

Ashur University
College of Medicine

Title: introduction to nutrition

Grade: Third Grade

Module: NT

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Date: 21-9-2025

Objectives

By the end of this lecture you will be able to

- Know the relevant definitions.
- Understand the food & diet, staple food.
- list the main nutrient in food and classify them accordingly.
- Describe energy and nutrient density.
- Distinguish between 4 set of dietary reference intake.
- Distinguish dietary guideline.





Definitions nutrition:

❖The science of foods and the nutrients and other substances they contain, their ingestion, digestion, absorption, transport, metabolism, interaction, storage, and excretion.

❖The science that deals with the processes by which components of food are made available to an organism for meeting energy requirement, building, growing, maintaining tissues & maintaining the organism in optimum functional health.

Clinical nutrition: Is a medical specialty dealing with the relationship between disease & nutrition.

Acute & chronic illness is caused by deficiencies or excesses of dietary components.

❖**nutrients:** Substances obtained from food and used in the body to provide energy and structural materials and to serve as regulating agents to promote growth, maintenance, and repair.

❖**Food:** all solid or liquid materials that taken by mouth to the digestive tract & utilized in the body to maintain &build the body tissues



❖**Diet:** all nutrient that enter the body orally or parenterally e.g. Glucose water & normal saline as well as parenteral feeding of amino acids & fatty acids in addition to oral food



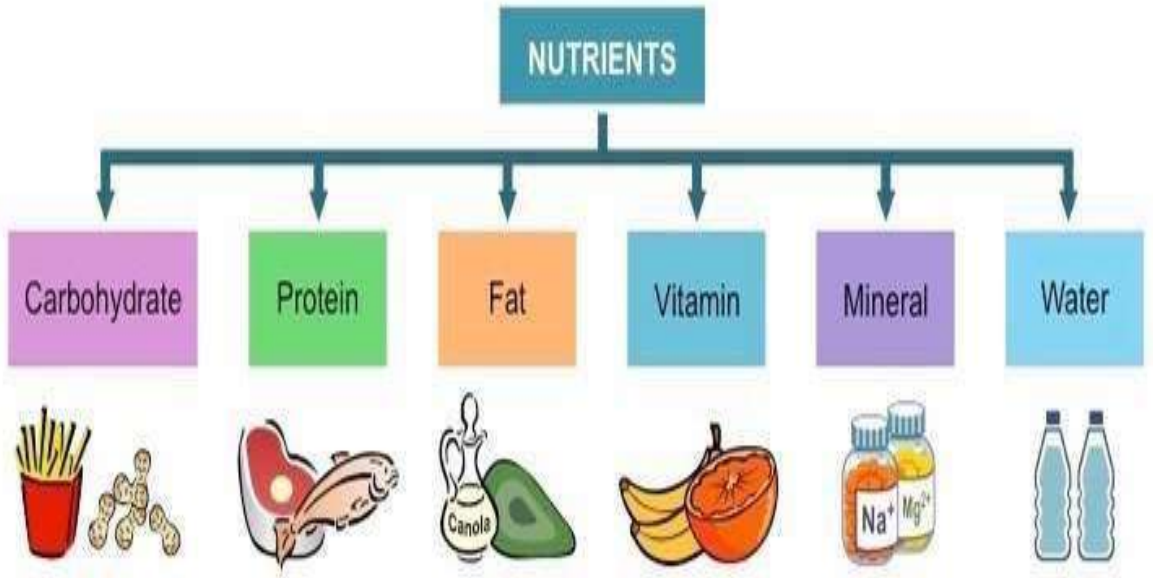
❖**Staple food:** Is one that form the basis of the diet in term of both quantity &frequency of consumption & provides the highest proportion of energy. It is vary with the geographical region, e.g.. Cereals, rice, wheat…



Six Classes of Nutrients:

- ✓Carbohydrates
- ✓Proteins
- ✓Fats
- ✓Vitamins
- ✓Minerals
- ✓water





There are several ways to classify the classes of nutrients.

- Organic or inorganic
- Essential or nonessential
- Macronutrient or micronutrient
- Energy yielding or not



Classification of Foods

By chemical nature	• Carbohydrates, Protien, Fats, vitamins, Minerals, Dietary fiber, Water
By functions in the body	• Energy Giving • Body Buidling • Protective
By chemical properties	• Organic • Inorganic
By mass	Macro Nutrients Micro Nutrients
By Origin	Plant Foods Animal Foods
By nutiritve value	12 Categories

Classifying Nutrients by their composition:

Organic nutrients: in chemistry, substances or molecules containing carbon-carbon bonds or carbon-hydrogen bonds. The **four** organic nutrients are carbohydrate, fat, protein, and vitamins.

Inorganic nutrients: not containing carbon. The **two** classes of nutrients that are inorganic are minerals and water.



Classifying Nutrients by their essentiality:

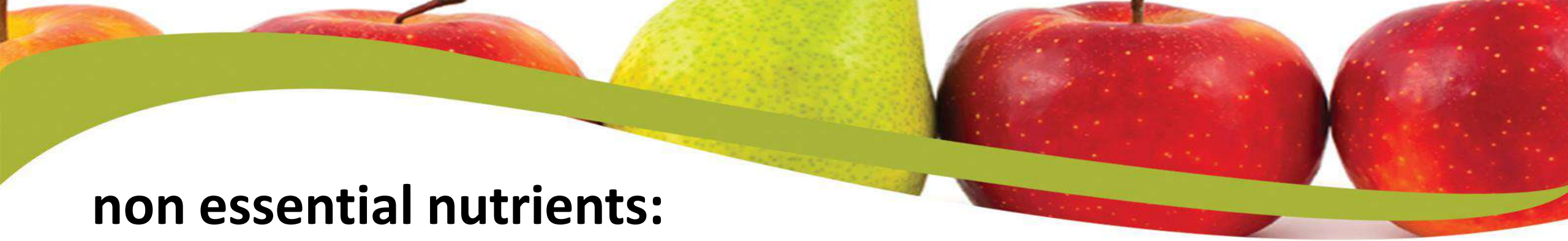
Essential nutrients: nutrients a person **must** obtain from food because the body cannot make them for itself in sufficient quantity to meet physiologic needs.

Nonessential nutrient: a nutrient that **can be** manufactured in the body by means of other nutrients. Thus, it is not essential to consume this nutrient regularly in the diet. for example: cholesterol, some a.a (alanin, asparagine, aspartic acid, glutamine)

The essential nutrients:

Food category	Essential nutrient
CHO	Glucose
Fat or lipids	Linoleic acid, Linolenic acid
Protein	Amino acid: Lysin, leucine, Isoleucine, Threonine, Phenylalanine, Tryptophane, Methionine, Valine, Arginine (ess. for infants), Histidine.
Vitamins	-Fat soluble vitamins; V.A ,V.E, V.K 1 -Water soluble vitamins; V.C , V.B1, V.B2, Niacin, V.B6,Pantothenic acid, folic acid, $V.B_{12}$
Minerals	Macrominerals; Ca,Na,K,Mg (>100mg/day)- Microminerals; Fe,Zn,I,Se,Mn(≤100mg/day)

***lipid can be used in cell resp. instead of carbs but brain and CNS use only glucose**



non essential nutrients:

Biotin : is manufactured by the GIT bacteria

Cholesterol: is made by the liver.

Vitamin D: is synthesized by sunlight

Vitamin K2 :is produced by intestinal bacteria.

Vitamin K2 only produced by intestinal bacteria in adults, while K1 are not in infants, have not built up colonies of such bacteria yet, in condition of digestive disorders when the bacterial colonies may disrupted so some consider it as conditionally essential..

Classify nutrient according to their Quantity Needed:

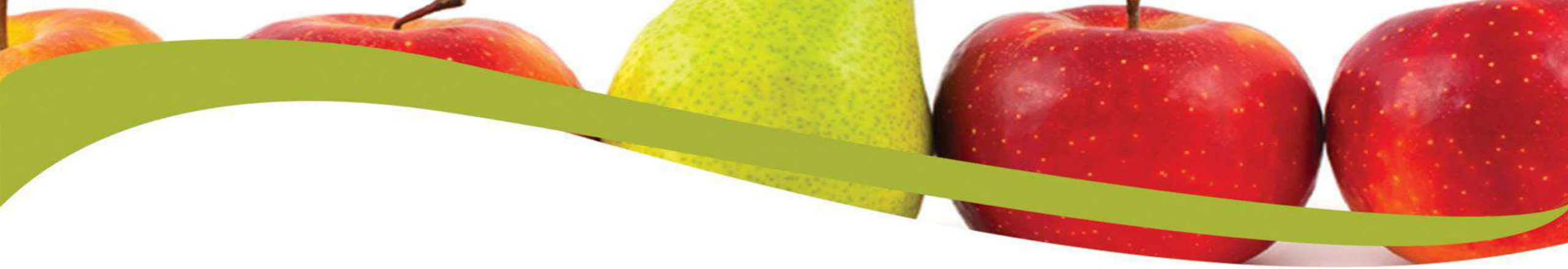
- **Macronutrient:** are nutrients the body needs in large amounts to function optimally.

Carbohydrates: Provide energy.

Proteins: Essential for growth, repair, and maintenance of tissues.

Fats: Important for energy storage and cell function.

- **Micronutrients:** are nutrients the body needs in relatively small amounts they are necessary for the biochemical reactions of metabolism, among other vital functions. They include **vitamins, minerals**(protective function).



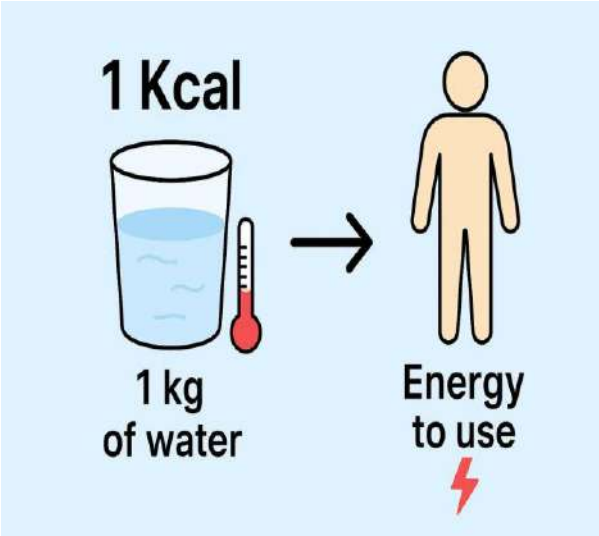
Classification according to energy-yielding

❖ **The three** energy-yielding nutrients are **carbohydrate, protein, and fat.**

➢**Vitamins and Minerals** do **not provide energy** to the body. But they **facilitate the release of energy** from the three energy-yielding nutrients.

➢**Water** also does **not provide energy** but it is the medium in which all of the body's processes take place.

Calories: refers to the amount of energy in food or the amount that is expended in physical actions. One kcalorie is the amount of heat necessary to raise the temperature of 1 kilogram (kg) of water 1°C.(1000 calories = 1 kilocalorie),



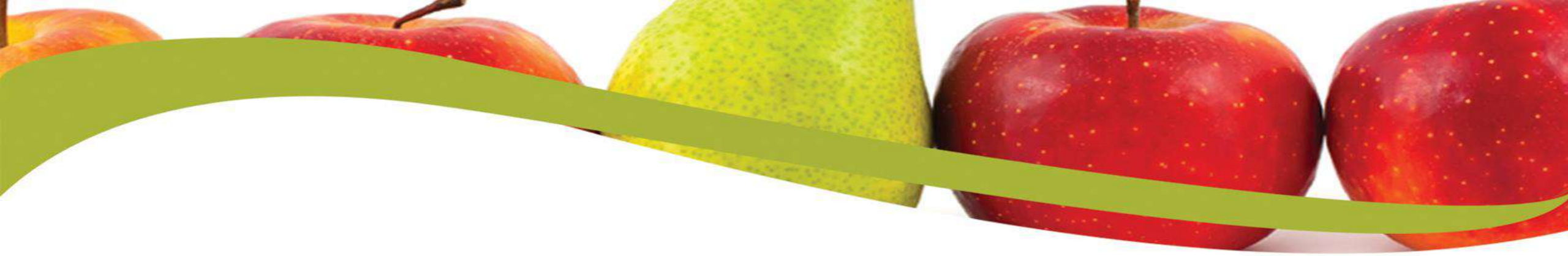
- ✓Each **1 gram of carbohydrate** yields **4 kcalories .**
- ✓Each **1 gram of protein** yields **4 kcalories**.
- ✓Each **1 gram of fat** yields **9 kcalories.**
- ✓Each **1 gram of alcohol** yields **7 kcalories.** (Alcohol is not a nutrient because it cannot support the body's growth, maintenance, or repair).

Energy and Nutrient Density:

a measure of the energy a food provides relative to the amount of food (kcalories per gram).

Energy Density = amount of kcalories per serving/ Grams per serving



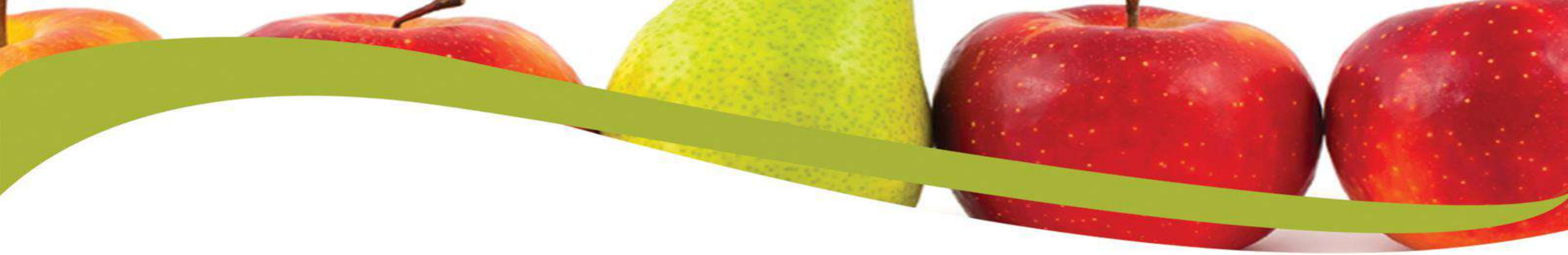


Energy dense foods (Empty-kcalorie or Energy-Dense Nutrient-Poor foods or drinks)

include foods that are **high in fat** have the highest energy density for example (butter, oil, French fries, fried meats, fried chicken, ice cream…..) also foods and drinks that have **high sugar** (carbohydrate based desserts, sugary drinks, candy bars hard candies)but **little or no other nutritional value(vitamins, minerals, complex CHO, lean protein and healthy food..) or both of them.**



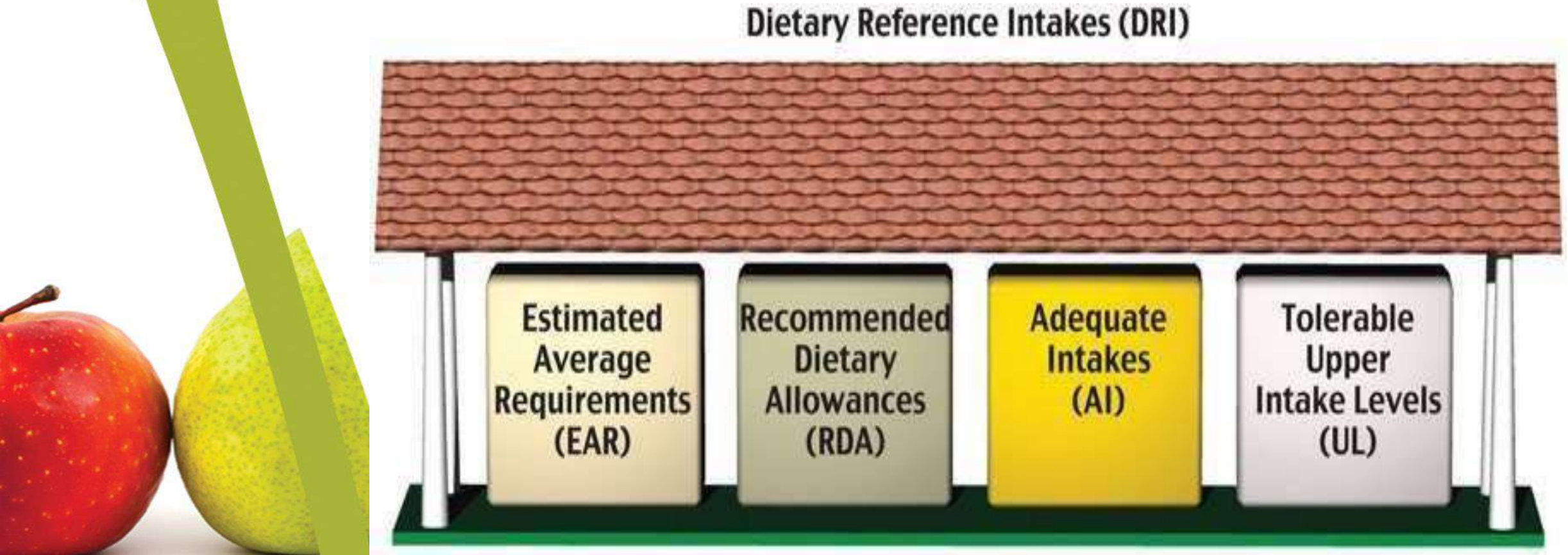
❑A food with a high **nutrient density** means that it has a relatively high concentration of **nutrients for a relatively few calories** in a smaller volume of a given food for example (vegetables, fruits, legumes, whole grains, lean protein, non-fatty fish, white chicken, and low-fat dairy/dairy-substitute products.....).



❑Some foods are both **energy and nutrient dense**, which means that they provide a lot of both **kilocalories and nutrients** for example (avocados, cheese, seeds (e.g., sunflower seeds), nuts, nut butters (e.g., peanut butter, almond butter).

Dietary reference intake(DRI):

A set of 4 types of nutrient intake reference standards used to assess and plan dietary intake.



1)Recommended Dietary Allowances (RDA):

presents of the average daily nutrient needed to meet the requirements of almost all (97%- 98%) of the healthy individuals of a given age and gender for whom it was developed.

- An RDA for a nutrient should serve as a goal for intake for **individuals,** not as a benchmark for adequacy of diets of populations.

2)Adequate Intakes(AI):

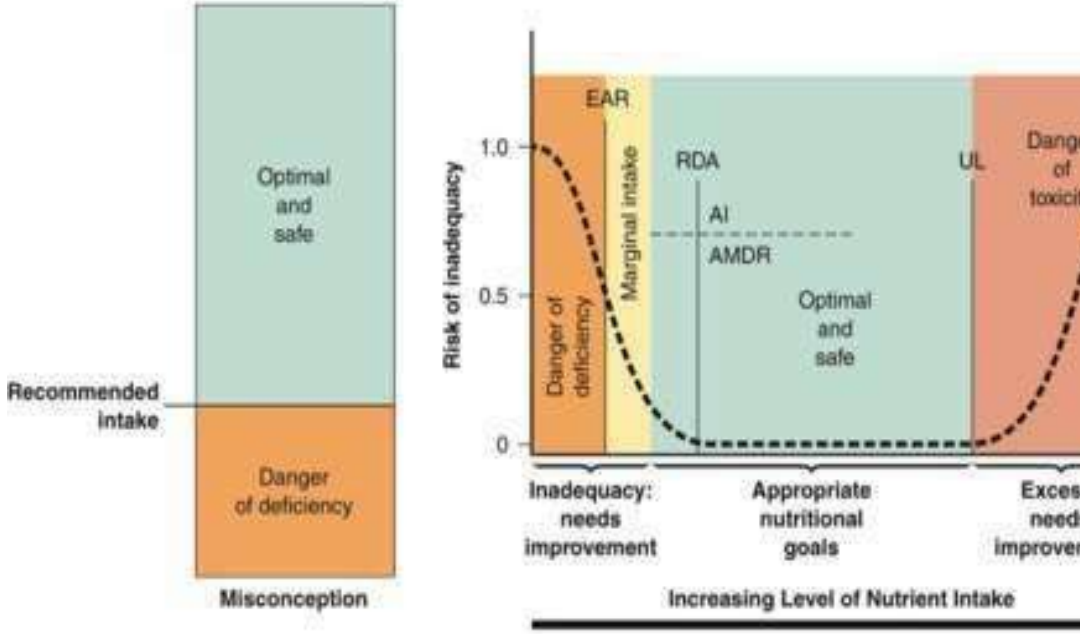
used to examine that intake is adequate when no RDA is set for nutrient.

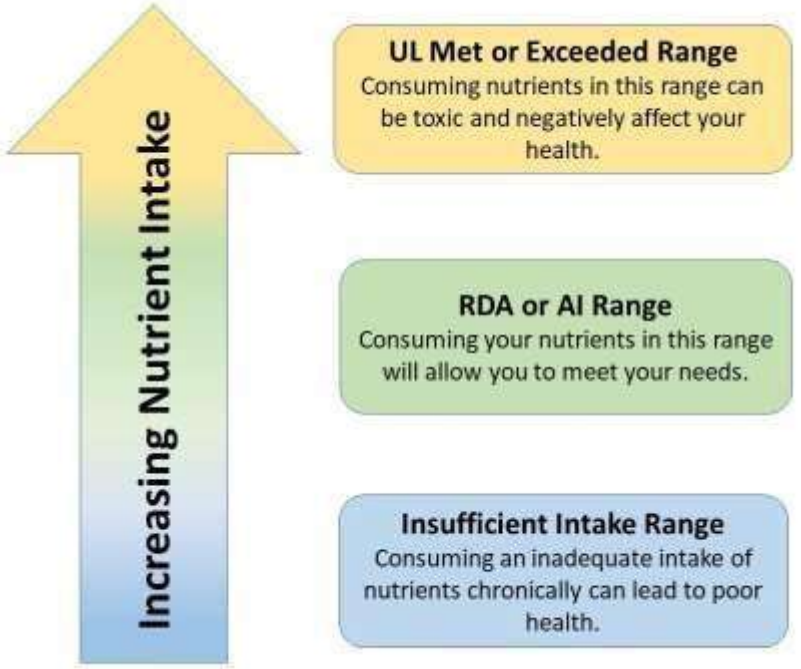
3)Tolerable Upper Intake Levels (UL):

a set of values reflecting the **highest average daily** nutrient intake levels that are likely to pose **no risk of toxicity** to almost all healthy individuals in a particular life stage and gender group. As intake increases above the UL, the potential risk of adverse health effects increases.

4)Estimated Average Requirements(EAR): the average

daily nutrient intake levels estimated to meet the requirements of **half** of the healthy individuals in a given age and gender group; used in nutrition research and policymaking and as the basis on which RDA values are set.





Levels of Nutritional Status :

(1)Ideal nutrition :

✓Intake is sufficient to meet daily needs and to keep nutritional stores full while maintaining a healthy body weight

(2)Borderline nutrition:

✓intake is sufficient to meet daily needs, but not enough to keep reserves full

✓Body is not prepared to handle times of stress (Illness, pregnancy…), growth and development.

(3)Malnourished:

- under-noursished :

✓intake insufficient to meet daily caloric and nutrient needs and nutrient reserves are empty

✓Life threatening, medical intervention required

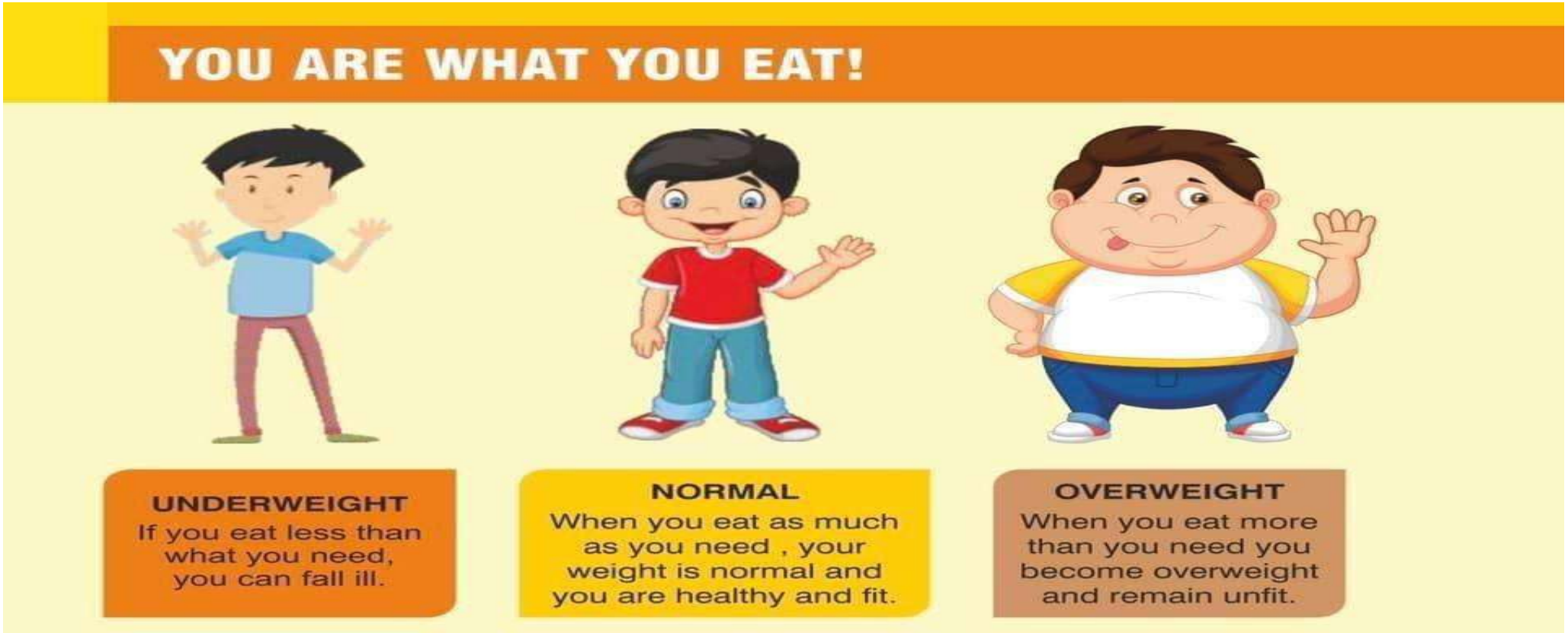
✓Chronically malnourished children may not be able to "catch-up" for poor nutrition, therefore they may not reach their full potential.



(4)Over-nutrition:

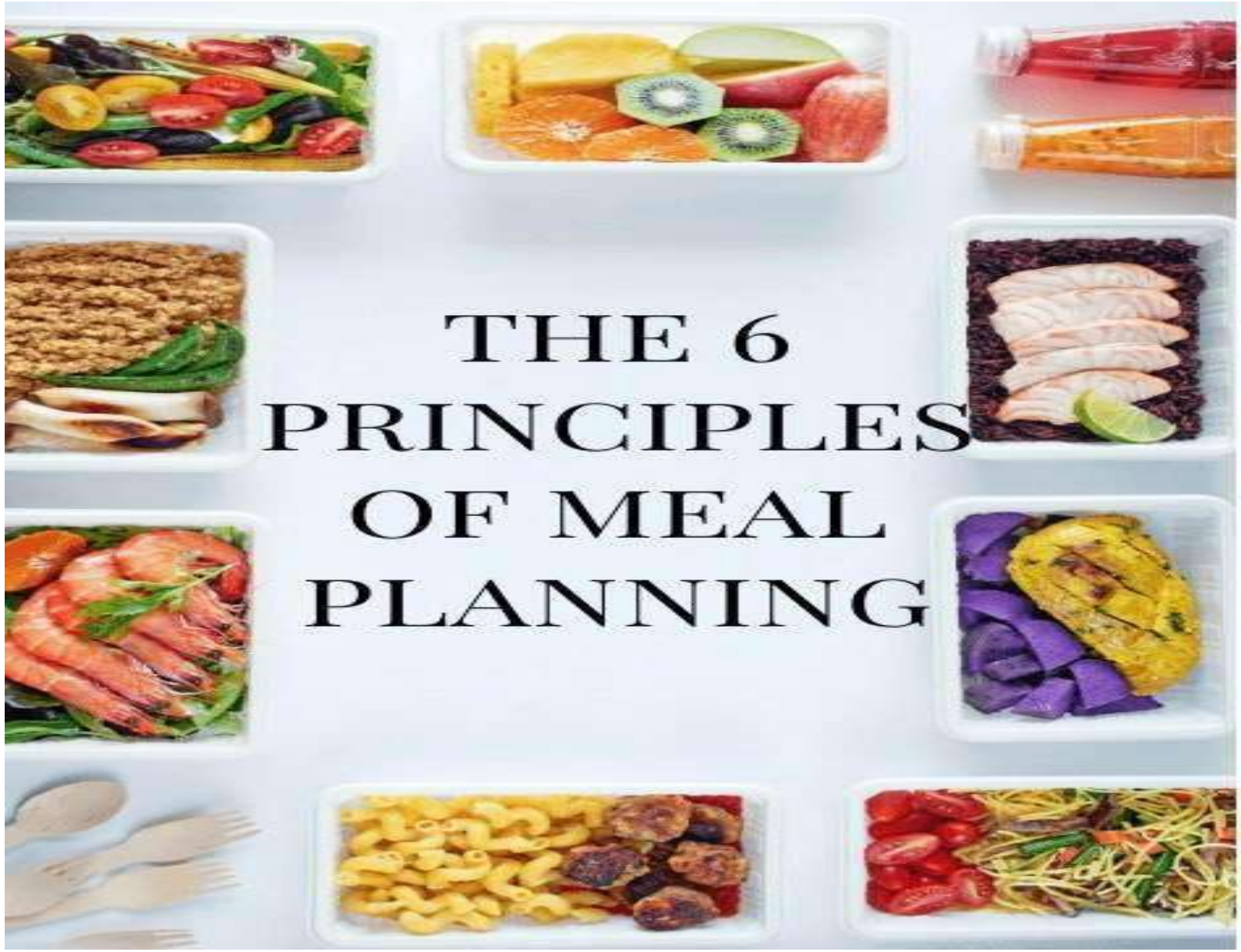
✓ excessive caloric intake that leads to obesity and increase risk of obesity related diseases (heart disease, diabetes….)

✓ overuse of vitamin supplements that leads to toxicity



Diet – planning principles:

1. Adequacy.
2. Balance.
3. Energy control.
4. Nutrient density.
5. Moderation.
6. Variety.





1)Adequacy: means providing all the essential nutrients, fiber, and energy in amounts sufficient to maintain health.

(2)Balance (proportionality): A concept that emphasizes eating appropriate amounts of foods from each group.

(3)Energy control: The amount of energy coming into the body from foods should be controlled through balancing with the amount of energy being used by the body to sustain its metabolic and physical activities.

(4)Nutrient density: choosing the more nutrients and the fewer kcalories, the higher the nutrient density.

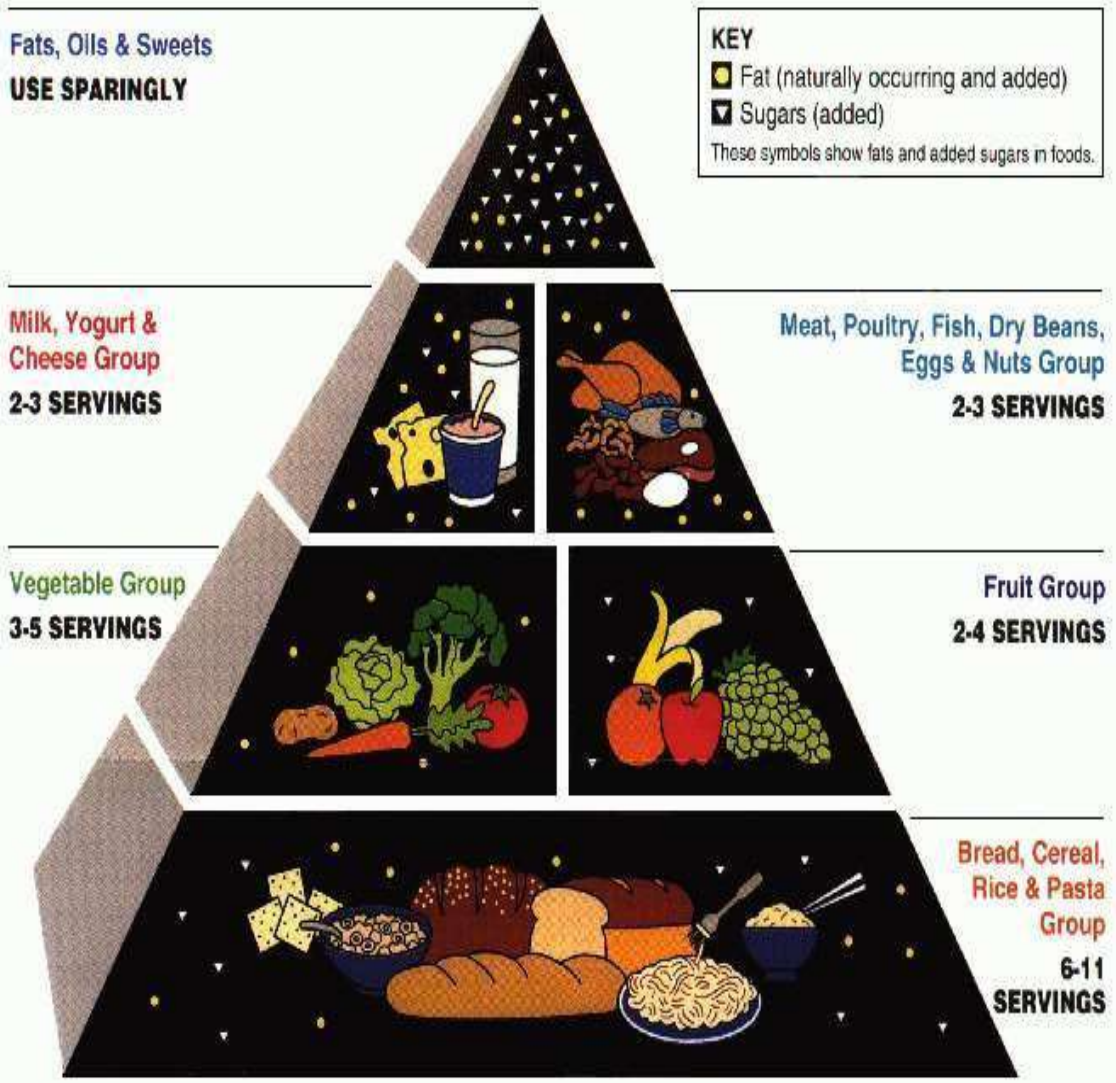
(5)Moderation: A concept that emphasizes not consuming too much of a particular type of food.

(6)Variety: eating different types of foods within and among the major food groups.



DIETARY GUIDELINES: (according to food groups)

A **food pyramid** is a representation of the **optimal number of servings to be eaten each day from each of the basic food groups, In 1992 pyramid introduced by the United States Department of Agriculture (USDA) was called the "Food Guide Pyramid" or "Eating Right Pyramid".**



Composition of USDA pyramid:

✓6-11servings of bread, cereal, rice and pasta occupied the large base of the pyramid;

✓Followed by 3 to 5 servings of vegetables;

✓Then fruits (2 to 4);

✓Then milk, yogurt and cheese (2 to 3);

✓Followed by meat, poultry, fish, dry beans, eggs, and nuts (2 to 3);

✓And finally fats, oils and sweets in the small apex (to be used sparingly).



Food guide pyramid was updated in 2005 to MyPyramid

which contain colorful vertical wedges that replace the hierarchical levels of the Food Guide Pyramid

Often displayed without images of foods, creating a more abstract design.

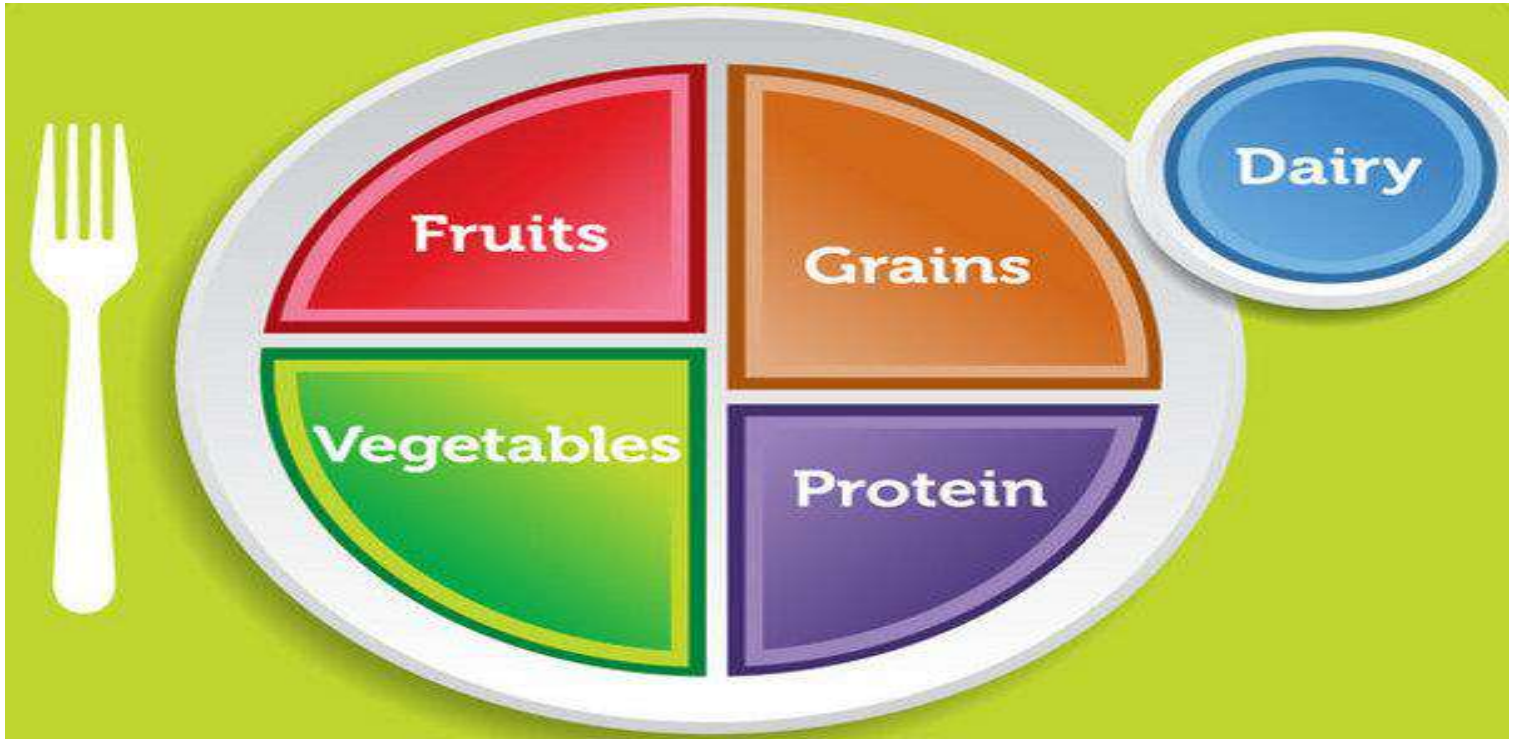
•Stairs were added up the left side of the pyramid with an image of a climber to represent a push for exercise.



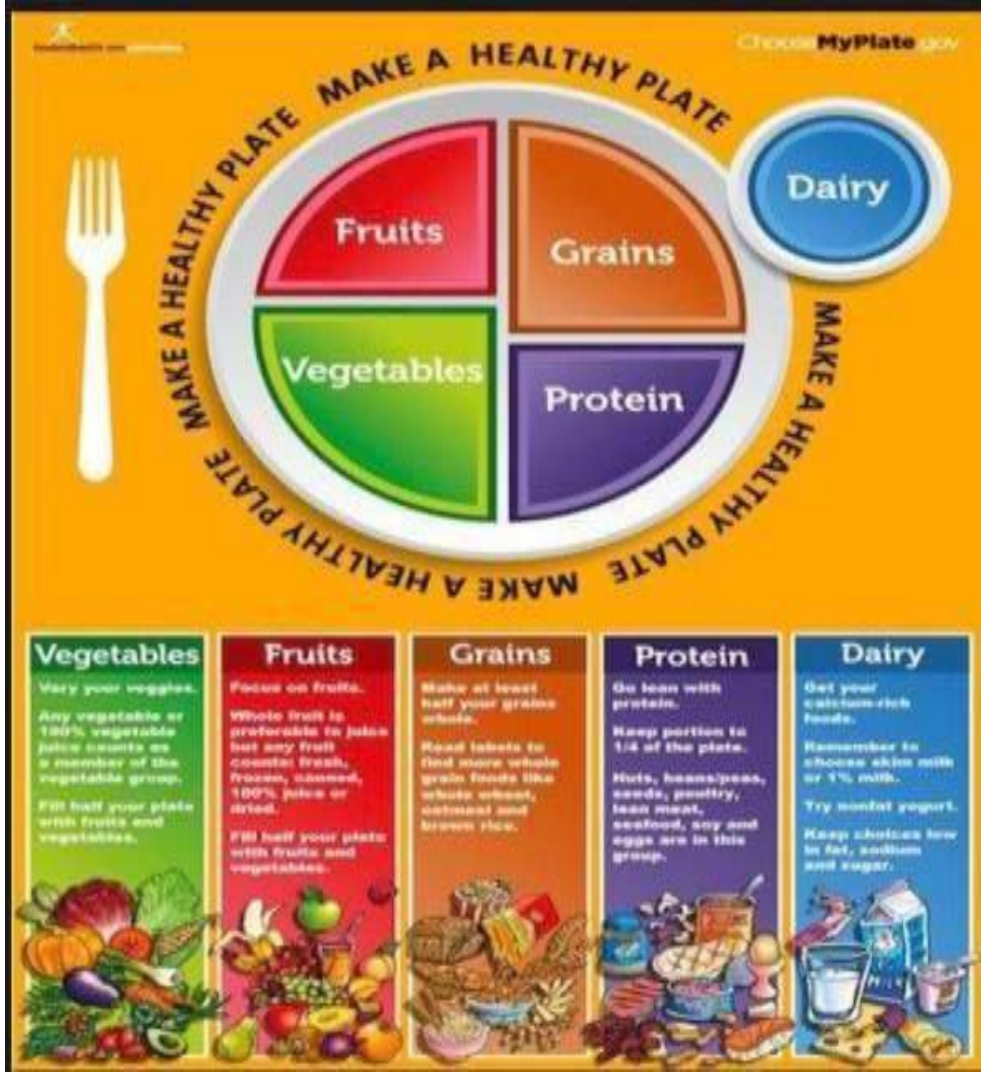
•Varying width of the wedge of food groups suggest that person should choose more from bigger wedges and vice versa however these bands do not suggest exact proportion they are just a general guide for proportion of food one should consumed. For example an unmarked white tip represented discretionary calories for items such as candy, alcohol, or additional food from any other group.



•And then MyPyramid diagram was replaced in 2011 by "MyPlate". Which is the current nutrition guide published by the United States Department of Agriculture, consisting of a diagram of a plate and glass divided into five food groups.(to build a healthy plate):



- Fill 1/2 of plate with fruits and vegetables.
- Fill 1/4 of plate with grains (preferably whole).
- Fill 1/4 of plate with a lean protein source.
- Having a serving of dairy on the side.
- Additional recommendations include to enjoy food but eat less, avoid oversized portions, make at least half of grains whole, switch to fat-free or low-fat milk, choose foods with less sodium, and drink water instead of sugary drinks.



THANK YOU!

