drought periods. Excess supply or availability of boron is also harmful to the plant.

- ✓ **Zinc (Zn)**

  Zinc is an essential element which helps in photosynthesis, energy production and regulation of growth. Zinc deficiency may cause slower maturity and reduction in the size of the leaf. Zinc deficiencies often occur during the cold, wet spring season.

- ✓ **Manganese (Mn)**

  Manganese is essential for photosynthesis and nitrogen metabolism. Premature leaf drop and delayed maturity are the symptoms of manganese deficiency. Manganese is abundant in wet soils, whereas dry soil has limited manganese.

- ✓ **Iron (Fe)**

  Iron is essential for energy transfer, nitrogen reduction, and fixation. Iron, along with sulfur, acts as a catalyst in the formation of other reactions. Yellow leaves are the symptom of Iron deficiency.

- ✓ **Copper (Cu)**

  Copper is essential for proper photosynthesis, grain production and to the strengthening of a cell wall. Stunted growth, yellow leaves are the symptoms of copper deficiency. There will not be enough copper in many soils.

- ✓ **Molybdenum (Mo)**

  Molybdenum is responsible for pollen formation. It is also responsible for nitrogen fixation. Reduced fruit or grain growth are the symptoms of Molybdenum deficiency. Sandy soils in the humid region are the places where zinc deficiencies are found.

- ✓ **Chlorine (Cl)**

  Chlorine is the nutrient which helps in osmosis and ionic balance. It also plays a key role in the process of photosynthesis. Decreased resistance, reduced plant growth are the symptoms of chlorine deficiency.

- **Identification of types of vitamins**

  Vitamins play a vital role in many biochemical functions in the human body and are essential components for maintaining optimal health. There are two main groups of vitamins – fat-soluble (easily stored in fat upon absorption) and water-soluble (washed out and not easily stored). Although adequate intake of all vitamins is important, regular intake is required to avoid deficiency due to the transient nature of water-soluble vitamins.

  The water-soluble vitamins include Vitamin C and Vitamin B complex (thiamine, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folate, and cobalamin).

✓ **Water-soluble vitamins**

- Thiamine (B1)
- Riboflavin (B2)
- Niacin (B3)
- Pantothenic acid (B5)
- Pyridoxine (B6)
- Biotin (B7)
- Folate (B9)
- Cobalamin (B12)
- Vitamin C (ascorbic acid, ascorbate)

✓ **Fats soluble vitamins**

- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K

- **Description of water-soluble vitamins**

  Water-soluble vitamins dissolve in water upon entering the body. Because of this, humans cannot store excess amounts of water-soluble vitamins for later use. There are nine water-soluble vitamins: The B vitamins - folate, thiamine, riboflavin, niacin, pantothenic acid, biotin, vitamin B6, and vitamin B12 - and

vitamin C. Deficiency of any of these water-soluble vitamins results in a clinical syndrome that may result in severe morbidity and mortality.

- ✓ **Thiamine (B1)** is a cofactor for multiple enzymes, including pyruvate dehydrogenase, alpha-ketoglutarate, transketolase, and branched-chain ketoacid dehydrogenase, all of which are involved in glucose breakdown. Deficiency can result in adenosine triphosphate depletion and often affects highly aerobic tissues such as the brain, nerves, and heart first. With heart involvement, it is called wet beriberi and is characterized by high-output heart failure, edema, and dyspnea on exertion.

  When the nervous system is involved, it is called dry beriberi, characterized by polyneuritis and symmetrical muscle wasting. Damage to the medial dorsal nucleus of the thalamus and the mammillary bodies in the brain can result in a condition called Wernicke encephalopathy, recognized by the classic triad of confusion, ophthalmoplegia, and ataxia, or Wernicke-Korsakoff syndrome when accompanying confabulation, personality change, and memory loss is present. Thiamine deficiency often is part of the presentation in patients with alcohol use disorder secondary to malnutrition and malabsorption, in addition to patients suffering from malnutrition.
- ✓ **Riboflavin (B2)** is a cofactor in redox reactions. Deficiency leads to cheilosis (inflammation of lips and fissures of the mouth) and corneal vascularization. Of note, ultraviolet (UV) light can destroy riboflavin; hence it is always packaged in opaque containers.
- ✓ **Niacin (B3)** is also utilized in redox reactions and derives from tryptophan. Deficiency can present as pellagra, otherwise known as the 3-D's: diarrhea, dermatitis, and dementia. Deficiency is rare but can occur in alcoholics and those with malnutrition. Niacin can be used to treat dyslipidemia, and a side effect is facial flushing, which can be avoided by treatment with aspirin.
- ✓ **Pantothenic acid (B5)** is a component of coenzyme A and fatty acid synthase, both of which are necessary for energy production and the formation of hormones. Deficiency is characterized by dermatitis, enteritis, alopecia, and adrenal insufficiency.
- ✓ **Pyridoxine (B6)** is converted to pyridoxal phosphate (PLP) and is part of reactions including transamination, decarboxylation, and glycogen phosphorylase. It is critical for the formation of red blood cells, and deficiency can result in sideroblastic anemia, hyperirritability, convulsions, peripheral neuropathy, and mental confusion. Peripheral

neuropathy is a potential side effect of isoniazid, a key drug utilized in treating tuberculosis, and it is customary to supplement treatment with B6.

- ✓ **Biotin (B7)** is necessary for the metabolism of protein, fats, and carbohydrates. Deficiency can lead to muscle pain, heart problems, anemia, and depression. Additionally, since biotin is a contributor to keratin, biotin has become popularized as a supplement to improve the quality of hair, skin, and nails. Large, unregulated doses of biotin can skew a variety of clinical tests, including thyroid tests T3 and T4, which can be either falsely elevated or falsely lowered depending on the particular assay; this is because nearly all immunoassays rely on the biotin-streptavidin attraction. This binding is also responsible for the biotin deficiency seen as a result of chronic consumption of large amounts of raw egg whites, as raw egg whites contain a high volume of intact avidin, which strongly binds biotin. When egg whites are cooked, the avidin denatures and does not bind biotin as avidly. Of note, TSH levels are unaffected by biotin supplementation.
- ✓ **Folate (B9)** is converted to tetrahydrofolate and is vital for DNA and RNA synthesis. Deficiency can result in neural tube defects, prompting folate supplementation during pregnancy, and macrocytic (MCV>100) megaloblastic anemia. Folate deficiency may also be a feature of alcohol use disorder.
- ✓ **Cobalamin (B12)** is essential for erythropoiesis and the growth of the nervous system. Deficiency may lead to pernicious anemia and subacute combined degeneration of the spinal cord. The macrocytic megaloblastic anemia from B12 deficiency presents similarly to folate deficiency, and to differentiate them, it is imperative to obtain serum homocysteine and methylmalonic acid levels. In folate deficiency, homocysteine will elevate, but methylmalonic acid levels will be normal. In vitamin B12 deficiency, both homocysteine and methylmalonic acid levels will present as elevated. Additionally, B12 deficiency will present with neurologic symptoms, whereas folate deficiency will not.
- ✓ **Vitamin C** (ascorbic acid, ascorbate) is needed for collagen growth, wound healing, bone formation, enhancing the immune system, absorption of iron, strengthening blood vessels, and acting as an antioxidant. When deficiency occurs, it can result in scurvy which can present with swollen and bleeding gums, loss of teeth, poor wound healing, and poor tissue growth.

✓ **Description of Fats soluble vitamins**

Fat-soluble vitamins are vitamins which absorbed along with fats in the diet and are stored in the body's fatty tissue and in the liver. They are found in many plant and animal foods and in dietary supplements. Vitamins A, D, E, and K are fat-soluble.

A – healthy vision, eyes, and skin. From oily fish, egg yolk, dark green and yellow veg, cheese, butter etc.

D – absorption of calcium and phosphorous, bone and teeth formation. From Canned fish, egg yolk, margarine, sun

E – antioxidant, protects body from oxygen damage, cancer fighting potential. From Vegetable oil, pine nuts, peanuts, popcorn, sweet potato

K – produces clotting factor in blood. From Egg yolk, liver, tomatoes, greens, skin of fruit and vegetables

Identification of types of minerals

✓ **Trace minerals**

Trace minerals, also called micro minerals, are essential minerals that the human body must get from food, but, unlike macro minerals, we only need a very small amount.

Chromium is that helps insulin regulate glucose (blood sugar) levels and can be found in liver, whole grains, nuts, and cheeses.

Copper aids in the formation of bone and cartilage and helps the body use iron properly. Copper can be found in beef, organ meats, fruits, vegetables, nuts, and beans.

Fluoride aids in the formation of bones and teeth and helps prevent tooth decay. It can be found in fish, some teas, and water that is either naturally fluoridated or has added fluoride. It is important not to exceed the recommended daily allowance for fluoride.

Iron is critical for the manufacture of blood and crucial in pregnancy and early childhood. Iron can be found in meat, poultry, enriched breads and cereals, whole grains, nuts, and beans.

Manganese is an enzyme that can be found in many foods, particularly plants.

Molybdenum iodine is found in hormones that help regulate metabolism, growth, and development and can be found in foods that are grown in iodine rich soil.

Most people now get iodine from iodized salt since iodine deficiency is a leading worldwide cause of impaired cognitive development in children.

Selenium is an antioxidant found in grains, meat, and seafood. Antioxidants are molecules that can help protect against cell damage.

Zinc is found in many enzymes in the human body that help make protein and genetic material. Zinc also plays a role in fetal development, wound healing, the immune system, and adolescent development. It can be consumed through meat, fish, poultry, vegetables, and some grains.

✓ **Major minerals**

The major minerals, which are minerals used and stored in large quantities in the body and are classified as minerals that are required in the diet each day in amounts larger than 100 milligrams. These include sodium, potassium, chloride, calcium, phosphorus, magnesium, and sulfur. These major minerals can be found in various foods. For example, in Guam, the major mineral, calcium, is consumed in the diet not only through dairy, a common source of calcium but also through the mixed dishes, desserts, and vegetables that they consume. Consuming a varied diet significantly improves an individual's ability to meet their nutrient needs.

- **Calcium**

  Calcium is the most abundant mineral in the body and greater than 99% of it is stored in bone tissue. Although only 1% of the calcium in the human body is found in the blood and soft tissues, it is here that it performs the most critical functions. Blood calcium levels are rigorously controlled so that if blood levels drop the body will rapidly respond by stimulating bone resorption, thereby releasing stored calcium into the blood.

- **Phosphorus**

  Phosphorus is present in our bodies as part of a chemical group called a phosphate group. These phosphate groups are essential as a structural component of cell membranes (as phospholipids), DNA and RNA, energy production (ATP), and

regulation of acid-base homeostasis. Phosphorus however is mostly associated with calcium as a part of the mineral structure of bones and teeth.

- **Sulfur**

  Sulfur is incorporated into protein structures in the body. Amino acids, methionine and cysteine contain sulfur which are essential for the antioxidant enzyme glutathione peroxidase. Some vitamins like thiamin and biotin also contain sulfur which are important in regulating acidity in the body. Sulfur is a major mineral with no recommended intake or deficiencies when protein needs are met. Sulfur is mostly consumed as a part of dietary proteins and sulfur containing vitamins.

- **Magnesium**

  Approximately 60 percent of magnesium in the human body is stored in the skeleton, making up about 1 percent of mineralized bone tissue. Magnesium is not an integral part of the hard mineral crystals, but it does reside on the surface of the crystal and helps maximize bone structure. Observational studies link magnesium deficiency with an increased risk for osteoporosis.

- **Sodium**

  Sodium is vital not only for maintaining fluid balance but also for many other essential functions. In contrast to many minerals, sodium absorption in the small intestine is extremely efficient and in a healthy individual all excess sodium is excreted by the kidneys. In fact, very little sodium is required in the diet (about 200 milligrams) because the kidneys actively reabsorb sodium.

- **Chloride**

  Chloride is the primary anion in extracellular fluid. In addition to passively following sodium, chloride has its own protein channels that reside in cell membranes. These protein channels are especially abundant in the gastrointestinal tract, pancreas, and lungs.

- **Potassium**

  Potassium is the most abundant positively charged ion inside of cells. Ninety percent of potassium exists in intracellular fluid, with about 10 percent in extracellular fluid, and only 1 percent in blood plasma. As with sodium, potassium levels in the blood are

strictly regulated. The hormone aldosterone is what primarily controls potassium levels, but other hormones (such as insulin) also play a role.

Summary of Minerals their functions and Sources

Major minerals

Mineral	Function	Sources
Sodium	Needed for proper fluid balance, nerve transmission, and muscle contraction	Table salt, soy sauce; large amounts in processed foods; small amounts in milk, breads, vegetables, and unprocessed meats
Chloride	Needed for proper fluid balance, stomach acid	Table salt, soy sauce; large amounts in processed foods; small amounts in milk, meats, breads, and vegetables
Potassium	Needed for proper fluid balance, nerve transmission, and muscle contraction	Meats, milk, fresh fruits and vegetables, whole grains, legumes
Calcium	Important for healthy bones and teeth; helps muscles relax and contract; important in nerve functioning, blood clotting, blood pressure regulation, immune system health	Milk and milk products; canned fish with bones (salmon, sardines); fortified tofu and fortified soy beverage; greens (broccoli, mustard greens); legumes

Phosphorus	Important for healthy bones and teeth; found in every cell; part of the system that maintains acid-base balance	Meat, fish, poultry, eggs, milk, processed foods (including soda pop)
Magnesium	Found in bones; needed for making protein, muscle contraction, nerve transmission, immune system health	Nuts and seeds; legumes; leafy, green vegetables; seafood; chocolate; artichokes; "hard" drinking water
Sulfur	Found in protein molecules	Occurs in foods as part of protein: meats, poultry, fish, eggs, milk, legumes, nuts

Table 1:Summary of Minerals their functions and Sources

Source: https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=ta3912

(Retrieved on 20-March-2023)

Trace minerals (microminerals)

The body needs trace minerals in very small amounts. Note that **iron** is considered to be a trace mineral, although the amount needed is somewhat more than for other micro minerals.

Trace minerals

Mineral	Function	Sources
Iron	Part of a molecule (hemoglobin) found in red blood cells that carries oxygen in the body; needed for energy metabolism	Organ meats; red meats; fish; poultry; shellfish (especially clams); egg yolks; legumes; dried fruits; dark, leafy greens; iron-enriched breads and cereals; and fortified cereals

Mineral	Function	Sources
Zinc	Part of many enzymes; needed for making protein and genetic material; has a function in taste perception, wound healing, normal fetal development, production of sperm, normal growth and sexual maturation, immune system health	Meats, fish, poultry, leavened whole grains, vegetables
Iodine	Found in thyroid hormone, which helps regulate growth, development, and metabolism	Seafood, foods grown in iodine-rich soil, iodized salt, bread, dairy products
Selenium	Antioxidant	Meats, seafood, grains
Copper	Part of many enzymes; needed for iron metabolism	Legumes, nuts and seeds, whole grains, organ meats, drinking water
Manganese	Part of many enzymes	Widespread in foods, especially plant foods
Fluoride	Involved in formation of bones and teeth; helps prevent tooth decay	Drinking water (either fluoridated or naturally containing fluoride), fish, and most teas
Chromium	Works closely with insulin to regulate blood sugar (glucose) levels	Unrefined foods, especially liver, brewer's yeast, whole grains, nuts, cheeses

Mineral	Function	Sources
Molybdenum	Part of some enzymes	Legumes; breads and grains; leafy greens; leafy, green vegetables; milk; liver

Table 2:Trace minerals

Source: https://myhealth.alberta.ca/Health/pages/conditions.aspx?hwid=ta3912(Retrieved on 20-March-2023)

Activity 3: Guided Practice,

Task:

You brainstorm on the (a and b) and you present in the plenary session.

As you have already read the scenario in task 1, discuss the following questions:

a. Describing water soluble vitamins

b. Describing Fats soluble vitamins

Activity 4: Application

Topic 5.1

In the kitchen workshop perform the following activities:

a. Select the major food commodities reach in water soluble vitamins

b. Select the major food commodities reach in fat soluble vitamins

Task:

TOPIC 1.2: DESCRIBING MACRO- NUTRIENTS

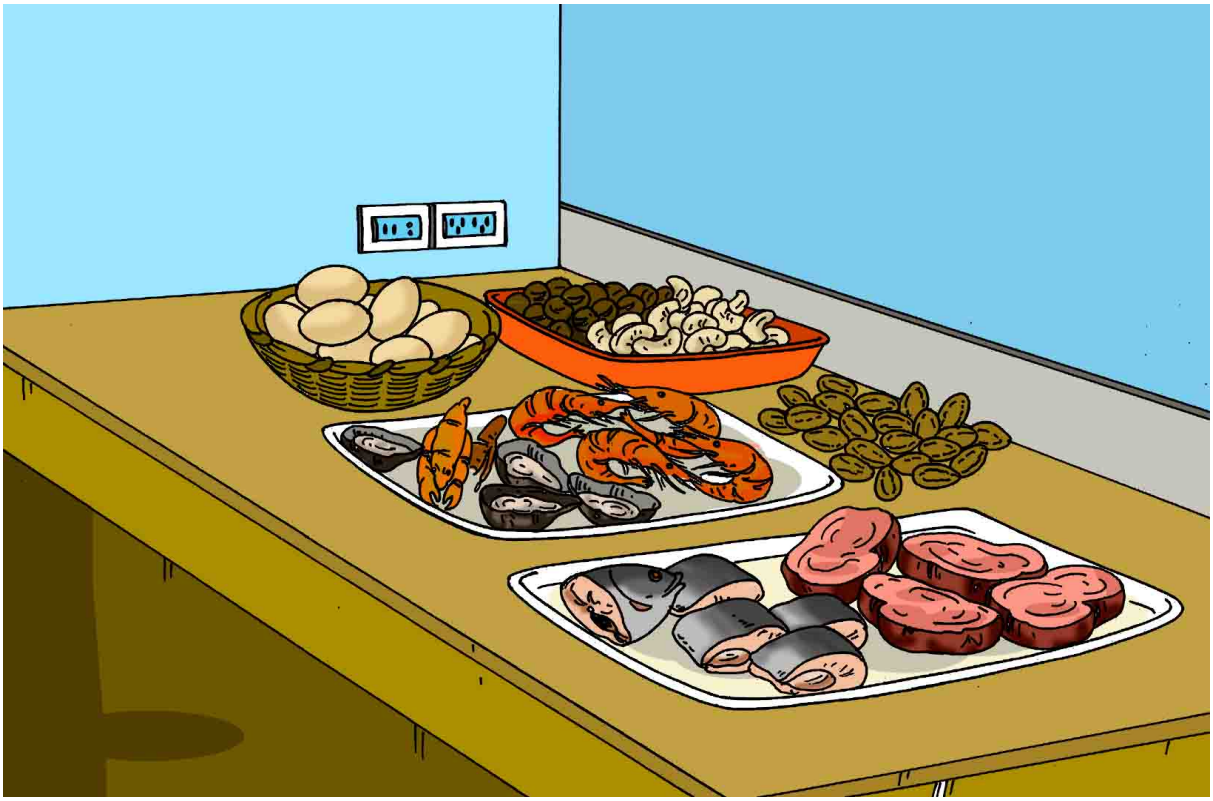

Figure 3: Source of macro- nutrients

Activity 1: Discovery

Fatuma has a child suffering from kwashiorkor, and she is looking for someone who can help her advice on a good menu for her child's quick recovery.

Activity 1: Problem Solving

1.Create groups of 3-4 and discuss the situation written as follows:

2. Read the situation in task 1 and brainstorm to the following question

a. Identify types of proteins that Fatuma needs for her child for quick recovery

3. Take time to brainstorm and discuss the questions in your respective groups.

4. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Describing macro- nutrients**
  - ✓ **Macro nutrients**

Macronutrients, or macros, are essential nutrients the body needs in large quantities to remain healthy. Macronutrients provide the body with energy, help prevent disease, and allow the body to function correctly. There are three main types of macronutrients: proteins, fats, and carbohydrates.

Macronutrients are available in many food sources, but it can be difficult to determine the right amount to consume. There are also a number of factors that can influence the quantity of macronutrients people may need.

Carbohydrates

Carbohydrates are a preferred source Trusted Source of energy for several body tissues, and the primary energy source for the brain. The body can break carbohydrates down into glucose, which moves from the bloodstream into the body's cells and allows them to function.

The term "carbohydrates" covers a large number of neutral chemical compounds, formed of carbon, oxygen, and hydrogen atoms in proportions, which almost always correspond to the empirical formula (CH_20) n, where n is 3 or more. The carbohydrates as a group contain sugars, polyhydroxy aldehydes, ketones, alcohols and acids, their simple derivatives, and any compound that may be hydrolyzed to these. The carbohydrates can be broadly classified as sugars and nonsugars. The simplest sugars are monosaccharides, which are divided into subgroups—trioses $(C_3H_6O_3)$, tetroses $(C_4H_8O_4)$, pentoses $(C_5H_{10}O_5)$, hexoses $(C_6H_{12}O_6)$, and heptoses $(C_7H_{14}O_7)$ depending upon the number of carbon atoms present in the molecule.

Carbohydrates are important for muscle contraction during intense exercise. Even at rest, carbohydrates enable the body to perform vital functions such as maintaining body temperature, keeping the heart beating, and digesting food.

The identification of carbohydrates is based on their chemical structure, with the three most commonly known groups being monosaccharides, disaccharides and polysaccharides.

Here is a list of the most common food and drink sources for different types of carbohydrates.

- **Monosaccharides**
  - ✓ **Fructose**
    - Honey
    - Dried fruits such as apples, dates and sultanas
    - Fruit jams, chutney's, barbecue & plum sauce, gherkins, sundried tomatoes
    - Breakfast cereals with whole wheat, oats and fruits
    - Canned fruits such as pineapple, strawberry and plum
    - Fresh fruits including grapes, apples, pear, kiwi &banana
    - Also derived from the digestion of sucrose
  - ✓ **Glucose**
    - Honey, golden syrup
    - Dried fruits such as dates, currants & figs
    - Small amounts are found in some fruits (grapes and dried apricots), vegetables (sweet corn) and honey
    - Manufactured foods such as juices, cured hams, pasta sauces
    - Digestion and conversion of other carbohydrates
  - ✓ **Galactose**
    - Flavoured yogurts or with fruit pieces added
    - Lactose-free milk
    - Instant coffee granules, ground black pepper
    - Digestion of lactose

- **Disaccharides**
  - ✓ **Sucrose**
    - Derived from sugar cane and sugar beet
    - Table sugar, manufactured foods, such as cakes, cookies, and dark chocolate

- Sweet root vegetables such as beetroot and carrots

✓ **Maltose**

- Malted wheat and barley
- Breads, bagels, breakfast cereals, energy bars
- Malt extract, molasses
- Beer

✓ **Lactose**

- Milk, buttermilk, yogurt, sour cream, condensed milk,
- Milk products, frozen yogurts, cottage cheese, evaporated milk, goats milk & ice creams

✓ **Trehalose**

- Mushrooms and edible fungi
- Some seaweeds, lobsters, shrimp
- Honey
- Wine & beers

- **Oligosaccharides**

Raffinose, stachyose, verbascose, inulin, fructo and galacto-oligosaccahrides

- Legumes, beans, cabbage, broccoli, brussel sprouts
- Onion, artichoke, fennel, asparagus, beans & peas
- Pre-biotics

- **Polysaccharides**

✓ **Starch**

- Cereal foods, cornmeal, pretzels, flours, oats, instant noodles, pasta, rice
- Potato, corn
- Small amounts in other root vegetables and unripe fruit

✓ **Non-starch polysaccharides**

- Vegetables, fruit
- Wholegrain cereals
- Pulses

- **Fats /lipids**

Fats are an important part of the diet that can also provide the body with energy. While some types of dietary fats may be healthier than others, they are an essential part of the diet and play a role Trusted Source in hormone production, cell growth, energy storage, and the absorption of important vitamins.

- **Proteins**

Protein consists of long chains of compounds called amino acids. These play an essential role in the growth, development, repair, and maintenance of body tissues.

Protein is present in every body cell, and adequate protein intake is important for keeping the muscles, bones, and tissues healthy. Protein also plays a vital role in many bodily processes, such as aiding the immune system, biochemical reactions, and providing structure and support for cells.

- **Types of carbohydrates (CHO)**

Scientists classify carbohydrates as either simple or complex, depending on how many sugar molecules they contain.

- **Simple carbohydrates**

Simple carbohydrates have one or two sugar molecules and include glucose, fructose, sucrose, and lactose. Simple carbohydrates naturally occur in:

- Fruits
- Fruit juices

- Milk
- Milk products

- **Complex carbohydrates**

Complex carbohydrates contain longer, more complex chains of sugars. They include oligosaccharides and polysaccharides. Complex carbohydrates also contain fiber and starch. Examples of complex carbohydrates include:

- Whole grains, including some types of bread, cereal, pasta, and rice
- Peas and beans
- Vegetables and fruits

- **Identification Types Fats / lipids**

Lipids are important fats that serve different roles in the human body. The three main types of lipids monounsaturated, polyunsaturated, and saturated fats.

Monounsaturated fat – This type of fat is found in plant oils. Common sources are nuts (almonds, cashews, pecans, peanuts, and walnuts) and nut products, avocados, extra virgin olive oil, sesame oil, high oleic safflower oil, sunflower oil, and canola oil.

Polyunsaturated fat – This type of fat is found mainly in plant-based foods, oils, and fish. Common sources are nuts (walnuts, hazelnuts, pecans, almonds, and peanuts), soybean oil, corn oil, safflower oil, flaxseed oil, canola oil, and fish (trout, herring, and salmon).

Saturated fat – This fat is found in animal products, dairy products, palm and coconut oils, and cocoa butter. Limit these products to less than 10 percent of your overall dietary fat consumption. Saturated fat, which is found in meat, dairy products, and some plant oils, is associated with increased bloodstream cholesterol. High cholesterol levels indicate that a person is at a major risk for disease, such as heart attack. Avoid saturated fat, or at least consume in moderation.

Identification of 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. Proteins are made up of many different amino acids linked together. There are twenty different of these amino acid building blocks commonly found in plants and animals. In general, animal sources, such as meat, poultry, fish, eggs, milk, cheese and yogurt, have higher biological value proteins, while plants, such as legumes, grains, nuts, seeds and vegetables, provide low biological value proteins.

- **High Biological proteins**

We say High Biological proteins, when a protein contains the essential amino acids in the right proportion required by humans. In general, animal proteins like meat, dairy, and eggs contain all the essential amino acids. What you actually need from protein are the amino acids. You need 20 different ones. Your body makes some of them, but you must get nine from your diet. These are called essential amino acids. Complete proteins provide all nine essential amino acids. Sources of complete protein include:

- Beef
- Pork
- Eggs
- Fish and seafood
- Lean meat
- Poultry
- Wild game
- Dairy products such as milk, yogurt, and cheese

Generally, animal protein sources also supply other important nutrients, including vitamin B12 and a type of iron called heme iron. Heme iron is more readily absorbed than the iron found in plant foods, which is known as non-heme iron

- **Low biological proteins**

We say low biological value when the presence of one essential amino acid is insufficient. Plant-based proteins from foods like beans, grains, nuts, and soy are rich in some amino acids but may lack others.

Most plant sources of protein are incomplete. However, you can get all the essential amino acids you need from plant foods, as long as you eat a variety of them. Sources of plant protein are: There are many sources of plant proteins, such as:

- Beans
- Nuts
- Legumes
- Soybean products like tofu, tempeh, and edamame
- Buckwheat
- Ezekiel bread
- Quinoa
- Wheat
- Wild rice
- Nutritional yeast
- Chia seeds
- Hemp seeds
- Spirulina
- Seeds
- Whole grains
- Legumes such as beans, peas, and lentils
- Vegetables
- Whole sources of soy such as tofu, edamame, and tempeh

Some plant protein sources, such as Ezekiel bread, quinoa, buckwheat, spirulina, soybeans, nutritional yeast, chia seeds, and hemp seeds contain all nine essential amino acids, meaning they are complete protein sources.

Other plant protein sources, such as beans, nuts, legumes, wheat, and wild rice, are too low in or missing one or more essential amino acids.

Activity 2: Guided Practice

Task:

1.You brainstorm on the (a and b) and you present in the plenary session.

Discuss the following questions:

a. Describe the types of proteins that Fatuma needs for her child's quick recovery

Activity 3: Application

Task:

Trainees are guided to the workshop for observation.

Observe carefully and perform the following tasks:

a. Select food items rich in proteins that Fatuma needs for her child's quick recovery Fatuma needs for her child for quick recovery.

Each group is requested to present.

The class comments on each group performance.

TOPIC 1.3: IDENTIFYING SOURCES OF NUTRIENTS

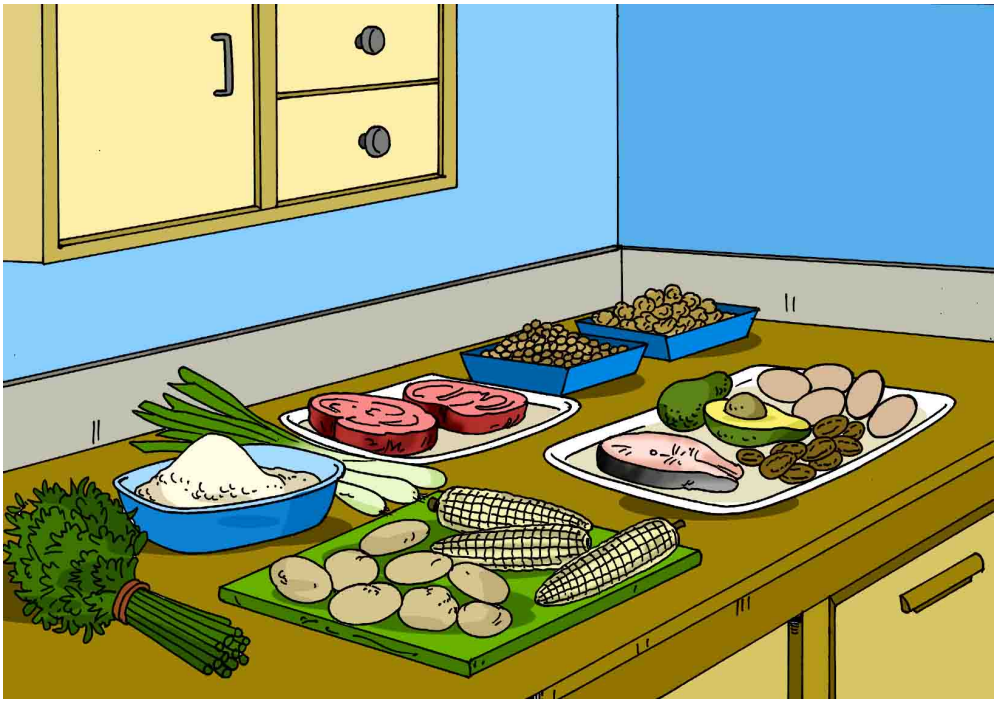

Figure 4: Identification of Sources of nutrients

Activity 1: Discovery

A hotel manager is preparing to receive a group of vegetarian people with restrictions on animal products. Therefore, he requests you to plan a menu while considering their nutritional concerns.

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss and brainstorm the following questions:

a. Identify the food sources of proteins for vegan people.
b. Identify the food sources of fats/ lipidsproteins for vegan people.

2. Take time to brainstorm and discuss the questions in your respective groups.

3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Identification of food Sources of carbohydrates**

  Sources of Carbohydrates include sugar, starch, and fibers such as bread, milk, beans, potatoes, soft drinks, corn, etc. Carbohydrates are biomolecules consisting of **carbon**, hydrogen, and oxygen atoms. Carbohydrates are also present in animals but in smaller amounts. The only substantial animal source of carbohydrates is milk.

  ✓ **Plants origin Sources of carbohydrates**

  Cellulose is the most abundant carbohydrate in the plant kingdom, forming the fundamental structure of plant cell walls, where cellulose is closely associated with other components such as hemicelluloses and lignin.

Animal origin Sources of carbohydrates

In animal cells, the main form of carbohydrate storage is "glycogen," found in liver, muscle, and some other tissues, and plays a major role in energy metabolism. Glycogen is in fact a generic term used to describe a group of highly branched polysaccharides similar toamylopectins in structure.

Food groups with examples of foods and type of carbohydrate present within each food group

Food Group	Example of Food	Type of Carbohydrate Present
Fruits	Apple, orange, banana Orange juice	Sucrose, glucose, fructose, and fiber Sucrose, glucose, fructose
Vegetables	Non-starchy veggies	Sucrose, glucose, fructose, and fiber

	Starchy veggies (corn, potatoes, sweet potatoes, peas)	Starch and fiber, with varying amount of sucrose, glucose, and fructose
Dairy	Milk, plain yogurt, cheese	Lactose
Grains	Rice, oatmeal, barley Sprouted grains	Starch and fiber Starch, fiber, and maltose

Table 3: Food groups with examples of foods and type of carbohydrate present within each food group

Source: https://www.flickr.com/photos/usdagov/36623517294/sizes/l(Retrieved on 21-March-2023)

- **Food sources of fats/ lipids**

Foods high in good fats include vegetable oils (such as olive, canola, sunflower, soy, and corn), nuts, seeds, and fish.

- **Plants origin**

Olive, peanut, and canola oils. Avocados. Nuts such as almonds, hazelnuts, and pecans. Seeds such as pumpkin and sesame seeds.

- **Animal origin**

Animal fats can be found in various products such as by-products of meat (carcass fat of cattle and pigs, tallow, lard), by-products of fish caught (fish oil), milk (milk fat, butter fat) and accessorily poultry and eggs.

- **Food sources for proteins**

Protein is one of three macronutrients, which also include carbohydrates and fats.[1] These nutrients are called macronutrients because your body needs them in high amounts. Of the three macronutrients, protein is the most critical to achieving optimal health. Your body needs protein to perform many functions including repairing its own tissues to supplying your body with energy. In fact, protein is the building block of your body.

Protein comes from two sources: animal foods and plant foods. Animal sources of protein are considered “high-quality proteins” because they contain all the essential amino acids and are easier for the body to digest and utilize. Most plant sources do not contain all of the essential amino acids, so it is important to eat a variety of plant proteins every day.

- **Plants origin**

Plant-Based Protein foods also tend to be high in fiber, vitamins, minerals, and other important nutrients.

- ✓ Beans
- ✓ Broccoli
- ✓ Chickpeas
- ✓ Greens
- ✓ Lentils
- ✓ Nut Butter
- ✓ Nuts and Seeds
- ✓ Peas
- ✓ Potatoes
- ✓ Quinoa
- ✓ Seaweed
- ✓ Soymilk
- ✓ Spinach
- ✓ Tempeh
- ✓ Tofu
- ✓ Veggie Patties

The right plant-based foods can be excellent sources of protein and other nutrients, often with fewer calories than animal products. Some plant products, such as soy beans and quinoa, are complete proteins, which means that they contain all nine essential amino acids that humans need. Others are missing some of these amino acids, so eating a varied diet is important. The following healthful, plant-based foods have a high-protein content per serving:

Soy products are among the richest sources of protein in a plant-based diet. The protein content varies with how the soy is prepared:

- Firm tofu (soybean curds) contains about 10 g of protein per ½ cup
- Edamame beans (immature soybeans) contain 8.5 g of protein per ½ cup
- Tempeh contains about 15 g of protein per ½ cup

Tofu takes on the flavor of the dish it is prepared in so that it can be a versatile addition to a meal.

People can try tofu, as a meat substitute, in a favourite sandwich or soup. Tofu is also a popular meat substitute in some dishes, such as kung pao chicken and sweet and sour chicken.

These soy products also contain good levels of calcium and iron, which makes them healthful substitutes for dairy products.

2. Lentils

Red or green lentils contain plenty of protein, fiber, and key nutrients, including iron and potassium.

Cooked lentils contain 8.84 g of protein per ½ cup.

Lentils are a great source of protein to add to a lunch or dinner routine. They can be added to stews, curries, salads, or rice to give an extra portion of protein.

3. Chickpeas

Cooked chickpeas are high in protein, containing around 7.25 g per ½ cup.Chickpeas can be eaten hot or cold and are highly versatile with plenty of recipes available online. They can, for example, be added to stews and curries, or spiced with paprika and roasted in the oven.

A person can add hummus, which is made from chickpea paste, to a sandwich for a healthful, protein-rich alternative to butter.

4. Peanuts

Peanuts are protein-rich, full of healthful fats, and may improve heart health. They contain around 20.5 g of protein per ½ cup.

Peanut butter is also rich in protein, with 3.6 g per tablespoon, making peanut butter sandwiches a healthful complete protein snack.

5. Almonds

Almonds offer 16.5 g of protein per ½ cup. They also provide a good amount of vitamin E, which is great for the skin and eyes.

6. Spirulina

Spirulina is blue or green algae that contain around 8 g of protein per 2 tablespoons. It is also rich in nutrients, such as iron, B vitamins — although not vitamin B-12 — and manganese.

Spirulina is available online, as a powder or a supplement. It can be added to water, smoothies, or fruit juice. A person can also sprinkle it over salad or snacks to increase their protein content.

7. Quinoa

Quinoa is a grain with a high-protein content, and is a complete protein. Cooked quinoa contains 8 g of protein per cup.

This grain is also rich in other nutrients, including magnesium, iron, fiber, and manganese. It is also highly versatile.

Quinoa can fill in for pasta in soups and stews. It can be sprinkled on a salad or eaten as the main course.

8. Mycoprotein

Mycoprotein is a fungus-based protein. Mycoprotein products contain around 13 g of protein per ½ cup serving.

Products with mycoprotein are often advertised as meat substitutes and are available in forms such as “chicken” nuggets or cutlets. However, many of these products contain egg white, so people must be sure to check the label.

A very small number of people are allergic to *Fusarium venenatum*, the fungus from which the my coprotein brand known as Quorn is made. People with a history of mushroom allergies or with many food allergies may wish to consider another protein source.

9. Chia seeds

Seeds are low-calorie foods that are rich in fiber and heart-healthy Omega-3 fatty acids. Chia seeds are a complete source of protein that contain 2 g of protein per tablespoon.

Try adding chia seeds to a smoothie, sprinkling them on top of a plant-based yogurt, or soaking them in water or almond milk to make a pudding.
Chia seeds are available from some supermarkets, health food stores, or to buy online.

10. Hemp seeds

Similarly, to chia seeds, hemp seeds are a complete protein. Hemp seeds offer 5 g of protein per tablespoon. They can be used in a similar way to chia seeds. Hemp seeds can also be bought online.

11. Beans with rice

Separately, rice and beans are incomplete protein sources. Eaten together, this classic meal can provide 7 g of protein per cup.

Try rice and beans as a side dish, or mix rice, beans, and hummus together then spread on Ezekiel bread, which is made from sprouted grains, for a savory, protein-packed meal.

12. Potatoes

A large baked potato offers 8 g of protein per serving. Potatoes are also high in other nutrients, such as potassium and vitamin C.

Add 2 tablespoons of hummus for a flavourful snack that is healthier than butter-covered potatoes and increases the protein content. Two tablespoons of hummus contain about 3 g of protein.

13. Protein-rich vegetables

Many dark-colored, leafy greens and vegetables contain protein. Eaten alone, these foods are not enough to meet daily protein requirements, but a few vegetable snacks can increase protein intake, particularly when combined with other protein-rich foods.

- a single, medium stalk of broccoli contains about 4 g of protein
- kale offers 2 g of protein per cup
- 5 medium mushrooms offer 3 g of protein

Try a salad made from baby greens with some quinoa sprinkled on top for a protein-rich meal.

14. Seitan

Seitan is a complete protein made from mixing wheat gluten with various spices. The high-wheat content means that it should be avoided by people with celiac or non-celiac gluten sensitivity. For others, it can be a protein-rich healthful meat substitute.

When cooked in soy sauce, which is rich in the amino acid lysine, seitan becomes a complete protein source offering 21 g per 1/3 cup.

15. Ezekiel bread

Ezekiel bread is a nutrient-dense alternative to traditional bread. It is made from barley, wheat, lentils, millet, and spelt. Ezekiel bread is an excellent choice for bread lovers who want a more nutritious way to eat toast or sandwiches.Ezekiel bread offers 4 g of protein per slice. Get even more protein by toasting Ezekiel bread and spreading it with peanut or almond butter.

- **Animal origin**

Animal proteins are complete proteins and contain all nine amino acids. Seafood such as wild-caught fish are known for their high-quality protein, high amounts of vitamin B and vitamin D, and omega-3 fatty acids. They also contain minerals such as potassium and selenium.

Generally, **poultry** (chicken, turkey, duck) and a variety of seafood (fish, crustaceans, molluscs) are your best bet. Eggs can be a good choice, too.

If you enjoy dairy foods, it's best to do so in moderation (think closer to 1-2 servings a day; and incorporating yogurt is probably a better choice than getting all your servings from milk or cheese).

Red meat—which includes unprocessed beef, pork, lamb, veal, mutton, and goat meat—should be consumed on a more limited basis. If you enjoy red meat, consider eating it in small amounts or only on special occasions.

Processed meats, such as bacon, hot dogs, sausages, and cold cuts should be avoided. Although these products are often made from red meats, processed meats also include items like turkey bacon, chicken sausage, and deli-sliced chicken and ham. (Processed meat refers to any meat that has been "transformed through salting, curing, fermentation, smoking, or other processes to enhance flavor or improve preservation.

Food sources of Protein, Animal sources of protein

	Food type	Protein content (g) per 100g
Meat	Chicken breast (grilled, without skin) Pork chop (lean, grilled) Beef steak (lean, grilled) Lamb chop (lean, grilled)	32.0 31.6 31.0 29.2
Fish	Tuna (canned in brine) Salmon (grilled) Cod (baked) Mackerel (grilled)	24.9 24.6 23.9 20.3

	Food type	Protein content (g) per 100g
Seafood	Crab (canned in brine) Mussels (cooked) Prawns (cooked)	18.1 17.7 15.4
Eggs	Chicken egg (whole, boiled)	14.1
Dairy	Whole milk Semi-skimmed milk Skimmed milk Cheddar cheese Reduced-fat cheddar Cottage cheese Plain Greek-style yogurt Plain low-fat yogurt	3.4 3.5 3.5 25.4 27.9 9.4 5.7 4.8

Table 4: Food sources of Protein, Animalbased sources of protein

Plant sources of protein

	Food type	Protein content (g) per 100g
Pulses	Red lentils (boiled) Chickpeas (canned)	7.6 7.2
Beans	Tofu (steamed) Kidney beans (canned) Baked beans	8.1 6.9 5.0
Grains	Wheat flour (brown) Rice (easy cook, boiled) Bread (brown) Bread (white) Pasta (dried cooked) Porridge oats	12.2 10.9 7.9 7.9 4.8 3.0
Nuts	Almonds Walnuts Hazelnuts	21.1 14.7 14.1

Table 5: Food sources of Protein, Plant based sources of protein

Source:https://www.nutrition.org.uk/healthy-sustainable-diets/protein/?level=Consumer(Retrieved on 28-March-2023)

Food sources of Vitamins

Both plants and animals are important natural sources for vitamins. All vitamins can be either synthesized or produced commercially from food sources and are available for human consumption in pharmaceutical preparations.

- **Vitamin A**

Vitamin A is a single vitamin, but two types are found in food. Preformed vitamin A, which your body can use immediately, is found in animal foods. Provitamin A is found in plant foods; Beta-carotene is the most common example of provitamin A.

Here are foods high in vitamin A:

- ✓ Eggs
- ✓ Meat, especially organ meats such as liver
- ✓ Fish
- ✓ Fortified milk
- ✓ Fortified cereals
- ✓ Carrots, sweet potatoes, bell peppers, cantaloupe, squash, mangos and other red, yellow and orange plant foods
- ✓ Dark, leafy greens such as kale, spinach, arugula
- ✓ Broccoli

- **Vitamin B**

The B vitamins are a group of eight essential nutrients humans need to support health. They're all lumped into one class of vitamins because they have similar properties and are found in many of the same foods. The eight B vitamins include:

- Vitamin B1 (thiamine)
- Vitamin B2 (riboflavin)
- Vitamin B3 (niacin)
- Vitamin B5 (pantothenic acid)
- Vitamin B6 (pyridoxine)
- Vitamin B7 (biotin)

- Vitamin B9 (folate and folic acid)
- Vitamin B12 (cyanocobalamin)

The best food sources of B vitamins are:

- **B1:** Organ meats (such as liver and kidney), eggs, nuts, seeds, whole grains, enriched grains, legumes, peas
- **B2:** Eggs, dairy products, organ meats, leafy greens, lean meats, legumes, nuts
- **B3:** Eggs, salt-water fish, poultry, enriched and whole grains, legumes, avocados, potatoes
- **B5:** Cabbage family vegetables (broccoli, cabbage, brussels sprouts, kale), eggs, organ meats, poultry, milk, mushrooms, legumes, lentils, white potatoes, sweet potatoes, whole grains
- **B6:** Meat and poultry, nuts, whole grains, avocado, bananas, legumes
- **B7:** Chocolate, egg yolks, legumes, nuts, dairy milk, organ meats, pork, yeast
- **B9:** Asparagus, broccoli and other cabbage-family greens, leafy greens, beets, brewer's yeast, fortified grains, lentils, oranges, wheat germ, peanuts
- **B12:** Eggs, dairy products, poultry, beef, pork, shellfish, organ meats, fortified foods (such as fortified plant milks)

- **Vitamin C**

Best known for supporting immune health, vitamin C also contributes to the growth, development and repair of various tissues in your body. Vitamin C is an important part of the structure of your skin, tendons, ligaments and blood vessels, and it helps to form scar tissue in response to injuries.

To make sure you're getting enough vitamin C in your diet, eat plenty of these vitamin C-rich foods:

- ✓ Citrus fruits, including oranges, lemons, limes and grapefruit
- ✓ Semi-acidic fruits, such as mangoes, papayas, kiwi, pineapple and cantaloupe

- ✓ A variety of berries, including strawberries, blackberries, blueberries, cranberries and raspberries
- ✓ Broccoli, brussels sprouts, cabbage, lettuce, turnip greens, spinach, collard greens and cauliflower
- ✓ Sweet potatoes
- ✓ Winter squash varieties
- ✓ Peppers, especially red and green varieties
- ✓ Tomatoes and tomato products

- **Vitamin D**

The very best source of vitamin D is sunshine, but plenty of foods contain trace amounts of vitamin D to support a well-rounded diet. It's hard to get enough vitamin D from food alone, so it's a good idea to get outside for a few minutes each day in addition to prioritizing these foods.

- ✓ Fatty fish, such as tuna, mackerel and salmon
- ✓ Egg yolks
- ✓ Beef liver
- ✓ Mushrooms
- ✓ Fortified milk
- ✓ Cheese made with fortified milk
- ✓ Other fortified foods, such as orange juice, cereal, soy milk and yogurt

- **Vitamin E**

Vitamin E is an antioxidant responsible for many bodily functions, including the formation of red blood cells. Deficiency in vitamin E can lead to complications such as nerve damage, muscle weakness, loss of motor control, weakened immune function and vision problems. The best food sources of vitamin E are:

- ✓ Nuts, especially peanuts, almonds, and hazelnuts
- ✓ Seeds, especially pumpkin seeds and sunflower seeds

- ✓ Some vegetables oils, including wheat germ oil, safflower oil, sunflower oil and soybean oil
- ✓ Leafy green vegetables
- ✓ Mangos
- ✓ Avocados
- ✓ Asparagus
- ✓ Red bell pepper
- ✓ Fortified foods

Vitamin K

Vitamin K is primarily a coagulant, which means it helps blood clot. Without vitamin K, you would lose too much blood even from a small cut or scrape. People on blood-thinning medications should talk to their doctor about vitamin K before increasing their consumption. If it's safe for you to eat more vitamin K-containing foods, try adding these sources to your diet:

- ✓ Eggs
- ✓ Poultry, pork, beef and organ meat
- ✓ Leafy green vegetables, such as kale, spinach, arugula, Swiss chard, lettuce, collard greens and turnip greens
- ✓ Broccoli, cabbage, brussels sprouts, cauliflower

Food sources of minerals

Minerals are present in both organic materials from plants and animals and in inorganic material that breaks down into the soil and is later absorbed by a plant's roots. The macro minerals include calcium, phosphorus, magnesium, sodium, potassium, chloride and sulfur. Trace minerals include iron, manganese, copper, iodine, zinc, cobalt, fluoride and selenium.

- **Calcium**

Calcium is the most abundant mineral in the human body -- you need plenty of it to keep your bones and teeth healthy, as well as support muscle and nerve function. The best sources of calcium include:

- ✓ Dairy products
- ✓ Leafy greens
- ✓ Sardines and canned salmon, thanks to their edible bones
- ✓ Almonds
- ✓ Tofu prepared with calcium
- ✓ Whey protein
- ✓ Fortified foods, such as cereal or flour-based products

- **Phosphorus**

Second only to calcium in terms of bundance, phosphorus makes up 1% of your body weight and is present in every cell in your body. Phosphorus helps form your bones and teeth, makes protein for tissue growth and repair, and produces the molecules your cells use for energy. These foods contain ample phosphorus:

- ✓ Beef, pork, poultry, eggs and organ meats
- ✓ Milk, yogurt, cheese and other dairy products
- ✓ Seafood

Many plant foods contain phosphorus, but most plants store the mineral as phytic acid, which humans can't digest or absorb. The best way to get phosphorus is from animal foods.

- **Magnesium**

Like the other macro minerals, magnesium supports nerve and muscle function, as well as bone and heart health. You can find magnesium in:

- ✓ Whole grains
- ✓ Most fruits
- ✓ Dark chocolate
- ✓ Avocados
- ✓ Nuts, particularly almonds, Brazil nuts and cashews
- ✓ Most seeds
- ✓ Peas and legumes
- ✓ Soy products, such as tofu and tempeh

- **Sodium**

This electrolyte is essential for maintaining fluid balance in your body and helping your muscles contract, among other things. Many people try to limit their sodium intake (and some people need to), but consuming too little sodium can lead to health problems just like consuming too much can.

The foods highest in sodium generally aren't the healthiest sources of sodium, and sometimes a single savory snack can nearly reach the daily recommended sodium limit. However, some whole foods contain trace amounts of sodium, including:

- ✓ Artichokes
- ✓ Bell peppers
- ✓ Broccoli
- ✓ Carrots
- ✓ Celery
- ✓ Radishes
- ✓ Sweet potatoes

Foods high in sodium, such as bread, pasta, soup, deli meat, sauces and dressings, broths, stocks, canned foods, frozen foods and snack foods. Most people don't need to increase their sodium intake and should limit sodium-rich foods if they tend to eat more than the recommended daily allowance of 2,300 milligrams.

- ✓ **Potassium**

Another important electrolyte, potassium supports a regular and healthy heartbeat, offsets sodium's effect on blood pressure, supports nerve function and muscle contraction, and moves waste products out of cells. Foods high in potassium include:

- ✓ Citrus fruits
- ✓ Vine fruits, such as grapes
- ✓ Leafy greens
- ✓ Root vegetables, such as potatoes, carrots, beets and turnips
- ✓ Bananas

- ✓ **Chloride**

Chloride is an electrolyte that works with sodium and potassium to fulfill a variety of roles in the body. Dietary chloride primarily comes from table salt and sea salt, and most people get enough through the foods they eat daily, but you can maximize chloride intake by eating these foods:

- ✓ Rye bread
- ✓ Tomatoes
- ✓ Seaweed (like nori)
- ✓ Lettuce
- ✓ Olives

- **Sulfur**

Our body uses sulphur to repair DNA, protect our cells against damage, metabolize food and provide structure to our skin and other connective tissues. It's an important trace mineral can be get from a variety of foods, including:

- ✓ Pork, chicken, beef, duck, turkey and organ meats
- ✓ Most types of fish
- ✓ Seafood, including scallops, shrimp, prawns and mussels
- ✓ Eggs
- ✓ Dairy foods
- ✓ Many vegetables, including broccoli, asparagus, onions, leeks, radishes, cabbage and brussels sprouts
- ✓ Dried fruit
- ✓ Beer, wine and cider

- **Iron**

Most people know iron for its role in blood production. Most of the iron in your body is found in hemoglobin and myoglobin, two substances essential to the transport and transferring of oxygen throughout your body. The top food sources of iron include:

- ✓ Fortified breakfast cereals
- ✓ Oysters
- ✓ Dark chocolate
- ✓ White beans, soybeans and lentils
- ✓ Tofu
- ✓ Sardines
- ✓ Spinach
- ✓ Red meat and organ meat

- **Manganese**

This trace mineral is a cofactor for many enzymes, which means it plays a role in lots of chemical reactions that occur in your body, including the metabolism of carbs and protein. The best food sources of manganese are:

- ✓ Clams, oysters and mussels
- ✓ Brown rice and other whole grains
- ✓ Leafy greens
- ✓ Sweet potatoes
- ✓ Soybeans and soy foods, such as tofu
- ✓ Chickpeas and lima beans
- ✓ Pineapple
- ✓ Coffee and tea

- **Copper**

Like manganese, copper is a cofactor for several enzymes. It's also important for proper brain development and connective tissue integrity. Here's where to find copper in food:

- ✓ Whole grain products
- ✓ Shellfish
- ✓ Chocolate

- ✓ Organ meats
- ✓ Nuts and seeds

- **Iodine**

Our body needs iodine for proper thyroid function: Iodine is especially important for babies and pregnant women, because this mineral is crucial to bone and brain formation.

The primary source of iodine in diet is iodized salt. If you consume a lot of salt, you probably get enough iodine. But in case you don't, you can find iodine in these other foods:

- Fish and seafood
- Cheese, yogurt, milk and other dairy products
- Seaweed

- **Zinc**

Zinc, the mineral popularized for its rumored defenses against COVID-19, has long been an ingredient in cold medications and throat lozenges. In addition to its well-known role in immune function, zinc also contributes to wound healing and protein synthesis. The best food sources of zinc include:

- ✓ Oysters
- ✓ Crabs and lobster
- ✓ Red meat
- ✓ Poultry
- ✓ Whole grains, especially fortified products
- Dairy products

- **Cobalt**

Cobalt is found in the body as part of vitamin B-12 and helps your body process and absorb the vitamin. Most foods contain trace amounts of cobalt, but foods high in vitamin B-12 are particularly high in cobalt.

- **Fluoride**

Fluoride keeps your teeth healthy and strong. It also spurs new bone formation, so it's especially important for infants and children. Most drinking water contains fluoride, although if you have well water, it may not be fluoridated. In addition to water, you can get fluoride from:

- ✓ Seafood (the ocean contains sodium fluoride)
- ✓ Coffee and tea
- ✓ Any foods prepared with fluoridated water

- **Selenium**

Selenium protects cells from damage, promotes reproductive health and thyroid function and supports DNA production. The most potent food source of selenium is Brazil nuts, and these can actually cause selenium toxicity if consumed too often. Other sources of food high in selenium include:

- ✓ Tuna, halibut and sardines
- ✓ Shrimp
- ✓ Beef, pork and chicken
- ✓ Whole grains
- ✓ Eggs
- ✓ Beans, legumes and lentils

Activity 3: Guided Practice

1.As you have already worked on task 2, perform the following task:

a. Describe the food sources of proteins for vegan people.
b. Describe the food sources of fats/ lipids for vegan people.

Activity 4: Application

1. In kitchen workshop, observe the store carefully and perform the following tasks:

    a. Apply storage techniques for food commodities

        a. Select food sources of proteins for vegan people.

        b. Select food sources of fats/ lipids for vegan people

2. Each student will perform individually.

TOPIC 1.4: DESCRIBING NUTRIENTS FUNCTIONS IN THE HUMAN BODY

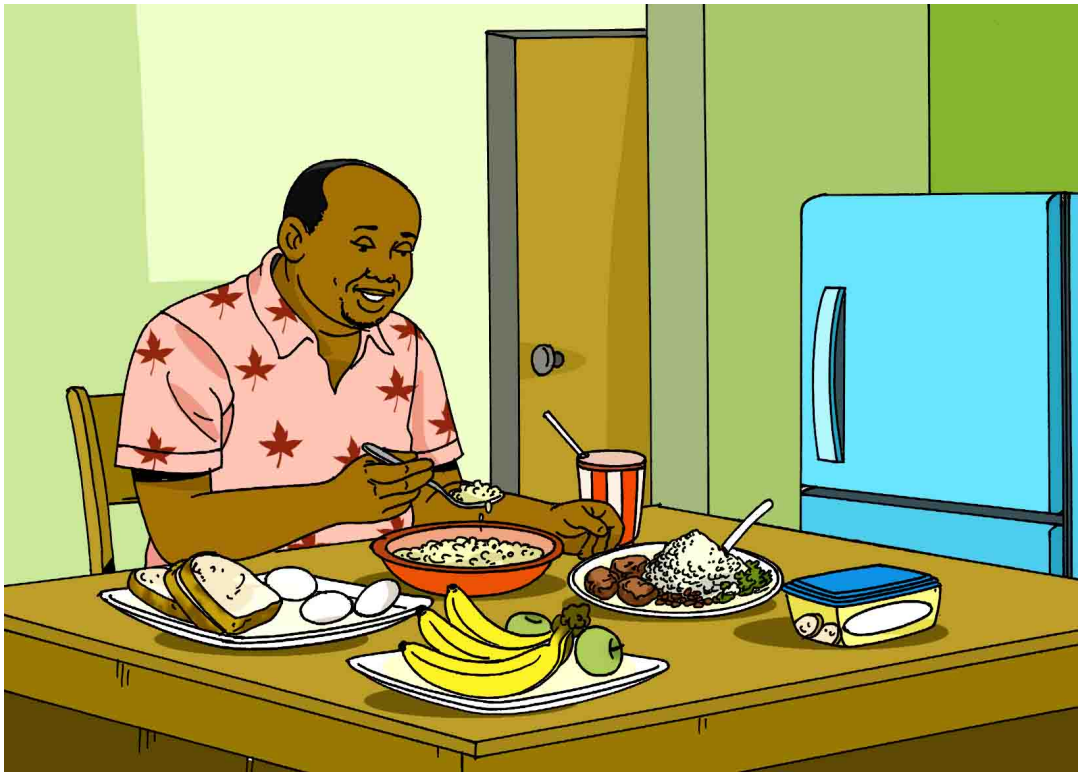

Figure 5: Nutrients functions in the human body

Activity 1: Discovery

Iwacu Football Academy's manager wants to plan a menu for his team that will help the players maintain physical fitness and stay energetic during matches. He requests your assistance in creating a menu that meets these requirements.

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss and brainstorm the following questions:

a. Identify food items to be included in menu which will help players to have physical fitness and stay energetic during matches.

2. Take time to brainstorm and discuss the questions in your respective groups.

3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Functions of carbohydrates in the human body**

There are five primary functions of carbohydrates in the human body. They are energy production, energy storage, building macromolecules, sparing protein, and assisting in lipid metabolism.

Carbohydrates have six major functions within the body:

- ✓ Providing energy and regulation of blood glucose
- ✓ Sparing the use of proteins for energy
- ✓ Breakdown of fatty acids and preventing ketosis
- ✓ Biological recognition processes
- ✓ Flavor and Sweeteners
- ✓ Dietary fiber

- **Functions of simple CHO**

Simple carbohydrates are broken down quickly by the body to be used as energy. Simple carbohydrates are found naturally in foods such as fruits, milk, and milk products. They are also found in processed and refined sugars such as candy, table sugar, syrups, and soft drinks.

Functions of complex CHO

Complex carbohydrates raise blood glucose levels for longer and produce a more lasting elevation in energy. The primary function of carbohydrates is to provide the body with energy, and complex carbohydrates do this more effectively. Complex carbohydrates are key to long-term health. They make it easier to maintain a healthy weight and can even help guard against type 2 diabetes and cardiovascular problems in the future.

- **Functions of fats/ lipids**

Triglycerides, cholesterol and other essential fatty acids—the scientific term for fats the body can't make on its own—store energy, insulate us and protect our vital organs. They act as messengers, helping proteins do their jobs.

- **Provision of energy**

Fats are a source of energy in the human diet, together with carbohydrates and proteins, the other two main macronutrients. Fat is the most concentrated source providing 9 kcal per 1 gram consumed, which is more than double the energy content of protein or carbohydrate (4 kcal per gram) and more than quadruple the energy content of fibre (2 kcal per gram). Fat can be stored in the body's fat tissue, which releases fatty acids when energy is required.

- **Structural component**

The membranes around the cells in our body physically separate the inside from the outside of the cell, and control the movement of substances in and out of the cells. They are mainly made of phospholipids, triglycerides and cholesterol.

- Carrier of vitamins

In the diet, fat is a carrier for the fat-soluble vitamins A, D, E and K, and supports their absorption in the intestine. Consuming sufficient amounts of fatty foods that contain these vitamins is thus essential for adequate intake of these micronutrients.

- **Functions of saturated fats**

However, certain saturated fatty acids, ranging from 12 to 22 carbons, may play an important role in hormone production, cardiovascular health, gene transcription, lipogenesis, apoptosis, cellular membrane structure, and protein signaling.

- **Brain health**

    - The brain is composed primarily of saturated fat and cholesterol
    - A diet lacking in healthy saturated fats deprives the brain of raw materials needed to function properly.

- **Nerve signaling**
  - Saturated fats function as signaling messengers that control the metabolism and the proper release of insulin
  - Certain saturated fats are necessary in telling the glands and organs what to do; otherwise nerve signaling functions improperly.
- **Cardiovascular function**
  - Reduces levels of lipoprotein A, which is strongly associated with risk of heart disease
    - Currently no medication to reduce this, only dietary means via saturated fats
  - Saturated as well as other healthy fats increase HDL cholesterol (the good kind).
- **Strong bones**
  - Saturated fats are necessary in order for calcium to be properly assimilated in the body
  - Women who avoid saturated fats have lower bone density and are more likely to develop osteoporosis
  - Building bone mass at a young age is critical, especially for females, because the body naturally stops producing in mid-30s
- **Liver health**
  - Saturated fat in the diet encourages liver cells to dump fat content
    - Clearing fat from liver is essential in reducing middle-body fat storage, also related to heart health
  - Protects liver from toxic side effects of alcohol and other medications, and can also reverse damage already done
- **Lung health**
  - In order for lungs to function properly, they must be coated with a thin layer of lung surfactant, composed of 100% saturated fatty acids
  - Deficiency of saturated fats in the diet can often result in breathing difficulties
    - This is what's missing the lungs of premature infants with respiratory distress syndrome, and plays a role in the rise of asthma among children

- **Strong immune system**
    - Lack of sufficient saturated fatty acids in white blood cells hinders their ability to recognize and combat viruses and bacteria
    - Saturated fats in the diet keep the immune system alert against the development of cancerous cells and infectious invaders.
- **Functions of unsaturated fats**

Unsaturated fats, which are liquid at room temperature, are considered beneficial fats because they can improve blood cholesterol levels, ease inflammation, stabilize heart rhythms, and play a number of other beneficial roles. Unsaturated fats provides energy; indeed it is the most energy dense of all the macronutrients, with 1 g providing 37 kJ (9 kcal). However, the constituent parts of fat, fatty acids, are required by the body for many other functions than simply as an energy source, and there is an increasing awareness of the potential health benefits of specific types of fatty acids.

- **Functions of proteins**

Protein has many roles in your body. It helps repair and build your body's tissues, allows metabolic reactions to take place and coordinates bodily functions. In addition to providing your body with a structural framework, proteins also maintain proper pH and fluid balance.

- **Functions of High biological proteins**

High biological proteins serve as the major structural component of muscle and other tissues in the body. In addition, they are used to produce hormones, enzymes and hemoglobin. Proteins can also be used as energy; however, they are not the primary choice as an energy source. When body tissues break down the same amount of protein that it uses to build and repair tissues.

Functions of low biological proteins

Low biological proteins are essential elements for growth and repair, good functioning and structure of all living cells. Hormones, such as insulin

Insulin is a hormone produced by the pancreas which helps to maintain our blood sugar levels. Low biological value proteins make improvements in our insulin sensitivity means our body requires less insulin to maintain normal blood sugar levels, which greatly reduces our risk of developing type 2 diabetes.

, control blood sugar levels; enzymes, such as amylases, lipases, proteases are crucial for digestion of foods; antibodies help us fight infections; muscle proteins allow contraction, etc.

Functions of Vitamins

- Help the body maintain good health.
- Regulating the tissues and help in repairing cells.
- Fight against aging.
- Formation of new cells.
- Keeping bones, teeth, and nails healthy.
- Help the muscles and ligaments function smoothly.

Functions of water-soluble vitamins

All water-soluble vitamins play a different kind of role in energy metabolism; they are required as functional parts of enzymes involved in energy release and storage. Vitamins and minerals that make up part of enzymes are referred to as coenzymes and cofactors, respectively.

These travel freely through the body. The part that the body doesn't use passes through the kidneys and leaves the body as urine or stool. The body needs water-soluble vitamins in frequent, small doses. They aren't likely to reach toxic levels.

Functions of fats soluble vitamins

These are stored in the body's cells. They are not passed out of the body as easily as water-soluble vitamins. Fat-soluble vitamins can reach toxic levels if you get more than you need.

Table summarizing the functions of Vitamins and their sources

Water-soluble vitamins		
Vitamin	**Functions**	**Sources**
Thiamine (vitamin B1)	Part of an enzyme needed for energy metabolism; important for nerve function.	Found in all nutritious foods in moderate amounts: pork, whole-grain or enriched breads and cereals, legumes, nuts and seeds.
Riboflavin (vitamin B2)	Part of an enzyme needed for energy metabolism; important for normal vision and skin health.	Milk and milk products; leafy green vegetables; whole-grain or enriched breads and cereals.
Niacin (vitamin B3)	Part of an enzyme needed for energy metabolism; important for nervous system, digestive system, and skin health.	Meat, poultry, fish, whole-grain or enriched breads and cereals, vegetables (especially mushrooms, asparagus, and leafy green vegetables), peanut butter.
Pantothenic acid	Part of an enzyme needed for energy metabolism.	Widespread in foods.
Biotin	Part of an enzyme needed for energy metabolism.	Widespread in foods; also produced in intestinal tract by bacteria.
Pyridoxine (vitamin B6)	Part of an enzyme needed for protein metabolism; helps make red blood cells.	Meat, fish, poultry, vegetables, fruits.
Folate (folic acid)	Part of an enzyme needed for making DNA and new cells, especially red blood cells.	Leafy green vegetables and legumes, seeds, orange juice, and liver; now added to most refined grains.

Cobalamin (vitamin B12)	Part of an enzyme needed for making new cells; important for nerve function.	Meat, poultry, fish, seafood, eggs, milk and milk products; not found in plant foods.
Ascorbic acid (vitamin C)	Antioxidant; part of an enzyme needed for protein metabolism; important for immune system health; aids in iron absorption.	Found only in fruits and vegetables, especially citrus fruits, vegetables in the cabbage family, cantaloupe, strawberries, peppers, tomatoes, potatoes, lettuce, papayas, mangoes, kiwifruit.

b. Fat-soluble vitamins

Vitamin	What it does	Where it's found
Vitamin A (and its precursor, beta-carotene) A precursor is converted to the vitamin by the body.]	Needed for vision, healthy skin and mucous membranes, bone and tooth growth, immune system health.	Vitamin A from animal sources: Fortified milk, cheese, cream, butter, fortified margarine, eggs, liver. Beta-carotene (from plant sources): Leafy, dark green vegetables; dark orange fruits (apricots, cantaloupe) and vegetables (carrots, winter squash, sweet potatoes, pumpkin).
Vitamin D	Needed for proper absorption of calcium; stored in bones.	Egg yolks, liver, fatty fish, fortified milk, fortified margarine. When exposed to sunlight, the skin can make vitamin D.
Vitamin E	Antioxidant; protects cell walls.	Polyunsaturated plant oils (soybean, corn, cottonseed,

		safflower); leafy green vegetables; wheat germ; whole-grain products; liver; egg yolks; nuts and seeds.
Vitamin K	Needed for proper blood clotting.	Leafy green vegetables (kale, collard greens, and spinach); green vegetables (broccoli, brussels sprouts, and asparagus); also produced in the intestinal tract by bacteria.

Table 6:Table summarizing the functions of Vitamins and their sources

Source : Edited by Authorfrom:https://www.healthlinkbc.ca/healthy-eating-physical-activity/food-and-nutrition/nutrients/vitamins-their-functions-and-sources. (Retrieved on 12-March-2023)

Function of minerals

Minerals help maintain acid-base balance, to keep the body pH neutral. Minerals help regulate body processes, such as in enzyme systems. Minerals function in nerve impulse transmission and muscle contraction. Minerals help release energy from food.

- **Functions of trace minerals**

Trace minerals function primarily as catalysts in enzyme systems; some metallic ions, such as iron and copper, participate in oxidation-reduction reactions in energy metabolism. Iron, as a constituent of hemoglobin and myoglobin, also plays a vital role in the transport of oxygen.

Trace minerals are critical to the health of the body and help maintain enzymatic and metabolic processes.

- **Functions of major minerals**

Major minerals are inorganic components that play several functional roles in human cells. The body's organs utilize these minerals for energy production, growth, movement, development, and the maintenance of internal homeostasis.

Functions of water in the human body

Adequate water intake enables our body to excrete waste through perspiration, urination, and defecation. Water helps kidneys remove waste from our blood and keep the blood vessels that run to our kidneys open and filter them out. Water is also important for helping prevent constipation.Health Benefits of Water:

- Regulates body temperature.
- Moistens tissues in the eyes, nose and mouth.
- Protects body organs and tissues.
- Carries nutrients and oxygen to cells.
- Lubricates joints.
- Lessens burden on the kidneys and liver by flushing out waste products.

Activity 3: Guided Practice

1. As you have already worked on task 2, perform the following task:

a. Describe the major food items to be included in the menu that will help players maintain physical fitness and stay energetic during the match.

Activity 4: Application

1. In kitchen workshop, observe the store carefully and perform the following tasks:

a. Select energetic foods which can help players to have physical fitness and stay energetic during the matches

2. Each student will perform individually.

TOPIC 1.5: DESCRIBING NUTRITION DEFICIENCY IN THE HUMAN BODY

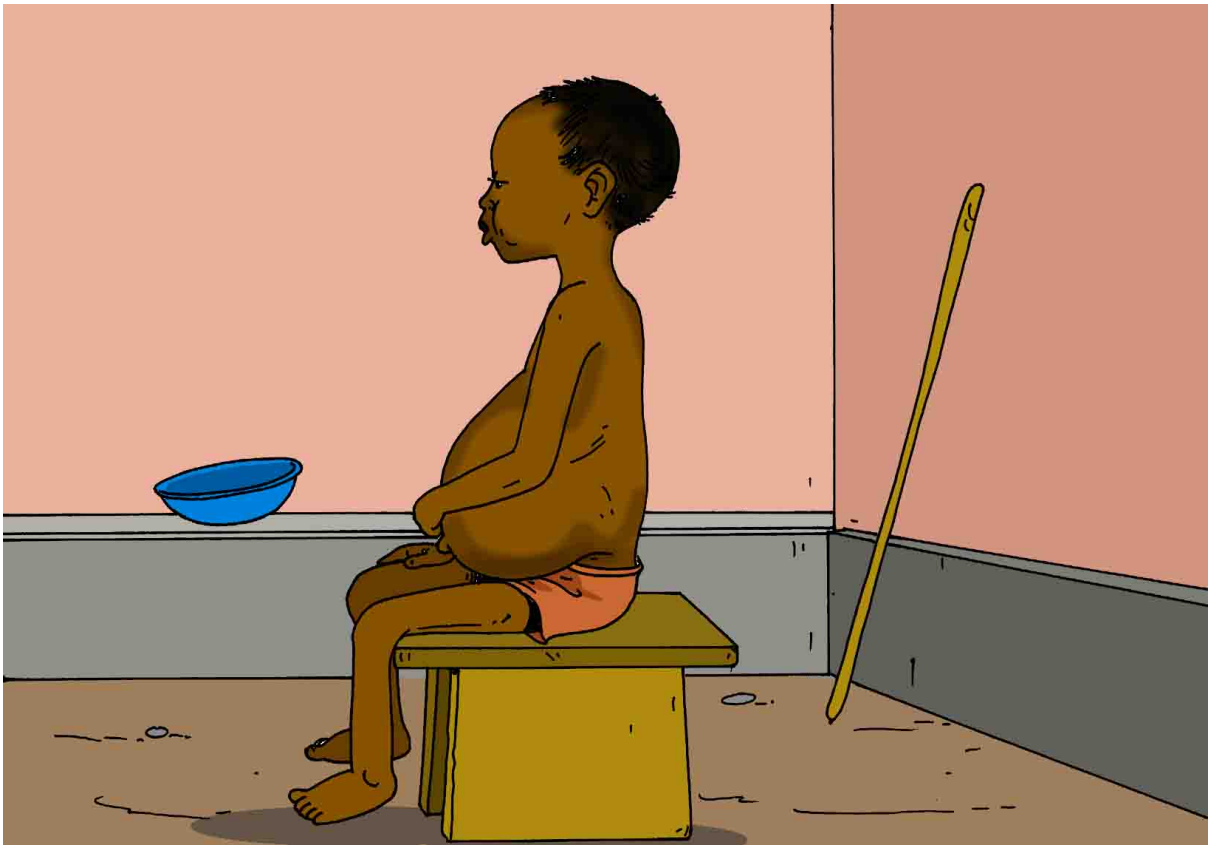

Figure 6: Nutrition deficiency in the human body

Activity 1: Discovery

" Kwizera has two children with the following nutritional symptoms: brittle hair and nails, mouth ulcers or cracks in the corner of the mouth, bleeding gums, poor night vision and white growths on the eyes, hair loss, and red or white bumps on the skin. He is looking for someone who can help advise him on what nutrients his children may be missing out."

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss and brainstorm on the following questions:

a. Identify nutrition deficiency symptoms of carbohydrates.
b. Identify nutrition deficiency symptoms of proteins.

2. Take time to brainstorm and discuss the questions in your respective groups.

3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Description of nutrition deficiency in the human body**

✓ **Deficiency of carbohydrates**

Carbohydrate deficiency diseases constitute a category of health conditions that occur due to a lack of carbohydrates present in the human body. Most people avoid carbohydrates in order to avoid gaining weight. Skipping carbohydrates makes you prone to several carbohydrate deficiency diseases. The symptoms of carbohydrate deficiency are as follows:

- Insufficient energy
- Low appetite
- Nausea
- Constipation
- Dizziness
- Fatigue
- Halitosis (Bad breath)
- Dehydration

Deficiency of fats/ lipids

Fat deficiency leads to skin disorders, neurological dysfunction, retarded growth, hair loss, and many more. Fat deficiency symptoms and physical signs are:

- Loss and de-pigmentation of hair
- Dry skin, scaly rashes
- Brittle nails
- Poor healing of wounds and risk for infection
- Retarded growth among children and loss in weight gain

- Increased risk for mental disorders
- Visual symptoms like difficulty in reading and poor vision during the night
- Shoot up in omega-9 fatty acids and decrease in omega-6 fatty acids in the tissues
- Impaired cholesterol transport
- Decrease in myocardial contractility

Prolonged fats deficiency may accelerate several health problems and fat deficiency diseases, most of which with supplementation of the essential fat can be treated or managed. Fat deficiency effects are seen in lipid profile, skin, mental, and heart health.

Skin Disease: Fatty acids play indispensable roles in skin functions. Deficiency in EFA will first affect the epidermal tissues. The skin barrier function is also affected by a deficiency of fat. Individuals with compromised immunity and deficient in fat are prone to psoriasis. Lack of fat will pave the way to dermatitis, hyperproliferation of epidermis, and transepidermal water loss.

Multiple Sclerosis (MS): MS may result in omega-6 deficiency. Providing 19 to 23g of additional omega-6 fatty acids has shown to be fruitful in reducing the risk for disability.

Mental Disorders: Diets low in polyunsaturated fatty acids have been revealed to affect mental health. Individuals with autism spectrum disorder are found to have low levels of PUFA (omega-3 fats) and findings suggest that supplementation may aid in managing the symptoms. Although, more studies are needed to conclude on supplementation.

Major depressive disorders have been associated with lower concentrations of omega-3 fatty acids. Postpartum depression in mothers could be due to poor dietary intake of fats. Deficiency may also pose a risk for schizophrenia, characterized by cognitive decline, delusions, and social isolation. The deficiency of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) in the brain cells of people with schizophrenia was observed. A decrease in plasma concentrations of PUFAs (omega-3 fats) may augment the risk for Alzheimer's disease.

Dyslipidemia: Cholesterol levels may be altered due to essential fatty acids deficiency. Deficiency induced the activity of the HMG CoA reductase, and thus, increased cholesterol synthesis was observed. Treating the deficiency retarded the activity of the enzyme.

Heart Disease: The EPA and DHA content in the red blood cell membranes (omega-3 index) are correlated with the risk of heart disease. Observational studies have revealed that low content of EPA and DHA increased the risk for coronary heart disease. An omega-3 index of less than 4% is a high risk for cardiovascular disease.

Deficiency of proteins

Protein deficiency is when your intake is unable to meet your body's requirements. An estimated one billion people worldwide suffer from inadequate protein intake. Certain people in developed countries are also at risk. This includes people who follow an imbalanced diet, as well as institutionalized older people and hospitalized patients

The most severe form of protein deficiency is known as kwashiorkor. It most often occurs in children in developing countries where famine and imbalanced diets are common.

Protein deficiency can affect almost all aspects of body function. As a result, it is associated with many symptoms. Some of these symptoms may start to occur even when protein deficiency is marginal. They are listed below, along with some typical symptoms of kwashiorkor.

1. Edema

Edema, which is characterized by swollen and puffy skin, is a classic symptom of kwashiorkor. Scientists believe it is caused by low amounts of human serum albumin, which is the most abundant protein in the liquid part of blood, or blood plasma.

Because of reduced human serum albumin levels, severe protein deficiency leads to lower oncotic pressure. As a result, fluid accumulates in tissues, causing swelling. For the same reason, protein deficiency may lead to fluid buildup inside the abdominal cavity. A bloated belly is a characteristic sign of kwashiorkor.

2. Fatty Liver

Another common symptom of kwashiorkor is a fatty liver, or fat accumulation in liver cells. Left untreated, the condition may develop into fatty liver disease, causing inflammation, liver scarring and potentially liver failure. Fatty liver is a common condition in obese people, as well as those who consume a lot of alcohol.

3. Skin, Hair and Nail Problems

Protein deficiency often leaves its mark on the skin, hair and nails, which are largely made of protein. For instance, kwashiorkor in children is distinguished by flaky or splitting skin, redness and patches of depigmented skin. Hair thinning, faded hair color, hair loss (alopecia) and brittle nails are also common symptoms. However, these symptoms are unlikely to appear unless you have a severe protein deficiency.

4. Loss of Muscle Mass

Our muscles are your body's largest reservoir of protein. When dietary protein is in short supply, the body tends to take protein from skeletal muscles to preserve more important tissues and body functions. As a result, lack of protein leads to muscle wasting over time.

Even moderate protein insufficiency may cause muscle wasting, especially in elderly people. One study in elderly men and women found that muscle loss was greater among those who consumed the lowest amounts of protein. This has been confirmed by other studies that show that an increased protein intake may slow the muscle degeneration that comes with old age.

5. Greater Risk of Bone Fractures

Muscles are not the only tissues affected by low protein intake. Our bones are also at risk. Not consuming enough protein may weaken bones and increase the risk of fractures.

6. Stunted Growth in Children

Thus, deficiency or insufficiency is especially harmful to children whose growing bodies require a steady supply.

7. Increased Severity of Infections

A protein deficit can also take its toll on the immune system. Impaired immune function may increase the risk or severity of infections, a common symptom of severe protein deficiency. For instance, one study in mice showed that following a diet consisting of only 2% protein was

associated with a more severe influenza infection, compared to a diet providing 18% protein. Even marginally low protein intake may impair immune function. One small study in older women showed following a low-protein diet for nine weeks significantly reduced their immune response.

8. Greater Appetite and Calorie Intake

Although poor appetite is one of the symptoms of severe protein deficiency, the opposite seems to be true for milder forms of deficiency. When your protein intake is inadequate, our body attempts to restore protein status by increasing appetite, encouraging to find something to eat. But a protein deficit doesn't aimlessly drive the urge to eat, at least not for everyone. It may selectively increase people's appetite for savory foods, which tend to be high in protein.

Deficiency of Vitamins

Vitamin deficiency can cause a number of symptoms, including fatigue, dry skin and hair, depression, poor wound healing, and more. While they can vary between deficiencies, many of them overlap. Usually, noticeable effects don't begin to develop until you've had low levels for several months.

1. Brittle hair and nails

A variety of factors may cause brittle hair and nails. One of them is a lack of biotin. Pregnant women, heavy smokers or drinkers, and people with digestive disorders like Crohn's disease are at the greatest risk of developing biotin deficiency. Also, the prolonged use of antibiotics and some anti-seizure medications is a risk factor (2Trusted Source). Eating raw egg whites may cause biotin deficiency as well. That's because raw egg whites contain avidin, a protein that binds to biotin and can reduce its absorption.

2. Mouth ulcers or cracks in the corners of the mouth

Lesions in and around the mouth may partly be linked to an insufficient intake of certain vitamins or minerals. For instance, mouth ulcers, also commonly referred to as canker sores, are often the result of deficiencies in iron or B vitamins.

3. Bleeding gums

Sometimes a rough tooth brushing technique is at the root of bleeding gums, but a diet lacking in vitamin C can also be to blame. Consuming very little vitamin C through the diet for long periods can bring on symptoms of deficiency, including bleeding gums and even tooth loss.

Another serious consequence of severe vitamin C deficiency is scurvy, which depresses the immune system, weakens muscles and bones, and makes people feel fatigued and lethargic. Other common signs of vitamin C deficiency include easy bruising, slow wound healing, dry scaly skin, and frequent nosebleeds.

4. Poor night vision and white growths on the eyes

A nutrient-poor diet can sometimes cause vision problems. For instance, low intakes of vitamin A are often linked to a condition known as night blindness, which reduces people's ability to see in low light or darkness.

5. Scaly patches and dandruff

Seborrheic dermatitis (SB) and dandruff are part of the same group of skin disorders that affects the oil-producing areas of your body. Both involve itchy, flaking skin. Dandruff is mostly restricted to the scalp, whereas seborrheic dermatitis can also appear on the face, upper chest, armpits, and groin. The likelihood of these skin disorders is highest within the first 3 months of life, during puberty, and in mid-adulthood.

Studies show that both conditions are also very common. Up to 42% of infants and 50% of adults may suffer from dandruff or seborrheic dermatitis at one point or another. Dandruff and seborrheic dermatitis may be caused by many factors, with a nutrient-poor diet being one of them. For instance, low blood levels of zinc, niacin (vitamin B3), riboflavin (vitamin B2), and pyridoxine (vitamin B6) may each play a role.

6. Hair loss

Hair loss is a very common symptom. In fact, up to 50% of adults report hair loss by the time they reach 50 years of age. A diet rich in the following nutrients may help prevent or slow hair loss.

7. Red or white bumps on the skin

Keratosis pilaris is a condition that causes goosebump-like bumps to appear on the cheeks, arms, thighs, or buttocks. These little bumps may also be accompanied by corkscrew or ingrown hairs. The condition often appears in childhood and naturally disappears in adulthood. The cause of these little bumps is still not fully understood, but they may appear when too much keratin is produced in hair follicles. This produces red or white elevated bumps on the skin. Keratosis pilaris may have a genetic component, meaning that a person is more likely to have it if a family member has it. That said, it has also been observed in people with diets low in vitamins A and C.

8. Restless leg syndrome

Restless leg syndrome (RLS), also known as Willis-Ekbom disease, is a nerve condition that causes unpleasant or uncomfortable sensations in the legs, as well as an irresistible urge to move them.

According to the National Institute of Neurological Disorders and Stroke, RLS affects up to 10% of Americans, with women twice as likely to experience the condition. For most people, the urge to move seems to intensify when they're relaxing or trying to sleep.

Deficient of minerals

Mineral deficiencies can lead to a variety of health problems, such as weak bones, fatigue, or a decreased immune system.

- **Magnesium**

Magnesium is one of the most important minerals in the body. It promotes the absorption and metabolizing of other minerals, including sodium, potassium, phosphorus, and calcium. This means magnesium is crucial for proper hydration, acid-alkaline balance, and muscle contractions, including the heart.

Related: The Benefits of Magnesium; Why 80% of Americans Are Deficient

Magnesium is involved in the creation of enzymes that control the metabolism of carbohydrates and amino acids. It is also important for bone growth and even helps in the absorption of vitamin C and the B complex vitamins.

Deficiency symptoms:

- ✓ Excitability or irritability
- ✓ Dizziness
- ✓ Cramps
- ✓ Muscle weakness
- ✓ Fatigue
- ✓ Depression
- ✓ Tremors
- ✓ Calcification of tissues

- **Calcium**

Calcium is the most abundant mineral in the body, most of which is found within the bones and teeth. Calcium does much more than ensure strong bones and healthy teeth. It also regulates heartbeat, controls the acid-alkaline balance of blood, is a part of blood clotting, aids the function of neurotransmitters, helps build muscle, and plays a role in the creation of some hormones.

Deficiency symptoms:

- ✓ Arthritis
- ✓ Muscle or bone pain, especially in back and neck
- ✓ Brittle nails
- ✓ Depression
- ✓ High blood pressure
- ✓ Numbness
- ✓ Kidney stones
- ✓ Cramps

- ✓ Spasms
- ✓ Nervousness
- ✓ Tooth decay
- ✓ Osteoporosis

- **Iron**

Iron is vital to the movement of oxygen throughout the body via the bloodstream. Iron forms the very important, oxygen-carrying part of the protein hemoglobin, but is also a key element of other proteins, mainly enzymes, that aid in digestion and help along with other bodily functions. Iron deficiency is the most common deficiency in the world.

Deficiency symptoms:

- ✓ Fatigue
- ✓ Weakness
- ✓ Anemia
- ✓ Confusion
- ✓ Dizziness
- ✓ Heart palpitations
- ✓ Foggy memory
- ✓ Lowered immune function
- ✓ Sore tongue
- ✓ Ice eating

- **Potassium**

Potassium is an essential mineral, found in every cell of the body. As an electrolyte, potassium is vital to water balance, proper hydration, and controlled blood pressure. Potassium is also involved in muscle and nerve function, plays a role in metabolism, and helps transfer oxygen to the brain.

Deficiency symptoms:

- ✓ Muscle weakness
- ✓ Spasms and cramps
- ✓ Muscle aches and stiffness
- ✓ Heart palpitations
- ✓ Dizziness
- ✓ Fainting
- ✓ Abdominal pain and bloating
- ✓ Numbness or paralysis
- ✓ Cognitive impairment
- ✓ Fatigue

- **Sodium**

Sodium works with potassium to regulate water balance and equalize the acid-alkaline properties of blood. It is also found in every cell of the body. Sodium is prevalent in our modern diets and usually over-consumed as we lean on more processed foods that use forms of sodium as preservatives and flavoring.

Too much sodium leads to high blood pressure and other concerns, but there are circumstances where someone can become deficient. An extended low sodium diet, the use of diuretics, or excessive sweating can result in a deficiency.

Deficiency symptoms:

- Gas
- Weight loss
- Muscle weakness
- Fatigue
- Disorientation
- Cramps
- Headaches
- Nausea or vomiting
- Heart palpitations
- Seizures

- **Phosphorus**

Phosphorus is the second most abundant mineral in the body and, like potassium and sodium, is found in every cell. Phosphorus must be balanced with calcium for either one to be fully effective. Phosphorus plays a role in almost every chemical reaction within the body, including metabolism, energy production, muscle contractions, cellular division, and the use of B vitamins.

Deficiency symptoms:

- ✓ Weak bones or teeth
- ✓ Joint pain or stiffness
- ✓ Fatigue
- ✓ Weight loss
- ✓ Less appetite
- ✓ Hair loss
- ✓ Numbness
- ✓ Anemia

- **Sulfur**

Sulfur is found in every living cell, though at much lower concentrations than the previous minerals. This doesn't make sulfur any less important though, as it is a major component of many proteins. It is a part of enzymes, connective tissue, joints, skin, hair, nails, and more. Sulfur also plays a part in regulating insulin, carbohydrate metabolism, and cellular respiration.

Deficiency symptoms:

- ✓ Acne, eczema, or itchy skin or scalp
- ✓ Brittle hair or nails
- ✓ Headaches
- ✓ Gastrointestinal problems
- ✓ Depression
- ✓ Convulsions
- ✓ Memory loss

- ✓ Slow healing
- ✓ Sore throat
- ✓ Hay fever
- ✓ Lowered immune function

- **Selenium**

Selenium is a mineral that acts as an antioxidant, protecting the body from damaging free radicals. Selenium helps in the prevention of premature aging, cancer, arteriosclerosis, cirrhosis, arthritis, and stroke. It preserves the elasticity of tissues that can be lost as we age. Deficiency is rare.

Deficiency symptoms:

- Fatigue
- Lowered thyroid function
- Mental impairment
- Reproductive disorders
- Age spots
- Cataracts
- Liver cirrhosis
- Lowered immune function

- **Chlorine**

The mineral chlorine must not be confused with the toxic yellow gas used to treat water. Chlorine in the form of chloride, found in salt, is an essential electrolyte. Chlorine works with potassium and sodium to control pressure and water balance in the blood.

It also helps regulate the pH, acid-alkaline properties within the body. Chlorine is also used by the body to create the stomach acid necessary for digestion. Heavy sweating, diarrhea, and vomiting can lead to deficiencies.

Deficiency symptoms:

- ✓ Muscle weakness and cramping
- ✓ Fatigue or apathy
- ✓ Dehydration
- ✓ Loss of appetite
- ✓ Nausea

- **Zinc**

Zinc is a trace mineral found in the body in fairly large amounts. Zinc protects the immune system, fights disease, protects eyesight, and plays a part in male sex drive.

Deficiency symptoms:

- ✓ Loss of appetite
- ✓ Acne
- ✓ Hair loss
- ✓ Anorexia
- ✓ Body odors
- ✓ Fatigue
- ✓ Loss of taste or smell
- ✓ Eczema
- ✓ Brittle nails or white spots
- ✓ Impaired healing
- ✓ Memory loss or cognitive impairment
- ✓ Diarrhea

- **Manganese**

Manganese is a part of many enzymes and it stimulates or activates many other enzymes. It also acts as an antioxidant to protect against cellular aging. It plays a role in many of the chemical processes within the body, helping with amino acid and protein digestion.

Deficiency symptoms:

- ✓ Joint pain

- ✓ Arthritis
- ✓ Hearing loss or tinnitus
- ✓ Infertility
- ✓ Loss of sex drive
- ✓ Dizziness

- **Copper**

Copper is a vital antioxidant, protecting fatty acids like those found in cell membranes. Copper is important in maintaining hair color, in growth and development, in assisting the formation of red blood cells, and in the use of iron.

Deficiency symptoms:

- ✓ Hair loss, brittle hair, or gray/white hair
- ✓ Arthritis
- ✓ Depression
- ✓ Diarrhea
- ✓ High cholesterol
- ✓ Impaired thyroid function
- ✓ Nervous ticks
- ✓ Liver cirrhosis
- ✓ Varicose veins

- **Nickel**

Nickel is a trace mineral needed in only minute amounts. Nickel activates or inhibits certain enzymes and is involved in the production of a few hormones. Nickel may act as a stabilizer for DNA and RNA. Deficiencies are rare.

Deficiency symptoms:

- ✓ Anemia
- ✓ Delayed puberty
- ✓ Skin problems
- ✓ Slow growth
- ✓ Lowered zinc absorption

- **Chromium**

Chromium is an important mineral in the metabolism of carbohydrates, the activation of enzymes, and the synthesis of fatty acids. It also increases the effectiveness of insulin.

Deficiency symptoms:

- ✓ Impaired glucose tolerance
- ✓ Weight loss
- ✓ Confusion
- ✓ Nerve damage
- ✓ High cholesterol
- ✓ Diabetes
- ✓ Mood swings
- ✓ Fatigue
- ✓ Infertility

- **Germanium**

Germanium regulates the uptake of oxygen into cells, acts as an antioxidant, enhances immune function, and initiates electrical activity. Small amounts of the trace element can be found in foods like garlic, aloe, and ginseng. It's thought that organic germanium helps to protect healthy cells.

Deficiency symptoms:

- ✓ Low energy levels and fatigue
- ✓ Arthritis
- ✓ Asthma
- ✓ Lowered immune function
- ✓ Cancer

- **Vanadium**

Vanadium prevents cholesterol from forming in the blood vessels of the brain, enhances insulin's effectiveness, promotes healthy cellular division, decreases cholesterol production, and aids in heart contractions.

The main food sources of vanadium are black pepper, mushrooms, dill seed, parsley, soy, corn, olives, and olive oil. Dill, radishes, snap beans, vegetable oils, and whole grains are also good sources of vanadium.

Deficiency symptoms:

- ✓ Cardiovascular disease
- ✓ Diabetes
- ✓ High cholesterol
- ✓ Kidney stones
- ✓ Weight gain
- ✓ Infertility
- ✓ Hypoglycemia

- **Molybdenum**

Molybdenum is an essential mineral, but its requirements are very small. Deficiencies are rare for this reason but can occur on occasion during specific medical treatments or with highly processed food diets. Molybdenum is needed for nitrogen metabolism, urine production, enzyme activation, and bone growth.

Deficiency symptoms:

- ✓ Gout
- ✓ Weight gain
- ✓ Gum disease or gum and mouth problems
- ✓ Anemia
- ✓ Acne
- ✓ Parasites
- ✓ Allergies

- **Lithium**

Lithium is important in combating depression. It is toxic in large doses, but essential in trace amounts. Lithium's actions within the body are not entirely clear, but it is believed to stabilize

serotonin, decrease inflammation, strengthen immune function, and increase white blood cell production.

Deficiency symptoms:

- ✓ Depression
- ✓ Mood swings
- ✓ Infertility
- ✓ ADHD

- **Silicon**

Silicon is used by the body to create strong bones and connective tissue, including hair, skin, nails, and joints. Silicon aids nerve function and the synthesis of vitamin B1. In the human body, you can find high concentrations of silicon in the connective tissue and major blood vessels.

Evidence suggests that silicon plays an essential role in the formation of collagen. Collagen is crucial for healthy skin, bones, hair, and nails. It's thought that silicon helps in the formation of the collagen network, improving skin elasticity and strength.

Deficiency Symptoms:

- ✓ Depression
- ✓ Slow growth
- ✓ Poor hair and nail quality
- ✓ Osteoporosis
- ✓ Arteriosclerosis

- **Iodine**

Iodine is a trace element that naturally occurs in some foods and available as a dietary supplement. Iodine is used in the creation of hormones by the thyroid gland. These types of hormones control the body's metabolism as well as other important functions.

A healthy body contains roughly 15-20 mg of iodine, with the majority stored in the thyroid.

Deficiency symptoms:

- ✓ Goiter
- ✓ Slow growth
- ✓ Lowered IQ
- ✓ Unexpected weight gain
- ✓ Weakness and fatigue
- ✓ Hair loss
- ✓ Dry and flaky skin

Activity 3:Guided Practice

1. As you have already worked on task 2, perform the following task:

a. Describe carbohydrates nutrition deficiency

b. Describe protein nutrition deficiency

Activity 4: Application

1. In kitchen workshop, observe the store carefully and perform the following tasks:

a. Identify carbohydrates deficiency symptoms among patients.

b. Identify protein deficiency symptoms among patients.

2. Each student will perform individually.

Formative Assessment

True or False Questions

1. Nutrients are chemical compound such as protein, fat, carbohydrate, vitamin, water, and mineral contained in foods. These compounds are used by the body to function and grow.

True False

Answer:……..

2. Nutrition is the art of reducing food intake for weight lose in relation to your body's requirements to avoid getting overweight, obesity and diet-related noncommunicable diseases (such as heart disease, stroke, diabetes, and cancer).

True False

Answer:……..

3. Micronutrients are nutrients that are required by the body in lesser amounts for its growth and development. And they also play a major role in the metabolic activities of the body.

True False

Answer:……

4. Fat-Soluble Vitaminsplay an important role in producing energy in the body. Since they are not stored in the body, it is important to take them enough from different food sources.

True False

Answer:…….

5. Macronutrients are essential nutrients the body needs in large quantities to remain healthy and provide the body with energy, help prevent disease, and allow the body to function correctly.

True False

Answer:……..

6. Sugar, starch, and fibers such as bread, milk, beans, potatoes, soft drinks, corn are sources of Carbohydrates.

True False

Answer:……..

Open Ended Questions

1. **State types of micronutrients and give two examples on each?**

Answer:……

……

2. **What are** three main types of macronutrients**?**

Answer:

……

……

3. **What are six major functions of carbohydrates have within the body?**

Answer:……

……

4. **State Fat deficiency symptoms and physical signs:**

Answer:

……

……

5. **Enumerate the types of minerals**

Answer:

……

……

6. **State the two based of sources of proteins**

Answer:

……

……

7. **Describe types of Fats / lipids**

Answer:

……

……

8. **Describe the types of proteins**

Answer:

……

……

9. **Explain the Functions of Fat-soluble vitamins and Water-soluble vitaminsin human body.**

Answer:

……

……

10. **List out at least 5 food sources of fats/ lipids for vegan people**

Answer:

……

……

11. **Describe carbohydrates deficiency in human body and its symptoms.**

Answer:

……

……

12. **Describe protein deficiency in human body and its symptoms.**

Answer:

……

……

Multiple choice questions

1. **One of the following is not Factor influencing food choice**

    a. Biological determinants such as hunger, appetite, and taste
    b. Physical determinants such as short, tall
    c. Economic determinants such as cost, income, availability
    d. Physical determinants such as access, education, skills (e.g. cooking) and time
    e. Social determinants such as culture, family, peers and meal patterns
    f. Psychological determinants such as mood, stress and guilt
    g. Attitudes, beliefs and knowledge about food

Answer:…….

2. **Which of the following is the most essential nutrient for a woman during her initial stages of pregnancy to prevent birth defects?**

    (a) Thiamin
    (b) Folic acid
    (c) Vitamin C
    (d) Vitamin E

Answer:……..

3. **Which of the following food sources has the highest levels of vitamin C?**

    (a) Parsley
    (b) Broccoli
    (c) Black currants
    (d) Orange juice

Answer:…….

4. **Which of the following vitamin helps in blood clotting?**

    (a) Vitamin A
    (b) Vitamin C

(c) Vitamin D

(d) Vitamin K

Answer:……

5. **Which is the leading cause of blindness in children worldwide?**

   (a) Glaucoma

   (b) Cataracts

   (c) Colour blindness

   (d) Vitamin A deficiency

Answer:……

6. **Which of the following vitamin deficiency causes Beriberi?**

   (a) Vitamin B1

   (b) Vitamin B2

   (c) Vitamin B6

   (d) Vitamin B12

Answer: ……

7. **Who is most likely to develop scurvy – A vitamin C deficiency?**

   (a) A pregnant woman

   (b) A malnourished child

   (c) A long-time alcoholic

   (d) A person with the eating disorder anorexia nervosa

Answer:……

8. **Which of the following vitamin functions as both, hormone, and visual pigment?**

   (a) Thiamine

   (b) Retinal

   (c) Riboflavin

   (d) Folic acid

Answer:……

9. **Which of the following nutrient deficiency causes megaloblastic anaemia?**

(a) Folic acid

(b) Niacin

(c) Pyridoxine

(d) Cobalamin

Answer:……..

10. Which of the following is a fat-soluble vitamin?

(a) Vitamin B

(b) Vitamin C

(c) Vitamin B_{12}

(d) Vitamin K

Answer:……..

11. Which of the following vitamins serves as a hormone precursor?

(a) Vitamin A

(b) Vitamin C

(c) Vitamin D

(d) Vitamin K

Answer:……..

12. Which of the following is a component of the coenzyme A?

(a) Retinol

(b) Pyridoxine

(c) Retinoic acid

(d) Pantothenic acid

Answer:……..

13. Which of the following vitamins is also known as cobalamin?

(a) Vitamin B11

(b) Vitamin B2

(c) Vitamin B6

(d) Vitamin B12

Answer:……..

14. Which of the following statements is false about Ascorbic acid?

(a) It shows antioxidant activity

(b) It is a strong reducing agent

(c) It can be synthesized in the body

(d) Involved in the hydroxylation of prolyl- and lysyl- residues of collagen

Answer:……..

15. Which of the following vitamins has a coenzyme function?

(a) Vitamin A

(b) Vitamin C

(c) Vitamin B

(d) All of the above

Answer:……

16. Which of the following food source are the best sources of vitamin A?

(a) Sweet potato

(b) Poultry

(c) Legumes

(d) Dairy products

Answer:……..

17. Which of the following is a water-soluble vitamin?

(a) Vitamin B1

(b) Vitamin C

(c) Vitamin B2

(d) All of the above

Answer:……

18. Weakness in muscles and increase in the fragility of red blood cells is caused due to the _____.

(a) Deficiency of vitamin E

(b) Deficiency of vitamin D

(c) Deficiency of vitamin C

(d) Deficiency of vitamin A

Answer:…….

19. Which of the following is the scientific name of Vitamin K?

(a) Ascorbic acid

(b) Phytonadione

(c) Tocopherol

(d) Pantothenic Acid

Answer:……

20. Which of the following is not Plants origin of fat?

a. Olive,
b. Peanut,
c. Canola oils,
d. Avocados,
e. Butter fat
f. Almonds,
g. Hazelnuts,
h. Sesame seeds.

Answer:(e) Butter fat

Self Reflection

At the end of every unit trainees should:

1) *Re-take the self-assessment they did at the beginning of the unit.*
2) *Fill in the table above and share results with the trainer for further guidance.*

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Points to Remember

- Wash produce quickly. If you soak produce, you may leach out water-soluble vitamins and minerals.
- Avoid fruits that were picked green. Tomatoes ripened outdoor on the vine can have twice as much vitamin C as greenhouse tomatoes, for example.
- Choose cooking pots wisely. Iron pots may destroy vitamin C but add iron, especially in acidic food, while unlined copper will destroy vitamin C, vitamin E, and folacin.
- Try eating a mix of cooked and raw foods, and learn how to process the food you eat in ways that preserve their vitamins.
- Don't overcook. Roasting meat for a long time destroys thiamin.
- Drink more water and other unsweetened beverages, instead of sugary and other high-calorie drinks. Soda, sweetened juice, energy and sports drinks are a major source of added sugar and calories in many diets.
- It better to consume vegetable with care, cooking vegetables can reduce the amount of vitamin C they contain, though it can also increase other valuable nutrients, such as lycopene. Broccoli, watercress, and garlic are all generally better raw than cooked.
- Raw broccoli contains sulforaphane, a potentially protective compound, and raw carrots contain polyphenols, another protective group of chemicals. Cooking these vegetables destroys these compounds but replaces them with other beneficial substances including indole and carotenoid.
- Know which foods are most nutritious when cooked and how to cook them. If a food contains a lot of nutrients and vitamins but your body cannot absorb or process them, then the nutrients are essentially wasted.
- Cooking can often increase the absorption of certain nutrients. For instance, the absorption of beta-carotene was found to be 6.5 times greater when carrots were stir fried versus when eaten raw. Tomatoes sautéed in olive oil may be linked to an increased absorption of lycopene, an antioxidant.

- Spinach, asparagus, and mushrooms are other foods that may benefit from heating, as this can increase the bioavailability of certain nutrients, allowing your body to better absorb them.
- Try cooking foods whole and unpeeled to preserve their vitamins while cooking.Steam where possible. If you boil vegetables or cook them in large quantities of fat (for instance, through deep-frying), you may end up leaching out valuable vitamins. Water-soluble vitamins such as vitamin B and vitamin C will be leached out during boiling, while fat-soluble vitamins such as vitamin A will leach out into cooking oil.

Further Information for the Trainer

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Figure 7: Illustration of Food Groups

Source: https://www.chp.gov.hk/en/static/90017.html

Unit summary:

This unit describes the knowledge, skills and attitudes needed to describe energetic food groups, body building food and body protecting nutrients.

At the end of this unit, you will be able to describe all food groups.

Self-Assessment: Unit 2

1. Look at the illustration. What is happening? What do you think this learning outcome will be about?

2. Fill in the self-assessment below.

   There are no right or wrong ways to answer this survey. It is for your own use during this course. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this learning outcome, we'll take this survey again.

My experience **Knowledge, skills and attitudes**	**I don't have any experience doing this.**	**I know a little about this.**	**I have some experience doing this.**	**I have a lot of experience with this.**	**I am confident in my ability to do this.**
Define food groups					
Identify food groups					
Identify energy giving food					
Describe energetic food					
Identify carbohydrates					
Describe Fats /lipids.					

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Describe Energy boosting food items.					
Identify body building food					
Describe Proteins					
Describe Minerals					
Identify body building food items					
Identify body protecting nutrients					
Describe body protecting nutrients					

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify food groups.	1. Describe the food groups.	1. Food groups are well described 2. Acuteness
2. Identify body building foods	2. Describe body building foods.	3. Body building foods are properly described 4. Mastery.
3. Identify body protecting nutrients	3. Describe body protecting nutrients.	5. Body protecting nutrients are properly described. 6. Curiosity

Discovery activity

Task:1.

Discuss the following questions with your partner (pair):

1. What are food groups
2. Identify energy giving foods
3. Describe carbohydrates
4. Describe Fats /lipids.

Discuss with your pair all the questions (1., 2., 3)

Share your findings on the question (4) with the rest of the class. Compare and discuss your ideas.

TOPIC 2.1: DESCRIBING ENERGETIC FOOD

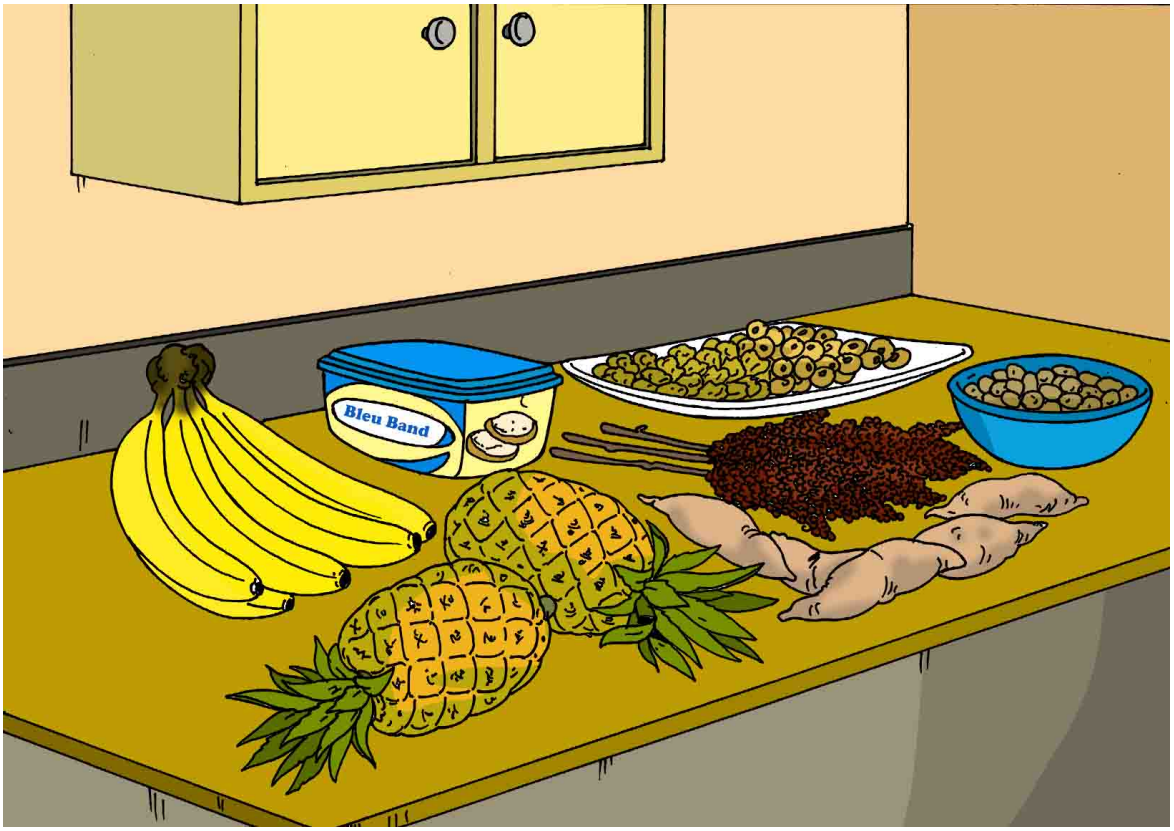


Figure 8: Illustration of Energetic food

Activity 1: Discovery

Mary is a chef at Bethanie Hotel, and she needs to prepare an energetic meal for her children. She requests you to go to the market and purchase food commodities that will provide energy for her children.

Activity 2: Problem Solving

1. In group of 5 discuss on the following situation:
    a. Identify the types of energetic foods
2. Take a time to brainstorm and discuss the questions in your respective groups.
3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Description of energetic food.**

  Energy giving foods (carbohydrates). These are the foods that give the body strength to work. These foods help the body to carry out its normal bodily functions like breathing, circulation, and digestion. They also help in doing other external work like walking, running and carrying goods.

  ✓ **Identification of energy giving food nutrients**

  - Energy-giving foods are those that supply the body with energy to accomplish work after getting digested.
  - They have a relatively higher sugar content than the other kinds of food.

  Energy value of foods must be stated in kj (metric system). To convert kcal to kj, the formula is 1kcal = 4.2kj. Many manufacturers still list energy content in foods as calories or use both calories and kilojoules.

  Examples of energy-giving food:

  Carbohydrates

  Most important source of energy is carbohydrates. Digestive system changes carbs into glucose, body then uses this sugar for energy in tissues, cells and organs, any remaining is stored in the liver and muscles for later.Carbohydrate is the main food for human. Carbohydrate is formed with carbon, hydrogen, and oxygen. It has no color and smell. It tastes sweetened.

The types of carbohydrate are as below. These are from various sources.

- **Plant Source**

Carbohydrates that we get from plants-

- ✓ **Starch**

Paddy, wheat, corn, and other crop grains are the main source of starch. Besides these, potato, red potato, and arum are the source of starch.

- ✓ **Glucose**

It is less sweetened than sugar. This carbohydrate is available in grapes, apples, carrots, and dates.

- ✓ **Fructose**

It is known as “Fruit Carbohydrate”. It is available in sweet fruits like mango, papaya, banana, orange, and honey found in flowers.

- ✓ **Sucrose**

The sources of sucrose are the juice of sugar cane, sugar, fruits and honey.

- ✓ **Cellulose**

Mango, banana, watermelon, nuts, dried fruits, and all types of vegetables are the source of cellulose.

- **Animal Source**
  - ✓ **Lactose or Milk Carbohydrate**

Lactose is the major carbohydrate in milk. This carbohydrate is available in cow or goat milk and in the milk of most species.

- ✓ **Glycogen**

Glycogen is available in the meat and liver of animals and birds like cock and pigeon.

The functions of carbohydrates are inevitable for the human body. It increases the working capability of the body and produces heat and energy. The energy, needed for the metabolism of the body is produced from the oxidation of carbohydrate foods during absorption. 4.1-kilocalorie energy is produced from per gram carbohydrate digestion. Glycogen delivers energy

for the physical activity of living things. Cellulose is an indigestible natural carbohydrate. It is full of fiber. It participates in DNA and RNA formation.

Moreover, protein and fat are synthesized from carbohydrates.

- Carbohydrates are one of the primary sources of energy for our bodies.
- They are organic molecules.
- Bread, grains, and fruits are some examples of food that are rich in carbohydrates.

The energy in food is measured as food calorie or kilo-calorie. A calorie is the unit of energy. The heat and energy, produced from the oxidation one-gram food are called the calorie of food. The 'food calorie' of food means how much heat will be released from the complete oxidation of the food.

According to the nutritionists, 58-60% of the daily requirement of calorie of the human body should be consumed from carbohydrate type foods. 4 to 6-gram carbohydrate should be consumed per kilogram weight. And an adult person should intake a minimum of 300-gram carbohydrate type foods daily.

Both, less and excess carbohydrate consumption is harmful to health. Malnutrition occurs for carbohydrate deficiency. Metabolism process is hampered for the reduction of carbohydrates in the blood. The symptom of hypoglycemia occurs for the lessening of carbohydrate levels in blood. The symptoms are

- Hungry Feel,
- Nausea,
- Excess Sweating,
- Fluctuation of Heart Beats.

Simple carbohydrate is much important for human body nutrition. The human body can absorb only simple carbohydrates. To get rid of diseases, due to carbohydrate deficiency, we need to take the required amount of carbohydrate daily. Carbohydrates can be digested easily among carbohydrates, fat, and protein. Carbohydrate provides energy-producing heat in the body within very few moments just after the absorption. The requirement of carbohydrates depends on age, body weight, height, and physical activity level. Excess carbohydrate is stored in the body as fat if it is consumed more than the requirement of our body. As a result, obesity and diabetes may occur.

- **Fats /lipids**

Fat is formatted with fatty acid and glycerol. About 20 types of fatty acids are found in food. Feature of fat depends on fatty acids. Solid fat is a completely fatty acid. It is solid in normal temperature; for instance, fat of fish or meat. Liquid fats are known as oil. These are liquid in normal temperature; such as soybean, mustard oil.

Lipids are organic compounds that contain hydrogen, carbon, and oxygen atoms, which form the framework for the structure and function of living cells.

These organic compounds are nonpolar molecules, which are soluble only in nonpolar solvents and insoluble in water because water is a polar molecule. In the human body, these molecules can be synthesized in the liver and are found in oil, butter, whole milk, cheese, fried foods and also in some red meats. Let us have a detailed look at the lipid structure, properties, types and classification of lipids.

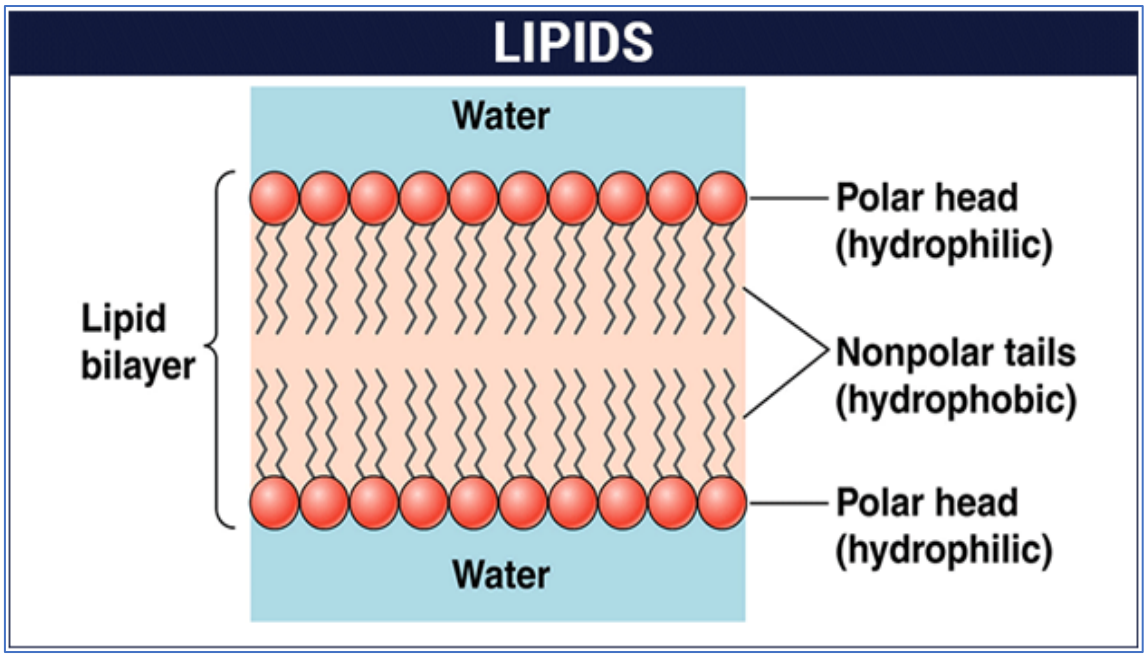


Table 7:Properties of Lipids

Source: https://byjus.com/biology/lipids/ (Retrieved on 25-March-2023)

Properties of Lipids

Lipids are a family of organic compounds, composed of fats and oils. These molecules yield high energy and are responsible for different functions within the human body. Listed below are some important characteristics of Lipids.

1. Lipids are oily or greasy nonpolar molecules, stored in the adipose tissue of the body.

2. Lipids are a heterogeneous group of compounds, mainly composed of hydrocarbon chains.
3. Lipids are energy-rich organic molecules, which provide energy for different life processes.
4. Lipids are a class of compounds characterised by their solubility in nonpolar solvents and insolubility in water.
5. Lipids are significant in biological systems as they form a mechanical barrier dividing a cell from the external environment known as the cell membrane.

Lipid Structure

Lipids are the polymers of fatty acids that contain a long, non-polar hydrocarbon chain with a small polar region containing oxygen. The lipid structure is explained in the diagram below:

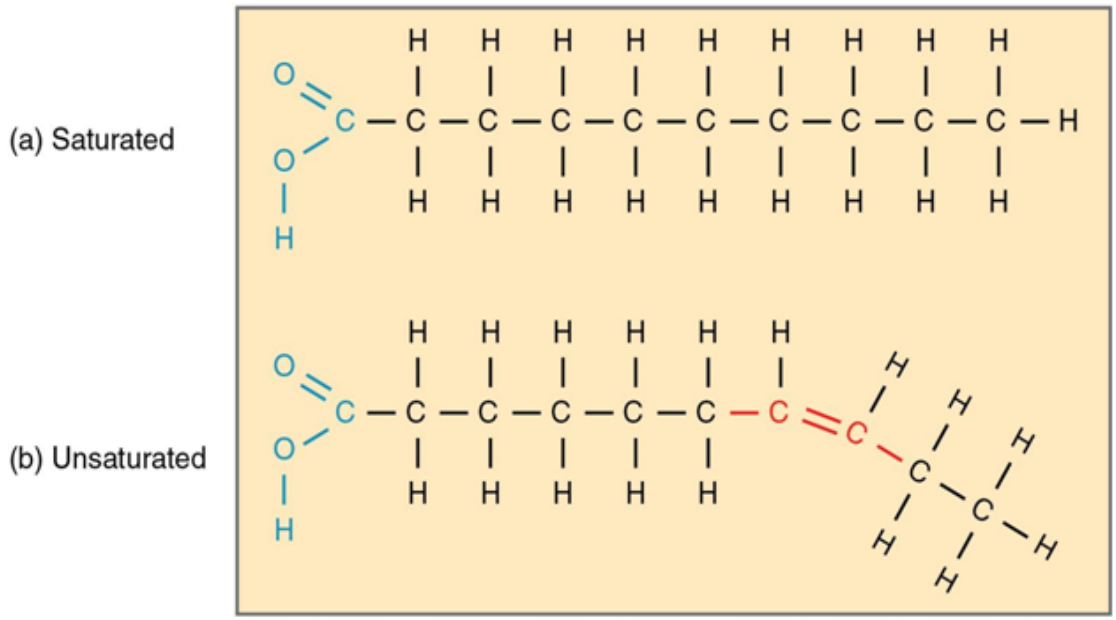


Table 8: Lipid Structure – Saturated and Unsaturated Fatty Acids

Source:https://byjus.com/biology/lipids/ (Retrieved on 25-March-2023)

Fats and lipids are an essential component of the homeostatic function of the human body. Lipids contribute to some of the body's most vital processes. Lipids are fatty, waxy, or oily compounds that are soluble in organic solvents and insoluble in polar solvents such as water. Lipids include:

- Fats and oils (triglycerides)

- Phospholipids
- Waxes
- Steroids

Classification of Lipids

Lipids can be classified into two main classes:

- Nonsaponifiable lipids
- Saponifiable lipids

Non saponifiable Lipids

A nonsaponifiable lipid cannot be disintegrated into smaller molecules through hydrolysis. Nonsaponifiable lipids include cholesterol, prostaglandins, etc

Saponifiable Lipids

A saponifiable lipid comprises one or more ester groups, enabling it to undergo hydrolysis in the presence of a base, acid, or enzymes, including waxes, triglycerides, sphingolipids and phospholipids. Further, these categories can be divided into non-polar and polar lipids. Nonpolar lipids, namely triglycerides, are utilized as fuel and to store energy. Polar lipids, that could form a barrier with an external water environment, are utilized in membranes. Polar lipids comprise sphingolipids and glycerophospholipids. Fatty acids are pivotal components of all these lipids.

Types of Lipids

Within these two major classes of lipids, there are numerous specific types of lipids, which are important to life, including fatty acids, triglycerides, glycerophospholipids, sphingolipids and steroids. These are broadly classified as simple lipids and complex lipids.

Also read: Biomolecules in Living Organisms

Simple Lipids

Esters of fatty acids with various alcohols.

1. **Fats:** Esters of fatty acids with glycerol. Oils are fats in the liquid state
2. **Waxes**: Esters of fatty acids with higher molecular weight monohydric alcohols

❖ **Complex Lipids**

Esters of fatty acids containing groups in addition to alcohol and fatty acid.

1. **Phospholipids**: These are lipids containing, in addition to fatty acids and alcohol, phosphate group. They frequently have nitrogen-containing bases and other substituents, eg, in glycerophospholipids the alcohol is glycerol and in sphingophospholipids the alcohol is sphingosine.

2. **Glycolipids (glycosphingolipids)**: Lipids containing a fatty acid, sphingosine and carbohydrate.

3. **Other complex lipids**: Lipids such as sulfolipids and amino lipids. Lipoproteins may also be placed in this category.

- **Fats – Sources**

Foods high in good fats include vegetable oils (such as olive, canola, sunflower, soy, and corn), nuts, seeds, and fish.Fats are two types on the basis of the source.

✓ **Animal Fat**

Meat with fat, butter, ghee, cheese, yolk is the source of animal fat.

✓ **Plant Fat**

Various types of oil collected from plants such as mustard, soybean, parmesan, wheat, coconut, sunflower, and palm are a source of fat. Besides, pee nuts, pistachios, Chinese almonds are the source of fat.

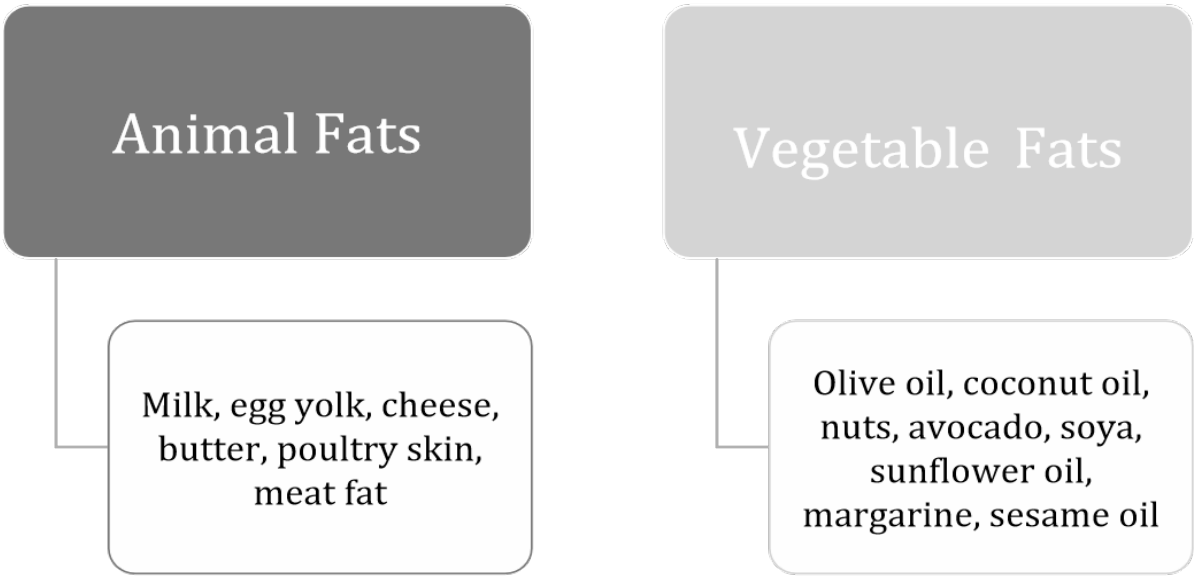


Table 9: Fats – Sources, Source:KOLAKOWSKA A., SIKORSKI Z.E., (2003).

- **Energy boosting food items**

Sugary drinks, candy, and pastries put too much fuel (sugar) into our blood too quickly. The ensuing crash leaves you tired and hungry again. "Complex carbs," healthy fats, and protein take longer to digest, satisfy your hunger, and provide a slow, steady stream of energy.

It's a complex carbohydrate. That means it's full of fiber and nutrients. Oatmeal is slower to digest and supplies energy evenly instead of all at once, and it is whole grain and gluten-free. A bowl in the morning will keep you going for hours.

A single one has just 70 calories, and yet has 6 grams of protein. That provides fuel that gets released slowly. It also has more nutrients per calorie than most other foods. That helps it satisfy hunger. As a result, you're more likely to skip that mid-morning doughnut in the office break room that will spike your blood sugar and crash your energy.

Steady energy feels great. To optimize your daily energy level, try adding some of these foods into your meal plan.

- **Oatmeal**. The complex carbs in oatmeal mean it's a slow-burning source of energy. Oats also boost serotonin production which can help us manage stress and enhance learning and memory function. Caveat: sugar-packed packets of flavored instant oats

are worth avoiding. Make your own instead and load them up with berries, bananas and a drizzle of maple or honey for a healthy treat of a breakfast.

- **Bananas**. One of the best foods for energy, whether frozen and blended into a smoothie, sliced onto oatmeal or eaten on the go. They're full of complex carbohydrates, vitamin B6, potassium and even a little protein.
- **Yogurt**. The carbs in yogurt are mainly in the form of simple sugars, such as lactose and galactose. When broken down, these sugars can provide ready-to-use energy. Greek yogurt is an especially good choice. Top with fresh berries and a drizzle of local honey or maple syrup.
- **Sesame seeds**. Toasted sesame seeds add a little crunch and flavor to salads, soups, stir fries and more. They're chock full of magnesium, which helps convert sugar into energy, plus they've got a blood-sugar-stabilizing dose of healthy fat and fiber.
- **Cinnamon**. Cinnamon works to keep blood sugar levels stable, therefore it also helps to stabilize your energy levels. One teaspoon of cinnamon contains as many antioxidants as half a cup of blueberries, one of the most antioxidant-rich foods. Shake a little into your yogurt or add a dash to your coffee.
- **Water**. Dehydration is a certain cause of low energy and even brain fog. Feel a slump? A nice tall glass of cool water might just do the trick.
- **Beans**. Whether you opt for pinto, Great Northern, red, black or Anasazi beans, or any of the hundreds of other varieties, they share a similar nutrient profile. They digest slowly, which stabilizes blood sugar. They also contain antioxidants, fiber, protein and carbs. Beans are great sources of folic acid, iron and magnesium, which help produce energy and deliver it to our cells.
- **Lentils** are tasty little legumes, rich in carbs and fiber. Just one cup of cooked lentils contains about 15 grams of fiber and 36 grams of carbs. Lentils are energy powerhouses, upping your energy levels by replenishing your stores of iron, folate, zinc and manganese. These nutrients help break nutrients down and help with cellular energy production.
- **Hummus**. Chickpeas in hummus are a good source of complex carbs and fiber, which your body can use for steady energy. The tahini (sesame seed paste) and olive oil in hummus contain healthy fats and slow the absorption of carbs, which helps us avoid blood sugar spikes.

- **Dates** are high in natural sugars, so if you need a quick burst of energy mid-day, instead of going for a second cup of coffee go for a handful of dates. Or, if you don't like plain dates, whip up some energy balls or oatmeal bars packed with dates and cinnamon to fight the mid-day slump. Dates contain vitamins and minerals like iron, manganese, copper, potassium and magnesium, in addition to fiber and antioxidants.
- **Brown rice** is a very nutritious, satisfying food. It's less processed than white rice which allows it to hang onto more nutritional value in the form of vitamins, fiber and minerals. Just a half-cup of brown rice packs two grams of fiber and lots of your recommended daily intake of manganese, a mineral needed for enzymes to break down carbs and proteins, turning them into energy.
- It's also low on the glycemic index, meaning it could help regulate blood sugar levels and promote steady energy levels throughout the day.
- **Avocados**. They're a superfood! Avocados are rich in 'good' fats, fiber and B vitamins. Around 85% of the fat in avocados is from monounsaturated and polyunsaturated fatty acids, which promote healthy blood-fat levels and boost the absorption of nutrients. About 80% of the carb content in avocados is made up of fiber, which means delicious, sustained energy.
- **Sardines & fatty fish**. According to an article from Harvard School of Public Health, fish and other seafood are the major sources of healthful long-chain omega-3 fats and are also rich in other nutrients such as vitamin D and selenium. Fatty fish is high in protein and low in saturated fat. There is also strong evidence that eating fish or taking fish oil is good for your heart and blood vessels. In addition to boosting your energy, eating fish once or twice a week may also reduce the risk of stroke, depression, Alzheimer's disease and other chronic conditions.
- **Eggs** are satisfying and packed with protein, which means steady and sustained energy. They also contain leucine, an amino acid known to stimulate energy production in several ways. It helps cells take in more blood sugar, stimulates energy production in the cells and ups the breakdown of fat to produce energy. Eggs are also rich in B vitamins, which help enzymes perform their roles in the process of turning food into energy.
- **Shrimp**. These versatile little critters are low in calories and offer nice helpings of vitamin B12 and omega-3 fat, a known mood and energy booster.

- **Cashews** are low in sugar and rich in fiber, heart-healthy fats, and plant protein. They're a solid source of copper, magnesium and manganese which are key ingredients for energy production, healthy bones brain health and immunity.
- **Sweet potatoes** are a great source of iron, magnesium and vitamin C, a nutrient needed for energy production. Add to that a healthy dose of fiber (complex carbs) and these nutritional powerhouses are also rocket boosters for your energy level.

Activity 3: Guided Practice

Task:

Brainstorm on the (a and b) and present in the plenary session.

As you have already read the scenario in task 1, discuss the following questions:

a. Describe carbohydrates
b. Describe Fats/lipids

Activity 4: Application

Topic 5.1

In the kitchen workshop perform the following activities:

a. Select the major food commodities rich in carbohydrates
b. Select the major food commodities rich in Fats/lipids

TOPIC 2.2: DESCRIBING BODY BUILDING FOOD

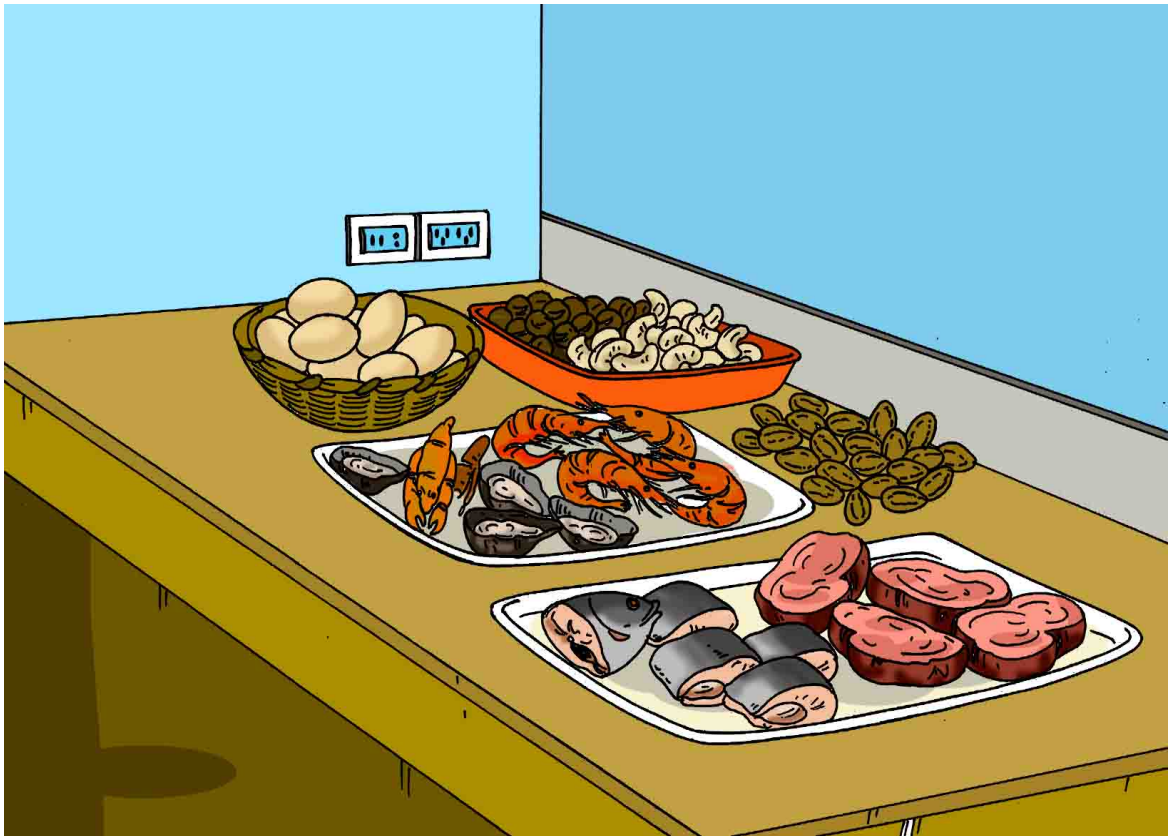


Figure 9: Illustration of Body building food

Activity 1: Discovery

Keza has children with physical development retardation, and she is looking for a meal that will aid in their physical development.

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss the situation written as follows:

2. Read the situation in task 1 and brainstorm to the following question

    a. Identify types of body building foods which can help Keza's children for physical development

3. Take time to brainstorm and discuss the questions in your respective groups.

4. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Description of body building food.**

The Food rich in proteins are generally referred to as bodybuilding food. They are required for the growth and repair of cells in our body. Milk, chicken, fish, egg and pulses are rich sources of proteins. Fruits and vegetables are sources of vitamins and minerals. These are the foods that help in building the body tissues for example muscles. They also help in the growth and repair of these body tissues. See the following examples:

✓ **Body building nutrients**

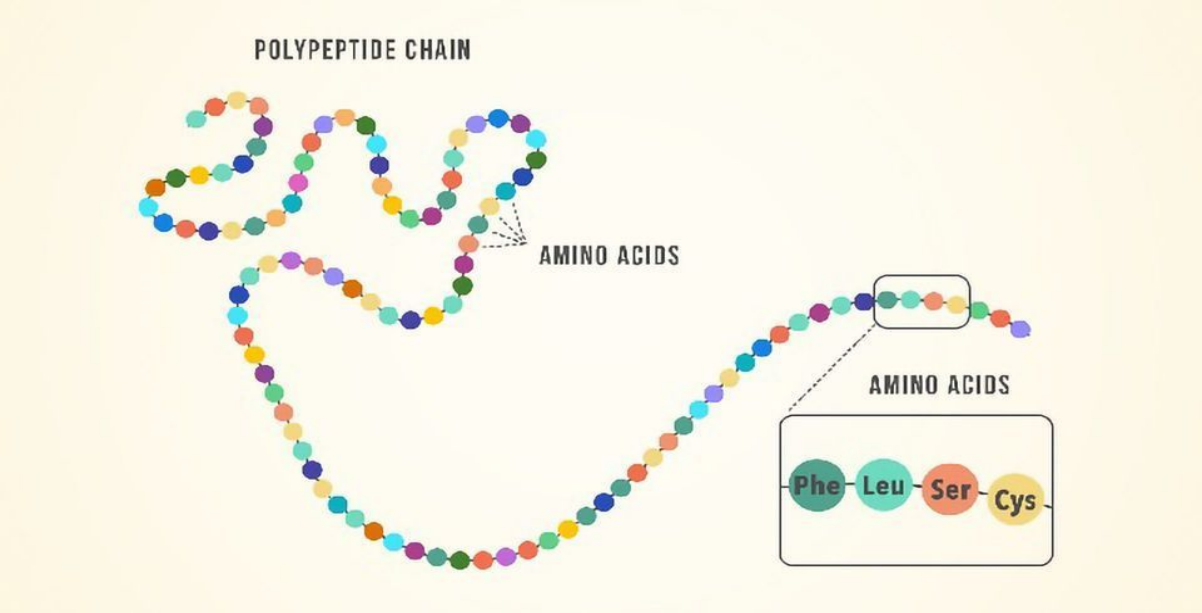
Body building nutrients are very important for gaining muscle, but carbohydrates and fats are also necessary sources of energy.

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. Proteins consist of chains of amino acids

They make up a large proportion of our cells, muscles, and tissues

Carry out important bodily functions.



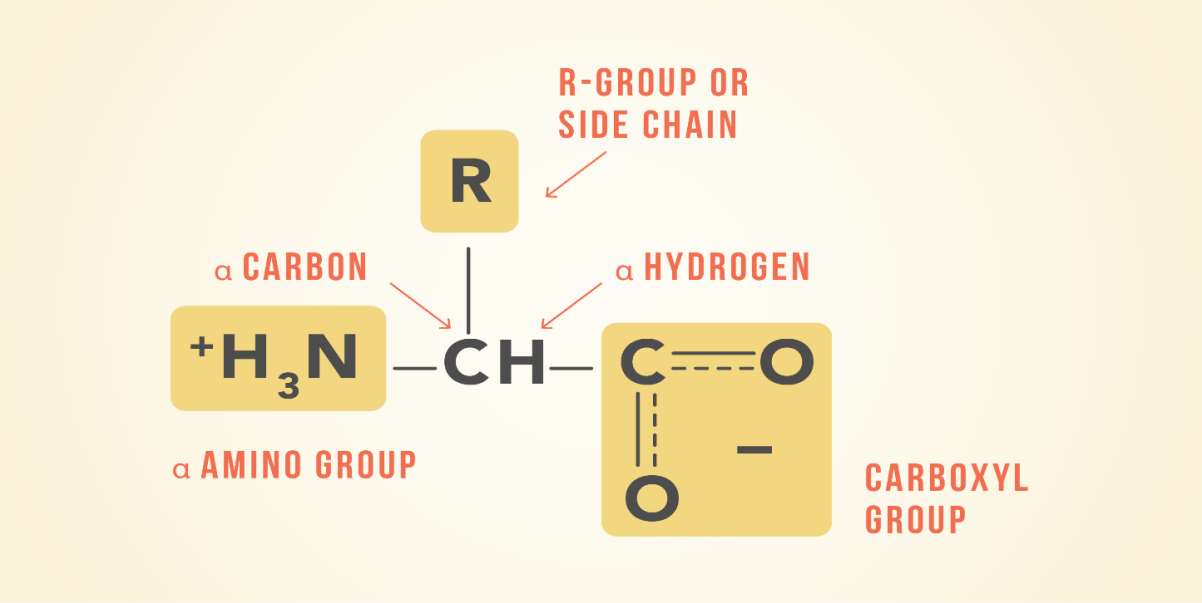


Table 10: Amino acids structure

Source:https://www.technologynetworks.com/applied-sciences/articles/essential-amino-acids-chart-abbreviations-and-structure-324357 (Retrieved on 9-April-2023)

Amino acids make up about 20% of our bodies or about 50% of our solid body mass; they are the next largest component in our bodies after water. The body of a person who weighing 50 kg has about 10 kg of amino acids in their body make up. Amino Acids are the building blocks of proteins. There are 100,000 types of proteins that are made up of just 20 amino acids. Twenty types of amino acids make up the proteins for the human body.

✓ **Essential Amino Acids**

Of total 20 amino acids, 9 amino acids cannot be synthesized in our bodies and we need to take them in through our diets. These are called essential or indispensable amino acids. Essential amino acids are: Histidine, Isoleucine, Leucine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan and Valine.

✓ **Non-Essentials Amino Acids**

The 11 remaining amino acids can be synthesized from other amino acids in the body and thus are called non-essential (or dispensable) amino acids. Non-essential amino acids are: Alanine, Arginine, Asparagine, Aspartic acid, Cysteine, Glutamic acid, Glutamine, Glycine, Proline, Serine, and Tyrosine. However, both essential and non-essential amino acids play an important role to support our life.

✓ **Meats, poultry, and fish:** Sirloin steak, ground beef, pork tenderloin, venison, chicken breast, salmon, tilapia, and cod.

- **Dairy:** Yogurt, cottage cheese, low fat milk, and cheese.
- **Grains:** Bread, cereal, crackers, oatmeal, quinoa, popcorn, and rice.
- **Fruits:** Oranges, apples, bananas, grapes, pears, peaches, watermelon, and berries.
- **Starchy vegetables:** Potatoes, corn, green peas, green lima beans, and cassava.
- **Vegetables:** Broccoli, spinach, leafy salad greens, tomatoes, green beans, cucumber, zucchini, asparagus, peppers, and mushrooms.
- **Seeds and nuts:** Almonds, walnuts, sunflower seeds, chia seeds, and flax seeds.
- **Beans and legumes:** Chickpeas, lentils, kidney beans, black beans, and pinto beans.
- **Oils:** Olive oil, flaxseed oil, and avocado oil.

- **Minerals**

Minerals are required in the diet each day in amounts larger than 100 milligrams. These include sodium, potassium, chloride, calcium, phosphorus, magnesium, and sulfur.

- **Calcium**

Calcium is the most abundant mineral in the body and greater than 99% of it is stored in bone tissue. Although only 1% of the calcium in the human body is found in the blood and soft tissues, it is here that it performs the most critical functions. Blood calcium levels are rigorously controlled so that if blood levels drop the body will rapidly respond by stimulating bone resorption, thereby releasing stored calcium into the blood.

- **Phosphorus**

Phosphorus is present in our bodies as part of a chemical group called a phosphate group. These phosphate groups are essential as a structural component of cell membranes (as phospholipids), DNA and RNA, energy production (ATP), and regulation of acid-base homeostasis. Phosphorus however is mostly associated with calcium as a part of the mineral structure of bones and teeth.

- **Sulfur**

Sulfur is incorporated into protein structures in the body. Amino acids, methionine and cysteine contain sulfur which are essential for the antioxidant enzyme glutathione peroxidase. Some vitamins like thiamin and biotin also contain sulfur which are important in regulating acidity in the body. Sulfur is a major mineral with no recommended intake or deficiencies when protein needs are met. Sulfur is mostly consumed as a part of dietary proteins and sulfur containing vitamins.

- **Magnesium**

Approximately 60 percent of magnesium in the human body is stored in the skeleton, making up about 1 percent of mineralized bone tissue. Magnesium is not an integral part of the hard mineral crystals, but it does reside on the surface of the crystal and helps maximize bone structure. Observational studies link magnesium deficiency with an increased risk for osteoporosis.

- **Sodium**

Sodium is vital not only for maintaining fluid balance but also for many other essential functions. In contrast to many minerals, sodium absorption in the small intestine is extremely efficient and in a healthy individual all excess sodium is excreted by the kidneys. In fact, very

little sodium is required in the diet (about 200 milligrams) because the kidneys actively reabsorb sodium.

- **Chloride**

Chloride is the primary anion in extracellular fluid. In addition to passively following sodium, chloride has its own protein channels that reside in cell membranes. These protein channels are especially abundant in the gastrointestinal tract, pancreas, and lungs.

- **Potassium**

Potassium is the most abundant positively charged ion inside of cells. Ninety percent of potassium exists in intracellular fluid, with about 10 percent in extracellular fluid, and only 1 percent in blood plasma. As with sodium, potassium levels in the blood are strictly regulated. The hormone aldosterone is what primarily controls potassium levels, but other hormones (such as insulin) also play a role.

❖ **Body building food items**

The following are foods containing protein to help someone build muscle. Some also contain fiber, while many others contain beneficial micronutrients.

✓ **Eggs**

A boiled or poached egg contains 6.28 g Trusted Source of protein. Eggs contain the amino acid leucine, which research indicates is essential for muscle synthesis. Eggs are also a suitable source of B vitamins that people need to produce energy.

✓ **Chicken**

A medium chicken breast without skin weighing 120 g contains 35.5 g Trusted Source of protein. Chicken without the skin is a low fat protein source that someone can easily add to different meals and recipes

✓ **Turkey**

A cup of chopped turkey contains 37.23 g of protein, while a turkey drumstick contains nearly 27 g of protein. Like chicken, turkey is a low fat protein source that is adaptable to different meals and recipes.

- ✓ **Greek yogurt**

Five ounces (oz) of Greek yogurt contains 12–18 g of protein. A person could add some carbohydrate-rich banana to their Greek yogurt for a healthy snack after training.

- ✓ **Cottage cheese**

Part-skimmed cottage cheese contains 14 g of protein per half-cup. Cottage cheese is also rich in calcium for healthy bones.

- ✓ **Salmon**

A 227 g salmon steak contains 58.5 gTrusted Source of protein. Salmon also contains omega-3 fatty acids, which have health benefits Trusted Source, including preventing muscle loss in older adults.

- ✓ **Tuna**

Tuna fish is a suitable source of omega-3 fatty acids besides their benefits for general health and inflammation. Research Trusted Source suggests omega-3 fatty acids may also improve muscle size and strength. Tuna contains 7 g of protein per ounce.

- ✓ **Milk**

Skimmed or 1% fat milk contains 8 g of protein per 8 oz, and high protein milk contains 13 g of protein per 8 oz. As long as individuals tolerate milk, it can be a healthy choice to boost protein and hydration after exercise. Milk also contains calcium which people require for healthy bones.

- ✓ **Jerky**

Dried beef or turkey jerky contains 10–15 g of protein per oz. Jerky can be a protein-rich snack that people can easily transport when going to the gym.

- ✓ **Whey protein powder**

Whey protein isolate powder contains 50 g of protein per 3 scoops. If someone tolerates whey protein powder, they can boost their protein intake by making shakes and drinks.

- ✓ **Soy protein powder**

Soy protein powder contains around 25 g of protein per scoop. People who eat a plant-based diet may find soy protein powder a valuable addition to boost their protein intake. They can add it to a smoothie along with some fruit and plant-based milk.

✓ **Lean beef**

Lean beef contains just over 23 g of protein per 4 oz. It also contains selenium, zinc, and iron, which are essential for energy and recovery.

✓ **Edamame**

Edamame beans are immature soybeans. Some people use them in Asian cooking. Fresh or frozen edamame beans contain 6 g of protein per half-cup. Adding them to a quick stir fry can make a healthy meal, perhaps with some other beans or chicken for extra protein. One oz of dry-roasted edamame beans contains 13 g of protein, which is a suitable option as a quick and convenient snack.

✓ **Quinoa**

A 2020 reviewTrusted Source suggests that quinoa has an exceptional nutritional profile due to its:

- High protein
- Balanced amino acid profile
- Fiber content
- Range of vitamins and minerals
- antioxidants
- Absence of gluten

The same review indicates that quinoa has a protein content of between 9.1–15.7 g per 100 g, depending on where manufacturers cultivate it.

✓ **Chickpeas**

Chickpeas, which people also call garbanzo beans, are a suitable source of protein and carbohydrates. A person can choose to eat chickpeas either dried and soaked, canned, or as a ready-made dish such as dahl. Canned chickpeas contain 14.6 gTrusted Source of protein per cup, making them suitable for people following plant-based diets and wishing to increase their muscle. Hummus, which contains ground chickpeas, has 7 g of protein per one-third of a cup.

✓ **Brown rice**

A cup of cooked brown rice contains 5.32 gTrusted Source of protein and is a suitable source of carbohydrates, fiber, and B vitamins. Combining brown rice with beans, chickpeas, or lentils gives a person on a plant-based diet a complete range of amino acids in one meal.

✓ **Tofu**

Tofu is a suitable protein source for people eating a plant-based diet, containing 12.68 gTrusted Source of protein per 100 g. When manufacturers prepare tofu with nigari, it is also an excellent source of calcium for healthy bones. It contains 345 milligrams (mg) of calcium per 100g.

✓ **Seeds**

Seeds are a suitable source of healthy fats, fiber, and minerals such as magnesium and zinc. A half-cup of roasted sunflower seeds contains just under 14 g of protein, while a half-cup of roasted pumpkin and squash seeds contains around 18 g of protein. People can eat seeds as a snack or sprinkle them on breakfasts, salads, or vegetables.

✓ **Seafood**

Seafood, such as crabmeat, shrimp, and lobster, contains around 6 g of protein per oz. Seafood is a rich source Trusted Source of:

- Amino acids, particularly taurine
- Fiber
- Vitamins and minerals
- Omega-3 fatty acids

However, according to older researchTrusted Source, people should be aware that some researchers link eating seafood with risks of toxicity, heavy metals, and pollutants.

✓ **Peanuts**

One cup of peanuts contains nearly 41 gTrusted Source of protein. Two tablespoons of peanut butter contain 7 g of protein. Peanuts also contain 257 mg of magnesium per cup, which researchTrusted Source indicates may enhance exercise performance.

- ✓ **Walnuts**

A cup of chopped shelled walnut halves contains 15.2 g of protein and 9 g of omega-3 fatty acids, which may benefit muscle building. Walnuts are also a suitable source of dietary vitamin E, which researchTrusted Source indicates may protect the body against physical stress during exercise.

- ✓ **Buckwheat**

Buckwheat is a seed that people can use as a grain or flour. Retailers sometimes market buckwheat as groats or kasha. A cup of buckwheat contains 22.5 g of protein and suitable Trusted. Source amounts of carbohydrates, vitamins, and minerals. Buckwheat is a valuable addition to a plant-based diet, and people can use it in place of rice or use the flour to make protein pancakes.

- ✓ **Lean pork**

Lean pork or fresh ham contains nearly 40 g of protein per cup. A 2012 study Trusted Source found that adults with a high body mass index who increased their intake of fresh, lean pork for 6 months improved their body composition, weight, and body fat scores. The authors suggested that pork is a nutritious meat that does not negatively impact someone's cardiovascular risk.

- ✓ **Bison**

A 2018 study Trusted Source indicates that bison had a lower atherogenic — referring to fatty deposits in the arteries — risk than beef in healthy men. Therefore, if someone chooses to include red meat in their diet, bison may be a wise choice.

- ✓ **Lentils**

Lentils contain 9 g of protein per half-cup and a range of amino acids. They are a suitable source Trusted Source of fiber, carbohydrates, vitamins, and minerals. Lentils provide a protein source for people following plant-based diets, and someone can achieve a balanced amino acid profile by combining lentils with a whole grain such as brown rice.

- ✓ **Beans**

Beans are a valuable source of protein for people eating plant-based diets. Kidney beans, black beans, and navy beans contain 8 g of protein per half-cup.Beans are also a suitableTrusted Source source of fiber and minerals for bone health, such as calcium, magnesium, and phosphorous

- ✓ **Almonds**

A cup of dry roasted almonds without salt contains nearly 29 g of protein. Nuts also provide fiber to help keep someone fuller for longer and B vitamins for energy during training.

- ✓ **Cheese**

A cup of diced cheddar cheese contains around 30 g of protein, while a cup of Mozarella cheese has over 31 g of protein. However, many kinds of cheese are a source of saturated fats. Government guidelines advise people to limit saturated fats to no more than 10%Trusted Source of their daily calories.

- ✓ **High protein cereals**

Some packaged cereals are higher in protein, with between 7 and 15 g of protein per portion. Eating high protein cereals for breakfast also offers a source of carbohydrates and fiber.

- ✓ **Soy milk**

Soy milk is a suitable protein source for people who follow a plant-based diet or are intolerant to dairy milk. An 8 oz portion of soy milk contains 7 g of protein.

Activity 2: Guided Practice

Task:

1.Brainstorm on the (a and b) and present in the plenary session.

Discuss the following questions:

a. Describe the types of body building foods which can help Keza's children for physical development

Activity 3: Application

Task:

Trainees are guided to the workshop for observation.

Observe carefully and perform the following tasks:

b. Select food items rich in proteins and minerals.

Each group is requested to present.

The class comments on each group performance.

TOPIC 2.3: DESCRIBING BODY PROTECTING NUTRIENTS

Figure 10: Body protecting nutrients

Activity 1: Discovery

Kamaliza is always sick due to the insufficiency of body protecting nutrients consumption. So, he requests you to plan a menu by considering their nutrients concerns for her situation.

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss and brainstorm on the following questions:

c. Identify the food items rich vitamins.

2. Take time to brainstorm and discuss the questions in your respective groups.

3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Description of body protecting nutrients.**

Protective foods are foods that help in protecting the body from diseases. These foods also help the body to heal much faster. Protective foods help the body to stay healthy.

Body protecting nutrients play a vital role in many biochemical functions in the human body and are essential components for maintaining optimal health. There are two main groups of vitamins – fat-soluble (easily stored in fat upon absorption) and water-soluble

✓ **Body protecting nutrients**

Vital for regulation of metabolism and for normal growth and body functions. Needed in small amounts (micronutrients) Most foods do contain vitamins – sunlight, soil, animal feed, harvest process, storage may all effect vitamin concentration. Fat soluble – ADEK and Water soluble - BC

Vitamins ADEK

A – healthy vision, eyes, and skin. From oily fish, egg yolk, dark green and yellow veg, cheese, butter etc.

D – absorption of calcium and phosphorous, bone and teeth formation. From Canned fish, egg yolk, margarine, sun

E – antioxidant, protects body from oxygen damage, cancer fighting potential. From Vegetable oil, pine nuts, peanuts, popcorn, sweet potato

K – produces clotting factor in blood. From Egg yolk, liver, tomatoes, greens, skin of fruit and vegetables

- **B Complex vitamins**

B complex (thiamine, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folate, and cobalamin).

✓ Thiamine (B1)

- ✓ Riboflavin (B2)
- ✓ Niacin (B3)
- ✓ Pantothenic acid (B5)
- ✓ Pyridoxine (B6)
- ✓ Biotin (B7)
- ✓ Folate (B9)
- ✓ Cobalamin (B12)
- ✓ Vitamin C (ascorbic acid, ascorbate)

- ✓ **Thiamine (B1)** is a cofactor for multiple enzymes, including pyruvate dehydrogenase, alpha-ketoglutarate, transketolase, and branched-chain ketoacid dehydrogenase, all of which are involved in glucose breakdown.

- ✓ **Riboflavin (B2)** is a cofactor in redox reactions. Deficiency leads to cheilosis (inflammation of lips and fissures of the mouth) and corneal vascularization. Of note, ultraviolet (UV) light can destroy riboflavin; hence it is always packaged in opaque containers.

- ✓ **Niacin (B3)** is also utilized in redox reactions and derives from tryptophan. Deficiency can present as pellagra, otherwise known as the 3-D's: diarrhea, dermatitis, and dementia.

- ✓ **Pantothenic acid (B5)** is a component of coenzyme A and fatty acid synthase, both of which are necessary for energy production and the formation of hormones. Deficiency is characterized by dermatitis, enteritis, alopecia, and adrenal insufficiency.

- ✓ **Pyridoxine (B6)** is converted to pyridoxal phosphate (PLP) and is part of reactions including transamination, decarboxylation, and glycogen phosphorylase. It is critical for the formation of red blood cells.

- ✓ **Biotin (B7)** is necessary for the metabolism of protein, fats, and carbohydrates. Deficiency can lead to muscle pain, heart problems, anemia, and depression. Additionally, since biotin is a contributor to keratin, biotin has become popularized as a supplement to improve the quality of hair, skin, and nails.

- ✓ **Folate (B9)** is converted to tetrahydrofolate and is vital for DNA and RNA synthesis. Deficiency can result in neural tube defects, prompting folate supplementation during pregnancy, and macrocytic (MCV>100) megaloblastic anemia. Folate deficiency may also be a feature of alcohol use disorder.
- ✓ **Cobalamin (B12)** is essential for erythropoiesis and the growth of the nervous system. Deficiency may lead to pernicious anemia and subacute combined degeneration of the spinal cord. The macrocytic megaloblastic anemia from B12 deficiency presents similarly to folate deficiency, and to differentiate them, it is imperative to obtain serum homocysteine and methylmalonic acid levels.

- **Vitamin C**

Vitamin C (ascorbic acid, ascorbate) is needed for collagen growth, wound healing, bone formation, enhancing the immune system, absorption of iron, strengthening blood vessels, and acting as an antioxidant. When deficiency occurs, it can result in scurvy which can present with swollen and bleeding gums, loss of teeth, poor wound healing, and poor tissue growth.

Body protecting food items

Body protecting food items are foods that contain adequate amounts of vitamins, minerals, and high-quality proteins and protect against development of a deficiency disease like pellagra, beriberi and scurvy is called protective foods.

Including protective foods in your diet is a natural way to fight disease, ward off infection and maybe even extend your lifespan. Protective foods have benefits beyond disease prevention as well. The calcium and nutrients found in low-fat dairy products, vegetables, fruits, grains and lean proteins, for example, can guard against certain cancers, hypertension, scurvy, diabetes, osteoporosis heart disease, bone loss, kidney stones and stroke. Diet alone cannot guarantee good health and is not a magical cure-all, but its significance is enormous.

1. Fish

Fish is a good source for 9 of 14 essential vitamins. These include Vitamins A, B1, B2, B3, B5, B6, B12, D, and E. Among all fish Tuna and Trout provide the most vitamins but be sure to eat a wide variety of fish for a healthy diet.

2. Dark Leafy Greens

Dark Leafy Greens are a good source for 8 of 14 essential vitamins. These include Vitamins A, B2, B3, B6, B9, C, E, K, and Beta-Carotene. While all dark leafy greens are great, extra nutrient-dense sources include spinach and kale.

3. Seeds

Seeds are a good source for 6 of 14 essential vitamins. These include Vitamins B1, B2, B3, B5, B5, B6, and E. Vitamin rich choices for seeds include sunflower and flax seeds.

4. Broccoli

Broccoli is a good source for 6 of 14 essential vitamins. These include Vitamins A, B9, C, E, K, and Beta Carotene. Other nutritious cruciferous vegetables include brussels sprouts, cabbage, and cauliflower.

5. Pork

Pork is a good source for 6 of 14 essential vitamins. These include Vitamins B1, B2, B3, B5, B6, and D. Good cuts of pork include pork chops (loin) and shoulder.

6. Beef and Lamb

Beef and lamb is a good source for 5 of 14 essential vitamins. These include Vitamins B2, B3, B5, B6, and B9. To reduce calories, leaner cuts of beef and lamb are recommended.

7. Mushrooms

Mushrooms are a good source for 4 of 14 essential vitamins. These include Vitamins B2, B3, B5, and D. Mushrooms are highly nutritious while being low in carbs and calories. Good choices include portobello, cremini (button), and shiitake mushrooms.

8. Nuts

Nuts are a good source for 4 of 14 essential vitamins. These include Vitamins B1, B2, B6, and E. Nuts are a heart-healthy, cholesterol-lowering snack. Try not to have more than 1-2 handfuls a day. Good choices for nuts include almonds and walnuts.

9. Eggs

Eggs are a good source for 4 of 14 essential vitamins. These include Vitamins B2, B5, B12, and D. While eggs are now considered heart healthy, they are still high in cholesterol, so try not to eat more than 2 a day.

10. Sweet Bell Peppers

Bell Peppers are a good source for 4 of 14 essential vitamins. These include Vitamins A, and C, Beta-Carotene, and Lycopene. Bell Peppers are one of the foods highest in vitamin C. Colorful red and yellow peppers have higher amounts of beta-carotene and lycopene than green peppers.

11 Avocados

Avocados are a good source for 4 of 14 essential vitamins. These include Vitamins B5, B6, B9, and E. Avocados are high in calories and fat, so try not to eat more than 1/2 a large avocado, or 1 small avocado, a day.

12. Green Peas

Peas are a good source for 4 of 14 essential vitamins. These include Vitamins A, B1, E, and Beta Carotene. Green peas are also a good vegetarian source of protein.

13. Winter Squash

Butternut Squash is a good source for 4 of 14 essential vitamins. These include Vitamins A, B1, E, and Beta Carotene. Good choices for winter squash include butternut, acorn squash, and pumpkin.

14. Tropical Fruits

Tropical Fruits a good source for 4 of 14 essential vitamins. These include Vitamins A, B1, E, and Lycopene. Fruits with red flesh, like Papayas, are the best choice for lycopene.

15. Dried Fruits

Dried Fruits are a good source for 4 of 14 essential vitamins. These include Vitamins A, B6, K, and Beta Carotene. Dried fruits are high in sugar, try not to eat more than 1 handful a day.

In addition to those in the top 15, here in table are some more high vitamin foods which appeared on the most nutritious foods lists.

Asparagus	High in Vitamins B1, B9, K, and Lycopene
Liver	High in Vitamins A, B3, and B12
Carrots	High in Vitamin A, Beta Carotene, and Lycopene
Cheese	High in Vitamins B2, B5, and B12
Shellfish	High in Vitamins B2, B12, and E
Sweet Potatoes	High in Vitamins A, B5, and Beta Carotene
Beans	High in Vitamins B1, and B9
Wholewheat Bread	High in Vitamins B1, and B9
Cantaloupe	High in Vitamins A, and Beta Carotene

Guavas	High in Vitamin C, and Lycopene
Kiwifruit	High in Vitamins C, and E
Plant Oils (Olive Oil)	High in Vitamins E and K
Tomatoes	High in Vitamin C, and Lycopene
Fortified Tofu	High in Vitamins B12 and D
Cereals	High in Vitamins B12 and D
Bananas	High in Vitamin B6
Berries (Strawberries)	High in Vitamin C
Citrus Fruits	High in Vitamin C
Dry Roasted Soybeans	High in Vitamin B1
Peanuts	High in Vitamin B3
Lentils	High in Vitamin B9

Table 11: Most nutritious foods lists

Source: https://www.myfooddata.com/articles/high-vitamin-foods.php (Retrieved on 13-April-2023)

Activity 3: Guided Practice

1. As you have already worked on task 2, perform the following task:

a. Describe the food items rich vitamins.

Activity 4: Application

1. In kitchen workshop, observe the store carefully and perform the following tasks:

b. Select Food items rich vitamins.

2. Each student will perform individually.

Formative Assessment

True or False Questions

1. Energy giving foods are the foods that give the body strength to work, and these foods help the body to carry out its normal bodily functions like breathing, circulation, and digestion. They also help in doing other external work like walking, running, and carrying goods.

True False

Answer:……..

2. Carbohydrate is formed with carbon, hydrogen, and oxygen and it has no color and smell.

True False

Answer:……

3. Body building nutrients are very important nutrients for gaining energy in human body including fats, but sugars are also necessary sources of energy.

True False

Answer:……..

4. Protective foods are foods that help in protecting the body from diseases. These foods also help the body to heal much faster and help the body to stay healthy.

True False

Answer:……

Open Ended Questions

1. State 3 food groups needed by the body for better functioning and give one example for each?

Answer:

……

……

2. Describe types of carbohydrates based on their sources

Answer:

……

……

Multiple choice questions

1. **Select two of the following which are not energy giving food**

   a. Oatmeal
   b. Bananas
   c. Tomatoes
   d. Yogurt
   e. Sesame seeds
   f. Water
   g. Beans
   h. Tofu
   i. Lentils
   j. Sweet potatoes

Answer: ……

2. Which of the following is not of body building foods?

   a. Eggs
   b. Chicken
   c. Turkey
   d. Avocados
   e. Cheese
   f. Lean beef
   g. Seafood
   h. Peanuts

Answer: ……

3. Which of the following vitamins which boost healthy vision, eyes, and skin and available from oily fish, egg yolk, dark green and yellow veg, cheese, butter.

a. Vitamin A
b. Vitamin D
c. Vitamin E
d. Vitamin K

Answer:…….

Self Reflection

At the end of every unit trainees should:

1. *Re-take the self-assessment you did at the beginning of the unit.*
2. *Fill in the table below and share results with the trainer for further guidance.*

Areas of strength	Areas for improvement	Actions to be taken to improve
1.	**1.**	**1.**
2.	**2.**	**2.**

Further Information for the Trainer

1. Diet, physical activity, and health. In: Fifty-fifth World Health Assembly, Geneva, 13--18 May 2002. Volume 1. Resolutions and decisions, annexes. Geneva, World Health Organization, 2002 (document WHA55/2002/REC/1):28--30.
2. Katz F. Active cultures add function to yoghurt and other foods. Food Technol. 2001; 55:46–9.
3. https://www.chp.gov.hk/en/static/90017.html
4. https://byjus.com/biology/lipids/ (Retrieved on 25-March-2023)
5. https://byjus.com/biology/lipids/ (Retrieved on 25-March-2023)
6. https://www.technologynetworks.com/applied-sciences/articles/essential-amino-acids-chart-abbreviations-and-structure-324357 (Retrieved on 9-April-2023)
7. https://www.myfooddata.com/articles/high-vitamin-foods.php (Retrieved on 13-April-2023)

Points to Remember

- People need a variety of protein sources and amino acids to build muscle during training.
- They can choose from many common animal- and plant-based foods and combine these with adequate amounts of carbohydrates.
- Protein foods, such as oily fish, may have additional benefits for health and exercise.
- Individuals should ensure they consume essential vitamins and minerals in their diet for energy, performance, and recovery.

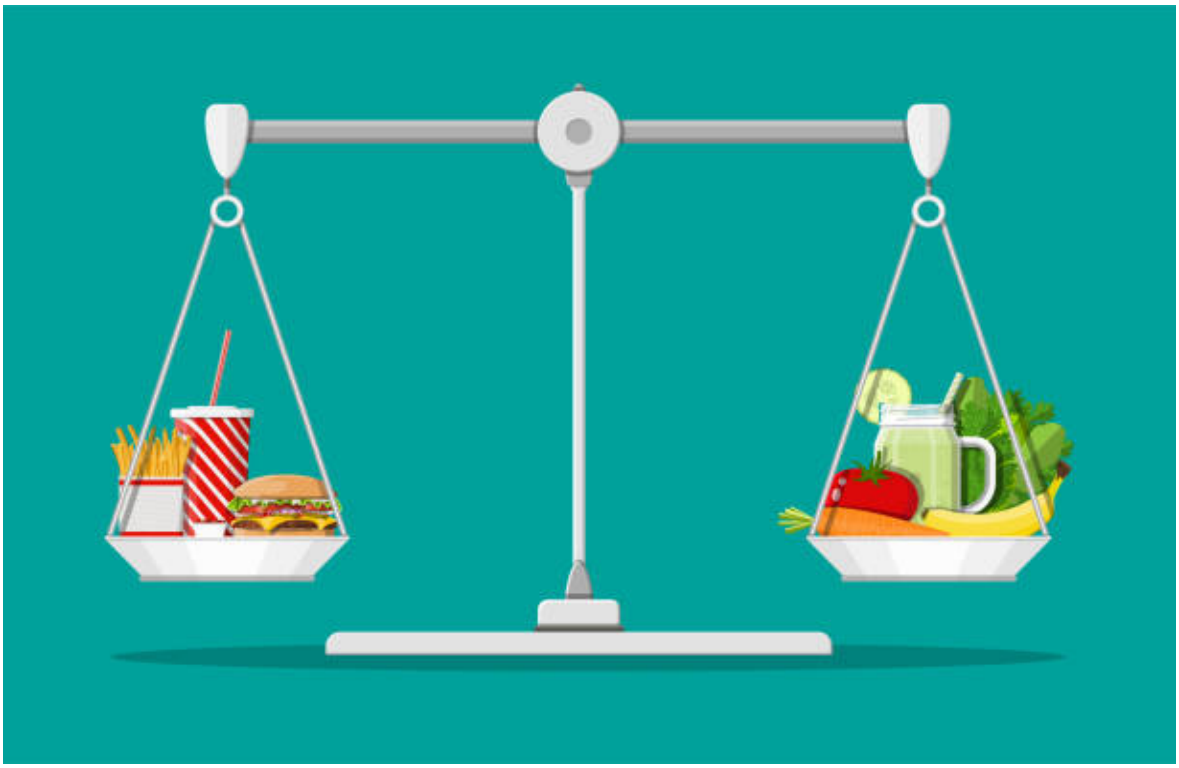


Figure 11: Illustration of Balanced Diets

Source: https://www.istockphoto.com/photos/balance-food

Unit summary:

This unit describes the knowledge, skills and attitudes needed to identifydiets, Select diets as per health conditions.

At the end of this unit, you wil lbe able to calculate different food nutrients.

Self-Assessment: Unit 3

1. Look at the illustration. What is happening? What do you think this learning outcome will be about?
2. Fill in the self-assessment below.

   There are no right or wrong ways to answer this survey. It is for your own use during this course. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this learning outcome, we'll take this survey again.

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Define Diets					
Define balanced diets					
Define Dietary habit					
Identify types of diets					
Describe the importance of a balanced diets in the body					

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Select diets as per health conditions					
Calculate recommended dietary allowance					

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify balanced diets.	**1.** Describe balanced diets.	**1.** Balanced diets are well described **2.** Acuteness
2. 2. Select diets as per health conditions	**2.** Describe diets as per health conditions.	**3.** Diets are properly described as per health conditions **4.** Mastery.
3. 3. Calculate nutrients as per Recommended Dietary Allowance	**3.** Describe Recommended Dietary Allowance.	Recommended Dietary Allowance is properly described. **5.** Curiosity

Discovery activity

Task:1.

Discuss the following questions with your partner (pair):

Discuss the following questions with your partner (pair):

1. Define balanced diets
2. Describe the importance of a balanced diets in the body

Discuss with your pair all the questions (1,3)

Share your findings on the questions (2) with the rest of the class. Compare and discuss your ideas.

TOPIC 3.1: IDENTIFY DIETS

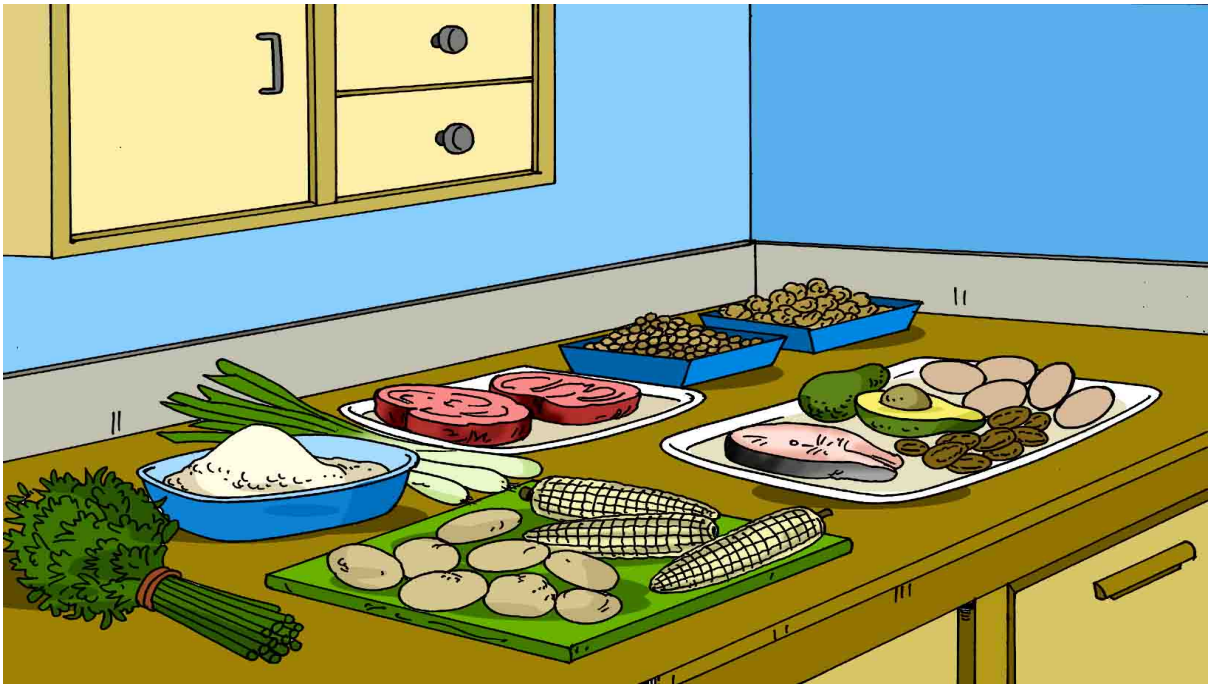


Figure 12: Diets Identification

Activity 1: Discovery

" Kamana is a Head chef at Kingi Faisal Hospital, and he needs to prepare a balanced diet for children with physical development retardation, so he requests you to prepare a balanced diet for those children.

Activity 2: Problem Solving

1. In group of 5 discuss on the following situation:
    a. Identify types of diets
    b. Describe the importance of a balanced diets
2. Take a time to brainstorm and discuss the questions in your respective groups.
3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Identify diets**

✓ **Definition of the key terms**

Diets

In nutrition, diet refers to the food and drink that is regularly consumed by an individual (or a group). During a particular therapy of a disease or management of a particular health condition, the diet may be controlled, i.e. one that meets the physical needs of an individual. For instance, the diet of a diabetic person may be restricted to a selection of food and drinks that help manage the level of blood sugar. The diet recommended for patients with diabetes includes plenty of fibrous, non-starchy fruits and vegetables. Starchy foods are rich in carbohydrates that consuming a large portion may result in increased sugar level in blood.

- **Balanced diets**

A balanced diet is a diet that contains differing kinds of foods in certain quantities and proportions so that the requirement for calories, proteins, minerals, vitamins and alternative nutrients is adequate and a small provision is reserved for additional nutrients to endure the short length of leanness.In addition, a balanced diet ought to offer bioactive phytochemicals like dietary fiber, antioxidants and nutraceuticals that have positive health advantages. A balanced diet should offer around 60-70% of total calories from carbohydrates, 10-12% from proteins and 20-25% of total calories from fat.

- **Dietary habit**

Dietary habits are defined as “the habitual decisions of individuals or a group of people regarding what foods they eat”. Food choices are influenced by a variety of factors, among which demographic and socioeconomic factors play a significant role and their impact has been extensively investigated. When it comes to age, one must consider not only physiological changes that come with older age but also food preferences from lifetime experiences. Physiological, psychosocial, and economic factors that appear with aging can be an obstacle to a healthy diet.

Not only do dietary habits change over a lifetime but so do nutrition requirements, which mainly refer to a lower energy intake, higher protein content, and a higher intake of vitamins and minerals.

Importance of a Balanced diets

Healthy eating increases energy, improves the way your body functions, strengthens your immune system and prevents weight gain. A balanced diet supplies the nutrients our body needs to work effectively. Without balanced nutrition, our body is more prone to disease, infection, fatigue, and low performance. Children who don't get enough healthy foods may face growth and developmental problems, poor academic performance, and frequent infections. A well-balanced diet provides important vitamins, minerals, and nutrients to keep the body and mind strong and healthy. Eating well can also help ward off numerous diseases and health complications, as well as help maintain a healthy body weight, provide energy, allow better sleep, and improve brain function.

The other 5 major benefits of a balanced diets are:

1. **Control Body Weight**

Eating a healthy variety of nutrient-dense foods leaves less room for those calorie-dense foods that typically lead to weight gain.

2. **Fight Off Disease**

When eating a balanced diet, essential nutrients will produce and help maintain key germ-fighting cells in the immune system, and greatly improve vascular function. The immune system relies heavily on blood flow, so better vascular function will help provide disease fighting cells to areas of need quickly

3. **Have More Energy**

The food we eat has a tremendous impact on the energy we have throughout the day. Nutrient-dense foods will digest and therefore be released into the system over a longer period of time.

4. **Sleep Better**

There are few things our bodies need more than sleep. It allows our muscles to recover and replenish from the day's activities and workouts. Sleep will rejuvenate the brain and its ability to function at a high level for the next day.

Poor eating habits often cause stomach and digestive issues due to the toxins that may be released into the blood system.

5. **More Brain Power**

Omega 3 fatty acids provide a number of important benefits, such as improved memory and the ability to learn. They also help fight against debilitating mental disorders, for example, depression, dementia, and schizophrenia.

Identification of types of diets

- **Vegetarians diet**

The most popular diets that you will come across is vegan diet. As the name says it all, it is a type of vegetarian diet. Generally, this particular diet is followed for ethical or environmental reasons. It is intended towards restraining animal exploitation or cruelty and not just for health reasons. As right the reason sounds, following this sort of diet, especially for non-vegetarians is a hard task.

Vegetarian diet can be divided into three parts that is - total vegetarian, lacto vegetarian and lacto-ovo vegetarian.

- **Non- vegetarian diet**

A non-vegetarian diet includes chicken, meat, eggs and fish. A non-vegetarian diet also has several health benefits because this type of food is rich in protein and vitamin B. Non-vegetarian food strengthens our muscles and helps them grow faster. It also helps to maintain body stamina and hemoglobin.

- **Lacto-vegetarian diet**

The lacto-vegetarian diet is a variation of vegetarianism that excludes meat, poultry, seafood, and eggs. While still consuming dairy products such as milk, cheese, yogurt, butter, ghee, cream, and kefir. People often adopt a lacto-vegetarian diet for environmental or ethical reasons. Some also choose to follow the diet for health reasons. In fact, reducing your intake of meat and other animal products may be associated with several health benefits.

Other common forms of vegetarianism include the lacto-ovo-vegetarian diet.

- **Lacto-ovo vegetarian diet**

A lacto-ovo vegetarian eating pattern is based on grains, fruits and vegetables, legumes (dried beans, peas and lentils), seeds, nuts, dairy products and eggs. It excludes meat, fish and poultry or products containing these foods. A low fat lacto-ovo vegetarian eating pattern has many potential health benefits.

Activity 3: Guided Practice

Task:

You brainstorm on the (a and b) and you present in the plenary session.

As you have already read the scenario in task 1, discuss the following questions:

a) Select the right ingredients for children balanced diets

Activity 4: Application

Topic 5.1

In the kitchen workshop perform the following activities:

a. Select the right ingredients for children balanced diets

Task:

TOPIC 3.2: SELECT DIET AS PER HEALTH CONDITIONS

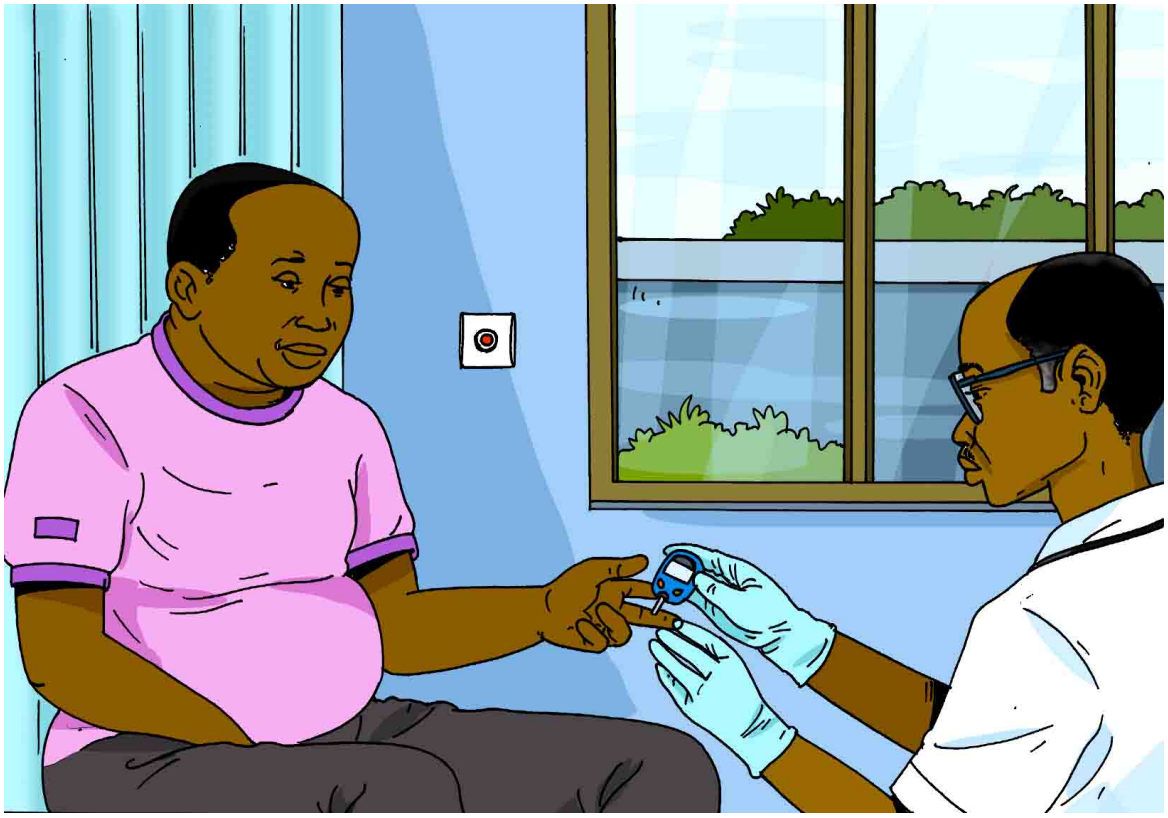


Figure 13: Illustration of Diets as per health conditions

Activity 1: Discovery

Andrew is a Head chef at Rwakamole hotel, and he is preparing to receive customers who are restricted to Gluten consumption, so he requests you to prepare a balanced diet for those customers.

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss on situation written as follow:

2. Read the situation in task 1 and brainstorm to the following question

a. Identify types of health conditions

b. Describe five factors influencing nutritional needs

3. Take time to brainstorm and discuss the questions in your respective groups.

4. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Select diets as per health conditions**

A healthy diet helps to protect against malnutrition in all its forms, as well as noncommunicable diseases (NCDs), including diabetes, heart disease, stroke and cancer.Consuming a healthy diet throughout the life-course helps to prevent malnutrition in all its forms as well as a range of noncommunicable diseases (NCDs) and conditions.

✓ **Identification of health conditions**

- Diabetes
- Obesity
- Heart attack
- Cancer
- High Blood Pressure
- HIV/AIDS

❖ **Nutritional needs according to different factors**

A healthy, balanced diet includes foods from all 5 food groups: fruit, vegetables, grains, proteins, and dairy.

- **Childhood Nutrition**

Childhood nutrition should be a balance between the high energy and nutrient content required for growth and development and establishing a healthy diet with weight control, in

association with regular physical exercise. The balance between these two aspects changes from the very high-fat content of infancy to the low-fat, high-fibre diet of adulthood.

The diet for a child should be focused on natural, fresh sources of energy and nutrients. Drastic dieting and fad foods must be avoided. A positive attitude to healthy eating should be encouraged from an early stage.

- **Preschool children**

Energy

Children have a high energy requirement because they are growing quickly and becoming more active. They therefore require foods which are high in energy (as well as vitamins and minerals). Young children do not have large enough stomachs to cope with big meals and so should have small and frequent meals. A diet which is low in fat and high in fibre may not provide enough energy for a young child. A healthy family approach to diet and lifestyle should be encouraged, as food preferences are often established at this stage.

A diet which is low in fat and high in fibre will not provide enough energy for a young child but a family approach to a healthy diet is important at this stage because food preferences are often established very early in life. Ideally, children should restrict the number of times a day that they have foods and drinks containing sugar and then only have them at mealtimes.

Young children should not be put on weight reduction diets but a healthy family approach to food and regular physical activity are important in avoiding excessive weight gain and obesity.

❖ **Other nutritional requirements for Childhood**

The diet must also be high in vitamins and minerals. In particular, a good supply of protein, calcium, iron and vitamins A and D is required. Supplements of vitamins A, C and D in the form of liquid drops are recommended for children under 5 years of age if they are considered to be at risk of deficiency - eg, poor eaters or those who do not have much exposure to sunlight.

Whole cow's milk is recommended for children over the age of 12 months as a main drink, as it is a rich source of a number of nutrients. Semi-skimmed milk can be introduced after the child is 2, as long as the diet provides enough energy.

Skimmed milk is not suitable for children under 5 years of age, as it does not provide enough energy and vitamin A for the growing child.

Iron

Iron-deficiency anaemia may be associated with frequent infections, poor weight gain and delay in development. Red meat is the best source of easily absorbable iron and can be offered to children from 6 months of age. Iron-rich foods, such as liver and red meat, are not usually popular with young children.

Other good sources of iron include green vegetables, pulses, bread and some breakfast cereals. Iron from plant sources is less well absorbed than iron from animal sources but can be improved by having vitamin C-rich foods or drinks with a meal.

Calcium

Young children need plenty of calcium in their diets for healthy bones and teeth. Dairy products have a high calcium content and other good sources include white bread, dark green leafy vegetables, pulses (eg, baked beans) and fortified cereals.

Nutritional Needs for the Elderly

The following are essential nutrients that the elderly needs:

- ✓ **Protein**

Dietary protein intake stimulates muscle protein synthesis, which leads to an improvement in lean muscle mass, strength and function.

Sources of protein: The protein sources from animal protein and dairy products are considered higher quality proteins in terms of the higher proportion of essential amino acids that are useful for muscle protein synthesis as compared to vegetable sources.

- ✓ **Calcium**

Osteoporosis causes fractures of the hip, wrist and vertebra as its most serious complications, resulting in mortality, loss of independence, functional decline, high fall risks and chronic pain. Calcium supplementation is recommended for those whose oral intake remains insufficient.

Sources of calcium: Dairy products, dried beans, kale, fortified juices, tofu and spinach.

- ✓ **Vitamin D**

Low vitamin D levels have been associated with risks of falls, osteoporosis, fractures, cardiovascular diseases, metabolic disorders, cancers and poorer cognitive function.

Sources of vitamin D: Egg yolks, cod liver oil and fatty fish like salmon, tuna and mackerel. Foods fortified with vitamin D such as milk provide the bulk of dietary vitamin D.

- ✓ **Iron**

Iron helps in the transportation of oxygen to tissues through haemoglobin and myoglobin. Iron stores also affect immunity cognition and muscle function. Anaemia is the most common cause of nutrition-related anaemia among the institutionalised or chronically ill elderly.

Sources of iron: Heme iron from animal sources such as beef, pork, poultry and fish and non-heme iron from beans, dried fruits, enriched grains and fortified cereals. Nonheme iron needs to be in a soluble form for absorption; the ability to absorb is often reduced among the elderly.

- ✓ **Vitamin A**

Vitamin A is important for vision, especially for sensing low light. Low vitamin A intake is often coincident with a low protein diet.

Sources of vitamin A: Green leafy vegetables, carrots, squash, eggs, beef liver and fortified foods.

- ✓ **Vitamin B12/cobalamin**

Vitamin B12 deficiency has been associated with depression, psychosis, sub-acute combined degeneration of the cord, dementia and multiple sclerosis. Common causes of vitamin B12 deficiency include pernicious anaemia, poor intake, and disorders of the stomach, pancreas and small bowel.

Sources of vitamin B12: Meat, fish, poultry, eggs and fortified cereals.

✓ **Folic acid**

Folic acid is important in DNA synthesis and amino acid metabolism. Deficiency causes anaemia and diarrhoea.

Sources of folate: Green leafy vegetables, fruits, nuts, beans, peas, dairy products, eggs, seafood, poultry, meat and fortified foods such as bread, cereal and pasta.

❖ **Selection diets according to different factors**

Major determinants of food choice

The key driver for eating is of course hunger but what we choose to eat is not determined solely by physiological or nutritional needs. Some of the other factors that influence food choice include:

- ❖ Biological determinants such as hunger, appetite, and taste
- ❖ Economic determinants such as cost, income, availability
- ❖ Physical determinants such as access, education, skills (e.g. cooking) and time
- ❖ Social determinants such as culture, family, peers and meal patterns
- ❖ Psychological determinants such as mood, stress and guilt
- ❖ Attitudes, beliefs and knowledge about food

✓ **Culture**

Surely, culture has an enormous influence on what we eat. The world is teeming with unique cultures. Each culture comes with its own customs, social institutions, expectations and, of course, food. In addition, each one of these cultures influences how we eat and what we eat from the day we are born.

✓ **Religion**

Religion is also one of the factors that influence food choices. Some religions encourage abstinence from certain meats such as beef or pork. Other religions frown upon the use of alcohol. Others still avoid caffeinated products, as mandated by their religious sect.

- ✓ **Family**

Our family has an enormous influence on the foods we eat. As such, it's one of the most noteworthy factors that influence food choices. Specifically, our parents play an integral role in what we like to eat. As children, most of our meals are prepared by and eaten with our families. According to the National Center For Biotechnology Information, "children come with a set of behavioural predispositions that allow them to learn to accept the foods made available to them." This is especially true in the first few years of children's lives.

As a result, children who grow up in a household that values health and nutrition are much more likely to eat balanced, nutritious foods as adults. Children who are exposed to less nutritious foods, on the other hand, have values pertaining to food selection and preferences that are shaped accordingly. This is an important observation for anyone wishing to make changes to his or her eating habits. It may, therefore, be more difficult to make certain food selections for some people. This may not be a matter of lack of willpower. Rather, it may be one borne more out of habit.

- ✓ **Peers**

Our peers have a tremendous influence on our food choices, too. From the moment we begin school, our values and choices are shaped by those with whom we associate. As we grow up and gain greater independence, the degree to which our parents influence our food selections diminishes. The impact our families have on what we eat begins to be replaced by what we see our peers eat, particularly at school.

- ✓ **Physical stage of development**

Though often overlooked or omitted, this factor that influences our food choices is nonetheless important.

Unquestionably, our physical stage of development affects what foods we eat and how much. A growing adolescent with a fast metabolism may require more food and with greater frequency than an older adult.

- ✓ **Cost**

Food costs is an important factor that influences food choices. Frequently, how much money we have at our disposal severely restricts what food we can buy. This is especially true when more nutritious foods tend to cost more than heavily processed, nutrient-drained foods.

- ✓ **Income**

How much money we make is certainly one of the factors that influence food choices. Generally speaking, with a relatively good income, we have greater purchasing power. This power can translate to being able to afford a wider variety of food products. It's cause and effect. Of course, it takes more than a few dollars in the pocket to decide to buy nutritious foods. But there is no question that money makes such food more accessible.

- ✓ **Availability and access**

Depending on where we live, we may not have easy access to a variety of foods. In fact, we may not have access to some at all. Ever. Consequently, the food choices that are made are entirely based on what is currently available. At times, limited availability may make it difficult to eat nutritionally-balanced meals. There is no doubt about that. Many remote, geographically-isolated communities, in this country and many others, experience problems with food availability.

- ✓ **Restaurant menu**

Closely related to availability, a factor that can influence our food choices is the options listed on the restaurant menu.

At times, we are compelled to compromise what we would really like to eat and select an alternative, a second or third best.

The good news is that most restaurants these days allow for substitutions and modifications of meals to suit the given needs of the person. That said, limited options at some restaurants can affect our food choices.

✓ **Proximity**

For some, proximity is one of the most significant factors that influence food choices. In fact, buying local is becoming increasingly more popular as socially aware consumers place a great deal of importance on supporting their local communities.

Rather than going through an impersonal process of buying form a larger corporation, many people are choosing to buy foods, products and services that originate close to home. Supporting small- and medium-sized, local businesses in such a way can build a sense of community and prosperity.

✓ **How food was produced**

The manner in which food was produced is also becoming more and more important for many people. As such, it is a factor that influences food selection that cannot be overlooked.

Consumers are increasingly looking at production methods such as:

- Is the food product organic?
- Has the food been made with GMO or non-GMO ingredients?
- Is the meat free-range, grain-fed as well as hormone and antibiotic-free?

✓ **Education**

Another factor that influences food choices that we make is education.

Simply put, the more background knowledge we have about the nutritional value of foods, the better the position to make informed choices. This is precisely why our **nutritional counselling sessions** focus on education as it applies to **meal planning**.

Deep down inside we want to make good choices. This applies not only to food selection, but also to other aspects of life. If we have all the information before us, we are more likely to make those choices.

✓ **Cooking passion and skill**

Some of us love to **meal prep** and cook, while others do not. Similarly, some of us are blessed with culinary skills, whereas others not so much.

The greater the passion for cooking, the greater the drive to want to cook. And the greater the motivation, the more opportunities to develop and refine cooking skills.

When we enjoy cooking and can do it well, we are certainly less likely to buy and eat processed, nutrient-stripped foods.

Although exceptions exist, those of us who are competent cooks are less likely to resort to buying take-out food.

Conversely, those who do not enjoy cooking or do not feel confident in the kitchen, are likely to rely more on the convenience of fast, processed or packaged food.

- ✓ **Time**

Without a doubt, time matters. How much time we have can no doubt prove a key factor that influences food choices.

These days it is very difficult for many of us to find the time to prepare food from scratch for ourselves, let alone the whole family. As we become busier and busier, there seems to be less time for cooking meals at home.

That, coupled with the slew of fast food restaurants and food delivery services, makes it less likely that those of us who lead busy lifestyles will cook at home. The accessibility of such services is a great convenience, a convenience that has an indelible impact on what foods we eat.

- ✓ **Mental health**

Our mental health is another one of the factors that influence food choices. For example, depression, anxiety, frustration, anger and so on, are all interlinked with overindulgences in highly palatable foods. Rather than dealing with the root cause of unpleasant feelings, which can be challenging and prolonged, it is more simple for some to reach for a piece of sugary, salty or high-fat food that provides temporary relief.

- ✓ **Body image**

This is significant factor that influences the food choices we make. Although many people think that body image struggles are something that adolescents often go through, the impact is far-reaching across all age groups.

Feeling dissatisfied with how your body looks can lead to decisions harmful to the health of your body. For example, when you follow a fad diet, you often deprive yourself of certain foods to lose weight and change the way you look.

- ✓ **Self-esteem**

Self-esteem influences the food choices we make. When your self-worth is high and you thoroughly feel good about yourself, you tend to make wiser, healthier food selections. You do so because you respect and care for your body.

- ✓ **Mood**

Closely related to mental health, our mood can affect the food choices we make. Food stimulates neurons, increasing the levels of serotonin–the body's primary pleasure system. When our mood is low and we have a difficult time finding natural ways to improve it, we may resort to finding artificial ways of doing so. One of these ways is through food that makes us feel good, comfort food.

- ✓ **Stress**

Growing levels of stress in today's world can certainly affect the food choices we make. As stress increases, many of us seek for ways to escape, relax and decompress. Some of us do so through healthful activities such as exercise, nature walks, yoga, listening to music and so on.

Others, however, turn to food to obtain a similar effect. Highly palatable foods that are high in sugar, salt and fat can produce a powerful pleasurable effect almost instantaneously.

- ✓ **Guilt**

Guilt is one of the factors that can influence food choices. The guilt that some of us experience following the consumption and/or overindulgence of a highly-palatable food can be a powerful motivator.

That is to say that some of us may deny ourselves our favourite treat out of guilt that we had experienced following our last indulgence. There is no room for feelings of guilt or shame when our relationship with food is a positive one.

- ✓ **Beliefs, ethics**

Our beliefs certainly affect food choices. There are a number of ethical concerns that lead us to eat certain foods while avoiding others. Some of us abstain from eating animal products,

not just for health reasons, but also because we are concerned with the welfare of animals. Meanwhile, others make their food selections that are dependent on sustainability and the impact on the environment. Others still, choose to eat foods based on fair trade and labour practices. These are just a few of the many ethical reasons that are contributing factors that influence food choices.

- ✓ **Routines**

Simply put, routines are recurring eating behaviours that influence food choices. These can be environmental, cultural and religious. Routines can have their roots at home, work and social groups, amongst many others. The act of eating can be a firmly-embedded routine during our favourite Netflix show, before or after a workout, or the learned behaviour of always having dessert after dinner. Eating routines can be a powerful influence on the food we eat, so much so that when we choose to break the habit for one reason or another, it can prove challenging.

- ✓ **Athletic pursuits**

Taking part in athletic competitions and sporting activities can have an enormous impact on the food choices we make. After all, diet differs for athletes who perform endurance sports to those athletes who take part in combat sports or to those who engage in strength training or weightlifting.

Studies show that proper nutrition is a critical component of improved athletic performance. As such, it has increasingly become the focus of many athletes and sporting organizations, be it amateur, competitive or professional.

Athletes of all ages and genders choose the foods they eat to help them fuel, sustain, recover and repair their bodies. For those whose goal is achieving peak performance in a given discipline, selecting foods that help the cause is likely the most important factor that influences food choices.

- ✓ **Dietary conditions, sensitivities, intolerances and allergies**

Naturally, various dietary conditions, sensitivities, intolerances and allergies all play an important role in food selection. Special diets (veganism, plant-based eating, vegetarianism, flexitarian, gluten-free, etc.) require their own individualized consideration and approach.

Anyone who is afflicted with any of the aforementioned must carefully choose foods to avoid adverse side effects that can occur if certain foods are ingested.

- ✓ **Nutritional deficiencies**

If a test indicates that your body is lacking certain nutrients, your diet may require tweaking to ensure that these missing nutrients are taken in. For this reason, deficiencies in certain nutrients can surely influence our food choices, whether we like it or not.

- ✓ **Hunger**

This is certainly one of the more common and obvious factors that influence food choices. When we are hungry, we need to eat food. Otherwise, we may experience unpleasant symptoms such as light-headedness, irritability, growling stomach, fatigue and so on. It's quite simple, really. There are a couple of tricky parts here though. One challenge is to be able to select foods that are nutritious while we are experiencing hunger symptoms. And the second, being able to distinguish between hunger and cravings.

- ✓ **Appetite**

According to Medical News Today, appetite is different from hunger. It is different in that appetite is the desire to eat food, while hunger is the biological response to a lack of food. Regardless, appetite is one of the most dominant factors that influence food choices. Reason being, it can be triggered by a whole host of conditions and situations we encounter virtually every day: stress, boredom, mental health, habit, smell, social occasions and so on.

- ✓ **Taste**

Without a doubt, taste as it relates to food selection is one of the primary factors that influence food choices, and one that is self-evident.

When a certain food tastes good, we enjoy eating it. When it doesn't, we don't. The challenge is to recognize the fact that we are drawn to highly-palatable foods, namely foods high in sugar, salt and fat.

Typically, the foods that contain these three ingredients are not healthy and require some restraint. This restraint is needed to ensure our bodies are fuelled with wholesome, nutritious foods that help our bodies be healthy. Conversely, regularly indulging in highly-palatable foods that stimulate the body's pleasure system is nothing more than instant gratification. Doing so will provide short-term pleasure, while risking long-term harm to our health.

- ✓ **Marketing**

It seems that we are constantly bombarded by messages to eat. We watch TV commercials, cooking shows, Youtube ads, food posts on Instagram and Facebook, and so on, all of which encourage us to eat. And why is food marketing so commonplace? Well, because it works. It works very well. Viewing beautifully prepared and presented food can stimulate our desire to eat. This is another powerful factor that influences our food choices.

- ✓ **Exposure**

Surely, exposure plays a similar role. As a result, it is one of the factors affecting food choices. The more we are exposed to food, the more likely we will eat it. And this occurs whether or not we are hungry. It's the out-of-sight, out-of-mind principle reversed. For this reason, many health professionals recommend to people who struggle with food addiction to limit exposure to situations they have trouble resisting. This is an incredibly important principle, especially at the very beginning of the change-of-lifestyle process.

Activity 2: Guided Practice

Task:

1.You brainstorm on the (a and b) and you present in the plenary session.

Discuss the following questions:

a. Select at least 5 healthy food commodities for gluten free people

Activity 3: Application

Task:

Trainees are guided to the workshop for observation.

Observe carefully and perform the following tasks:

a. Select healthy food items for diabetic people menu.

Each group is requested to present.

The class comments on each group performance.

TOPIC 3.3: CALCULATE NUTRIENTS

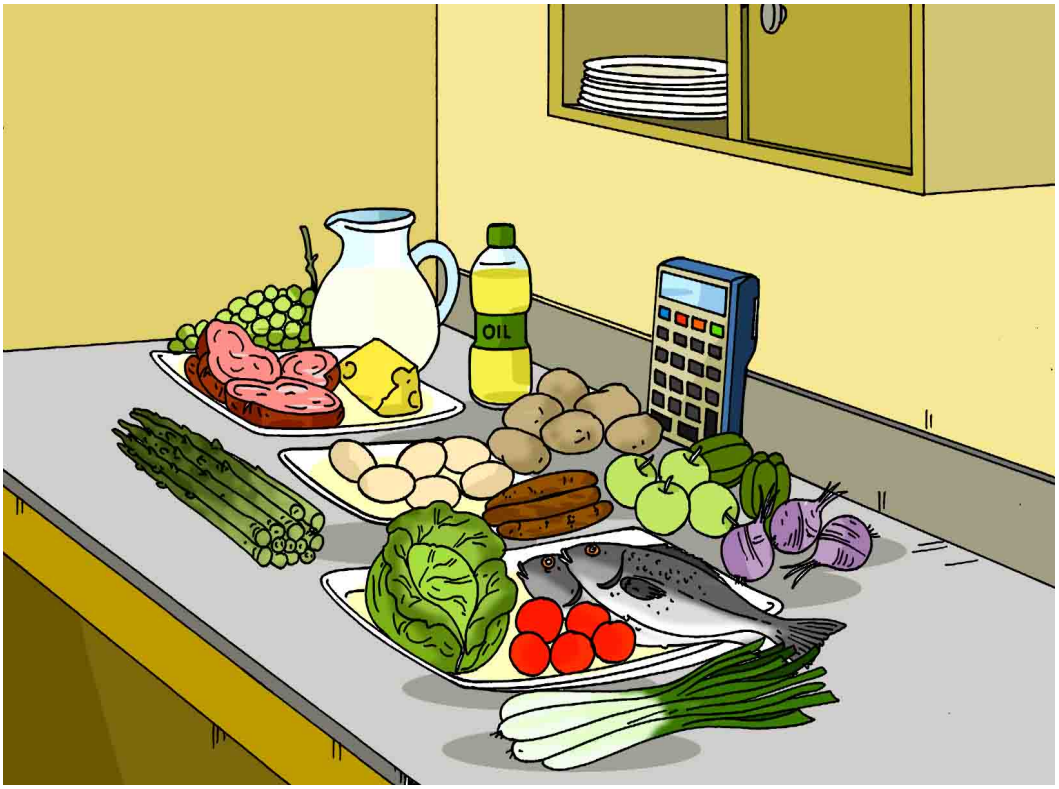


Figure 14: Nutrients Calculation

Activity 1: Discovery

Twahirwa is manager of Kwitonda football academy, and he need to prepare a well calculated balanced diet for his team. So, he requests you to plan a menu for his team by considering Recommended Dietary Allowance (RDA) for football players.

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss and brainstorm on the following questions:

d. Identify different Recommended Dietary Allowances (RDA) for football players.
e. What is carbohydrate quantity needed for younger football players.

2. Take time to brainstorm and discuss the questions in your respective groups.

3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Calculate nutrients**

✓ **Recommended Dietary Allowance (RDA) for different nutrients**

The Recommended Daily Allowances, or RDA, are a part of a larger nutrition system called the Dietary Reference Intake, or DRI, deteremined by the Institute of Medicine. Because the exact number of carbohydrates needed each day varies from person to person, the DRI is given as a percentage of total daily caloric intake. Carbohydrates contribute four calories per gram; the USDA recommends that between 45 and 65 percent of your total caloric intake should come from carbohydrates. Based on a 2,000-calorie diet, this would equate to between 225 and 325 grams of carbohydrates daily.

- **Carbohydrate Sources**

Carbohydrates are broken down into three main categories: starches and starchy vegetables, fruits and dairy products. The USDA recommends that at least half of the starches and grains included in your diet be whole grains, such as bran, whole-wheat breads and pastas, brown rice and oatmeal. Other complex carbohydrates recommended include fruits and vegetables and low-fat or fat-free dairy products. On average, each serving provides between 12 and 15 grams of carbohydrate, and a serving may be made up of a slice of bread, 1/3 cup of rice or pasta, a cup of milk or a small piece of fresh fruit. Carbohydrate, fat, and protein are the three nutrients that provide energy (calories). However, carbohydrate from starch and sugars is our main source of energy. During digestion, starch is broken down to sugar (glucose). Carbohydrate in the form of glucose provides energy to cells, tissues, and organs to carry out daily activities. Some glucose is stored in the liver and muscle cells for later use when required. Children need carbohydrate for growth, and adults need carbohydrate to maintain their weight.

The Recommended Dietary Allowance (RDA) for carbohydrate is 130 grams per day for everyone over the age of one year. This is the amount of glucose needed for optimum brain and nervous system function. Since the carbohydrates (starch and sugar) in our food provide 4 calories of energy per gram, this is equivalent to a minimum of 520 calories from carbohydrate each day.

It is recommended that we consume 45% to 65% of our total energy intake (in calories) from carbohydrate. Because carbohydrate provides 4 calories per gram, we can figure out how many grams of carbohydrate we need. For example, if our daily energy need is 2000 calories, it would be recommended that we consume 225 to 325 grams of carbohydrate per day:

2000 calories x 45% = 900 calories; 900 calories divided by 4 calories/g = 225 g
2000 calories x 65% = 1300 calories; 1300 calories divided by 4 calories/g = 325 g
The Dietary Guidelines for Americans recommend that carbohydrates make up 45% to 65% of total daily calories.

So if you get 2,000 calories a day, between 900 and 1,300 calories should be from carbohydrates. That translates to between 225 and 325 grams of carbs a day.

- **Fats /lipids**

The USDA recommends that healthy adults over the age of 19 consume between 20 and 35 percent of their daily calories from fat. Young children (ages 1 to 3 years) need as much as 40 percent of their daily calories to come from fat. If you eat a diet of 2,000 calories per day, ingest between 44 grams and 77 grams of total fat daily.

- **Proteins**

From 10% to 35% of calories should come from protein. So, if your needs are 2,000 calories, that's 200–700 calories from protein, or 50–175 grams. The recommended dietary allowance to prevent deficiency for an average sedentary adult is 0.8 grams per kilogram of body weight. For example, a person who weighs 165 pounds, or 75 kilograms, should consume 60 grams of protein per day.

Once you reach ages 40–50, sarcopenia, or losing muscle mass as you age, begins to set in. To prevent this and to maintain independence and quality of life, your protein needs increase to about 1–1.2 grams per kilogram or 75–90 grams per day for a 75-kilogram person.

People who exercise regularly also have higher needs, about 1.1–1.5 grams per kilogram. People who regularly lift weights or are training for a running or cycling event need 1.2–1.7 grams per kilogram. Excessive protein intake would be more than 2 grams per kilogram of body weight each day.

If you are overweight, your weight is adjusted before calculating your protein needs to avoid overestimating. You can see a dietitian to help develop a personalized plan.

Table: Recommended Dietary Allowance for Vitamins and Minerals

Requirements for energy and micronutrients change throughout the life cycle. Although inadequate intake of certain micronutrients is a concern, far greater problems come from the dietary excesses of energy, saturated fat, cholesterol, and refined carbohydrate, which are fueling the current epidemics of obesity and chronic disease. Clinicians can assist patients in choosing foods that keep energy intake within reasonable bounds, while maximizing intakes of nutrient-rich foods, particularly vegetables, fruits, legumes, and whole grains.

Pregnancy	**Increased requirements**: energy, protein, essential fatty acids, vitamin A, vitamin C, B-vitamins (B1, B2, B3, B5, B6, B12, folate, choline) &calcium, phosphorus, magnesium, potassium, iron, zinc, copper, chromium, selenium, iodine, manganese, molybdenum
Lactation	**Increased requirements**: vitamins A, C, E, all B-vitamins, sodium, magnesium **Decreased requirements**: iron
Infancy, childhood	**Increased requirements**: energy, protein, essential fatty acids

Adolescence	**Increased requirements**: energy, protein, calcium, phosphorus, magnesium, zinc (females only)
Early adulthood (ages 19-50)	**Increased requirements for males, compared with females**: vitamins C, K; B1, B2, B3, and choline; magnesium, zinc, chromium, manganese **Increased requirements for females, compared with males**: iron
Middle age (ages 51-70)	**Increased requirements:** vitamin B_6, vitamin D
Elderly (age 70+)	**Increased requirements:** vitamin D **Decreased requirements:** energy; iron (females only)

Table 12:Recommended Dietary Allowance for Vitamins and Minerals

Source: https://apotekos.com/en/blog/recommended-daily-intake/ (Retrieved on 27-April-2023)

- **Physical activities**

Human energy requirements are estimated from measures of energy expenditure plus the additional energy needs for growth, pregnancy and lactation. Recommendations for dietary energy intake from food must satisfy these requirements for the attainment and maintenance of optimal health, physiological function and well-being. The latter (i.e. well-being) depends not only on health, but also on the ability to satisfy the demands imposed by society and the environment, as well as all the other energy-demanding activities that fulfil individual needs.

The unit of energy is the kilojoule (kJ) or megajoule (1 MJ = 1,000 kJ) 4.18 kilojoules are equal to 1 kilocalorie.

Allowing for intestinal absorption and for the nitrogenous parts of protein that cannot be completely oxidised, the average amount of energy released ranges from approximately 16.7 kJ/g for carbohydrates or protein to 29.3 kJ/g for alcohol and 37.7 kJ/g for fats.

Humans need energy for basal metabolism which comprises a set of functions necessary for life such as cell metabolism, synthesis and metabolism of enzymes and hormones, transport of substances around the body, maintenance of body temperature and ongoing functioning

of muscles including the heart, and brain function. The amount of energy needed for this purpose in a defined period of time is called the basal metabolic rate (BMR). BMR represents about 45–70% of daily energy expenditure, depending on age, gender, body size and composition.

Physical activity is the most variable determinant of energy need and is the second largest user of energy after BMR. Humans perform a number of physical activities including the obligatory demands of an individual's economic, social and cultural environment (eg occupational, schoolwork, housework etc) or discretionary activity (eg energy expended for optional exercise or sport, or in additional social or cultural interactions).

Table. Physical Activity (PA) Categories and Values

Activity Level	Men PA Value	Women PA Value	Description
Sedentary	1.00	1.00	No physical activity beyond that required for independent living
Low	1.11	1.12	Equivalent to walking 1.5 to 3 miles per day
Moderate	1.25	1.27	Equivalent to walking 3 to 10 miles per day
High	1.48	1.45	Equivalent to walking 10 or more miles per day
These values only apply to normal weight adults and not to children or pregnant or lactating women.			

Table 13:Physical Activity (PA) Categories and Values

Source:https://www.researchgate.net/figure/Physical-activity-level-PAL-categories-and-walking-equivalence-in-the-IOM-report_tbl3_51828365 (Retrieved on 20-April-2023)

These values only apply to normal weight adults and not to children or pregnant

- **Weight loss or gain**

Portion control is the act of being aware of the actual amount of food you eat and adjusting it based on its nutritional value and the goals of your eating plan. The simple truth is large or unbalanced portion sizes can easily undermine that weight loss efforts.

- **Body Mass Index**

  - The body mass index is calculated using weight and height.
  - A higher number means more fat and a lower means less fat.
  - Enter your weight and height at the right to calculate your BMI.
  - The range for good health is between 18.5 and 25; up to 28 is acceptable if over age 50.
  - Obesity is from 30 to 40 and morbid obesity is over 40.
  - Severe malnutrition is 17.5 and lower.

In addition to your weight and height, the calories needed to maintain that weight depend upon gender, age, and activity.

- Activity is estimated from the number of minutes spent exercising each day including walking.

- This estimator only applies to persons ages 3 and older.

- You can also use the estimator as a guide to lose or gain weight.
  - ◊ Use your target weight to estimate your target calories needed.
  - ◊ To lose weight, choose a level below your target calories but no less than 1000 calories per day unless otherwise directed by your physician.
  - ◊ To gain weight, choose a level above your target calories.

- A balanced diet includes servings from each food group during each day.

- Use the calculator on the right to convert any calorie goal between 1000 and 9800 into the number of servings needed from each food group each day.

- The number of calories entered will be rounded to the nearest 200 to generate the list of servings.

- Whole grains should make up half of the servings of grains.

- A variety of fruits and vegetables of different bright colors will provide needed vitamins and minerals.

- Oil should include vegetable oils containing essential fatty acids to be used in food dressings and cooking.

- If meat is not lean and/or dairy is not reduced fat, then the servings of extra calories should be reduced.

- The size of each serving is critical in determining the total number of calories consumed each day. See the following table that shows the relatively modest size of the servings compared to what may be customary.

- **Diseases**

✓ **Nutritional recommendations for individuals with diabetes**

The Dietary Guidelines (DG) for patients with diabetes state that the adequate intake values of CHOs, fat, and protein consumption are 45–60%, 20–35%, and 15–20% of total energy intake, respectively (11, 12). NSPs are included in total CHOs, for which their recommended daily intake should be 25–38 g/day.

As for the general population, people with diabetes are encouraged to choose a variety of fiber-containing foods such as legumes, fiber-rich cereals (≥5 g fiber/serving), fruits, vegetables, and whole grain products because they provide vitamins, minerals, and other substances important for good health.

✓ **Nutritional recommendations for individuals with heart disease**

The best diet for preventing heart disease is one that is full of fruits and vegetables, whole grains, nuts, fish, poultry, and vegetable oils; includes alcohol in moderation, if at all; and goes easy on red and processed meats, refined carbohydrates, foods and beverages with added sugar, sodium, and foods with trans-fat.

People with diets consistent with this dietary pattern had a 31% lower risk of heart disease, a 33% lower risk of diabetes, and a 20% lower risk of stroke.

Activity 3:Guided Practice

1. As you have already worked on task 2, perform the following task:

a. Identify 10 highly recommended food items for football players.

b. Calculate carbohydrate needed daily for football players.

Activity 4: Application

1. In kitchen workshop, observe the store carefully and perform the following tasks:

a. Calculate Recommended Dietary Allowances (RDA) for football players on Carbohydrate

2. Each student will perform individually.

Formative Assessment

True or False Questions

1. A balanced diet is a diet that contains differing kinds of foods in certain quantities and proportions so that the requirement for calories, proteins, minerals, vitamins, and alternative nutrients is adequate and a small provision is reserved for additional nutrients to endure the short length of leanness.

True False

Answer: ……

2. In nutrition, diet refers to the food and drink that is regularly consumed by a pregnant woman for reducing the risk of getting diseases during this particular therapy of a pregnancy or management of a particular health condition for women.

True False

Answer: ……

3. Healthy eating increases energy, improves the way your body functions, strengthens your immune system and prevents weight gain. And a balanced diet supplies the nutrients our body needs to work effectively. Without balanced nutrition, our body is more prone to disease, infection, fatigue, and low performance.

True False

Answer: ……

4. A healthy diet helps to protect against malnutrition in all its forms, as well as noncommunicable diseases, including diabetes, heart disease, stroke and cancer.

True False

Answer: ……

5. Consuming a healthy diet throughout the life-course helps to prevent malnutrition in all its forms as well as a range of noncommunicable diseases (NCDs) and conditions.

True False

Answer: ……

6. Recommended Daily Allowances are a part of a larger nutrition system called the Dietary Reference Intake determined by the Institute of Medicine, Because the exact number of carbohydrates needed each day varies from person to person, and the Dietary Reference Intake is given as a percentage of total daily caloric intake.

True False

Answer: ……..

7. The Dietary Guidelines (DG) for patients with diabetes state that the adequate intake values of carbohydrate, fat, and protein consumption are 45–60%, 20–35%, and 15–20% of total energy intake, respectively (11, 12). NSPs are included in total CHOs, for which their recommended daily intake should be 25–38 g/day.

True False

Answer: ……

Open Ended Questions

1. State and explain types of Vegetarian diets

Answer:

……

……

2. Describe the importance of a balanced diet in the human body.

Answer:

……

……

3. Calculate carbohydrateRecommended Dietary Allowances (RDA) for football players

Answer

……

……

Multiple choice questions

1. **Select two of the following which are not identified as health conditions for human**
    a. Diabetes
    b. Obesity
    c. Heart attack
    d. Balanced diet
    e. Cancer
    f. Infant dietary allowance
    g. High Blood Pressure
    h. HIV/AIDS

Answer: ……..

2. Which of the following is not recommended food items for football players?

a. Oily fish
b. Spinach
c. Milk
d. Brandy
e. Eggs
f. Blueberries
g. Avocados

h. Beetroot

i. Quinoa

j. Chia Seeds

k. Broccoli

Answer:…….

Self Reflection

At the end of every unit trainees should:

3) Re-take the self assessment they did at the beginning of the unit.

4) Fill in the table above and share results with the trainer for further guidance.

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Points to Remember

- Eat a variety of foods to ensure adequate intake of nutrients.
- Eat plenty of fruits and vegetables. At least 400 g (i.e. five portions) of fruit and vegetables per day.
- Consume whole grains, nuts and healthy fats rich in unsaturated fatty acids.
- Reduce the intake of saturated fats. To prevent unhealthy weight gain in the adult population, saturated fats should be reduced to less than 10% of total energy intake.
- Limit sugar intake. Free sugars intake should be reduced to less than 10% or to less than 5% of total energy for additional health benefits. This would be equivalent to 50 g or 25 g of free sugars per day, respectively.
- Cut back on salt. Less than 5 g of salt (equivalent to one teaspoon) per day.
- Drink water regularly. Good hydration is crucial for an optimal health.

Further Information for the Trainer

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UNIT 4: CONSERVE NUTRIENTS IN COOKING

Figure 15: Conserve Nutrients in Cooking

Unit summary:

This unit describes the knowledge, skills and attitudes needed to identify cooking methods, effects of cooking on nutrients.

At the end of this unit, you will be able to maintain cooking guidelines.

Self-Assessment: Unit 4

1. Look at the illustration. What is happening? What do you think this learning outcome will be about?
2. Fill in the self-assessment below.

   There are no right or wrong ways to answer this survey. It is for your own use during this course. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this learning outcome, we'll take this survey again.

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Define cooking					
Identify types of cooking methods					
Describe the Importance of cooking food					
Identify the effects of cooking on nutrients					
Identify guidelines for cooking starches					
Identify guidelines for cooking vitamins					
Identify guidelines for cooking minerals					

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the best cooking methods which conserve nutrients in cooking.	1. Describe the best cooking methods which conserves nutrients in cooking.	1. Best cooking methods which conserve nutrients in cooking are well described as per recipe 2. Acuteness
2. Identify effects of cooking on nutrients	2. Describe effects of cooking on nutrients.	3. Effects of cooking on nutrients are properly described 4. Mastery.
3. Identify cooking guidelines	3. Describe cooking guidelines.	5. Cooking guidelines are properly described. 6. Curiosity

Discovery activity

Task:1.

Discuss the following questions with your partner (pair):

1. Discuss the following questions with your partner (pair):
    a. Identify effects of cooking on nutrients
    b. Identify guidelines for cooking starches
    c. Describe the best cooking methods which conserves nutrients in cooking
2. Discuss with your pair all the questions (a and b)
3. Share your findings on the questions (c) with the rest of the class. Compare and discuss your ideas.

TOPIC 4.1: IDENTIFYING COOKING METHODS

Figure 16: Identifying cooking methods which conserves nutrients in cooking

Activity 1: Discovery

" Manzi is a Head chef at Mandela hotel, and he requests you to prepare broccoli by conserving nutrients and color during cooking.

Activity 2: Problem Solving

1. In group of 5 discuss on the following situation:
    a. Identify 5 best cooking methods which conserve nutrients during cooking
    b. Describe the importance of cooking food
2. Take a time to brainstorm and discuss the questions in your respective groups.
3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Identification of cooking methods**

✓ **Importance of cooking food**

It is important to cook our food for the following reasons:

- Cooking makes food easier to eat.
- It makes food more appetizing and palatable.
- It makes food easier to digest.
- It makes food safe to eat.
- Some foods keep longer when cooked.
- Cooking improves the appearance of food.
- It improves the taste of food.

✓ Cooking methods

1. **Dry Heat Cooking**

Dry heat cooking works without the presence of any moisture, broth, or water. Instead, it relies on the circulation of hot air or contact with fat to transfer heat to foods. Temperatures of 300 degrees or hotter are used to create browning, a reaction where the amino acids and sugars in food turn brown and create a distinct aroma and flavor. The unique scents of toasted bread or seared meat are both examples of dry heat cooking at work.

Broiling

Broiling works by transferring extremely high heat onto food, usually directed from a radiant located above the food which cooks on one side at a time. Browning can occur very quickly with this method, sealing juices and flavor inside and leaving a crisp exterior. Because this cooking method is fast, it's helpful to use a timer or check the doneness so foods don't become burnt or overcooked. In commercial kitchens, broiling can be performed with a salamander or broiler oven.

Best foods for broiling:

- **Meats**: Broiling works best on thinner cuts of meat, like steaks, pork chops, or hamburger patties. Tender cuts are preferred because the dry heat will quickly evaporate moisture and dry out the meat.
- **Poultry**: Use chicken or turkey cutlets, breast halves, quarters, and legs in the broiler for flavourful results.
- **Fish**: Choose thick, sturdy fish, like salmon, that can handle high heat and won't dry out easily.
- **Fruits and Veggies**: Broiling can even be used on fruits and vegetables. Try broiling peaches or grapefruit for a unique menu item.

Grilling

Grilling is similar to broiling, in that it uses radiant heat to cook foods quickly. Most commonly, grilling equipment will feature an open grate with a heat source located beneath the food. Flipping is required to cook foods on both sides and grill marks from the hot grate or rack are desirable.

Best foods for grilling:

- **Burgers**: Ground hamburger meat is moist and cooks up very well on a hot grill. The high heat sears the outside of the patty for delicious charred flavour.
- **Meats**: The dry heat from grilling will quickly remove moisture from meat so it's best to choose tender cuts or marinate the meat first. Rib eyes, porterhouses, t-bones, and strip steaks have higher fat content and marbling that produces a succulent grilled steak.
- **Poultry**: **Boneless cuts of chicken** work best because they will grill more evenly. Whole chickens can be grilled, but spatchcocking is recommended.
- **Fish**: Salmon, tuna, and swordfish steaks are sturdy enough for the grill and won't dry out quickly. It's possible to wrap fish in foil before placing it on the grates to prevent it from falling through.

Roasting

Roasting is performed inside an oven and uses indirect heat that cooks from all sides for even browning. This method of cooking works more slowly, coaxing flavors out of meats and vegetables. Roasting can be performed at very low temperatures between 200 degrees and 350 degrees Fahrenheit for tougher cuts of meat, or higher temperatures up to 450 degrees Fahrenheit for more tender cuts.

Best foods for roasting:

- **Meats**: Roasting cooks large cuts of meat slowly and evenly. Prime rib, beef tenderloin, pork butt or shoulder, and pork loin all benefit from roasting.
- **Poultry**: Whole chickens or turkeys can be placed in a roasting pan or on a rotisserie spit and cooked for several hours for a moist and flavorful product.
- **Fruits and Veggies**: Roasting is a great way to bring out the best qualities in fruits and vegetables. Grapes, cherries, and tomatoes can be roasted to intensify their flavors. Pumpkin, squash, eggplant, and cauliflower are also excellent candidates for roasting.

Baking

Baking and roasting both use indirect heat to surround foods and cook from all sides. The term roasting is used when cooking meats or vegetables, and baking is used when making bread, rolls, and cakes. Technically, these cooking methods are the same, but baking is usually performed at lower temperatures than roasting.

Best foods for baking:

- **Baked Goods**: Baking transforms wet dough or batter into a final product with a firm texture. Bread, pastries, and cakes are all baked.
    - **Pizza**: As pizzas are baked in a hot oven, the dough becomes firm, a crust is formed, and the cheese topping melts.

Sauteing

Sauteing is performed over a burner in a hot, shallow pan and uses a small amount of oil or fat to coat food for even browning. This method cooks foods very quickly so it's best to keep the food moving by tossing or flipping. *Saute* is a French word that translates to "jump". To

achieve great results with sauteing, make sure the oiled pan is hot before adding any food, don't overcrowd the pan with too many items, and stir or toss frequently.

Best foods for sauteing:

- **Meats**: Sauteing cooks quickly, so tender meats work best. Use ground beef, tenderloin, or medallions in a saute pan. Small, uniformly sized cuts of meat brown evenly.
- **Poultry**: Boneless breasts, strips, or cutlets can be sauteed to sear in flavor.
- **Vegetables**: Zucchini, squash, and leafy greens can all be sauteed in olive oil or butter. Carrots, celery, and onions can also be sauteed and often make a flavorful base for other dishes.

2. **Moist Heat Cooking**

As the name indicates, moist heat cooking relies on the presence of liquid or steam to cook foods. This method can be used to make healthy dishes without any added fat or oil. It's also a great way to tenderize the tough fibers in certain cuts of meat, like beef chuck or brisket. When cooking fibrous vegetables and legumes, moist heat cooking softens the food until it reaches the perfect tenderness. Unlike dry heat cooking methods, moist heat cooking will not produce a browned crust.

Poaching

Poaching is a gentle method of cooking in which foods are submerged in hot liquid between 140 degrees and 180 degrees Fahrenheit. The low heat works especially well for delicate items, and moisture and flavor are preserved without the need for fat or oil.

Best foods for poaching:

- **Eggs**: Poaching is a common method of cooking eggs that results in a soft, tender egg white and creamy yolk. No oil is needed so it's more health-conscious than pan frying.
- **Poultry**: Broth, wine, or aromatics can be used for poaching liquid, which adds flavour to boneless, skinless chicken breasts. The result is tender chicken that can be cubed, sliced, or shredded and added to salads, pasta, or sandwiches.

- **Fish**: Poaching is a great way to preserve the delicate texture of light fish like tilapia, cod, and sole. A special broth, called *court bouillon*, is used to add flavor to the fish as it cooks.
- **Fruit**: Use a sweetened liquid to poach fruits like pears or apples for a unique dessert. The flavor of the fruit is deepened and the texture becomes soft and tender. Any leftover liquid can be used to make a flavoured syrup to serve with the fruit.

Simmering

Simmering is also a gentle method of cooking foods but uses higher temperatures than poaching, usually between 180 degrees and 205 degrees Fahrenheit. This temperature range lies below the boiling point and produces tiny bubbles. To achieve a simmer, first bring water to the boiling point and then lower the temperature.

Best foods for simmering:

- **Rice**: Simmering produces cooked rice with a light, fluffy texture. Using water that is boiling or too hot causes the rice to become sticky and dry.
- **Meats**: Choose tougher cuts of meat that will release fat and collagen as they simmer, like chuck roast.
- **Soups and Stocks**: Because simmering releases the fat and proteins from meat, it produces a rich flavourful broth that can be used in soups or stews.
- **Vegetables**: Tough root vegetables like potatoes and carrots are cooked to the perfect texture with gentle simmering.
- **Grains**: Grains like quinoa, oats, or millet can be simmered until they reach a soft edible texture. Hot cereal is made by simmering grains until most of the water has evaporated, creating a smooth porridge.
- **Legumes**: Dried beans and legumes are simmered to achieve a soft, edible texture. Some types of beans, like lentils, cook quickly, while others take several hours of gentle simmering to become fully cooked.

Boiling

This cooking technique involves submerging food in water that has been heated to the boiling point of 212 degrees Fahrenheit. The boiling water produces large bubbles, which keep foods in motion while they cook. The expression *slow boil* means that the water has just started to produce large, slow-moving bubbles but is not quite heated to the boiling temperature. A *full boil* occurs at the boiling point and results in fast-moving, rolling bubbles. Steam is also released from the water as it boils.

Best foods for boiling:

- **Pasta**: Pasta may come to mind as one of the most commonly boiled foods. The hot water cooks the pasta quickly so that it can be removed from the water before starches break down, preventing a mushy texture.
- **Eggs**: Boiling eggs in their shell produces hard- or soft-boiled eggs. The texture of the yolk can range from firm to creamy, depending on the cook time.
- **Vegetables**: Tough root vegetables like potatoes and carrots will cook more quickly in boiling water but it's recommended to test their tenderness with a fork so they don't overcook.

Steaming

In steaming, water is boiled continuously to produce a steady amount of steam. The steam surrounds foods and cooks evenly while retaining moisture. Steaming can be performed in a few different ways.

For high volume kitchens, a commercial steamer or combi oven is the most efficient. Other methods of steaming include using a pot and steamer basket, using a microwave, or wrapping foods in foil so they can steam in the oven.

Best foods for steaming:

- **Vegetables**: Most vegetables can be steamed with great results. Sturdy veggies like beets, carrots, and potatoes will steam for longer than delicate foods like leafy greens.

- **Fish and Shellfish**: For more flavorful results, broth or wine can be used instead of water. Fish stays tender and shellfish like clams, mussels, lobster, or **crabs** are cooked inside their shells.
- **Desserts**: Some types of desserts are steamed rather than baked, producing a moist, silky texture. Creme brulee, flan, and panna cotta are all custards made by steaming.
- **Tamales**: Tamales are a popular food made by steaming masa, a dough made of ground corn, and fillings inside a corn husk packet. The steam makes the corn dough tender and moist.

3. **Combination Cooking**

Combination cooking utilizes both dry and moist cooking methods. Foods are cooked in liquids at low heat for an extended period of time, resulting in a fork tender product. This technique works with the toughest cuts of meat, gradually breaking down fibers until they melt into the liquid.

Braising

During braising, foods are first seared in a hot oiled pan then transferred to a larger pot to cook in hot liquid. The foods are only partially submerged in simmering water, broth, or stock. Using low heat, the foods soften over an extended cook time and the liquid becomes reduced with intensified flavors. Braising is a great method for producing fork tender meats that fall off the bone.

Best foods for braising:

- **Meats**: Braising is most commonly used with cheaper, tougher cuts of meat because it softens and tenderizes the muscle fibers. Choose pork shoulder, chuck roast, or lamb shank.
- **Vegetables**: Vegetables can be braised along with meat to add more flavour, or they can be braised alone as their own dish. Root vegetables like potatoes, beets, and turnips are softened during braising. Celery and fennel also respond well to braising, absorbing liquid but maintaining a firm texture.
- **Legumes**: Lentils, chickpeas, and green beans can be braised in broth or wine for a texture that's soft but not mushy.

Stewing

The key difference between stewing and braising is that foods are completely submerged in hot liquid while stewing instead of being partially submerged. Smaller cuts of meat are used in a stew, but the method of slow cooking at low heat is the same. As the stew cooks, fibrous vegetables break down and fat and collagen from the meats melt away. The result is a thick, flavourful gravy filled with tender bites of meat and soft vegetables.

Best foods for stewing:

- **Meats**: Meats that are rich in collagen and fat do well in a stew pot. Avoid lean cuts and choose brisket, oxtail, or chuck roast.
- **Vegetables**: Vegetables add depth to your stews. Onions, carrots, potatoes, and celery are common choices for building a stew, but also consider parsnips, turnips, or rutabaga.

Activity 3: Guided Practice

Task:

You brainstorm on the (a and b) and you present in the plenary session.

As you have already read the scenario in task 1, discuss the following questions:

a. Select the best cooking methods for cooking vegetables

Activity 4: Application

Topic 2.1

In the kitchen workshop perform the following activities:

a. Apply the best cooking methods which conserve nutrients in cooking vegetables

TOPIC 4.2: IDENTIFYING EFFECTS OF COOKING ON NUTRIENTS

Figure 17:Effects of cooking on nutrients

Activity 1: Discovery

Kamali is restaurant owner, and he receives complaints from customers every day that the foods are not nutritious, so he requests you to investigate the cause and suggest a better solution.

Activity 1: Problem Solving

1. Create groups of 3-4 and discuss on situation written as follow:

2. Read the situation in task 1 and brainstorm to the following question

   a. Identify the effects of cooking on vitamins

3. Take time to brainstorm and discuss the questions in your respective groups.

4. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Identification of effects of cooking on nutrients**

Cooking food improves digestion and increases the absorption of many nutrients. But, cooking foods, especially in a lot of water or fat at high heat, can reduce the amounts of vitamins and potassium in them, when vitamins such as C evaporate or get thrown out in the cooking water or oil. However, you don't have to eat everything raw. Just choose the best cooking methods to help retain vitamins and minerals.

✓ Effect of heat on micro –nutrients

Many people think that cooking destroys vitamins in foods. However, not all vitamins are destroyed during heating. Vitamins are destroyed depending on the heat applied. Below are ways that heat can affect vitamins and how to save the nutritional content of foods.

- **Effect of heat Vitamins**

Vitamin A

Vitamin A is essential for the immune system, vision, and cell recognition. It's found in liver, garlic, butter, broccoli, seaweed, carrots, tomatoes, green onions, and dill. Cooking destroys up to 30% of its biological properties. Vitamin A is especially destroyed during frying and drying. This vitamin is well preserved during the sterilization which has a heat treatment of approximately 248°F.

Vitamin B1

Vitamin B1 helps prevent complications in the muscles, heart, stomach, and nervous system. It's contained in oatmeal, millet, pork, liver, buckwheat, and pasta. It is especially sensitive to cooking and can lose up to 42% of its benefits during frying and up to 30% during stewing. This vitamin loses its properties at a temperature of over 248°F.

Vitamin B2

It maintains a healthy liver, eyes, muscles, nerves, and skin. Liver, mushrooms, chicken eggs, and goose are the best sources of vitamin B2. When boiling any of these foods, you can lose up to 43% of the useful properties of this vitamin. Therefore, you can use other cooking methods such as stewing. Vitamin B2 loses only 10% of the biological activity during stewing.

Vitamin B6

This vitamin is quite important for heart health. If you don't consume such foods as beans, tuna, mackerel, sweet pepper, chicken, spinach, and white cabbage, you may require cardiac screening to check your heart health. This vitamin is very resistant to the effects of high temperature; therefore, you can boil any of the listed products. This cooking method is quite beneficial for foods containing this vitamin since B6 releases its active components.

Vitamin B9

Vitamin B9 or folic acid prevents cancers and is essential for pregnant women. The vitamin is found in liver, beans, spinach, broccoli, barley, porcini mushrooms, and champignons. It doesn't tolerate any cooking method and loses up to 90% of its properties.

Vitamin C

It is a strong antioxidant that normalizes blood pressure, lowers heart disease risk, and protects memory and cognitive function. Rosehips, sweet peppers, cabbage, oranges, lemons, garlic, and spinach are rich in vitamin C. We usually eat these foods raw, which is good since boiling destroys up to 90% of this vitamin, while stewing destroys only 50%.

Vitamin D

Vitamin D reduces the risk of multiple sclerosis, fights depression, and boosts weight loss. We mostly get vitamin D from the sun, but it's also contained in sea bass, liver, chicken eggs, and butter. Vitamin D tolerates cooking, only if the temperature doesn't exceed 212°F. Exposure to oxygen completely destroys this vitamin, therefore you can use sterilization.

Vitamin E

Vitamin E is a great antioxidant that protects your cells from damage and keeps your immune system healthy. It's found in rosehips, salmon, zander, wheat, dried apricots, prunes, oat, and barley groats. Cooking can't destroy this vitamin, however direct sunlight can.

Vitamin PP

Vitamin PP boosts levels of good cholesterol, brain function, and improves skin function. is contained in poultry, rabbit, beef, fish, and liver. It tolerates any heat treatment, canning, and freezing. Products containing vitamin PP will lose from 5 to 40% of its beneficial properties, no matter how they are cooked.

- **Effect of heat on Minerals**

Some minerals are also lost during cooking, although to a lesser extent. Boiling results in the greatest loss of nutrients, while other cooking methods more effectively preserve the nutrient content of food. Cooking does not reduce the amounts of most of the minerals in food, including calcium, phosphorus, magnesium, iron, zinc, iodine, selenium, copper, manganese, chromium and sodium. For example, milk has the same amount of calcium whether you drink it cold or hot. The exception is potassium, a mineral found in a wide variety of foods ranging from potatoes to fish, which can leach into cooking water. The same cooking methods that retain water-soluble vitamins such as C also lessen potassium loss.

✓ **Effect of heat on macro- nutrients**

Cooking methods that use only small amounts of fat or water and don't require long heat exposure preserve nutrients best. For example, rather than boiling broccoli, stir fry it in a bit of oil, microwave it with a tablespoon or two of water or steam it until just tender-crisp.

- **Effect of heat on Carbohydrates**

Carbohydrates came in various forms, and each form reacts differently when exposed to heat. The two forms of carbohydrates that are of interest from a basic food science perspective are sugar and starch.

When exposed to heat, sugar will at first melt into a thick syrup. As the temperature continues to rise, the sugar syrup changes colour, from clear to light yellow to a progressively

deepening brown. This browning process is called caramelization. It is a complicated chemical reaction, and in addition to colour change, it also causes the flavor of the sugar to evolve and take on the rich complexity that we know to be characteristic of caramel.

Different types of sugar caramelize at different temperatures. Granulated white sugar melts at 320 F/160 C and begins to caramelize at 338 F/170 C.

In foods that are not primarily sugar or starch, a different reaction, known as the Maillard reaction, is responsible for browning. This reaction involves sugars and amino acids (the building blocks of protein). When heated, these components react and produce numerous chemical by-products, resulting in a brown colour and intense flavour and aroma. It is this reaction that gives coffee, chocolate, baked goods, dark beer, and roasted meats and nuts much of their rich flavour and colour.

Though the Maillard reaction can happen at room temperature, both caramelization and the Maillard reaction typically require relatively high heat (above 300 F/149 C) to occur rapidly enough to make an appreciable difference in foods. Because water cannot be heated about 212 F/100 C unless it is under pressure foods cooked with moist hear (boiling, steaming and poaching) will not brown. Foods cooked using dry-heat methods (sauteing, grilling, or roasting) will brown. It is for this reason that many stewed and braised dishes being with an initial browning of ingredients before liquid is added.

Starch, a complex carbohydrate, has powerful thickening properties. When starch is combined with water or another liquid and is heated, individual starch granules absorb the liquid and swell. this process, known as gelatinization, is what causes the liquid to thicken. Gelatinization occurs at different temperatures for different types of starch. As a general rule of thumb, root-based starches (potato and arrowroot for instance) thicken at lower temperatures but break down more quickly, whereas cereal-based starches (corn and wheat for example) thicken at higher temperatures but break down more slowly. High levels of sugar or acid can inhibit gelatinization, while the presence of salt can promote it.

Starch is the most common carbohydrate in human diets, whether it's natural or is added to foods. As heat is applied to starch it absorbs moisture from its surroundings and becomes softer. This process is called gelatinization and is the reason pasta and rice double in size and soften when cooked. Gelatinization of starch begins at 150° F.

- **Effect of heat on Fats/lipids**

When lipids or foods containing lipids are heated in the presence of oxygen, they undergo oxidation, which causes degradation of the fatty acids. The free radicals produced in these oxidation reactions may react with proteins, vitamins, or other food constituents and reduce the nutritive quality of the food. When heat is applied to fats, they melt, rather than evaporate or solidify. Fats can take the form of a solid, liquid, or a variation of both. However, they all become liquid when heated. Fats are used as a medium for cooking and baking because they are less likely to burn than other substances.

✓ **Effect of cooking methods on nutrient**

- **Effect of boiling on nutrients**

A large amount of it is lost when cooked in water. or more of their vitamin C when boiled. Because vitamin C is water-soluble and sensitive to heat, it can leach out of vegetables when they're immersed in hot water. Vitamins B1,2,3 are also destroyed during boiling due to dissolving into the water. Boiling results in the greatest loss of nutrients, while other cooking methods more effectively preserve the nutrient content of food. Steaming, roasting and stir-frying are some of the best methods of cooking vegetables when it comes to retaining nutrients.

- **Effect of frying on nutrients**

The frying process reduced the amino acid contents, with the lowest value was obtained in samples fried in palm oil. Deep-fat frying had been reported to decrease the available lysine of fish fillets by about 17% and by 25% when the fish oil had been used for continuous frying for 48 h as a result of interactions between the amino group of lysine and carbonyl compounds. The frying process can cause changes in the structure of labile nutrients, such as proteins, vitamins and antioxidants. Some compounds produced during frying process such as trans-fat acid and acrylamide are a public health problem.

Foods that contain many fat-soluble vitamins should be prepared with some oil or fat, otherwise, the body will not be able to absorb these vitamins. However, as with water

solubility, they can dissolve in fat when cooking with fat, so you should keep the amount of fat to a minimum. Fat soluble vitamins include:

- ✓ Vitamin A which is present in carrots, peppers, and spinach.
- ✓ Vitamin D which is present in mushrooms and milk.
- ✓ Vitamin E which is present in vegetable oils, peppers, asparagus, and margarine.
- ✓ Vitamin K which is present in green leafy vegetables.

- **Effect of grilling on nutrients**

Grilling meat retains more of its nutrients such as thiamine and riboflavin. These nutrients are essentials in one's health. Also, it comes with benefits corresponding to meat nutrients.

- **Effect of steaming on nutrients**

Steaming is one of the best cooking methods for preserving nutrients, including water-soluble vitamins, which are sensitive to heat and water. Steaming also retained the carotenoids in broccoli best, followed by microwaving and stir-frying. Furthermore, a review of studies found that steaming helped maintain the nutritional quality of several vegetables other than broccoli.

When steaming, the food is evenly heated by hot steam from all sides and should remain crisp and aromatic.

- ✓ Be careful if heat-sensitive vitamins are also water-soluble – especially when it comes to the cooking time.
- ✓ Water-soluble vitamins (C & B complex) leach into the cooking water during both cooking and steaming.
- ✓ Use a little water to steam them as quickly as possible or microwave them using a few tablespoons of water.
- ✓ An exception to this is, of course, liquid foods in which the water is part of the meal. For example, in a vegetable soup, you will preserve all the vitamins that are water-soluble.

- **Effect of poaching on nutrient**

Poaching is a technique where we submerge foods in water and they loose up to 50% of their vitamin C. Vitamins B1, B2 & B3 are damaged by heat as B vitamins are similarly heat sensitive of thiamin, niacin and other B vitamins may be lost when meat is simmered and its juices run off. **Poaching, as opposed to boiling, is the gentle heating of a food in water. Typically, an acid is also added to the water (wine, vinegar, citrus juice) and this can impact on acid/pH sensitive vitamins such as vitamin K.**

Activity 2: Guided Practice

Task:

1.You brainstorm on the (a and b) and you present in the plenary session.

Discuss the following questions:

a. Describe the effect of boiling on nutrients

Activity 3: Application

Task:

Trainees are guided to the workshop for observation.

Observe carefully and perform the following tasks:

b. Identify effects of cooking on nutrients.

Each group is requested to present.

The class comments on each group performance.

TOPIC 4.3: MAINTAINING COOKING GUIDELINES

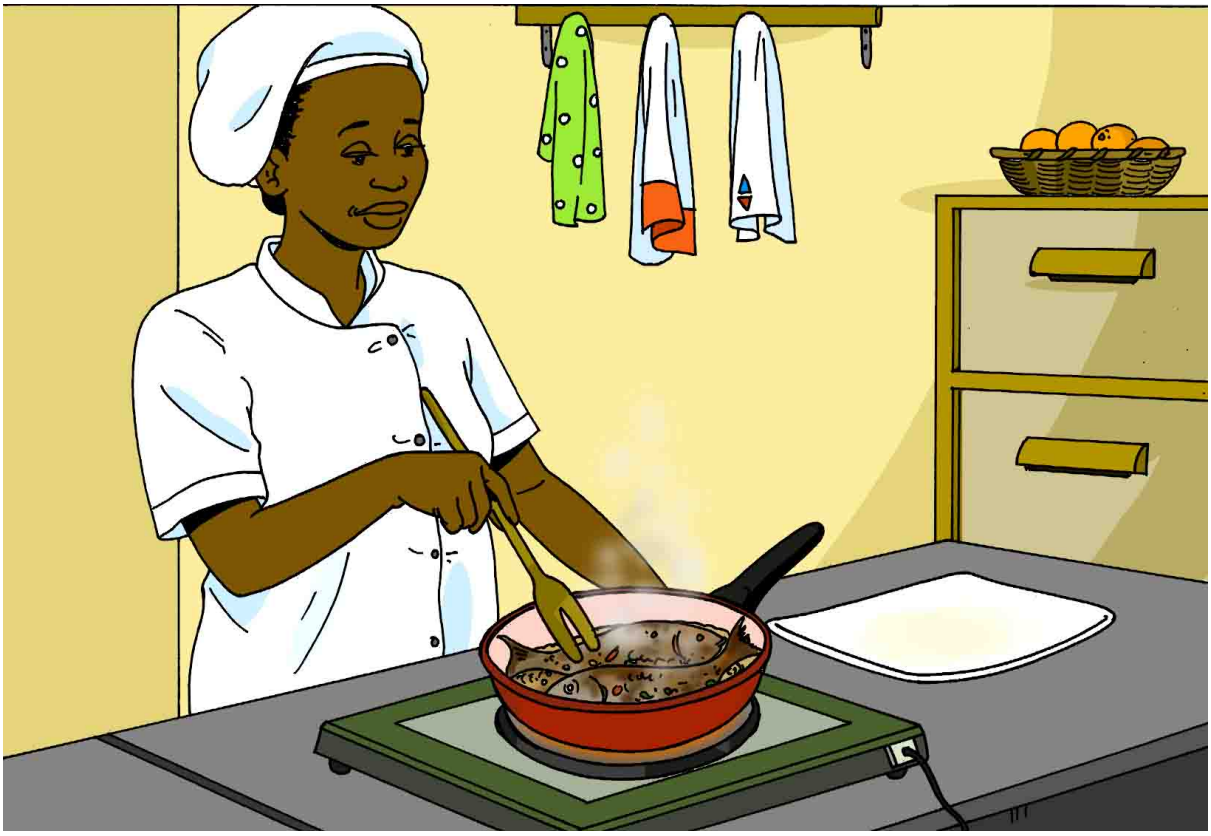

Figure 18: Maintaining cooking guidelines

Activity 1: Discovery

" Muhire is Restaurant manager, and he need to prepare al-dente vegetables and pasta for his customers. So, he requests you to set guidelines required to cook al-dente vegetables."

Activity 2: Problem Solving

1. Create groups of 3-4 and discuss and brainstorm on the following questions:

a. Identify cooking guidelines for cooking al-dente vegetables

2. Take time to brainstorm and discuss the questions in your respective groups.

3. Present your work in a plenary session.

Task

Key Facts (Indicative contents)

- **Maintaining cooking guidelines**

When preparing food, aim to preserve the nutrient value of the food and utilize healthy fats, reasonable portions, and whole foods. Here are a few tips:

- ✓ Use healthy cooking methods such as steaming, broiling, grilling and roasting. Frying requires adding fat to achieve the desired results and deep-fried foods add considerable fat to the American diet.
- ✓ Cook foods in as little water and for as short a period of time as possible to preserve all water-soluble vitamins.
- ✓ Use a variety of herbs and spices for additional flavor rather than relying on salt alone.
- ✓ Avoid packaged or processed foods, which are likely to contain added salt, sugar, and fats. Recognize that consuming these foods increases your intake of salt, sugar, and fats considerably (often without knowing specifically what or how much). As we eat more and more processed foods, we eat less of the phytochemicals and nutrients our bodies need.

- **Guidelines for cooking starches**

Typically, most starches should be dissolved in cold, warm, or simmering liquids and broths, as adding them to already boiling pots can trigger the gelatinization before the starch granules are evenly distributed. Most starches are cooked as follows:

- ✓ Fill a large pot with six quarts water.
- ✓ Bring to a boil.
- ✓ Add salt.

Starchy Root vegetables like potato, turnip and carrots should be boiled with skins and the peel should be removed after boiling. Boiling with peels helps the nutrients to migrate to the centre of the vegetables which helps in better retention of its nutrients.

- **Guidelines for cooking vitamins**

To maximize vitamins in food, take advantage of as many vitamins as possible by following these tips:

- ✓ Keep skins on when possible
- ✓ Avoid continuous reheating of food
- ✓ Use a minimal amount of cooking liquid
- ✓ Choose steaming over boiling
- ✓ When boiling, retain the cooking liquid for a future use (like soups and stocks)
- ✓ Use the microwave
- ✓ Use a pressure cooker when possible
- ✓ Avoid using baking soda to retain color
- ✓ Cut veggies into large chunks to reduce surface area

- **Guidelines for cooking minerals**

When it comes to keep minerals in cooking there are some general rules to keep in mind.

- ✓ Only use a little water.
- ✓ Keep the temperature low.
- ✓ Cook them quickly.

Activity 3: Guided Practice

1. As you have already worked on task 2, perform the following task:

a. Describe the effect of boiling on nutrients

Activity 4: Application

1. In kitchen workshop, observe the store carefully and perform the following tasks:
   a. Identify effects of cooking on nutrients.
2. Each student will perform individually.

Formative Assessment

True or False Questions

1. Cooking food improves digestion and increases the absorption of many nutrients. But, cooking foods, especially in a lot of water or fat at high heat, can reduce the amounts of vitamins and potassium in them, when vitamins such as C evaporate or get thrown out in the cooking water or oil.

True False

Answer:……

2. Vitamin A is especially destroyed during frying and drying, and this vitamin is well preserved during the sterilization which has a heat treatment of approximately 567°F.

True False

Answer:……

3. Vitamin B1 is especially sensitive to cooking and can lose up to 42% of its benefits during frying and up to 30% during stewing. And this vitamin loses its properties at a temperature of over 248°F.

True False

Answer:……

4. Boiling destroys Vitamin C up to 90% while stewing destroys only 50%.

True False

Answer:……

5. Boiling results in the greatest loss of nutrients, while other cooking methods more effectively preserve the nutrient content of food.

True False

Answer:……

6. Cooking reduces the amounts of most of the minerals in food, including calcium, phosphorus, magnesium, iron, zinc, iodine, selenium, copper, manganese, chromium and sodium. For example, milk has not the same amount of calcium whether you drink it cold or hot.

True False

Answer:……..

7. Cooking methods that use only small amounts of fat or water and don't require long heat exposure preserve nutrients best. For example, rather than boiling broccoli, stir fry it in a bit of oil, microwave it with a tablespoon or two of water or steam it until just tender-crisp.

True False

Answer:……..

8. When lipids or foods containing lipids are heated in the presence of oxygen, they undergo oxidation, which causes degradation of the fatty acids. The free radicals produced in these oxidation reactions may react with proteins, vitamins, or other food constituents and reduce the nutritive quality of the food.

True False

Answer:……

9. Starchy Root vegetables like potato, turnip and carrots should be boiled with skins and the peel should be removed after boiling. Boiling with peels helps the nutrients to migrate to the centre of the vegetables which helps in better retention of its nutrients.

True False

Answer:……..

10. Prolonged exposure to water, heat, and light may cause some foods to lose nutritional value like vitamin B1, vitamin C and polyphenols. Here are simple tips which will help you retain nutrients while enjoying your favourite foods. Have a look!

True False

Answer:……

Open Ended Questions

1. State at least 3 best cooking methods which conserves nutrients in cooking?

Answer:

……

……

2. Describe the guidelines for cooking minerals for a better result of keeping minerals during cooking

Answer:

……

……

3. Describe the guidelines for cooking vitamins for maximize vitamins in food while cooking

……

……

Multiple choice questions

1. **One of the following is not identified as the importance of cooking food**
    a. Cooking makes food easier to eat.
    b. It makes food more appetizing and palatable.
    c. It makes food easier to digest.
    d. It makes food safe to eat.
    e. It involves submerging food in water that has been heated to the boiling point of 212 degrees Fahrenheit.
    f. Some foods keep longer when cooked.
    g. Cooking improves the appearance of food.
    h. It improves the taste of food.

Answer: ……

2. Which of the following is not best foods for broiling?

a. Meats
b. Poultry
c. Bread
d. Fish
e. Fruits and Veggies
f. (e) All of the above

Answer:……..

3. Which of the following is not best foods for grilling?

a. Burgers
b. Meats
c. Minestrone
d. Poultry
e. Fish
f. All of the above

Answer: ……..

4. One of the following is not Guideline for cooking starches

a. Fill a large pot with six quarts water.
b. Bring to a boil.
c. Add salt.
d. Roast immediately after boiling.
e. All the above

Answer: ……

5. Which of the following vitamin reduced or killed by prolonged cooking and better to consume it raw?

(a) Vitamin A

(b) Vitamin C

(c) Vitamin D

(d) Vitamin K

(e) All of the above

Answer: ……

6. Which of the following is a vitamin that resist during cooking?

(a) Vitamin B

(b) Vitamin C

(c) Vitamin K

(e) All of the above

Answer: ……..

7. Which of the following cooking methods which conserves nutrients in cooking, especially for vegetables?

(a) Roasting

(b) Boiling

(c) Steaming

(d) All of the above

Answer: …….

Self Reflection

At the end of every unit trainees should:

5) *Re-take the self-assessment you did at the beginning of the unit.*
6) *Fill in the table below and share results with the trainer for further guidance.*

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Points to Remember

Prolonged exposure to water, heat, and light may cause some foods to lose nutritional value like vitamin B1, vitamin C and polyphenols. Here are simple tips which will help you retain nutrients while enjoying your favourite foods. Have a look!

- Always wash the vegetables first and then chop them. Chopping first and then washing takes away the nutrition of your food.
- Do not chop vegetables into very small pieces as most of the nutients will be destroyed when they come in contact with air. The best way is to chop the vegetable into larger chunks.
- Cook vegetables in smaller amounts of water. Boiling in too much water damages the nutrients. It is best advised to cook the veggies covered on low flame in their own water.
- Avoid re-heating of food as it destroys the chemical structure of nutrients and vitamins.
- As soon as you chop veggies, you should cook them as the vitamins and minerals are secure in their cells as once they are exposed to light and air, the nutrient contents can be destroyed.
- Do not throw away the excess water drained after boiling rice or vegetables. The excess water is loaded with nutrients and it can have used in preparing gravies, kneading dough or serve it as a refreshment drink.
- Root vegetables like potato, ginger, turnip and carrots should be boiled with skins and the peel should be removed after boiling. Boiling with peels helps the nutrients to migrate to the centre of the vegetables which helps in better retention of its nutrients.
- Don't use baking soda when cooking vegetables. Although it helps in retaining colour of the vegetables as well as speeds up the cooking process, but destroys the vitamin C content of the veggies.

- Eating fresh food is an good idea because the depletion of nutrients could be slowed down. Another reason is the quicker you consume it, the more nutrients can be gained from it. Try eating within 4 hours of cooking your food.
- The longer the cooking time and the higher the temperature, the more nutrients are destroyed as most of the vitamins are sensitive to heat and air exposure.
- Cooking methods that use only small amounts of fat or water and don't require long heat exposure preserve nutrients best. For example, rather than boiling broccoli, stir fry it in a bit of oil, microwave it with a tablespoon or two of water or steam it until just tender-crisp.
- Boiling is most damaging to nutrients, unless you eat the liquid along with the vegetable, as you might do with soup.
- Deep-frying can damage or destroy heat-sensitive vitamins - a good reason to eat vitamin C-rich potatoes steamed instead of fried. When possible, store and cook vegetables whole or in large chunks rather than chopped, and retain the cooking water, to keep evaporation and water loss to a minimum. For example, if you make mashed potatoes, cook the potatoes in a smaller amount of water and mash them with the cooking liquid rather than draining them.

Further Information for the Trainer

1. BOSKOU, D., (2003). Frying fats In: Chemical and functional properties of food lipids. Eds: Kolakowska A., Sikorski Z.E, CRC Press
2. KOCK WAI, T. N., (2007). Local Repeatedly-Used Deep Frying Oils Are Generally Safe, 1 (2): 55-60, International e-Journal of Science, Medicine and Education.
3. KOLAKOWSKA A., SIKORSKI Z.E., (2003). The role of lipids in food quality. In: Chemical and functional properties of food lipids. Eds: Kolakowska A., Sikorski Z. E, CRC Press foods. Journal Food Science, 59(4): 804-807

Summative Assessment

Integrated/Summative assessment (For specific module)

Integrated situation

X hotel is expecting to host a group of 10 persons from Rwanda TVET board, coming for a meeting of two days and they wish to take lunch at your hotels on a la carte menu, bearing in mind that, their dietary needs are different as 2 women are pregnant, 2 old persons, 1 woman has a child of 3 years old , 5 of them are vegetarian while other 5 guests are non- vegetarians . you are requested to prepare a balanced diet menu and serve each category of guests. Within 2 hours

Resources

Tools	▪ kitchen tools(measuring tools, mixing tools, cooking tools, cutting tools) ▪ Food service tools(cutlery, flatware, crockery, table linen) ,pens, papers , calculators
Equipment	▪ kitchen equipment (ovens, fridges, tables, chairs , restaurant equipment
Materials/ Consumables	▪ Different food items

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