Animal health

Level-I

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Introduction to the Module

This unit covers the knowledge, skill and attitude required to categorize agricultural foods items, recognize malnutrition in the community, identify the role of agriculture in nutrition and contribute to the awareness creation of the community in utilization of agricultural products.

LG #34	LO #1-Identify Categories of agricultural foods items

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying and explaining basic terminologies and concepts in nutrition
- Identifying and explaining food groups, nutrient and their sources of balanced diet
- Identifying and describing origin and composition of food stuffs
- Identifying and explaining energy dense and nutrient dense food sources

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify and explain basic terminologies and concepts in nutrition
- Identify and explain food groups, nutrient and their sources of balanced diet
- Identify and describe origin and composition of food stuffs
- Identify and explain energy dense and nutrient dense food sources

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1

1.1 Identifying and explaining basic terminologies and concepts in nutrition

- **Definition of terms**

✓ **Food:** Any product obtained from plant or animal source that can be taken into the body and contain usable nutrients to yield energy, for the maintenance of life and the growth and repair of tissues.

✓ **Diet:** Diet refers to the way people feed themselves and the foodstuffs they use. It is concerned with the eating patterns of individuals or a group, and the sequence of meals in a day. People may eat twice, three or four times in a day. This is strongly influenced by people's traditions and religion, their economic position, their place in society and the possibilities offered by their natural surroundings. Even in one community different population group may its own eating pattern, i.e., diet.

✓ **Nutrient:** Chemical substances that are essential to life which must be supplied by food to the body to yield energy and substances for the maintenance of life and the growth and repair of tissues.

✓ **Nutrition:** The science of food and the nutrients there in, and their body function and interaction with health

✓ **Micronutrient:** Micronutrients include vitamins and minerals. Micronutrients are vital for healthy and normal functioning of our body. Micronutrients are used by the body to produce enzymes, hormones, and other substances essential for proper growth and development. The daily micronutrient requirement of the body is very small. Vitamins are essential for the development of the immune system of our body. Majority of minerals involve in the body metabolic processes.

✓ **Macronutrient:** are vitamins and minerals that are needed for health in Very minute quantities measured in micrograms or milligrams. Among the micronutrients, three have obtained worldwide attention due to their high public health significance, Vitamin A, Iodine and Iron

✓ **Balanced Diet:** A balanced diet is a diet that contains all the nutrients in the proportion that is optimal for long-term health and survival. Literally it is a diet having the desired proportion of carbohydrates, proteins and micronutrients.

- ✓ **Healthy Diet:** A Healthy Diet is characterized by its nutrient adequacy and balance. There are many types of healthy diets. Optimal nutrient adequacy, balance, and variety are characteristics of a healthy diet. Healthy diets contain different foods that provide the optimal functioning of the body. Variety of food is required to obtain all of the essential nutrients we need in our body. What is important is that the contributions of a variety of individual foods add up to an adequate and balanced diet. An Adequate diet is a diet that contains variety of foods to provide sufficient levels of calories and essential nutrients. Balanced diet is a diet that gives the body the right proportion of nutrients and calories that are needed to maintain healthy body.
- ✓ **Bioavailability:** Bioavailability is a measure of the relative amount of the ingested nutrient that is absorbed from the intestinal content and reaches the systemic circulation. It is described as the rate and extent to which the nutrient is absorbed and becomes available to the body's metabolic processes.
- ✓ **Food taboos:** Food taboo is defined as any food avoidance that is maintained solely because failure to do so would generate disapproval, exclusion or punishment within one's own cultural group or because it would compromise one's own ethical standards.
- ✓ **Window of opportunity:** The period between conception and age two when irreversible damage caused by malnutrition can and should be prevented.
- ✓ **Body growth:** Refers to the increase of the body size. Example child gets bigger in size.
- ✓ **Body Development:** Refers to qualitative changes of the body such as changes in the activity of different body systems. It is different from growth, continues throughout the individual's life span
- ✓ **Hidden hunger:** Micronutrient malnutrition or vitamin and mineral deficiencies, which can compromise growth, immune function, cognitive development, and reproductive and work capacity
- ✓ **Food fortification:** The addition of one or more micronutrients (vitamins and minerals) to a food during processing at the factory/industry
- ✓ **Biofortification:** The development of micronutrient-dense staple crop varieties using traditional breeding practices or biotechnology. It is fortification while the crop is growing and alive
- ✓ **Food security:** the condition when all people, at all times, have physical and economic access to sufficient, safe and nutritional food to meet their dietary needs and food

preferences for an active and healthy life. Food availability, access, utilization, and stability/vulnerability are pillars of food security.

- ✓ **Nutrition Security:**The condition when all people have ongoing access to the basic elements of good nutrition, i.e., a balanced diet, safe environment, clean water, and adequate health care (preventive and curative), and the knowledge needed to care for and ensure a healthy and active life for all household members.
- ✓ **Agricultural food diversification: is** the act of introducing or producing a variety food from agricultural activities like crop or animal farming. Diversification of foods grown by a household can itself improve dietary diversity and nutrition outcomes.
- ✓ **Smallholder farmer:** Marginal and sub-marginal farm households that own and/or cultivate typically less than two hectares of land.
- ✓ **Malnutrition: is**a state in which the physical function of an individual is impaired to the point where he or she can no longer maintain adequate bodily performance processes such as growth, pregnancy, lactation, physical work, and resisting and recovering from disease
- ✓ **Cretinism:** The stunting of body growth and poor mental development in the offspring that result from inadequate maternal intake of iodine during pregnancy.
- ✓ **Stunting:** It is a malnutrition condition reflected by inadequate linear growth of a child. It is referred to as chronic malnutrition.
- ✓ **Wasting:** wasting is reflection of current nutritional status and is measured using the ratio of a child's weight to height/length.
- ✓ **Underweight:** underweight children have low weight for their age.

1.2 Identifying and explaining food groups, nutrient and their sources of balanced diet

1.2.1 Food groups

Foods are usually classified in to six different groups based on the dominant nutrient they contain. The six food groups are described as follows:

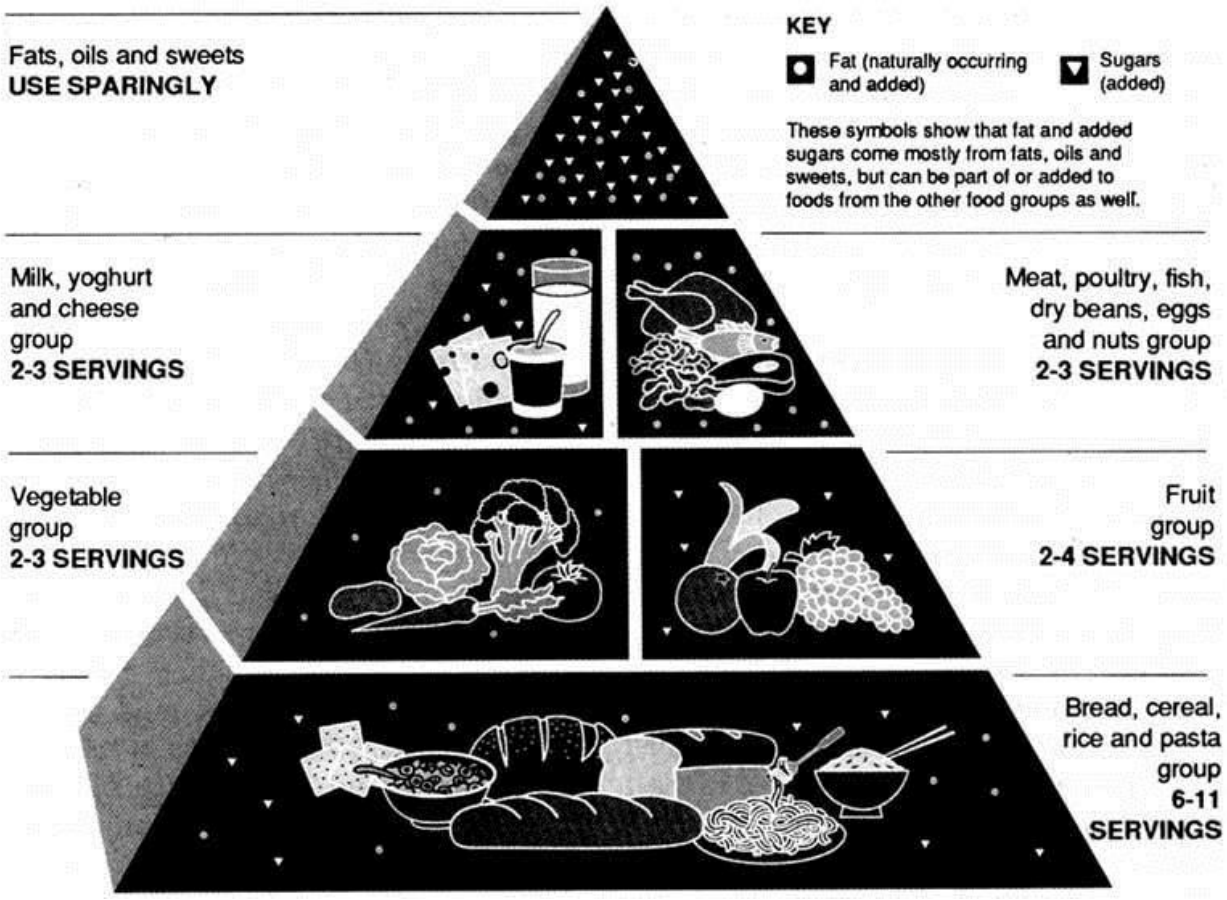


Fig. 1.1 food pyramid

A. Vegetables food group

This group includes green leaf and yellow vegetables such as cabbage, kale, spinach, cauliflower, lettuce, carrot, celery, cucumber, eggplant, green pepper, broccoli, pumpkin, onion, tomato, and others such as mushroom. They provide mostly vitamins, minerals, and water. Vegetables also contain fiber, which is necessary for proper digestion.

B. Fruits food group

This group includes citrus fruits (oranges, lemons, and mandarins), bananas, apples, avocados, cherries, grapes, pineapple, papaya, mango, peaches, guavas, watermelon, sweet melon, and many others. Fruits provide mostly carbohydrates, vitamins, and water.

C. Legumes and nuts food group

This group includes groundnuts, soybeans, beans, peas, chick peas, broad beans, kidney beans, and lentils. They provide mainly protein and carbohydrates. Soybeans and nuts also contain a lot of fat in addition to protein and carbohydrates.

Nutrient content of pulses:

D. Animal source food group

Animal foods include meat, poultry, eggs, milk/milk products, and fish. They provide protein, fats, vitamins, and minerals.

-Milk and milk products

Meat provides useful amounts of riboflavin and niacin, a little thiamine and small quantities of iron, zinc and vitamins A and C.

E. Fats oils and sweets food group

This group includes oil seeds (soybeans, sesame seeds, linseeds, and groundnuts); avocado pear; cooking oil; margarine; milk and milk products such as butter and yogurt; meat; fish; and poultry. They mainly provide fat.

F. Staples food group

Staple foods include cereal grains such as sorghum, millet, maize, barley, oats, wheat, teff, rice, starchy roots (cassava, sweet potato, false banana, potato), and starchy fruits (banana). They mostly provide carbohydrates. They also provide many other nutrients such as proteins and minerals depending on how they are processed.

1.2.2 **Identify nutrient group and their sources**

Different food staffs contain different nutrient which the body uses for life supporting functions. Based on their main body functions these different nutrients are classified in to 5 groups. Water is also considered as the sixth nutrient group but not discussed here

A. Carbohydrates

Carbohydrates are compounds containing carbon, hydrogen and oxygen elements. Carbohydrates are the main source of energy for our body. During metabolism a gram of carbohydrate generates 4 kilocalories of energy. Carbohydrates contribute most of the calories in human diets Carbohydrates should comprise 45-65% of the daily calorie for optimal nutrition. Carbohydrates

include sugars, starch, and fibers. The carbohydrates in the human diet exist mainly in the form of starches and various sugars.

- **Dietary Fiber**

In humans, any of the indigestible carbohydrates when consumed in food pass in the elementary tract as components of faeces. These carbohydrates are often termed "dietary fibers". Dietary fibre is an important component in diets. High-fibre diet is important for normal and healthy intestinal and bowel functioning, and reduces constipation. Because it facilitates the rapid passage of materials through the intestine, fibre may be a factor in the control of problems related to appendix, hemorrhoids and heart related disease and cancers. It is therefore advisable to promote the consumption of locally available nutrient-rich and high fiber content foods.

B. Lipids/Fats

Fats, like carbohydrates, are compounds contain carbon, hydrogen and oxygen, but in different composition and conformation. Lipids include all fats and oils that occur in human diets. Usually “oil” refers to liquid, and ‘fat’ to solids lipids at normal temperature. Fats/oils are concentrated source and storage form of energy for our body, and a gram of fat/oil generate 9 kilocalories up on combustion. Fat should comprise 20-35% of the daily calories for optimal nutrition.

Digestion of dietary fat/oils products smaller molecules called fatty acids and glycerol. Fat/oils make the diet more palatable. Lipids also serve energy storage and structural functions. Stored fats serve as fuel reserves for the body by storing the excess calories. Excess calories from carbohydrates, protein and lipids are stored in the form of fat in the body. Structural fats are part of the essential structure of the cells, occurring in cell membranes, mitochondria and intracellular organelles. Fats also function in assisting the absorption of fat-soluble vitamins. Fat deposited beneath the skin serve as insulation against cold, and it forms a supporting tissue for many organs such as the heart and intestines. Cholesterol is a lipid present in all cell membranes. It plays a role in fat transport and is the precursor from which bile salts and adrenal and sex hormones are made. Diet containing optimal amount of cholesterol is therefore important.

The fat/oils in our diets can be saturated or unsaturated. All fats and oils eaten by humans are mixtures of saturated and unsaturated fatty acids. Saturated fatty acids are those fats that do not contain any double bonded carbon in the molecular structure while unsaturated fatty acids have on or more double bond in the structure. Fats from land animals (i.e. meat fat, butter and ghee)

contain more saturated fatty acids than do those of vegetable origin. Fats from plant products and fish have relatively more unsaturated fatty acids. Due to the many body functions discussed above, fat/oils are essential to health. Optimal intake and availability of fat in the body is therefore important. But excess of some saturated fats in the body will be associated with health problems such as increasing risk of heart related diseases.

C. Proteins

Like carbohydrates and fats, proteins contain carbon, hydrogen and oxygen, they all also contain nitrogen, and many of them sulfur and few phosphorus and iron. Proteins are necessary for growth and repair of the body, and for production of enzymes and hormones. Proteins are the main structural constituents of body cells and tissues, and next to water they make up the greater portion of the substance of the muscles and organs. Unlike carbohydrates and fats, there is no true storage of protein in the body. Any protein in excess of the amount needed for growth, cell and fluid replacement and various other metabolic functions is used to provide energy. A gram of protein upon combustion yields 4 kilocalories of energy. Proteins should comprise 10-35% of the daily calorie for optimal nutrition. The proteins in different body tissues are not all exactly the same. The proteins in liver, blood and in different hormones are all different.

If carbohydrate and fat in the diet do not provide adequate energy, then the body converts proteins to carbohydrate to produce energy in expense of body growth, cells repair, and enzyme and hormone production. This is especially important for children, who need extra protein for growth.

All proteins are large molecules which are made of smaller units called amino acids. The various proteins are made of different amino acids linked together in different chains. Because there are many different amino acids, there are many different proteins. During digestion proteins break down to form amino acids. Animals (humans) cells unlike plants are unable to synthesize amino acids directly from simple inorganic chemical substances. Humans derive all the amino acids necessary for building their protein from consumption of plants or animal source foods. 20 of the amino acids are common in plants and animals, and eight of them are termed ‘essential’ amino acids". They are essential because the body cannot synthesize them from other amino acids, and therefore should be taken from food.

Different foods items have different kind of proteins that contain different amino acids. The protein value of any food is assessed based on total quantity of protein it contains; the kind

number, and proportion of essential amino acids it contains. The quality of the protein a food contains depends largely on its amino acid composition and its digestibility. If a protein is deficient in one or more essential amino acids, its quality is lower. If one essential amino acid is missed in the diet, it limits the use of the other amino acids for building protein in the body.

Proteins of a certain food that have a better mixture of the different amino acids have a higher biological value. Some proteins in a food contain a mixture of different amino acids which include all the essential ones, but other may not. Proteins from meat and other animal products are complete proteins, and supply all of the amino acids the body can't make on its own. The proteins albumin in egg and casein in milk, for example, contain all the essential amino acids in good proportions and are nutritionally superior proteins. Proteins from plant foods are incomplete proteins. The proteins in maize and wheat for example lack or have very little quantity of some of the essential amino acids. These plant-based proteins must combine provide all of the amino acids your body needs.

Consuming variety foods/meal therefore helps the body get all the essential amino acids. The deficiency of one food item/group can be overcome by mixing it with other food groups. For example, consuming maize or wheat together with pulses will yield complete set of amino acids for the body. A mixture of foods of cereals and vegetable origin can serve as a substitute for animal protein especially if consumed at the same meal. Children need more protein than adults because they are growing faster. Infants need more protein than young children. A pregnant woman needs an additional supply of protein to build up the fetus inside her. Similarly, a lactating woman needs extra protein foods, because the milk she secretes contains protein.

Table.1: protein content of food groups, its source and digestibility

Protein content of food groups		**Protein sources and true digestibility.**	
Foods	**Protein content range (g/100g)**	**Protein source**	**True digestibility**
Cereals	6-15	Egg	97
Legumes	18-45	Milk, cheese	95
Oil seeds	17-28	Meat, fish	94
Shell fish	11-23	Maize	85
Fish	18-24	Rice, polished	88
Milk(fresh)	3.5-4.0	Wheat, whole	86

Wheat	11.6	Oatmeal	86
Rice	7.9	Peas, mature	88
Corn	9.2	Soy flour	86
Barely	10.6	Beans	78
Oats	12.5	Maize + beans	78
Rye	12.0	Maize + beans + milk	84
Sorghum	10.4	Chinese mixed diet	96
Millet	11.8	Indian rice + beans diet	78

D. Minerals

Minerals are inorganic elements. Many different minerals serve important functions in our body. Mineral are grouped in to macro and trace minerals. Calcium, phosphorus, potassium, and sodium are the principal micro minerals while iron, iodineand zinc are some of the trace minerals the human body. Minerals have a number of functions in our body. Sodium, potassium and chlorine are present in form of salt in the body and serve to maintain osmotic balance. Iron is the important component of hemoglobin in the red blood cells. Calcium and phosphorus form the bones tissues and give rigidity to the whole body. Some minerals such as chlorine are used to keep acidic, alkaline, or neutral body fluid conditions. Iodine is main component of thyroxin hormone. And zinc is component of different enzymes. Some of the minerals such as phosphorus are widely available and the deficiencies are not common. The minerals that are of most importance in human nutrition are thus calcium, iron, iodine, and zinc.

- **Calcium**: is essential for the formation and maintenance of bone health. It is also necessary for blood clotting and for muscle and nerve functions. Calcium deficiency can lead to osteomalacia and osteoporosis in adults and rickets and retarded growth in children. An excess intake can cause the formation of kidney stones and neural motor dysfunction.
- **Magnesium:** is important for teeth and bone structure. In addition, magnesium is required as a cofactor for various enzymes involved in energy metabolism and for RNA, DNA, and protein synthesis. Like calcium, magnesium is necessary for blood clotting.

- **Iron:** comes in two different types: haem (meat, offal) and non-haem (pulses, vegetables, cereals, and dairy). Iron aids the transport of oxygen via hemoglobin present in red blood cells. Iron is important for immune function and participates in energy production via the various enzymes. Iron deficiency is probably the most common nutrient deficiency throughout the world and affects all populations.
- **Zinc**: is present in all body tissues and important for the immune system, protein synthesis, growth, and wound healing. Zinc is also vital for the synthesis of insulin.
- **Sodium and chloride:** help maintain the body's water balance and sodium is essential for both nerve and muscle functions. An excess of sodium chloride may result in high blood pressure whilst a lack of salt may cause muscle cramps.
- **Selenium:** -is essential in the production of red blood cells and development of the immune system. It is also important in thyroid metabolism. Areas with low selenium content in the soil have higher prevalence of selenium deficiency.
- **Iodine:** is essential in the synthesis of thyroxin. The thyroid hormone controls the metabolic processes in the body and affects energy metabolism as well as mental function.

Table.2: Minerals and trace elements

Name	Food source	Deficiency	Toxicity
Selenium	Fish, offal, meat, cereals and dairy	Keshan disease, Kaschin–Beck disease	>400µ/day
Magnesium	Oysters, fish, shellfish, legumes, grains, vegetables	Hypertension, impaired CHO metabolism	Hypermagnesaemia >350 mg/day
Zinc	Lean red meat, whole grain cereals, legumes,	Growth retardation, hypogonadism and delayed sexual maturity, impaired wound healing, immune deficiency	>1g/day
Iron	Meat, liver, breakfast cereals, bread	Anemia	Organ damage
Iodine	Fish, shell fish, meat, milk, eggs, cereals	Impaired mental function, hypothyrodism, goitre, cretinism	Wolff–Chaikoff effect

Calcium	Meat, fish, dairy products	Adults: osteomalacia, osteoporosis	Kidney stones

The three most important micronutrient deficiencies of global public health significance are iron deficiency anemia, vitamin A deficiency, and iodine deficiency. **Iron deficiency anemia**:

- ✓ May be defined as a low concentration of hemoglobin (Hb) in the blood.
- ✓ In addition to iron, a deficiency of folic acid, riboflavin, and B12can also lead to anemia. Iron deficiency is of public health concern as it increases the morbidity and mortality of pregnant women,
- ✓ Adversely affects physical capacity and work performance, and may impair cognitive performance at all ages.

E. Vitamins

Vitamins are organic substances playing vital role for healthy functioning of the body. They are essential for proper metabolism and body immunity building. Vitamins present in minute amounts in foodstuffs. Vitamin A, B, C, D, E and K are commonly known vitamins. Vitamin A, D, E, and K are fat soluble vitamins while vitamin B groups and vitamin C are water soluble. Vitamin A is the most public health important vitamin.

The vitamins are a group of organic nutrients that cannot be synthesized in sufficient quantities by our bodies and therefore must be obtained from the diet. Vitamins have the functions of:

- Biochemical functions: hormones, antioxidants, cell signaling, tissue growth, etc.
- Precursors for enzyme cofactor biomolecules (coenzymes) that help act as catalysts and substrates in metabolism.
- Playing vital role for healthy functioning of the body. They are essential for proper metabolism and body immunity building.

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Vitamins by solubility are classified into two groups: ***water-soluble*** vitamins and ***fat-soluble*** vitamins. Water-soluble vitamins are easily absorbed by the body and excreted. Fat-soluble vitamins are absorbed through the intestinal tract with the help of lipids.

Table.3: Vitamins supplied by fruit, vegetables and root crops

Vitamin	**Name**	**Source**

A	**Retinol**	From carotene in dark green leaves, tomatoes, carrots, papayas
B1	**Thiamine**	Pluses, green vegetables, fruit, cereal grains have B in germ and outer-seed coat
B2	**Riboflavin**	Green leafy vegetables and pulses
B6	**Pyridoxin**	Bananas, peanuts
PP	**Niacin (nicotinic acid**	Pulses, peanuts
-	**Folic acid**	Dark green leaves, broccoli, spinach, beets, cabbage, lettuce, avocados
C	**Ascorbic acid**	Citrus, pepper, guava, mango, papaya

Table.4: Classification of vitamins according to solubility

Water soluble	**Fat-soluble**
Thiamin(B1)	Retinol (Ait A)
Riboflavin (B2)	Cholecalciferol (Vit D)
Niacin (nicotinic acid, nicotinamide)	Alpha-tocopherol (Vit E)
Pantothenic acid(B5)	Phyloquinone (menaquinones, Vit K)
Pyridoxine (Vit B6)	
Biotin(B7)	
Foloic acid(B9)	
Cobalamin(B12)	
L-Ascorbic acid (Vit C)	

Table.5: Water soluble vitamins

Name (standard& other)	**Food source**	**Deficiency**	**Toxicity**
Thiamin(B1)	Meat, nuts, legumes, fortified cereals, wheat germ bran, yeast	Berberi	>3g/day
Riboflavin(B2)	Liver, kidney, dairy products, fortified cereals, Marmite	Arboflabnosis	No reports up to 120 mg/day
Niacin(B3)	Liver, kidney, rice, wheat, oatmeal, Marmite	Pelagra	>200 mg/day
Pyrodixin(B6)	Meat, fish, pulses, potatoes, nuts, seeds, bananas, avocados, milk	Anemia-small cell	2–7 g/day
Folate(Folic acid-B9)	Liver, kidneys, nuts and seeds, fortified breakfast cereals, fresh vegetables	Anemia-large cell	
Vitamin B12(Cobalamin)	Liver, sardines, oysters, meat or animal produce such as egg, cheese, milk	Permicius	
Biotin	Liver, egg yolk, yeast, cereals, soy flour	Very rare	No reports up to 10 mg/day
Panthotonic acid(B5)	Whole grains, legumes, animal products	Very rare	

Vitamin C(ascorbic acid)	Fresh fruit and vegetables, especially spinach, potatoes, broccoli, tomatoes, strawberries.	Scurvey	5–10 g/day

Table.6: Water soluble vitamins and their functions

Vitamins	Function
Thiamin	➢ Important for energy metabolism and is part of the coenzyme thiamine diphosphate (TDP). ➢ The development and maintenance of the nervous system is also dependent on thiamin.
Riboflavin	➢ Like thiamine, plays a vital part during energy production from fat, carbohydrates, and protein. ➢ As the coenzymes flavin mononucleotide and flavin adenine Dino nucleotide, riboflavin is part of the electron transport chain.
Niacin – NAD and NAFP –	⇨ They are the coenzymes of niacin, which play a central role in the metabolism of glucose, fat, and alcohol. ⇨ Unlike the other B vitamins, the liver is able to synthesize niacin from tryptophan.
Vitamin B6	⇨ Have many vital functions within the body, which are facilitated via numerous enzyme systems. ⇨ Vitamin B6 is important for a healthy immune system through the production of white blood cells. ⇨ It also converts tryptophan to niacin and is involved in transamination (the synthesis of amino acids). ⇨ Vitamin B6plays important roles in energy production through glycogen breakdown and gluconeogenesis.
Folate, also known as folic acid or folacin	⇨ Is vital during fetal development. ⇨ Folate is essential for growth and development during cell division and DNA synthesis. ⇨ It is also important in the maturation of red blood cells and tissue repair. ⇨ Hence, folate is important in the prevention of anaemia.

Vitamin B12	⇨ Is vital for folate metabolism. ⇨ It is also essential for growth and development of tissues and for a healthy cardiovascular system. In the nervous system, vitamin B12 helps to maintain the myelin sheath that protects nerves. ⇨ It also helps fatty acids to enter the Krebs cycle.
Biotin	⇨ It is a cofactor for many enzymes and is important in carbohydrate, fat, and protein metabolism. ⇨ It is also involved in fatty acid breakdown and synthesis including gluconeogenesis
Pantothenic acid	⇨ It stimulates growth and is part of coenzyme A (CoA). ⇨ CoA helps to circulate acetate and other molecules through the glucose, fatty acid, and energy metabolism pathways.
Pantothenic acid	⇨ It stimulates growth and is part of coenzyme A (CoA). ⇨ CoA helps to circulate acetate and other molecules through the glucose, fatty acid, and energy metabolism pathways.

Table.7: Fat soluble vitamins

Vitamin	Food sources	Deficiency	Toxicity
A	Liver, dairy products, oily fish β-carotene: carrots, apricots, dark green leafy vegetables		>100×RN
D	Egg yolk, oily fish, fortified milk and butter; sunlight is the best source	Osteomalacia (adults)Rickets (children)	>150 ng/ml (plasma)
E	Vegetable oils	Myopathies,neuropathies, liver necrosis	
K	Green vegetables such as kale, spinach, parsley, cabbage, broccoli	Vitamin K deficiency bleeding (VKDB)	

RNI Reference nutrient intake

.

- **Dietary sources**

The main sources of retinol are butter, eggs, milk, liver of beef, pork, chicken, fishes. Carotene is contained in many plant foods. Various dark green and yellow vegetables and pigmented fruits, such as mangoes, papayas and tomatoes, and pumpkins contain useful quantities of carotene. Carrots and red palm oil are rich sources of carotene. Yellow maize is the only cereal that contains carotene. Most people in developing countries rely mainly on carotene for their supply of vitamin A. When the diet is entirely of plant origin, larger amounts of carotene are required because the conversion from carotene to Vitamin A is not very efficient.

Vitamin A is soluble only in fat. It is absorbed in the wall of the intestine. It is poorly utilized when the diet has a low-fat content. Intestinal diseases such as dysentery and intestinal parasites limit the absorption of vitamin A. Bile salts are also essential for the absorption of vitamin A. Lactating mothers need 50% more than normal adults, and children and infants need less vitamin A than adults. Excess vitamin A is stored in the liver, and the body can utilize it upon demand.

The five nutrient groups can be assigned to three functional categories based on their body function:

1. Nutrients that primarily provide us with calories to meet energy needs (Carbohydrates and Lipids)
2. Nutrients that are important for growth, development and maintenance (Proteins)
3. Nutrients that act to keep body remain healthy and functions normally (vitamins and minerals)





What is the Food Pyramid Explaining I

Fig and video about groups of food

1.3 Identifying and describing origin and composition of food stuffs

Most food has its origin in plants. Some food is obtained directly from plants; but even animals that are used as food sources are raised by feeding them food derived from plants. Cereal grain is a staple food that provides more food energy worldwide than any other type of crop. Corn (maize), wheat, and rice – in all of their varieties – account for 87% of all grain production worldwide.

1.3.1 Plant source food stuff

Many plants and plant parts are eaten as food and around 2,000 plant species which are cultivated for food. In fact, the majority of foods consumed by human beings are seed-based foods. These include:

- Edible seeds include cereals (corn, wheat, rice,), legumes (beans, peas, lentils,) and nuts.
- Oilseeds are often pressed to produce rich oils - sunflower, flaxseed and oil sesame.
- Fruits are the ripened ovaries of plants. Some botanical fruits, such as tomatoes, pumpkins, and eggplants, are eaten as vegetables.
- Vegetables (root vegetables; potatoes and carrots, **bulbs;** onion family, **leaf vegetables**: spinach and lettuce, **stem vegetables** : bamboo shoots and asparagus, and **inflorescence vegetables** :globe artichokes and broccoli and other vegetables such as cabbage or cauliflower).

1.3.2 Animal source food stuffs

Animals are used as food either directly or indirectly by the products they produce. Meat is an example of a direct product taken from an animal, which comes from muscle systems or from organs. Food products produced by animals include:

- ✓ Milk produced by mammary glands, which in many cultures is drunk or processed into dairy products (cheese, butter, etc.).
- ✓ birds and other animals lay eggs, which are often eaten, and;
- ✓ bees produce honey, reduced nectar from flowers, which is a popular sweetener in many cultures.

1.3.3 Others source food stuffs

Some foods not from animal or plant sources include various edible fungi, especially mushrooms. Fungi and ambient bacteria are used in the preparation of fermented and pickled foods like leavened bread, alcoholic drinks, cheese and yogurt. Another example is blue-green algae such as Spirulina. Inorganic substances such as salt, baking soda

1.4 Identifying and explaining energy dense and nutrient dense food sources

1.4.1 Identify energy dense food sources

The energy density is defined as the energy content per gram of food. The high fat and low moisture content of most foods makes energy density an important contributor to energy regulation and overweight. Whilst the addition of fat and sugar increases palatability and taste, they both contribute to the energy density of foods. In many developing countries where the

staples are cereal based or tubers, their energy density on cooking is very low. This is largely due to a considerable absorption of water during the gelatinization of starch.

The energy density of foods can range from 0 (water) to 37 kJ/g (fat) (0—9 kcal/g). As energy density is essentially dependent on the moisture and fat content, numerous low-calorie foods available today are manufactured by altering either the moisture and/or the fat content. Low-energy dense foods are made with considerable attention being paid to their palatability.

Foods that provide calories and low amount of nutrients are referred to as energy-Dense foods. Nutrient-dense foods are easier to make them adequate and balanced diets than empty-calorie foods. Majority of the naturally occurring fibrous foods tend to be high in nutrient density and lower in energy-density while majority of the processed and fast foods are empty-calorie foods. Empty-calorie foods are usually deficient of vitamins and minerals. High water content in the food item also lowers energy density. Children can be provided energy-dense foods together with optimal provision of nutrient-dense foods. Adults with high energy-demanding physical works such as ploughing may consume energy-dense foods but complemented with nutrient-dense foods.

Table.8: Fat content and energy density of some common foods

Foods	**Fat content(gm)**	**Energy density**	
		(KCal/gm)	(KJ/gm)
Soy flour	23.5	4.47	18.7
Wheat flour	2.0	3.24	13.6
Fresh pasta, raw	2.4	2.74	11.5
Fresh pasta, cooked	1.5	1.59	6.7
Easy cook rice, raw	3.6	3.83	16.0
Cheese and tomato pizza	10.3	2.77	11.6
Milk, full fat	3.9	0.66	2.8
Double cream	53.7	4.16	17.4
Cheddar cheese	34.9	4.16	17.4
Chicken eggs, raw	11.2	1.51	6.3
Peanuts, roasted	53.0	6.02	25.2
Potato crisps	34.2	5.3	22.2

I. Protein source food

The protein requirements of humans are dependent on a number of factors. Some of these include: gender, age, body weight and composition, energy intake and micronutrient composition of the diet. The protein requirements of an individual represent the dietary needs necessary to prevent losses of body protein and to accommodate, as appropriate, rates of deposition for growth, pregnancy, and lactation.

When a diet is lacking in protein, the nitrogen lost in the urine and faeces amounts to approximately 49mg N/kg body weight in adults. To this figure 5 mg N/kg body weight must be added to accommodate losses in sweat, hair, skin, etc. The total nitrogen loss is therefore 54 mg N/kg body weight when fed a protein-free diet. This is sometimes called obligatory nitrogen loss and represents the inevitable loss of nitrogen (protein) when the body is fed a protein-free diet.

Table.9: Estimates of amino acid requirements for infants and adults

Amino acids	**Infants (3-4months (mg/kg/day)**	**Pre-school children (2 years (mg/kg/day**	**Adults(mg/kg/day)**
Histidine	28	?	8-12
Isoleucine	70	31	10
Leucine	161	73	14
Lycsine	103	64	12
Methionine + cystine	58	28	13
Phenylalanine + tyrosine	125	69	14
Threonine	87	37	7
Tryptophan	17	12.5	3.5
Valine	93	38	10
Total essential amino acids	714	352	84

Adapted from Energy and Protein Requirements (FAO/WHO/UNU, 1985)

Protein is an essential nutrient, responsible for multiple functions in our body, including building tissue, cells and muscle. For sporty individuals a daily dose of around 1g of protein per 1kg of

body weight is recommended. After exercise, protein is particularly important since muscles need it to recover and grow. A portion of protein (15-25g) is recommended within 30 minutes of exercise.

Proteins are made up of a collection of 20 amino acids. Of these, eight are classed as 'essential' and need to be sourced from food, while the other 12 are classed as 'non-essential' and can be produced inside our body. 'High-quality proteins' such as eggs and meat fruits and offer more muscle-building amino acids than other protein foods, so are considered more valuable sources of protein.

- **Good protein sources**
  - ✓ **Eggs**: King of food protein is the humble egg. A medium egg has around **6g of protein** of the highest biological value, meaning it comes **complete with all 20 amino acids** in the most digestible form.
  - ✓ **Milk and milk products:** Dairy products are also protein sources that contain bone-building **calcium** specially after processed in to Cheese, whey or yogurt.
  - ✓ **Meat:** Meat is usually defined as the flesh (mainly muscles) and organs (for example, liver and kidneys) of animals (mammals, reptiles and amphibians) and birds (particularly poultry). Meat contains about 19 percent protein of excellent quality and iron that is well absorbed.
  - ✓ **Fish and seafood**: Fish and seafood are good sources of protein and are typically low in fat.
  - ✓ **Soya bean**: Eating soya protein foods such as *tofu* and soya-based drinks will **help post-recovery**, plus they can help to lower cholesterol and reduce the risk of heart disease.
  - ✓ **Beans, pea, chickpea, lentils are also good sources of protein.**

II. Fat source foods

Fats contain a variety of fatty acids. Fats derived from land animals (e.g., butter and lard) usually contain a high proportion of saturated fatty acids and are solid at room temperature. Fats derived from vegetable products and marine animals (e.g., groundnut and cod-liver oils) contain more unsaturated fatty acids; they are usually liquid at room temperature and are termed oils. The key

is focusing on the good fats (monounsaturated and polyunsaturated) and eliminating the bad fats (trans and saturated fats).

A. Avocados: Avocados are high in fat. The most of the fat in an avocado is monounsaturated, the heart-healthy kind that actually lowers bad cholesterol.

B. Olive Oil: Olive oil is commonly used in the Mediterranean diet (one of the most recommended for a healthy lifestyle), and we've all heard that olive oil reduces the risk of heart disease, blood pressure and certain types of cancer.

C. Nut Butter: Nut butters are another source of healthy fats, and peanut butter is just the beginning-try almond or cashew butter if you're feeling adventurous. All of these butters boost protein and fiber intake.

D. Butter: consists mainly of the fat from milk and are with saturated fatty acid. It usually contains about 82 percent fat, with a trace of protein and carbohydrate; the rest is water. Butter is rich in vitamin A and has a small amount of vitamin D, but the content varies with the time of year and the diet of the cow from which it was derived. Usually about 800 mg of retinol and 50 IU of vitamin D are present in 100 g of butter. Butter and margarine are increasingly used in diets in developing countries as the use of bread increases.

E. Fatty Fish: The term "fatty fish" may sound unappealing, but actually, these are the healthiest and most delicious foods from the sea. Oily fish are full of omega-3 fatty acids—good fats, unlike the bad saturated fat you find in most meats.

F. Oil seeds: Sesame (contain about 50 percent fat and 20 percent protein)**, Sunflower seeds (**contain about 36 percent oil (less than sesame), 23 percent protein**), Red palm oil and other oilseeds like** pumpkin seeds, melon seeds, oyster nutand cottonseed.

G. Fatty meat: The amount of fat depends on the animal that the meat comes from and the cut. The energy value of meat rises with the fat content. The fat in meat is fairly high in its content of saturated fatty acids and cholesterol.

H. Vegetable oils: - are the cooking fats most commonly used in Africa, Asia and Latin America, and there are many different kinds. Except for red palm oil, they have the

disadvantage of containing no vitamins except vitamin E. They are mainly low in saturated fatty acids.

III. Carbohydrate source of foods

What carbohydrates are exactly, and what carbohydrates do for your body. Here is a quick overview of some useful information about carbohydrates:

- They are made up of carbon, hydrogen and oxygen to create a sugar molecule.
- The three most common forms of carbohydrates are sugars, fibers and starches.
- They are grouped into two categories: simple and complex.
- Simple carbohydrates are mainly made up of sugars like table sugar, fruit sugar or corn sugar.
- Complex carbohydrates are foods made up of three or more linked sugars like bran, potatoes, brown rice, peas and whole grain cereals.
- They are broken down and are turned into glucose to be used as a source of energy for cells.

Carbohydrates are still useful to the body because they act as a source of energy, and with these

1.4.2 Nutrient dense food sources

Nutrient-dense foods are those foods that provide multiple nutrients in appropriate amounts relative to calories. Nutrient-dense food contains sufficient amounts of vitamins, minerals and fibers. Nutrient-dense foods comprises foods are without solid fats in the food or added to it; added sugars, added refined starches, and added sodium. Nutrient-dense foods usually retain naturally occurring components such as dietary fibers. All vegetables, fruits, whole grains, see foods, eggs, peas and beans, unsalted nuts and seeds, fat-free and low-fat dairy, and lean meats and poultry are nutrient-dense foods when prepared without solid fats and sugars.

The choice of nutrient-dense or energy-dense foods depends on different factors such as age and daily energy expenditure. At normal circumstances consumption of high nutrient-dense foods is recommended for optimal nutritional and health status.

- **Fibers sources food**

Fiber is found in healthy, plant-based foods. It is not digested by the body and does not contain nutrients. Yet, fiber is critical for healthy digestion and bowel function and can help to reduce the

risk of **chronic disorders** such as high blood pressure, cholesterol, diabetes and heart disease. In the digestive tract, fiber forms a gel-like mass that bulks up food, facilitating digestion and increasing nutrient absorption. Eg. Like legumes (lentils, peas and beans), whole grains, oat meal, berries, nuts

- **Legumes**

Legumes are a family of vegetables that include lentils, peas, and beans. The recommend adding of legumes to your daily diet for their nutritional benefits, as well as their high fiber content. These nutrient-rich foods are also high in the minerals iron, magnesium and potassium, do not contain cholesterol and are low in fat.

- **Whole Grains**

Whole grains are not refined and still contain their germ or bran layer. This means they have high fiber content and nutrition. Whole-grains are made into breads, pastas and other foods.

Oatmeal

Oats are considered a power-food because they are high in dietary fiber and other nutrients; Oats have a low glycemic index, which means they slow the absorption of sugar from the digestive tract into the blood. This can help to keep energy steady and reduce excess hunger. Oats are popularly eaten as porridge and are also made into bread, cookies, and other baked foods.

- **Berries**

Berries and other fruits are high in fiber content. Eating fruit helps to add both soluble and insoluble fiber for better blood sugar balance and lower blood cholesterol. Berries are among other kinds of fruit that have the highest fiber content.

- **Nuts**

Nuts and seeds are also good natural sources of dietary fiber. Seeds such as sunflower seeds, pumpkin seeds and flaxseed are also high in fiber and other essential nutrients.

Fiber can lower blood sugar, cut cholesterol, and may even prevent colon cancer and help you avoid hemorrhoids. Fiber helps you lose weight, and it helps lower bloodcholesterol."

Self-check 1	

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.

Test 1:Short Answer Questions

1. What is the different food and nutrition? (3pts)
2. What is agricultural food diversification mean? (3pts)
3. What is agricultural food security mean? (3pts)
4. Describe the six food groups? (4pts)
5. What is the importance of carbohydrate? (2pts)
6. Describe the different sources of minerals and vitamins? (4pts)
7. Mention some of fat source foods? (3pts)
8. Mention some of carbohydrate source foods? (3pts)
9. Mention some Fibers sources food? (2pts)
10. Describe estimates of amino acid requirements for infants and adults? (3pt)

Note: **Satisfactory points** =25 and above **Unsatisfactory** =below 25 points

You can ask your teacher for the copy of your answer.

LG #35	LO #2-Recognize malnutrition in the community

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying and explaining physical signs of malnutrition
- Identifying forms, causes and consequencesof malnutrition
- Promoting measures to overcome malnutrition
- Making awareness creation programs

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify and explain physical signs of malnutrition
- Identify forms, causes and consequences of malnutrition in different groups of community
- Promote measures to overcome malnutrition, importance of maintenance of adequate and balanced diet
- Make contribution in elders, family heads and women awareness creation programs

Learning Instructions:

- Read the specific objectives of this Learning Guide.
- Follow the instructions described below.
- Read the information written in the information Sheets
- Accomplish the Self-checks
- Perform Operation Sheets
- Do the “LAP test”

Information Sheet 2

2.1.Identifying and explaining physical signs of malnutrition

Malnutrition refers to abnormal nutrition condition, both under nutrition and over nutrition. Currently it is a public health problem of both developed and developing countries. While majority of developed countries suffer from problems related over nutrition, developing countries suffers from the double burden of under nutrition and over nutrition. Even in sub-Saharan countries people are suffering from the triple burden of hunger, under nutrition, and over nutrition. Globally 868 million people (12.5%) remain undernourished inter terms of energy and protein consumption, and around 2 billion people are suffering from micronutrient deficiencies. To the contrary near to 1.5 billion people worldwide are overweight and obese, and at risk of contracting chronic non communicable disease.

Malnutrition is currently considered the leading cause of child mortality, and worldwide more than one third of child mortality is attributed to malnutrition. The global community is urging for prevention of under nutrition in children by focusing on the 1000 days nutrition interventions- the period from pregnancy to the first two years of life. This period is called the' window of opportunity' because proper nutrition at this period has the greatest effect on child health, growth and development. If under nutrition occurs during this period, the damage on child physical and cognitive development will be irreversible.

2.2.Identifying forms, causes and consequences of malnutrition

2.2.1 Forms of malnutrition

From the perspective of developing countries, malnutrition results from inadequate intake of nutrients and/or from disease factors and from over nutrition (over intake of nutrients) which results obesity and overweight especially in developed countries. Protein energy malnutrition (PEM), iron deficiency anemia (IDA), vitamin A deficiency (VAD), and iodine deficiency disorders (IDD) are the most common forms of malnutrition.

A. Protein-Energy Malnutrition (PEM) arises due inadequate intake of calories from macronutrients: Carbohydrates, fats and proteins.
B. Micro-Malnutrition (Hidden Hunger) refers to mineral and vitamin deficiency such as iron, iodine, and vitamin A. Both these conditions can have serious negative consequences for physical and mental health.

- **Protein-Energy Malnutrition**

Protein-Energy Malnutrition (Macronutrient Deficiency) is currently the most important nutritional problem in developing countries. Failure to grow adequately is the first and most important manifestation of PEM. It often results from consuming too little food, especially energy, and is frequently aggravated by infections. PEM can be due to long-term or short-term food shortages and infections. The term PEM is used to describe both the moderate and the sever forms of under nutrition. Moderate (mild) PEM is manifested mainly as poor physical growth in children. Stunting, underweight, and wasting are manifestations of child growth failure due to mild/moderate PEM. Kwashiorkor (petting oedema) and nutritional marasmus (severe wasting) are manifestations of sever PEM, and often lead to death of many children.

- **Stunting:** It is a malnutrition condition reflected by inadequate linear growth of a child. It is referred to as chronic malnutrition. Stunted children are too short for their age. Stunting develops over a long period of time as a result of inadequate dietary intake, and repeated infections. Stunting is a condition most of the time manifested in children of under 2 years ages. 26% of children under five years of age in the world are stunted in 2012 while in Ethiopia 44% of children under five years are stunted in 2011.Stunted children will have relatively poor physical and mental development. Stunting is an irreversible condition; a stunted child will become a stunted and mentally less developed adult. The irreversible physical and cognitive damage from stunting leads to lower adult productivity and enormous long-term economic loss to societies. Stunted children will perform low at schools, sport activities, and will be less innovative and productive at adult stages.

The 1,000-day period from pregnancy through age 2 is therefore the critical window of opportunity to shape a child's lifelong health and development. Proven interventions to reduce

occurrence of stunting during the 1000days of life, and to sustainably reduce it in the population include:

- ✓ Appropriate breast-feeding practices: Early initiation and colostrum feeding, exclusive breast feeding, and breast feeding continued up to 2 years of age
- ✓ Appropriate child complementary feeding practice (meal made of diversified food items and proper consistency)
- ✓ Greater access to and utilization of nutritious foods for pregnant and lactating women, and children during the first 5 years of life
- ✓ Increased household health care, water and sanitation access in the community
- ✓ Improved child caring practices such as mothers time for child care
- ✓ Promoting and improving household diet diversity through agricultural interventions such as sustainable diversified food production and utilization

- **Wasting:** wasting is reflection of current nutritional status and is measured using the ratio of a child's weight to height/length. It is the most life threatening of the three types of malnutrition. Wasted children are too light for their height/length. Wasting is caused by inadequate intake of total calories resulting in rapid weight loss or failure to gain weight. Wasting and acute malnutrition are often used interchangeably. Wasting can be reversed with improved diet and the treatment of underlying illnesses. Wasted children should be identified and treated with nutritious foods at the community level or at health facilities. If not treated on time these children enter to marasmus or kwashiorkor stages and may die.
- **Underweight:** underweight children have low weight for their age. Children may become underweight because of wasting or stunting or both. Underweight is measured in children using weight for age. While prevention of stunting and underweight through diet diversity may be the main contribution of agricultural development programs in addressing chronic malnutrition, children who are wasted/acutely malnourished need to be referred for treatment.

- **Body Mass Index (BMI):** is often used to measure the nutritional status of adults, especially of adolescent girls and pregnant women. It is calculated by dividing the body

weight in kilogram to the square of body height in meters (BMI = kg/m2). A BMI range of 18.5 to 24.9 is an indicator of normal nutritional status. A BMI less than 18.5 is an indication of underweight while greater that 25.9 is an indication of overweight status. Persons with BMI of out of the normal range should seek immediate dietary measures, or else in overweight cases will develop different disorders and complication such as diabetes and hypertensions. Prevalence rates of underweight, stunting, and wasting, percent of children under 5 years of age

Table.10: showing stunting, wasting and underweight level

Status of children	CSA Surveys			Ethiopia DHS		
	1983	1992	1998	2000	2005	2011
Stunting (Low height-for-age)	60.7	64.0	52.0	58	51	44
Wasting (Low weight-for-height)	8.0	9.3	9.0	12	12	10
Underweight (Low weight-for-age)	37.3	46.9	42	41	33	29

CSA=Central Statistics Agency, DHS= Demographic Health Survey

2.2.2 Causes of malnutrition

Malnutrition is not caused by a single factor. The nutritional status of an individual, households, and the community at large is determined by many different and interconnected factors. UNICEF in 1990 identified malnutrition and death in children and women as the final outcome of a long sequence of interconnected factors. These factors are classified at three levels of causes as immediate, underlying, and basic causes of malnutrition.

A. The Immediate Causes of Malnutrition

Inadequate dietary intake and diseases are the most significant immediate causes of malnutrition of children and women. An individual will get malnourished either due to inadequate dietary intake or infection of diseases, or both at the same time. If the individual do not get adequate food the body will not get the necessary nutrients for energy production, growth and healthy

functioning. At the same time the individual will be malnourished if he gets infected with diseases. Parasitic worms and protozoa infections are the common conditions that cause child malnutrition in the majority of developing countries.

Malnutrition and disease conditions are self-rein forcing. Malnutrition makes the body more susceptible to disease by weakling the body immunity, and disease predisposes our body for malnutrition by reducing food intake, affecting digestion and nutrient absorption, and disturbing the body metabolism.

B. The Underlying Causes of Malnutrition

The causes for inadequate dietary intake and disease can be numerous. The underlying causes for malnutrition are context-specific and classified in to three interrelated groups as follows.

- Insufficient food availability and access
- Inadequate care for children and mothers
- Insufficient health services and inadequate provision of a healthy environment (e.g. clean water and sanitation).

To ensure nutrition security at the household and community level these three groups of underlying factors should be addressed. To remain nutrition secured a household needs to have a sustainable access to adequate foods (food secured); children in the household needs to get optimal level of feeding and maternal care from parents (optimal child Care); the household members need to have sustainable access to improved health care, water and sanitation services. Ensuring nutrition security therefore is not a one or few sectors responsibility but, the responsibility of many different sectors working in collaboration both at national and local levels.

C. Basic Causes of Malnutrition

The major *basic* causes of malnutrition include economic, technological, political, cultural, and institutional structures and processes, the means of control of physical resources, and the level of human development. These basic causes are very complex and diffused to different sectors. Improved education and economic status, political commitment, and evidence based and locally specific development policies will contribute for improved nutritional outcomes in a society.

The three categories of causes of malnutrition function synergistically with each other. It is also important to recognize that there are horizontal cause and effect relationships at all levels, although these linkages are somewhat more obvious for the underlying causes, the food-care-

health triad. The following framework of causes of malnutrition depicts these vertical and horizontal relationships of causes at different levels.

2.2.3Consequence of malnutrition

Malnutrition has a series of public health consequences that diminish the individual quality of life and the prospects for socioeconomic progress. The impacts of malnutrition can be reflected at the individual, household, and community level. Malnutrition harms both physical and cognitive development. Poor health status, intergeneration cognitive deficits, and reduced economic productivity and growth are some of the impacts of malnutrition. Children and mothers usually suffer the most because many nutrients are critical for normal growth and development. Malnutrition in pregnant mothers causes intra-uterine growth retardation of the fetus leading to low weight at birth and lower chance of survival. Long time malnourishment deprives our body from the nutrients for proper health and development and makes us vulnerable to infection and disease. Without timely and proper treatment, severe forms of malnutrition in children lead to death. Consequences of malnutrition are described below:

A. Susceptibility to mortality (death)

Stunting and other forms of under nutrition are clearly a major contributing factor to child mortality, disease and disability. A severely stunted child faces a four times higher risk of dying, and a severely wasted child is at a nine times higher risk. Specific nutritional deficiencies such as vitamin A, iron or zinc deficiency also increase risk of death. Child under nutrition predisposes and aggravates infection and death from infectious diseases such as diarrhea, measles, and pneumonia. Depending on the socioeconomic development status of countries under nutrition accounts for 33-60% child deaths. Over nutrition also increases the risk of infection and death from non-communicable disease such as diabetes, cancer and cardiovascular disorders.

B. Susceptibility to acute morbidity (disease)

Compared with people with adequate nutrition, those with poor nutritional status (determined by anthropometry) are more likely to contract diarrheal, malarial and respiratory infections and more likely to suffer from these illnesses for longer duration. They are also more likely to develop devastating consequences from these common infections.

C. Poor cognitive development

Stunting is associated with poor school achievement and poor school performance. Specific nutrient deficiencies such as iodine and iron impaired cognitive development. Malnourished children score poorly on tests of cognitive function and have poorer psychomotor development and poor fine motor skills. Ethiopian profiles Team & AED/Linkages 2005 concluded that stunted children have, on average, an IQ that is 5 points lower than normal children. Therefore, improving nutritional status of members of the community is central is a development issue.

D. Decreased economic productivity

Under nutrition early in life clearly have major consequences for future educational, income and productivity outcomes. Malnourished individuals will remain unhealthier and physically unfit than individual with optimal nutritional status. Malnourished people will have less motivation and encouragement, and will be ineffective in agricultural and related business activities. Malnourished people will not experience prompt and complete recovery from infectious diseases, and often may stay longer off-works in critical production seasons. Reduced school attendance and educational outcomes result in diminished income-earning capacity in adulthood. All these condition will result in less productivity and innovation which leads to poor socio-economic development of countries. Malnutrition therefore is a bottleneck for economic and human development.

E. Susceptibility to chronic diseases in later life

Children experiencing malnutrition in their early life will have increased risk of overweigh and obesity. Different researches are proving that stunted children will suffer from disproportionate and rapid weight gain later in life. Poor fetal growth, small size at birth and continued poor growth in early life followed by rapid weight gain later in childhood raises the risk of coronary heart disease, stroke, hypertension, and diabetes (type II). Attaining optimal growth before 24 months of age is desirable; becoming stunted but then gaining weight disproportionately after 24 months is likely to increase the risk of becoming overweight and developing other health problems.

2.3 Promoting measures to overcome malnutrition

2.3.1. Importance of adequate diet

Adequate intake is known about the precise nutritional needs of infants, nearly all intake recommendations for babies younger than 12 months are given as AIs. For all age and gender groups, the recommendations for water, vitamin K, potassium, sodium and dietary fiber are also in the form of AIs. In general, AI recommendations are based on the amounts thought to maintain and protect health.

Recommended Dietary Allowance (RDAs) are the recommended amounts of nutrients most people need to stay healthy. As with AIs, the RDA of a specific nutrient varies depending on age and gender. RDAs have been established for carbohydrates, protein, nearly all vitamins and most minerals for all age and gender groups apart from infants.

2.3.2. Importance of balanced diet

A balanced diet needs to contain foods from all the main food groups in the correct proportions to provide the body with optimum nutrition. It should also be made up of the correct number of calories to maintain a healthy weight, and be low in processed foods. Every person is different and hence the correct diet for health may vary from person to person.

A balanced diet is one that provides the body with all the essential nutrients, vitamins and minerals required to maintain cells, tissues and organs as well as to function correctly. A diet that is lacking in nutrients can lead to many different health problems ranging from tiredness and lack of energy to serious problems with the function of vital organs and lack of growth and development

2.4. Making awareness creation programs

Women and girls worldwide face many inequities and constraints, often embedded in norms and practices and encoded in legal provisions. Some laws, such as those governing access to land, include inequitable and exclusionary provisions, thus institutionalizing discrimination. Where such legislative measures are not in place, customary rules and practices often have restrictive consequences for women limiting their access to key resources such as land and credit, and affecting household food security and nutrition. Not only are women and girls affected directly, but members of their households and communities are also affected inter- and intra-generationally.

Women and girls are affected through **two main channels.** One is the limits on their access to education and employment opportunities, which curtails their economic autonomy and weakens their bargaining position within the family. Their weakened bargaining position translates into little or no voice in household decisions, differential feeding and care giving practices favoring boys and men, food and nutrition insecurity, and lower health and nutrition outcomes.

Second, the discrimination they face not only exposes women to material deprivation, it also makes it more difficult for them to fulfill their vital roles in food production, preparation, processing, distribution, and marketing activities. Challenging the constraints women face must therefore be treated as a key component in the fight against hunger and malnutrition. Such an approach is achievable, it is inexpensive, and it can be highly effective. The cost to society of not acting urgently and more decisively will be considerable.

However, more than good intentions are required to remove the inequities and obstacles facing women and girls. Amendment of legislation that is gender-discriminatory by itself sufficient. Social and cultural norms and the gendered division of roles they impose must be challenged. Empowerment of women is required. This means a greater role for women in decision making at all levels, including the household, local communities, and national parliaments. Women's empowerment is not only a priority goal in itself but an intrinsic human right already recognized such pledges and commitments by governments. It is recognized also because it has instrumental value and is a condition for society to benefit from the increased contribution of women to food security and adequate nutrition. Society urgently needs the full potential of women's contribution, but it can only materialize with wider recognition and acknowledgment—by women and men alike—of its benefits to all society, and the vital importance of reshaping social structures.

Global challenges confronting the world in the form of food price increases, economic and financial crises, and the ecological crisis are then reviewed. The relevance of these developments to the gender dimension is then discussed, particularly their impact on women and girls.

Cost elderly have difficulties in managing food safety and nutrition by themselves. Various nutrition educations for the elderly have been developed, but food safety and nutrition education program and educational tools for the elderly are very limited.

Awareness raising is understood to be a constructive and potentially catalytic force that ultimately leads to a positive change in actions and behaviors. These changes may be sought by stakeholders in individuals, groups, organizations, communities or societies. To raise (public) awareness of a topic or issue is to inform a community's attitudes, behaviors and beliefs with the intention of influencing them positively in the achievement of a defined purpose or goal:

Nutrition promotes strengthening dietary diversity and healthy eating habits and food preparation to prevent malnutrition. Changes in availability and access to food should not negatively affect dietary composition or intake. Cultural values as well as dietary and eating habits should be taken into account when making policy and program. Education and awareness raising It focuses on strengthening education and training opportunities, especially for girls and women, to support sustainable development. Human rights education should be integrated into school curricula and officials and members of civil society trained to participate in the progressive realization of the right to food. Support for vulnerable groups it emphasizes the need to identify the food insecure, along with reasons for their food insecurity, and to devise measures to immediately and progressively provide access to adequate food. Discrimination against specific groups, especially women and children, should be overcome and assistance should be targeted effectively.

Self-Check – 2	

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is malnutrition? (3pts)
2. What is protein-Energy Malnutrition? (3pts)
3. What are forms of malnutrition? (4pts)
4. What is the cause of malnutrition? (4pts)
5. What is the Consequence of malnutrition? (4pts)
6. What is the Importance of balanced diet? (4pts)
7. What is importance of adequate diet? (3pts)

Note*:* **Satisfactory rating - 20 points and above** **Unsatisfactory - below 20 points**

You can ask you teacher for the copy of the correct answers

LG #36	LO #3- Identify the role of agriculture in nutrition

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Recognizing and promoting the role of agriculture for food Varity
- Describing the contribution of agriculture sector in nutrition sensitive intervention
- Identifying and communicating nutrition sensitive agricultural practices

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Recognize and promote the role of agriculture as source of variety foods
- Describe the contribution of agriculture sector in nutrition sensitive intervention
- Identify and communicate nutrition sensitive agricultural practices

Learning Instructions:

Read the specific objectives of this Learning Guide.

Follow the instructions described below.

Read the information written in the information Sheets

Accomplish the Self-checks

Perform Operation Sheets

Do the “LAP test”

Information Sheet 3

3.1 Recognizing and promoting the role of agriculture for food Varity

3.1.1. Nutrition sensitive intervention

Acceleration of progress in nutrition will require effective, large-scale nutrition-sensitive program that address key underlying determinants of nutrition and enhance the coverage and effectiveness of nutrition-specific interventions. The four sectors—agriculture, social safety nets, early child development, and schooling. Enhancing access to diverse diets in poor populations and fostering women's empowerment. Nutritional effect of agricultural program is inconclusive—except for vitamin A from bio fortification of orange sweet potatoes—largely because of poor quality evaluations. Individual studies show some effects on younger children exposed for longer durations, but weaknesses in nutrition goals and actions, and poor service quality probably explain the scarcity of overall nutritional benefits. Combined early child development and nutrition interventions show promising additive or synergistic effects on child development—and in some cases nutrition—and could lead to substantial gains in cost, efficiency, and effectiveness. Ways to enhance program nutrition-sensitivity include: improve targeting; use conditions to stimulate participation; strengthen nutrition goals and actions; and optimize women's nutrition, time, physical and mental health, and empowerment. Nutrition-sensitive program can help scale up nutrition-specific interventions and create a stimulating environment in which young children can grow and develop to their full potential.

I. Diversification of Agricultural production

It is the act of introducing variety especially in food from agricultural activities in our case. Agricultural activities like in crop or animal farming require diversification in product. Diversification of foods grown by a household in its turn improves dietary diversity and nutrition outcomes.

A. Diversification of crop production

Diversification of agriculture refers to the shift from the regional dominance of one crop to regional production of a number of crops, to meet ever increasing demand for cereals, pulses,

vegetables, fruits, oilseeds, and fibers etc. It aims to improve soil and human nutrition health and a dynamic equilibrium of the agro-ecosystem. Crop diversification takes into account the economic returns from different value-added crops and nutritional improvement. It is different from the concept of multiple cropping or succession planting in which multiple crops are planted in succession over the course of a growing season. It implies the use of environmental and human nutrition sources to grow a mix of crops with complementary marketing opportunities, and it implies a shifting of resources from low value crops to high value crops, usually intended for human consumption such as fresh market fruits and vegetables. With globalization of the market, crop diversification in agriculture means to increase the total crop productivity in terms of quality, and quantity.

Crop diversification may occur as a result of government policies. Crop diversification is the outcome of several interactive effects of many factors:

- Environmental factors including irrigation, rainfall, temperature, and soil fertility.
- Technology-related factors including seeds, fertilizers and water technologies, but also those related to marketing, harvest, storage, agro-processing, distribution, logistics, etc.

B. Diversified animal production

These integrated farming systems involve several subsystems including crops, animals and fish. These synergistic interactions have a greater total effect than the sum of the individual effects on nutrition.

3..2 Describe the contribution of Agriculture sector in nutrition intervention

Agriculture has a unique and critical role in improving nutrition outcomes. Agriculture's unique role in food production and consumption makes it indispensable sector for food and nutrition security. Improved agricultural productivity and food security are vital for nutrition security.

The following are some of the reasons explaining why agriculture is important sector for nutrition security.

A. Agriculture products food and affects consumption

Agriculture sector directly affects food production and consumption of nutritious foods needed for healthy and active lives. Physical and economic access to adequate and affordable nutritious

food is primarily a function of the agriculture sector through increased production and improved post-harvest storage and processing.

B. Majority of undernourished people in the world is involved in Agriculture

Agriculture has the most direct influence on the majority of households in the world where undernourished individuals reside. Among the world poor peoples, 75% are rural, and most of those are smallholder farmers. Nutrition is one of the development activities of this population having an enormous potential to impact on factors that constrain human capital and well-being. For example, agriculture extension workers have direct and ongoing contact with smallholder farmers, and therefore have a unique opportunity to strengthen messages regarding consumption of nutritious foods.

C. **Agricultural growth is more pro-poor**

Agriculture-led growth and development is more pro-poor than non-agricultural-led growth; thereby increasing agriculture's potential to improve nutrition. Agricultural growth is at least twice as effective in reducing poverty as GDP growth originating outside agriculture and is therefore pro-poor. Agriculture-led growth has led to faster (though still insufficient) declines in under nutrition than non-agricultural growth.

D. A large percentage of rural women are employed in the formal/informal agriculture

Women contribute over 50% of the agriculture labor force in many developing countries. Agricultural interventions will have a large direct impact on nutrition outcomes for the entire household through increased discretionary income and reduced workloads for women.

E.Some agriculture projects could cause unintended nutritional harm.

Nutritional status of household members is strongly influenced by clean water, disease occurrence, food quality, and child care practices. Several unintended but related consequences, such as reducing women's available time for child care, have been documented as arising from some agricultural interventions.

3.2.1 The role of Nutrition for Agriculture

Under nutrition is intimately linked with both poverty and smallholder farmer well-being and is a major constraint to rural development among farmers. When farmers are undernourished, they are less productive. Furthermore, undernourished children are less likely to attend school. These children in smallholder families are less likely to transition out of small-scale farming, and thereby fail to get out of the poverty trap. Improving nutrition can benefit agriculture sector performance at least in the following four ways:

A. Improved nutrition means improved smallholder farmers well-being.

Reducing malnutrition among the world's most vulnerable people is the main objective of poverty reduction programs of different international donor and civil society organizations. Most of these agriculture program and projects have the goal of improving the well-being of farmers and poor people living in rural areas, and this will be possible only when the nutritional status of the community members is improved.

B. Nutrition investments improve human capital and have a positive impact on agricultural productivity.

Smallholder farmers are often among the populations most likely to be malnourished. Women smallholder farmers, who form a majority of the agricultural labor force in many cases, are disproportionately likely to be malnourished. Under nutrition accounts for the majority of

maternal and child deaths and this is naturally reflected in communities with poor agricultural productivity. Evidence shows that when farmers are malnourished, they are less productive. Iron deficiency anemia results in lower work capacity. In an agricultural context, anemia has been shown to reduce productivity by 17 %. Overall, malnutrition diminishes lifetime earnings by 10% or more, and reduces GDP by 2-3% in the worst affected countries. Investments in human capital, including nutrition, consistently have been shown to increase productivity.

C. Nutrition knowledge may be an added incentive for transition to a diversified production model.

Transition of households to diversified production is an often-cited goal for the agricultural sector to raise household income, minimize risk exposure, and promote ecosystem resilience. Nutrition education and information can be leveraged to improve both supply and demand for high-value vegetables, fruits, legumes, fish, and livestock products. Nutrition knowledge among farmers could be an additional incentive for farmers to diversify their production model to include nutritious, high-value crops, beyond the widely recognized incentives to reduce risk exposure to weather, biotic stress, or price shocks. Additionally, nutrition knowledge among consumers can increase demand for high-value nutritious products substantially, and increase income for farmers who grow them.

D. Nutrition sensitivity promotes agricultural productivity through better women participation and empowerment.

Adopting a nutrition lens is likely to improve women's participation and empowerment, with important effects on income and productivity, in addition to nutrition and gender equity. Approximately half the world's farmers are women. In some countries, the ratio is much higher. In Southeast Asia, women supply up to 90% of the labor required for rice cultivation. Women account for 70% of farm labor and perform 80% of food processing in Africa.

Retaining female participation may improve if agriculture projects adopt nutrition sensitive approaches. Apart from their livelihoods, women farmers' main time demands come from infant and child care and feeding. Agricultural projects that do not account for women's major role in child care are likely to see female participation in projects flag. Structuring programs so women with small children can meet care needs for their children can increase female participation and

improve project outcomes. If women had the same access to productive resources as men, they could increase yields on their farms by 20-30%, raising total agricultural output in developing countries by 2.5-4%, and reducing the global number of hungry people by 12-17%.

3.2.2 Perform nutrition sensitive agricultural practice

Food is produced through agriculture, yet many of the world's undernourished children live in families who farm for their livelihood. One key reason for this irony is that much agricultural production focuses on staple crops, such as rice, maize and cassava. These foods provide energy but are lacking the variety of nutrients essential to healthy growth and development. Interventions designed to improve agriculture often focus on increasing the yield of these staple crops. A much greater impact on nutrition can be achieved by shifting the main focus to increasing the variety of nutrient-rich foods produced and consumed by smallholder farm families. This requires explicitly building nutrition objectives into agriculture program designs, empowering women smallholder farmers, and incorporating nutrition education with agriculture interventions.

3.1 Identifying and communicating nutrition sensitive agricultural practices

Under nutrition is intimately linked with both poverty and smallholder farmer well-being and is a major constraint to rural development among farmers. When farmers are undernourished, they are less productive. Furthermore, undernourished children are less likely to attend school. These children in smallholder families are less likely to transition out of small-scale farming, and thereby fail to get out of the poverty trap. Improving nutrition can benefit agriculture sector performance at least in the following five ways:

A. Improved nutrition means improved smallholder farmers well-being.

Reducing malnutrition among the world's most vulnerable people is the main objective of poverty reduction programs of different international donor and civil society organizations. Most of these agriculture program and projects have the goal of improving the well-being of farmers and poor people living in rural areas, and this will be possible only when the nutritional status of the community members is improved.

B. Nutrition investments improve human capital and have a positive impact on agricultural productivity.

Smallholder farmers are often among the populations most likely to be malnourished. Women smallholder farmers, who form a majority of the agricultural labor force in many cases, are disproportionately likely to be malnourished. Under nutrition accounts for the majority of maternal and child deaths and this is naturally reflected in communities with poor agricultural productivity. Evidence shows that when farmers are malnourished, they are less productive. Iron deficiency anemia results in lower work capacity. In an agricultural context, anemia has been shown to reduce productivity by 17 %. Overall, malnutrition diminishes lifetime earnings by 10% or more, and reduces GDP by 2-3% in the worst affected countries. Investments in human capital, including nutrition, consistently have been shown to increase productivity.

C. Nutrition knowledge may be an added incentive for transition to a diversified production model.

Transition of households to diversified production is an often-cited goal for the agricultural sector to raise household income, minimize risk exposure, and promote ecosystem resilience. Nutrition education and information can be leveraged to improve both supply and demand for high-value vegetables, fruits, legumes, fish, and livestock products. Nutrition knowledge among farmers could be an additional incentive for farmers to diversify their production model to include nutritious, high-value crops, beyond the widely recognized incentives to reduce risk exposure to weather, biotic stress, or price shocks. Additionally, nutrition knowledge among consumers can increase demand for high-value nutritious products substantially, and increase income for farmers who grow them.

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E. Perform nutrition sensitive agricultural practice

Food is produced through agriculture, yet many of the world's undernourished children live in families who farm for their livelihood. One key reason for this irony is that much agricultural production focuses on staple crops, such as rice, maize and cassava. These foods provide energy but are lacking the variety of nutrients essential to healthy growth and development. Interventions designed to improve agriculture often focus on increasing the yield of these staple crops. A much greater impact on nutrition can be achieved by shifting the main focus to increasing the variety of nutrient-rich foods produced and consumed by smallholder farm families. This requires explicitly building nutrition objectives into agriculture program designs, empowering women smallholder farmers, and incorporating nutrition education with agriculture interventions.

Self-Check – 3	

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is diversification of agriculture ?(5pts)
2. What are Crop diversification factors? (5pts)
3. Why agriculture is important sector for nutrition security? (5pts)
4. What is the importance nutrition for agriculture sector performance? (5pts)
5. Describing the role of Nutrition for Agriculture (5pts)

LG #37	LO #4- Demonstrate diversified Agricultural food production and consumption techniques

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying and discussing importance of diet diversification
- Identifying and demonstrating techniques of diversified food production
- Assessing and implementing techniques of enhancing the nutrient content of foods
- Identifying utensils and demonstrating cooking techniques
- Selecting and using PPE
- Demonstrating balanced and nutrient dense diet preparation

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify and discuss importance of diet diversification
- Identify and demonstrate techniques of diversified food production
- Assess and implement techniques of enhancing the nutrient content of family foods
- Identify utensils and cooking techniques demonstrated for specific agricultural products
- Select and use PPE in accordance to OHS requirement and code of ethics
- Demonstrated balanced and nutrient dense diet preparation

Learning Instructions:

Read the specific objectives of this Learning Guide.

Follow the instructions described below.

Read the information written in the information Sheets

Accomplish the Self-checks

Perform Operation Sheets

Do the “LAP test”

Information Sheet 4

4.1 Identifying and discussing importance of diet diversification

In addition to nutritional requirement, economic growth, demographic change, urbanization, and global media and mass marketing have stimulated rapid changes and diversification in food consumption patterns. Diversification into high-value food commodities led to the development of innovative supply chains, opening new prospects for augmenting income, generating employment, and promoting exports. Food security, moreover, improved in regions in which agricultural diversification took place in favor of horticulture, animal husbandry, and aquaculture.

4.2 Identifying and demonstrating techniques of diversified food production

Cooking techniques are a set of methods and procedures for preparing, cooking and presenting food. Good techniques also take into account economical use of food and cooking fuel resources, as well as food safety. The techniques used in preparing a dish can affect what the dish is like as much if not more than the ingredients themselves. For this reason, many cooks believe it is more important to learn cooking techniques than to learn to follow recipe.

Cooking techniques are different from recipes in that:

- A recipe is a list of ingredients with step-by-step directions, while a cooking technique focuses on how to prepare one of the items in the list of ingredients for the recipe (e.g., chopping an onion) or on the method used to cook the assembled dish;
- A recipe is an end in itself, whereas a cooking technique (e.g. chopping an onion) is transferable from recipe to recipe and can even be used without a recipe;
- Very experienced cooks at home tend to not use recipes, and instead base their cooking entirely upon their knowledge of cooking techniques.

The broad categories of techniques in cuisine for prepping food are: beating, chopping, creaming, crimping, deboning, de-seeding, dicing, filleting, glazing, grating, peeling, rolling, shredding, skinning, slicing, tenderizing and testing.

4.3 Assessing and implementing techniques of enhancing the nutrient content of foods

4.3.1. Fortification

Food fortification or **enrichment** is the process of adding micronutrients (essential trace elements and vitamins) to food. It may be a purely commercial choice to provide extra nutrients in a food, which aims to reduce the number of people with dietary deficiencies within a population. Diets that lack variety can be deficient in certain nutrients. Sometimes the staple foods of a region can lack particular nutrients, due to the soil of the region or because of the inherent inadequacy of the normal diet. Addition of micronutrients to staples and condiments can prevent large-scale deficiency diseases in these cases.

Fortification refers to "the practice of deliberately increasing the content of an essential micronutrient, i.e., vitamins and minerals (including trace elements) in a food irrespective of whether the nutrients were originally in the food before processing or not, so as to improve the nutritional quality of the food supply and to provide a public health benefit with minimal risk to health,"

As outlined by the FAO, the most common fortified foods are:

- Cereals and cereal based products
- Milk and Milk products
- Fats and oils
- Tea and other beverages
- Infant formulas

4.3.2. Germination

Germination is a process in which small shoots come out of the pulse or cereal when these are kept with small amount of water. The grains and pulses to be sprouted need to be soaked in just

enough water so that all of it is absorbed. If the extra water in which they are soaked is thrown away, a lot of nutrients are lost.

Grains like wheat, barley, sorghum, etc. can also be sprouted. These grains can then be dried in shade and roasted lightly. They can be ground and used in many dishes. Pulses are also sprouted first and then steamed and consumed. The time and water which each grain or pulse needs for soaking and sprouting is different. Normally 8-16 hours are needed for soaking and 12-24 hours for sprouting. The cloth in which the soaked dhal is tied should be kept moist all the time. When sprouting is followed by fermentation the vitamin content becomes much more improved.

Germination helps you to:

- Increase the digestibility of foods:

✓Some carbohydrates and proteins are broken down into smaller and easily digestible forms.

✓Grains and pulses become soft after sprouting, so they take less time for cooking and are easy for you to digest.

- Increase the nutritive value of food with no additional cost.

Some vitamins and minerals become more when foods are germinated. Vitamin B becomes almost double in quantity while vitamin C increases almost 10 times.

4.3.3. Fermentation

Fermentation is a process in which some micro-organisms are added to the food. They change nutrients already present in the foods into simpler and better forms and also make other new nutrients. Fermentation makes the dough rise and become almost double in quantity. During fermentation the micro-organisms use up some of the nutrients present in the dough and change them into other better-quality nutrients. They also make some new nutrients.

- Milk Curd, bread, 'Injera' etc. are all examples of fermented foods.

Advantages of Fermentation:

Fermentation improves the digestibility of foods. The micro-organisms which cause fermentation break the proteins and carbohydrates into smaller parts, which are easier to digest.

- During fermentation of cereals and foods like peas, beans etc. the minerals, calcium, phosphorus, and iron are changed into better quality ones. These are then easily absorbed by the body.
- Fermented foods become spongy and soft and are liked by children and adults.

4.3.4. Roasting

Roasting is a cooking method that uses dry heat where hot air envelops the food. Roasting can enhance flavor of the food. Roasting uses indirect, diffused heat (as in an oven), and is suitable for slower cooking of meat in a larger, whole piece. Meats and most root and bulb vegetables can be roasted.

With roasting, direct heat is applied to the food. The heat seals the outside part of the food and the juice inside the food cooks the food. Roasting is mainly used when cooking fleshy food like fish, meat or chicken. When heat is applied to the outer covering of the food, it seals it up thereby trapping all the juices inside the food. The action of direct heating, heats up the juices inside the food, which then cooks the food.

4.3.5. Cooking

In cooking, there are some basic methods of cooking that are used. These commonly used basic cooking methods are divided into two general groups. The groups are: Dry heat cookery methods and moist heat cookery methods.

- **Dry heat Cookery Methods**

In dry heat cooking methods, the food being cooked does not use water to cook the food. The food is left dry and heat is applied to cook the food. Such methods of cooking are: baking, steaming, grilling, and roasting. When heat is applied to the food, the food cooks in its own juice or the water added to the food during its preparation evaporates during the heating process and this cooks the food. Heat is applied directly to the food by way of convection thus making the food to get cooked.

- **Moist Heat Cookery Methods**

In moist heat cookery methods, liquid is used as a medium to cook the food. Such medium could be water, coconut cream or oil. These liquids are added to the food before heat is applied to it or sometimes heat is applied to the liquid before the food is added into the cooking utensils to be cooked. The moist heat cookery methods include: boiling, stewing, shallow frying, deep frying, barbequing and basting. All these moist heat cooking methods use liquid to cook the food in.

4.4 Identifying utensils and demonstrating cooking techniques

Contaminated foods eaten at home or in public eating places may appear to be safe or may have evidence of contamination. If food, beverages, dishes or utensils are obviously unclean, if the food looks or smells bad, if a food that is meant to be eaten hot is served cool or lukewarm, if the environment where the food is served has flies, cockroaches or evidence ofrodents or if food servers have dirty hands and clothes, then it is likely that the food being served is contaminated.

- **Baking Pan, Small Ceramic: -** We use this 7-inch square ceramic baking pan in both our conventional and microwave ovens. We use it for baking small cakes and other cooking needs where a cover is not required. Baking Pan - Silicone This non-stick silicone rubber baking pan is ideal for baking cakes and other light weight recipes.



Bowls, Glass Baking, Mixing, and Serving We use these glass baking bowls mostly when we need to bake something in our conventional or microwave oven that does not require a cover. The other nice feature of these bowls is that you can mix together the ingredients in these bowls



Bowls, Stainless Steel Mixing We use this set of stackable stainless steel mixing bowls almost every day. They are light weight, and almost indestructible. They are also very easy to clean. If you're only going to have one type of mixing bowls.



Brush, Vegetable A vegetable brush is a very handy tool to have around the kitchen. It can help scrub the dirt off of root vegetables, and also double as a washing aid for cleaning up utensils.



Colander We should have this sturdy plastic colander in our kitchen have used it almost every day to wash and drain our salad vegetables. It also makes an excellent strainer for freshly cooked pasta as the hot boiling water does not soften the plastic. We also use this colander to wash and rinse dried and soaked beans.



Garlic Press There is nothing like the flavor of freshly crushed garlic



Juicers, Citrus This is an inexpensive plastic hand citrus juices, which will juice any citrus fruit from as small as a lime to as large as a grapefruit.



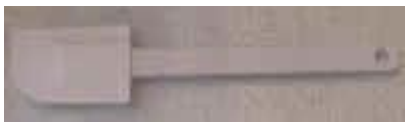
Juice, Lemon Lime This cast metal hand lemon lime juicer is generally considered to be a bar tool, but it is also great juice free pulp and seeds is desired. The half lemon or lime is then placed cut side down between the jaws of the juicer, and the handled are them squeezed over where you want the clear juice to flow



Measuring Cup, Liquid We prefer heat treated glass liquid measuring cups so that we can heat the contents in our microwave oven, when necessary. This particular cup is calibrated in both the English and metric systems of liquid measurement.



Pasta Pot With the pasta pot, the pasta never sticks to the bottom of the pot, and when it's cooked, all that is necessary is to lift out the inner pot and the water drains out.



Spatula, Rubber This is a heavy-duty rubber spatula. It is excellent for scraping ingredients from the surface of mixing containers and for some lighter duty mixing jobs.



Spoons, Large Cooking We prefer using these large plastic cooking spoons because of their one-piece construction. Metal spoons with wood or plastic handles have a tendency to get food caught in the joint between the metal and handles. The black spoon is for heavy duty cooking and mixing of stiff ingredients. The lighter duty cream colored spoon is good for rice and other soft and loose preparati

4.5 Selecting and using PPE

Personal protective equipment is equipment that protects workers from different damages and injuries.Therefore, when we select these equipments we should conduct process of selecting suitable PPE because:

- PPE is very important when building and maintaining structures.
- Where appropriate clothes for working outdoors, i.e., long trousers and a hat etc.
- Where thick protective gloves when required.

PPE will be determin by the type of activity being undertaken and may include

- work boots,
- gloves goggle
- overalls
- sun hat
- sunscreen lotion
- safety harness and hard hat.

Before starting work in a new area, the possible **risks** should be **evaluate**d. The working tools, methods, environment, the skills of the workers and so on should be evaluated, and all technical

and organizational measures should be planned. If the risks cannot be eliminated by those methods, PPE can be used to **improve** the protections. PPE can never be used as the only **preventive** method. It must be seen as a complementary means only.

4.6 Demonstrating balanced and nutrient dense diet preparation

A balanced diet provides the correct amounts of food energy and nutrients needed during the day to cover the dietary requirements of the person eating it. A balanced diet must be composed of a variety of different foods from different food groups so that it contains all the many macronutrients and micronutrients the person needs.

Cook vegetables quickly to preserve nutrients

The way we store, prepare and cook our food affects the nutrients in it. For example, some vitamin C and foliate are lost during cooking. Ways to reduce nutrient losses are:

- buying or picking vegetables and fruits on the day you use them and storing them in a cool place;
- cleaning and cutting vegetables and fresh starchy roots immediately before cooking;
- cooking vegetables in little water or with a stew until just tender; other cooking methods for vegetables that preserve nutrients are stir frying (i.e., frying very quickly over high heat), or sautéing (i.e., cooking in fat or oil in a pan or on a griddle);
- Eating food soon after cooking.

We absorb the vitamin A in plant foods better when the food is cooked (but not overcooked) and eaten with fat.

Families may cook and eat less often if fuel is scarce or expensive. Ways to save fuel include:

- using fuel-efficient stoves and cooking methods;
- using dry firewood;
- soaking legumes for several hours;
- cutting food into small pieces just before cooking;
- putting a tight-fitting lid on the pot;
- cleaning soot off pans;
- Putting out fires promptly.

- We all enjoy our meals if they are tasty and we eat them in a comfortable happy environment. Mealtime can be a time when families talk together, entertain guests and teach young children's good habits and customs. It is a time when parents can give children loving attention as they encourage them to eat.

Before sharing information with families, you may need to:

A. Find out. What foods are eaten at different meals?

- What types of snacks are eaten?
- Which foods need promoting?
- What the different foods eaten by different family member's e.
- How food is shared?
- What foods are eaten away from home?
- What the cooking facilities?
- Whether people have enough different foods to make healthy meals. If not, why not.
- What local recipes are used?

B. Prioritize. Decide which information is *most important* to share with groups or individual families.

C. Decide whom to reach. For example: people who prepare family meals, food vendors, cooks, and school-age children.

D. Choose communication methods. For example: discussions and demonstrations of meal planning with women's and other community groups and at schools; leaflets with recipes.

- To get proper nutrition from your diet you should consume the majority of your calorie

  - ✓ Fresh fruit
  - ✓ Fresh vegetable
  - ✓ Whole grains
  - ✓ Legumes
  - ✓ Nuts

Nutrient-dense foods and beverages provide vitamins, minerals, and other substances that may have positive health effects with relatively few calories. The term "nutrient dense" indicates that the nutrients and other beneficial substances in a food have not been "diluted" by the addition of calories from added solid fats, added sugars, or added refined starches, sodium, or by the solid fats naturally present in the food. Ideally, they also are in forms that retain naturally occurring

components, such as dietary fiber. All vegetables, fruits, whole grains, seafood, eggs, beans and peas, unsalted nuts and seeds, fat-free and low-fat milk and milk products, and lean meats and poultry - when prepared without adding solid fats or sugars - are nutrient-dense foods. For most Americans, meeting nutrient requirements within their calorie needs is an important goal for health. Eating nutrient-dense foods, in the recommended amounts, from each food group is the best approach to achieving this goal and building a healthy eating pattern.

Self-Check – 4	

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is the importance of diversification of diet? (3pts)
2. What is the difference between Cooking and recipes? (3pts)
3. What is Food fortification? (3pts)
4. What is germination? (3pts)
5. What is fermentation? (3pts)
6. What are the advantages of fermentation? (3pts)
7. What are nutrient dense foods? (4pts)
8. What are balanced diet foods? (3pts)

Note: **Satisfactory point** =20 and above **Unsatisfactory points** = below 20

Ask your teacher for the copy of the answer

LG #38	LO #5- Perform proper handling and storage of agricultural food products

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Explaining importance of hygiene
- Identifying storage facilities and supporting family holds
- Handling and storing agricultural products
- Demonstrating methods and techniques of handling and storing

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Explain importance of hygiene for nutrition
- Identified storage facilities and family holds supported in construction.
- Safe agricultural products handled and store
- Demonstrate methods and techniques of safely handling and storing agricultural products in accordance products requirement

Learning Instructions:

Read the specific objectives of this Learning Guide.

Follow the instructions described below.

Read the information written in the information Sheets

Accomplish the Self-checks

Perform Operation Sheets

Do the "LAP test"

Information Sheet 5

5.1 Explaining importance of hygiene

Food quality and safety are also affected by food hygiene, food handlers, people involved in food processing, those retailing the food and finally practices in the home. Certain codes and government inspections may help ensure some degree of safety, and education and knowledge of food hygiene by al] people will reduce the likelihood of contamination in the home. However, available facilities also influence food hygiene. Households that have poor facilities, no refrigeration, contaminated or inadequate water supplies or fuel shortages will find it more difficult to ensure food safety.

Proper hygiene is very important when it comes to food preparation. Without washing hands and kitchen tools, diseases may easily spread. Since cross-contamination is a major cause of food poisoning and can transfer bacteria from one food item to other foods, it is crucial to be aware of how it spreads so you will know how to prevent it.

Another essential tool to keep your kitchen clean is to install the right kitchen extractor and ventilation systems. Professional food handlers must understand and implement proper food

hygiene techniques. If you want to be a healthy and professional food handler, simply identifying the do's and don'ts alone is not enough.

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food borne illness. In this way Food Safety often overlaps with Food Defense to prevent harm to consumers. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer. In considering industry to market practices, food safety considerations include the origins of food including the practices relating to food labeling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning. In developed countries there are intricate standards for food preparation, whereas in lesser developed countries the main issue is simply the availability of adequate safe water, which is usually a critical item.

- **The five key principles of food hygiene, according to WHO, are:**
  - ✓ Prevent contaminating food with pathogens spreading from people, pets, and pests.
  - ✓ Separate raw and cooked foods to prevent contaminating the cooked foods.
  - ✓ Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
  - ✓ Store food at the proper temperature.
  - ✓ Do use safe water and raw materials.

5.1.1 Personal hygiene practices

Personal hygiene habits such as washing your hands and brushing and flossing your teeth will help keep bacteria, viruses, and illnesses at bay. "Practicing good body hygiene helps you feel good about yourself, which is important for your mental health. If you want to minimize your risk of infection and also enhance your overall health, follow these basic personal hygiene habits:

- **Bathe regularly.** Wash your body and your hair at regular intervals that work for you.

- **Trim your nails.** Keeping your finger and toenails trimmed and in good shape will prevent problems such as hang nail and infected nail beds.
- **Brush and floss.** Ideally, you should brush your teeth after every meal. At the very least, brush your teeth twice a day and floss daily.
- **Wash your hands.** Washing your hands before preparing or eating food, after going to the bathroom, after coughing or sneezing, and after handling garbage, goes a long way toward preventing the spread of bacteria and viruses.

5.1.2. Environmental Hygiene

Environmental hygiene and levels of living are needed, together with improvements in people's knowledge of disease transmission and prevention. Latrine construction has been on the agenda of health ministries, in many countries the prevalence (and sometimes also the intensity) of helminthes infections remains as high as ever. With huge continuing population increases, the numbers of persons infected rise. Generally, clean water, waste disposal and housing conditions are the major environmental hygiene practices.

5.2 Identifying storage facilities and supporting family holds

Food logistics is both a traditional domestic skill and is important industrially. Transport and storing of food as well as timely delivery to consumers is important in order to secure the procurement of food. Storing of food has several main purposes:

- Storage of harvested and processed plant and animal food products for distribution to consumers.
- Enabling a better-balanced diet throughout the year
- Reducing kitchen waste by preserving unused or uneaten food for later use
- Preserving pantry food, such as spices or dry ingredients like rice and flour, for eventual use in cooking
- Preparedness for catastrophes, emergencies and periods of food scarcity or famine
- Protection from animals or theft

5.2 Handling and storing agricultural products

5.3.1 Handling food products

Safe steps in food handling, cooking, and storage are essential to prevent food borne illness. You can't see, smell, or taste harmful bacteria that may cause illness. In every step of food preparation, follow the four steps of the Food Safe Families campaign to keep food safe:

- ✓ Clean — Wash hands and surfaces often.
- ✓ Separate — Do not cross-contaminate.
- ✓ Cook — Cook to the right temperature.
- ✓ Chill — refrigerate promptly

- **Storage**
  - ✓ Always refrigerate perishable food
  - ✓ Cook or freeze fresh poultry, fish, ground meats, and variety meats
  - ✓ Perishable food such as meat and poultry should be wrapped securely to maintain quality

- **Food storage area**
  - ✓ Food-poisoning bacteria grow and multiply fastest in the temperature danger zone between 5 °C and 60 °C. It is important to keep high-risk food out of this temperature zone.
  - ✓ Food-poisoning bacteria can grow and multiply on some types of food more easily than others. High-risk foods include:
  - ✓ Raw and cooked meat, including poultry such as chicken and turkey, and foods containing these, such as casseroles, curries and lasagna
  - ✓ Dairy products, such as custard and dairy based desserts like custard tarts and cheesecake
  - ✓ Eggs and egg products, such as quiche
  - ✓ Small goods such as hams and salamis
  - ✓ Seafood, such as seafood salad, patties, fish balls, stews containing seafood and fish stock
  - ✓ Cooked rice and pasta
  - ✓ Prepared salads like coleslaws, pasta salads and rice salads
  - ✓ Prepared fruit salads
  - ✓ Ready to eat foods, including sandwiches, rolls, and pizza that contain any of the food above.

- ✓ Food that comes in packages, cans and jars can become high-risk foods once opened, and should be handled and stored correctly.

5.3 Demonstrating methods and techniques of handling and storing

- **Storing food in the fridge**

Fridge temperature should be at 5 °C or below. The freezer temperature should be below -15 °C. Use a thermometer to check the temperature in your fridge.

- **Store raw food separately from cooked food**

✓ Raw food and cooked food should be stored separately in the fridge.

✓ Bacteria from raw food can contaminate cold cooked food, and the bacteria can multiply to dangerous levels if the food is not cooked thoroughly again.

✓ Always store raw food in sealed or covered containers at the bottom of the fridge.

✓ Keep raw foods below cooked foods, to avoid liquid such as meat juices dripping down and contaminating the cooked food.

- **Food preparation area**

✓ **Floors**: Floors should be made of material that is durable, easy to clean and slip resistant

✓ **Space in a kitchen:** There should always be enough space to allow high-risk food to be prepared on separate work surfaces. There must be enough room for different activities

✓ **Ventilation**: There must be adequate ventilation in a kitchen, it helps to reduce air temperature and relative humidity. This can be achieved by having easily opened windows or extractor fans. The amount of ventilation required can be determined by the amount and type of food that is to be cooked.

✓ **Windows**: Windows and other openings should be constructed in place that does not make them susceptible to accumulating dirt or grime.

✓ **Worktops**: Work surfaces need to be suitably hard wearing and preferably constructed of stainless steel or high-quality laminate. Heavily used work surfaces should be constructed of a material that is resistant to the formation of mould and has a finish that is not prone to flaking or the shedding of debris

Self-Check – 5	

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Short Answer Questions

1. What is food safety? (3pts)
2. Write five key principles of food hygiene? (5pts)
3. What is Food logistics? (3pts)
4. What are the main purposes Storing of food? (5pts)
5. What are the requirements of food preparation area? (4pts)
6. Where raw food and cooked food should be stored? (3pts)

Note: **Satisfactory rating –18 and above points** **Unsatisfactory - below 18 points**
You can ask you teacher for the copy of the correct answers

LG #39	LO #6- Document and report food production, consumption and difficulties

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Documenting diversified food production and consumption activities
- Reporting difficulties happened in the processes

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Document diversified food production and consumption activities
- Report difficulties happened in the processes to the respective authorities.

Learning Instructions:

Read the specific objectives of this Learning Guide.

Follow the instructions described below.

Read the information written in the information Sheets

Accomplish the Self-checks

Perform Operation Sheets

Do the “LAP test”

Information Sheet 6

6.1 Documenting diversified food production and consumption activities

- Documentation will:
- ✓ Prove that programs are effective and being completed as written;
- ✓ Demonstrate due diligence;
- ✓ Meet requirements for third party customer assessments/audits;
- ✓ Meet regulatory requirements;
- ✓ stablish a paper trail to improve the current food safety program.

It is important to understand the difference between a document and a record.

- **Documents**
  - ✓ Permanent
  - ✓ facility policies and work instructions
  - ✓ Define systems, processes and procedures
- **Record**
  - ✓ Fill activities as occur
  - ✓ Provide proof that policies were followed or activities performed
  - ✓ Demonstrate processes and procedures are being conducted as required

Follow these three general principles to develop records and documents

- Keep it short and simple use bullet pointsand flow diagrams instead of long sentences and lengthy paragraphs.
- Clarity is important. Step-by-step instructions are easily understood.
- Use a standardized, consistent format. Although different programs may need different documents and records, using a similar approach will help staff learn quickly.

Document or record must contain the following:

- Title
- Prepared by/issued by
- Creation/revision date
- Approved date
- Page number
- Approval signature

6.2 Reporting difficulties happened in the processes

Reports communicate information which has been compiled as a result of research and analysis of data and of issues. It is covering a wide range of topics, but usually focuses on transmitting information with a clear purpose, to a specific audience.It gives a spoken or written account of something that one has observed, heard, done, or investigated.

- When report
  - ✓ Food poisoning
  - ✓ Food contaminated
  - ✓ Lack of materials use
- If you see any of the abovementioned signs, you can report them to government agencies that are responsible for different parts of the food supply chain. In case you need to report hazardous or unusual meat, processed egg and poultry products.
  - ✓ The original packaging or container of the product.
  - ✓ Any foreign item you might have seen in the product.
  - ✓ Uneaten part of the food.
  - ✓ Refrigerate or freeze this so it does not spoil
- In case you want to make a complaint through the hotline, make sure you have the following information hand
  - ✓ The brand, product name and manufacturer name of the product.
  - ✓ The size of the packaging and the type of packaging.
  - ✓ The codes of the can or the package.
  - ✓ The location and the name of the store you bought the product.

Self-Check – 6	

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Give short Answer accordingly

1. What is record? (3pts)
2. What is documentation? (3pts)
3. What is report? (4pts)
4. When report(5pts)

Note: **Satisfactory rating –10 and above points** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

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