Chapter 3: Health: The Ultimate Treasure

1. What is Health?

According to the **World Health Organization (WHO)**, health is defined as a *"state of complete physical, mental, and social well-being, and not merely the absence of disease."*

THE THREE DIMENSIONS OF HEALTH

Physical Health
Proper functioning of body parts, physical fitness & stamina

Mental Health
Emotional stability, stress management & positive mindset

Social Health
Healthy relationships, effective communication & social harmony

2. Signs vs. Symptoms of Illness

When the body is unwell, it indicates changes in structure or function through symptoms and signs:

Feature	Symptoms	Signs
Definition	Subjective experiences felt and reported by the patient.	Objective indications observed and measured by others.
Visibility	Cannot be directly seen or measured by a clinician.	Can be directly seen, measured, or detected by diagnostic tests.
Examples	Headache, tiredness, body ache, dizziness, nausea.	High body temperature (fever), skin rash, high blood pressure, swelling.

3. Broad Classification of Diseases

Diseases are conditions that impair normal body functioning. They fall into two main categories:

CLASSIFICATION OF DISEASES

Communicable Diseases
Infectious • Transmissible • Caused by Pathogens

Non-Communicable Diseases (NCDs)
Non-infectious • Lifestyle/Environmental • Non-transmissible

A. Communicable (Infectious) Diseases

Caused by microscopic biological agents called **pathogens** (bacteria, viruses, fungi, protozoa, and parasitic worms). They can spread from an infected person to a healthy person.

MODES OF DISEASE TRANSMISSION

Direct Contact
Shaking hands, physical contact

Air / Droplets
Sneezing, coughing droplets

Food / Water
Contaminated meals, dirty water

Vectors
Mosquitoes, houseflies

Animals
Rabid dog bites, animal contact

Comprehensive Table of Communicable Diseases

Category	Disease	Causal Agent	Site of Infection	Key Symptoms	Preventive Measures
Airborne	Common Cold & Flu	Virus	Respiratory tract	Nasal congestion, sore throat, fever, cough	Handwashing, wearing masks, avoiding close contact
	Chickenpox	Virus	Skin & respiratory tract	Fever, itchy skin rashes, fluid-filled blisters	Patient isolation, vaccination, hygiene
	Measles	Virus	Skin & respiratory tract	High fever, sore throat, red skin rashes	Patient isolation, MMR vaccination
	Tuberculosis (TB)	Bacteria	Lungs	Persistent cough, fever, night sweats, fatigue	BCG vaccine, covering mouth when coughing
Water & Food Borne	Hepatitis A	Virus	Liver	Jaundice, dark urine, fatigue, loss of appetite	Drinking boiled water, vaccination
	Cholera	Bacteria	Intestine	Severe watery diarrhoea, vomiting, dehydration	Clean drinking water, safe food, hygiene
	Typhoid	Bacteria	Intestine	High prolonged fever, headache, abdominal pain	Proper sanitation, clean water, vaccination
	Ascariasis	Roundworm	Intestine	Worms in stool, abdominal pain, anaemia, poor growth	Washing vegetables/ fruits, sanitary waste disposal
Vector Borne	Malaria	Protozoa (*Plasmodium*)	Blood & Liver	High fever with chills and profuse sweating	Mosquito nets, repellents, preventing stagnant water
	Dengue Fever	Virus (via *Aedes* mosquito)	Blood & Skin	High fever, severe joint/muscle pain, headache	Preventing mosquito breeding, wearing long sleeves

B. Non-Communicable Diseases (NCDs)

NCDs cannot spread from one individual to another. They are caused by unhealthy lifestyle habits, nutritional deficiencies, environmental factors, or genetic predisposition. NCDs account for the majority of chronic illnesses today.

- **Chronic Diseases:** Long-term health conditions persisting for more than 3 months (e.g., Diabetes, Cancer, Hypertension, Asthma).
- **Deficiency Diseases:** Diseases caused by the lack of specific nutrients in the diet (e.g., Scurvy - Vitamin C, Anaemia - Iron, Goitre - Iodine).

MAJOR LIFESTYLE-RELATED NCDS

Disease	Major Causes	Symptoms	Preventive Lifestyle Changes
Diabetes	Hormonal imbalance, lack of physical activity, obesity, high sugar diet	Frequent urination, excessive thirst, weight loss, slow wound healing	Balanced diet, regular exercise, reducing sugar & refined carbohydrates
Obesity	Overeating junk/processed food, high fat intake, sedentary lifestyle	Excess body fat accumulation, breathlessness, fatigue	Daily physical activity, active lifestyle, avoiding fast food
Hypertension	High salt intake, stress, lack of exercise, smoking, alcohol	Severe headaches, dizziness, chest tightness (often asymptomatic)	Low sodium diet, yoga/ meditation, avoiding smoking and alcohol

4. Immunity and Vaccines

Immunity is the body's natural defense capacity to recognize, combat, and eliminate disease-causing pathogens.

HOW VACCINES BUILD ACQUIRED IMMUNITY

1. **Vaccine Administration:** A weakened, dead, or harmless fragment of a germ (antigen) is introduced into the body.
2. **Immune Activation:** The immune system identifies the antigen as foreign and produces specific *antibodies*.
3. **Memory Cell Formation:** The body creates memory cells that retain the blueprint of the pathogen.
4. **Rapid Defense on Real Infection:** If exposed to the active germ later, memory cells trigger an immediate, robust antibody response, neutralizing the pathogen before disease occurs.

Key Principle: Vaccines are Preventive, Not Curative

Vaccines prepare and train your immune system in advance. They protect individuals from contracting or developing severe illnesses but cannot cure an active infection once a person is already sick.

5. Treatment & Antibiotic Resistance

When the immune system is unable to overcome a bacterial infection, medical treatment with **antibiotics** is required.

- **Mechanism:** Antibiotics selectively target bacterial cell structures (such as cell walls or bacterial ribosomes) that differ from human cells.
- **Selective Target:** Antibiotics are effective *only against bacterial infections*. They do not work against viruses (e.g., cold, flu) or protozoa.

THE CYCLE OF ANTIBIOTIC RESISTANCE

! **Overuse / Incomplete Course:** Taking antibiotics unnecessarily or stopping a course early leaves surviving bacteria behind.

! **Mutation & Survival:** A small number of bacteria develop natural mutations rendering them resistant to the drug.

! **Multiplication & Spread:** Resistant bacteria survive, multiply rapidly, and transfer resistance genes to other bacteria.

! **Treatment Failure:** Standard antibiotic treatments fail, leading to prolonged illnesses, complications, and higher risk of severe disease.

6. Scientific Heritage & Contributions

Key Pioneers in Biomedical Science

- **Edward Jenner (Late 1700s):** Discovered the first vaccine (Smallpox vaccine). He observed that milkmaids who contracted mild cowpox were immune to deadly smallpox. Mass vaccination eventually led to the global eradication of smallpox in 1979.
- **Alexander Fleming (1928):** Discovered *Penicillin*, the world's first antibiotic, from a mould contaminating a bacteriological petri dish.
- **Dr. Kamal Ranadive (1917–2001):** Indian biomedical researcher who established links between tissue culture, hormones, environmental pollution, and cancer.
- **Dr. Maharaj Kishan Bhan:** Prominent Indian pediatrician and scientist who spearheaded the development of India's indigenous Rotavirus vaccine to combat severe childhood diarrhoea.
- **Traditional Indian Medicine (Ayurveda, Siddha, Unani):** Emphasize bodily balance, *dinacharya* (daily routine), *ritucharya* (seasonal routine), and preventative natural health care.