

## Chapter 8 - Diseases

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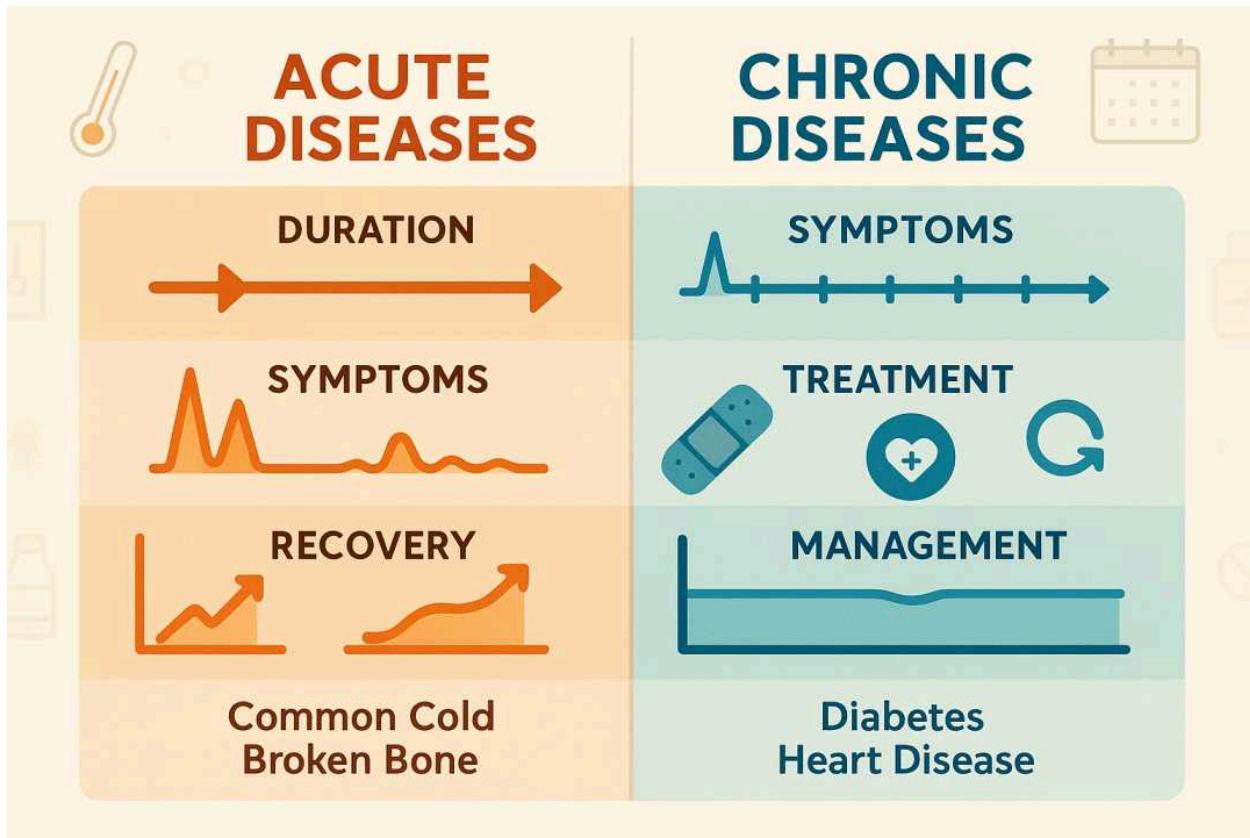
The advertisement features a dark blue background with white and yellow text. It includes four main sections: 'Class 10 Biology' in yellow, 'All 11 Chapters' in white, 'All Lectures Playlist' in white, and 'Full Book' in white. To the right, there is a photograph of a young woman with long dark hair, wearing a purple t-shirt, sitting in front of a book cover for 'Textbook of Biology Grade 10'. The book cover has 'FEDERAL BOARD' at the top, 'Based on National Curriculum of Pakistan 2022-23' above the title, and 'National Book Foundation as Federal Textbook Board Islamabad' at the bottom. The book cover also features illustrations of a heart and a virus.

### 8.1. Diseases

- A **disease** is a condition that affects the normal functioning of an organism, causing harm or discomfort.
- Causes: genetics, environment, lifestyle, or infection.
- **Disease vs Illness:**
  - Disease → objective, biological, medical condition.
  - Illness → subjective experience of feeling unwell (social, cultural, psychological factors included).

#### Types of Diseases (by Duration)

1. **Acute Diseases** → Short-term, resolve quickly (e.g., pneumonia).
2. **Chronic Diseases** → Long-term, persist/worsen over time (e.g., diabetes).



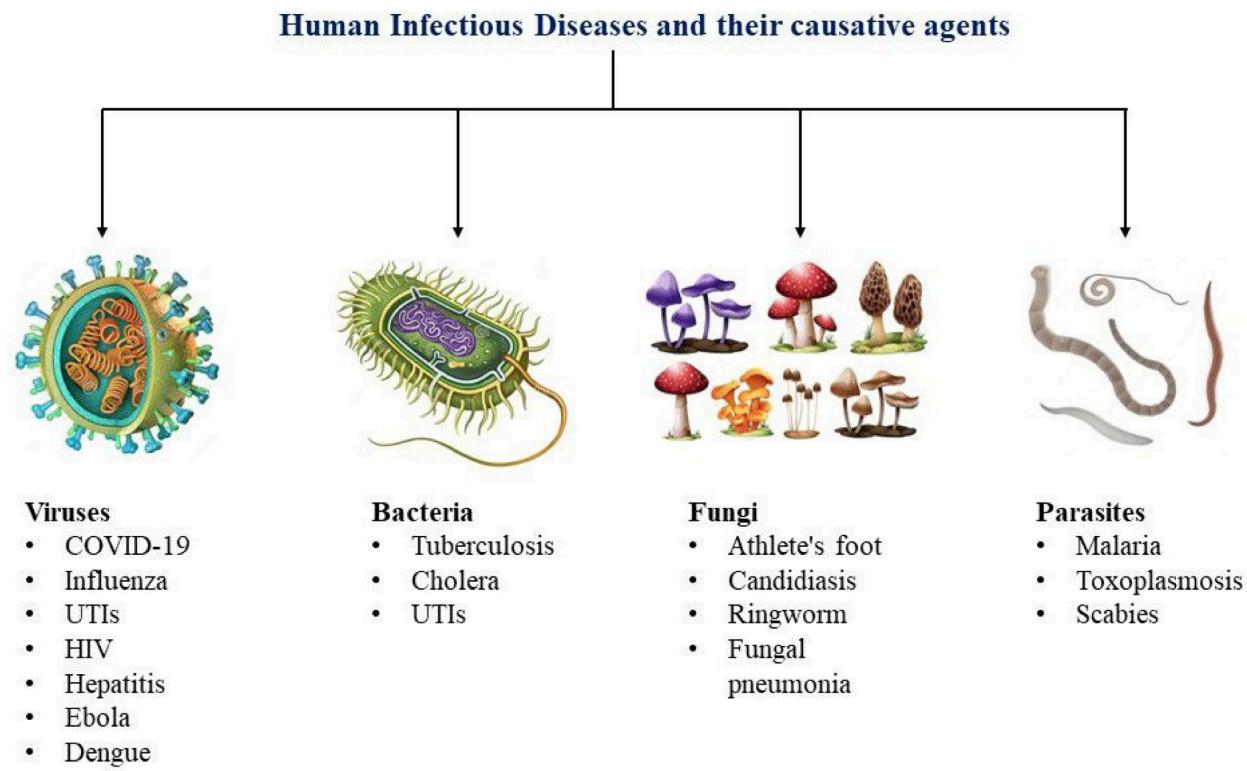
### Types of Diseases (by Cause)

- **Infectious diseases** (spread by pathogens).
- **Non-infectious diseases** (not caused by pathogens).

### 8.2. Infectious Diseases

- Spread from person-to-person or animals-to-humans.
- **Pathogen:** an agent that causes disease (bacteria, viruses, fungi, protozoa, parasitic worms).
- Spread through:
  - Skin contact
  - Bodily fluids
  - Contaminated food/water
  - Airborne droplets
  - Contaminated objects

### 8.2.1. Types of Infectious Diseases



### 8.3. Zoonotic Diseases

- **Zoonosis:** Infectious disease transmitted from animals to humans.
- Can be caused by: viruses, bacteria, fungi, protozoa, parasites.
- **Symptoms** vary depending on disease (e.g., bird flu → fever, cough, fatigue, sore throat, runny nose, headache).

#### 8.3.1. Types of Zoonotic Diseases

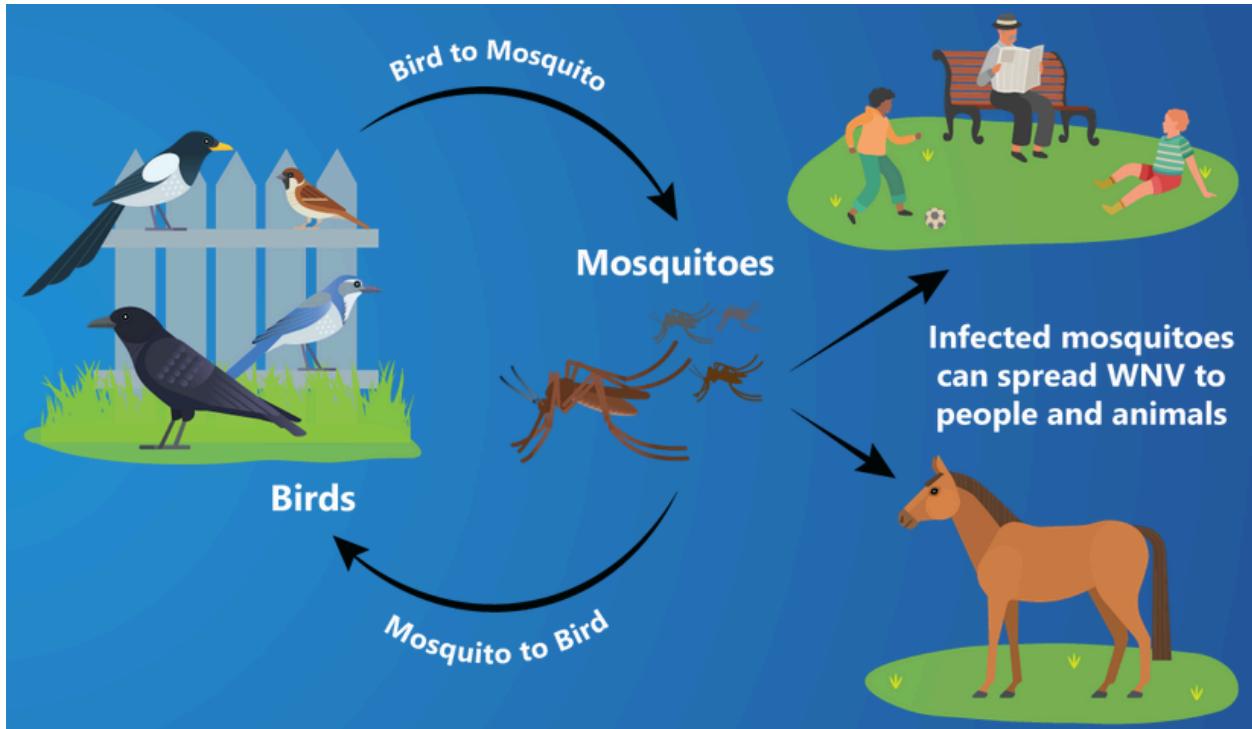
1. **Viral zoonoses** → Rabies (mammals), Bird flu (birds).
2. **Bacterial zoonoses** → Anthrax (cattle), Plague (rat fleas).
3. **Fungal zoonoses** → Ringworm (cats, cattle).
4. **Protozoan zoonoses** → African sleeping sickness (tsetse fly), Beaver fever (beavers).
5. **Parasitic worm zoonoses** → Snail fever (snails), Tapeworm (pigs).

#### 8.3.2. Transmission of Zoonotic Diseases

- Bites, scratches, ingestion, contact with contaminated waste/products.
- Over 60% of human pathogens are zoonotic in origin.

#### 8.4. Vector-Borne Diseases

- **Vector:** the living organism that transmits pathogens from infected → healthy hosts.
- Examples of vectors: mosquitoes, ticks, fleas, lice, mites, flies.



#### Types of Vectors

1. **Biting Vectors** → Mosquito, mite, flea, tick (pathogens multiply inside the body, transmitted by biting).
2. **Carrier Vectors** → Houseflies (pick pathogens on body, spread by contact).

#### Examples of Vector-Borne Diseases

- Malaria (mosquito), Dengue fever (mosquito), Lyme disease (tick).

#### 8.5. Non-Infectious Diseases

- Not caused by pathogens, cannot spread.

## Types

1. **Physiological diseases** (e.g., Diabetes Type 2, cancer).
2. **Genetic disorders** (e.g., sickle cell anaemia, colour blindness).
3. **Autoimmune diseases** (e.g., type 1 diabetes, rheumatoid arthritis).
4. **Nutritional deficiency diseases** (e.g., scurvy, rickets).
5. **Environmental diseases** (e.g., lung cancer from smoking, skin cancer from UV rays).
6. **Degenerative diseases** (e.g., osteoporosis, osteoarthritis, Alzheimer's disease).
7. **Psychological disorders** (e.g., anxiety, depression).

## 8.6. COVID-19

- Caused by **Coronavirus SARS-CoV-2**.
- Global pandemic (2020–2022).
- An **acute disease** affecting multiple body systems:

## Effects

1. **Respiratory** → Breathing difficulty, pneumonia.
2. **Cardiovascular** → Risk of heart attack, stroke.
3. **Nervous system** → Headache, fatigue, loss of taste/smell.
4. **Digestive system** → Diarrhoea, nausea, vomiting, liver damage.
5. **Urinary system** → Abnormal kidney function.
6. **Immune system** → Weakens immune response.
7. **Mental health** → Anxiety, depression, stress.
8. **Long-term effects** → Permanent lung damage, chronic health issues.

## Prevention

- Washing hands frequently
- Wearing masks

- Social distancing
- Staying home if symptomatic
- Vaccination

## **Effects on Body Systems**

- 1. Urinary System**
  - Abnormal kidney function
  - Kidney damage
- 2. Respiratory System**
  - Breathing difficulty
  - Pneumonia
- 3. Cardiovascular System**
  - Risk of heart attack
  - Risk of stroke
- 4. Nervous System**
  - Headaches
  - Fatigue
  - Loss of taste and smell
  - Anxiety, depression, stress
- 5. Digestive System**
  - Diarrhea
  - Nausea, vomiting
  - Liver damage
- 6. Immune System**
  - Weakened immune system

## **AIDS (Acquired Immunodeficiency Syndrome)**

- Caused by **HIV (Human Immunodeficiency Virus)**.
- Attacks the **immune system**, specifically **helper T cells (CD4 T cells)**.
- Weakens the body's ability to fight infections.

## **Transmission**

- Through infected blood and body fluids
- Sharing contaminated needles, blood transfusions, or instruments

## Symptoms of AIDS

- Fever, headache, muscle aches
- Joint pain, swollen lymph nodes
- Diarrhoea, weight loss
- Severe immune dysfunction

## Stages of HIV to AIDS

1. **Stage 1: Asymptomatic**
  - No symptoms
  - Virus multiplies in blood
  - Lasts a few weeks
2. **Stage 2: Mild Symptoms**
  - Mild infections, swollen lymph nodes
  - Can last up to 10 years
3. **Stage 3: Advanced Symptoms**
  - Immune system weakens
  - Opportunistic infections start
4. **Stage 4: AIDS**
  - Severe symptom
  - Rapid decline of CD4+ T cells
  - Many opportunistic infections

## Treatment

- **Antiretroviral Therapy (ART)**: manages HIV and prevents AIDS progression
- Early detection and treatment are crucial

## Diabetes

- A group of **metabolic disorders** characterised by **high blood sugar levels**.
- Chronic disease.

## Types of Diabetes

- 1. Type 1 Diabetes (T1D):**
  - An autoimmune disease that destroys insulin-producing cells in the pancreas.
  - Treated from insulin injections.
- 2. Type 2 Diabetes (T2D):**
  - Caused by insulin resistance and impaired insulin secretion.
  - Chronic disease.
- 3. Gestational Diabetes (GDM):**
  - Develops during pregnancy.
  - Usually reverses after delivery.

## **Management**

- Medication, diet, and lifestyle changes.

## **Prevention / Management Steps**

- Be more active
- Eat fiber-rich foods
- Eat whole grains
- Lose weight
- Make healthier choices
- Don't smoke

## **Effects of Unmanaged Diabetes**

- 1. Short-term Effects**
  - Increased thirst and urination
  - Fatigue, blurred vision
  - Slow-healing wounds
- 2. Long-term Effects**
  - Heart diseases, high blood pressure
  - Irregular heartbeat
  - Kidney and nerve damage
  - Retina damage, foot ulcers
  - High cholesterol, high uric acid, high lipid levels
  - High risk of COVID-19

- Ketoacidosis, memory loss

## Plant Diseases in Pakistan

- Pakistan is mainly an agricultural country where crops are the backbone of its economy.
- Just like humans, plants can also get sick due to microorganisms. In Pakistan, many **fungal diseases** damage important crops.

## Major Fungal Plant Diseases

### 1. Rust of Wheat

- Caused by fungus *Puccinia rustica*.
- Infects wheat, barley, and rye.
- Spreads from one plant to another through **air-borne spores**.
- Can reduce yield by up to **20%**.
- Appears as reddish-brown spots on leaves and stems.

### 2. Smut Disease

- Another fungal disease affecting wheat and grasses.
- Appears as **sooty black powder** replacing grains.
- Reduces crop yield and quality
- Caused mainly by fungus *Ustilago*.

### 3. Red Rot of Sugarcane

- Very destructive disease of sugarcane.
- Caused by fungus *Colletotrichum falcatum*.
- Symptoms:
  - Red-colored patches inside sugarcane stem.
  - Dull, reduced juice content.
- Severely affects sugar production.

## Control of Plant Diseases

- Use of **disease-resistant varieties**.
- Proper **crop rotation** (changing crops in fields).
- Use of **fungicides**.
- Early detection and regular monitoring

## **Antibiotics**

- Antibiotics = Chemicals made by microorganisms that **kill or slow down** the growth of harmful microbes.
- Effective against **bacteria and some fungi** but **not viruses**.

## **Discovery of Penicillin**

- Discovered accidentally by **Alexander Fleming** in 1928.
- While growing bacteria in dishes, he observed that mold (*Penicillium notatum*) produced a substance that killed bacteria.
- This substance was named **Penicillin – the first true antibiotic**
- In the 1940s, Penicillin became widely used and saved millions of lives.
- Today, many different antibiotics are available.

## **Sources of Antibiotics**

1. **Bacteria** – e.g., Streptomycin, Tetracycline, Erythromycin.
2. **Fungi** – e.g., Penicillin, Cephalosporin.
3. **Plants** – some produce antibiotic-like substances (e.g., garlic).
4. **Animals** – some, like frogs, produce protective antibiotic chemicals.

## **Mode of Action (How Antibiotics Work)**

Antibiotics work by interfering with **vital bacterial processes**, leading to death or stopping growth.

- **Cell Wall Inhibition** – e.g., Penicillin blocks bacterial cell wall synthesis.
- **Protein Synthesis Inhibition** – e.g., Tetracycline stops bacterial ribosomes from making proteins.
- **DNA Replication Inhibition** – e.g., Gentamicin prevents DNA copying.
- **Membrane Damage** – e.g., Polymyxins break bacterial cell membrane.

- **Metabolic Inhibition** – e.g., Sulfonamides block enzymes needed for metabolism.

## Classification of Antibiotics

- **Bactericidal** – Kill bacteria directly.
- **Bacteriostatic** – Stop growth, allowing immune system to remove bacteria.
- **Narrow-Spectrum** – Work on specific bacteria (e.g., Penicillin).
- **Broad-Spectrum** – Act on a wide variety of bacteria (e.g., Tetracycline, Cephalosporin).

## Antibiotic Resistance

- **Definition:** Ability of bacteria to survive even in presence of antibiotics.
- **Cause:** Overuse or misuse of antibiotics → bacteria develop resistance.
- **Result:**
  - Infections become **harder to treat**.
  - **Longer treatment required**.
  - **Higher healthcare costs**.
  - Some diseases become life-threatening (e.g., drug-resistant TB, drug-resistant typhoid).



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