

## Chapter 3: Health: The Ultimate Treasure

### 1. Introduction: The Current State of Health and Key Questions

Here are the key health statistics and facts presented in the chapter's "Bulletin Board":

- **Diabetes:** 11.4% of India's population is diabetic, equating to more than 100 million people according to an ICMR report. The WHO notes that diabetes and heart attacks are more prevalent in people of South-east Asia. Fast food is cited as one of the leading causes of diabetes.
- **Obesity and Diet:** 28.6% of Indians are obese. A key diet mantra is to reduce the amount of oil and sugar in the diet, specifically aiming to reduce oil by 10%.
- **Air Pollution:** Air pollution is a public health emergency and one of the leading risk factors for health.
- **Screen Time and Mental Health:** Excessive screen watching leads to dry eye disease in children. Furthermore, increased screen time in children leads to a rise in obesity, sleep disorders, and anxiety. Immersion into social media is also spurring a rise in loneliness.
- **Disease Prevention:** Regular handwashing reduces infection by 50%, and safe drinking water directly reduces cases of water and vector-borne diseases. The arrival of the monsoon leads to an increase in malaria and dengue cases.
- **Holistic Health:** Initiatives like the "FIT INDIA MOVEMENT" and practices like yoga are encouraged. Yoga is described as being for the mind, body, and soul, helping to reduce anxiety and increase concentration.

Probe and Ponder Questions to Consider:

1. How does the body respond to an infection like the common cold?
2. Why are diseases like smallpox and polio rare today, while diabetes and heart problems are increasingly common?
3. Could climate change lead to entirely new types of diseases?
4. How do emotions like stress or worry physically affect us and make us sick?
5. Why do certain groups of people get affected more than others during disease outbreaks?

### 2. Health: Is It More Than Not Falling Sick?

Being healthy is not solely defined by the absence of disease.

- **The WHO Definition:** The World Health Organization (WHO) formally defines health as a "state of complete physical, mental, and social well-being, and not merely the absence of disease".
- **The Three Pillars of Health:** True health incorporates physical fitness, mental stability, and social connectivity. A healthy person efficiently performs tasks, copes well with difficult situations, maintains a positive mindset, and adjusts well with peer groups and society.

- **Activity 3.1 (The Impact of Loneliness):** The text illustrates the social and mental aspects of health through a scenario of a Grade 8 student who moved to a new city. Lacking friends and feeling lonely, he turned to excessive phone and social media use, which worsened his condition. This social isolation manifested in physical and mental symptoms: headaches, weight loss, and insomnia. Recovery required medical advice (reducing screen time) and social support (a school counselor helping him make friends).

Our Scientific Heritage (Ayurveda):

- Ayurveda teaches that health is a delicate balance of the body, the mind, and the surroundings.
- This balance is actively maintained by following *dinacharya* (daily routine) and *ritucharya* (seasonal routine).
- It requires eating fresh, wholesome food specifically suited to an individual's *prakriti* (body constitution).
- Overall well-being is heavily supported by regular exercise, cleanliness, restful sleep, and a calm mind (achieved through practices like yoga, meditation, and mindfulness).

### 3. How Can We Stay Healthy?

Maintaining health requires active effort across multiple areas of our lives, specifically focusing on our lifestyle (how we live) and our environment (our surroundings).

#### A. Maintaining a Healthy Lifestyle (Activity 3.2)

We must proactively adopt good habits and actively avoid detrimental ones.

- **Good Habits to Adopt:** Maintaining personal hygiene to keep clean, eating a balanced diet, exercising regularly, and taking time to relax or meditate every day.
- **Harmful Habits to Avoid:** Spending excessive time on mobile phones/digital screens, eating fast food and junk food daily, sleeping very late or lacking sleep, and skipping meals (especially breakfast).

Actionable Steps for a Healthy Lifestyle:

- Eat a balanced diet rich in fruits, vegetables, and whole grains.
- Avoid processed, fatty, or sugary foods and beverages.
- Stay physically active through outdoor play, walking, running, cycling, or exercising.
- Limit screen time and replace it with time spent in nature.
- Get enough sleep to allow the body and mind to properly rest and recover.
- Regularly practice yoga or simple breathing exercises like *pranayama*.
- Say a strict 'NO' to harmful substances like tobacco, alcohol, and addictive drugs.

#### B. Keeping the Environment Clean (Activity 3.3)

Personal hygiene must be paired with environmental cleanliness.

- **Physical Surroundings:** A clean, well-maintained, and beautiful playground promotes health, whereas a polluted, dirty, unhygienic area filled with flies and mosquitoes drastically increases the chances of falling sick.
- **Air and Water Quality:** Clean air and water are non-negotiable for health. In cities, vehicular and factory air pollution causes severe respiratory issues like coughing and asthma. The Air Quality Index (AQI) is used to measure and understand how clean the air is.
- **Mental and Emotional Environment:** Health is not just about the body; feelings and relationships matter immensely. Even with a perfect diet and clean environment, a person can suffer health issues if they are lonely or upset. Talking, laughing, and having fun with friends and family are vital for keeping the mind healthy.

#### 4. How Do We Know That We Are Unwell? (Symptoms vs. Signs)

Our body is designed to function in a specific way. When we fall unwell, it indicates that internal systems are not working correctly. Medical professionals differentiate between two key indicators:

- **Symptoms:** These are subjective experiences that the patient *feels*, such as pain, tiredness, dizziness, or nausea.
- **Signs:** These are objective, observable conditions that can be *seen or measured* by others, such as fever (high body temperature), rash, high blood pressure, or swelling.

#### 5. Diseases: What Are the Causes and Types?

A disease is defined as a condition that affects the normal working of the body or mind. It occurs when one or more organs, or entire organ systems, fail to function properly. Diseases are broadly grouped into two main categories based on their causes and methods of spreading.

##### A. Non-Communicable Diseases (NCDs)

- **Definition:** These diseases do not spread from one person to another and are absolutely not caused by pathogens. Instead, they are deeply linked to lifestyle choices, diet, and environmental factors.
- **Current Crisis in India:** NCDs like diabetes, heart disease, and cancer have become increasingly common in India due to lifestyle shifts, such as consuming more processed food, getting less exercise, and living longer lives. Currently, the majority of deaths in India are caused by NCDs.
- **Chronic Diseases:** Illnesses such as cancer, diabetes, and asthma that persist for a long time (generally more than 3 months) are classified as chronic diseases.
- **Focus on Diabetes:** Diabetes prevalence is surging in both adults and children, giving India one of the highest diabetic populations globally. It develops through a combination of hormonal imbalances, unhealthy eating habits, physical inactivity, and obesity.

- **Deficiency Diseases:** Recalling Grade 6 concepts, conditions like scurvy, anaemia, and goitre are caused by a lack of specific nutrients in the diet. These are also classified as non-communicable diseases.
- **Activity 3.5 (Lifestyle Diseases):** A survey of lifestyle diseases notes that Obesity requires eating a balanced diet and exercising regularly; Diabetes manifests through frequent urination, excessive thirst, and weight loss; and High Blood Pressure manifests through tiredness and slow healing.

## B. Communicable Diseases

- **Definition:** These diseases are caused by disease-causing organisms known as **pathogens** (which include bacteria, viruses, fungi, worms, and single-celled protozoa). These diseases can easily spread from one person to another.
- **Methods of Transmission (Fig 3.4):** Pathogens move from an infected person to a healthy person through several routes:
  - **Air:** Through the air we breathe, especially when an infected person coughs or sneezes.
  - **Direct Contact:** Physical touch, such as shaking hands.
  - **Indirect Contact:** Sharing personal items or touching surfaces.
  - **Food and Water:** Consuming contaminated food or drinking water.
  - **Vectors:** Insects and animals that transmit diseases, such as mosquitoes, houseflies, or rabid animals like dogs.
- **Parasitic Worms:** Some infectious diseases are caused by worms living inside the body, particularly in the digestive system. These parasites feed on host nutrients and spread via contaminated food, water, soil, or contact with infected individuals/animals.

## 6. Exhaustive Breakdown of Common Communicable Diseases (Table 3.1)

Understanding the specific causal agents, infection sites, symptoms, and preventive measures for diseases is crucial.

| Disease                          | Causal Agent | Site of Infection       | Symptoms                                                              | Preventive Measures                                                                             |
|----------------------------------|--------------|-------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Common cold and influenza</b> | Virus        | Respiratory tract       | Nasal congestion and discharge, sore throat, fever, cough, body ache. | Washing hands frequently, not sharing personal items, covering the mouth and nose using a mask. |
| <b>Chickenpox</b>                | Virus        | Skin, respiratory tract | Mild fever, itchy skin, rashes, blisters.                             | Complete isolation of the patient, covering the mouth and nose, vaccination.                    |

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|--------------------------------|----------|-------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Measles</b>                 | Virus    | Skin, respiratory tract | Fever, sore throat, and reddish rashes on the neck, ears and other parts of the skin.          | Isolation of the patient, covering the mouth and nose, maintaining good hygiene, vaccination.                                   |
| <b>Tuberculosis (TB)</b>       | Bacteria | Lungs                   | Cough, fever, fatigue, loss of appetite, night sweats.                                         | Avoiding close contact with TB-infected people, covering the mouth and nose, maintaining good hygiene, getting vaccinated.      |
| <b>Hepatitis A</b>             | Virus    | Liver                   | Fatigue, fever, loss of appetite, nausea, vomiting, jaundice, pain in the upper right abdomen. | Drinking boiled water, vaccination.                                                                                             |
| <b>Cholera</b>                 | Bacteria | Intestine               | Diarrhoea and dehydration.                                                                     | Maintain personal hygiene and good sanitary habits, consumption of properly cooked food and boiled drinking water, vaccination. |
| <b>Typhoid</b>                 | Bacteria | Intestine               | Headache, abdominal discomfort, fever, and diarrhoea.                                          | Maintain personal hygiene and good sanitary habits, consumption of properly cooked food and boiled drinking water, vaccination. |
| <b>Ascariasis (roundworms)</b> | Worms    | Intestine               | Worms in stool, loss of appetite, poor growth, diarrhoea, weight loss, anaemia.                | Maintain personal hygiene and good sanitary habits, consumption of properly cooked food                                         |

|                                        |          |             |                                                 |                                                                                                                                                           |
|----------------------------------------|----------|-------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |          |             |                                                 | and boiled drinking water.                                                                                                                                |
| <b>Malaria</b>                         | Protozoa | Skin, blood | High fever, profuse sweating, periodic chills.  | Use of mosquito nets and repellents, wearing long-sleeved clothes, control of mosquito breeding in and around your home.                                  |
| <b>Dengue fever (Break bone fever)</b> | Virus    | Skin, blood | Fever, headache, muscle and joint pain, nausea. | Use of mosquito nets and repellents, wearing long-sleeved clothes, control of mosquito breeding in and around your home, avoiding areas with still water. |

General Preventive Precautions for Communicable Diseases:

- Keep yourself and your surroundings clean.
- Practice basic daily hygiene.
- Wash hands thoroughly with soap and water to remove pathogens.
- Cover the mouth and nose while coughing or sneezing.
- Wear a mask in crowded places for protection.
- Avoid sharing personal items like towels and handkerchiefs.
- Keep homes, food, and water clean.
- Stay home and rest when unwell to help the body recover and prevent spreading the disease to others.

## 7. How to Prevent and Control Diseases?

The core philosophy of health management is that 'Prevention is better than cure'.

- **Community Action (Activity 3.6):** A case study in Bhadrak district, Odisha, showcased a community-led sanitation campaign. By helping more people build and use toilets, open defecation was significantly reduced. This directly improved child health by lowering cases of diarrhoea and infections.

### A. The Immune System and Vaccines

- **Immunity:** The natural ability of our body to fight off diseases is known as immunity. This is managed by the immune system.
- **What is a Vaccine?** Vaccines train the immune system to recognize and attack harmful germs, providing "acquired immunity" (protection developed after exposure to a pathogen or a vaccine). They protect against serious viral and bacterial infections like polio, measles, tetanus, and hepatitis.

- **How Vaccines are Made:** They can be formulated from weakened or dead pathogens, from inactive/harmless parts of the pathogen, or through newer methods that instruct body cells to manufacture a harmless piece of the germ for the immune system to practice fighting.
- **Tetanus Example:** A tetanus shot (often given post-injury) contains an inactivated bacterial toxin that builds immunity without causing the illness itself.
- **The Nature of Vaccines:** Vaccines are heavily tested for safety by scientists and doctors. They are fundamentally preventive, not curative—they stop severe diseases from happening but do not treat someone who is already sick. Getting vaccinated protects the individual and the surrounding community.

Historical Breakthroughs in Vaccination:

- **Edward Jenner and Smallpox:** In the late 1700s, smallpox was a deadly disease causing blisters and millions of deaths. English doctor Edward Jenner observed that milkmaids who caught "cowpox" (a milder disease in cows) never contracted smallpox. He hypothesized that the pus from cowpox blisters provided protection. He experimented by injecting cowpox sap into a boy, who successfully resisted a later exposure to smallpox. This invention of the first vaccine led to global mass vaccination campaigns. The provided graph shows that after a massive vaccine campaign began in 1965, the number of countries reporting cases plummeted until smallpox was officially eradicated in 1979.
- **Traditional Indian Variolation:** Prior to modern vaccines, Indians practiced variolation—using material from an active smallpox sore to scratch a healthy person's skin, creating a mild infection to build immunity. The practitioners were known as *teekedaars*.
- **India's Modern Role:** India is currently one of the world's largest vaccine producers. Under the "Vaccine Maitri" initiative, India supplied 24 crore doses to over 100 countries and crossed 200 crore domestic vaccinations, playing a massive role during the COVID-19 pandemic.

## B. Treatment of Diseases: Antibiotics and Resistance

- **Antibiotics:** If the immune system fails and a person falls ill, doctors prescribe medicines called antibiotics.
- **How They Work:** Antibiotics are strictly designed to kill bacteria. They target specific parts of bacterial cells that are fundamentally different from human or animal cells. Therefore, antibiotics **do not work** against viruses or protozoa.
- **Discovery:** Penicillin, the first antibiotic, was discovered in 1928 by London bacteriologist Alexander Fleming. While studying harmful bacteria, he found that a mould growing on a discarded petri dish released a substance that stopped and killed the bacteria.

The Crisis of Antibiotic Resistance (Fig 3.5a & 3.5b):

- **What is it?** The indiscriminate and improper use of antibiotics has caused some bacteria to mutate, survive, and multiply despite being treated with drugs that

used to kill them. This makes common infections incredibly hard to treat, leading to prolonged illnesses, complications, and death.

- **How it Develops:** When antibiotics are taken unnecessarily, they kill the "good bacteria" protecting the body alongside the bad ones. The few bacteria that naturally develop resistance survive, multiply, take over, and can even transfer this resistance trait to other bacteria.
- **Spread in the Community:**
  - *Through Animals:* Animals given antibiotics develop resistant bacteria. This spreads through animal food products (butter, milk, meat) or through their faeces/manure entering the soil of crop fields, eventually reaching the human digestive system via agricultural produce.
  - *Through Humans:* Patients who take antibiotics unnecessarily or fail to complete their prescribed dose develop resistant bacteria. They spread these bacteria to the community when they go home, or within hospitals through dirty surfaces or healthcare workers, leading to severe illnesses in other patients.
- **Prevention:** Antibiotics must only be used when strictly prescribed by a doctor, in the exact correct dose, and for the entire prescribed duration.

### C. Traditional Medicine and NCD Therapies

- **Traditional Systems:** India utilizes Ayurveda, Siddha, and Unani to manage common health issues. These systems employ natural herbs, oils, and minerals while promoting lifestyle balance. While excellent for everyday well-being, they may not be effective for all diseases at every stage of progression.
- **NCD Treatment:** Therapies for non-communicable diseases focus heavily on managing symptoms and improving the patient's quality of life. This is achieved through continuous medication, lifestyle changes, and rehabilitation. Early diagnosis and sustained care are the keys to controlling disease progression and preventing fatal complications.

### 8. Key Scientific Figures Noted in the Chapter

- **Kamal Ranadive (1917–2001):** A pioneering biomedical researcher who linked specific hormones and viruses to cancer development, improving treatment and prevention strategies. Her vital work proved that tobacco, poor diet, and pollution increase cancer risk, stressing the need for healthy lifestyles.
- **Maharaj Kishan Bhan:** A prominent Indian doctor and scientist who served as Secretary of the Department of Biotechnology. He was instrumental in developing the Rotavirus vaccine (which protects children from fatal diarrhoea), championing the use of research to create affordable, accessible healthcare in India.
- *(Note: The "Discover, design, and debate" section also tasks students with reading about other notable Indian scientists like Suniti Solomon, Asima*

*Chatterjee, Yellapragada Subbarao, and Mary Poonen Lukose for their immense contributions to health and disease management).*

#### **9. Key Insights from Snapshots and "Keep the curiosity alive"**

- **Health and Happiness:** Being happy helps us stay active and healthy, and conversely, good health dramatically improves our mood.
- **Pathogen Memory:** When the body encounters a pathogen for the first time, the immune response is generally low. However, upon exposure to the exact same pathogen again, the immune response is vastly stronger and faster due to the immune system's trained memory.
- **Analytical Application:** Students are challenged to create bar graphs tracking dengue cases over a year to identify peak months, correlate them with natural environmental factors (like the monsoon), and suggest preventative community steps. They are also asked to understand that diseases like Hepatitis A, Poliomyelitis, Cholera, and Typhoid can spread if drinking water is contaminated by the excreta of an infected person.