

HUMAN ORGAN SYSTEMS AND NUTRITION

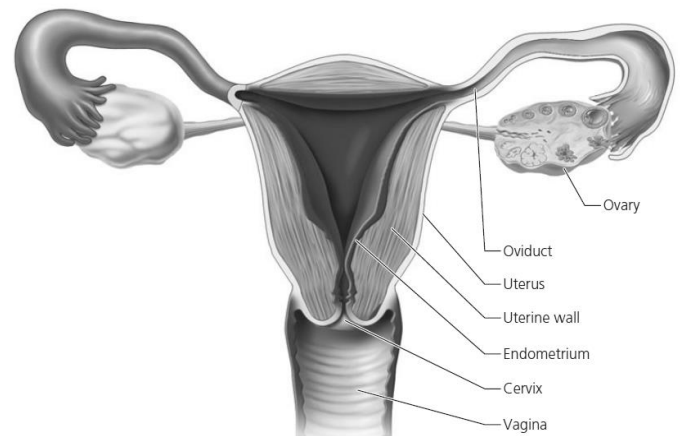
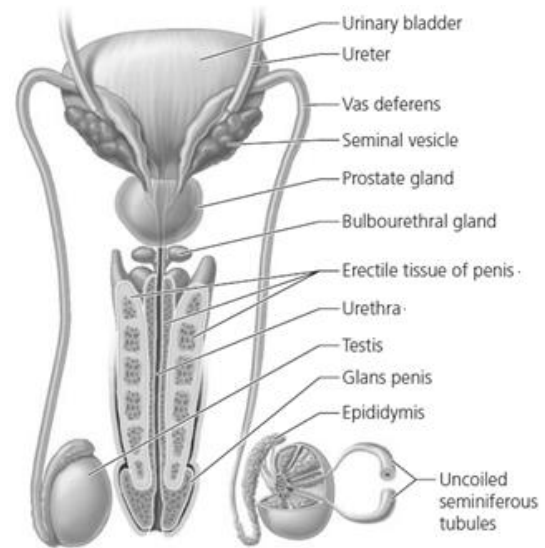
ENDOCRINE SYSTEM

- **Glands & Hormones:** Our body produces its own chemicals and uses them to control certain functions, and the main system that coordinates these chemicals is called the endocrine system
- A gland is a group of cells that produces and secretes, or gives off, chemicals. A gland selects and removes materials from the blood, processes them, and secretes the finished chemical product for use somewhere in the body
- Exocrine glands, such as the sweat and salivary glands, release secretions in the skin or inside of the mouth. Endocrine glands, on the other hand, release more than 20 major hormones directly into the bloodstream where they can be transported to cells in other parts of the body
- 2 Important Endocrine diseases **Diabetes:** Diabetes mellitus is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because cells do not respond to the insulin that is produced.
- **Type 1 diabetes:** results from the body's failure to produce insulin, and requires the person to inject insulin
- **Type 2 diabetes:** results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency
- **Growth Disorders:** If the body produces too much growth hormone (GH), gigantism or acromegaly (gigantism in adults) can occur; too little growth hormone results a condition called growth hormone deficiency,
- **Osteoporosis:** is a condition in which bones become fragile and more likely to break.
- **Polycystic Ovary Syndrome (PCOS):** PCOS is a condition associated with symptoms of infrequent or irregular menstruation
- **Thyroid Disorders:** Thyroid hormones, hormones produced by the thyroid gland, influence nearly all of the body's symptoms. Thyroid problems include hyperthyroidism (too much thyroid hormone), hypothyroidism
- **Cushing's syndrome:** Cortisol is a hormone that helps the body perform a number of important functions including converting fat into energy, maintaining immune system function, and responding to stress
- **Addison's disease:** Addison's disease occurs when the adrenal glands, which are located at the top of each kidney, produce an insufficient amount of steroid hormones despite the presence of an adequate amount of ACTH, the hormone that triggers the adrenal glands to release steroids.

REPRODUCTIVE SYSTEM

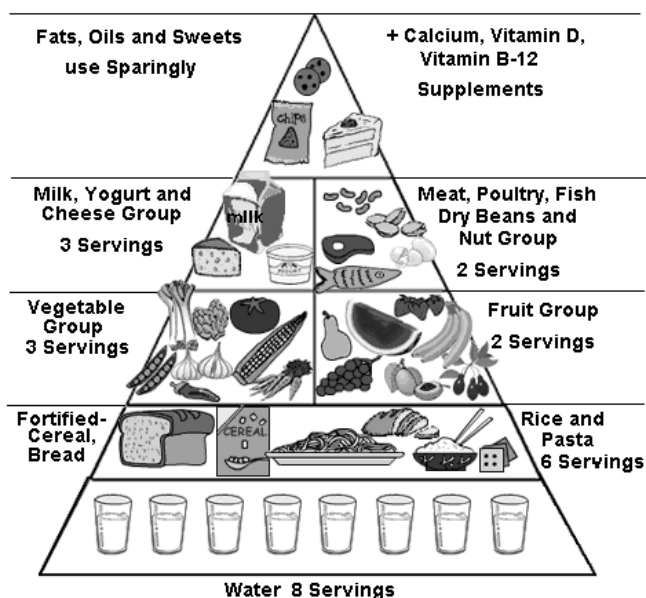
- Animals' reproductive systems can be divided into the internal reproductive organs and the external genitalia
- Gametes are reproductive cells that unite during sexual reproduction to form a new cell called a zygote. When the haploid male and female gametes unite in a process called fertilization, they form what is called a zygote
- In the male, testes produce sperm, and in the female, ovaries make eggs
- Hermaphroditism is when one organism has both sexes. Earthworms and garden snails always have both male and female organs
- Parthenogenesis is the ability of an unfertilized egg to develop and hatch.
- There are two major mechanisms of fertilization. In external fertilization, used by many aquatic invertebrates, eggs and sperm are simultaneously shed into the water, and the sperm swim through the water to fertilize the egg.
- In internal fertilization, the eggs are fertilized within the reproductive tract of the female, and then are covered with eggshells and/or remain within the body of the female during their development.
- **Oviparous organisms:** like chickens and turtles, lay eggs that continue to develop after being laid, and hatch later.

- **Viviparous organisms** like humans and kangaroos, are live-bearing. The developing young spend proportionately more time within the female's reproductive tract,
- **Ovoviviparous organisms** like guppies, garter snakes, and Madagascar hissing roaches, have eggs (with shells) that hatch as they are laid, making it look like live birth.
- **Male Reproductive System:** Sperm are produced in the testes located in the scrotum. From there, sperm are transferred to the epididymis, coiled tubules also found within the scrotum that store sperm and are the site of their final maturation
- The ends of the vasa deferentia, behind and slightly under the bladder, are called the ejaculatory ducts. The seminal vesicles are also located behind the bladder.
- Their secretions are about 60% of the total volume of the semen and contain mucus, amino acids, fructose as the main energy source for the sperm, and prostaglandins to stimulate female uterine contractions to move the semen up into the uterus
- The prostate is the largest of the accessory glands and puts its secretions directly into the urethra secretions are alkaline to buffer any residual urine, which tends to be acidic, and the acidity of the woman's vagina.
- The bulbourethral glands or Cowper's glands: this fluid may serve as a lubricant for inserting the penis into the vagina,
- **Female Reproductive System:** Eggs are produced in the ovaries. Within the ovary, a follicle consists of one precursor egg cell surrounded by special cells to nourish and protect it. Due to the stimulation of follicle-stimulating hormone (FSH) one egg per cycle matures and is released from its ovary.
- Ovulation is the release of a mature egg due to the stimulation of Luteinizing Hormone (LH), which then stimulates the remaining follicle cells to turn into a corpus luteum which then secretes progesterone to prepare the uterus for possible implantation
- Each egg is released into the abdominal cavity near the opening of one of the oviducts or Fallopian tubes.
- The vagina is a relatively-thin-walled chamber. It serves as a repository for sperm (it is where the penis is inserted), and also serves as the birth canal
- The cervix secretes mucus, the consistency of which varies with the stages in her menstrual cycle
- **Cervical cancer:** It is one of the most common cancers in women is caused due to Human Papilloma Virus (HPV). Pap smear test is a common and quick method to check cervical cancer.
- **Problems with Reproduction System: Testicular cancer:** It occurs when cells in the testicle divide abnormally and form a tumor.
- **Inguinal hernia:** When a portion of the intestines pushes through an abnormal opening or weakening of the abdominal wall and into the groin or scrotum, it is known as an inguinal hernia.
- **Syphilis** is a sexually transmitted disease caused by the bacteria *Treponema pallidum*. Antibiotics, usually penicillin, are used to treat Syphilis.



FOOD AND NUTRITION

- **Carbohydrates:** Carbohydrates are the organic compounds containing carbon, hydrogen and oxygen which constitute sugars (Starch, cellulose, glucose etc).
- Simple Carbohydrates are made up of a single basic sugar & provide the sweet taste in our food
- Complex carbohydrates are a combination of different types of sugars. Based on the number of sugars they are classified as disaccharide, Oligosaccharides, Polysaccharides
- **Proteins:** Proteins are polymer chains made of amino acids linked together by peptide bonds
- Protein is found in all cells of the body and is the major structural component of all cells in the body. Hormones and enzymes are also formed from amino acids
- Protein deficiency causes Kwashiorkor – a severe under-nourishment condition.
- **Fats:** Fat molecules are a rich source of energy for the body. Proteins and carbohydrates contain 4 kcal per gram as opposed to fats which contain 9 kcal per gram.
- **Saturated fats:** Solid at room temperature. Saturated fats directly raise total and LDL (bad) cholesterol levels hence are advised to avoid
- **Unsaturated fat:** Liquid at room temperature. They are 2 types. Monounsaturated fats which are found in olives, olive oil, nuts, peanut oil, canola oil and avocados.
- Trans Fats or Hydrogenated Fats: actually unsaturated fats, but they can raise total and LDL (bad) cholesterol levels while also lowering HDL (good) cholesterol levels
- Low-density lipoprotein (LDL) is one of the five major groups of lipoproteins, which enable transport of cholesterol within the water-based bloodstream.
- **Vitamins:** A vitamin is an organic compound required as a nutrient in tiny amounts by an organism.
- The two types of vitamins are: water-soluble vitamins (all the B vitamins and vitamin C) and fat-soluble vitamins (vitamins A, D, E, and K). Fat-soluble vitamins are stored in the liver and fatty tissue of the body, whereas water-soluble vitamins are not easily stored and excess amounts are flushed out in the urine.
- **Essential Minerals:** Calcium: Healthy bones and teeth, muscle contraction, assists in blood clotting, oxygen transport, cellular secretion of fluids and enzyme activity.
- Copper: Acts as a catalyst to store and release iron to help form hemoglobin.
- Iodine: Needed by the thyroid hormone and influences nutrient metabolism, nerve and muscle function, nail, hair, skin and tooth condition, and physical and mental development
- Iron: Necessary for red blood cell formation and required for transport of oxygen throughout the body
- Phosphorous: Works with calcium to develop and maintain strong bones and teeth.
- **Balanced Diet:** Food is anything solid or liquid that has a chemical composition which enables it, when swallowed to do one or more of the following:
 - Provide the body with the material from which it can produce heat, or any form of energy.
 - Provide material to allow growth, maintenance, repair or reproduction to proceed.
 - Supply substances, which normally regulate the production of energy or the process of growth, repair or reproduction.



- **The body mass index (BMI)**, or Quetelet index, is a tool that helps one to measure the amount of body fat one has based on height and weight. BMI does not actually measure the percentage of body fat.
- **Malnutrition:** Malnutrition essentially means “bad nourishment”. malnutrition is characterized by inadequate or excess intake of protein, energy, and micronutrients such as vitamins, and the frequent infections and disorders that result. Severe forms of malnutrition include marasmus, cretinism and irreversible brain damage due to iodine deficiency; and blindness and increased risk of infection and death from vitamin A deficiency

Malnutrition: 20% of world population

Asia : 70% Africa: 26% Latin America and Caribbean : 4%

- Anaemia occurs primarily due to iron deficiency and is caused by undernutrition and poor dietary intake of iron

Weekly Iron and Folic Supplementation program (WIFS):

Implementation: rural and urban areas
The scheme will cover: 12 crore adolescents
(3.2 crore anemic girls, 2 crore anemic boys).
Funding: National Rural Health Mission.

- The cause Individual nutritional status depends on the interaction between food that is eaten, the overall state of health and the physical environment

HUNGAMA (hunger and malnutrition) report: 2011

- I. 112 rural districts of India, covering nearly 20% of Indian children.
- II. Of the 112 districts surveyed, 100 were selected from the bottom of a child development district index developed for UNICEF India in 2009, referred to as the 100 Focus Districts in this report.
- III. 40%: underweight, 60%: stunted (their height is much lower than the median height-for-age of the reference population).
- IV. The 100 Focus Districts are located across Bihar, Jharkhand, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh.
- V. Children from Muslim or SC/ST households generally had worse nutrition indicators.
- VI. The prevalence of underweight in children born with a weight below 2.5 kg is 50 per cent, while that among children born with a weight above 2.5 kg is 34 per cent.

- **Food Additives:** Food additives are non-nutritive substances added deliberately to any food product in small amounts to improve its color, texture, taste, flavor, consistency and shelf life
- **Bulking agents:** Bulking agents such as starch are additives that increase the bulk of a food without affecting its nutritional value
- **Emulsifiers:** Emulsifiers allow water and oils to remain mixed together in an emulsion, as in mayonnaise, ice cream, and homogenized milk.
- **Preservatives:** Preservatives prevent or inhibit spoilage of food due to fungi, bacteria and other microorganisms
- **Benzoates** (such as sodium benzoate, benzoic acid): beverages, jams, pickled products, salads, cheeses, meats and margarines.
- **Nitrites** (such as sodium nitrite): Packaged meats. They also impart a pink, fresh hue to cured meat
- **Sulphites** (such as sulphur dioxide): dried fruits, wines (particularly red wines) and fruit juices and in many other food products.
- **Sorbates** (such as sodium sorbate, potassium sorbate): breads, cheeses, bakery products etc.
- **Sweeteners:** Sweeteners are added to foods for flavoring. Sweeteners other than sugar are added to keep the food energy (calories) low, or because they have beneficial effects for diabetes mellitus and tooth decay and diarrhea.

- **The Food Safety and Standards Act, 2006:** The Indian Parliament has passed the Food Safety and Standards Act, 2006 that overrides all other food related laws. It will specifically repeal eight laws:
- The Act establishes a new national regulatory body, the Food Safety and Standards Authority of India, to develop science based standards for food and to regulate and monitor the manufacture, processing, storage, distribution, sale and import of food so as to ensure the availability of safe and wholesome food for human consumption
- **Food Security:** The concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences.

PROGRAMME	OBJECTIVES
National development council's -National food security mission: 11 th plan	Rice: 10 m tons Wheat: 8 m tons Pulses: 2 m tons Implemented by department of agriculture and cooperation in 17 states
Food safety and standards act: 2006	I. To develop science based standards for food II. To regulate and monitor the manufacture, processing, storage, distribution, sale and import of food III. To ensure the availability of safe and wholesome food for human consumption

- **Food access:** having sufficient resources to obtain appropriate foods for a nutritious diet.
- **Food use:** appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.
- Food security is a complex sustainable development issue, linked to health through malnutrition, but also to sustainable economic development, environment, and trade.
- **Scope of the Problem:** Chronic food deficits affect about 792 million people in the world (FAO 2000), including 20% of the population in developing countries.
- More than 70% of children with protein-energy malnutrition live in Asia, 26% live in Africa, and 4% in Latin America and the Caribbean
- **Interventions:** Interventions that contribute to preventing malnutrition include :
 - Improved water supply, sanitation and hygiene, Health education for a healthy diet.
 - Improved access, by the poor, to adequate amounts of healthy food, Ensuring that industrial and agricultural development do not result in increased malnutrition
- **Nutritional Security:** WHO considers household food and nutrition security as a basic human right.
- Ensuring food and nutrition security is a challenge for India, given its huge population and high levels of poverty and malnutrition.
- Economic access to food by about a fourth of the population living below the poverty line is problematic, despite impressive economic growth in the recent years.

Occupational lifestyle diseases: Survey by ASSOCHAM (<i>associated chamber of commerce and industry</i>)	
I.	68% of working women afflicted with lifestyle disorders like obesity, depression, chronic backache, diabetes and hypertension.
II.	10% of adults suffer with hypertension.
III.	3/100 suffers with stroke.
IV.	In corporate employees 36% of sample population suffer with obesity, 21% with depression, 12% with blood pressure and 8% with diabetes