Chapter 17
Human Health and Environmental Risks

Three categories of human health risks

- physical
- biological
- chemical

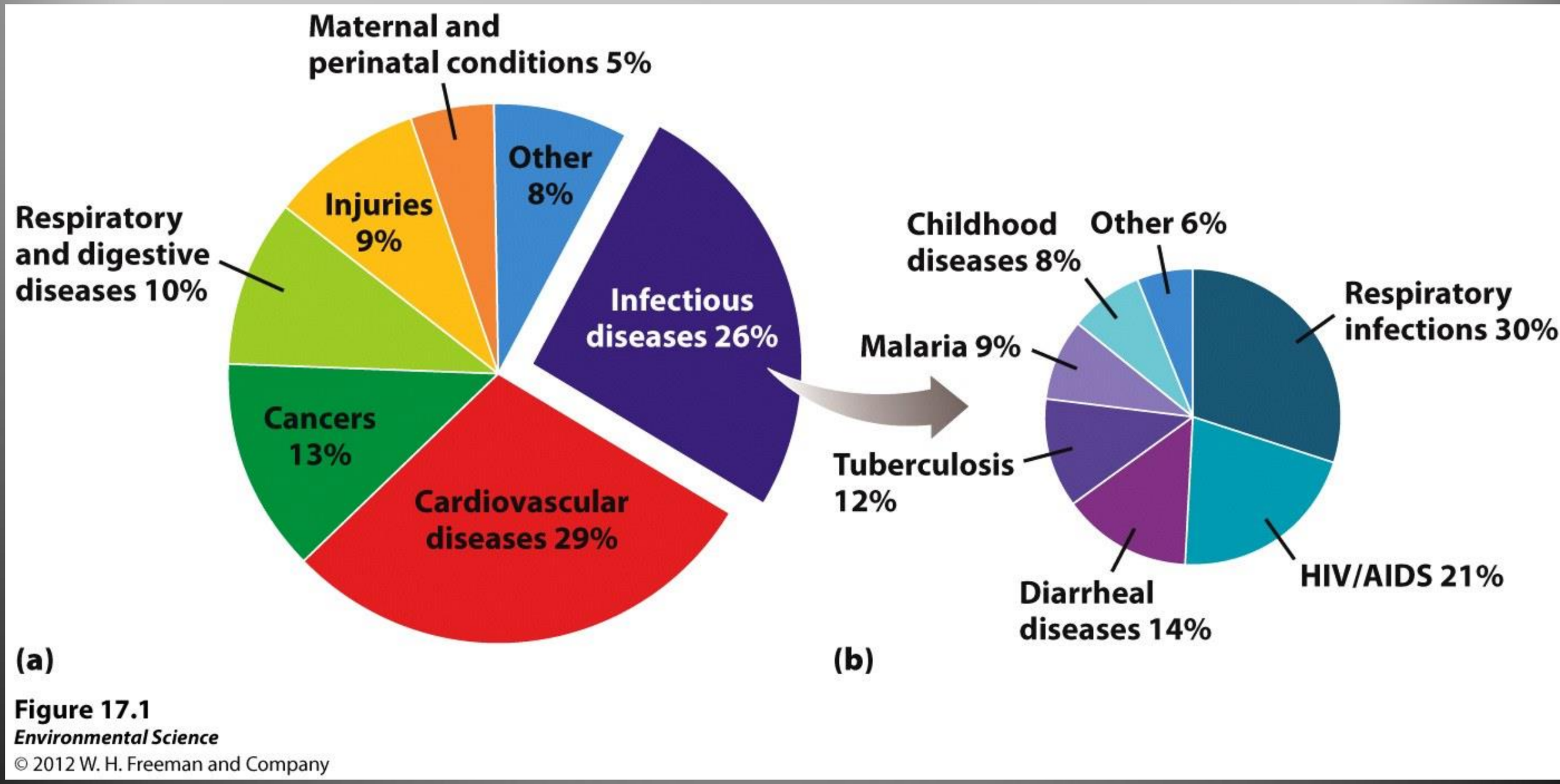

Figure 17.1
Environmental Science

Biological Risks

- Infectious diseases- those caused b y infectious agents, known as pathogens.
- Examples: pneumonia and venereal diseases

Biological Risks

- Chronic disease- slowly impairs the functioning of a person's body.
- Acute diseases- rapidly impair the functioning of a person's body.

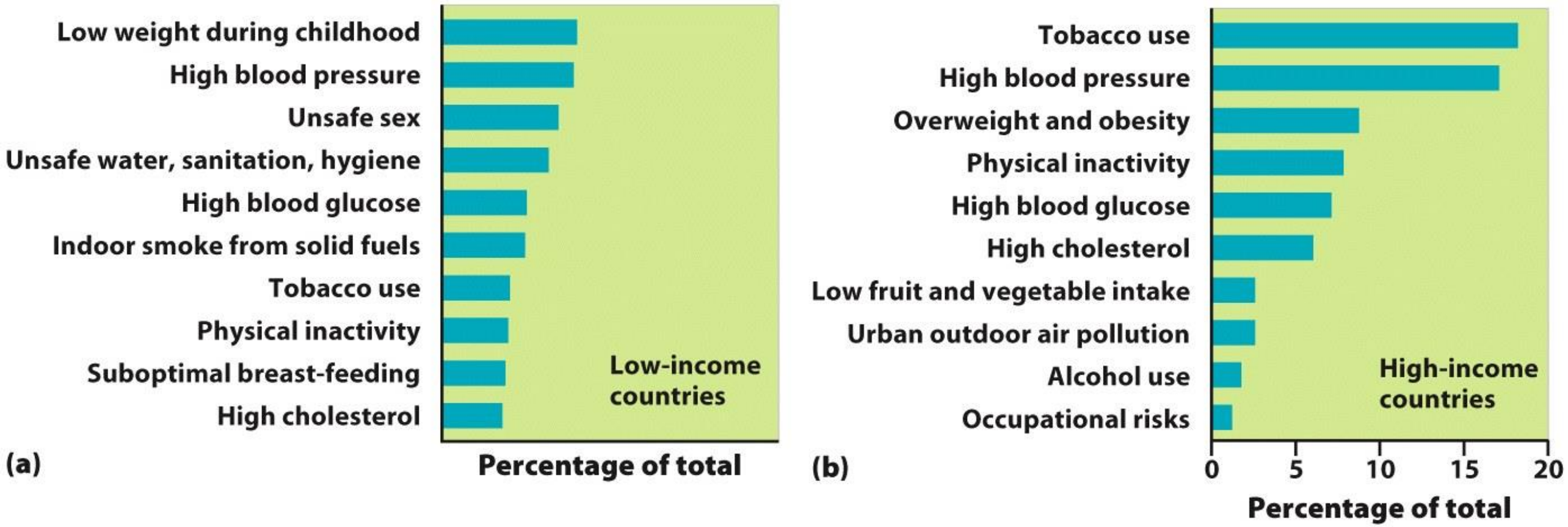

Figure 17.2
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Historical Diseases

- Plague
- Malaria
- Tuberculosis

Emergent Diseases

- HIV/AIDS
- Ebola
- Mad Cow Disease
- Bird Flu
- West Nile Virus

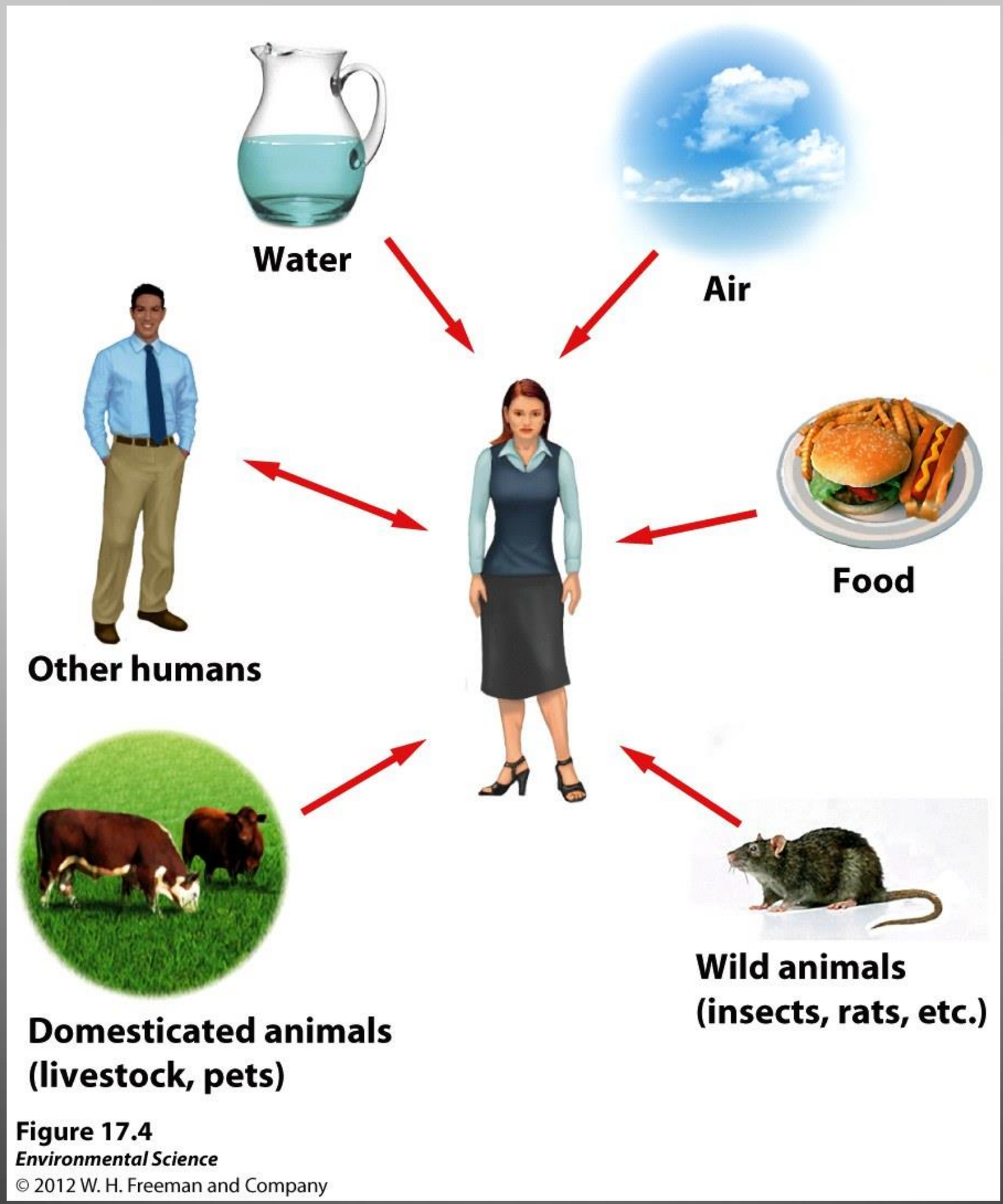

Figure 17.4
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Chemical Risks

- Neurotoxins- chemicals that disrupt the nervous system
- Carcinogens- chemicals that cause cancer
- Teratogens- chemicals that interfere with the normal development of embryos or fetuses
- Allergens- chemicals that cause allergic reactions
- Endocrine disruptors- chemicals that interfere with the normal functioning of hormones in an animal's body

Dose-Response Studies

- LD50- lethal dose that kills 50% of the individuals
- ED50- effective dose that causes 50% of the animals to display the harmful but nonlethal effect

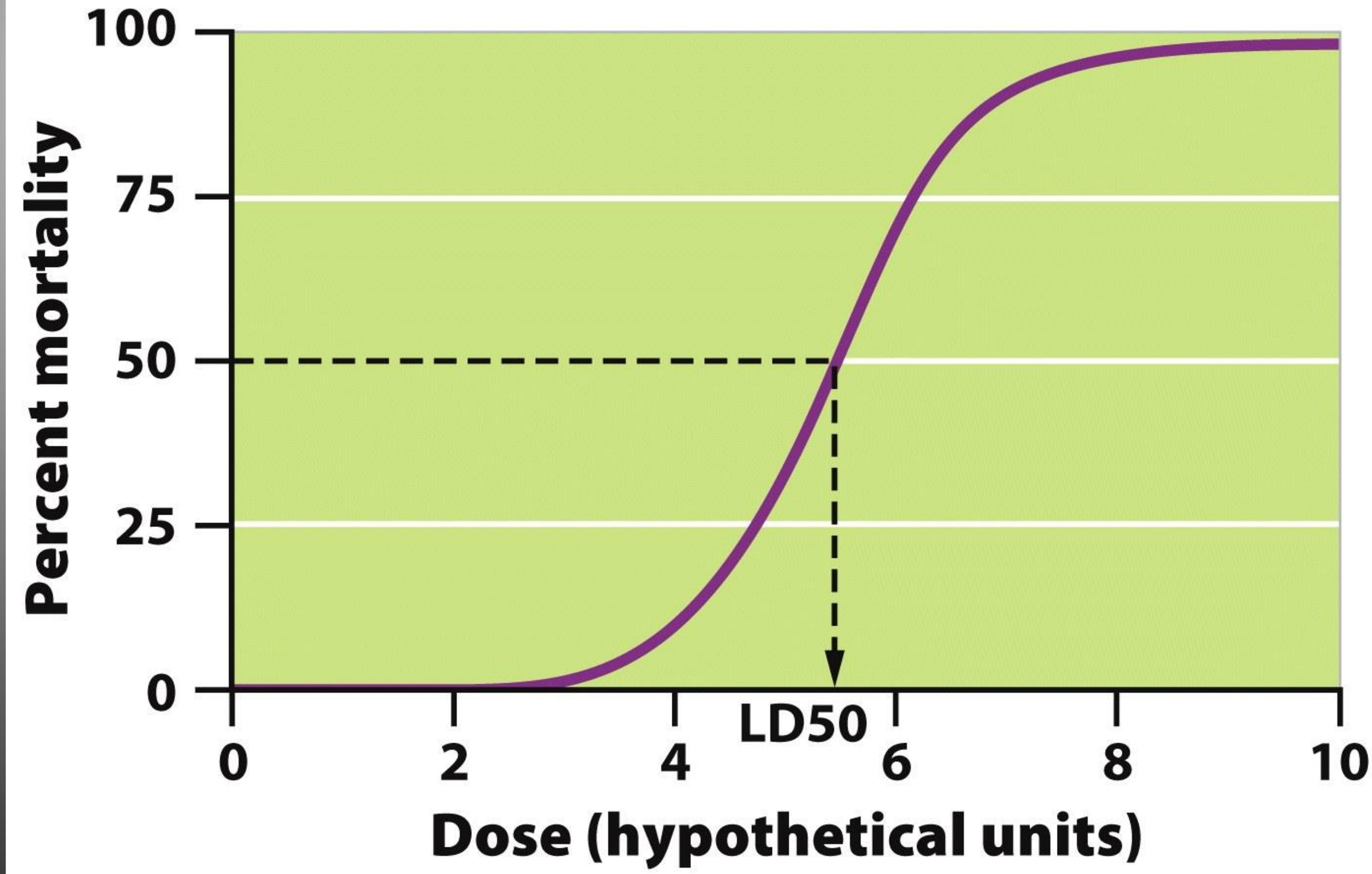

Figure 17.16
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- Synergistic interactions- when two risks come together and cause more harm that one would. For example, the health impact of a carcinogen such as asbestos can be much higher if an individual also smokes tobacco.

Routes of Exposure

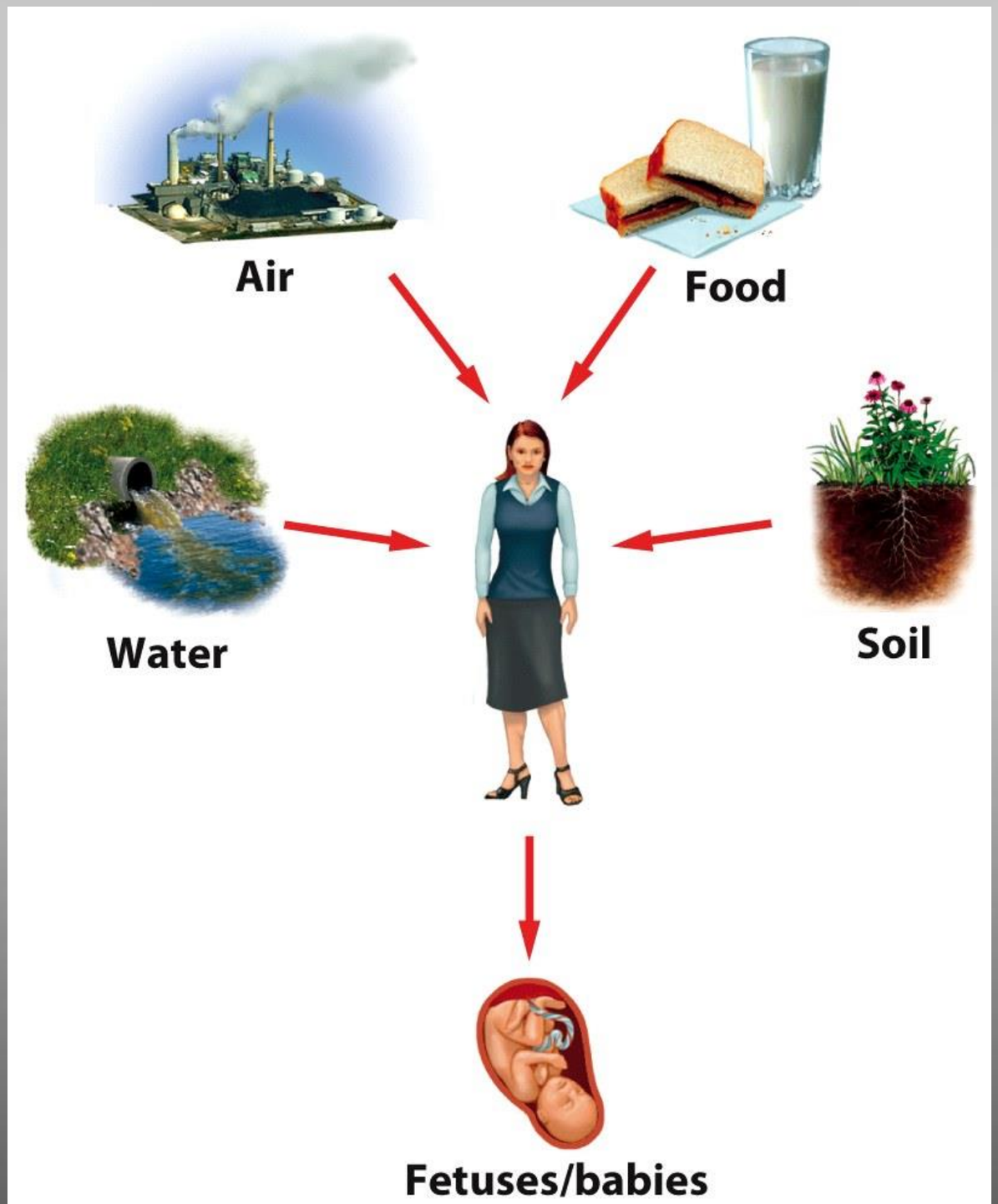

Figure 17.20
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Bioaccumulation

- bioaccumulation- an increased concentration of a chemical within an organism over time

Biomagnification

- Biomagnification- the increase in a chemical concentration in animal tissues as the chemical moves up the food chain.

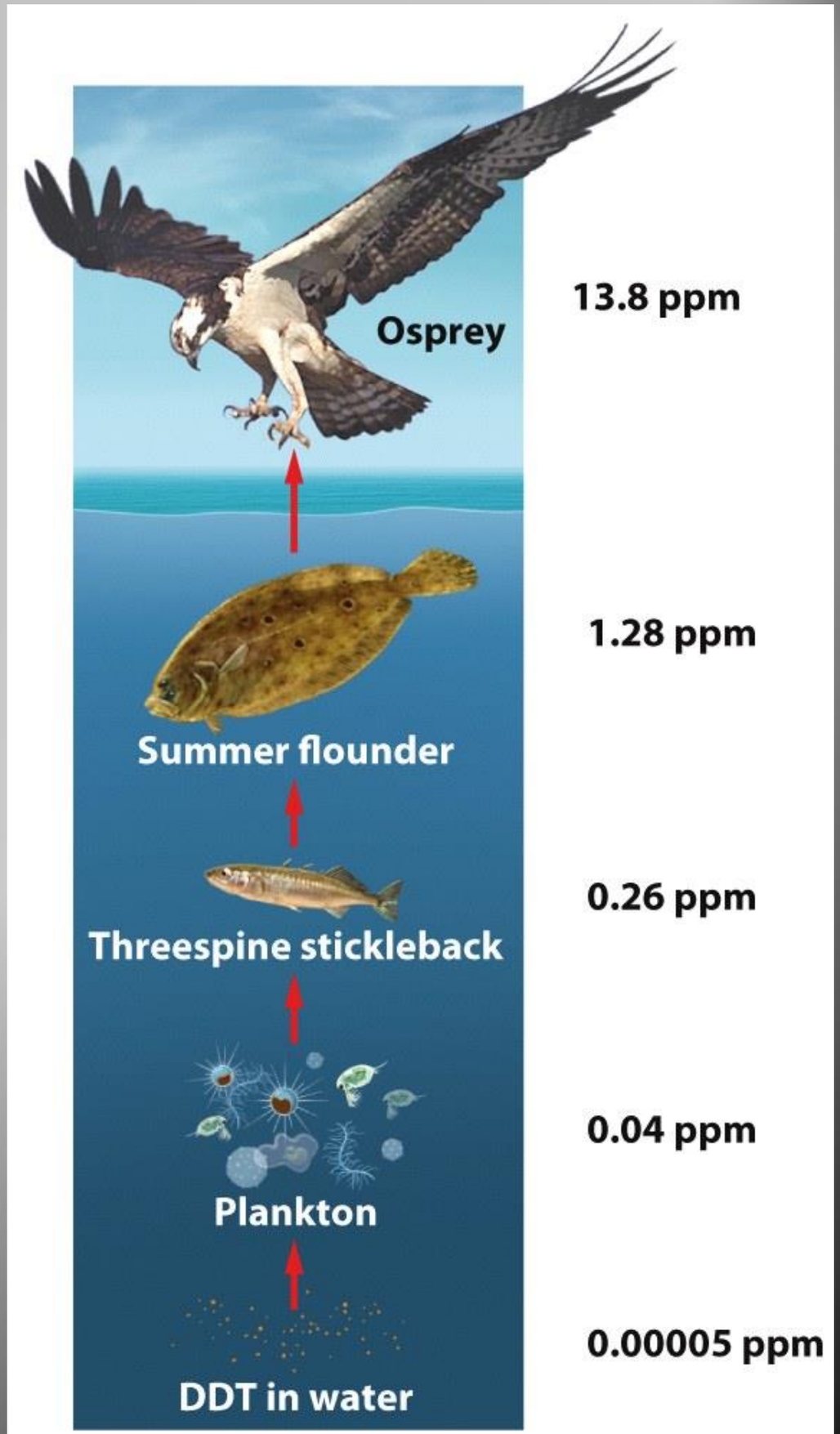

Figure 17.21
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Persistence

- Persistence- how long a chemical remains in the environment

TABLE 17.2 The persistence of various chemicals in the environment, measured in terms of their half-life

Chemical	Half-life
Malathion insecticide	1 day
Radon	4 days in air
Vinyl chloride	4.5 days in air
Phthalates	4.5 days in water
Roundup herbicide	7 to 70 days in water
Atrazine herbicide	224 days in wetland soils
Polychlorinated biphenyls (PCBs)	8 to 15 years in water
DDT	30 years in soil

Source: Hazardous Substances Data Bank, http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB/.

Table 17.2
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Risk Analysis

Figure 17.22
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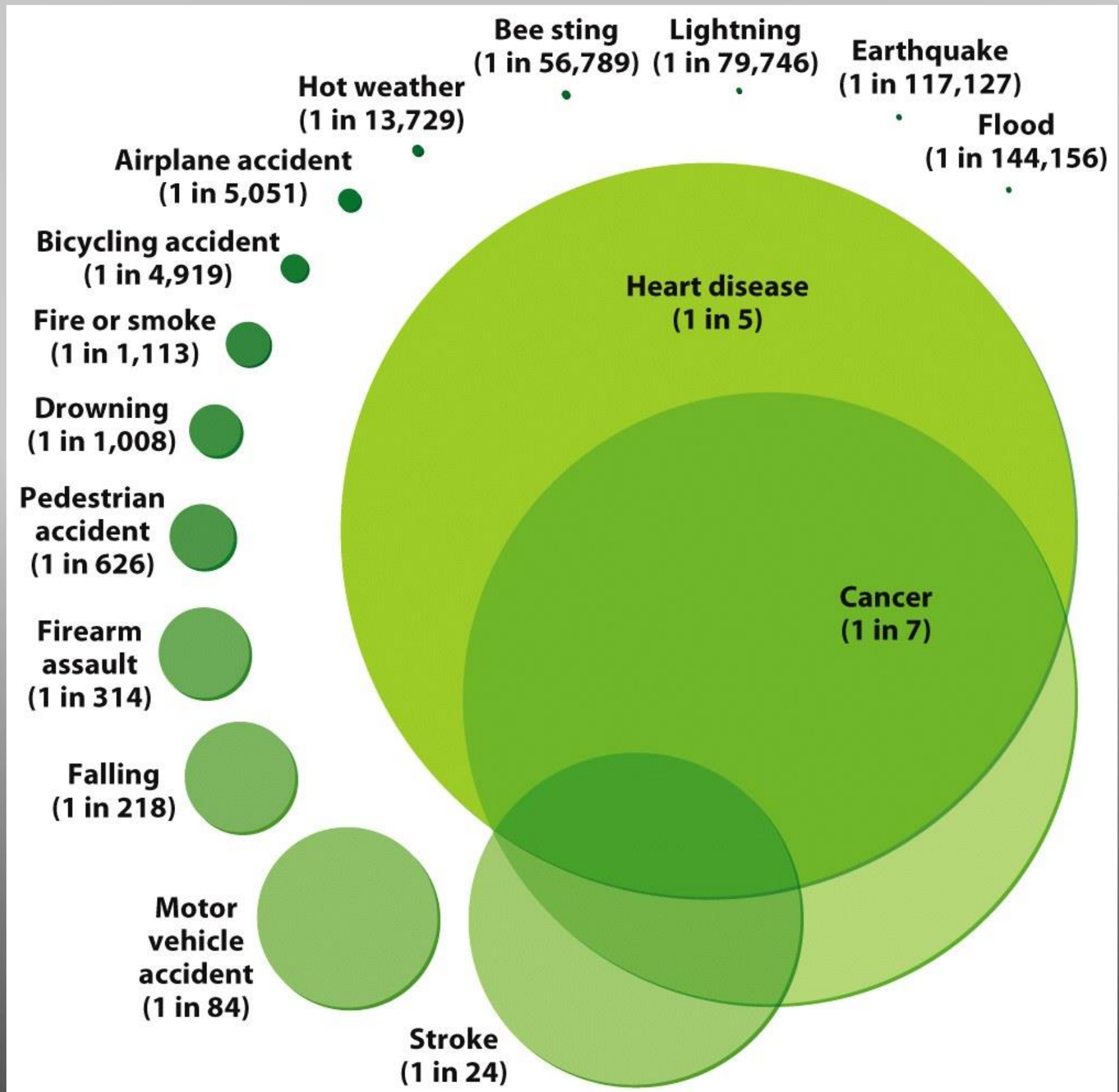

Figure 17.23
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Qualitative Risk Assessment

- Making a judgment of the relative risks of various decisions
- Probability- the statistical likelihood of an event occurring and the probability of that event causing harm

Quantitative Risk Assessment

- The approach to conducting a quantitative risk assessment is:
- Risk= probability of being exposed to a hazard X probability of being harmed if exposed

Stockholm Convention

- In 2001, a group of 127 nations gathered in Stockholm, Sweden, to reach an agreement on restricting the global use of some chemicals
- 12 chemicals were to be banned, phased out, or reduced
- These include DDT, PCBs, and certain chemicals that are by-products of manufacturing processes.