

Nutritional Requirements

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What is nutrition?

It is to supply the body cells with important molecule to keep them alive.

- Composition and quantity of food intake by living organisms
- Biochemical utilization of food
- Human nutrition is divided into three areas:
 - Undernutrition (nutrient deficiency)
 - Overnutrition (excessive nutrient intake) may lead to toxicity
 - Optimal nutrition (balanced nutrient intake)

Assessment of malnutrition:

- Malnutrition in humans is measured by:
 - Dietary intake studies: identify people with deficient diets
 - Biochemical studies: identify subclinical nutritional deficiencies *these are usually done to identify subclinical nutritional deficiencies*
 - Clinical symptoms: identify clinical nutritional deficiencies

Dietary Reference Intakes (DRIs): they are actually estimations of the quantities of nutrients that should be taken to prevent deficiency and maintain optimal health for a fixed population.

- Quantitative estimates of nutrient intakes required to prevent deficiencies and maintain optimal health and growth
- Recommended by: Food and Nutrition Board of the National Research Council, USA

Dietary Reference Intakes (DRIs)

DRIs has four reference standards for intake of nutrients:

1. Estimated Average Requirement (EAR) if you were given a population and u wanted to calculate the minimal amount of a certain type of food that is needed to maintain optimal growth and prevent deficiency in 50% of that population you would use the estimated average requirement.
- The average daily amount of nutrient intake estimated to meet the nutritional requirement of half of the healthy individuals in an age and gender group

2. Recommended Dietary Allowance (RDA) this covers most of the people

- The average daily amount of nutrient intake that is sufficient to meet the nutritional requirement of nearly all (97-98%) healthy individuals in an age and gender group
- RDA is two SD above EAR
- $RDA = EAR + 2 SD$
- **Standard deviation** means how much the data is varied. Let's say we have 3 students, one got 4 marks, the other 5 marks and the 3rd 6 marks, the average would be $15/3 = 5$, so the **standard deviation** would be $5+1$ (the maximum value) $5-1$ (the minimum value) by this, we get the whole range.
- Example: for carbohydrates, $EAR = 30 (+/-15)$ EAR (+/-SD). 50% of the population and the standard deviation 15, so the range = from $30-15$ to $30+15 = 15$ to 45 . $RDA = 30 + 2 \times 15 = 30 + 30 = 60$

3. Adequate Intake (AI)

- It is used instead of EAR and RDA if:
 - A nutrient is considered essential but the experimental data are inadequate for determining EAR and RDA
- AI covers the nutritional requirement of all individuals in a group with approximation due to insufficient data
- In this case, you take a healthy group of people and calculate their intake to approximate and calculate back how much is required for optimal growth. This will cover most of the population.

4. Tolerable Upper Intake Level (UL)

- highest average daily nutrient intake level that has no adverse health effects or toxicity in almost all individuals
- The recommended amount of nutrient should be less.

Acceptable Macronutrient Distribution Ranges (AMDR)

- Range of adequate intake of a macronutrient associated with reduced risk of chronic disease while producing adequate amounts of essential nutrients
- AMDR for adults (% of total calories)
 - **Carbohydrates** 45-65
 - **Fats** 20-35
 - **Proteins** 10-35
 - **Fiber** >25 g

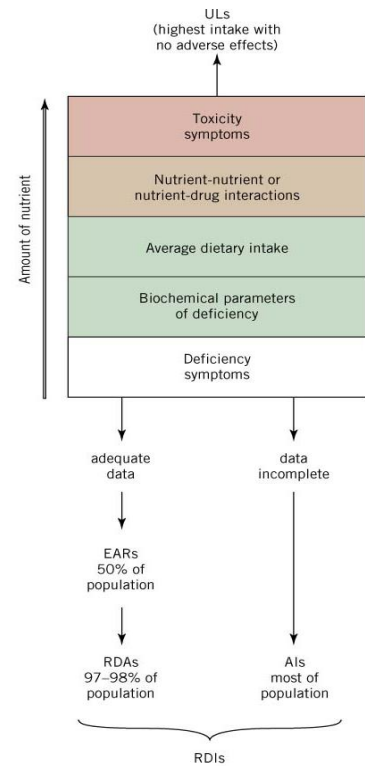
YOU MUST MEMORIZE THESE PREVIOUS AMOUNTS

Food Pyramid

United States Department of Agriculture
Center for Nutrition Policy and Promotion

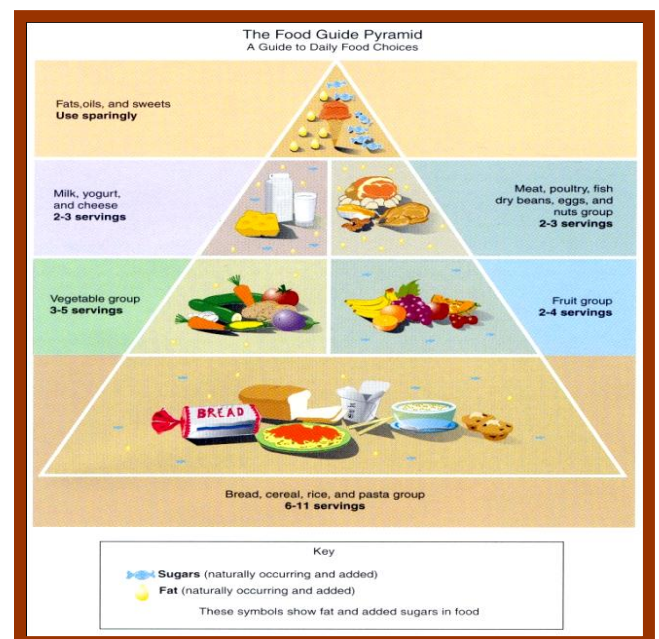
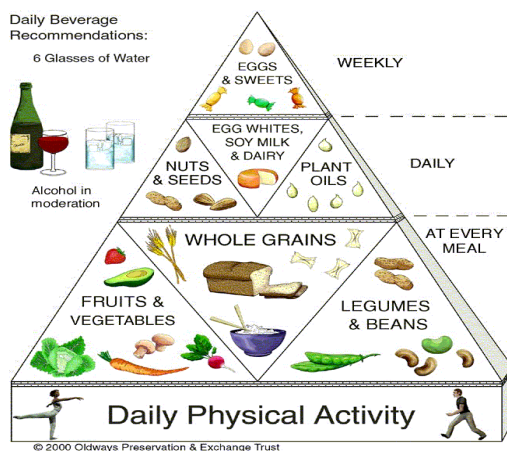
- Public educational tool established in 1992
- Recommends size of daily servings
- Pyramid shape
- Fats, oils and sweets have small serving size

YOU SHOULD ONLY KNOW THE LEVELS OF THE PYRAMIDS



Dietary Reference Intakes

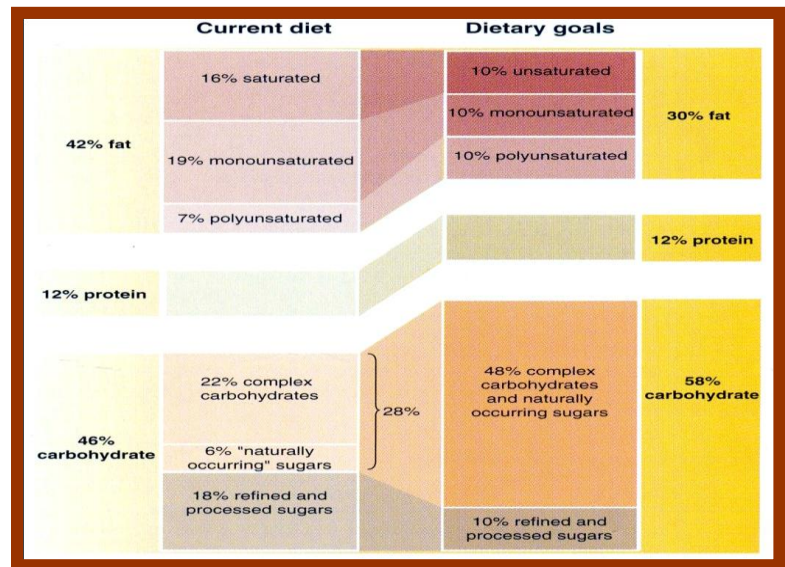
The Traditional Healthy Vegetarian Diet Pyramid



Dietary guidelines and goals

- Consume a variety of foods from the basic food groups
- Control calorie intake to manage body weight
- Be physically active everyday
- Choose fats and CHOs wisely for good health
- Increase daily intake of fruits, vegetables, whole grains, and non-fat or low-fat milk and milk products
- Choose and prepare foods with little salt

This picture shows the dietary intake of some individuals and how they should be changed to meet the goals of healthy body weight and growth



Energy requirement in humans

- ✓ The dietary energy intake required to maintain energy balance in a healthy individual
- ✓ Energy balance is maintained by calorie intake and energy expenditure
- ✓ Energy content of food is measured in calories or kilocalories (heat energy)

Energy requirement in humans

Sex	Age	Weight (Kg)	Avg. Energy Needs (kcal)
Men	23-50	70	2900
Women	23-50	55	2200
Pregnant	-	-	+300
Lactating	-	-	+500

Vegetarians and nutrient intake

- ✓ Lower intake of iron, calcium and vitamin D
- ✓ Long-term vegans may develop megaloblastic anemia due to vitamin B₁₂ deficiency
- ✓ Most consume enough protein
- ✓ Lower in total dietary fat

Vegetarians and chronic disease

- Lower Body Mass Index (BMI)
- Lower death rate from ischemic heart disease
- Lower blood pressure
- Lower cancer rates as compared to non-vegetarians

[read this through once only](#)

This position paper reviews the current scientific data related to key nutrients for vegetarians, including protein, iron, zinc, calcium, vitamin D, riboflavin, vitamin B-12, vitamin A, n-3 fatty acids, and iodine. A vegetarian, including vegan, diet can meet current recommendations for all of these nutrients. In some cases, use of fortified foods or supplements can be helpful in meeting recommendations for individual nutrients. Well-planned vegan and other types of vegetarian diets are appropriate for all stages of the life cycle, including during pregnancy, lactation, infancy, childhood, and adolescence. Vegetarian diets offer a number of nutritional benefits, including lower levels of saturated fat, cholesterol, and animal protein as well as higher levels of carbohydrates, fiber, magnesium, potassium, folate, and antioxidants such as vitamins C and E and phytochemicals. Vegetarians have been reported to have lower body mass indices than nonvegetarians, as well as lower rates of death from ischemic heart disease; vegetarians also show lower blood cholesterol levels; lower blood pressure; and lower rates of hypertension, type 2 diabetes, and prostate and colon cancer. Vegetarian diets offer a number of advantages, including lower levels of saturated fat, cholesterol, and animal protein and higher levels of carbohydrates, fiber, magnesium, boron, folate,

antioxidants such as vitamins C and E, carotenoids, and phytochemicals (27-30). Some vegans may have intakes for vitamin B-12, vitamin D, calcium, zinc, and occasionally riboflavin that are lower than recommended

Basic energy expenditure depends on: all the energy that we get from food is used in three things:

- Resting metabolic rate (RMR) is the amount of calories that we need to maintain normal body functions after taken food and without any activities.
 - Energy expense at rest
 - Required for normal body function
 - Depends on age, sex, growth, body surface area, fever, fasting, stress
- Physical activity this causes the variation in required amounts of nutrients.
 - Sedentary (inactive person) person: 30-50% more than RMR
 - Active person: 100% or more calories above RMR
- Thermic effect of food
 - Heat produced by the body due to food digestion and absorption
 - It means that when you digest and absorb food, your body temperature goes up, the rising temperature would expend energy.

