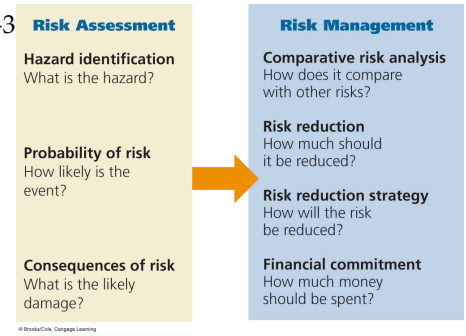
Chapter 17: Environmental Quality

APES 2013

1

Risk

Fig. 17-3



- Risk assessment - statistical analysis of how much harm a hazard can have to human health or the environment
- Risk management - deciding how to deal with a risk
- People do not understand risk well
  - Avian flu vs. Common flu

2

Types of Hazards

- Biological - pathogens (causes disease) like bacteria, viruses...
- Chemical - harmful chemicals in the air, land, and water
- Physical - fire, earthquakes, volcanic eruptions, floods, storms
- Cultural - unsafe working conditions, criminal assault, poverty
- Lifestyle - smoking, eating, drinking, sex

3

Disease

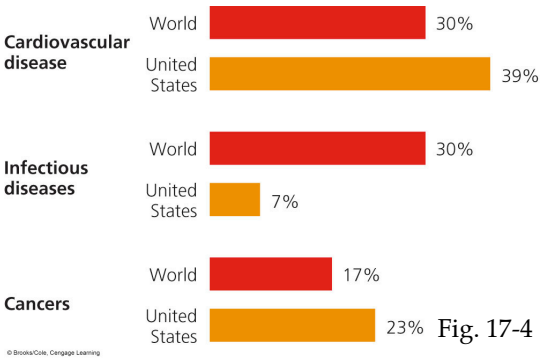


Fig. 17-4

- Nontransmissible disease - does not spread from one person to another (ex. cardiovascular disease, cancers, asthma)
- Infectious disease - pathogen invades the body (flu, HIV, malaria)

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Infectious Disease

- Epidemic - outbreak of a disease in an area or country
- Pandemic - global epidemic

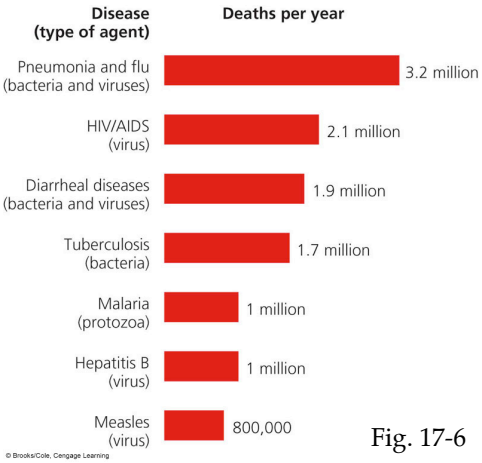

Fig. 17-6

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Malaria

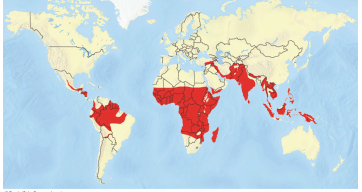

Fig. 17-7

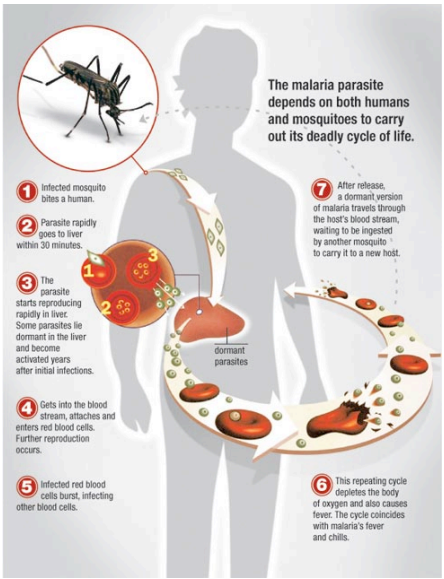

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Fig. 17-10

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Chemicals

- Toxic Chemicals - cause temporary or permanent harm or death to humans and animals
  - FDA lists arsenic, lead, mercury, vinyl chloride, and polychlorinated biphenyls as five most toxic substances
- Carcinogens - chemicals, types of radiation, and viruses that can promote cancer
- Mutagens - chemicals or forms of radiation that cause mutations in DNA
- Teratogens - chemicals that cause harm or birth defects

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Toxic Chemical Pathways

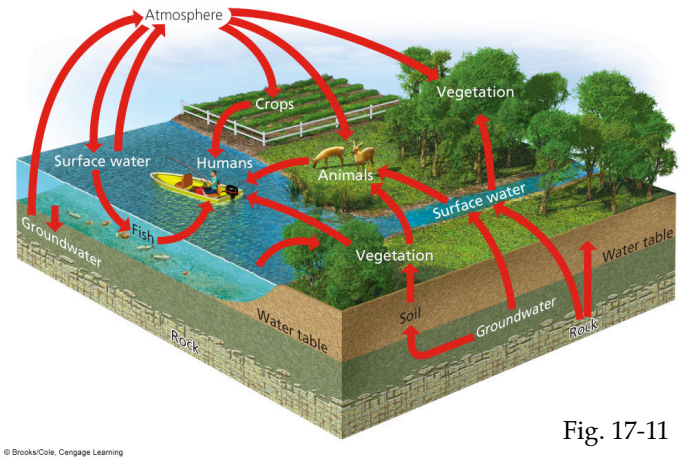

Fig. 17-11

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PCBs

- More than 200 chlorine-containing organic compounds
- From 1920s-1970s used as lubricants, hydraulic fluids, and electrical insulators among other products
- Banned in 1977
- Currently found in air, water, and soil around the world and can travel long distances

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Mercury

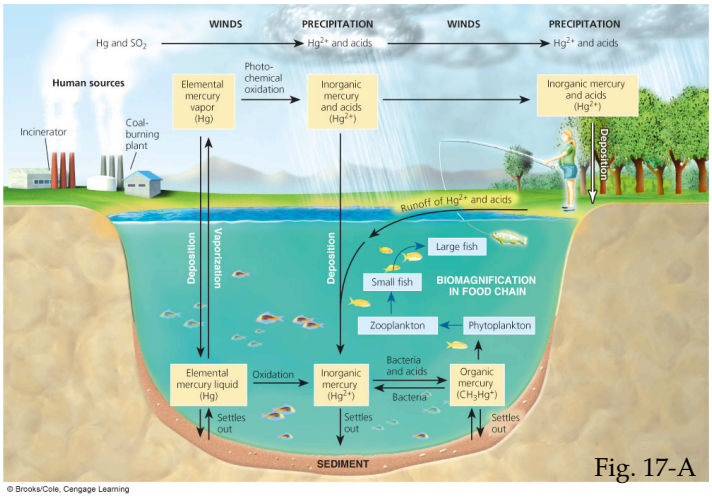

Fig. 17-A

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Fig. 17-B

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Toxicology

- Toxicology - study of harmful effects of chemicals on organisms
- Toxicity - measure of how harmful a substance is (any synthetic or natural chemical is harmful if ingested at a large enough quantity)
- Dose - amount ingested
- Response - damage resulting from exposure

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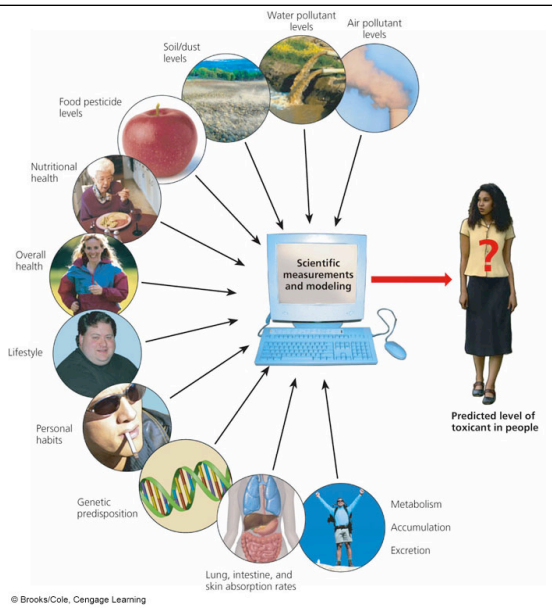

Fig. 17-13

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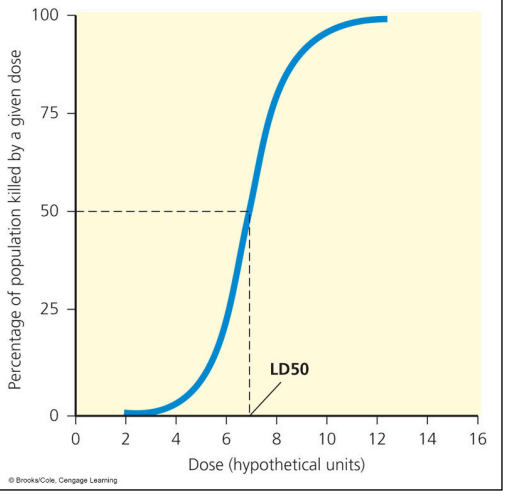
Estimating Toxicity

- Dose-response curve - determining effects of dose and plotting them
- LD50 - median lethal dose, dose that kills 50% of animals



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Types of Dose-Response Curves

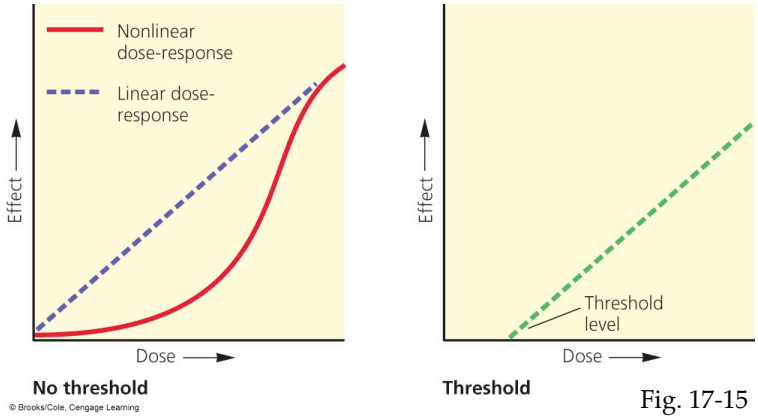

Fig. 17-15

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Toxicity Ratings

Table 17-1

Toxicity Ratings and Average Lethal Doses for Humans

Toxicity Rating	LD50 (milligrams per kilogram of body weight)*	Average Lethal Dose**	Examples
Supertoxic	Less than 5	Less than 7 drops	Nerve gases, botulism toxin, mushroom toxin, dioxin (TCDD)
Extremely toxic	5–50	7 drops to 1 teaspoon	Potassium cyanide, heroin, atropine, parathion, nicotine
Very Toxic	50–500	1 teaspoon to 1 ounce	Mercury salts, morphine, codeine
Moderately toxic	500–5,000	1 ounce to 1 pint	Lead salts, DDT, sodium hydroxide, sodium fluoride, sulfuric acid, caffeine, carbon tetrachloride
Slightly toxic	5,000–15,000	1 pint to 1 quart	Ethyl alcohol, Lysol, soaps
Essentially nontoxic	15,000 or greater	More than 1 quart	Water, glycerin, table sugar

*Dosage that kills 50% of individuals exposed.
**Amounts of substances in liquid form at room temperature that are lethal when given to a 70-kilogram (150-pound) human.

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Toxic Chemical Sources

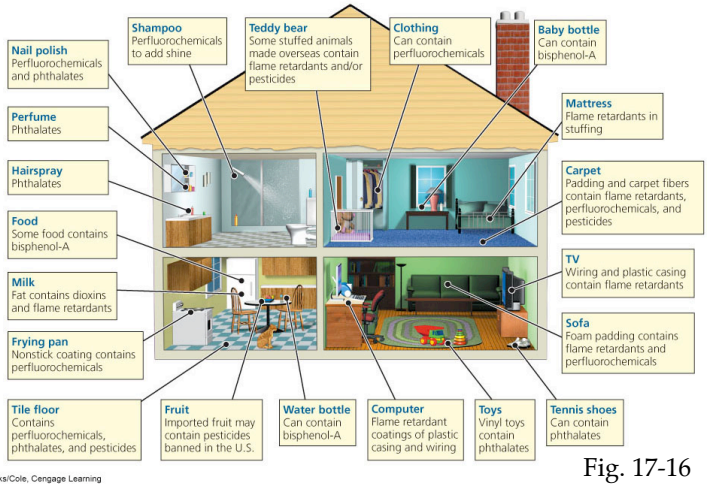

Fig. 17-16

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Risk Analysis

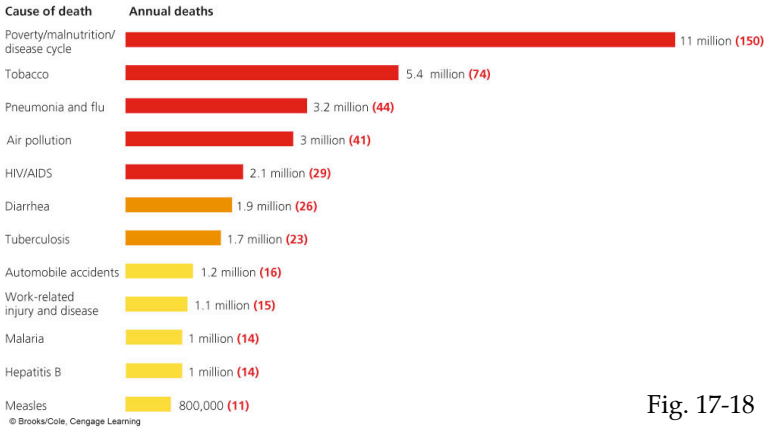

Fig. 17-18

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Risk Analysis

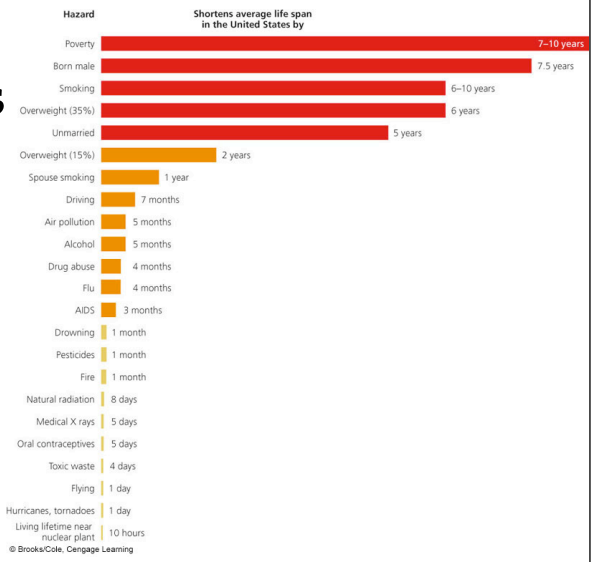

Fig. 17-19

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Risk Analysis

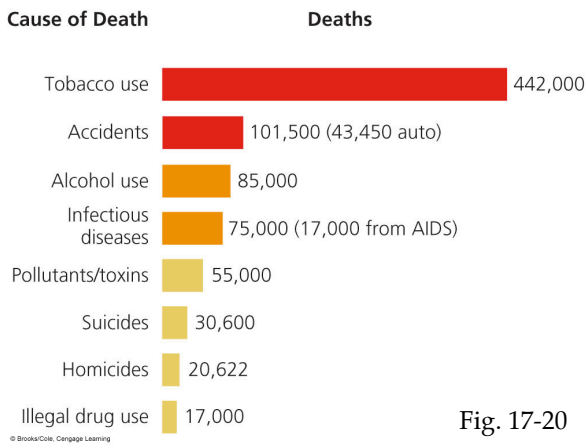

Fig. 17-20

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