

**DIPLOMA IN REGISTERED NURSING  
E-LEARNING TRAINING PROGRAM**

**Course Title: Nutrition**

**Course Code: NTR 016**

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# **COURSE OVERVIEW**

## **INTRODUCTION TO THE COURSE**

Welcome to our course Nutrition. In the last course you learnt about psychology and nursing. We hope you now understand human behaviour and are well equipped to attend to the psychological needs of your clients. In this course you will learn about nutrition. As you may be aware, nurses need to have vast knowledge on nutrition and dietetics. This is because they have to educate patients and clients on the importance of good nutrition which is key to promoting health and the wellbeing of individuals. Therefore, this course aims at equipping you with the knowledge and skills you need to meet nutritional needs of your clients.

This course will begin by looking at the importance of nutrition and health.

## **COURSE OBJECTIVES**

By the end of this course, you should be able to:

- Describe the basics of nutrition and health
- Explain the applied nutrition assessment methods
- Discuss the First 1000 Most Critical Days of children's life
- Discuss the essential nutrition programmes in the health sector
- Describe the introduction to dietetics and their daily requirements
- Explain the special nutritional needs to different individual groups

## **COURSE CONTENT**

This course has six (6) main sections as follows:

### **Unit 1: Basics Of Nutrition And Health**

This unit looks at the common terms and principles of nutrition. The unit also looks at the importance of nutrition to growth and development and maintenance of health. In addition, the section also describes the different cultural aspect of nutrition and the nutritional assessments.

### **Unit 2: Applied Nutrition Assessment Methods**

In this unit, you will describe the types of nutrients e.g. carbohydrates, proteins, fats and vitamins including mineral salts. The section further looks at the different methods of food preservation, cooking and storage. In addition, the unit also looks at different food groups and pyramid and the essential nutritional programs in the health sector.

### **Unit 3: The First 1000 Most Critical Days**

In this unit, you will learn the First 1000 Most Critical Days in a life of children. It highlights the importance of nutrients in a growing child and Zambia is trying to do to mitigate the impact of under nutrition

### **Unit 4: Essential Nutrition Programmes In The Health Sector**

This unit defines terms used in dietetics and also looks at institutional feeding, nutrition education and counselling, dietary management for non-communicable diseases and nutrition in HIV/AIDS.

### **Unit 5: Introduction To Dietetics**

In this unit you will learn about food fortification and safety and also the link between safe motherhood and maternity leave. Further, you will also look at the code of marketing breast milk substitutes and the policy issues guidelines in public health.

### **Unit 6: Special Nutrition Needs**

The unit will look at special nutritional needs for the school children, the aged, chronically ill and the disabled people. Others include the lactating mothers, pregnant mothers and vegetarians. It is hoped that students will take interest in understanding these special groups of people

## ASSESSMENT

Your work in this course will be assessed as follows:

- Continuous assessment (**worth 40%**)
- Which comprises 2 tests (**20%**) and 2 assignments (**20%**).

A written final examination set by the institution in which you are enrolled for this diploma program (**worth 60%**)

## LEARNING TIPS

It will possibly take a minimum of 25 hours to work through this course. The apportioned time should be spent on studying the course and readings, doing the activities and self-help questions and completing the assessment tasks. Note that units are not of the same length, so make sure you plan and pace your work to give yourself time to complete all of them. For example unit 3, on special nutritional needs is bulky.

## Activities, Self-Help Questions And Case Studies

You will find activities, self -help questions and case studies in this course. These are part of a planned distance education programme. They are intended to help you make your learning more active and effective as you process and apply what you read. They will help you to engage with ideas and check your understanding. Make sure you write full answers to the activities, or take notes of the discussions.

## Further Reading

There is a list further at the end of the course. This includes books and articles referred to in the course and suggestions in case you wish to explore topics further. You are encouraged to read as widely as possible during and after the course, but you are not expected to read all the books on this list.

## UNIT 1.0 BASICS OF NUTRITION AND HEALTH

### 1.1: Unit Introduction

Hello dear learner, welcome to our first unit on nutrition and health. In this unit, you will learn about the definition of terms and the principles of nutrition. We shall also discuss the nutrition situation and common nutrition indicators in Zambia. In addition, you will also learn about the role of nutrition in health, growth and development and illness, cultural aspects of nutrition. Lastly, you will also look at the types of nutrients and methods of food processing. Let us start by reviewing our unit objectives.

### 1.2: Unit Objectives

By the end of this unit you should be able to:

- |    |  |
|----|--|
| 1. | Define key terms   |
| 2. | Outline the principles of nutrition  |
| 3. | Describe the nutrition situation in Zambia                                   |
| 4. | Describe the role of nutrition in health, growth and development and illness |
| 5. | Discuss the role of culture aspects in nutrition                             |
| 6. | Describe the types of nutrients  |
| 7. | Describe the methods of food processing                                      |

### 1.3: Definition Of Terms Used In Nutrition

The term nutrition is not new to you as you learnt about it in high school biology, food and nutrition. Take 2 minutes to think about it and then complete the following activity.

### Activity 1.1

Write down the meaning of the following terms in your notebook:

- Nutrition
- Health

Well done! Now compare your answers with the definitions we will discuss in the following section **Nutrition**

This is the study of foods and how our bodies use them. It is concerned with how food is produced, processed, handled, sold, prepared, stored, shared and eaten. It is also concerned with what happens to food in the body, i.e. how it is digested, absorbed and used.

### **Health**

Health is a state of complete physical, social, mental well-being and not merely the absence of disease or infirmity.

**Let us look at other terms used in nutrition and health.**

**Food-**Food is any solid or liquid that provides nourishment to the body.

**Nutrient-** A nutrient is a substance that must be consumed as part of the diet to provide a source of energy, to build tissues and to keep healthy.

**Malnutrition-**is a condition which results from insufficient or excessive intake of nutrients.  
**SUMMARY**



We have now come to the end of this unit Where we looked at the definition of terms used in nutrition these are health ,nutrition, nutrient, food and malnutrition a condition arising under feeding or overfeeding,

## **SELF TEST**

1.....is a state of complete physical, social, mental well-being and not merely the absence of disease or infirmity.

- (a) Health
- (b) Mental health
- (c)Malnutrition
- (d) Substance

2. ....is the study of foods and how our bodies use them. It is concerned with how food is produced, processed, handled, sold, prepared, stored, shared and eaten.

- (a) Foods
- (b) Nutrients
- (c)Nutrition
- (d)Social

3. .... is any solid or liquid that provides nourishment to the body.

- (a) Nutrition
- (b) Food
- (c)Body
- (d)Nutrients

4..... is a substance that must be consumed as part of the diet to provide a source of energy, to build tissues and to keep healthy.

- (a) Nutrient

- (b) Shared
- (c) Stored
- (d) Malnutrition

5.....is a condition which results from insufficient or excessive intake of nutrients.

- (a) Cultural
- (b) Nutrients
- (c) Marasmus
- (d) Malnutrition

#### **Answers to self test**

- 1. A
- 2. C
- 3. B
- 4. A
- 5. D

***We have defined the common terms used in nutrition, now we will look at the principles of nutrition.***

### **1.4: Overview Of Principles Of Nutrition**

Before you learn about the principles of nutrition, let us start with the basics. What is a principle? Let us start with your understanding of this term. Do the following activity.

## Activity 1.2

Write down the meaning of the word “principle” in your notebook

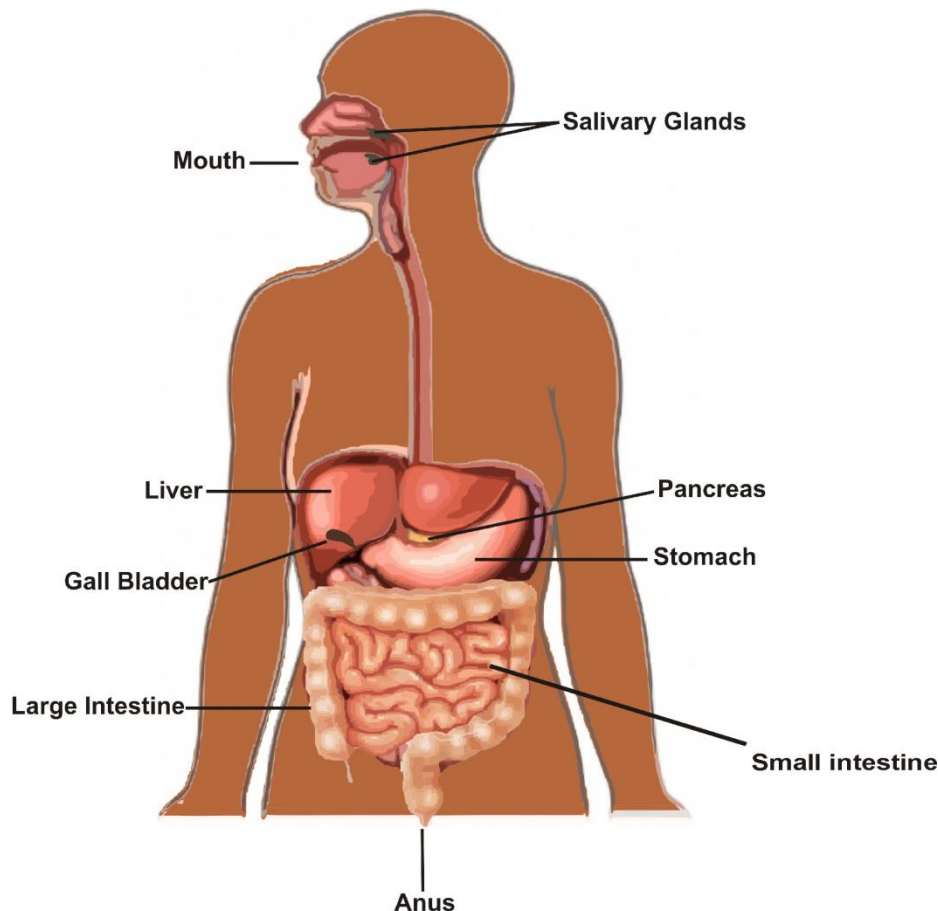
Good try! A principle is a general rule or belief that serves as a foundation for a system of beliefs.

**The following are the principles of nutrition:**

- **Sources of food-** human beings can adapt to eating anything, whether mineral, vegetable or animal. But simply because something can be eaten does not mean that this may be done without risking good health. As much as we obtain food by buying it from the market place and by growing it ourselves, we can further classify this food into its various food sources as follows:
  - Minerals- e.g. water and salt.
  - Animals- e.g. meat of various aquatic (from the sea) and land animals can be used as food.
  - Vegetables-these foods are the healthiest and have the most healing properties. Various types of vegetables can be used as food e.g. higher plants; which are foods that are part of the plant; (fruit, seed, bulb, leaves, roots) seaweed, and fungi.
- **Nutrients**-these are substances that must be consumed as part of the diet to provide a source of energy, to build tissues and to keep healthy.

Examples of nutrients include: carbohydrates, proteins, fats, vitamins and minerals.

- **Digestion-** is a series of chemical and physical changes by which food is broken down in preparation for absorption from the intestinal tract into the blood stream. These changes take place in the digestive tract. The digestive tract is made up of the mouth, pharynx, oesophagus, stomach, small intestines and the large intestines. (Refer to diagram 1 below on the digestive system).



**Figure 1: The digestive system**

- **Absorption-** is a the process by which nutrients in the form of glucose, amino acids and fatty acids are taken up from the intestines and passed into the blood

stream to facilitate cell metabolism. Absorption takes place primarily in the small intestines.

- **Metabolism-** is the sum of all the chemical and physical changes nutrients undergo from the time they are absorbed until they become a part of the body or are excreted from the body. Metabolism comprises two processes namely: anabolism and catabolism.
  - Anabolism-is the building up, synthesis of cell structure from the digested food materials
  - Catabolism-is the breaking down of complex food materials to simpler ones with excretion of waste products.

**Now you will do a self test**

**INSTRUCTION TO CANDIDATE:** indicate true(t) or false(f) against each statement given

The following are the five principles of nutrition

1. Sources, nutrients, digestion,absorption and metabolism
2. Sources, anabolism, digestion, nutrients and absorption
3. Sources, catabolism, metabolism, absorption and digestion

**ANSWERS**

- 1.T
2. F
- 3.F
- 4.

*Good! Now, we will move on to the nutrition situation and common nutrition indicators in Zambia.*

## 1.5: The Nutrition Situation In Zambia

Zambia is classified as a country with a high burden of stunting which requires immediate actions (The word 'stunning' means retarded growth). According to World Health Organization (WHO), the severity of the situation is very high when stunting is above 40%. The prevalence of stunting in Zambia is at 45% among children under five years of age.

There are a number of indicators that help us to assess the nutrition status of our people. What is an indicator? Before you read on do the following activity.

### Activity 1.3

In your own words write the meaning of the word "indicator".

Good! I hope your definition captured the following meaning of an indicator.

**An indicator** is a quantifiable fact or measurement that indicates the state or level of something. It helps you to know where you are, which way you are going and how far you are from where you want to be. Let us now look at the common indicators of nutrition.

#### 1.5.1 Common Nutrition Indicators

- In nutrition, we use measurements based on child growth or anthropometry, as indicators of child malnutrition and are used to assess the nutritional status of populations. The WHO Global Database on Child Growth and Malnutrition uses a Z-score cut-off point of  $<-2$  SD to classify low weight-for-age, low height-for-age and low weight-for-height as moderate and severe undernutrition, and  $<-3$  SD to define severe undernutrition. The cut-off point of  $>+2$  SD classifies high weight-for-height as overweight in children. The  $-2$ SD is the negative curve of the standard deviation emphasizing the severity of underweight as scored on the children's clinic card. The common nutrition indicators in Zambia are as follows:-**Stunting (Shortness)** - arises when a child has low height or length for its age. Shortness is associated with long

term effects of low food intake and repeated infections and illnesses over the life of the child. A child whose height is less than -2SD of the normal height curve for its age is considered to be 'stunted'.

- **Underweight** – is when the child has a low weight for its age. A child can be underweight due to stunting (linear growth) or due to poor growth (body mass). The causes of growth are believed to be different. Weight that is less than -2SD of the normal weight for age curve is classified as 'underweight'.
- **Wasting (Thinness)**–is when the child has low weight for its height. Thinness is frequently associated with acute and short term consequences such as severe infections or food deprivation. When a child's weight is less than -2SD of the normal weight for height curve, it is classified as 'wasted'.

## SUMMARY

We have discussed the nutrition situation in Zambia of which it stands at 45% among the under five children and according to WHO when stunting is above 40% the situation is severe. The body measurement will show if there is stunting, underweight and wasting based the WHO scoring using the cut off points of the Z scores emphasizing on the +/- of the standard deviation curve of the normal weight for height curve,

Now do the following self test

### Self-assessment

Match the following nutrition indicators in column A with their description in column B

#### Column A

- 1.Stunting
- 2.Underweight
- 3.Wasting

#### Column B

- is when the child has a low weight for its age
- is when a child has low height or length for its age
- is when the child has low weight for its height

## ANSWERS

1. 3

2. 1

3. 2

*You now know the common nutrition indicators. Next we shall discuss the roles of nutrition in health, growth and development and illness.*

## **1.6 The Role Of Nutrition:**

Before you learn about the role of nutrition in health, growth and development and illness, let us start by understanding the word 'role'. What is a role? Let us start with your understanding of this term. Do the following activity.

### **Activity 1.4**

Write down the meaning of the word "role" in your notebook

Good! A role is a function assumed or part played by a person or thing in a particular situation.

We have now defined the meaning of a role. We will now look at the role of nutrition in health, growth and development and illness? Take 2 minutes to think about it and then complete the following activity.

### **Activity 1.5**

Write down the role of nutrition in health, growth and development and illness.

Well done! Now compare your answers with the information in the following discussion.

#### **1.6.1: Role of nutrition in health,**

Nutrition provides the basic needs of: promotion of good health & prevention of diseases. Good nutrition strengthens the immune system e.g. vitamin A plays a vital role in the resistance of diseases and helps to maintain mucus membranes. In the case of dietary deficiencies the body's resistance to disease is compromised a situation which adversely affects the immune system. Nutrition in health also provides energy which is



the essence of life- without which we cannot survive. We need energy for all the basic physiological functioning of the body, e.g. breathing, digestion and excretion.

#### 1.6.2: Role of nutrition in growth and development

A child starts life as a single cell inside its mother. The cell absorbs nutrients; it grows and divides into two cells. The cell uses some nutrients as building materials for the new cell and other nutrients as for energy. Each new cell absorbs more nutrients to grow larger and divide again. The cell continues to absorb nutrients and grow. The normal human life has four (4) general stages of overall development namely *infancy*, *childhood*, *adolescence* and *old age*.

##### 1. Infancy

This is a period of latent growth during the first days of birth, the infant loses weight but slowly regains. The gastro-intestinal tract, liver and kidneys are not fully developed and the child also requires time to learn how to feed by way of mouth. Nutrition during infancy lays the foundation for health. Growth is rapid and changes in body composition take place at this age compared to an adult; in terms of body weight an infant needs all the nutrients in more quantities. A healthy new born baby doubles in birth weight by the 5th month and triples by 1 year.

##### 2. Childhood

The growth rate declines after the child is one year. Growth is slow and steady at this stage. Physical activity is increased hence the nutrient intakes must be well balanced. Periodical assessment of the child's growth helps rectify problems in time. Growth pattern; weight and height record of gain are manifestations of growth and development which have to be evaluated periodically. Children need more calories per kg body weight compared to an adult. Good nutrition will provide enough energy to make up for the increased loss through elevated activity.

##### 3. Adolescence

This is the period between childhood and adulthood and it is often referred to as the transition period. It is a challenging period-physically and emotionally. Some adolescents take food as their target of vengeance and because of this many existing disorders are prevalent among adolescents. Adolescence is another period of rapid growth. Internal activities like secretions, hormonal reactions, basal metabolism and biochemical reactions are during this stage. Puberty growth demands more body building substances and basal metabolic rate is increased which demands more energy. Adolescent girls in particular require all nutrients in good quantities, not just for rapid growth but to obtain optional storage for later requirements during pregnancy and lactation. Adolescent girls should not be underweight as this may make them be susceptibility to infection.

#### 4. Old Age

The nutritional requirements for old people differ from that of normal adults.

The lowered metabolic rate reduces the caloric requirements by 25% compared to normal adults. Physical activity is also less as compared to a normal person. If an old person has normal body weight adequate calories can be given. For obese old people the caloric intake should be adjusted to reduce body weight.

#### 1.6.3: Role Of Nutrition In Illness

Nutrition supports the recovery and rebuilding of body tissue. Most often infections results in poor health, this is due to the increase in metabolism and tissue breakdown. Consequently, the need for nutrients rises on the other hand. This and other associated aspects of the disease process result in emaciation and severe chronic energy deficiency.

Nutrition therefore plays the role of tissue rebuilding and energy provision to sustain life during the disease process. The body needs nutrients to resist and fight infections and to recover from infections. Disease reduces appetite and brings about nausea and vomiting which eventually reduces food intake.

*you know the role of nutrition health, growth and development and illness. We will now look at the cultural aspects of nutrition . But before we go any further, let us start by understanding the word 'culture'. AWe believe this is not a new word, you must have learnt it in sociology and nursing. Culture is the way of life of the people.*

Now that you have successfully finished this part/passage,s

#### **Self tests**

1. Concerning the role of nutrition in health, the normal human life has the following four (4) general stages .....
  - a) Infancy, childhood, adolescence and old age
  - b) Infancy, adulthood, adolescence and old age
  - c) Infancy, adolescence, motherhood and old age
2. What role does nutrition play in illness?
  - a) Results in poor health
  - b) Results in emaciation
  - c) Rebuilding of body tissues

## **ANSWERS**

1.A; 2C

### **1.7: Social and Cultural aspect of nutrition (Taboos and Beliefs)**

We will now look at the cultural aspect of nutrition. Take 2\_minutes to think about it and then complete the following activity.

#### **Activity 1.6**

Write down the cultural aspect of nutrition.

Good try! Now compare your answers with the information in the following discussion.

Each cultural group possesses its own typical food selection patterns and has clearly defined ideas about what is 'food' and 'non-food'. This explains the scarcity of particular plants or animals in certain places/countries. Cultural groups have beliefs as well as taboos.

Beliefs are statements or ideas believed to be true but not proven. Many cultures have prohibitions associated with pregnancy, based on beliefs about possible effects on the fetus. Others may restrict intakes of foods, such as meat or other useful sources of iron, for which needs are increased in pregnancy. It is also believed by some that eating a particular mixture of foods around the time of conception can influence the gender of the embryo.

Taboos are forbidden behavior. A taboo that occurs in most world cultures is that against cannibalism.

**Taboos and beliefs-**A taboo is something that is forbidden and belief can be defined as faith, trust or acceptance of something as being true. Food patterns may vary from one part of the country to another or tribe to another. Some people would prefer certain types of food and dislike the other. This may be due to personal preferences traditional or religious beliefs or lined up with superstition or witchcraft.

However, taboos and beliefs depends on a particular nation and this affects the eating habits of people e.g. in Zambia, the staple food is nshima, because of this a Zambian will eat food of maize origin at almost every meal, this means that a Zambian may consume more carbohydrates than any other nutrient and this will definitely have an impact on the nutritional health of an individual. On the other hand, nationality may cause change in an individual's food habits. In case of migration to another country, an individual has to adapt to that country's way of eating or may even start combining his ways with the new ways.

**Religion:** Some religion has an important influence on the nutrition of many people. Many world religions forbid the eating of particular foods completely or at special times. These include the prohibition on pork among Muslims and Jews, while the Muslims are restricted to eat only halal prepared animals . For Hindus, they will not eat cattle for food as they believe it is sacred. Fasting which is denying oneself food is a religious custom. Some Christians fast for up to 40 days and this may have an effect one's nutritional needs.

### **Holidays/ cultural celebrations**

Each cultural group has special days set aside each year for celebration. Cultural influences are most apparent on these days. For example in Zambia, during Christmas and New Year's Days, most families eat chicken and rice and take a lot of Sodas and alcohol.

**Take Note 1.1:** Overall, culture causes change in food habits, confines people to a particular way of eating (feeding practices), imparts food preferences and influences cooking methods.

**Now try to do a self test**

**Self test** IN THE FOLLOWING STATEMENTS INDICATE TRUE (T) OR FALSE(F)

- a. Culture are beliefs as well as taboos
- b. Belief are statements or ideas believed to be true but not proven
- c. Taboo is something that is forbidden and belief can be defined as faith, trust or acceptance of something as being true

ANSWERS

1.F; 2.T; 3.T

## **1.8: Types of Nutrients – Carbohydrates, Protein, Fats, Minerals and Vitamins**

The term nutrient is not new to you as you learnt about it earlier. Can you remember what a nutrient is? Take 2 minutes to think about it and then complete the following activity.

### **Activity 2.1**

Write down the meaning of the word nutrient in your notebook.

Good! A nutrient is a substance that must be consumed as part of the diet to provide a source of energy, to build tissues and to keep healthy.

## Activity 2.2

Write down the nutrients that you know.

Well done! Examples of nutrients include: carbohydrates, proteins, fats, vitamins and minerals.

### 1.8.1 Carbohydrates

Now you will look at carbohydrates, but before we go any further let us start by looking at the term carbohydrate. What is a carbohydrate? Take 2 minutes to think about it and then complete the following activity.

## Activity 2.3

Write down the meaning of the term carbohydrate in your notebook.

Good try! Now compare your answer with the definition written below.

Definition of carbohydrates

**Carbohydrates** are any group of organic compounds, the most important of which are the saccharides, starch, cellulose and glycogen. In other words, they are energy giving foods

### ***Chemical Composition***

Carbohydrates consist of carbon, hydrogen, and oxygen, the hydrogen and oxygen being in the same proportion as in water. Now you will learn about the classification of carbohydrates. Before we move on, let us start with your understanding of how carbohydrates are classified. Take 2 minutes to think about it and then do the following activity.

## Activity 2.4

Write down the classification of carbohydrates in your notebook.

Good attempt! I hope your answer captured the main classifications of carbohydrates.

### Classification of carbohydrates

Carbohydrate compounds having one carbohydrate molecule are called *monosaccharides*, compounds with two carbohydrate molecules are called *disaccharides* and those compounds containing more than two carbohydrate molecules are called *polysaccharides*.

### ***Give examples of monosaccharides, disaccharides and polysaccharides***

The following are examples of monosaccharides, disaccharides and polysaccharides:

*Monosaccharides* (glucose and fructose), *disaccharides* (sucrose and lactose), *oligosaccharides*, and *polysaccharides* (starch, glycogen, and cellulose).

Dietary sources of carbohydrates

Still on carbohydrates, now you will look at the dietary sources of carbohydrates.

The following are the dietary sources of carbohydrates: Whole wheat flour, rice, potatoes, nshima, etc.

Now you will look at the functions of carbohydrates. Let us start with your understanding of the functions of carbohydrates. What are the functions of carbohydrates? Do the following activity.

## Activity 2.5

Write down the functions of carbohydrates.

Well done! Now compare your answers to the following;

## Functions of carbohydrates

- To provide the body with energy.
- Provide a form of energy storage e.g. glycogen
- Form part of structure of DNA and RNA
- Can act as receptors on the cell surface, allowing the cell recognize other molecules and cells.

## Absorption of carbohydrates

The process of digesting carbohydrates begins in the mouth. Our saliva contains an enzyme called amylase that starts breaking down the more complex carbohydrates into simpler types. Enzyme activity continues in the stomach, but slows down significantly as digestive acids are released into the stomach by the glands. The pancreas secretes another version of amylase into the duodenum. This cuts down carbohydrates into simple sugars - maltose, lactose and sucrose. As the carbohydrate passes further into the intestine, the enzymes maltase, lactase and sucrase do cut maltose, lactose and sucrose into smaller bits, more easily absorbed which are eventually converted to glucose and absorbed through the intestinal walls into the bloodstream.

## Daily requirements of carbohydrates

For the daily requirements of carbohydrates, the body needs about 45 to 65 percent of your total daily calories.

Effects of carbohydrate deficiency and excess intake

You will now look at the effects of carbohydrate deficiency and excess intake. Let us start with your understanding of effects of carbohydrate deficiency and then excess intake. Take 2 minutes to think about it and then complete the following activity.

### Activity 2.6

What are the effects of carbohydrate deficiency? Write down your answers in your notebook

Good! Compare your answers to what has been written below

## Answer



- Marasmus

### **Effects of Excess Intake**

These include; Obesity, Non-insulin dependent diabetes mellitus and Dental carries. I presume you know what carbohydrates are. You will now move to the next nutrient which is protein.

You will now look at proteins. To begin with, let us start with your understanding of the term protein. What is a protein? Take 1 minute to think about it and thereafter do the following activity:

#### **Activity 2.7**

Write down the meaning of the term protein.

Good try! Continue to read about proteins

### **Proteins**

**Definition of protein** - A protein is a group of complex organic nitrogenous compounds formed from amino acids and occurring in every living cell of animal and vegetable tissue.

### **Chemical Composition of proteins**

Proteins are composed of the elements carbon, hydrogen, oxygen and nitrogen.

### **Classification of proteins**

Proteins are made up of amino acids. The amino acids are made up of carbon, hydrogen, oxygen and nitrogen. It is the nitrogen which makes proteins unique. There are about 20 amino acids, with 9 of them being essential. The body cannot manufacture some of the amino acids (termed essential amino acids); the diet must supply these. The amino acids regarded as essential for humans are phenylalanine, valine, threonine, tryptophan, isoleucine, methionine, leucine, lysine, and histidine. Essential amino acids are called 'essential' not because

they are more important to life than the others, but because the body does not synthesize them. Non-essential amino acids include alanine, arginine, asparagines, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, and tyrosine.

### **Dietary sources of proteins**

You will now look at the dietary sources of proteins. We shall start with your knowledge about dietary sources of proteins. What are the dietary sources of proteins? Do the following activity.

#### **Activity 2.8**

Write down the dietary sources of proteins.

Excellent! The dietary sources of proteins include: meat, fish, milk, eggs, soya beans and milk products\_excluding butter.

### **Functions of Proteins**

- Growth and repair of body cells and tissues
- Synthesis of enzymes, plasma proteins, antibodies (immunoglobulin) and some hormones.
- Provision of energy. Normally a secondary function, this becomes important only when there is not enough carbohydrate in the diet and fat stores are depleted.

You will now look at how proteins are digested, absorbed and metabolized. Let us start with your understanding of how proteins are digested, absorbed and metabolized. How are proteins digested, absorbed and metabolized? Take 2 minutes to think about it and then do the following activity.

## Activity 2.9

Write on how proteins are digested, absorbed and metabolized in the body

Good attempt! Now compare your answers with the information in the following discussion.

### **Absorption of proteins**

Protein digestion begins in the stomach, chiefly with the action of the hydrochloric acid that is produced there, and by the enzyme called pepsin. Protein digestion continues in the upper portion of the small intestine under the action of the pancreatic protein enzymes, trypsin and chymotrypsin. The amino acids are absorbed by the blood capillaries of the small intestines, carried through the liver, and then go into the blood of the general circulation. Recall from our discussion of carbohydrate digestion that absorption is done by means of selectively permeable membranes of the small intestine walls, which are arranged in folds called villi.

### **Daily requirements of proteins in the diet**

The daily requirements of proteins in the diet are: 0.8-1.0 g of protein/kg body weight

*Effect of protein deficiency includes kwashiorkor.*

### ***Effects of excess proteins include:***

- Obesity
- Endocrine diseases e.g. such as Diabetes mellitus

*You now know what proteins are. Now, you will look at fats as our next topic under nutrients.*

Fats

You will move on to look at fats. Let us start with your understanding of the term fats. What are fats? Take 2 minutes to think about it and then complete the following activity.

### **Activity 2.10**

Write down the meaning of the term fats in your notebook.

Good try! Now compare your answer with the definition written in this discussion.

Definition of Fats - These are substances that are composed of lipids or fatty acids and occurring in various forms or consistencies e.g. oil.

### ***Chemical Composition of fats***

Fats consist of carbon, hydrogen and oxygen, but they differ from carbohydrates in that the hydrogen and oxygen are not in the same proportions as in water.

### ***Classification of fats***

Fats are classified as follows: saturated and *unsaturated fats*.

Saturated or animal fat, contain mainly saturated fatty acids and glycerol and are found in milk, cheese, butter, eggs, meat, oily fish such as herring, cod and halibut.

- ***Unsaturated or vegetable fat***, contain mainly unsaturated fatty acids and glycerol, are found in some margarine and in most vegetable oils.
- Depending on the dietary requirements, fats are of two kinds - essential and non-essential. Essential fats are those that are not synthesized by the body and have to be included in the diet. For example, linoleic acid (Omega-3 fatty acid), linolenic acid (omega-6 fatty acid), arachidonic acid are polyunsaturated fatty acids. Non-essential fats are those that are synthesized by the body and are not necessary in the diet, example glycine.

### **Dietary Sources of Fats**

The dietary sources of fats include: milk, cheese, butter, eggs, meat, oily fish, margarine, and vegetable oils.

Now you will look at the functions of fats. Let us start with your understanding of the functions of fats. What are the functions of fats? Do the following activity.

#### Activity 2.11

Write down the functions of fat in your note book.

Well done! Now compare your answers to the following:

Let us now look at fats in details

### **Functions of fats**

- Fats are the chief energy stores of the body, which form an important source of energy during starvation.
- Fats play a role in the absorption of fats soluble vitamins like vitamins A, D, E and K.
- Formation of cholesterol and steroid hormones
- Constituent of nerve sheaths and of sebum, the secretion of sebaceous glands in the skin.
- Storage of energy as fat in adipose tissue under the skin.
- Insulation-as a subcutaneous layer it reduces heat through the skin.

### ***Absorption of Fats***

Fat digestion begins with the action of bile (from the gall bladder), which emulsifies lumps of fat into thousands of fatty droplets. This process allows enzyme lipase to begin its enzyme action and ultimately breaks the fats down into fatty acids and glycerol. Lipase originates in the pancreas and works in the small intestine as it digests the fats. Fats are not water soluble, but their end

products glycerol and fatty acids will dissolve in water so that the body can easily absorb them.

### **Daily requirements of fats**

The daily requirements of fat intake should: equal 30% of your total day's calories

**NB: 1 gram of fat = 9 calories**

Now you will look at the effects of fat deficiency and excess intakes. Let us start with your understanding of the effects of fat deficiency in the body. What are the effects of fat deficiency in the body? Do the following activity.

#### **Activity 2.12**

Write down the effects of fat deficiency in your notebook

Good! Now compare your answers with what is written below.

Fat deficiency has been linked with atherosclerosis (hardening of the arteries), increased triglyceride levels and reduced high density lipoprotein (HDL) cholesterol levels. All these factors restrict the flow of blood to your heart and increase your heart disease risk.

### ***Effects of excess fats in the body***

These may include the following:-

- Obesity-is highly associated with the risk of type II diabetes, and gall bladder disease.
- Cardiovascular diseases such as hypertension, atherosclerosis etc.

Now you know what fats are. You will move on to look at the next nutrient which is vitamins.

## *Vitamins*

Now you will look at vitamins. Before we go any further, let us start with your understanding of the term vitamins. What are vitamins? Take 2 minutes to think about it and then complete the following activity.

### **Activity 2.13**

Write down the meaning of the word vitamin in your notebook.

Good attempt!

Definition of a vitamin- A vitamin is an organic compound essential in small quantities for normal physiologic and metabolic functioning of the body.

### ***Chemical Composition of Vitamins***

Vitamins are in two groups: those which are fat-soluble only contain the elements carbon, hydrogen and oxygen; the water-soluble ones may also contain nitrogen and even Sulphur.

### ***Classification of vitamins***

Vitamins are divided into two main groups namely:

***Fat-soluble Vitamins*** include: Vitamin A (Retinol), Vitamin D, Vitamin E and Vitamin K.

***Water-soluble Vitamins*** include: Vitamin B complex comprising Vitamin B1 (thiamine), Vitamin B 2 (riboflavin), Folate (folic acid), Niacin (nicotinic acid),

Vitamin B 6 (Pyridoxine), Vitamin B12 (cobalamin), pantothenic acid and Biotin and Vitamin C (ascorbic acid).

## Activity 2.14

Write down the dietary sources of vitamins in your notebook.

You will now look at the dietary sources of vitamins. Let us start with your understanding of the dietary sources of vitamins. What are the dietary sources of vitamins? Do the following activity.

Well done! Now compare your answers to the following.

### **Dietary Sources of Vitamins**

#### ***Fat-soluble Vitamins***

Vitamin A (Retinol): cream, egg yolk, liver, fish oil, cheese and butter.

Vitamin D (Calciferol): Found mainly in animal fats such as eggs, butter, cheese, and fish liver oils.

Vitamin E (Tocopherol): Found in nuts, egg yolk, wheat germ, whole cereal, milk and butter.

Vitamin K (Phylloquinone): Sources of vitamin K are Liver, some vegetables oils and leafy green vegetables.

#### ***Water-Soluble Vitamins***

- Vitamin B<sub>1</sub> (Thiamine): present in nuts, yeast, egg yolk, liver, legumes, meat and the germ of cereals.
- Vitamin B<sub>2</sub> (Riboflavin): found in yeast, green vegetables, milk, liver, eggs, and cheese.
- Vitamin B<sub>9</sub>, Folate (folic acid): found in liver, kidney, fresh leafy vegetables and yeast.
- Vitamin B<sub>3</sub>, Niacin (nicotinic acid): found in liver, cheese, yeast, whole cereals, eggs, fish and nuts.



- Vitamin B<sub>6</sub> (Pyridoxine): found in meat, liver, vegetables, bran of cereals, egg yolk, and beans.
- Vitamin B<sub>12</sub> (Cobalamin): liver, milk and eggs.

Vitamin C (Ascorbic acid): found in citrus fruits, berries, green vegetables, potatoes, liver, and glandular tissue in animals. Now you will learn about the functions of vitamins. Before we move on, let us start with your understanding of the functions of vitamins. What are the functions of vitamins? Take 2 minutes to think about it and then do the following activity.

### Activity 2.15

Write down the functions of vitamins in your notebook.

Good attempt! I hope your answers captured the following functions of vitamins.

## Functions of Vitamins

### Fat-Soluble Vitamins

- Vitamin A (Retinol)
  - Maintains healthy epithelial tissues and cornea.
  - Formation of rhodopsin (visual purple)
- Vitamin D (Calciferol)
  - Facilitates the absorption and use of calcium and phosphate in the maintenance of healthy bones and teeth.
- Vitamin E (Tocopherol)
  - Antioxidant and promotes immune function
- Vitamin K (Phylloquinone)
  - Formation of prothrombin in the liver

### Water-Soluble Vitamins

- Vitamin B<sub>1</sub> (Thiamine)
  - Metabolism of carbohydrates and nutrition of nerve cells
- Vitamin B<sub>2</sub> (Riboflavin)
  - Carbohydrate and protein metabolism
  - Maintenance of a healthy skin
- Vitamin B<sub>3</sub> (niacin)
  - Necessary for cell respiration
  - Inhibits production of cholesterol

- 

## Vitamin B<sub>6</sub> (Pyridoxine)

Protein metabolism

- Vitamin B<sub>9</sub> Folate (Folic acid)
- DNA Synthesis
- Normal development of spinal cord in early pregnancy
- 
- Vitamin B<sub>12</sub> (Cobalamin)
- DNA synthesis
- 
- Vitamin B (Pantothenic acid)
- Associated with amino acid metabolism
- Vitamin 7 (Biotin)
- Carbohydrates and fat metabolism
- Vitamin C (Ascorbic acid)
- Formation of collagen
- Maturation of red blood cells

## Absorption of vitamins

Vitamins, mineral salts and water are also absorbed from the small intestine into the blood capillaries. Fat-soluble vitamins are absorbed into the lacteals along with fatty acids and glycerol. Vitamin B<sub>12</sub> combines with intrinsic factor in the stomach and is actively absorbed in the terminal ileum.

## Daily requirements of vitamins

### Fat Soluble Vitamins

**Vitamin A** intake for adults is 750g

### Vitamin D (Calciferol)

Daily requirements of Vitamin D intake for adults is 10ug.

## Vitamin E (Tocoferols)

**Daily requirements-** the recommended daily allowances (RDA) for men and women is 15mg, 15mg for pregnant women and 19mg for lactating mothers.

Let us now look at vitamin K

## Vitamin K (Phytonadione)

Daily requirements- the normal daily requirement is 1ug per kg body weight and only a small amount are stored in the liver and spleen.

## Water Soluble Vitamins

Water soluble vitamins consist of the Vitamin B complex and Vitamin C.

Vitamin B- is a list of multiple vitamin like B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> (Niacin) and B<sub>12</sub>, folic acid, biotin and pantothenic acid.

Daily requirements of water soluble vitamins are summarized in the table that follows.

*Table 1: Daily Requirements of water soluble vitamins*

Vitamin	Chemical Name	Sources	Function	Daily req	Deficiency
B <sub>1</sub>	Thiamine	Pork, sweet potatoes, legumes, orange juice, nuts, and organ	Co-enzyme in metabolism of carbohy	0.8- 1mg	Berberi characterised by stunted growth

		meat like liver	drates and provide nutrition to the nerve cells.		
B <sub>2</sub>	Riboflavin	Liver, yeast, milk, eggs, green vegetables, kidney and fish	It aids in carbohydrate and protein metabolism. Helps to keep the skin and eyes health.	1- 1.3 mg	Angular chellosis Stomatitis, dermatitis, eye lesion, glossitis.
B <sub>3</sub>	Niacin (Nicotinic acid)	Liver, fish, yeast, synthesised trypan in the body	Cellular respiration and inhibits production of	12-17mg	Pellagra characterised by 3Ds- dermatitis, diarrhoea and dementia.

			cholesterol		
B <sub>6</sub>	Pyridoxine	Whole grain cereals, liver, kidneys and meat	Helps in protein metabolism	1.2—1.4mg	Metabolism errors of amino acids and peripheral neuropathy.
B <sub>12</sub>	Cyanocobalamin	Animal sources e.g. meat	Essential factor in DNA synthesis	1.5ug	Pernicious anaemia, degeneration of nervous tissue.
Folic acid/pteroylglutamic acid/folate	Folic acid	Dark green vegetables, liver, eggs, synthesised in the colon	DNA synthesis and normal development of foetal spinal cord in early pregnancy.	200ug	Anaemia and increased incidence of spinal bifida.
B	Phatothernic	Liver, yeast, egg	Amino acid	3-7mg	Non known and rare

		yolk, fresh vegetables	metabolism		
B	Biotin	Yeast, liver, nuts and kidney	Fat metabolism	10-200mg	Dermatitis, conjunctivitis and hypercholesterolaemia
Vitamin C	Ascorbic acid	Citrus fruits, berries, potatoes and liver	Aid in wound healing, strengthening of tissues such as gum and muscles, boost the immune system	40mg	Multiple haemorrhages, slow wound healing, Scurvy characterised by swollen bleeding gums and a rash of tiny bleeding spots around the hair follicles.

Now you will learn about the effects of vitamin deficiency. Before we move on, let us start with your understanding of the effects of vitamin deficiency. Take 2 minutes to think about it and then do the following activity.

## Activity 2.16

Write down the effects of vitamin deficiency in your notebook

***Well done! Now compare your answers with the information in the following discussion.***

**The effects of vitamin deficiency are summarized in the following table.**

***Table 2 Fat-soluble vitamins***

<b><i>Vitamin A (Retinol)</i></b>	<b><i>Vitamin D (Calciferol)</i></b>	<b><i>Vitamin E (Tocopherol)</i></b>	<b><i>Vitamin K (Phylloquinone)</i></b>
<ul style="list-style-type: none"> <li>• Keratinization</li> <li>• Exophthalmia</li> <li>• Stunted growth</li> <li>• Night blindness</li> </ul>	<ul style="list-style-type: none"> <li>• Rickets in children</li> <li>• Osteomalacia in adults</li> </ul>	<ul style="list-style-type: none"> <li>• Anaemia</li> <li>• Ataxia</li> <li>• Visual disturbances</li> </ul>	<ul style="list-style-type: none"> <li>• Slow blood clotting</li> <li>• Haemorrhages in newborn</li> </ul>

***Now that you know about the fat soluble vitamins, you will move to water soluble vitamins***

***Table 3: Water-soluble vitamins***

<b>Vitamin B 1 (Thiamine)</b>  General fatigue and loss of muscle tone  Leads to beriberi  Stunted growth	<b>Vitamin B2 (Riboflavin)</b>  Angular stomatitis  Dermatitis	<b>Vitamin B12 (Cobalamin)</b>  Megaloblastic anaemia  Degeneration of nerve fibres of the spinal cord
<b>Vitamin B (Folic acid)</b>  Anaemia  Increased incidence of spinal bifida	<b>Vitamin B (Niacin)</b>  Pellagra, dermatitis, diarrhoea, dementia	<b>Vitamin B (Biotin)</b>  Dermatitis  Hypercholesterolemia
<b>Vitamin C (Ascorbic acid)</b>  Multiple haemorrhages		

Slow wound healing		
Anaemia		

## Effects of excess vitamins in the body

- *Vitamin A*: liver damage, reduced bone density which may result in osteoporosis, and central nervous system disorders.
- *Vitamin B<sub>6</sub>*: Long-term use of more than 100 mg of vitamin B<sub>6</sub> may result in damaged nerves in the arms, legs, hands, and feet.
- *Vitamin C*: Healthy adult who take more 1,000 mg or more of vitamin C may experience stomach upset, diarrhoea or constipation.
- *Vitamin D*: Large doses of vitamin D taken over a short period of time typically does not cause toxicity as excess vitamin D is stored and used by the body as needed.
- *Vitamin E*: Since vitamin E acts as an anticoagulant and may increase the risk of bleeding problems. Also, excessive levels of vitamin E may cause dizziness or an upset stomach.

Am sure you now know about vitamins. We will now move to mineral salts.

Now you will look at mineral salts. Let us start with your understanding of mineral salts. What are mineral salts? Take 2 minutes to think about it and then complete the following activity.

nMineral salts

Definition- Mineral salts are inorganic compounds necessary within the body for all body processes, usually in only small quantities

Examples of mineral salts include: calcium, phosphorus, sodium, potassium, Iron, Iodine, zinc, sulphur, chloride, magnesium, Iron, zinc, manganese, copper, iodide, chromium, cobalt and selenium

## Chemical composition of mineral salts

These are summarized in the following table.

**Table 4: Chemical composition of mineral salts**

Element	Percent of total ash	Gram / 70kg man
---------	----------------------	-----------------



Calcium (Ca)	39	1,160
Phosphorus (P)	22	670
Potassium (K)	5	150
Sulphur (S)	4	112
Chloride (Cl)	3	85
Sodium (Na)	2	63
Magnesium (Mg)	0.7	21
Iron (Fe)	0.15	4.5
Iodine (I)	0.0007	0.2

#### Classification of mineral salts

Mineral salts are classified into two (2) main groups as:

*Macro-elements*: which are minerals needed in the body in large amounts. Examples of macro-elements include Calcium, Phosphorus, Magnesium, and Sulphur.

*Micro-elements (Trace elements)*: which are minerals needed in the body in small amounts. Examples include zinc, Iron, Copper, Manganese, Iodine, Selenium, Chromium, Fluoride, Potassium, Sodium and Chloride.

You will now look at the dietary sources of mineral salts. Before we go any further, let us begin by finding out what you know about the dietary sources of mineral salts. What are the dietary sources of mineral salts? Do the following activity.

#### Activity 2.18

Write down the dietary sources of mineral salts in your notebook.

Good! I hope your answers captured the following:

#### **Dietary sources of mineral salts**

##### ***Macro-elements***

- *Calcium* - cheese, milk, eggs, green vegetables and some fish.
- *Phosphorous* - cheese, oatmeal, liver and kidney
- *Magnesium* - whole grain cereal, nuts, legumes, seafood, coffee, tea, cocoa and chocolate.

### ***Micro-elements***

- *Sodium*- fish, meat, eggs, milk, most processed foods and also added during cooking or as table salt.
- *Potassium*- distributed in all foods especially fruit and vegetables.
- *Iron*- liver, kidney, beef, egg yolk, whole meal, bread and green vegetables
- *Iodine*- Salt-fish and in vegetables grown in soil containing iodine

Before you read on the functions of minerals salts, let us start with your understanding of the functions of mineral salts. Do the following activity.

#### **Activity 2.19**

Write down the functions of mineral salts in your notebook.

Well done! Now compare your answers with the information in the following discussion.

### **Functions of Mineral Salts**

#### ***Macro-elements***

##### *Calcium*

- Calcium is involved in coagulation of blood and muscle contraction.
- Maintaining total body health
- Normal growth and development
- Keeping your bones and teeth strong over your lifetime( they contain 99% of the body's calcium, the remaining 1% is in blood)
- Ensuring the proper functioning of muscles and nerves
- keeping the heart beating
- Helping blood clotting and regulating blood pressure
- Metabolizing iron

##### *Phosphorous*

- Essential in the hardening of bones and teeth.
- Essential part of nucleic acids (DNA and RNA) and energy storage Molecules inside cells as adenosine triphosphate.

## ***Magnesium***

- Inhibits the blood clotting process
- Inhibit smooth muscle contraction by blocking calcium binding sites.

## ***Micro-elements***

### ***Sodium***

- Muscle contraction
- Transmission of nerve impulses along axons
- Maintenance of electrolyte balance in the body

### ***Potassium***

- Potassium is a mineral that helps maintain the water and acid balance in blood and tissue cells, assists in muscle building, and transmits electrical signals between cells and nerves.

### ***Iron***

- Essential for the formation of hemoglobin in red blood cells.
- Necessary for oxidation of carbohydrates
- Synthesis of hormones and neurotransmitters.

### ***Iodine***

- Essential for the formation of thyroxine and tri-iodothyronine, two hormones secreted by the thyroid gland.

## **Daily requirements for different mineral salts**

### ***Macro-elements:***

Daily requirements of calcium - 1200g

Daily Requirements of phosphorus - 780g

Daily Requirements of Magnesium - 25g

***Micro-elements:***

Daily intake requirements of sodium - 92g

Daily Intake Requirements of potassium - 110-137g

Daily intake requirements of iron - 4.0g

Daily requirements of Iodine -15-20mg

You will look at the effects of mineral salt deficiency, but before we go any further let us start with your understanding of mineral salt deficiency. What are effects of mineral salt deficiency? Take 5 minutes to think about it and then complete the following activity.

**Activity 2.20**

Write down the effects of various mineral salt deficiencies in your notebook.

Good attempt! I hope your answers have captured the following:

**Effects of mineral salt deficiency**

***Macro-elements***

***Effects of calcium deficiency***

- Osteoporosis (Bone disease) - a disease occurring especially in women after the menopause in which the bones become very porous, break easily, and heal slowly.
- Hypocalcaemia (low calcium in blood)- an unusually low level of calcium in the blood

***Effects of Deficiency of Phosphorus***

- Signs and symptoms may include anorexia, anaemia, muscle weakness, bone pain, parasthesia (sensation of pins and needles) and, if acute, confusion and death.

*Now, we shall go to deficiency of magnesium*

### ***Effects of Deficiency of Magnesium***

- Hypocalcaemia is a major sign in magnesium deficiency.
- Progressive muscle weakness, neuromuscular dysfunction, irregular heart beat and ultimately coma and death.

*We have looked at macro elements, now we will move to micro elements*

### ***Micro-elements***

#### ***Effects of deficiency of sodium***

- The symptoms include feelings of weakness, apathy, nausea and cramps in the muscles of the extremities. The deficiency, in very rare cases, may lead to shock due to extremely low blood pressure. The other symptoms are neurological, such as confusion, loss of reflexive movement, convulsions or even coma.

#### ***Effects of potassium deficiency***

Symptoms of hypokalemia, or potassium deficiency, include dry skin, muscle weakness, fatigue, and slow reflexes. If the deficiency develops rapidly or is left unchecked, heart problems and paralysis may result. Hypokalemia is a very serious condition which requires immediate medical attention.

#### **Effects of iron deficiency**

Iron deficiency anemia; impairs mental and motor development resulting in poor memory and learning, and a low attention span.

#### ***Effects of iodine deficiency***

- Mental retardation, goitre, protruding eyes and miscarriages

*How can mineral salt deficiency be prevented?*

*Let us look at the deficiency macro-elements*

### **Macro-elements**

#### ***Prevention of calcium deficiency***

- Consumption of calcium food sources at all meals during the day
- Adequate exposure to sunlight for synthesis of Vitamin K which is critical for calcium absorption
- Supplementation with calcium and vitamin D after menopause.
- Hormone replacement for about 5 years over the menopause.

***Prevention of phosphorus deficiency-*** A minimum intake of 400mg/day had been proposed to maintain adequate plasma phosphate.

***Prevention of magnesium deficiency-*** Eating balanced diet containing magnesium

*Let's go to prevention of micro-elements*

### **Micro-elements**

***Prevention of sodium deficiency-***Eating food sources containing sodium

#### ***Prevention of potassium deficiency***

Prevention is better than cure, and a balanced diet is the key to prevent hypokalemia (hypokalemia is a condition where there is inadequate potassium in the blood stream). You should include foods high in potassium, such as orange, banana, potato, tomato, watermelon, beans, some type of cereals, dried fruits such as peaches, dates, apricots, raisins etc., meat, grapes, milk, yogurt, spinach, etc., in your daily diet to strike that much-needed balance in your meal

#### ***Prevention of iron deficiency***

- Including more sources of Iron in the diet
- Taking iron supplements when iron losses are high
- Using iron fortified foods, especially in infants and young children

### ***Prevention of Iodine deficiency***

- Sufficient intake of iodine
- Table salts
- SUMMARY
- Mineral salts are macro and micro nutrients that the body needs in smaller quantities for normal functioning and deficiencies lead to abnormal function of the body, they are mostly taken as supplements or through the diet that's given.

*You have now learnt about mineral salts. Before you proceed to the next topic on methods of food preservation, cooking and storage, you are going to do a self –test to see how much you can remember on nutrients.*

### ***Self Test.***

Now proceed to do this activity

*A. Indicate your answer by stating 'T' for True or 'F' for False against each of the statements below.*

- 1. ....Carbohydrates consist of carbon, hydrogen and water.*
- 2. ....Carbohydrates can be classified as monosaccharides, disaccharides and polysaccharides.*
- 3. ....Marasmus is a good example of the effects of carbohydrate deficiency*
- 4. ....Diabetes mellitus is one of the effects of excess proteins in the body*

5. ....Valine is an example of a non-essential amino acid
6. ....Unsaturated fats are also known as animal fats
7. ....Linoleic acid and arachidonic acid are examples of essential fatty acids.
8. ....Fats are composed of carbon, hydrogen, oxygen and nitrogen
9. ....Calcium is an example of a macro-element
10. ....Hypokalemia is an effect of potassium deficiency

*B. Match the Vitamins in column A with their deficiencies in column B*

*Column A*

*Column B*

- |                |                          |
|----------------|--------------------------|
| 1. Vitamin A   | A Rickets in children    |
| 2. Vitamin B1  | B Slow wound healing     |
| 3. Vitamin B2  | C Ataxia                 |
| 4. Vitamin B12 | D. Slow blood clotting   |
| 5. Folic Acid  | E. Pellagra              |
| 6. Vitamin C   | F. Spinal bifida         |
| 7. Vitamin D   | G. Megaloblastic anaemia |
| 8. Vitamin E   | H. Night Blindness       |
| 9. Vitamin K   | I. Beri-beri             |
| 10. Niacin     | J. Angular stomatitis    |

*Good! Compare your answers. Now move to the methods of food processing*



## 1.10. Answers to the self-test

1.T 2.T 3.T 4.F 5.T 6.T 7.T 8.T 9.T 10.T

1.H 2.I 3.E 4.G 5.F 6.B 7.A 8.C 9.D 10.E

## 1.9 Methods of Food Processing

Before you learn about food preservation, cooking and storage, let us start with understanding of the word 'preservation'. What is to preserve? the following activity.

### Activity 2.23

Write down the meaning of the word "preservation" in your notebook.

Now compare your answer with the definition in our discussion below. Preservation means to keep something in an unaltered condition.

### ***Food preservation***

The following is the meaning of food preservation. Food preservation is a process of treating and handling food in a way to stop or cut down spoilage to prevent the food borne illness without hampering the texture, nutritional value and flavour.

### ***Methods of food preservation***

There are various methods used to preserve food. The following are the most common ways of preserving food in our country and include:

- Drying
- Smoking
- Freezing
- Salting

- Sugar

Now, let us discuss each one of them in detail.

### ***Drying***

This is one of the oldest methods of food preservation which reduces water activity sufficiently to delay or prevent bacterial growth. Most types of meat, fruits like apples, mangoes, papaya and cereal grains such as wheat, maize, oats, barley, rice and millet can be dried.

Now that we you are done with drying method of food preservation, you can look at advantages and disadvantages of drying.

### ***Advantages***

- Produces concentrated form of food.
- Inhibits microbial growth & autolytic enzymes.
- Retains most nutrients.

### ***Disadvantages***

- Can cause loss of some nutrients, particularly thiamin & vitamin C.

Sulphur dioxide is sometimes added to dried fruits to retain vitamin C , but some individuals are sensitive to this substance.

### ***Smoking***

Meat, fish and some other foods may be both preserved and flavoured through the use of smoke, typically in a smoke-house. The combination of heat to dry the food without cooking it, and the addition of the aromatic hydrocarbons from the smoke preserves the food.

Now that we you are done with smoking method of food preservation, you can look at advantages and disadvantages of it

### ***Advantage***

- *Smoking makes food stay for long time without getting bad*
- *Food can be eaten without cooking it*
- It is preserved partly by drying, partly by incorporation of substances from smoke

### ***Disadvantage***

- *It can easily be burned during the process of smoking.*
- Eating a lot of smoked foods has been linked with some cancers in some parts of the world.

### ***Freezing***

Freezing is also one of the most commonly used processes commercially and domestically used for preserving a very wide range of food stuffs including prepared food stuffs which would not have required freezing in their unprepared state. For example, potato waffles are stored in the freezer, but potatoes themselves require only a cool dark place to ensure many months' storage.

Now that we you are done with freezing method of food preservation, you can look at advantages and disadvantages of it.

### ***Advantages***

- Prevents microbial growth by low temperature & unavailability of water.
- Generally good retention of nutrients.

### ***Disadvantages***

- Blanching of vegetables prior to freezing causes loss of some B-Group vitamins and vitamin C.
- Unintended thawing can reduce product quality.

## ***Salting***

Salting or curing draws moisture from the meat through a process of osmosis. Meat is cured with salt.

You can look at advantages and disadvantages of salting.

### ***Advantages***

- Makes water unavailable for microbial growth.
- Process does not destroy nutrients.

### ***Disadvantages***

- Increases salt content of food.
- High heat processing (e.g. pasteurization)

## ***Sugar***

Sugar is used to preserve fruits , either in syrup form with fruit such as apples, pears, peaches, apricots, plums or in crystallized form where the preserved material is cooked in sugar to the point of crystallization and the resultant product is then stored *dry*.

*Now that we you are done with sugaring method of food preservation, you can look at advantages and disadvantages of it.*

### ***Advantages***

- Inactivates autolytic enzymes
- Destroys microorganisms.

### ***Disadvantage***

Loss of heat-sensitive nutrients

Now you will look at the various methods of cooking. How many methods of cooking do you know? Take 2 minutes to think about it and then complete the following activity.

### **Activity 2.24**

Write down the various methods of cooking that you know their advantages and disadvantages in your notebook.

Well done! Now compare your answers with the information in the following discussion.

## **Cooking**

*There are many ways of preparing food which are discussed below*

**Baking-** is the cooking of food by dry heat in an oven in which the action of the dry convection heat is modified by steam.

### **Advantages**

- A wide range of savoury and sweet foods can be produced
- Bulk cooking can be achieved with uniformity of colour and degree of cooking
- Baking ovens have effective manual or automatic controls
- There is straightforward access for loading and removal of items

### **Disadvantages**

- Requires regular attention
- Ovens are expensive to heat

**Roasting**-is cooking in dry heat in an oven or on a spit with the aid of fat or oil. Examples of foods which be roasted include beef, pork, poultry and vegetables like potatoes.

*Now we will go the merits and demerits of roasting*

### ***Advantages***

- Good quality meat and poultry tender and succulent when roasted
- Meat juices from the joint are used for gravy and enhance flavour
- Ovens with transparent doors enable cooking to be observed
- Access, adjustment and removal of items is straightforward

### ***Disadvantages***

- Requires regular attention
- Ovens are expensive to heat

**Grilling-** is a fast method of cooking by radiant heat and is also sometimes known as broiling. Examples of food which you may grill include fish, steak,

*We shall look at the merits and disadvantages of grilling*

### **Advantages**

- Speed of grilling enables food to be quickly cooked to order
- Charring foods gives a distinctive appearance and improves flavour
- Control of cooking is aided because food is visible during grilling
- Grills may be situated in view of customers

### **Disadvantages**

- More suitable for expensive cuts of meat
- Requires skill

**Frying** is the cooking of food in fat, such as butter or vegetable oil.

Now that we you are done with grilling method of food preservation, you can look at advantages and disadvantages of it.

### ***Advantages***

- It is a fast method of cooking food
- Frying adds fat and calories to food because the food absorbs some of the fat in the pan.

### ***Disadvantages***

- Some food may not be properly cooked.
- They are high risks of accidents or burns if one is not careful

### **Boiling method**

This is cooking food in boiling water , which has a temperature of about 100 °C (212 °F).

Now that we you are done with boiling method of food preservation, you can look at advantages and disadvantages of it.***Advantages***

- Older, tougher, cheaper joints of meat and poultry can be made palatable and digestible
- Nutritious, well flavoured stock is produced
- It is labour saving, as it requires little attention
- It is safe and simple

### ***Disadvantages***

- Foods can look unattractive
- It can be a slow method
- There is a loss of soluble vitamins in the water

**Steaming**-is the cooking of prepared foods by steam (moist heat) under varying degrees of pressure.

Now that we you are done with steaming method of food preservation, you can look at advantages and disadvantages of it.

### **Advantages**

- Retention of nutritional value
- Makes some foods lighter and easier to digest
- Vegetables are freshly cooked, retaining colour, flavour and nutritive value
- With steamed fish, the natural juices can be retained by serving with the fish or in making an accompanying sauce
- Steaming is economical on fuel as a low heat is needed

### Disadvantages

- Foods can look unattractive
- It can be a slow method

**Food storage***We are going to look at food storage. Before you continue reading, complete the following activity**In your note book try to do this activity*

*Activity:*

*In your own words, define the word “storage”*

The word ‘**storage**’ means to keep food in a safe place for future use. Let us now look at the methods of food storage

### **Methods of food storage**

These include:

- **Refrigeration:** food stored at low temperatures e.g. in a fridge
- **Covering:** food is covered to prevent contamination e.g. flies from sitting on it.



- Cupboards: enclosures made with a door which is usually locked in a kitchen.
- **Barn:** this enclosure can be made traditionally using wood and mud is applied on it. A small aperture with a lid is left where to access food from.

The following are the guidelines for food storage:

- Wash hands before touching any food when storing it.
- Store in metal bins, tins or in a barn all cereal foods like dry beans, ground nuts, maize, finger millet, sorghum etc.
- Avoid sneezing or coughing over the food to prevent cross-infection.
- Keep uncooked food on separate shelf from the cooked food and must be covered.
- Perishable food should be kept in the fridge or freezer.
- Put the fruits and vegetables in a dry cool place and vegetables to be wrapped in newspapers.
- Spray the house against flies and cockroaches

You now know how to preserve, cook and store food. That brings us to the end of this unit. Let us review what you have learnt.

### **1.10: Summary**

In this unit We have defined the terms such as nutrition and health. We further looked at the principles of nutrition and the nutrition situation in Zambia. We went on to look at the roles of nutrition in health, growth and development and illness and we described the cultural aspect of nutrition. Furthermore, We have discussed the types of nutrients and mineral salts in detail. Lastly but not the least, we looked at food processing, preservation methods and storage In our next unit, we will look at the applied nutrition assessment methods.

**NOTE:**

**Water soluble vitamins are easily destroyed by cooking**

**1.11 Self Test**

Write whether true(T) or false(F) against each statement

1. *Food preservation* is a process of treating and handling food in a way to stop or cut down spoilage to prevent the food borne illness without hampering the texture, nutritional value and flavour.
2. 2Methods of food preservation are: Drying, Smoking, Freezing, Salting & Sugar3Advantages of baking *include*:  
A A wide range of savoury and sweet foods can be produced  
a) B Bulk cooking can be achieved with uniformity of colour and degree of cooking

C Foods can look unattractive in

with

od

D Baking ovens have effective manual or automatic controls.

E There is straightforward access for loading and removal of items

F It can be a slow method

**ANSWERS**

1 T; 2.T 3A) T; B) T; C )F; D)T; E)T; F) F.

- *Disadvantages of boiling-*

## UNIT 2: APPLIED NUTRITIONAL ASSESSMENT METHODS

### 2.1: Introduction

Welcome to our second unit in our nutrition course. In the last unit we learnt about terms used in nutrition, types of nutrients and food processing, preservation and storage. In this unit we shall discuss nutritional assessment methods. A nutritional assessment is an in-depth evaluation of both objective and subjective data related to an individual's food and nutrient intake, lifestyle and medical history. Once the data on an individual is collected and organized, the health worker can assess and evaluate the nutritional status of that person. The assessment leads to a plan of care, or intervention, designed to help the individual either maintain the assessed status or attain a healthier status.

### 2.2: Unit Objectives

By the end of this unit students should be able to:

- Conduct Anthropometry (Body measurements)
- Conduct a Biochemical Assessment (Laboratory)
- Perform a Clinical Assessment (Physical)

Perform a dietary assessment (Feeding history)

Before you learn about nutritional assessment, let us start with the basics. What is an assessment?

#### Activity

Write down the meaning of the term assessment in your notebook

Good try! An assessment is an evaluation or estimation of the nature, or quality, of someone or something. Now, write down the meaning of the word “assessment” in your notebook

Now, you will read something on the body measurements!!

## : Anthropometry (Body measurements)

This cannot be discussed without taking into consideration the elements of Anthropometry.

### 2.3.1 Elements of a Nutritional Assessment

There are 4 elements of a nutritional assessment, namely:

- Anthropometrics
- Biochemical data
- Clinical data
- Dietary data

We shall now discuss each one of them in brief

#### 2.3.0 Anthropometrics

*This refers to the objective measurements of body muscle and fat or refers to the measurement of the human individual. They are used to compare individuals, compare growth in the young, and to assess weight loss or gain in the mature individual. Weight and height are the most frequently used anthropometric measurements, and skinfold measurement of several areas of the body is also taken. They are also explained as sets of noninvasive, quantitative techniques for determining an individual's body fat composition by measuring, recording, and analysing specific dimensions of the body, such as height and weight; skin-fold thickness; and bodily circumference at the waist, hip, and chest. Look at the table provided for the measurements depending on gender*

**Table 5: Anthropometric measurements**

ANTHROPOMETRIC MEASUREMENTS			
TEST	GENDER	NORMAL VALUES	VALUES SHOWING MALNUTRITION
Triceps skin folds (TSF)	Male	11-12.5mm	7.5-11mm
	Female	15-16.5mm	10-15mm
Mid upper arm circumference (MUAC)	Male	26-29mm	20-26cm
	Female	26-28.5cm	20-26cm
Arm muscle circumference (AMC)	Male	23-25cm	16-23cm
	Female	20-23cm	14-20cm
AMC=MUAC-0.314=TSF			

Source -

Mosby's Dictionary of Complementary and Alternative Medicine (c) 2005, Elsevier

Let us now look at these four elements one by one in detail

### 2.4: Biochemical Assessment (Laboratory)

Laboratory tests based on blood and urine are important indicators of nutritional status, but are often influenced by non-nutritional factors. Laboratory results can be altered by

medications, hydration status, and disease states or other metabolic processes, such as stress.

## 2.5: Clinical Assessment (Physical)

This provides information about the individual's medical history, including acute and chronic illness and diagnostic procedures, therapies, or treatments that may increase nutrient needs or induce mal-absorption. Current medications need to be documented, and both prescription drugs and over-the-counter drugs, such as laxatives or analgesics, must be included in the analysis. Physical signs of malnutrition can be documented during the nutrition interview and are an important part of the assessment process.

### 2.26: Dietary assessment (Feeding history)

During the nutrition interview, data collection should include questions about the individual's lifestyle, the number of meals eaten daily, where they are eaten and who prepares the meals. Information about allergies, food intolerances, and food avoidances, as well as caffeine and alcohol use, should be collected.

That brings us to the end of this unit. Before you continue answer the following questions to test your understanding of what you have just learnt.

#### Checkpoint Questions

##### Instructions: Circle The Most Appropriate Answer

All of the following are the four elements of nutritional assessment EXCEPT.....

- a) anthropometrics
- b) biochemical
- c) microscopy
- d) dietary data

The measurement of body muscle and fat is known as

- a) Biochemical data
- b) Anthropometrics
- c) Clinical data
- d)                                      (d)    Dietary data

Answers to the self test 2.7

1. C2. B

## 2.4: Unit Summary

In this unit we have looked at the applied nutritional assessment methods. It has been established that understanding of these methods may be difficult if elements are not taken into consideration and these four elements are Anthropometrics, Biochemical data, Clinical data and Dietary data. Having done this, our next unit will be unit 3 on the 1000 most critical days.

## 2.5 References and further readings

1. Barasi, M, (2003), Human Nutrition, 2th edition, New York.
2. Geisseler and Powers, (2011), Human Nutrition, 12<sup>th</sup> edition, London.
3. Kumar, P. and Clark M. (2005), Clinical Medicine, 6<sup>th</sup> edition, Elsevier Saunders, London.
4. 'Position of the American Dietetic Association: Vegetarian Diets' Journal of the American Dietetic Association, July 2009, Vol. 109, No. 7, pp. 1266-1282.
5. Subar AF, Krebs-Smith SM, Cook A, Kahle LL. (1991), Dietary sources of nutrients among US children, Pediatrics 1998;102(4 Pt 1):913-923

## Unit 3: The 1000 Most Critical Days

### 3.1: Unit Introduction

**Welcome to this unit. It discusses the 1000 most critical days in a child's life from conception to about 2 years. These are critical days because if nutrition to child becomes bad, then even the growth pattern, diseases and other ailments takes advantage, resulting into poor health of the child.**

### 3.2: Unit objectives

At the end of this unit, students should be able to:

1. Define the 1000 Most Critical Days

2. To outline rationales for the 1000 Most Critical Days
3. To outline the situation in Zambia
4. To explain the interventions
5. To describe the program activities
6. To mention the linkages of this programme

We are now going to look at the first 1000 critical days

### **3.3: Definition or the meaning of 1000 Most Critical Days Programme**

This is referred to the most important children's early days of life. The aim of the programme is to prevent stunted growth in Children less than two years of age as reflected in Nutrition Strategic Plan (NFNSP) 2011-2015. Good growth pattern begins from conception until two years or less of life. So bad nutrition to a pregnant mother may also affect the baby, as a result, it can also affect the child.

Now at the rationales for this program

### **3.4 Rationale P**

The rationales for the First 1000 Most Critical Days programme implementation is as a result of:

Clear and compelling evidence on the magnitude of under nutrition and its consequences well documented.

Clear and existing evidence concerning cost-effective interventions to prevent under nutrition  
undernutrition during the "window of opportunity"— during a woman's pregnancy and before a child reaches the age of 2 years. These effective interventions need to be implemented at scale without delay, through a harmonised multi-sectoral response.

Government, interest in reforms to address nutrition problems and a strong National Development Plan which recognises the importance of multi-sectoral engagement.

The potential for success is increased because most of the interventions needed to prevent stunting among children are already being developed and implemented in the country, primarily by the Ministry of Health.

Strong Provincial, district and community structures in different sectors through which the programme implementing organisations can provide support.

The NFNC has a large body of qualified and competent professionals responsive to support acceleration of actions.

Donor commitment (e.g. DFID, UNICEF, WFP, Irish Aid, USAID, European Union and World Bank) to support nutrition Government-led actions.

Sufficient information on magnitude of the nutrition problem in Zambia from various studies: the ZDHS reports, NFNC and NGO nutrition survey reports.

Now do a self test

Self test

Write two reasons/rationales for this programme

Good! Compare your answers

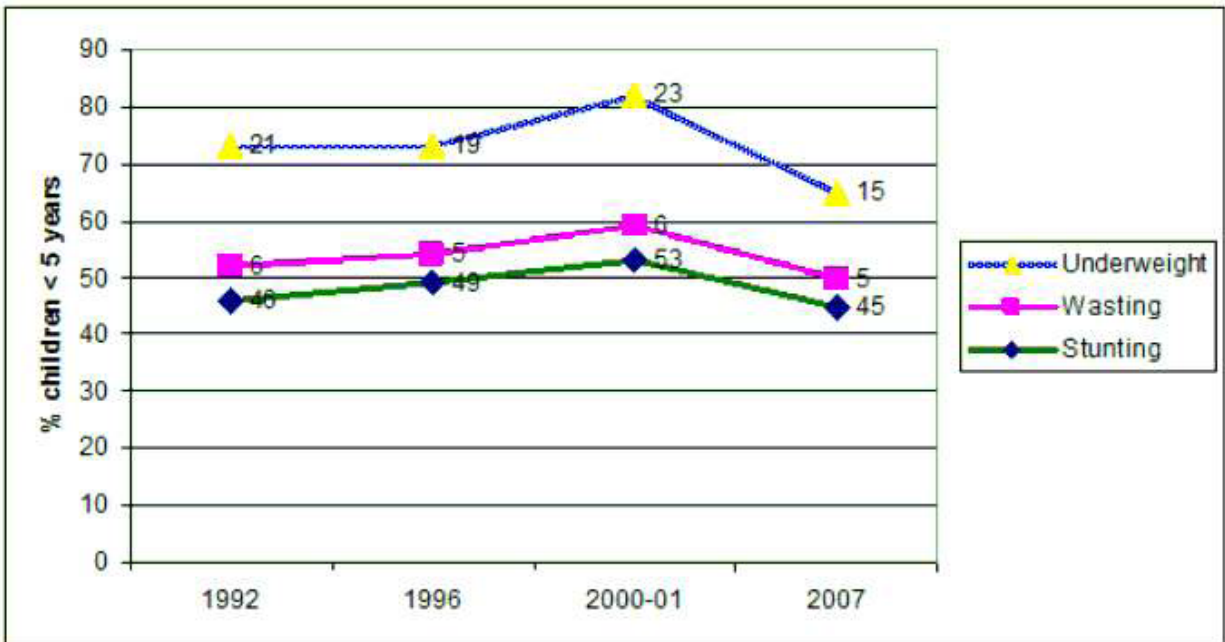
## **Now read the situation in Zambia**

### **3.5: The Situation of Under Nutrition In Zambia**

45% of children between 6 to 59 months are stunted in Zambia. This is higher than the 42% average for Africa. Among other forms of under nutrition, wasting accounts for 5% of under fives while 15% are underweight. In addition, 54% of children have vitamin A deficiency and 53% have iron deficiency anaemia and 9.3 % of children are born with low birth-weight, indicating poor maternal nutrition (NFNC, 2012).

Figure 1 below shows the prevalence of child malnutrition decline from 1992 to 2007. The trends had shown an improvement but at a very slow pace. Even up to now, issues of under nutrition in Zambia cannot be over emphasized.

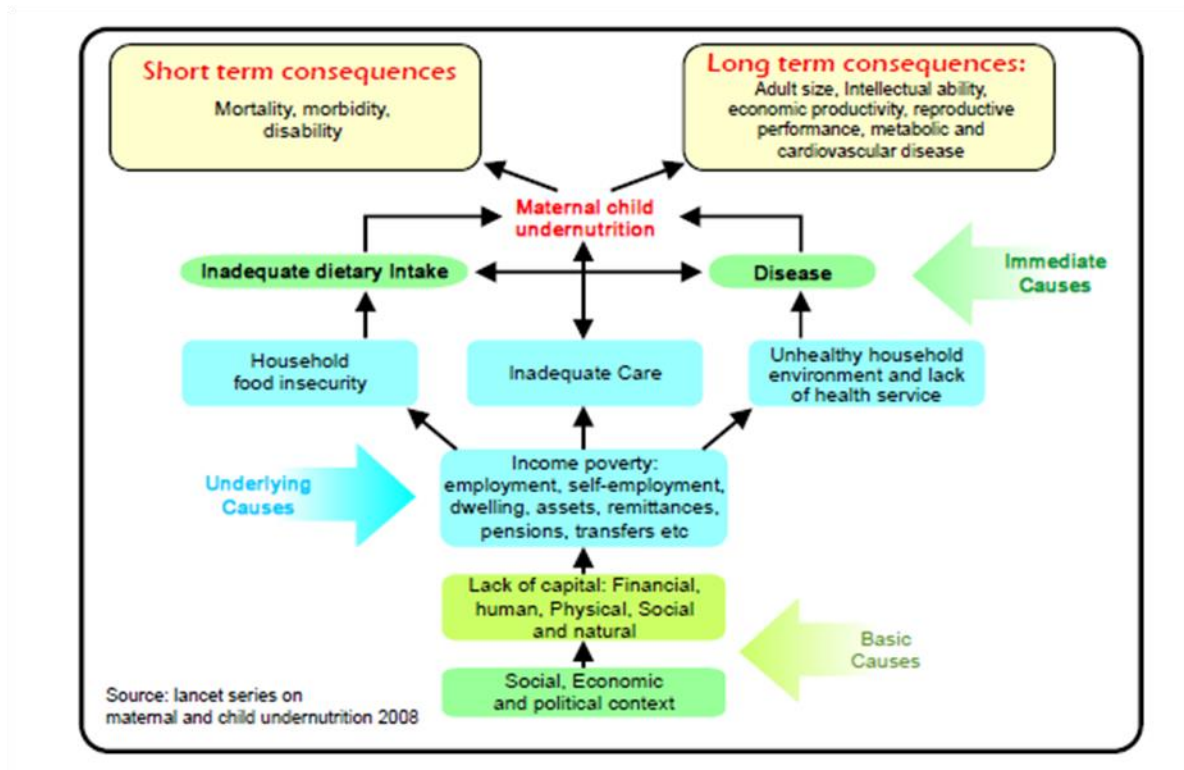




**Figure 2: Prevalence of Child Malnutrition (Source: Zambia DHS, 2007)**

If current levels of stunting remain unchanged in Zambia, the country is expected to lose US\$775million in economic production. Addressing under nutrition is therefore essential to meeting all economic and development targets, attainment of the Millennium Development Goals (MDGs) and protecting the human rights for health and freedom from hunger.

Therefore, the eradication of extreme poverty and hunger, improving educational levels and Maternal nutritional status, family planning and disease prevention among other factors, are inextricably linked to reducing under nutrition. Long term improvements in food and nutrition security at various levels will come from sustained and robust economic growth, macroeconomic and structural policies that promote job creation, economic inclusion, social empowerment and proved investment in the key sectors such as health, agriculture, water and sanitation, education and social protection. However, the under nutrition has serious consequences and are divided under short term consequences and long term consequences respectively as shown in figure 2 below:



**Figure 3: Determinants of maternal and child nutrition**

### Self test

#### INDICATE TRUE (T) OR FALSE (F) AGAINST EACH STATEMENT

1. 45% of children between 6 to 59 months are stunted in Zambia.
2. 54% of children have vitamin A deficiency
3. Addressing under nutrition is therefore essential to meeting all economic and development targets, but not the attainment of the Millennium Development Goals (MDGs) and protecting the human rights for health and freedom from hunger.

#### ANSWERS

1. T 2.T 3.F

### 3.4 Interventions

Addressing the direct and indirect causes of under nutrition

- Under nutrition arises from complex, multiple and interactive causes. The immediate causes include inadequate dietary intake and disease. Underlying these are causes operating at household and community levels: household food insecurity, inadequate care for women and children, unhealthy household environments and lack of health services, with low income and poverty underpinning all three.

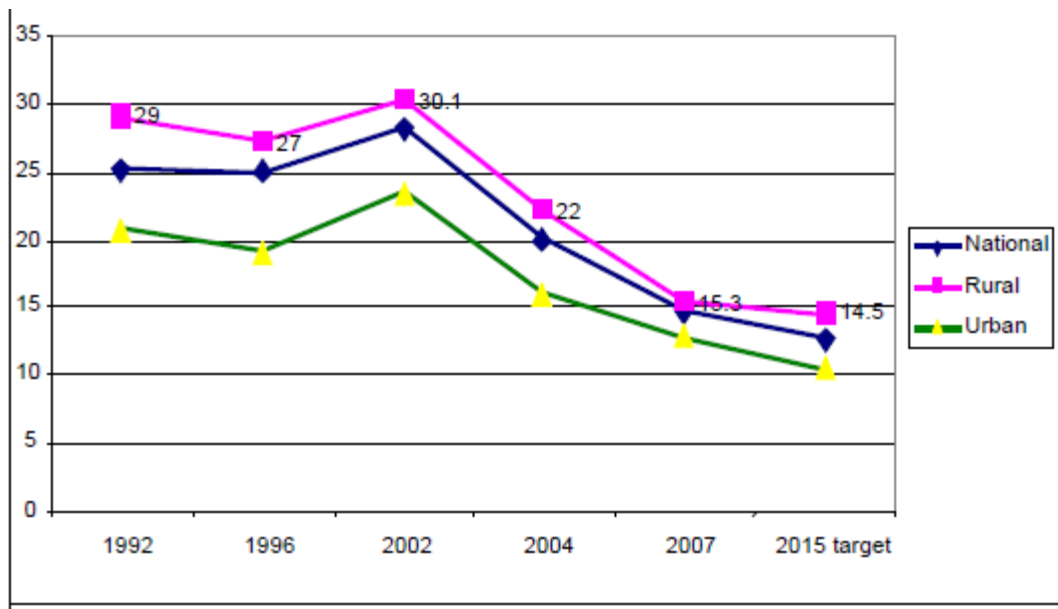
If progress in reducing under nutrition is to be sustained, the underlying causes related to poverty, inequity, low maternal education and women's social status must be addressed. These deep rooted and complex issues cut across sectors such as agriculture, water and sanitation, education, gender and social protection.

Cash and food voucher transfer programmes to the local economies could result in increased food consumption and asset ownership. **Poverty and nutrition**

Nutrition is one of the fundamental drivers of economic growth. Therefore, Sustainable social cash and food voucher transfers support for raising smallholder farm and livestock productivity, and Food assistance and alternative livelihood support to the nutritionally vulnerable households with pregnant and lactating women and malnourished children are among the interventions recommended to address poverty .

#### Urban-rural inequality

The 2011 MDG report for Zambia shows significant inequalities in nutritional status with hunger more concentrated in rural areas, where 15.3% of under-five children are underweight, compared to 12.8% in urban areas (Figure 4). Many other factors affect nutrition status such as gender, education, family size and HIV status. It is the poor who are most vulnerable and among these are women and children. The intervention to this problem is to address gender inequality, educate women and children.

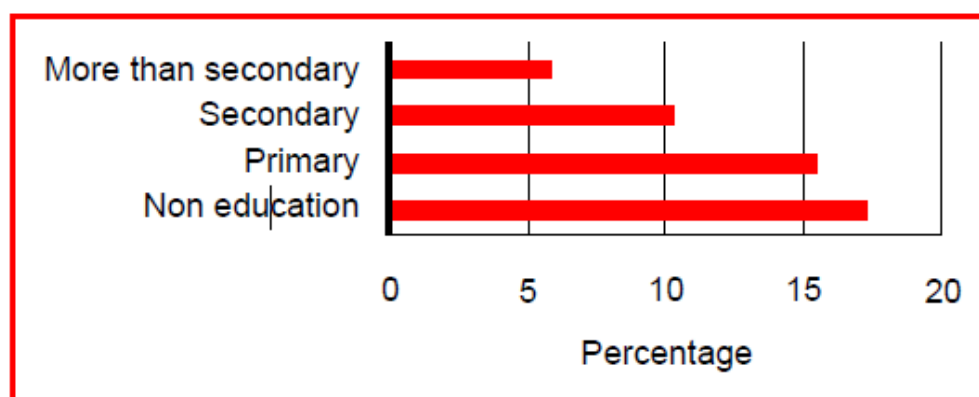


Source: Zambia DHS 2007

**Figure 4: Trends and targets for underweight children by rural and urban**

## Gender

The socially constructed gender roles of men and women have an impact on the nutrition status of the entire family. Women typically have limited access to land, education, information, health services, credit, technology, and decision making forums. Women's contribution to food and nutrition security, improves visits to health facilities for infants, raises household food security production, food preparation, and child care. The education level of women is a key determinant for childhood nutrition as seen in Figure 5. These elements are all critical for the social and economic development of communities, yet efforts in this direction are hampered by malnutrition



**Figure 5: Percent (%) underweight among under 5 year children**

## Food consumption

According to Central Statistics Office (2004) the majority of Zambians cannot afford three meals per day. Therefore, the intervention for this problem is to empower women in terms of land ownership and appointing women in decision making positions.

Now you can read specific interventions

### 3.4.1 Nutrition Specific Interventions

Vitamin A supplementation to help in reducing severity of infection in children.  
/There is consensus that this intervention should be delivered as part of the primary health care system .

***Deworming.*** This intervention has small positive effects on children's weight and a larger impact on anaemia in populations with high rates of intestinal helminthiasis. Systematic reviews show that regular de-worming in children could lead to a reduction of anaemia rates of between 4.4% to 21%. Iron deficiency anaemia is estimated to cause 1.6 million DALYs in children under the age of 5; of course not forgetting hand washing and sanitation.

#### ***Iron/ Folate supplementation for pregnant women.***

Iron deficiency anaemia in women contributes to maternal deaths. Universal iron and folate supplementation for pregnant women could avert an estimated 84,000 maternal deaths and 2.5 million DALYs. In Zambia, iron /folate for pregnant women is provided through ante-natal care. However, although rates for 1<sup>st</sup> ANC visits are high, this is not the case with follow up ANC visits, which explains why 56% of pregnant women do not take iron/ folate. There are also compliance challenges.

Zinc supplementation to reduce episodes of diarrhea and lower respiratory infections in children.

## 3.7 Programme Activities to address Under Nutrition

The National Food and Nutrition Policy (2006), launched in March 2008, acknowledged children and adults' right to good nutrition and to services such as micronutrient supplements, fortified foods, food production, preservation, storage and utilization.. It also set out the priorities for a multi-sectoral programme and stated that “in order to ensure that there is proper co-ordination and adequate capacity to undertake nutrition programmes, government shall:

A. Strengthen the NFNC institutional framework to enable it establish strong linkages with other relevant sector ministries and collaborating partners.

- bB. Amend the NFNC Act in order respond to the demands of emerging nutrition issues.

cC. Amend the National Food and Nutrition Commission Act in order to empower the NFNC to create any other bodies as they deem necessary for the promotion of food and nutrition

- activities.

dD. Empower the NFNC to adapt to relevant strategic institutional arrangements as they deem

- necessary.

eE. Strengthen existing and establish new structures for undertaking nutrition activities at

national, provincial, district and community levels; including the private sector.

- 
- f.F Strengthen partnerships and promote collaboration amongst all stakeholders at national,
- provincial, district and community levels.
- 
- g.G Establish a National Food and Nutrition Steering Committee to coordinate nutrition
- activities at all levels .”

The Sixth National Development Plan (SNDP) 2011 to 2015 (Table 2), which is intended to

accelerating actions towards attainments of MDGs (1, 4 & 5) articulates the links between

Nutrition and economic development. It indicates that nutrition will be 'mainstreamed' into a

programme of Food and Nutrition Coordination and Management, moving away from the more

Health-focused aspects of the previous national development plan towards ensuring diverse food availability, accessibility and utilisation, social protection, safe water and sanitation. These

Strategies are intended to contribute to improvements in the overall nutritional status of the

population, and to add value to the human capital required for social and economic development.

### **3.8 Links to other National, Regional and International Policies**

The First 1000 MCDs programme has been developed within the context of the overall national development agenda, and forms an integral part of the Sixth National Development Plan 2011 to 2015 (SNDP) and the Vision 2030 strategy, which aims at transforming Zambia into a prosperous middle-income nation by 2030. The programme is also linked to multi-sector policies and strategic frameworks for health, food and nutrition, education, agriculture, social protection and water and sanitation.

At regional and international levels, the programme is linked to various initiatives such as the

MDGs, the Scaling Up Nutrition (SUN), Comprehensive African Agriculture Development

Programme (CAADP), and Feed the Future Initiatives.

#### **Health Sector Organization and Coordination**

The nutrition service delivery in Zambia is liberalized and embraces diverse ownership through the public health sector, through the MOH health facilities and some government line ministries and departments; faith-based health sectors, the private health sector, and other NGOs.

Since 1991, Zambia's public health sector approach has focused on decentralization to the districts, where planning, service delivery and resource management takes place. This approach has also inevitably called for broader participation of all the key stakeholders, particularly the communities, in the governance of the health and nutrition services.

#### **Food and Nutrition Service Delivery Coordination**

NFNC is responsible for the overall coordination of the food and nutrition matters in Zambia. This can be achieved through the existing sector structures at national, provincial, district and community levels. However, to ensure that there is proper coordination and adequate capacity to undertake nutrition programmes, the NFNC Act of Parliament No. 41 of 1967 will be reviewed as guided by the National Food and Nutrition Policy on the institutional framework, as well as to address the current emerging developments in nutrition.

Civil society involvement in nutrition has been characterized as donor-driven. Until recently, <sup>41</sup> there have been no alliances, partnerships, or unified efforts to deal with matters of nutrition. Lack of a coordinating structure, an agreed action plan and common monitoring and evaluation system has led to non-regular consultation between CSOs and government. This has resulted in duplication of efforts and conflicts. CSOs working in advocacy have not prioritised nutrition in their efforts due to a lack of resources and insufficient technical capacity for engaging in nutrition issues. The SUN campaign has offered an opportunity for CSOs in Zambia to work with Government on nutrition matters. An alliance of national NGOs and international NGOs working in Zambia was formed in 2011 to lead civil society in the SUN/First 1000 MCDP. The alliance is still in its early stages but plans to support the implementation of the NFNSP 2011-2015 for Zambia <sup>42</sup> and the SUN framework. CSOs are part of the technical working group under the NFNC and there have been a number of consultative meetings to discuss how CSOs generally can collaborate with government partners under the NFNSP

#### The Human Resource Challenge in Nutrition

Zambia has significant human resource gaps both in terms of numbers and competences in

nutrition at the national level, but more so at the district and community levels. There are few

qualified personnel to effectively coordinate policy and nutrition programmes. Most government

Ministries and Departments, as well as NGOs, do not have adequate capacity to plan, implement

<sup>44</sup> and monitor nutrition policy and programmes at national, district and community levels. Capacity building, nutrition education and training will be a pivotal component of the NFNSP and of the First 1000 MCDP. (See Strategic Direction 3 for details)

#### **Monitoring, Evaluation and Research**

Monitoring and evaluation needs to be well linked with programme decision making and generating evidence for advocacy. The 2008 NFNC Food and Nutrition Situation report is the latest integrated report on progress of nutrition activities in different sectors.



The Health Management Information System (HMIS) tracks some nutrition indicators in the health sector.

Despite some progress, monitoring and evaluation of nutrition related programmes needs substantial improvement and better linkages with others sectors. While the basic framework for monitoring and evaluation is in place in each of the mainline Ministries working on food and nutrition and in the NFNC, most of these units will need to be linked, strengthened and/or expanded. The programme will also improve monitoring and evaluation coordination across sections of relevant Ministries, NGOs and survey coordinators. The NFNC is mandated to collate, synthesize and disseminate all nutrition-related information for Zambia. While the NFNC has been actively engaged in various national surveys, there is no mechanism for drawing in routine data or research from other sectors or from CSOs. Therefore, under the First 1000 MCDP, the NFNC will need capacity building to coordinate and lead on M&E across sectors by establishing specialist skills, systems and technology to support comprehensive data collection, analysis and dissemination. Information flow from source and feedback will need to be strengthened, and ensure information is used by policy makers, planners and implementers at

all levels.

#### The Nutrition Research Agenda

The nutrition research agenda in Zambia is determined by resource availability. Better allocation of resources, improved coordination, dissemination and technical capacity developed within NFNC, will ensure better prioritization of research studies. The academic institutions will be critical in taking a leadership role in coordinating nutrition research in collaboration with the NFNC, in research capacity building and prioritization of research projects. The programme will <sup>st</sup> also explore partnerships with research institutions both regionally and internationally. The 11000 MCDP will give emphasis to building capacity in operations research.

#### **Self test**

Indicate whether statement is true or false

- A. Strengthen the NFNC institutional framework to enable it establish strong linkages with
- other relevant sector ministries and collaborating partners is one of the program activities of under nutrition.....

- bB. Amending the NFNC Act in order respond to the demands of emerging nutrition issues is a program activity lined to mitigate the impact of under nutrition in Zambia.....
  
- cC. Amending the National Food and Nutrition Commission Act in order to empower the NFNC to create any other bodies as they deem necessary for the promotion of food and nutrition activities is not necessary in mitigating under nutrition in Zambia.....

You have now come to the end of this unit on 1000 most critical days in a child's life. Let us now review what you have learnt.

### 3.9 Summary

In this unit we have looked at the meaning of the 1000 most critical days in a child's life programme in Zambia. We have also highlighted the situation of under nutrition in Zambia and the dangers it is posing to growth pattern in children and the interventions the Government has put in place to mitigate the impact. However, it is also worth noting that program activities are being done in conjunction with other partnership.

### 3.10 References

1. Department for International Development, 2010. The neglected crisis of under nutrition: DFID's Strategy. Available at: <http://www.parliament.uk/deposits/depositedpapers/2010/DEP2010-0651.pdf>.  
  
Department for International Development, 2011. Summary of DFID's work in Zambia 2011-2015.
- DFID Zambia, 2011. Operational Plan 2011-2015.
- **The First 1000 Most Critical Days three year programme (December, 2012):**

## **UNIT 4: ESSENTIAL NUTRITION PROGRAMMES IN THE HEALTH SECTOR**

### **4.1: Unit Introduction**

Hello learner, welcome to our forth unit. In this unit, you will learn about food infant and young child nutrition, micronutrients control, growth monitoring and promotion, management of malnutrition and finally, maternal and adolescent nutrition needs. Let us start by looking at our unit objectives.

### **4.2: Unit objectives**

### **4.3: Infant And Young Child Nutrition (IYCN)**

Now you will learn about infant and young child nutrition, but before we move on, let us start with the basics first. Who is an infant/Child? Take 2 minutes to think about it and then complete the following activity.

#### **Activity 3.1**

Define the following terms in your own terms, write down in your note book;

- Infant
- Child

Good attempt! Now compare what you have written to the following definitions

An infant: is a baby aged one year or less.

A child is: any human being below the age of 18 years, unless under the law applicable to child maturity is attained earlier.

#### **4.3.1: Scientific Basis And Public Health Recommendations (required actions of health worker)**

WHO and United Nation International Children's Educational Fund (UNICEF) developed the Global Strategy for Infant and Young Child Feeding in 2002 to revitalise world attention to the impact that feeding practices have on the nutritional status, growth, development, health and survival of infants and young children.

The global public health recommendation is to protect, promote and support exclusive breastfeeding for up to two years of age or beyond. Many children however are not fed in the recommended way. They therefore are prone to malnutrition and malnutrition contributes to more than half of the 10.5 million deaths each year among young children in developing countries. Among the under five in Zambia, 47% are chronically malnourished, 5% have acute malnutrition while 28% are underweight. It is also estimated that 42% of all deaths that occur before five years of age are related to malnutrition (CSO, 2002).

#### **4.3.2: Breastfeeding**

You will now move on to look at breast feeding. We will start with your understanding of the term breastfeeding. What is breastfeeding? Do the following activity.

#### **Activity 3.2**

Write down the meaning of the word breastfeeding in your notebook.

Good! Breastfeeding is the giving of a child breast milk.

- **The importance of breastfeeding**

Breast milk continues to be the source of nutrients for several months and can provide one-third or more of the nutrients that a child needs up to the age of 2 years. The baby must be breastfed frequently during the day and night-at least 8 to 10 times in 24 hours. Therefore it should be given exclusively for the first 6 months. *Exclusive breast feeding* means giving the baby no other food or drink but only breast milk during the first six months of life<sup>6</sup>

#### ***Table 6: advantages and disadvantages of breast feeding***

Advantages	Disadvantages
<p>-It contains exactly the nutrients that a baby needs i.e. it has the exact combination of protein, fats, vitamins, minerals, enzymes, and sugars needed for the human infant at various stages of his growth.</p> <p>-It is easily digested and efficiently used by the body, breastfed babies are rarely constipated.</p> <p>-It protects the baby against infection due to its anti-infective properties, breastfed babies tend to have fewer incidences of symptoms of ear infections, respiratory illness, allergies, diarrheal, and vomiting.</p> <p>-Helps the mother and baby to bond. The bond between mother and child seems to be enhanced with breastfeeding.</p> <p>-It is cheap i.e. it is free.</p> <p>-It is readily available whenever the baby needs to be fed; there is no delay in preparing or</p>	<p>-It is not possible to see how much milk the baby is getting</p> <p>- In some cultures exposing the breasts is a taboo and so finding discreet places to breastfeed may be difficult.</p> <p>-Some women find it distasteful to breastfeed</p> <p>-Women wishing to return to work find it difficult to fit in the breastfeeding regime</p> <p>-In some cases, breastfeeding may be impossible due to a medical condition of either the infant or mother.</p>

<p>warming milk feeds</p> <p>-Breast milk is always clean and at the right temperature.</p> <p>-Breast milk contains growth factors which help the baby's intestines to grow and develop so that it is able to digest and absorb other foods.</p> <p>-It helps in the involution of the uterus; makes the uterus contract which helps to stop bleeding after delivery.</p> <p>-It helps delay pregnancy in lactating mother i.e.it can be a useful method of family planning.</p>	
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- **Good suckling position of the baby**

The following are signs that a baby is in a good suckling position

- The baby is close to the breast with his mouth wide open
- The baby's whole body is facing his mother and is close to her.
- The face is close up to the breast
- The chin is touching the breast
- The mouth is wide open
- The lower lip is turned outwards
- More areola will be seen above the upper lip than below the lower lip
- The baby takes slow deep sucks you can see or hear the baby swallowing.
- The cheeks are round and not pulled in
- The baby is relaxed and happy and is satisfied at the end.
- Mother does not feel any pain

### 4.3.3: Complementary feeding

Now you will look at complementary feeding. Let us start with what you know about complementary feeding. What is your understanding of the term 'complementary feeding'? Take 2 minutes to think about it and then complete the following activity.

#### Activity 3.3

Write down in your own words the meaning of the word complementary feeding in your notebook.

Good! I hope your answer captured the following meaning of complementary feeding.

**Complementary feeding** is the giving of other food apart from breast milk when a child reaches six months. Even when complementary feeds are given, breast milk should continue for up to two years or more. The process of weaning an infant means to 'accustom' the baby to new foods and in so doing diversify the diet from milk to one containing solid foods. The age at which this occurs and the foods used vary between different cultures and communities. The optimal age of weaning is between 4 and 6 months. Note that complementary feeds should be:

- **Timely-** Meaning that they are introduced when the need for energy and nutrients exceeds what can be provided through exclusive and frequent breastfeeding.
- **Adequate-** Meaning that they provide sufficient energy, protein and micronutrients to meet a growing child's nutritional needs.
- **Safe-** Meaning that they are hygienically stored and prepared and fed with clean hands using clean utensils and not bottles and teats.
- **Properly fed-** Meaning that they are given in response to a child's signals of hunger and that meal frequency and feeding methods are suitable for the child's age

### 4.3.4: Common nutrients gaps and how to fill them in

People on vegetarian diets generally receive adequate amounts of most nutrients. However, the following nutrients may be lacking. Vegetarians should make sure they get adequate amounts of these nutrients.

**Protein-This** is needed for growth and maintenance of body tissues. It also is necessary for enzymes, hormones, antibodies and milk production in women who are breastfeeding.

Plant sources of protein can provide adequate amounts of essential and nonessential amino acids, if they are reasonably varied and caloric intake is sufficient to meet energy needs. Whole grains, legumes, vegetables, seeds and nuts all contain essential and nonessential amino acids. Textured vegetable proteins and meat analogues, such as tofu and tempeh (usually made from soybeans and fortified with amino acids) are good protein sources. An assortment of plant foods eaten over the course of a day can provide all essential amino acids; thus, complementary proteins do not need to be eaten at the same meal.

**Omega-3 Fatty Acids-**These fats help to reduce the risk for developing cardiovascular disease, improve cognitive function and vision, and act as an anti-inflammatory in the body. The primary sources of omega-3 fatty acids in the diet are fish, organ meats, and eggs.

Based on these food sources, vegetarians may not get enough omega-3 fatty acids in their diet. However, vegetarians can still boost their omega-3 intake by eating foods like flaxseed, walnuts, canola oil and soy. They can also choose from the increasing variety of DHA-enriched foods sold in the marketplace, such as some soya milks and breakfast bars. Finally, capsule supplements made from DHA-rich microalgae are available, but it is always important to consult a healthcare provider before taking a supplement.

**Calcium-** Calcium is needed for strong bones and teeth, for normal blood clotting and for normal muscle and nerve function. Most calcium comes from milk and milk products. When these foods are avoided, calcium must come from other sources such as dark green leafy vegetables (spinach and pumpkin leaves).

**Vitamin D-** Vitamin D is required to absorb calcium from the digestive tract and to incorporate calcium into bones and teeth. Few foods contain large amounts of vitamin D. The best sources of vitamin D are fortified milk, egg yolks and liver which are all of animal origin. Therefore, vegetarians, especially vegans, may not get enough.

However, sunlight is another source of vitamin D. The body makes vitamin D from sunlight on the skin. People regularly exposed to sunlight can get enough vitamin D without having any come from food. However, sun exposure can be limited by several factors, including dark skin, pollution and northern latitudes. If sun exposure is limited and there are no animal products in the diet a vitamin D supplement is needed.

**Vitamin B<sub>12</sub>-**Vitamin B<sub>12</sub> is needed for normal red blood cell formation and normal nerve function. The body needs only small amounts and can store it in large amounts. Therefore, a deficiency takes a long time to develop, maybe several years. Its deficiency can result in irreversible nerve damage. Thus, vegetarians need to pay special attention to this nutrient.



The human form of vitamin B<sub>12</sub>, Cyanocobalamin, is available from non-animal products such as fortified commercial breakfast cereals, fortified soy beverages, some brands of nutritional yeast and other products. A vegetarian who eats dairy products daily will get enough vitamin B<sub>12</sub>. Vegans, however, have little or no vitamin B<sub>12</sub> in their diets and must obtain the vitamin through regular use of a vitamin B<sub>12</sub> sources such as fortified soya milk or yeast or a vitamin B<sub>12</sub> supplement.

**Iron**-Iron combines with protein to form haemoglobin, the substance in the blood that carries oxygen and carbon dioxide. An adequate intake of iron is necessary to prevent anaemia. Iron is found in animal and plant foods, but the iron in animal foods is more easily absorbed by the body than plant iron because of its high fibre content. For these reasons, vegetarians may be at a higher risk for developing iron deficiency.

Among plant foods, dark green leafy vegetables have the highest iron content. Dried fruits (such as raisins, apricots, peaches and prunes) also are high in iron. Eating plant sources rich in iron at the same time with foods high in vitamin C (Brussels sprouts, strawberries, citrus fruits, broccoli, collard greens, mustard greens, cantaloupe or vitamin C-rich fruit juices). When vitamin C and iron are eaten together, more iron is absorbed into the body.

- **Iodine**-Vegans especially who remove certain foods from their diets may be at risk for iodine deficiency.

Iodized salt is a source of iodine, while kosher and sea salts are not. Besides iodized salt, vegans can get iodine from seaweeds, soybeans, sweet potatoes and cruciferous vegetables such as broccoli and cabbage.

You have now come to the end of this unit where we have looked at complementary feeding in which the child may need other stuff besides the breastmilk. It is necessary for growth and development encompassing food from the food pyramid.

#### 4.3.5 Feeding During Illness

Intervention measures

- Provide low-fat, high-starch diet to reduce diarrhoea.

- Lactose intolerance is common in individuals with HIV infection and can cause diarrhoea, and cramping. Yogurt and hard cheese are usually better tolerated than liquid milk in lactose intolerance.
- Antiemetic medications, if ordered, should be taken before meal times.
- Provide small, frequent meals and foods of high energy density.
- Individuals with dementia may need to be reminded and encouraged to eat.
- Administer multivitamins daily.

#### **4.3.6: HIV and Infant feeding (GRZ recommendations)**

##### **Indinavir**

- Increases the risk of renal lithiasis (stones).
- Patient should therefore consume a minimum of 1500 ml fluid daily to reduce the risk.
- Drug should be taken on an empty stomach or after a small meal.
- A meal high in energy, fat and protein decrease absorption of drug.

##### **Amprenavir**

- Drug should not be taken with a high-fat meal, which reduces absorption.
- Patient should not take supplemental vitamin E.

##### **Didanosine**

Should not be taken with food, because its absorption rate will be reduced as much as 50%.

##### **Ritonavir**

Taken with food to increase its absorption.

##### **Stavudine**

Take at least 2 hours before a meal; a high-fat meal can reduce absorption.

##### **Tenofovir**

Take with a meal, which increases the bioavailability of the drug.

##### **Zidovudine**

Avoid taking with a high-fat meal, which reduces absorption.

#### **4.3.7: Link Between safe motherhood And Maternity Leave**

In 1987, the Safe motherhood initiative was launched. The launch of the Safe Motherhood Initiative (SMI) was seen as a major milestone in the race to reduce the burden of maternal mortality throughout the world, particularly in developing countries. It issued a call to action to reduce maternal mortality and morbidity by one half by the year 2000. All events that make pregnancy unsafe, irrespective of the gestation or outcome, are part and parcel of safe motherhood. Essential elements of this initiative included improving women's access to education, better nutrition, primary health care, family planning and comprehensive reproductive and maternal health services. Since then higher nursing educational programs have been established at university level. Addressing maternal health means ensuring that all women receive the care they need to be safe and healthy throughout pregnancy and childbirth. Safe motherhood encompasses social and cultural factors, as well as addresses health systems and health policy.

#### **4.3.8: Implementation of Baby Friendly Hospital Initiative (The ten (10) steps to a successful breastfeeding)**

Let us now look at these ten steps to a successful breastfeeding which is a key factor to babies in any particular nation.

***Table 7: The ten (10) steps to a successful breastfeeding***

The ten (10) steps focus on essential health care practices that promote breastfeeding and these include the following;

1. 1. Have a written infant feeding policy that is routinely communicated to all health staff.
2. 2. Train all health care staff in skills necessary to implement this policy
3. 3. Inform all pregnant women about the benefits and management of breastfeeding.
4. 4. Help mothers initiate breastfeeding within an hour of birth.
5. 5. Show mothers how to breastfeed and how to maintain lactation, even if they should be separated from their infants.
6. 6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. 7. Practice rooming-in: allow mothers and infants to remain together 24 hours a day.
8. 8. Encourage breastfeeding on demand.

9. 9. Give no artificial teats or pacifiers to breastfeeding infants.
- 10.10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

#### **4.3.9: Code Of Marketing Breast Milk Substitutes**

The international public health recommended regulating the marketing of breast milk substitutes. This was to contribute to the provision of safe and adequate nutrition for infants, by protecting and promoting breastfeeding and ensuring the proper use of breast milk substitutes, when they are necessary, on the basis of adequate information and through appropriate marketing and distribution.

The World Health Organization and UNICEF have for many years emphasized the importance of maintaining the practice of breastfeeding, and of reviving the practice where it is in decline, as a way to improve the health and nutrition of infants and young children. A variety of factors influence the prevalence and duration of breastfeeding. Governments should have responsibility for the provision of objective and consistent information on infant and young child feeding to families and professionals. Any informational material about formula should explain the social and financial implications of its use as follows:

- Informational material should explain the health hazards of inappropriate foods or feeding methods. There should be no advertising or promotion to the general public of products within the scope of the Code.
- No samples of breast milk substitutes may be given to mothers
- There should be no point-of-sale advertising
- There should be no gifts of articles or utensils given to pregnant women or mothers of infants and young children
- Informational material should not show any pictures or text that idealizes the use of breast milk substitutes
- Companies producing milk substitutes are not allowed by law to discourage breastfeeding mother as a way of promoting their products because this can lead to high mortality rate of children under five years.

#### **4.3.10: Infant and Young Feeding in Exceptionally Difficult Circumstances**

Feeding in exceptionally difficult situation includes:

- Emergency situations
- Malnourished children
- Low-birth weight babies
- Babies born with birth defects (e.g. cleft palate)
- Infants of HIV-infected mothers and Orphans

**Replacement feeding- This** is the process of feeding a child who is not breast feeding with a diet that provides all the nutrients the child needs until the child is fully fed on family food.

Replacement feeds must meet **AFASS** which stands for:

- **A- Acceptable-** Mother perceives no barrier to replacement feeding. Barriers may have cultural or social reasons, or be due to fear of stigma or discrimination.
- **F-Feasible-** Mother or family has adequate time, knowledge skills and other resources to prepare the replacement food and feed the infant up to 12 times in 24 hours.**A- Affordable-** Mother and family, with community can pay for the cost of purchasing/producing, preparing and using replacement, feeding including all ingredients, clean water, soap and equipment, without compromising the health and nutrition of the family.
- **S-Sustainable-** Availability of a continuous and uninterrupted supply, and dependable system of distribution for all ingredients and products needed for safe replacement feeding, for as long as the infant needs it, up to one year of age or longer.

**S- Safe-** Replacement foods are correctly and hygienically prepared and stored and fed in nutritionally adequate quantities with clean hands and using clean utensils, preferably by cup.

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#### **4.4: Micronutrients Control**

Now you will look at micronutrients. Under this item, we will look at food supplements, fortification and helminthic control. But we shall start with food supplementation.

#### **ACTIVITY**

In your own words, write the meaning of micronutrients.

Good try! Micronutrients are substances that an organism requires for growth and development but in very tiny amounts e.g. minerals and vitamins

##### **4.4.1: Supplementation (Vitamin A, ferrous sulphate and folic acid)**

Vitamin A supplementation plays a major role in reducing severity of infection and mortality in children . It improves the general health of children and Government has put a deliberate policy of National Immunization Days (NIDs) where all children from 6 months to 12 years get these supplements free of charge. There is consensus that this intervention should be delivered as part of the primary health care system . Vitamin A is important for cell growth and differentiation especially for fast-growing cells, such as the epithelial cells covering both internal and external body surfaces. It also helps to promotion of immunity and defense system against infection and promotes growth of bones.

Its deficiency causes night blindness due to poor formation of visual purple, which enables the retina of the eye to adapt to dim light as well as xerophthalmia (which is drying and thickening of the conjunctiva and, ultimately, there is ulceration and destruction of the conjunctiva). Apart from Vitamin A supplements, ferrous and folates are also given to prevent iron deficiency anaemia.

##### **4.4.2: Food fortification**

This is the adding of a micronutrient to a food to make it nutritious.

#### **Importance of Food Fortification**

The common nutrition problems in Zambia are Protein-Energy Malnutrition (PEM), micronutrient deficiencies and low birth weight. The most common and clinically significant micronutrient deficiencies in children and childbearing women throughout the world include deficiencies of iron, iodine; folate, vitamin D, and vitamin A. Micronutrient

enable the body to produce enzymes, hormones and other elements essential for appropriate growth and development of individuals. As tiny as the amounts are, the consequences of their absence are severe. Some foods do not contain the required elements needed for the normal growth of the body hence the need to supplement the missing elements.

On a global basis, food fortification is an important strategy for combating specific nutrient deficiency that may be prevalent in a community. It is important to choose both an appropriate food for fortification, which represents a regular item in the diet, as well as the best form of the mineral or vitamin to maintain the stability of the food product and maximize bioavailability of the nutrient. The amount of micronutrient in the food must be enough to supplement the diet. It must not be so much that it causes side-effects, or spoils the taste or appearance of the food. Examples of fortified foods include; salt which is fortified with iodine because it is not available in most foods. Iodine is needed for the normal physical and mental development of the body. On the other hand, dried skimmed milk, margarine and sugar are fortified with Vitamin A.

#### 4.4.3: Helminthic Control

This refers to the control of worms which cause a lot of health problems to humans especially children. If not controlled, they can cause intestinal obstruction, anaemia, pneumonia, malnutrition and biliary obstruction among other things. The Government has a deliberate policy of deworming to prevent the ailments described stated above.

**Deworming programme** has small positive effects on children's weight and a larger impact on anaemia in populations with high rates of intestinal helminthiasis. Systematic reviews show that regular de-worming in children could lead to a reduction of anaemia rates of between 4.4% and 21%. Iron deficiency anaemia is estimated to cause 1.6 million DALYs in children under the age of 5. Deworming programme is usually carried out every after six (6) months.

### 4.5: Growth, Monitoring and Promotion

For the health of the community, health workers need to monitor growth and promotion of children's health needs. We shall look at the following activities to meet the health needs of our community.

#### 4.5.1: Setting Up Of Community Based Monitoring And Promotion (CBGMP) Site

Protecting and improving health, especially in poor communities, requires a combination of community- and facility-based activities, with support from central levels of organization, as well as some centrally run programs (for example, food fortification). The place of these activities in a strategy is likely to vary, depending on level of

development (of infrastructure, health services, and socioeconomic status) and on many local factors.

For the poorest societies, the first priorities are basic preventive services, notably immunization, access to basic drugs, and management of the most serious threats to health, such as some access to emergency care. Moving up the development scale, starting community-based activities may soon become cost effective for prevention, referral, and management of some diseases (notably diarrhoea) when coverage of health services is poor.

Community-based programs continue to play a key role until health services, education, income, and communications have improved to the point that maternal and child mortality has fallen substantially and malnutrition is much reduced; at this intermediate development level, the needs are less felt, and health services again take on a more prominent role. In this scheme, the widely felt need for better access to emergency obstetric services is problematic, requiring a well-developed human and physical infrastructure, yet arguably being one of the highest priorities.

Facility-based programs can be seen either as linking with the community program (referrals, home visits from clinics, and so forth) or as actually being part of the same enterprise. A distinction is that community-based activities take place outside the health facility, in the home or at a community central point, even if they may be supported by health personnel based in health facilities. The local workers in community-based programs may be drawn from the community itself, may be home visitors from a health centre or clinic, or may sometimes be volunteers supervised by these home visitors. Many community-based programs come under the health sector, whatever the exact arrangements with local health services. Regarding specific program components, we return to the relative role of community programs and facilities later.

The integrated management of infant and childhood illness (IMCI) program provides guidance mainly on the curative health aspects and contains a number of nutrition activities (for example, administration of vitamin A capsules). Links to local health facilities are essential for the maintenance of the community activities and for referral in cases of illness.

As the IMCI training and implementation progresses, it should integrate directly with CHNPs (in fact, become part of the same exercise) Add to this treatment of additional diseases. IMCI addresses diarrhea, acute respiratory infection (ARI), malaria, nutrition, immunization, safe motherhood, and essential drugs (WHO 1997). The 16 key practices for child survival defined in the context of IMCI (Kelley and Black 2001, S115) are exactly those to be promoted within CHNPs.



#### 4.5.2: The Children's Clinic Card

This is a standard card which is used to monitor children's growth pattern so that intervention can be put if growth pattern seems poor. There are two different types of cards according to sex of the child. For males, it denoted with the colour blue and while is pink for girls. (See samples of children under five cards below)

#### **Plotting And Interpretation**

Weighing speaks volume of children's nutritional status which is followed by correct plotting and interpretation so that proper advice is given depending on the outcome. However, there are some parameters that are used for detecting the child's nutritional status and these include the following:

- Weight for Age (Underweight)
- Weight for Height (Wasting)
- Height for Age (Stunting)
- Mid-Upper Arm Circumference (MUAC) Test
- Oedema

Let us now look at each of them in briefly:-

- Weight for Age (Underweight)- Each age has its own weight, so if one's weight is less than normal then one is considered to be malnourished, if we consider the Z scores. On the other hand, if one's weight for height is less than -2 SD then one is malnourished this means one has deviated by -2 from the normal.
- Weight for Height (wasting - This is another parameter used to detect malnutrition. When one's weight is lower than the height then one is malnourished, where the Z score is less than -2SD.
- Mid-upper Arm Circumference (MUAC) Test- This is also used to detect the nutritional status of a child, when MUAC is less than 11.5cm one considered to be severe malnourished.
- Oedema-This is another way of detecting malnutrition. It can be classified into three, **+1** (where the face is the only one swollen), **+2** (where the face and the hands or the legs are swollen and **+3** (where the face, hands and legs are swollen).

- Height for Age (stunting)- Age has its own height, therefore, if one's height is not according to the recommended age, one is considered to be malnourished. This is referred to as stunting.

4.5.3: Counselling is the process of providing information to a client or care taker so that he or she can make an informed decision. In this case, the care giver (nurse/nutritionist) would give information to the mother or caretaker on good and correct foods and right amounts to be taken for the improvement of the child's health. It is discovered that issues of bad feeding which results in malnutrition in certain cases is as a result of ignorance of caretakers and as such, they need to be properly counselled or rather given the correct information at organized foras to prevent malnutrition and other ailments.

## 4.6: Management of Malnutrition

We shall look at the term malnutrition. The word s made up of two words; "mal" for bad and "nutrition" for feeding. Now try to define the same term in your own words

Good try! It is bad feeding.

4.6.1: Definition- Insufficient consumption of protein and calorie resulting in tissue breakdown to release energy.

### Types

- **Kwashiorkor**- A condition resulting from deficiency of proteins despite adequate calories.
- **Marasmus**-A condition resulting from deficiency of both calories and proteins.

4.6.2: Community mobilization

This is the mobilization/organization of the community at a particular site for health education or to organize people / resources in order to be ready for action. In this case, the community may be organized to be educated on the dangers of malnutrition as well improving the welfare of the community.

### 4.6.3: Out-patient treatment

This is normally organized from the same facilities that have in-patients facilities. However, out-patient treatment can also be arranged from peripheral health units

bringing the service closer to the community. Most patients can be admitted directly as an out-patient and can receive the treatment on a weekly basis. For each in-patient facility there should be many satellite sites providing out-patient treatment programs.

A strong communication and referral system needs to be in place to allow in-patients to move from in-patient (Phase 1 and Transition Phase) to out-patient treatment (Phase 2). The opposite applies if out-patients do not respond appropriately or if they develop complications. If this occurs they should be transferred immediately from out-patient to in-patient treatment.

Patients attending TB and ART services are at high risk of malnutrition and should be systematically screened for severe malnutrition using the **Mid-Upper Arm Circumference (MUAC)** tape and checking for oedema so that they can be promptly referred and admitted if needed.

#### **4.6.4: In-patient treatment**

Management of malnutrition in facilities should ideally be only for Phase 1 and the Transition Phase.

Patients that are admitted can be treated on a **24 hour basis** with full medical surveillance and treatment of complications. They would receive 6-12 meals of F75 per day during Phase 1 followed by 6 meals of F100 per day during the Transition Phase.

Patients may also be treated on a **Day Care basis**. In this case they would have to receive the 5-6 meals of F75 within 12 hours making this option not one that is recommended for Phase 1. Day Care is suitable for in-patient treatment during Phase 2 but it places a burden on the caregiver who has to come in on a daily basis. In general, the continuation of this treatment as in-patients for Phase 2 may increase the economic burden on the caregivers as well as on the facility. All in-patients that regain their appetite and have successfully passed the Transition Phase should continue treatment as out-patients if there is a service in place and if the caregivers agree.

Usually, severe acute malnutrition management involves therapeutic feeds such as F75 are used recommended by World Health Organization (WHO) for the stabilization of children. F75 is a milk based diet and it is known as the 'starter' formula used until the child is stabilized. On the other hand, F100 is a milk based diet recommended by WHO for the nutritional rehabilitation of children with severe acute malnutrition after stabilization. It is also described as the 'catch-up' formula used to rebuild wasted tissues. Additionally, Ready-to- Use Therapeutic Food (RUFT) is an energy-dense, mineral/vitamin enriched food specially designed to treat Severe Acute Malnutrition. RUFT has a similar nutrient composition to F100.

4.6.5: Supplementation Feeding- is the supplementation of nutrients or provision of extra foods i.e. micro-nutrients like vitamin A supplementation. They are billed as “brain power,” “immune power,” weight-loss wonders, broccoli in a bottle, muscle-expanding elixirs, and much more. They can be plucked from the shelves of health food stores, drug stores, and supermarkets. They are dietary supplements—a category that used to include just vitamins and minerals but now also encompasses herbs, amino acids, fish oils, hormones, and many other substances.

There is no doubt that vitamins and minerals are critical to good health. Vitamins are carbon-containing substances derived from living things. They are used by the body in tiny amounts to build, maintain, and repair tissues. For example, the various compounds dubbed vitamin A are used in eye tissues for vision, and in cell nuclei to aid gene expression, among other functions. Vitamin D is needed for bones to develop properly, and the B vitamin folic acid aids in the digestion of amino acids and plays a role in the metabolism of deoxyribonucleic acids (DNA) and ribonucleic acids (RNA). DNA is genetic material that codes instructions for the production of proteins—the basic building blocks of life; RNA is a molecule that helps carry out those instructions.

Unlike vitamins, minerals are *inorganic* (not bound to carbon). They come from soil and water, but make their way into the plants and animals people eat. Essential minerals include calcium, phosphorous, magnesium, iron, zinc, iodine, and selenium. These minerals have myriad biological roles. Some work in *enzymes*, protein “tools” that make possible many critical biological processes. Others enable blood to carry oxygen to the body's tissues; strengthen bones and teeth; help cells grow and repair themselves; or keep the heart beating properly.

#### 4.7: Maternal and Adolescent Nutrition Needs versus challenges and intervention

4.7.1: Adolescents- Now you will look at the nutritional needs of adolescents. To begin with, let us find out your understanding of the word ‘adolescents’. Who are adolescents? Do the following activity.

### Activity 3.4

Write down the functions of mineral salts in your notebook

Good try! An adolescent is young person between the ages of 10 and 19 years.

### **Nutritional needs of adolescents**

During adolescence, nutrient requirements are significantly increased above those required in childhood. This is due to the influence of hormonal changes; growth in height accelerates much faster than at any other time, except in the first year of life. Adolescence itself is a time of transition, associated with progress towards autonomy where the total nutrient needs are higher than any other time in the lifecycle of the human being. This is reflected in all aspects of the teenager's life, but inevitably impacts on food choice and nutritional intake. Rejection of food selected or prepared by parents is a normal aspect of this developing autonomy.

Prior to puberty, nutrient needs are similar for boys and girls. It is during puberty that body composition and biologic changes (e.g., menarche) emerge which affect gender-specific nutrient needs. Nutrient needs for both males and females increase sharply during adolescence. Failure to consume an adequate diet at this time can result in delayed sexual maturation and can arrest or slow linear growth. At the peak of the adolescent growth spurt, the nutritional requirements may be twice as high as those of the remaining period of adolescence.

**Carbohydrates**-Carbohydrate is the body's primary source of dietary energy. Carbohydrate-rich foods, such as fruit, vegetables, whole grains, and legumes are also the main source of dietary fibre. Dietary recommendations suggest that 50% or more of total daily calories should come from carbohydrate, with no

more than 10-25% of calories derived from sweeteners, such as sucrose and high fructose corn syrup.

Energy needs of adolescents are influenced by activity level, basal metabolic rate, and increased requirements to support pubertal growth and development. Basal metabolic rate is closely associated with the amount of lean body mass. Adolescent males have higher caloric requirements since they experience greater increases in height, weight, and lean body mass than females.

**Protein-**Protein needs of adolescents are influenced by the amount of protein required for maintenance of existing lean body mass and accrual of additional lean body mass during the adolescent growth spurt. Protein requirements per unit of height are highest for females in the 11 to 14 year age range and for males in the 15 to 18 year age range, corresponding to the usual timing of peak height velocity. When protein intakes are consistently inadequate, reductions in linear growth, delays in sexual maturation and reduced accumulation of lean body mass may be seen.

**Fat-**The human body requires dietary fat and essential fatty acids for normal growth and development. The Dietary Guidelines for Americans recommend that adolescents consume no more than 30% of calories from fat, with no more than 10% of calories derived from saturated fat. Major sources of total and saturated fat intakes among adolescents include milk, beef, cheese, margarine, and foods such as cakes, cookies, donuts, and ice cream

**Minerals-** There are many mineral salts which are discussed below

**Calcium-** Calcium needs during adolescence are greater than they are in either childhood or adulthood because of the dramatic increase in skeletal growth. Because about 45% of peak bone mass is attained during adolescence, adequate calcium intake is important for the development of dense bone mass and the reduction of the lifetime risk of fractures and osteoporosis. By age 17, adolescents have attained approximately 90% of their adult bone mass. Thus, adolescence represents a “window of opportunity” for optimal bone development and future health.

**Sources of Calcium-** Milk, provides the greatest amount of calcium in the diets of adolescents, followed by cheese, ice cream and frozen yogurt. Calcium-fortified foods are widely available e.g., orange juice, bread, cereals.

**Iron-** Iron is vital for transporting oxygen in the bloodstream and for preventing anaemia. For both male and female adolescents, the need for iron increases with rapid growth and the expansion of blood volume and muscle mass. The onset of menstruation imposes additional iron needs for girls. Iron needs are highest during the adolescent growth spurt in males and after menarche in females. The Recommended Dietary Allowance (RDA) for iron is 8 mg/day for 9-13 year olds, 11 mg/day for males' ages 14-18 and 15 mg/day for females ages 14-18

Source of Iron- Heme iron, which is found in meat, fish, and poultry, is highly bioavailable while non-heme iron, found predominantly in grains, is much less. Bioavailability of non-heme iron can be enhanced by consuming it with heme sources of iron or vitamin C. Because the absorption of iron from plant foods is low, vegetarians need to consume twice as much iron to meet their daily requirement.

- **Zinc-**Zinc is associated with more than 100 specific enzymes and is vital for protein formation and gene expression. Zinc is important in adolescence because of its role in growth and sexual maturation. Males who are zinc deficient experience growth failure and delayed sexual development. It is known that serum zinc levels decline in response to the rapid growth and hormonal changes that occur during adolescence.

Source of Zinc-Zinc is naturally abundant in red meats, shellfish, and whole grains. Many breakfast cereals are fortified with zinc. Indigestible fibers found in many plant-based sources of zinc can inhibit its absorption. Zinc and iron compete for absorption, so elevated intakes of one can reduce the absorption of the other. Adolescents who take iron supplements may be at increased risk of developing mild zinc deficiency if iron intake is over twice as high as that of zinc. Vegetarians, particularly vegans, and teens who do not consume many animal-derived products are at highest risk for low intakes of zinc.

#### **4.7.3: Maternal (Pregnant women and lactating mothers) needs**

Diet during pregnancy affects both the mother and the foetus. The key nutrition needs are during the first trimester (3 months of pregnancy) especially the need for folate. The need for all essential nutrients begins to increase in the second trimester. Proteins and iron are especially important during pregnancy. Proteins are needed to support the growth of the fetus. The fetus needs calcium for well-formed bones and strong teeth. Iron is especially needed during the last six months of pregnancy. This is because the baby needs enough to build reserves to use during its first six months of life.

The nutritional intervention which you have to institute to ensure that the pregnant woman remains healthy during pregnancy and lactation period are as follows:-

- i. Encourage increased food intake during pregnancy and lactation to promote health of the mother and the developing fetus. The three micronutrients (vitamin A, iron and iodine) and extra energy intake/reduction of energy expenditure are important.
- ii. Monitor weight gain during pregnancy as a yardstick for the woman's healthy.
- iii. Encourage the woman to eat at least one extra meal of staple food per day during pregnancy and the equivalent of an extra meal per day during lactation. A lactating woman needs at least two extra meals of whatever is available at home. In addition, a dose of vitamin A (200,000IU) should be given once between delivery and six weeks after delivery. This will enable the baby to get an adequate supply of vitamin A for the first six months.
- iv. Advise woman to gain at least one kilogram per month during the second and third trimester by eating mixed diet to promote maternal and fetal wellbeing.
- v. Encourage the woman to rest more during pregnancy and lactation to avoid stress and conserve energy.
- vi. Folate intake is especially important for the prevention of neural tube defects and should be consumed in adequate amounts prior to conception.
- vii. Pregnant women during the third trimester of pregnancy should be de-wormed using mebendazole or albendazole to prevent anaemia and promote maternal wellbeing.

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## **UNIT 5.0 INTRODUCTION TO DIETETICS**

### **5.1: Unit Introduction**

Hello dear learner, welcome to our fifth unit, introduction to dietetics. In this unit, you will learn about the some definition of terms and the ideals and challenges to institutional feeding. You will also learn about principles of nutrition education and counseling and the dietary management of non-communicable diseases including nutrition interventions in HIV/AIDS. Before we go in details of our discussion, let us start by reviewing our unit objectives.

## 5.2 Unit Objectives

By the end of this unit you should be able to:

1. Define the key terms in dietetics
2. Discuss the nutrition in Communicable Diseases (NCDs) and interventions in TB, HIV/AIDS and ART
3. Discuss the dietary management for non-communicable diseases and others
4. Outline the ideals and challenges related to institutional feeding
5. Explain principles of nutrition education and counselling
- 6.

## 5.3 Definition Of Key Term In Dietetics

To begin with, let us start with your understanding of the terms diet and dietetics. What is a diet and dietetics? Take 2 minutes to think about it and then complete the following activity.

### Activity 5.1

Write down the meaning of the term dietetics in your note book

Well done! Now compare your answer with the following definition

**Diet-** This is the sum of food consumed by a person or other organism

**Dietetics-** is the use of diet in the treatment and management of disease.

d patients & unconscious patients. The portions of food containing protein should be doubled. These should be given at the three (3) main meals e.g. Breakfast, lunch, supper then given extra drinks in between meals.

**Low fat diet-** It is given to patients with obstructive jaundice or liver disease. A person with such a condition should avoid foods like cheese and butter instead give a lot of carbohydrates. Now we will look at therapeutic diets or Nutrition in Communicable Disease (NCDs) Therapeutic diets or Nutrition in Communicable Disease (NCDs)

**Therapeutic diets:** are the diets used by the professional nutritional therapist to help individuals suffering from nutrition-responsive health problems. Therapeutic diets are formulated to optimise the nutritional needs of the client in order to treat a variety of diseases and disorders.

Let us now look at the purposes of therapeutic diets. First of all, we will begin with your understanding of the purposes of therapeutic diets. What are the purposes of therapeutic diets? Do the following activity.

### Activity 5.3

Write down the purpose of therapeutic diets in your notebook.

Good try! Now compare your answers with the following information

### Purposes Of Therapeutic Diets

- Regulate the amount of food
- Prevent or restrict oedema
- Assist body organs to regain and/or maintain normal function
- Aid in digestion
- Increase or decrease body weight

### Types Of Therapeutic Diets

Now you will look at the types of therapeutic diets and these include the following:

- Full diet
- Fluid diet
- Gastric diet
- Low protein diet
- Low salt diet
- High protein diet

- Low fat diet
- Weight reducing diet
- Diabetic diet
- Gluten free diet

Let us discuss each one of them in turn.

**Full diet-** this is a traditional or ordinary diet. It can be taken by any patient e.g. *nshima* with chicken and vegetables.

**Fluid diet-** consists of water, milk, glucose drinks, fruit juice and soup. They are ordered for special conditions.

**Gastric diet-** is given in order to treat conditions such as peptic ulcers so as to reduce the peristalsis. This is given with a low residue and should be given frequently in small amounts e.g. rice with milk, in order to prevent the stomach from being left empty that is why you need to serve frequent meals in small amounts. Avoid foods which are difficult to digest.

**Low protein diet-** This type of diet is ordered for patients with renal failure to rest the kidney. You give rice, corn flour, vegetables, fruits, sugar & fats. Avoid foods like meat, beans, eggs & fish.

**Low salt diet-** this is given to patients with hypertension and those with oedema because salt retains fluids in tissues. If the Doctor ordered “strict salt intake” no salt should be added to the meals.

**High protein diet-** is given to malnourished children

**Weight reducing diet-** is given to one who wants to lose weight. Avoid sugar, puddings, sweet cakes, biscuits. Reduce the intake of bread and potatoes, *nshima*. A person who wants to lose weight should take lean meat, fruits, fish, vegetables & unsweetened drinks.

**Diabetic diet-** it is given to patients with diabetes mellitus. No sugar or sweet cakes should be given to the patient. The amount of carbohydrates is controlled e.g. bread, cereals, porridge. Encourage patient to eat a lot of proteins e.g. beans, meat, chicken, milk, eggs. Vitamins are cardinal in form of vegetables and roughage.

**Gluten free diet-** is a protein that causes allergy especially in babies. So they should be given porridge which is gluten free.

SUMMARY communicable diseases are ailments that are and transmissible by air, water, blood and blood products and through close contact such sex. They need special diets to fight the effects of disease processes

#### 5.4 Nutrition in TB and HIV/AIDS

You will now look nutrition in TB and HIV/AIDS. Am sure these the terms HIV/AIDS are not new to you. Let us start with a quick recap of terms. What do the HIV and AIDS stand for? Do following activity.

##### Activity 4.7

Write down what the letters TB and HIV/ AIDS stand for in your notebook.

Excellent! HIV stands for Human Immuno-deficiency Virus and AIDS stands for Acquired Immuno Deficiency Syndrome. On the other hand, TB stands for Tuberculosis

Now let us look at nutrition in HIV/AIDS

HIV is the virus that causes AIDS. AIDS is a condition caused by the HIV when the body's immune system has become very weak because of the virus. When the immune system has been weakened, opportunistic infections will set in leading to AIDS. The infected individual is susceptible to opportunistic infections such as kaposi sarcoma, tuberculosis, and pneumocystic jiroveci pneumonia. Consequently, a person may have weight loss, diarrhea, anorexia and dementia.

#### 5.5: Dietary Management Of HIV/AIDS

Interventions

- Provide low-fat, high-starch diet to reduce diarrhoea.

- Lactose intolerance is common in individuals with HIV infection and can cause diarrhoea, and cramping. Yogurt and hard cheese are usually better tolerated than liquid milk in lactose intolerance.
- Antiemetic medications, if ordered, should be scheduled to be taken before meal times.
- Provide small, frequent meals and foods of high energy density.
- Individuals with dementia may need to be reminded and encouraged to eat.
- Administer multivitamins daily.

#### 5.5.1: Dietary Management Of TB

Tuberculosis is an air borne disease caused by mycobacterium tubercle. However, therapy goes with good nutrition such as:-

- Provide high protein diet to replace the worn out tissues
- Provide small, frequent meals and foods of high energy density for strength.
- Individuals with rash should be given vitamin B6 to reduce neuropathy.
- Administer multivitamins daily in certain cases

#### 5.5.2: Nutrition and Antiretroviral Therapy (ART)

It is important to look at the nutrition of a client who is on ART as most of the oral drugs have a side effect of nausea and vomiting. As a result of such side effects; the clients' appetite is distorted and this reduces the nutritional intake.

The following are examples of some antiretroviral drugs and their nutritional considerations:

##### **Indinavir**

This drug increases the risk of renal stones; therefore the patient should take a minimum of 1500 mls of fluid daily to reduce the risk. The drug should be taken on an empty stomach or after a small meal. A meal high in energy, fat and protein decreases absorption of drug.

##### **Didanosine**

This drug should not be taken with food, because its absorption rate will be reduced as much as 50%.

##### **Ritonavir**

This drug should be taken with food to increase its absorption.

##### **Stavudine**

This drug should be taken at least 2 hours before a meal; a high-fat meal can reduce absorption.

Tenofovir

Take the drug with a meal, this increase the bioavailability of the drug.

Zidovudine

Avoid taking the drug with a high-fat meal, which reduces absorption.

You now know the nutrition advice to give to clients taking antiretroviral drugs. Next let us look at institutional feeding.

## **5.6: Institutional Feeding**

What is institutional feeding? Take 2 minutes to think about it and then complete the following activity.

### **Activity 4.3**

Write down the meaning of the word institutional feeding in your notebook

We hope your answer captured the following meaning of institutional feeding.

Institutional feeding is the provision of catering and food services to institutions. For example, hospitals provide meals to patients.

### **5.5.1 Ideals of institutional feeding**

The following are the ideals of institutional feeding:

- Meals should be prepared in the hospital kitchen and the ward in-charge orders the meals for each patient using a diet sheet.
- The meals should be ordered according to the patients' preference, condition or disease and also according to the availability of food in the kitchen.
- After ordering, the food should be brought in the ward in a food trolley, ensuring that the food does not get cold and is well covered. It should be served when still hot.
- Breakfast, lunch, supper are served

Now you will look at the challenges of institutional feeding. To start with, let us look at your understanding of this term. What are the challenges of institutional feeding? Do the following activity.

#### **Activity 4.4**

Write down the challenges of institutional feeding in your notebook

Good attempt: now compare your answers to the following discussion

#### **Challenges of institutional feeding (in our Hospital set up)**

- Preparing food in bulk is involving and the food may not be cooked as it should be.
- Diet sheets may not be honored as there are limited choices or alternatives of menus to choose from hence some clients/ patients may not eat the food.
- Some individual clients/ patients may be given small or big portions of food.

### **5.7: Principles Of Nutrition Education And counseling**

You will now learn about nutrition education and counselling principles. Am sure these terms are not new to you. Take 2 minutes to think about it about and then complete the following activity.



### Activity 4.5.

Write down the meaning of the following terms in your notebook;

- Nutrition education
- Counselling

Good! Now compare your answers with the definitions we will discuss in the following section

**5.7.1: Nutrition education:** is any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviors conducive to health and well-being. Nutrition education is delivered through multiple venues and involves activities at the individual, community and policy levels.

**5.7.2: Counselling:** is a way of working with people where you understand how they feel and help them to decide what they think is best to do in their situation. It is important to implore some counseling skills when you talk to patients or clients.

The following are the skills you need to use when counseling mothers with young children

The counseling skills/principles include;

- **Listening and learning** were you should;
  - Use helpful non-verbal skills e.g. nodding, posture
  - Ask open questions e.g. questions that start with *What, How, Why* etc.
  - Use responses and gestures which show interest e.g. Ok.

- Reflect back what the mother says e.g. repeat what the mother said in your own words
  - Empathize – show that you understand how she feels
  - Avoid words which sound judging e.g. right or wrong
- ***Building confidence and giving support were you should;***
    - Accept what a mother thinks and feels
    - Recognize and praise what a mother and baby are doing right
    - Give practical help e.g. helping her hold the baby when she want to wash hands
    - Give a little, relevant information
    - Use simple language
    - Make one or two suggestions, not commands

## **5.8: Dietary Management For Non-Communicable Diseases And Others**

Now you will look at the dietary management of non-communicable diseases and others. First of all, let us begin with your understanding of the term non-communicable diseases. Take 2 minutes to think about it and then do the following activity.

### **Activity 4.6**

Write down the meaning of the term non-communicable disease

Well done! A non-communicable disease is a medical condition or disease, which is non-infectious and non-transmissible among people.

### **Mention the non-communicable diseases that you know.**

The following are the non-communicable diseases that will be discussed in this section:

- Gastrectomy
- Hepatitis
- Cancer
- Hypertension
- Congestion Heart Failure
- Diabetes Mellitus

Now let us discuss the dietary management for each one of them in detail.

**Gastrectomy-** is partial or total resection of the stomach in order to treat peptic ulcer or gastric cancer. Gastrectomy may lead into fat malabsorption and dumping syndrome.

Symptoms include nausea, abdominal pain, weakness, sweating, diarrhoea and weight loss.

#### Dietary management for Gastrectomy

##### Interventions

- Use skim or low-fat milk.
- Use plant proteins such as dried beans and peas regularly.
- Limit fried or fat foods.
- Eat small frequent meals (snacks); about 6 meals a day.
- Drink fluids at least 1 hour before or after meals.
- Eat fruits which are often well tolerated because of their soluble fibre (pectin) content.
- Pectin taken with meals and snacks may delay gastric emptying and carbohydrate absorption, reducing the risk of dumping syndrome.

**Hepatitis-** is the inflammation of the liver.

Hepatitis is caused by a virus, toxin or drug e.g. Panadol. Symptoms include jaundice, abdominal pain, hepatomegaly, nausea, vomiting and anorexia.

#### Dietary management for Hepatitis

##### Interventions

- Provide high energy, high protein (lean meat, poultry, legumes) (70-100g) and moderate fat (skim milk or low fat milk) diet to promote healing.
- Starches such as rice, potatoes, cereals and bread are good sources of energy.
- Advise to eat small frequent meals.

Cancer - is an abnormal proliferation of cells in the body.

Some cancers can cause cachexia which is a severe form of malnutrition characterised by anorexia, weight loss, anaemia, weakness and muscle wasting.

#### Dietary management for Cancer

## Interventions

- Add butter or margarine to hot foods such as soup, vegetables, mashed potatoes, cooked cereals and rice.
- Serve small meals frequently
- Prepare energy dense food such as soups and hot cereals.
- Add sauces to cooked vegetables.
- For problems like nausea and vomiting; serve liquids such as lemonade, juices and soft foods cold.
- For problems like anorexia; serve foods attractively, with variety in texture; small frequent feedings.
- For problems like diarrhoea, serve low-lactose, low fat; increase fluids; emphasise starches.

**Hypertension-** is a condition where the systolic blood pressure greater than 140mmHg and the diastolic pressure greater than 90mmHg. Increases in blood volume, heart rate and peripheral vascular resistance can lead to hypertension.

## Dietary management for Hypertension

### Interventions

- Weight reduction is encouraged for individuals who are overweight or obese
- Diet should be rich in fruits, vegetables, low fat-dairy products, low in saturated fats and cholesterol.
- Limit red meats, sweets and sugar containing beverages.
- Fish, nuts and whole grains are encouraged.
- Reduce sodium intake.

**Congestive Heart Failure-** is a state in which the heart fails to maintain an adequate circulation for the needs of the body. This condition results from decreased myocardial efficiency, and most commonly as a result of hypertension and ischemic heart disease. Other causes include damage to the heart valves, thiamine deficiency and congenital lesions of the heart.

## Dietary management for Congestive Heart Failure

### Interventions

- Reduce weight
- Eat five to six small meals per day than three large meals.
- Reduce dietary sodium to decrease fluid retention.
- Control fluid intake to help reduce circulatory volume.

Diabetes mellitus- is a disorder of carbohydrate, fat and protein metabolism as a result of insulin deficiency and is characterised by polyphagia, polydipsia, polyuria, glycosuria and hyperglycaemia. Despite the increase in liberation of glucose from the liver, cells cannot utilise glucose due to lack or very little insulin to facilitate its entry into the cells.

#### Dietary management for Diabetes Mellitus

- Avoid sugar, marmalade, honey, syrup, sweets, lemonade and chocolate.
- Eat in moderation bread, starch foods, breakfast, cereals, porridge, milk, potatoes and rice.
- Eat without restriction meat, fish, eggs, tea, vegetables such as cabbage, spinach, mushroom, cucumber, tomatoes and all green leafy vegetables.

### Summary

We have defined the key terms in dietetics education. We further looked at institutional feeding and nutrition education and counselling. In addition, we looked at the dietary management for non-communicable diseases and the nutritional interventions in TB and HIV/AIDS and ART. In our next unit, you will look at special nutrition needs. Before, you proceed to the next unit 6 ; you are going to do a self-test to see how much you have grasped.

#### Self-Test

Indicate your answer by writing 'T' for True or 'F' for False against each of the

responses.

1. .... Dietetics is the use of diet in the treatment and management of disease.
2. .... therapeutic diets aim at maintaining normal function in the body.
3. .... A low protein diet is given to patients with obstructive jaundice or liver disease.
4. .... A low salt diet is given to patients with hypertension and those with oedema.
5. .... Counselling skills include listening and learning, building confidence and giving support.
6. .... When counselling, the counselor is allowed to give more information to the mother.
7. .... A patient with Gastrectomy is plenty of fatty foods
8. .... Serving fluids like lemonade can help reduce nausea and vomiting.
9. .... Zidovudine can be taken with a high fat meal
10. .... Ritonavir can be taken with food to increase its absorption.

#### 4.9 Answers to Self-test

T	T	F	T	T	F	F	T	F	T
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## **UNIT 6: SPECIAL NUTRITION NEEDS**

### **6.1: Unit Introduction**

Welcome to our sixth unit on special nutritional needs. You will learn about the nutritional needs of school children, adolescents, pregnant and lactating mothers, the aged, chronically ill and vegetarians. Let us start by looking at our unit objectives.

### **6.2: Unit Objectives**

By the end of this unit you should be able to:

- Describe the feeding of school going children
- Discuss the nutritional challenges and interventions in adolescence.
- Outline the nutritional needs and interventions of pregnant women and lactating mothers, the aged, chronically ill and other sub-groups e.g. vegetarians.

### **6.3 School children**

School children need at least three mixed meals and snacks each day. When children start school, their eating patterns begin to be increasingly beinfluenced by factors other than the home environment. School meals should be given to school going children in order to prevent malnutrition. They are also supposed to be given nutrition supplementation.

### **6.4: The Aged**

Older persons are particularly vulnerable to malnutrition due to the decrease in their physical activity. This is related to physiological decline, to low economic status, limited food consumption, and multitude of disease processes they are prone to due to aging. As such, both lean body mass and basal metabolic rate decline with age, an older person's energy requirement per kilogram of body weight is also reduced. To counteract these effects, the aged need at least three or more meals each day as they may not eat much at each meal. They need fewer calories than young people but the same amount of protein and other nutrients. (WHO Nutrition tips, 2013)

Nutritional interventions should first emphasise healthy foods, with supplements playing a secondary role. Micronutrient deficiencies are often common in elderly people due to a number of factors such as their reduced food intake and a lack of variety in the foods they eat. The aged must therefore be supplemented with micronutrients which play a role in promoting health and preventing non-communicable. This will further reduce the degenerative diseases such as cardiovascular and cerebrovascular disease, diabetes, osteoporosis and cancer they are prone to due to aging.

The role of nutrition in disease prevention and health promotion among older persons include the provision of:-

- i. Dietary guidelines for older persons;
- Community support for improved nutrition for older persons.
- Community-based interventions in supplementing the diet of the aged.

### **6.5: The chronically ill**

Chronic and severe illnesses often trigger decreases in dietary intake. The presence of chronic underlying conditions can also lead to poor nutrition. Adequate nutritional support may prevent aspects of hyper catabolism and is associated with improved outcomes in ICU patients.

The main purpose of nutritional support to the chronically ill patients is to provide sufficient calories, protein and micronutrients so that patients may have the best outcomes. A patient's daily nutritional needs are based on energy and protein utilization to match his or her energy expenditure. Patients with chronic illnesses are usually bed-ridden and non-mobile. Their daily energy requirements are derived from the metabolic needs of major organs including the brain, kidneys, liver and the energy required for digestion known as the thermic effect of food. Other aspects of a patient's medical condition such as sepsis or tachycardia may increase his or her calorie requirements.

This is achieved by drinking plenty of fluids and treatment for many everyday health problems to live a health life.

### **6.6: Other sub-groups- vegetarians**

You will now look at the nutritional needs of vegetarians. Before we go any further, let us start with your understanding of the nutritional needs of vegetarians. What are the nutritional needs of vegetarians? Take\_2 minutes to think about it and then complete the activity.



### Activity 3.5

Write down the nutritional needs of vegetarians in your notebook.

Good! Compare your answers with the information in the following discussion.

When people think about a vegetarian diet, they typically think about a diet that doesn't include meat, poultry or fish. But vegetarian diets vary in what foods they include and exclude:

Vegetarian diet is built partially or entirely on plant foods. Many young vegetarians may have an inadequate understanding of the principles of nutrition, so that the traditional 'meat and vegetables' becomes just 'vegetables' or baked beans on toast. There may be little attempt to introduce other dietary items such as pulses, cereals or grains, into the diet to replace the animal foods avoided.

The following are types of vegetarian diets:-

- **Lacto-vegetarian** diets exclude meat, fish, poultry and eggs, as well as foods that contain them. Dairy products, such as milk, cheese, yogurt and butter, are included.
- **Lacto-ovo vegetarian** diets exclude meat, fish and poultry, but allow dairy products and eggs.
- **Ovo-vegetarian** diets exclude meat, poultry, seafood and dairy products, but allow eggs.
- **Vegan** diets exclude meat, poultry, fish, eggs and dairy products — and foods that contain these products.

Some people follow a semi-vegetarian diet also called a flexitarian diet which is primarily a plant-based diet but includes meat, dairy, eggs, poultry and fish on occasion or in small quantities.

Having done with vegetarians, look at the disabled with food s that they can be given

### 6.7: The disabled

There are many types of disabilities and depending on the disability one has, there can be different types of special nutrition to be given. However, the recommended nutrition to disabilities is high energy protein supplements (Heps) as it supports growth and development

We have come to the end of unit 6 but before you proceed to the summary of this unit, you need to do a self test

Self test **1.** write T true or F false against each statement

1. .... is associated with more than 100 specific enzymes and is vital for protein formation and gene expression.
2. ....is needed for strong bones and teeth, for normal blood clotting and for normal muscle and nerve function.

.....is young person between the ages of 10 and 19 years.

Lacto vegetarians eat only meat and milk.....

4 Vegetarians who eat only poultry and eggs are .....

### Answers

1. Zinc
2. Calcium
3. An adolescent
- 1.
4.           4. .Lacto-vegetarian .
5.           - Lacto-ovo vegetarian .
6.           -Ovo-vegetarian .
7.           -Vegan diets

### 6.8: Summary

We have looked at the nutritional needs of school children and adolescents. We further went on to look at the needs of pregnant and lactating mothers, the aged, chronically ill and vegetarians. Furthermore, we have also looked the special nutrition recommended to disabled children and it has been noticed that special diets depends on the type of disability but all in all, a high energy protein supplement is recommended.

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