Introduction to Public Health
Module # 7
Public health nutrition

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OBJECTIVES OF THE LECTURE

By the end of this lecture you will be able to:

- *Conceptualize*
  - *The importance of nutrition in human health*
  - *the impacts of malnutrition.*
  - *Obesity & its causes and prevention*
- *Understand the various steps that can be taken to measure the nutritional status such as BMI or QI etc.*

Concept of Nutrition:

- Nutrition can be defined as the process by which living organisms aquire substances called Nutrients for growth, repair and energy. Or
- Nutrition may be defined as the science of food and its relationship to health.

NUTRIENTS:

Nutrients are specific dietary constituents. They can

be classified into: **macronutrients** and **micronutrients**

NUTRIENTS:

Nutrients include:

- **Carbohydrate**
- **Protein**
- **Fat**
- **Vitamins**
- **Minerals**
- **Trace elements**
- **Dietary fibre**
- **Water**

Food

- Foods are substances containing nutrients
- They are needed for:
  - **Cell repair**
  - **Cell growth**
  - **Energy**
  - **Protection**

Nutrition and its importance

- Balanced diet
  - Proper quantities
  - Proportion of foods
  - Maintaining health and growth
- Why nutrition is important
  - Food provides energy, protein, essential fats, vitamins and minerals
  - To live, grow and function properly
  - Wide variety of different foods to provide the right amounts of nutrients

Important elements of nutrition

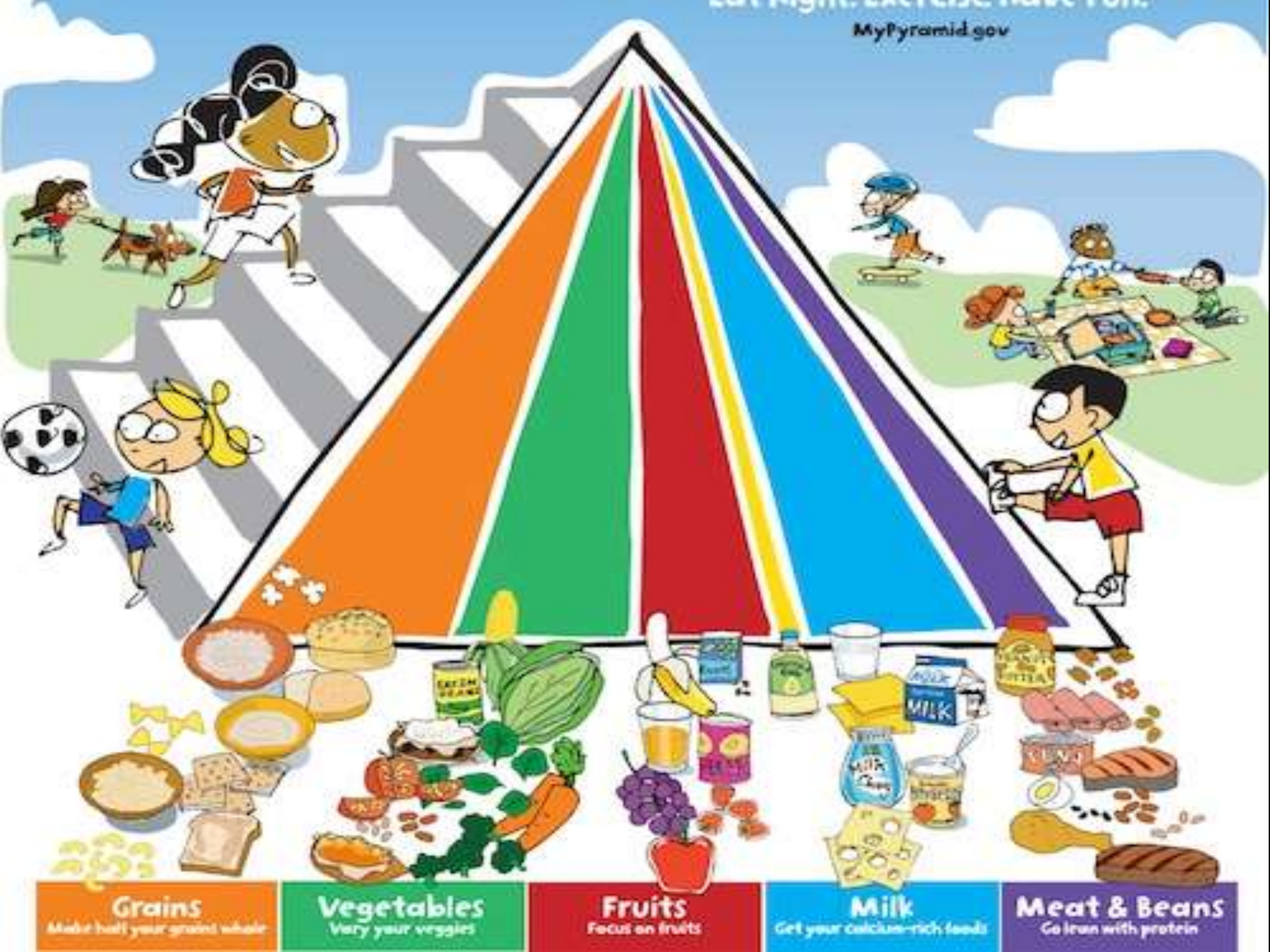
- Carbohydrate
  - Main energy source for the brain
  - Without carbohydrates, the body could not function properly
  - Sources: fruits, breads and grains, starchy vegetables and sugars
  - Whole grains and fruit are full of fiber, which reduces the risk of coronary heart disease and helps maintain normal blood glucose levels

- Protein
  - Major structural component of cells
  - Responsible for the building and repair of body tissues
  - Sources: low-fat meat, dairy, beans or eggs
  - Keeps immune system strong and allows body to move and bend
- Fat
  - Fat is an energy source
  - Insulate body, allowing you to maintain your body temperature
  - Sources: nuts, high-fat meats and full-fat dairy

- Vitamin
  - Helps to grow and develop
  - 13 vitamins in total, categorized by how body absorbs them
  - Fat-soluble vitamins, which include vitamins A, D, E and K, need fat to be absorbed properly
  - Water-soluble vitamins -vitamin C and the B vitamins dissolve in water before entering your bloodstream
  - Vitamin C provides structure to blood vessels, bone and ligaments

- Mineral
  - Like vitamins, minerals allow to grow and develop properly
  - Minerals are divided into two classes based on how much of each nutrient body needs
    - Major minerals – sodium, potassium, calcium, phosphorus, magnesium, sulfur and chloride – in large amounts
    - Trace minerals – copper, fluoride, zinc, iron, chromium, iodine are needed in small amounts
  - Sources: bananas, potatoes, tomatoes, milk, low-fat cheese and yogurt

- Water
  - Water is more than a thirst quencher
  - A major nutritional element that helps regulate body temperature, lubricate joints and protect major organs and tissues
  - Also helps transport important substances, like oxygen, throughout body
  - Aim to drink adequate amount of water every day.


MyPyramid.gov
MILK
Grains
Make half your grains whole
Vegetables
Vary your veggies
Fruits
Focus on fruits
Milk
Get your calcium-rich foods
Meat & Beans
Go lean with protein

MalNutrition

- The condition when the body does not get the right amount of the vitamins, minerals, and other nutrients it needs to maintain healthy tissues and organ function
- Causes of malnutrition
  - Poverty and lack of food
  - Loss of appetite
  - Chronic diseases
  - Drug or alcohol dependencies
  - Eating disorders: anorexia or bulimia

Severe Eating Disorders

- Anorexia

- Bulimia

Malnutrition in Bangladesh

- More than half the population suffers from malnutrition
- Severe acute malnutrition affects 600,000 children, while close to 2 million children have moderate acute malnutrition
- Stunting affects 40% of children under the age of five
- 1/3 of women are underweight and around 15% have short stature, which increases the risk of difficult childbirth and low-birth-weight infants
- Half of all women suffer from anaemia, mostly nutritional in origin
- Malnutrition is estimated to cost Bangladesh more than US$1bn every year in lost productivity
- Ready-to-use supplementary and therapeutic foods (RUSF and RUTFs) based on locally available ingredients (such as rice, lentils and chickpeas)

Obesity

- Abnormal or excessive fat accumulation that presents a risk to health
- Major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer
- Once considered a problem only in high income countries, now dramatically on the rise in LMIC, particularly in urban settings


Coca-Cola

Preventing obesity

- Follow a healthy eating plan- balance of energy IN and energy OUT
- Focus on portion size
- Be active- walk, bike or physical exercise
- Reduce screen time- use of TVs, computers, DVDs, and videogames because they limit time for physical activity
- Keep track of your weight, body mass index, and waist circumference

Calculate Your Body Mass Index (BMI)

- A common method of evaluating your weight
- BMI= body weight (in Kg)/height $(m)^2$

BMI Intervals

- Less than 18.5
- 18.5-24.9
- 25-29.9
- 30 and above

- Under weight
- Normal weight
- Overweight
- Obese

Factors in relation to Food

- The important factors in relation to Food

are:

1. Energy Value
2. Quality and Quantity of Primary Foods
3. Variation in the diet
4. Digestibility
5. Cooking
6. Psychological factors
7. Cost

RDA#Recommonded Dietery Allowence

- Carbohydrate = 50% - 65%
- Protein = 15%-20%
- Fat = 25%-30%
- Dietary Fiber = 25 -40 gram/ day Approx.
- Fresh vegetables+ fresh Fruits = Plenty if calorie free or zero kcal.
- Table salt = Less than 5 gm/day
- Water = for one kcal one ml of water plus daily loss.

Role of Proteins in the Diet

- Replacement of cells
- Growth
- Large molecules
  - Smaller molecules called Amino Acids
- Found in meats, eggs, beans

Role of Carbohydrates

- Primary energy source
- Molecules of C, H, O
  - Sugars ~ simple carbohydrates
  - Starches ~ complex carbohydrates
  - Fiber

Role of Fats

Provide energy / stores energy

- Absorb vitamins
- Make up cell membranes

Role Of Vitamins

- Organic (contain carbon)
- Growth
- Regulate body functions
- Prevent disease
- No food has all vitamins
- Water soluble
- Fat soluble
  - Stored in body

Role Of Minerals

- Inorganic (no carbon)
- Control chemical reactions
- Build cells
- Conduct nerve impulses
- Carry oxygen

Minerals

- Some minerals are always required
- Fruits, vegetables and cereals are the chief sources of minerals
- Milk products supply the majority of calcium and phosphorous

Minerals

Dr. Shaikh Abdus Salam

Minerals

Phosphorous:

1. Children should take 1 g per day, adults 1.3 g and a pregnant or lactating woman 1.9 g
2. Sources of phosphorous are meat, fish, milk, cheese and eggs. Vegetable foods such as beans, oatmeal and lentils

Iron:

1. Deficiency leads to anemia
2. Sources are bread, meat and potatoes. Also liver, kidney, egg yolk, green peas, cabbage, carrots
3. Only 10% of iron is absorbed
4. Children up to 12 years require 15-20 mg. daily, adult 40 mg. and pregnant and lactating women 50 mg

Minerals

1. Calcium:

- Increased amount of calcium is required by children, pregnant and lactating women
- The average intake should be about 800 mg per day
- Best sources are milk and cheese. Other sources are eggs, green vegetables, oranges, nuts, beans, carrots eggs

Minerals

Iodine:

1. The daily requirement of iodine is 0.05 mg. and is obtained from water, vegetables and fish
2. Simple goitre results due to dietary deficiency

Magnesium:

1. The average daily consumption of about 0.2 is sufficient
2. Sources are meat, green vegetables and bread

Copper:

1. The daily requirment is 2 mg.
2. Sources are liver, cocoa, nuts

Minerals

Sodium Chloride:

1. Usually 20 gm is consumed per day
2. The intake of salt is required only if abnormal quantities are lost e.g. severe exercise due to sweat; diarrhea
3. Heat stroke is prevented by ingestion of salt solutions instead of water

Water

- Nutrients carried in water
- Used in chemical reactions

Nutrition - use of food by organisms

- Energy/material providing nutrients
  Macronutrients: Protein, carbohydrate and lipid
- Micronutrients: Vitamins and minerals necessary for biochemical processes
- Essential fiber: Non-digestible polysaccharide material, essential for normal functioning of animal digestive systems (i.e. colon)

Trace elements

- Trace elements: Substances which require very small amount

FOOD CLASSIFICATION:

- Many ways we can classify foods e.g.-

(1) By origin– a. Foods of animal origin

b. Foods of Plant origin.

(2)By chemical composition–

a.Protein, b.fat

c. Carbohydrate, d. Vitamins, e. Minarals etc.

FOOD CLASSIFICATION (contd):

- 3) By predominant functions-

  a. Body-building foods-Meat, fish, Milk, Pulses etc.

  b. Energy giving foods-cereals,sugars, roots etc.

  c. Protective foods-vege,milk & fruits

Food Pyramid

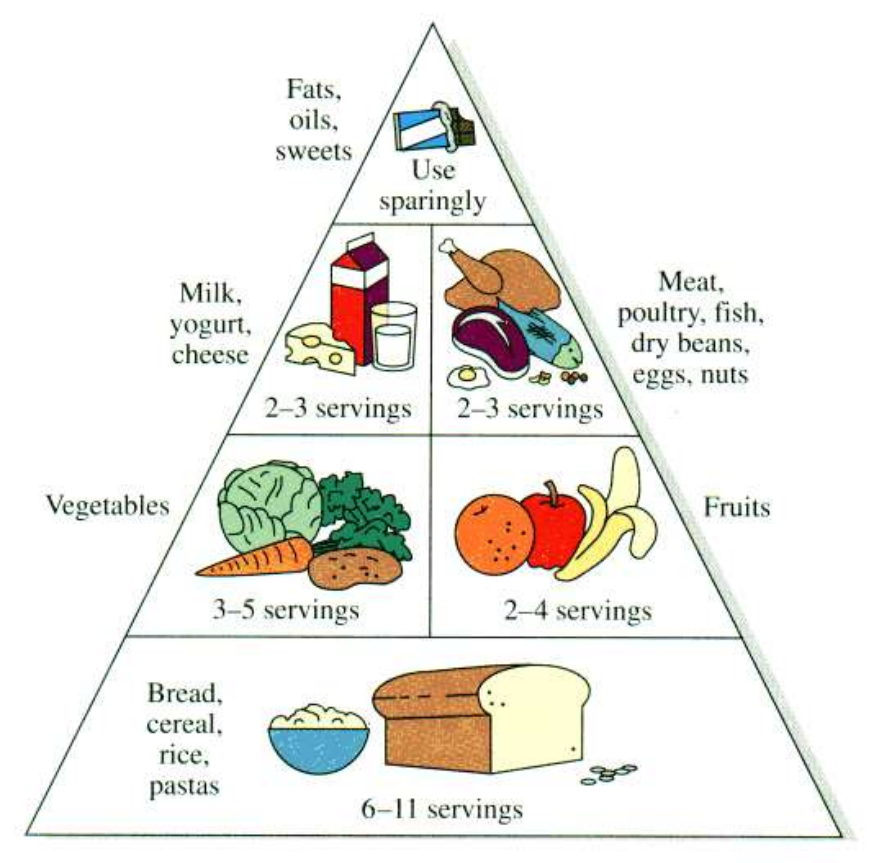


Figure 17-21 The food pyramid proposed by the U.S. Department of Agriculture to show how meals should be planned for good nutrition.

Components of Natural Foods

- Carbohydrates
- Proteins
- Fats
- Vitamins
- Minerals with trace elements
- Fiber
- Water

FDA Daily Dietary Recommendations

- 60% of daily caloric intake (250 g of polysaccharides)
- 50 g or less of simple sugars (mono- and di-saccharides such as table sugar)
- 20-30 g of fiber

FDA Recommendations

- Fats limited to 30% of caloric intake
- No more than one-third of fats should be saturated
- Unsaturated fats should be mostly cis- rather than trans-structures (next slide)
- Dietary cholesterol should be below 300 mg/day

Vitamins

- Organic compounds essential in the diet in small amounts but have little or no caloric value
- Non-polar or fat soluble are A, D, E, K
- Polar or water soluble are B and C
- Antioxidants are A, C,and E
- Vitamin A comes from carotene(carrots)

Minerals

- Minerals are inorganic substances that are required by a living system to sustain life
- In some cases metal ions needed to make enzymes function
- Iron is needed to make hemoglobin which carries oxygen
- Usually water soluble

FOODs

- Food Safety
- Food Security
- Food quality