Unit 3: Communicable Diseases: Causes, Prevention, and Management

Subject: Health Education–I

Unit 3: Communicable Diseases—Causes, Prevention, and Management

(Overview • Prevention Framework • Immunity & Vaccination • Disease-wise: Viral Hepatitis, HIV/AIDS, Tuberculosis, Malaria, Rabies, Tetanus, Measles–Mumps–Rubella, Dengue & Swine Flu)

3.1 Introduction to Communicable Diseases

Communicable (infectious) diseases are illnesses caused by microorganisms—viruses, bacteria, parasites, or fungi—that spread **from an infected source to a susceptible person**. The classic **chain of infection** has six links:

1. **Agent** → 2) **Reservoir** → 3) **Portal of exit** → 4) **Mode of transmission** → 5) **Portal of entry** → 6) **Susceptible host**.
   Breaking **any** link (e.g., handwashing, safe water, vaccination, masks/ventilation, vector control) reduces transmission.

3.2 Causes & Prevention: A Practical Framework

3.2.1 Modes of transmission → matching prevention

Transmission route	Examples	How it spreads	High-yield prevention
Airborne / Droplet	Measles, TB, flu	Infectious particles in air	Ventilation, masks/respiratory etiquette, early diagnosis & treatment, vaccination (where available)
Fecal–oral	Hepatitis A, diarrhoeal diseases	Contaminated water/food, hands	Safe water, sanitation, food hygiene, handwashing
Blood / Body fluids	HIV, Hepatitis B & C	Sexual contact, needles, transfusion, birth	Safer sex (condoms), sterile injecting, screened blood, PEP/PrEP (HIV), vaccination (HBV)
Vector-borne	Malaria, Dengue	Bites from infected mosquitoes	Insecticide-treated nets (ITNs), indoor residual spraying (IRS), source reduction, repellents, window screens
Zoonotic (animal→human)	Rabies	Saliva via bites/scratches	Immediate wound washing; prompt PEP; dog vaccination
Environmental wound contamination	Tetanus	Spores in soil enter wounds	Vaccination (Td/Tdap) + proper wound care

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3.3 Immunity, Vaccination, and Herd Protection

Immunity may be **innate** (in-born barriers) or **adaptive** (learned by exposure). Within adaptive immunity:

- **Active immunity:** body produces its own antibodies after **infection** or **vaccination** (slower onset, longer-lasting).
- **Passive immunity: ready-made antibodies** transferred (e.g., maternal antibodies, immunoglobulin; rapid, short-term).

Vaccines train the immune system **safely** to recognize pathogens, building memory B/T cells and reducing disease and transmission at population level (**herd protection**) when coverage is high.

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3.4 Disease-wise Notes: Causes, Symptoms, Prevention & Practical Management

The points below are student-level essentials for recognition and health-education counselling. Always follow national guidelines for diagnosis, treatment, and referral.

3.4.1 Viral Hepatitis (A, B, C, E)

Causes & transmission

- **HAV/HEV:** fecal–oral (unsafe water/food).
- **HBV/HCV:** blood & body fluids (sex, needles, transfusion), mother-to-child (HBV).
  Key features: fatigue, nausea, dark urine, **jaundice** (yellow eyes/skin).
  Prevention: safe water/food (A/E); **HBV vaccination**; screen blood; safe sex; sterile needles; **HBV prophylaxis in pregnancy** to prevent transmission. (No vaccine for HCV; curative antivirals exist—specialist care.)

Student tip: Encourage **early testing** with any jaundice or after needle/sexual exposure.

3.4.2 HIV/AIDS

Cause & spread: Human Immunodeficiency Virus (HIV-1/2) via **unprotected sex**, **shared needles**, **unscreened blood**, and **pregnancy/childbirth/breastfeeding** without treatment.
Features: acute fever/rash early; later, weight loss, recurrent infections.
Prevention & management: consistent condom use; **PrEP** (pre-exposure prophylaxis) for those at risk; **PEP** within 72 h after exposure; regular testing; antiretroviral therapy (ART). **U=U:** people on ART with **undetectable viral load do not sexually transmit HIV**—a key message against stigma.

3.4.3 Tuberculosis (TB)

Cause & spread: *Mycobacterium tuberculosis* via **airborne droplet nuclei** from persons with pulmonary TB.
Features: cough ≥2 weeks, fever/night sweats, weight loss, blood-streaked sputum.
Prevention: prompt **testing & treatment**, cough etiquette, **ventilation**, appropriate **respiratory protection** in healthcare; **BCG** prevents severe childhood TB forms; programmatic care (e.g., DOTS).

3.4.4 Malaria

Cause & spread: *Plasmodium* parasites via **female *Anopheles* mosquitoes**.
Features: fever with chills/rigors, headache, malaise (cyclical in some).
Prevention: ITNs and **IRS** (core WHO tools), eliminate breeding sites (stagnant water), repellents/covered clothing; chemoprophylaxis for travellers per guidelines.

3.4.5 Rabies

Cause & spread: Rabies virus from **bites/scratches/licks on broken skin**—usually dogs; nearly **100% fatal** after symptoms begin.

Immediate action after bite: wash wound with **soap and running water for 15 minutes**, seek care urgently. **PEP** = wound care + **rabies vaccine** ± **rabies immunoglobulin** (per risk and history). Community prevention: **mass dog vaccination** & avoiding animal bites.

3.4.6 Tetanus

Cause & spread: *Clostridium tetani* spores entering **contaminated wounds** (not person-to-person).
Features: jaw stiffness (**trismus**), muscle spasms, autonomic instability.
Prevention: vaccination across lifespan (Td/Tdap boosters) and proper **wound management**; consider **TIG** for certain dirty wounds and incomplete vaccination.

3.4.7 Measles, Mumps, Rubella (MMR)

Causes & spread: respiratory droplets/airborne; highly contagious (measles).
Features:

- **Measles:** high fever, cough/coryza/conjunctivitis, **Koplik spots**, rash.
- **Mumps:** parotid swelling, fever; complications include orchitis, meningitis.
- **Rubella:** mild fever/rash; **dangerous in pregnancy → Congenital Rubella Syndrome (CRS)** (hearing, heart, eye defects).
  Prevention: Two-dose MMR-containing vaccination in childhood; ensure adult catch-up if missed; vaccinate to protect against CRS.

3.4.8 Dengue

Cause & spread: Dengue virus via **Aedes aegypti** (a **day-biting** mosquito; peak early morning and before dusk).
Features: sudden high fever, severe headache, **retro-orbital pain**, myalgia/arthralgia, rash. **Danger signs (seek care):** belly pain, **persistent vomiting**, bleeding, lethargy—often **after the fever subsides**.
Prevention: source reduction (empty containers), **cover water storage**, personal protection (long sleeves, repellents), screens; community vector control. (Vaccines exist in some settings—follow local/WHO guidance.)

3.4.9 “Swine Flu” (Influenza A H1N1pdm09)

Cause & spread: now part of **seasonal influenza A** viruses; spreads via droplets/airborne and contaminated hands/surfaces.
Features: sudden fever, cough, sore throat, myalgia, fatigue; higher risk of complications in pregnancy, the elderly, and those with chronic conditions.
Prevention & management: annual influenza vaccination, respiratory hygiene, stay home when sick; early antivirals for high-risk/confirmed cases per protocol.

3.5 Quick Reference Tables

3.5.1 Disease–Prevention snapshot

Disease	Primary prevention	Post-exposure / additional steps
Hepatitis A	Safe water/food; vaccine (context-dependent)	—

Disease	Primary prevention	Post-exposure / additional steps
Hepatitis B	**HBV vaccine**; safe sex; sterile needles	HBV vaccine ± HBIG after exposure; antenatal prophylaxis
HIV	Condoms; **PrEP**; screened blood; harm-reduction	**PEP ≤72 h**; ART → **U=U** reduces transmission to zero when undetectable
TB	Ventilation, cough etiquette, early treatment; BCG (childhood severe forms)	Household screening & preventive therapy per policy
Malaria	**ITNs/IRS**, source control, repellents	Chemoprophylaxis for travellers
Rabies	Avoid bites; vaccinate dogs; pre-exposure vaccine for risk groups	**Wound wash** + **PEP** (vaccine ± RIG) ASAP
Tetanus	Routine **Td/Tdap** boosters; clean wounds	TIG + vaccine depending on wound/status
MMR	**Two-dose MMR** for all eligible	Catch-up; protect pregnancy from rubella
Dengue	Vector control, personal protection (daytime)	Monitor **warning signs**; supportive care in health facility for severe cases
H1N1 (flu)	**Annual flu vaccine**; hygiene	Early antivirals for high-risk/confirmed cases (protocol)

Unit Summary

Communicable diseases spread along a **chain of infection**; health action breaks the chain through **hygiene, safe water/food, ventilation & masks, vector control, safer sex/needle practices, and vaccination**. Understanding **immunity** (active/passive) clarifies **why vaccines work** and how herd protection builds. For priority conditions:

- **Hepatitis A/E** (water/food) vs **B/C** (blood/sex); **HBV vaccine** and perinatal prophylaxis matter.
- **HIV** prevention includes **condoms, PrEP/PEP, testing**, and **ART—U=U**.
- **TB** is **airborne**; ventilation, early treatment, and BCG (for severe childhood TB) reduce impact.
- **Malaria & Dengue** need **mosquito control** plus personal protection.
- **Rabies** demands **immediate wound washing and PEP**; **tetanus** demands **vaccination + wound care**.
- **MMR** two-dose vaccination protects individuals and communities; **H1N1pdm09** is now **seasonal—annual flu shots** and hygiene remain key.

Key Terms

- **Chain of infection • Reservoir/portal of exit/entry • Airborne vs droplet vs contact transmission**
- **Active vs passive immunity • Vaccination • Herd protection**
- **PEP/PrEP • ITN/IRS • Vector control • U=U** (Undetectable = Untransmittable)

Self-Assessment

A. MCQs

1. Breaking which **link** most directly stops mosquito-borne diseases?
   a) Portal of entry b) **Mode of transmission (vector control)** c) Susceptible host d) Reservoir
2. **U=U** means:
   a) Any ART reduces transmission to zero
   b) **Undetectable viral load on ART → zero sexual transmission risk**
   c) Only condoms prevent HIV transmission
   d) PrEP equals ART
3. **TB** primarily spreads by:
   a) Handshake b) Food c) Water d) **Airborne droplet nuclei**
4. The **most effective** community prevention for measles is:

a) Herbal tonics b) Isolation alone c) **Two-dose MMR vaccination** d) Vitamin C

5. **Rabies** first aid after a bite includes:
   a) Bandage only b) **15-minute soap-and-water wash + urgent PEP** c) Wait for symptoms d) Antibiotics only
6. **Tetanus** prevention hinges on:
   a) Mosquito nets b) **Lifelong vaccination + wound care** c) Masks d) Isolation
7. **Dengue danger signs** that need urgent care commonly appear:
   a) Only during fever b) **After fever subsides** c) Only in children d) Only with rash
8. The **core WHO tools** for malaria vector control are:
   a) Repellents and coils b) Fogging only c) **ITNs and IRS** d) Vaccines only

Answer key: 1-b, 2-b, 3-d, 4-c, 5-b, 6-b, 7-b, 8-c

B. Short Answer

1. Draw/describe the **chain of infection** and give **one method** to break each link.
2. Differentiate **active vs passive immunity** with **one real-life example** of each.
3. List **four HIV prevention strategies**, including one biomedical and one behavioural.
4. Write a **3-point community plan** to reduce **dengue** risk in monsoon season.
5. Explain why **BCG** does **not** fully prevent adult pulmonary TB yet remains important.

C. Reflective/Application

1. A hostel student has jaundice. Draft a **2–3 line health-education message** on **testing, hygiene, and contacts**.
2. Your college plans a **"Bite-to-Care"** poster. Write the **five steps** you will print for **dog-bite first aid**.
3. Plan a **one-page infographic** for parents about **MMR**: timing, benefits, myths to avoid.

End of Unit 3: Communicable Diseases—Causes, Prevention, and Management

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