

10.1 Infectious diseases

Name: _____ Class: _____ Date: _____ **Total: 27 marks**

KEY WORDS pathogen 病原体 • infectious disease 传染病 • cholera 霍乱 • tuberculosis 结核病
• malaria 疟疾

Objective

Build the skills to answer exam questions on **infectious diseases** — the **pathogens** 病原体 that cause cholera, malaria, TB and HIV, how they are transmitted, and how they are controlled.

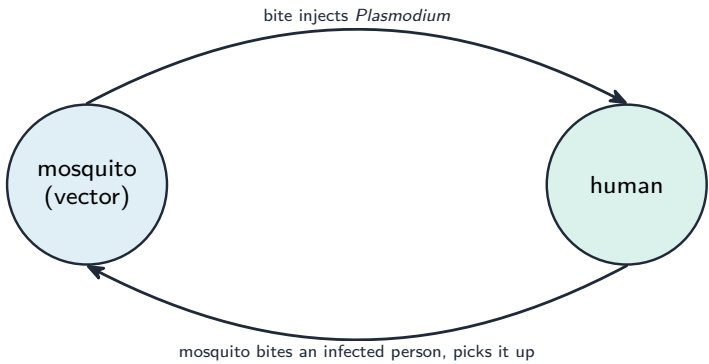
You must be able to:

- name the pathogen and type for cholera, malaria, TB and HIV/AIDS
- explain how each disease is transmitted
- discuss biological, social and economic factors in prevention and control

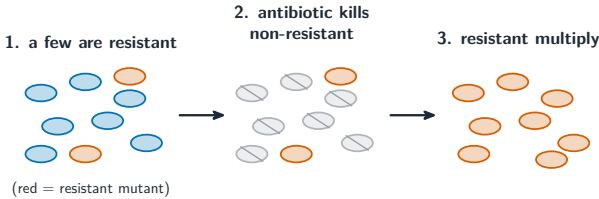
1 Worked examples

■ The four diseases

disease	pathogen (type)	transmission
cholera 霍乱	<i>Vibrio cholerae</i> (bacterium 细菌)	water/food contaminated with faeces
malaria 疟疾	<i>Plasmodium</i> (protoctist 原生生物)	bite of an infected mosquito (vector 媒介); infected blood
TB 结核 病	<i>Mycobacterium</i> (bacterium)	airborne droplets 飞沫 from coughs/sneezes
HIV/AIDS HIV (virus 病毒)		unprotected sex; infected blood; mother to baby



Malaria needs a mosquito vector — which is why control targets the mosquito



Antibiotic resistance complicates treating infectious disease

■ Prevention and control

Control has **biological**, **social** and **economic** sides. Examples: cholera — clean water and sewage treatment; malaria — nets, drain still water, insecticides, drugs; TB — find and treat with antibiotics, BCG vaccine, reduce crowding; HIV — condoms, clean needles, test blood, education (no cure/vaccine yet).

2 Practice

2.1 Name the type of pathogen that causes (a) malaria and (b) HIV/AIDS. [2]

2.2 State how tuberculosis is transmitted from person to person. [1]

3 Exam-style questions

3.1 Which disease is caused by a protoctist and spread by a vector? [1]

- **A** cholera
- **B** HIV/AIDS
- **C** malaria
- **D** tuberculosis

3.2 Cholera is best prevented by: [1]

- **A** sleeping under a mosquito net
- **B** providing clean water and treating sewage
- **C** using condoms
- **D** taking a long course of antibiotics

3.3 (a) Explain why providing clean drinking water reduces the spread of cholera. [2]

(b) Discuss **one** social and **one** economic factor that make malaria hard to control in some countries. [2]

3.4 A region recorded 4000 malaria cases in 2015. After a mosquito-net programme, this fell to 1500 cases in 2020.

(a) Calculate the percentage decrease in cases. [2]

(b) Explain why targeting the mosquito reduces malaria. [2]

3.5 The table gives information about four infectious diseases.

Disease	Pathogen	Type of pathogen	Main method of transmission
Cholera	<i>Vibrio cholerae</i>	protoctist	
Malaria			
Tuberculosis	<i>Mycobacterium tuberculosis</i>	virus	
HIV/AIDS			

(a) Complete the table. [6]

(b) Explain why cholera is common where there is flooding or a breakdown of sanitation.[3]

(c) Explain why the malarial parasite is difficult to control by vaccination. [2]

(d) Tuberculosis is treated with a combination of antibiotics taken for at least six months. Explain why the course is so long and why more than one antibiotic is used. [3]

Solutions

2.1 (a) a protoctist (*Plasmodium*); (b) a virus (HIV).

2.2 by airborne droplets from coughing/sneezing.

3.1 C. Malaria is caused by the protoctist *Plasmodium* and spread by the mosquito vector.

3.2 B. Cholera spreads via faeces-contaminated water, so clean water and sewage treatment prevent it.

3.3 (a) the cholera bacterium spreads in water contaminated with faeces; clean water removes this route of transmission.

(b) social, e.g. people may not use nets / lack of education; economic, e.g. cost of nets, drugs or insecticides is too high.

3.4 (a) decrease = 4000 – 1500 = 2500; percentage = $\frac{2500}{4000} \times 100 = 62.5\%$.

(b) the mosquito is the vector that transmits *Plasmodium*; killing mosquitoes / stopping bites breaks the transmission cycle.

3.5 (a) Cholera — bacterium; spread in water or food contaminated with faeces. Malaria — *Plasmodium*; spread by the bite of an infected female *Anopheles* mosquito, the vector. Tuberculosis — bacterium; airborne droplets from coughing and sneezing. HIV — human immunodeficiency virus; in body fluids, i.e. unprotected sex, shared needles, infected blood, or mother to child.

(b) Flooding mixes sewage with drinking water; the bacterium is transmitted by the faecal–oral route, so it spreads directly to anyone drinking or washing food in that water; crowded temporary shelters with no clean water or sanitation let one case infect many.

(c) *Plasmodium* has several stages in the human host, each with different surface antigens, so an antibody against one stage does not recognise the others; its antigens also vary between and within strains, so no single vaccine gives lasting immunity.

(d) The bacterium grows very slowly and can survive inside macrophages, so it takes months of treatment to kill every cell; if the course is stopped early the survivors — the most resistant — multiply; using several antibiotics at once makes it very unlikely that any one bacterium is resistant to all of them.