

Solutions

Each answer shows the steps, then the **result**.

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