Chapter 3: Health: The Ultimate Treasure

Exercises — Keep the Curiosity Alive

Q1 Group the diseases shown in the images as communicable or non-communicable.
Cold and flu, Typhoid, Diabetes, Asthma, Chickenpox

SOLUTION

Communicable diseases are caused by pathogens (bacteria, viruses, etc.) and can spread from one person to another.
Non-communicable diseases are not caused by pathogens and cannot spread from person to person — they are linked to lifestyle, diet, genetics, or environment.

Communicable diseases:
— Cold and flu (caused by viruses; spreads through air/droplets when an infected person coughs or sneezes)
— Typhoid (caused by Salmonella typhi bacteria; spreads through contaminated food and water)
— Chickenpox (caused by varicella-zoster virus; spreads through direct contact or air)

Non-communicable diseases:
— Diabetes (caused by hormonal imbalance, unhealthy lifestyle, genetic factors; does not spread person to person)
— Asthma (caused by inflammation of airways, triggered by allergens, pollution, or genetics; does not spread person to person)

Answer: Communicable: Cold and flu, Typhoid, Chickenpox. Non-communicable: Diabetes, Asthma.

Q2 Diseases can be broadly grouped into communicable and non-communicable diseases. From the options given below, identify the non-communicable diseases.
(i) Typhoid
(ii) Asthma
(iii) Diabetes
(iv) Measles
(a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iv) (d) (ii) and (iv)

SOLUTION

Evaluating each disease:

(i) Typhoid — caused by Salmonella typhi bacteria; spreads through contaminated food and water → COMMUNICABLE.

(ii) Asthma — a chronic inflammatory condition of the airways triggered by allergens, pollution, or genetics; not caused by a pathogen and does not spread from person to person → NON-COMMUNICABLE.

(iii) Diabetes — caused by hormonal imbalance, unhealthy diet, lack of physical activity; not caused by a pathogen → NON-COMMUNICABLE.

(iv) Measles — caused by a virus; spreads through air and direct contact → COMMUNICABLE.

Therefore, the non-communicable diseases from the list are (ii) Asthma and (iii) Diabetes, which corresponds to option (b).

Answer: (b) (ii) and (iii) — Asthma and Diabetes are non-communicable diseases.

Q3 There is a flu outbreak in your school. Several classmates are absent, while some are still coming to school coughing and sneezing.
(i) What immediate actions should the school take to prevent further spread?
(ii) If your classmate, who shares the bench with you, starts showing symptoms of the flu, how can you respond in a considerate way without being rude or hurtful?
(iii) How can you protect yourself and others from getting infected in this situation?

SOLUTION

(i) Immediate actions the school should take:

— Send students showing flu symptoms home and advise them to rest and consult a doctor.

— Inform parents about the outbreak so they can monitor their children's health.

— Increase sanitation: disinfect classrooms, desks, door handles, and common

areas regularly.
— Ensure hand-washing stations are accessible and encourage frequent hand-washing with soap.
— Promote wearing masks in school to reduce airborne transmission.
— Advise all students and staff to cover their mouths and noses while coughing or sneezing.
— Consider staggered schedules or temporary closure of affected sections if the outbreak is severe.

(ii) Responding considerately to a symptomatic classmate:
— Gently and privately tell them: 'I think you might be unwell — you should let the teacher know and maybe go see the school nurse or go home to rest.'
— Be kind and empathetic — falling sick is not the person's fault; avoid making them feel embarrassed or excluded.
— Avoid spreading rumours or making the classmate feel singled out in front of others.
— Encourage them to cover their mouth and nose when coughing or sneezing, while expressing concern for their health.

(iii) Protecting yourself and others:
— Wash hands frequently with soap and water, especially before eating and after touching shared surfaces.
— Avoid touching your face (eyes, nose, mouth) with unwashed hands.
— Wear a mask in crowded or enclosed spaces like classrooms.
— Maintain distance from people who are visibly coughing or sneezing.
— Do not share personal items such as water bottles, handkerchiefs, or stationery.
— If you feel unwell yourself, stay home to avoid spreading the virus to others.
— Eat nutritious food, get adequate sleep, and exercise regularly to strengthen your immune system.

Answer: (i) School should send sick students home, disinfect premises, ensure hand-washing, and promote mask use. (ii) Kindly suggest the classmate visit the nurse or go home; be empathetic and avoid making them feel embarrassed. (iii) Wash hands frequently, wear a mask, maintain distance from sick individuals, avoid sharing personal items, and stay home if unwell.

Q4 Your family is planning to travel to another city where malaria is prevalent.
(i) What precautions should you take before, during, and after the trip?
(ii) How can you explain the importance of mosquito nets or repellents to your sibling?
(iii) What could happen if travellers ignore health advisories in such areas?

SOLUTION

(i) Precautions before, during, and after the trip:
BEFORE: Consult a doctor about anti-malarial medicines or preventive medication. Pack mosquito repellents (creams, sprays), full-sleeved clothing, and a mosquito net. Check the local health advisories for the destination.
DURING: Apply mosquito repellent on exposed skin. Wear long-sleeved shirts and full-length trousers, especially at dusk and dawn when mosquitoes are most active. Use a mosquito net while sleeping. Avoid areas with stagnant or still water (mosquito breeding grounds). Keep windows closed in the evenings or use insect screens.
AFTER: Monitor for symptoms of malaria (high fever, chills, sweating, headache) for several weeks after returning. If any symptoms appear, consult a doctor immediately and mention the travel history.

(ii) Explaining mosquito nets and repellents to a sibling:
Malaria is spread by the female Anopheles mosquito. When an infected mosquito bites us, it injects the malaria-causing protozoan (Plasmodium) into our blood. Mosquito nets create a physical barrier so mosquitoes cannot reach us while we sleep. Repellents contain chemicals that mosquitoes dislike, which keeps them from landing on our skin and biting us. Using both is simple and effective — much easier than treating malaria once you have it.

(iii) Consequences of ignoring health advisories:
— Travellers may get infected with malaria, leading to severe illness with high fever, chills, body aches, and potentially life-threatening complications.
— Infected travellers can carry the pathogen back home and spread it to others in areas where malaria was not previously present (imported cases).
— If treatment is delayed, malaria can damage vital organs (liver, kidneys, brain) and can be fatal.
— Increased burden on local health systems in the destination city.

Answer: (i) Before: consult a doctor, pack repellents, take preventive medication. During: wear full-sleeved clothing, use repellents and mosquito nets, avoid stagnant water. After: watch for symptoms for a few weeks. (ii) Mosquito nets block mosquitoes physically; repellents deter them from landing — both prevent the bite that transmits malaria. (iii) Ignoring advisories can lead to malaria infection, serious complications, and spreading the disease to others.

Q5 Your uncle has started smoking just to fit in with his friends, even though it is well known that smoking can seriously harm health and even cause death.
(i) What would you say to him to make him stop, without being rude?
(ii) What would you do if your friend offers you a cigarette at a party?
(iii) How can schools help prevent students from indulging in such harmful habits?

SOLUTION

(i) What to say to the uncle (respectfully):
I would calmly and privately say: 'Uncle, I'm worried about your health. I know you want to fit in, but smoking harms your lungs and heart — it can cause cancer and many other serious diseases. True friends will respect your choices. Is there another way we can help you feel included without harming yourself?'
The key is to be caring rather than judgmental — focusing on concern for his well-being and offering support, not lecturing him.

(ii) What to do if a friend offers a cigarette:
Politely but firmly decline: 'No thanks, I don't smoke.' A real friend will respect this decision. Peer pressure is common, but we have the right to say no to anything harmful. If the offer persists, calmly explain that smoking damages the lungs and heart and that you prefer to stay healthy. You can also change the topic or move away from that situation.

(iii) How schools can help prevent harmful habits:
— Include health education in the curriculum: lessons on the dangers of tobacco, alcohol, and drugs.
— Invite doctors, counsellors, or reformed smokers to share real-life experiences with students.
— Create a safe space where students can discuss peer pressure and learn to say 'no' confidently.
— Organise campaigns, posters, and awareness activities about the long-term effects of smoking.

— Encourage sports, arts, yoga, and other healthy activities that give students a sense of belonging and achievement.
— Have a clear, enforced school policy against tobacco use on or near school premises.
— Make school counsellors accessible for students dealing with pressure from peers.

Answer: (i) Express concern respectfully: smoking causes serious diseases; true friends respect your choices. Offer support to quit. (ii) Firmly but politely say 'No thanks, I don't smoke'; a real friend will respect that. (iii) Schools can conduct health education, invite speakers, run anti-tobacco campaigns, encourage healthy activities, and offer counselling support.

Q6 Saniya claims to her friend Vinita that 'Antibiotics can cure any infection, so we don't need to worry about diseases.' What question(s) can Vinita ask her to help Saniya understand that her statement is incorrect?

SOLUTION

Saniya's statement is incorrect for two key reasons: (1) antibiotics work only against bacterial infections, not viral or protozoal ones; and (2) misuse of antibiotics leads to antibiotic resistance.

Vinita could ask the following questions to help Saniya see why her statement is incorrect:

1. 'Do antibiotics work against viral infections like the flu or COVID-19?' — No, antibiotics target bacterial cells specifically. Viruses have a completely different structure and antibiotics have no effect on them.

2. 'Do antibiotics cure malaria?' — Malaria is caused by a protozoan (Plasmodium), not bacteria. Antibiotics do not work against it; specific anti-malarial drugs are needed.

3. 'Have you heard of antibiotic resistance? What happens when we overuse antibiotics?' — When antibiotics are taken unnecessarily or not completed as prescribed, bacteria develop resistance — they survive despite the antibiotic. Future infections become much harder to treat.

4. 'If antibiotics can cure any infection, why do doctors still recommend vaccines and hygiene?' — Because prevention is better than cure. Vaccines protect against viral diseases (like polio, measles) that antibiotics cannot treat at all.

5. 'What happens if bacteria in our body become resistant to all common antibiotics?' — Antibiotic-resistant infections can cause serious illness, prolonged treatment, and even death, because no effective medicine is available.

These questions would guide Saniya to understand that antibiotics are useful but limited tools — effective only against bacteria, and only when used correctly.

Answer: Vinita could ask: Do antibiotics work on viral infections (like flu) or protozoal infections (like malaria)? What is antibiotic resistance and what causes it? Why do we still need vaccines if antibiotics can cure everything? — These questions would reveal that antibiotics work only against bacteria, not viruses or protozoa, and overuse leads to antibiotic resistance.

Q7 The following table contains information about the number of dengue cases reported in a hospital over a period of one year:

Month	No. of dengue cases
January	10
February	12
March	15
April	18
May	22
June	40
July	65
August	65
September	65
October	30
November	30
December	20

Make a bar graph of the number of cases on the Y-axis and the month on the X-axis. Critically analyse your findings and answer the following:
(i) In which three months were the dengue cases highest?
(ii) In which month(s) were the cases lowest?
(iii) What natural or environmental factors during the peak months might contribute to the increase in dengue cases?
(iv) Suggest a few preventive steps that the community or government can take

before the peak season to reduce the spread of dengue.

SOLUTION

Bar graph: Plot months (January–December) on the X-axis and number of dengue cases (0–70 scale) on the Y-axis. Each bar represents the cases for that month: Jan=10, Feb=12, Mar=15, Apr=18, May=22, Jun=40, Jul=65, Aug=65, Sep=65, Oct=30, Nov=30, Dec=20.

(i) Three months with highest dengue cases:
July, August, and September each recorded 65 cases — the highest of the year. These are the peak monsoon and post-monsoon months.

(ii) Month(s) with lowest cases:
January recorded the lowest number of cases (10 cases). January is mid-winter when mosquito activity is at its lowest.

(iii) Environmental/natural factors during peak months (July–September):
— Monsoon season brings heavy rainfall, which creates pools of stagnant water in coolers, pots, puddles, drains, and construction sites — these are ideal breeding grounds for Aedes mosquitoes that spread dengue.
— Warm and humid temperatures during and after the monsoon allow mosquitoes to breed rapidly.
— Waterlogging and poor drainage in urban areas increase standing water, providing more breeding sites.
— High humidity prolongs the survival of mosquitoes.
— These conditions together lead to a surge in mosquito population and, consequently, more dengue cases.

(iv) Preventive steps before the peak season:
— Regular inspection and elimination of stagnant water around homes, schools, and public spaces (empty coolers, flower pots, discarded tyres, etc.).
— Government-led fogging and spraying of mosquito repellents/larvicides in high-risk areas before and during the monsoon.
— Public awareness campaigns to educate communities about dengue symptoms and prevention (use of mosquito nets, repellents, full-sleeved clothing).
— Improving drainage and sewage systems to prevent waterlogging.
— Covering water storage containers tightly.
— Distributing mosquito nets and repellents in high-risk areas.
— Training local health workers to identify and report early cases for rapid response.

Answer: (i) July, August, and September (65 cases each) had the highest dengue cases. (ii) January had the lowest (10 cases). (iii) Monsoon rains create stagnant water (ideal breeding sites for Aedes mosquitoes); warm, humid conditions allow rapid mosquito multiplication. (iv) Eliminate stagnant water, conduct fogging/spraying before monsoon, run awareness campaigns, improve drainage, and distribute mosquito nets.

Q8 Imagine you are in charge of a school health campaign. What key messages would you use to reduce communicable and non-communicable diseases?

SOLUTION

A school health campaign should address both types of diseases with clear, memorable messages:

Key messages to reduce COMMUNICABLE diseases:
— 'Wash your hands — wash away germs!' Wash hands with soap before eating and after using the toilet.
— 'Cover it up!' Always cover your mouth and nose with a handkerchief or elbow when coughing or sneezing.
— 'Don't share, if you dare!' Avoid sharing personal items like water bottles, towels, and handkerchiefs.
— 'Stay home when sick.' If you have fever, cold, or other symptoms, rest at home to avoid spreading illness.
— 'Vaccinate — protect yourself and others!' Get all recommended vaccines on time.
— 'Kill the mosquito before it kills you!' Eliminate stagnant water; use nets and repellents to prevent malaria and dengue.
— 'Clean water, safe life!' Always drink clean, boiled, or purified water to prevent typhoid, cholera, and hepatitis A.

Key messages to reduce NON-COMMUNICABLE diseases:
— 'Eat right, live bright!' Choose fruits, vegetables, and whole grains over processed and junk food.
— 'Move more, sit less!' At least 60 minutes of physical activity every day.
— 'Sleep to succeed!' Get 8–10 hours of sleep each night.
— 'Screen time is mean time — in excess!' Limit time on phones, tablets, and screens.
— 'Say NO to tobacco and alcohol!' These cause cancer, heart disease, and

organ damage.

— 'Manage your stress!' Practice yoga, meditation, or talk to a trusted adult when feeling overwhelmed.

— 'Know your numbers!' Regular health check-ups help catch diseases like diabetes and hypertension early.

Answer: Key campaign messages: For communicable diseases — wash hands frequently, cover coughs/sneezes, get vaccinated, drink clean water, eliminate mosquito breeding sites, stay home when sick. For non-communicable diseases — eat a balanced diet, exercise daily, limit screen time, avoid tobacco and alcohol, manage stress, and get regular health check-ups.

Q9 It is recommended that we should not take an antibiotic for a viral infection like a cold, a cough, or flu. Can you provide the possible reason for this recommendation?

SOLUTION

Antibiotics are medicines designed to kill or inhibit the growth of bacteria. They work by targeting specific structures in bacterial cells — such as the bacterial cell wall or certain bacterial proteins — that are absent in human cells.

Viruses, however, are fundamentally different from bacteria. They lack the cellular structures (like a cell wall) that antibiotics act upon. Viruses work by entering host cells and using the host's own cellular machinery to replicate. Antibiotics have no mechanism to interfere with this process.

Therefore, taking antibiotics for a cold, cough, or flu (caused by viruses) provides NO benefit — the antibiotic cannot kill the virus or stop the infection.

Additionally, there is a serious risk from unnecessary antibiotic use: antibiotic resistance. When antibiotics are taken unnecessarily, the bacteria naturally present in the body (the normal flora) get exposed to the antibiotic. Some of these bacteria may develop resistance — they mutate and survive despite the antibiotic. These resistant bacteria can then spread to others, making future bacterial infections extremely difficult to treat.

For viral infections, the recommended approach is rest, adequate fluid intake, and letting the immune system fight the virus. Antiviral medicines exist for some specific viral infections but are different from antibiotics.

Answer: Antibiotics act only on bacterial cell structures (like the cell wall) that viruses do not have. They cannot kill viruses or stop viral replication, so they are ineffective against colds, coughs, or flu. Additionally, needless antibiotic use promotes antibiotic resistance, making bacteria harder to treat in the future.

Q10 Which disease(s) among the following may spread if drinking water gets contaminated by the excreta from an infected person?
Hepatitis A, Tuberculosis, Poliomyelitis, Cholera, Chickenpox.

SOLUTION

Diseases that spread through contaminated water (faecal-oral route) are those whose pathogens are shed in the excreta (faeces/urine) of infected individuals and can enter the water supply through poor sanitation.

Analysing each disease:

Hepatitis A — SPREADS via contaminated water/food. The Hepatitis A virus is excreted in faeces and can contaminate drinking water; ingesting contaminated water transmits the virus. It infects the liver.

Tuberculosis (TB) — Does NOT spread through contaminated water. TB is caused by Mycobacterium tuberculosis and spreads through the air when an infected person coughs or sneezes.

Poliomyelitis — SPREADS via contaminated water/food. The poliovirus is shed in faeces and spreads through the faecal-oral route when contaminated water or food is consumed. This is why safe drinking water is critical to polio eradication.

Cholera — SPREADS via contaminated water. Cholera is caused by Vibrio cholerae bacteria excreted in faeces; drinking contaminated water is the primary route of spread, causing severe diarrhoea and dehydration.

Chickenpox — Does NOT spread through contaminated water. Chickenpox is caused by the varicella-zoster virus and spreads through air (respiratory droplets) or direct contact with blisters.

Therefore, Hepatitis A, Poliomyelitis, and Cholera can spread through drinking water contaminated by the excreta of infected persons.

Answer: Hepatitis A, Poliomyelitis, and Cholera spread through drinking water contaminated by excreta from infected persons (faecal-oral route). Tuberculosis (airborne) and Chickenpox (airborne/contact) do not spread this way.

Q11 When our body encounters a pathogen for the first time, the immune response is generally low but on exposure to the same pathogen again, the immune response by the body is much more compared to the first exposure. Why is it so?

SOLUTION

This phenomenon is called immunological memory and is a key feature of the adaptive immune system.

FIRST EXPOSURE to a pathogen:
When the body encounters a new pathogen for the first time, the immune system takes time to identify it as a threat and mount a response. The body produces specific antibodies and activates immune cells (like B-lymphocytes and T-lymphocytes) to fight the pathogen. This process takes several days. During this time, the person may fall ill. Eventually, the immune system controls and clears the infection.

Crucially, after the infection is cleared, a special set of immune cells called memory cells (memory B-cells and memory T-cells) remain in the body for a long time — sometimes for life. These cells 'remember' the specific pathogen.

SECOND EXPOSURE to the same pathogen:
When the same pathogen enters the body again, the memory cells recognise it immediately. They quickly multiply and produce a large quantity of antibodies very rapidly — much faster and in greater amounts than during the first encounter. This swift, powerful response eliminates the pathogen before it can cause significant illness.

This is also the scientific principle behind vaccination: a vaccine introduces a harmless form of the pathogen (dead, weakened, or a harmless part of it), prompting the immune system to create memory cells without causing the disease. If the real pathogen enters later, the memory cells respond rapidly, providing protection.

Answer: The body creates memory cells (memory B-cells and T-cells) after the first encounter with a pathogen. On second exposure, these memory cells quickly recognise the pathogen and mount a rapid, large-scale antibody response, neutralising the pathogen before significant illness occurs. This immunological memory is also the basis of vaccination.