

Chapter 20.4

POPULATION SIZE

Human Population Growth

- J curve growth
- Grows at a rate of about 80 million yearly
 - $r = 1.3\%$
- Why doesn't environmental resistance take effect?
 - Altering their environment
 - Technological advances
 - The cultural revolution
 - The agricultural revolution
 - The industrial-medical revolution

The Human Population

- Doubled three times in the last three centuries
- About 6.1 billion and may reach 9.3 billion by the year 2050
- Improved health and technology have lowered death rates

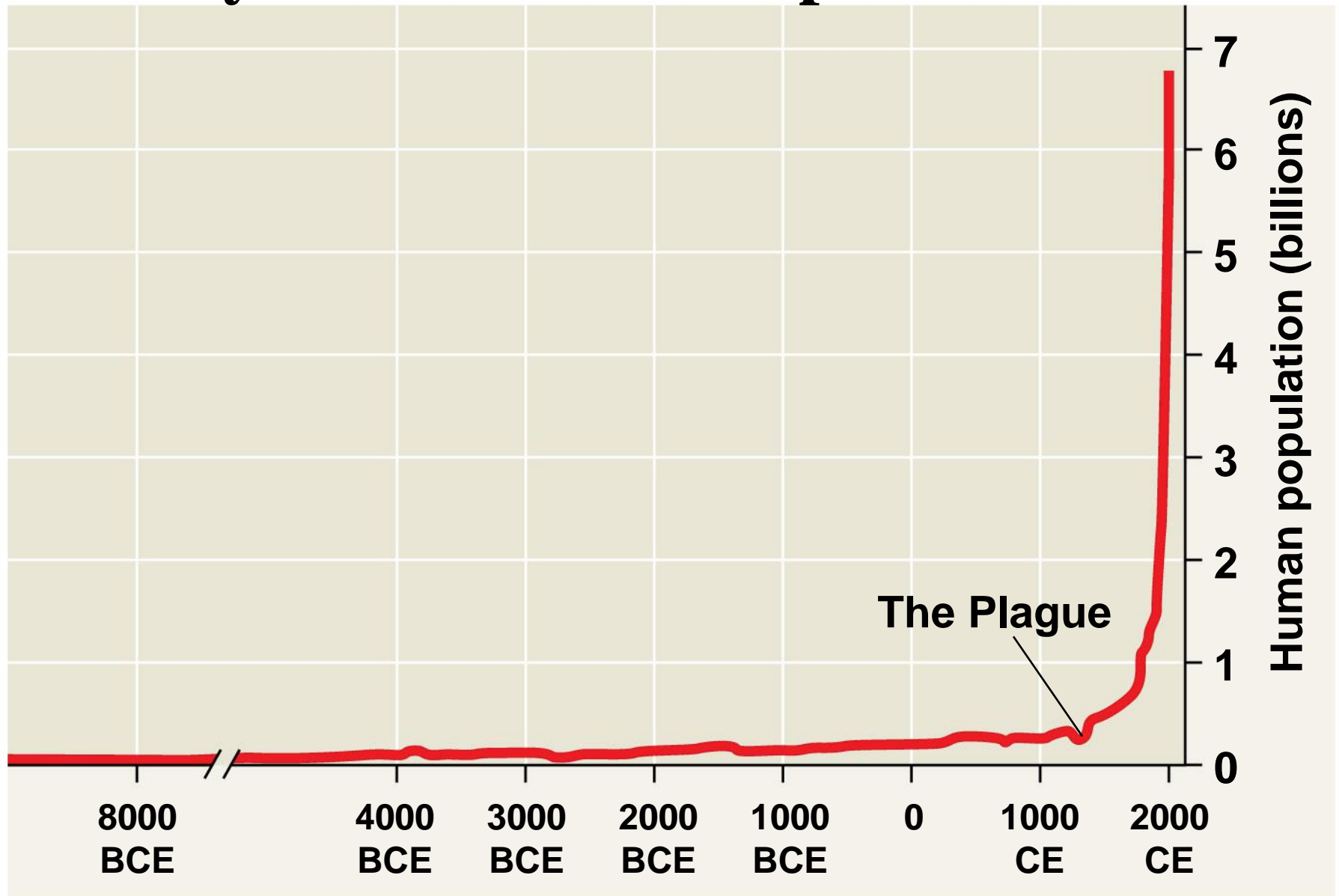
The human population is no longer growing exponentially but is still increasing rapidly

- No population can grow indefinitely, and humans are no exception

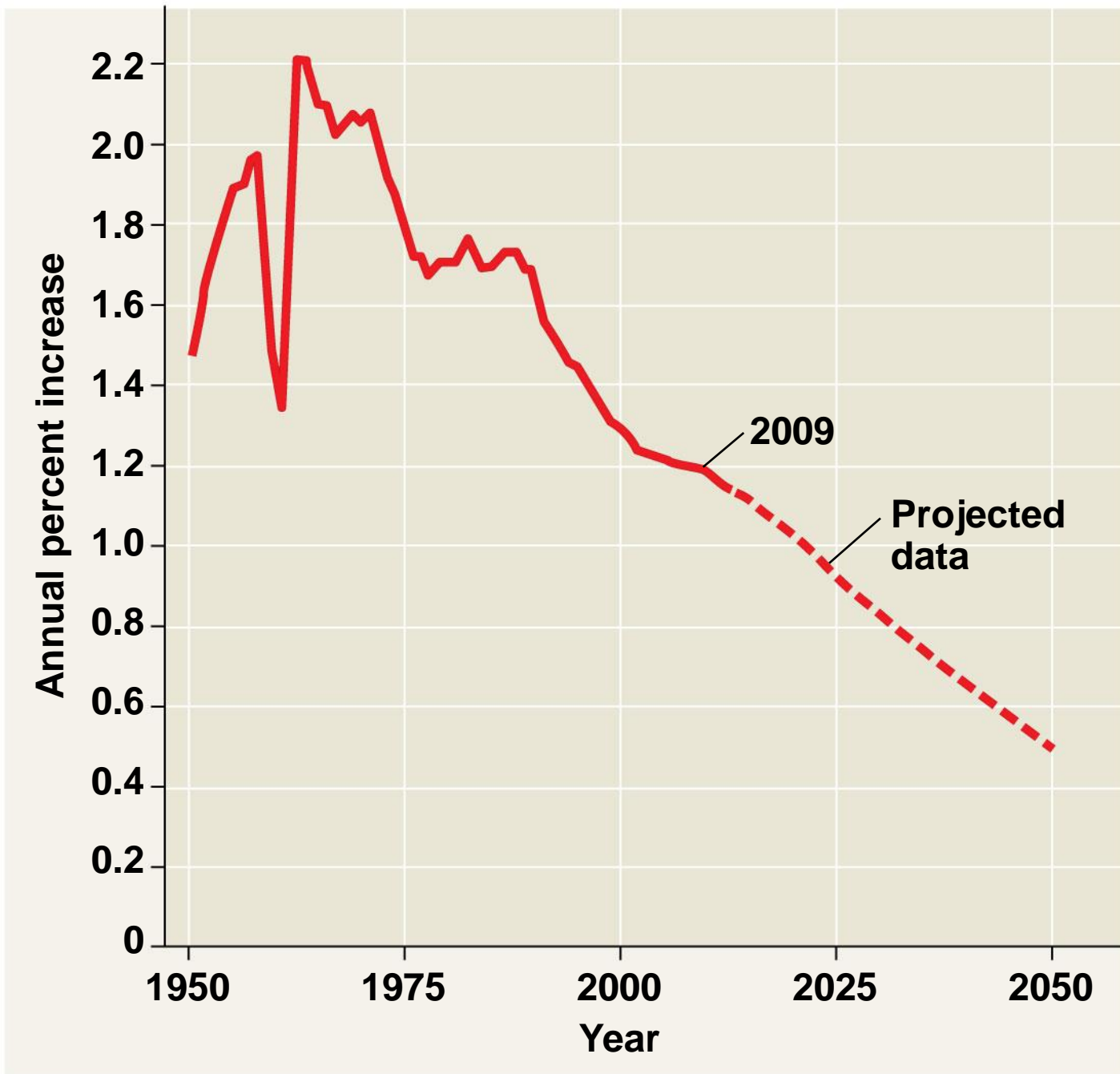
The Global Human Population

- The human population increased relatively slowly until about 1650 and then began to grow exponentially

History of the Human Population



- The global population is more than 6.8 billion people
- Though the global population is still growing, the rate of growth began to slow during the 1960s



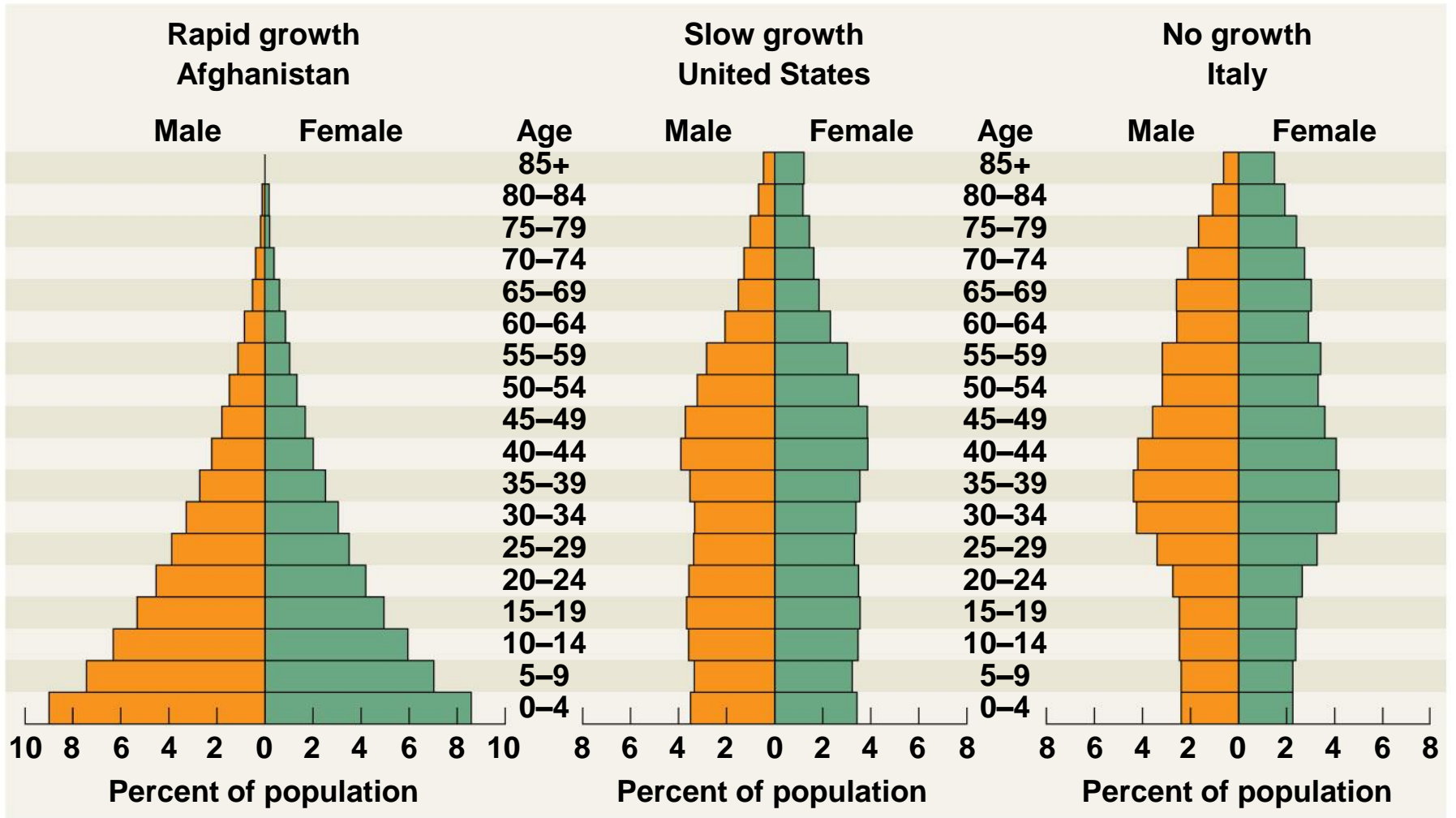
Regional Patterns of Population Change

- To maintain population stability, a regional human population can exist in one of two configurations
 - Zero population growth =
High birth rate – High death rate
 - Zero population growth =
Low birth rate – Low death rate
- The **demographic transition** is the move from the first state to the second state

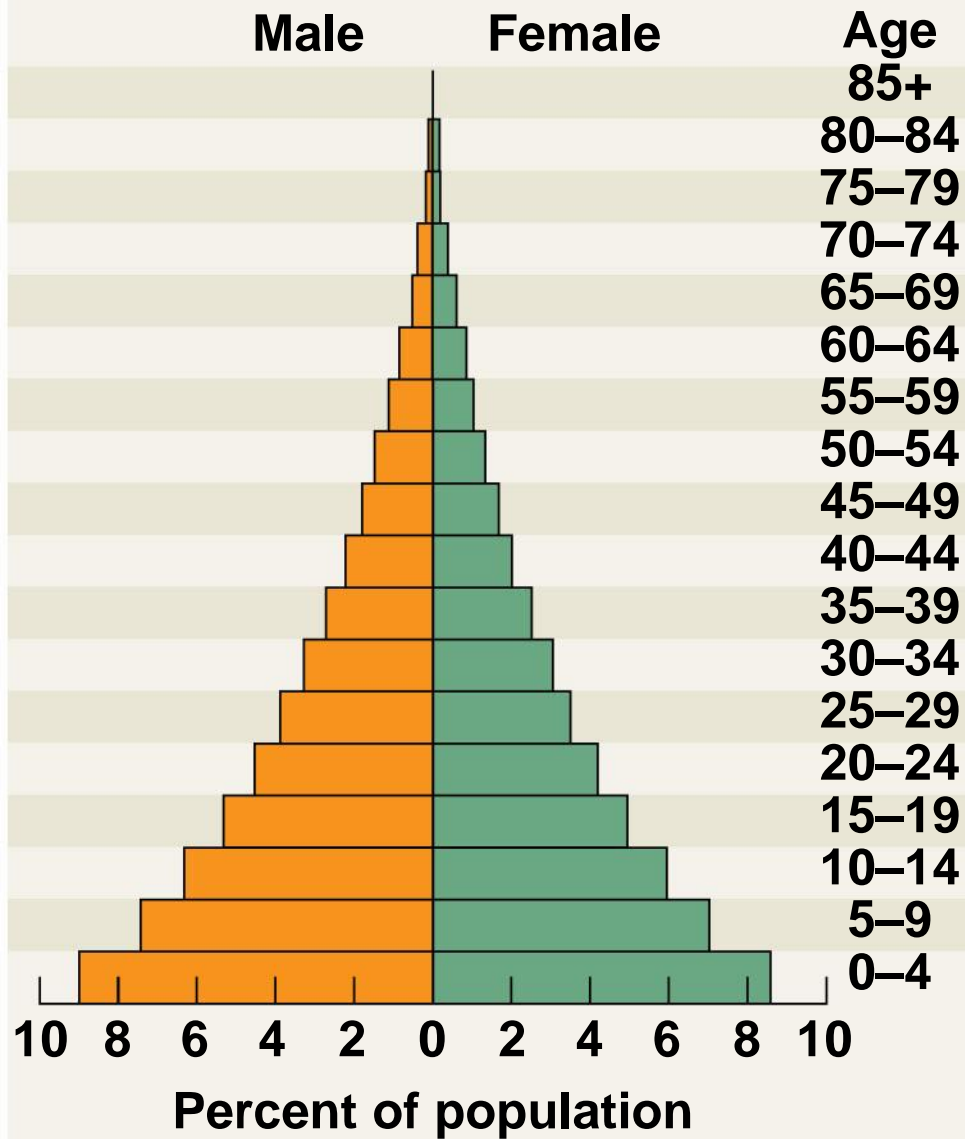
- The demographic transition is associated with an increase in the quality of health care and improved access to education, especially for women
- Most of the current global population growth is concentrated in developing countries

Age Structure

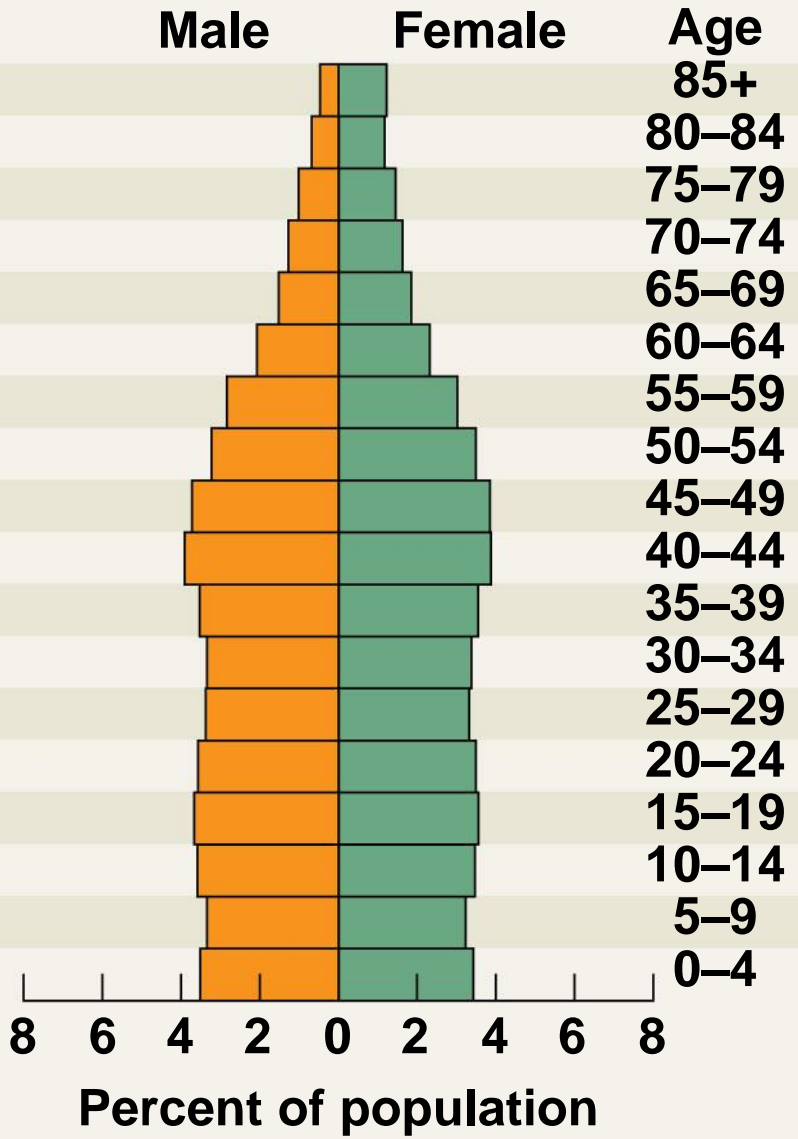
- One important demographic factor in present and future growth trends is a country's **age structure**
- Age structure is the relative number of individuals at each age



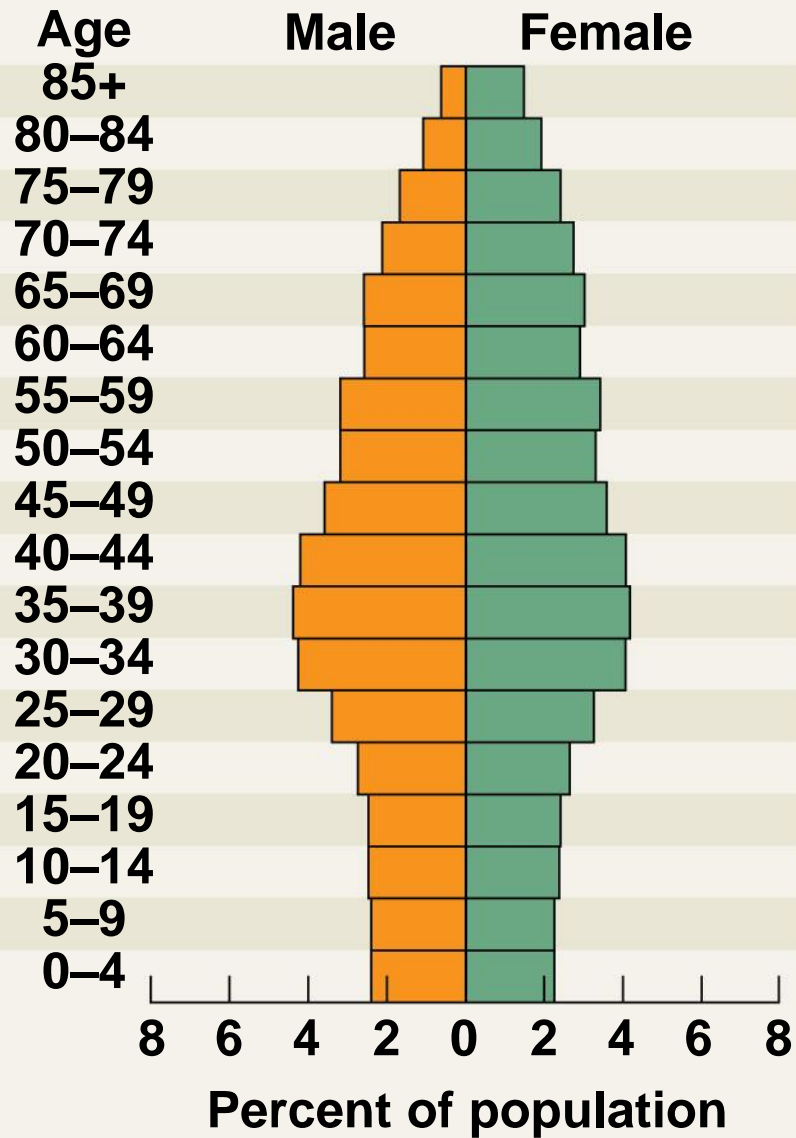
Rapid growth Afghanistan



Slow growth United States



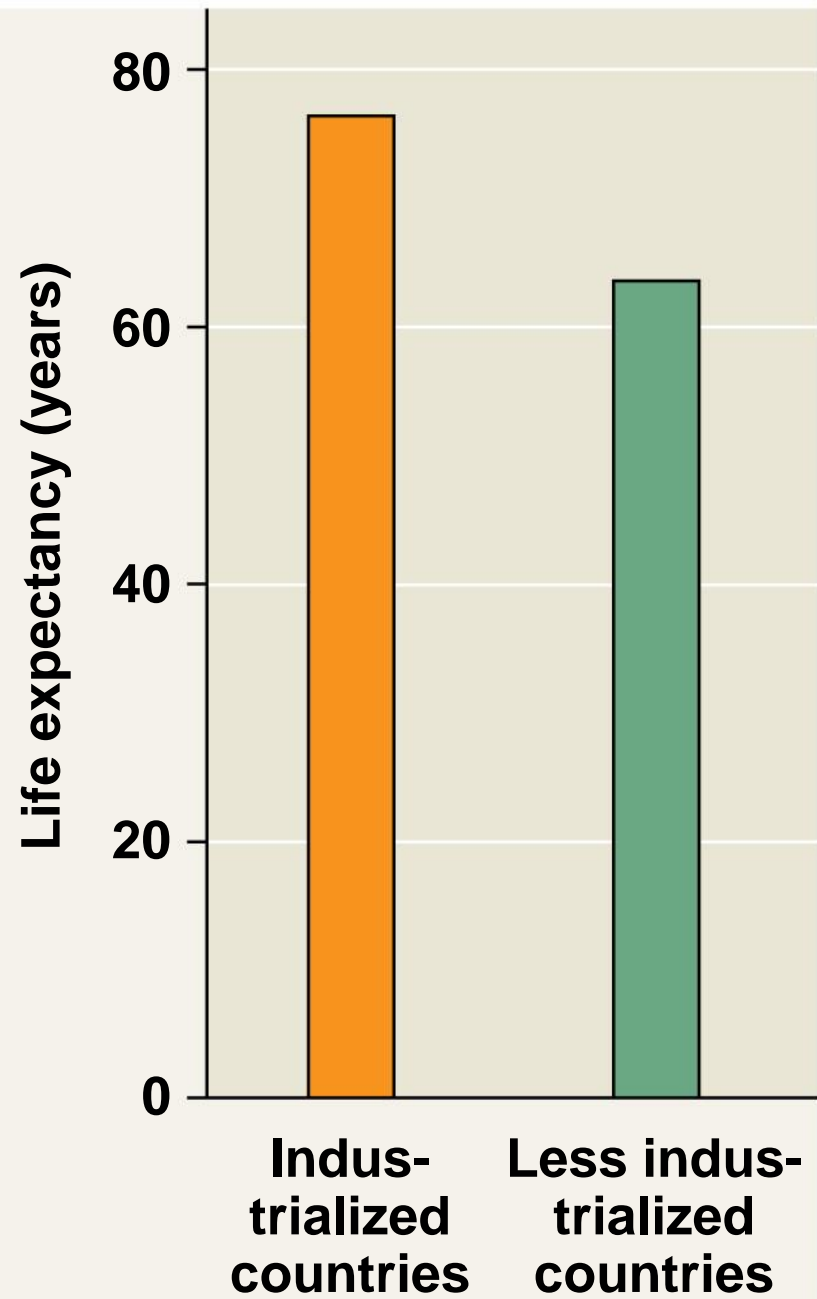
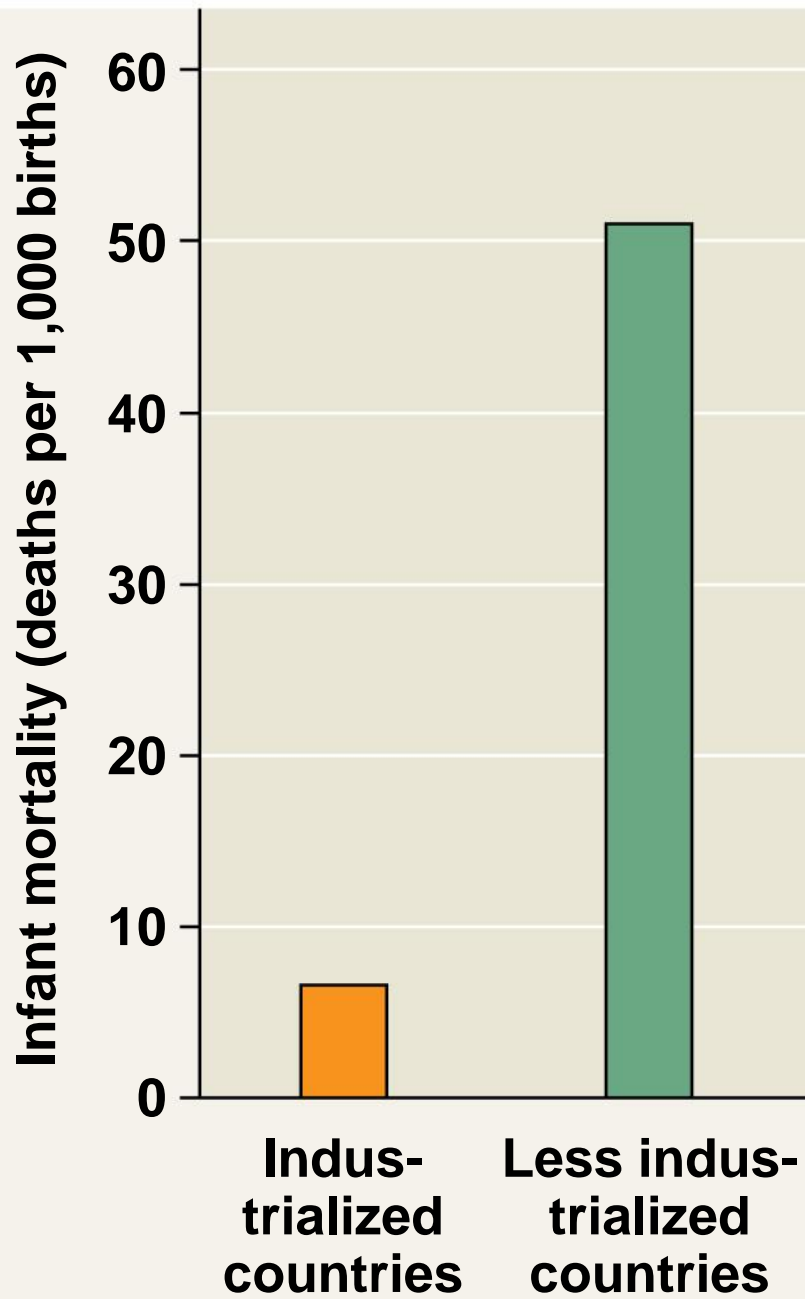
No growth Italy



- Age structure diagrams can predict a population's growth trends
- They can illuminate social conditions and help us plan for the future

Infant Mortality and Life Expectancy

- Infant mortality and life expectancy at birth vary greatly among developed and developing countries but do not capture the wide range of the human condition



Global Carrying Capacity

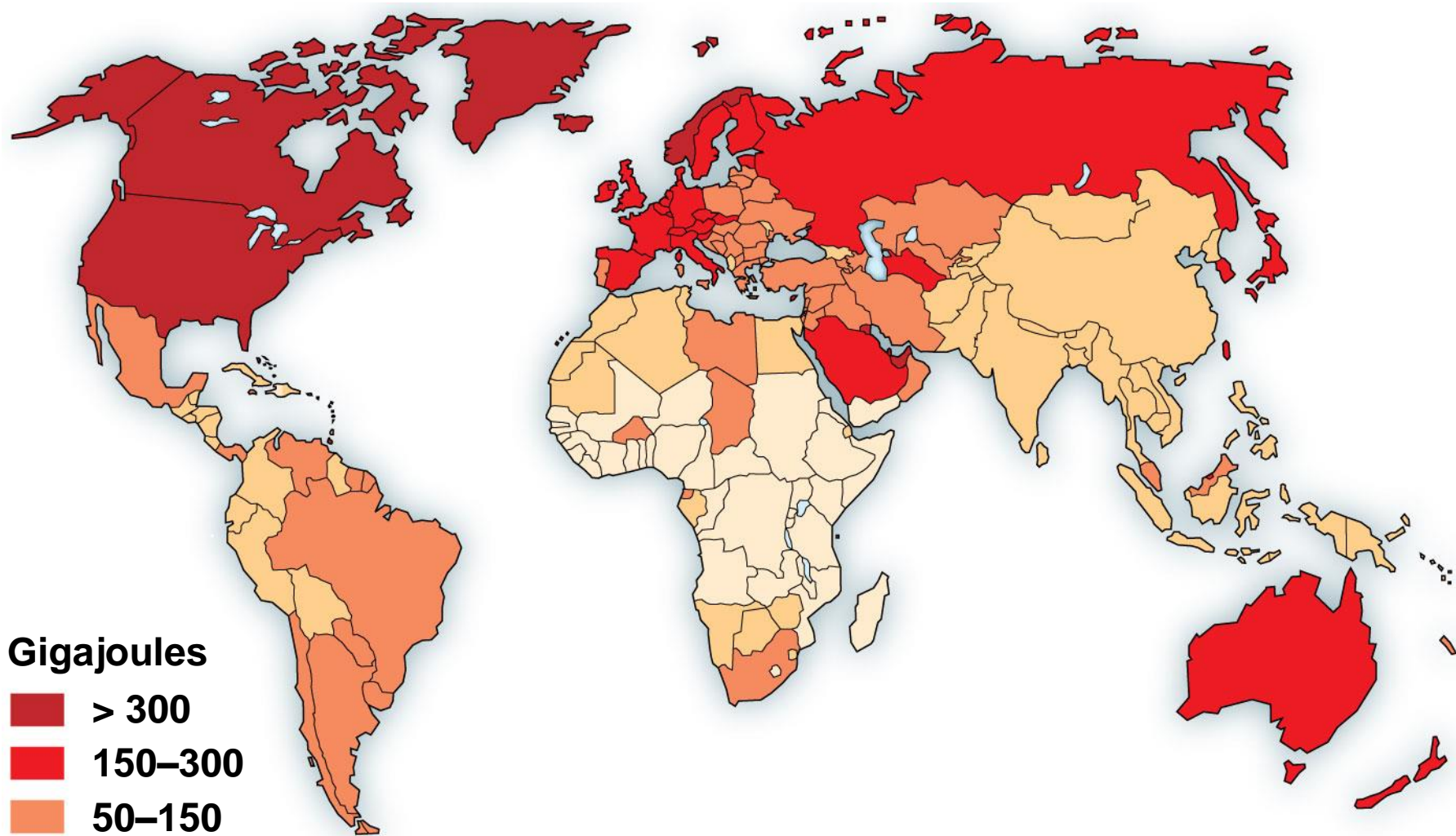
- How many humans can the biosphere support?
- Population ecologists predict a global population of 7.8–10.8 billion people in 2050

Estimates of Carrying Capacity

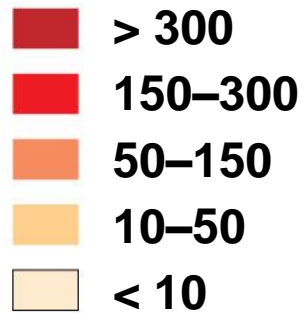
- The carrying capacity of Earth for humans is uncertain
- The average estimate is 10–15 billion

Limits on Human Population Size

- The **ecological footprint** concept summarizes the aggregate land and water area needed to sustain the people of a nation
- It is one measure of how close we are to the carrying capacity of Earth
- Countries vary greatly in footprint size and available ecological capacity



Gigajoules



- Our carrying capacity could potentially be limited by food, space, nonrenewable resources, or buildup of wastes
- Unlike other organisms, we can regulate our population growth through social changes