

MILLER/SPOOLMAN
LIVING IN THE ENVIRONMENT

17TH



Chapter 6

The Human Population and Its Impact

6-1 How Many People Can the Earth Support?

- ***Concept 6-1*** *We do not know how long we can continue increasing the earth's carrying capacity for humans without seriously degrading the life-support system that keeps us and many other species alive.*

Core Case Study: Slowing Population Growth in China: A Success Story

- Over population leads to regulation
 - 1.3 billion people
 - Promotes one-child families
 - Contraception, abortion, sterilization, incentives
- Over population can lead to ...
 - Fast-growing economy
 - Serious resource and environmental problems
- China has been successful at controlling pop growth
- Global model for population control?

Crowded Street in China



Fig. 6-1, p. 125

Human Population Growth Continues but It Is Unevenly Distributed (1)

- Reasons for human population increase
 1. Movement into new habitats and climate zones
 2. Early and modern agriculture methods
 3. Control of infectious diseases through
 - Sanitation systems
 - Antibiotics
 - Vaccines
 - Health care
- Most population growth over last 100 years due to drop in death rates
- Growing at a rate of 1.21% per year

Human Population Growth Continues but It Is Unevenly Distributed (2)

- Population growth in developing countries is increasing 9 times faster than developed countries
- 2050
 - 95% of growth in developing countries
 - 7.8-10.8 billion people
- **Cultural carrying capacity**
 - Max number of people who could live in reasonable freedom and comfort indefinitely, without decreasing the ability of the earth to sustain future generations.
- ✓ Read page 129 and answer critical thinking and caption questions.

Human Population Growth

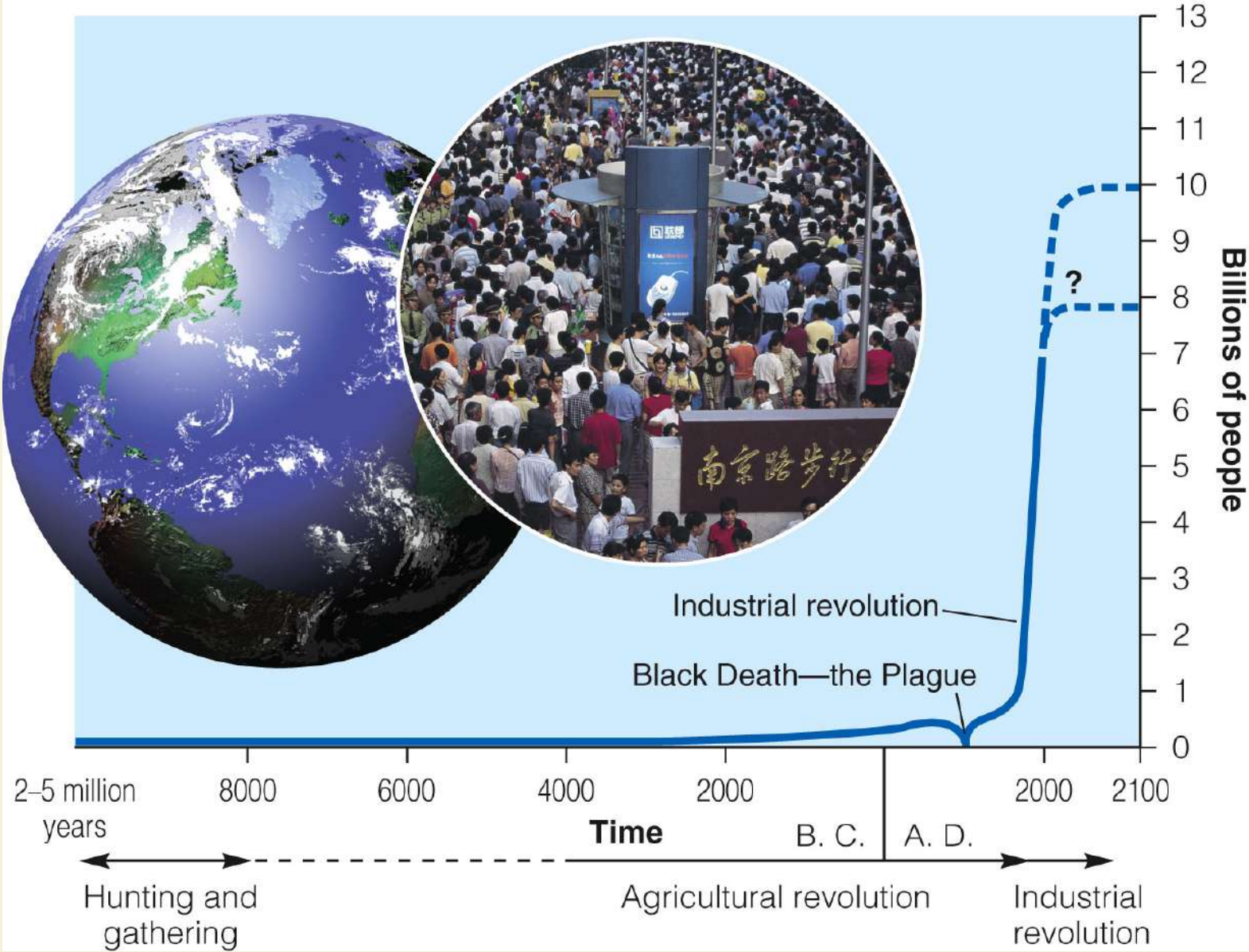


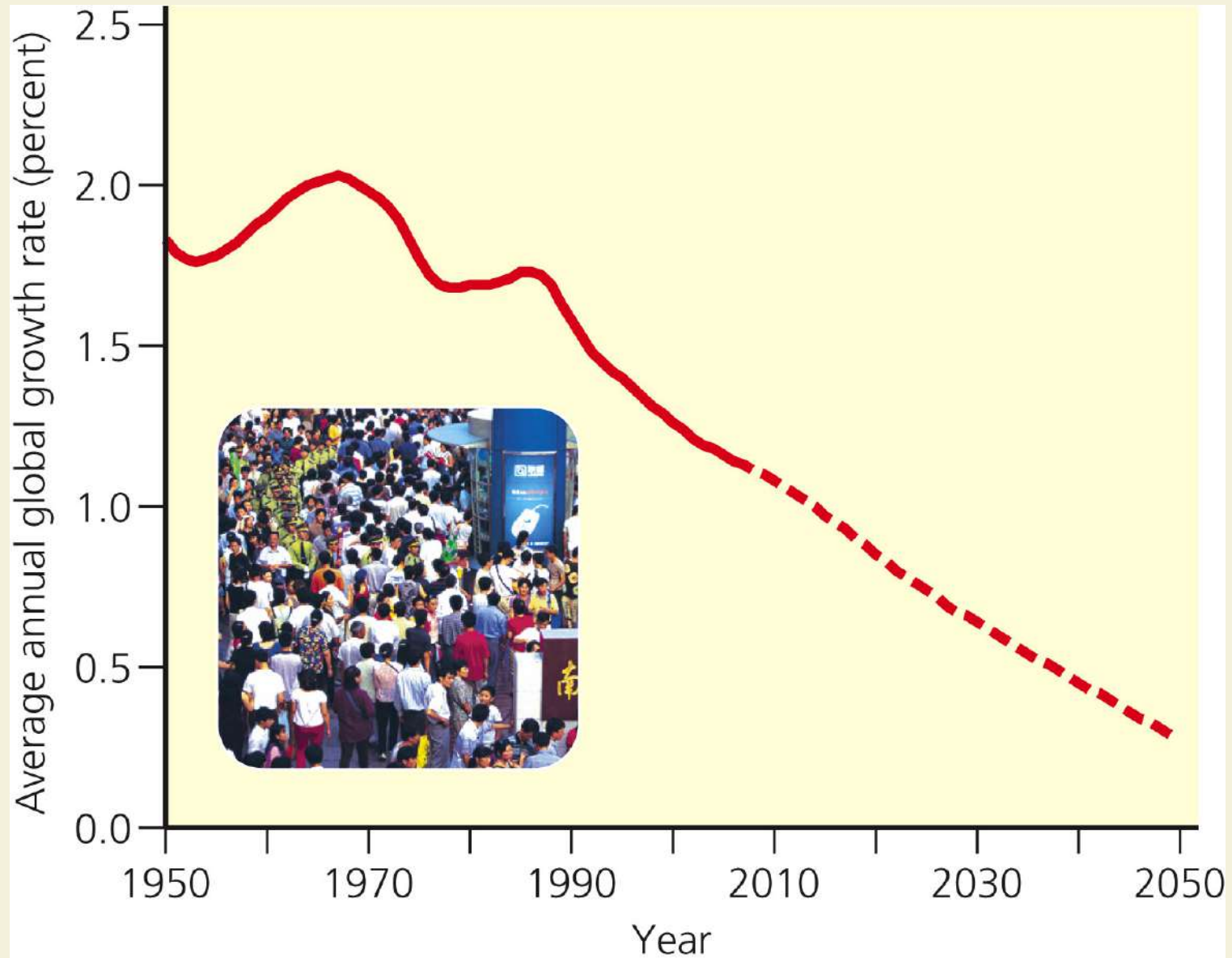
Fig. 1-18, p. 21

Population Time Line: 10,000 BC - 2042

Year	Event	Human population (approximate)
50,000 BC	Hunter-gatherer societies	1.2 million
10,000 BC	End of last Ice Age	4 million
8,000 BC	Agricultural Revolution	5 million
500 BC		100 million
1,000 AD		250 million
1347–1351	Black Death (Plague); 75 million people die	
1500		450 million
1750	Industrial Revolution begins in Europe	791 million
1800	Industrial Revolution begins in the United States	
1804		1 billion
1845–1849	Irish potato famine: 1 million people die	
1927		2 billion
1943	Penicillin used against infection helps decrease death rates	
1957	Great famine in China; 20 million die	
1961		3 billion
1974		4 billion
1984		5 billion
1987		6 billion
2011	Projected human population:	7 billion
2024	Projected human population:	8 billion
2042	Projected human population:	9 billion

Figure 3, Supplement 9

Annual Growth Rate of World Population, 1950-2010



Where Population Growth Occurred, 1950-2010

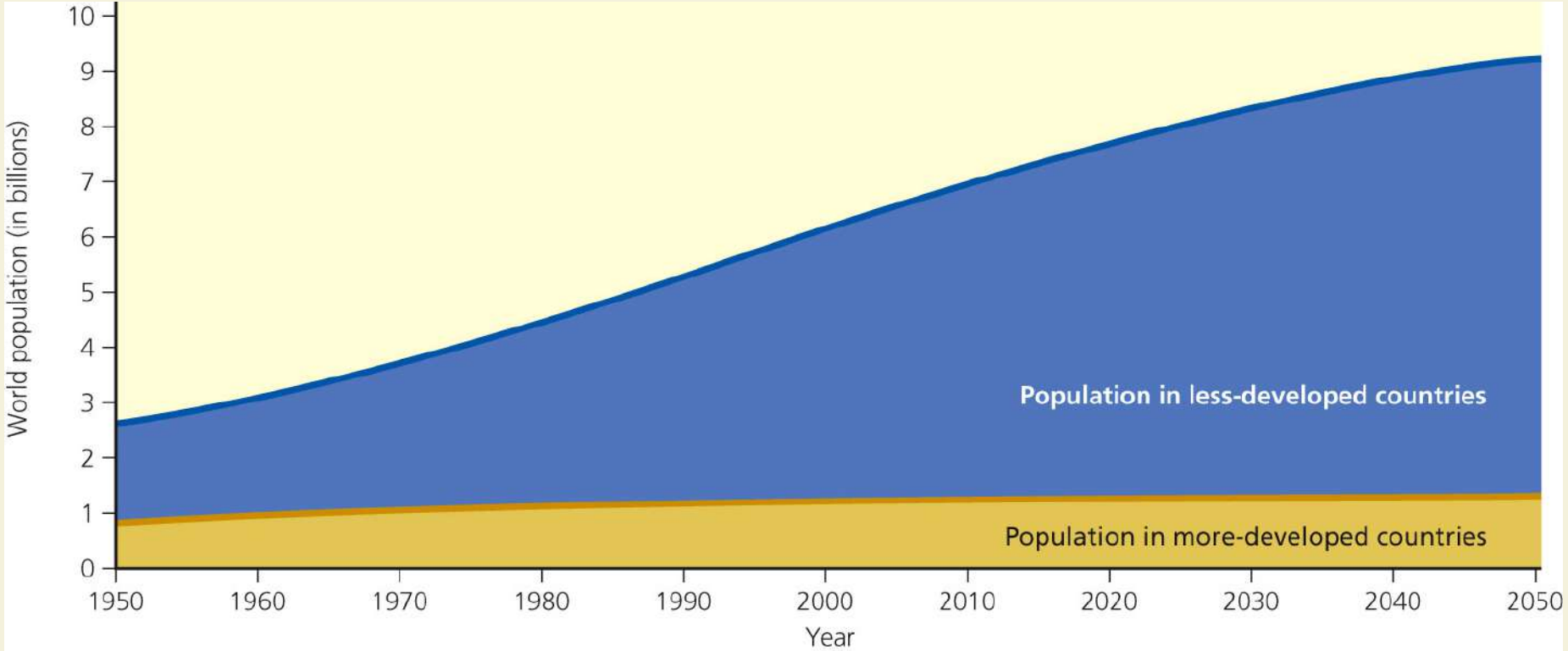
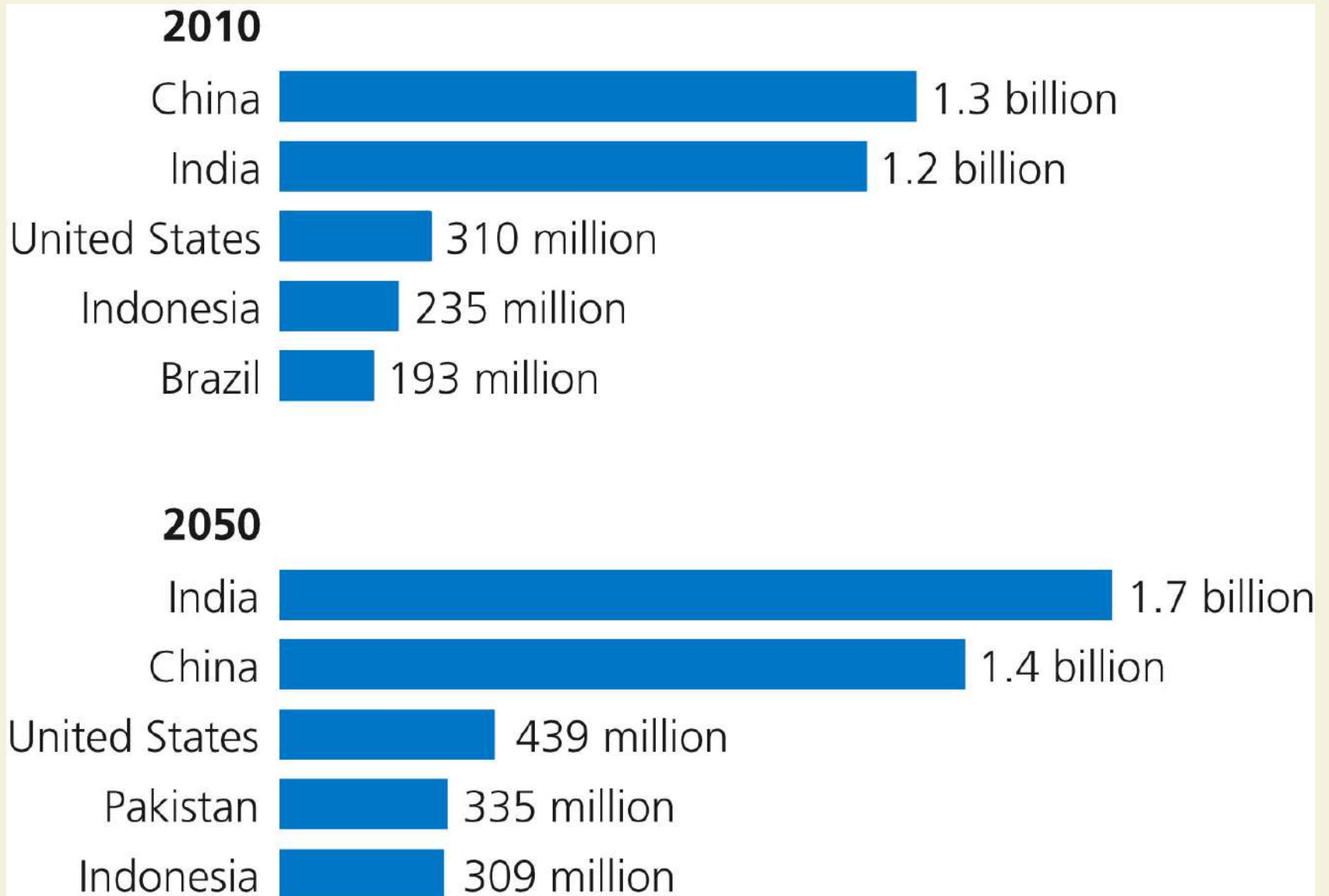


Fig. 6-3, p. 127

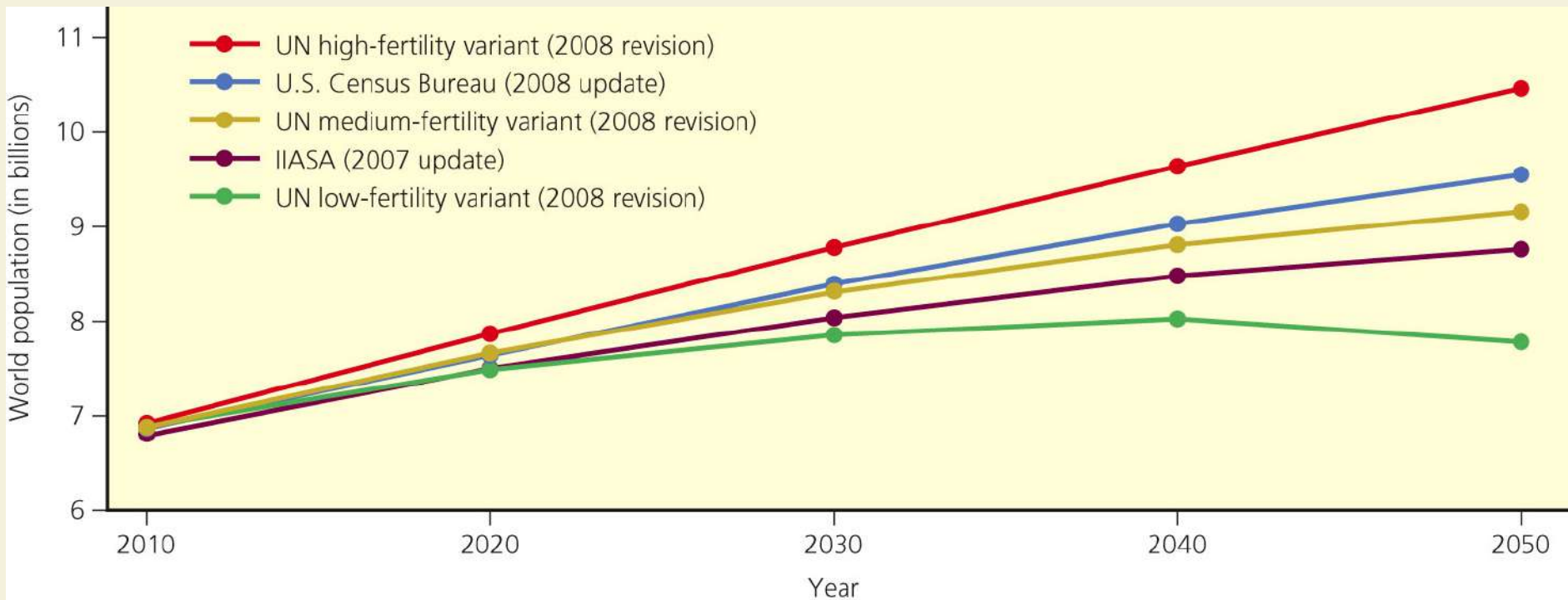
Five Most Populous Countries, 2010 and 2050



Science Focus: Projecting Population Change

- Why range of 7.8-10.8 billion for 2050?
 - Too many factors to consider
- Demographers must:
 1. Determine reliability of current estimates
 2. Make assumptions about fertility trends
 3. Deal with different databases and sets of assumptions
- ✓ Read Page 128 Science Focus and answer critical thinking question.

World Population Projections to 2050



Natural Capital Degradation: Altering Nature to Meet Our Needs

Natural Capital Degradation

Altering Nature to Meet Our Needs

Reducing biodiversity

Increasing use of net
primary productivity

Increasing genetic resistance in pest
species and disease-causing bacteria

Eliminating many natural predators

Introducing harmful species into
natural communities

Using some renewable resources
faster than they can be replenished

Disrupting natural chemical cycling
and energy flow

Relying mostly on polluting and
climate-changing fossil fuels



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Altering Nature to Meet Our Needs

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6-2 What Factors Influence the Size of the Human Population?

- **Concept 6-2A** *Population size increases because of births and immigration, and decreases through deaths and emigration.*
- **Concept 6-2B** *The average number of children born to women in a population (total fertility rate) is the key factor that determines population size.*

The Human Population Can Grow, Decline, or Remain Fairly Stable

- Population change
 - Births: fertility
 - Deaths: mortality
 - Migration
- **Population change** =
(births + immigration) – (deaths + emigration)
- **Crude birth rate**: # live births/1000/year
- **Crude death rate**: # deaths/1000/year

Women Having Fewer Babies but Not Few Enough to Stabilize the World's Population

- **Fertility rate**
 - number of children born to a woman during her lifetime
- **Replacement-level fertility rate**
 - Average number of children a couple must have to replace themselves
 - 2.1 in developed countries
 - Up to 2.5 in developing countries
- **Total fertility rate (TFR)**
 - Average number of children born to women in a population

Total fertility rate, 1955-2010

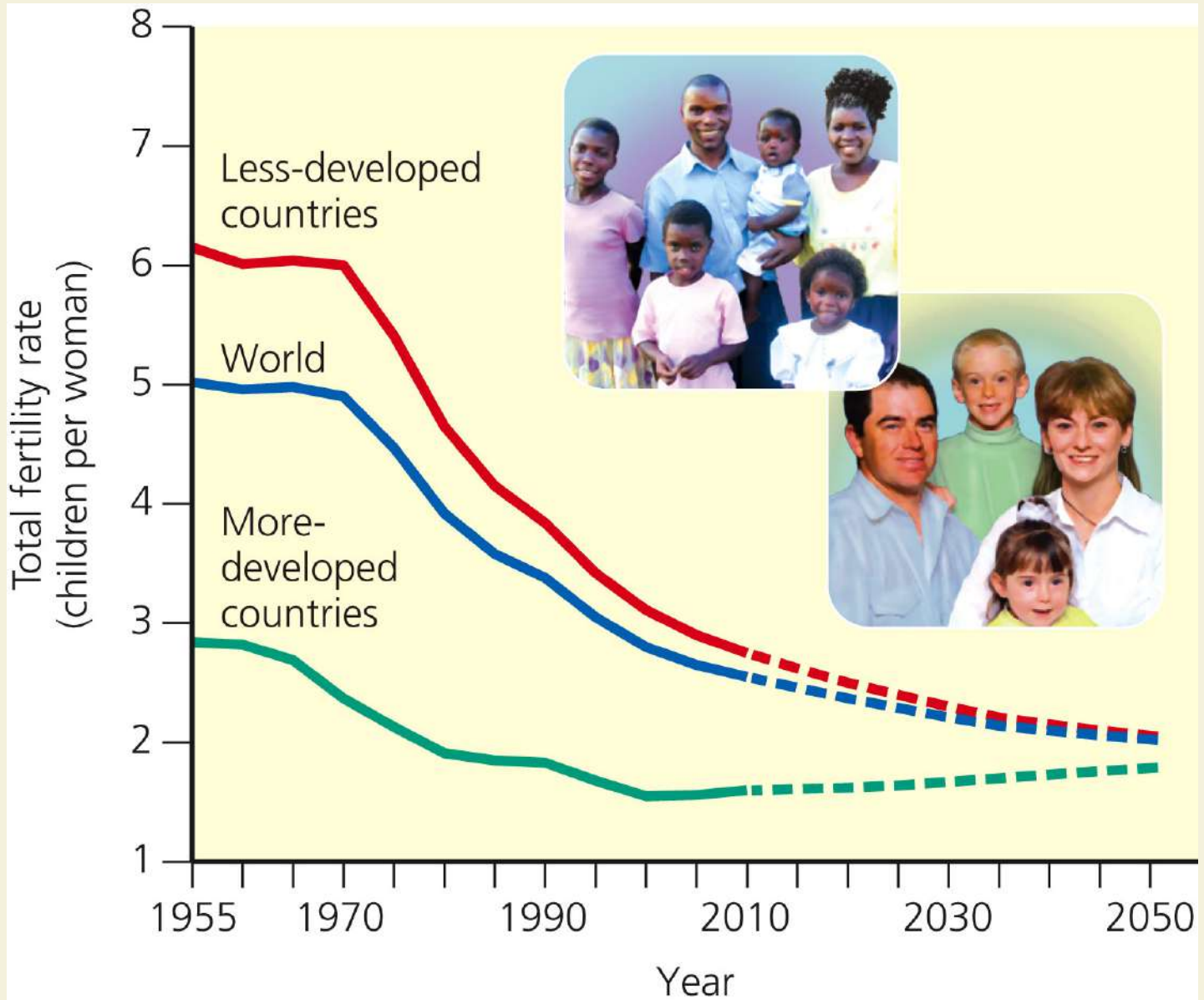


Fig. 6-5, p. 130

2010 Rate of Population Increase

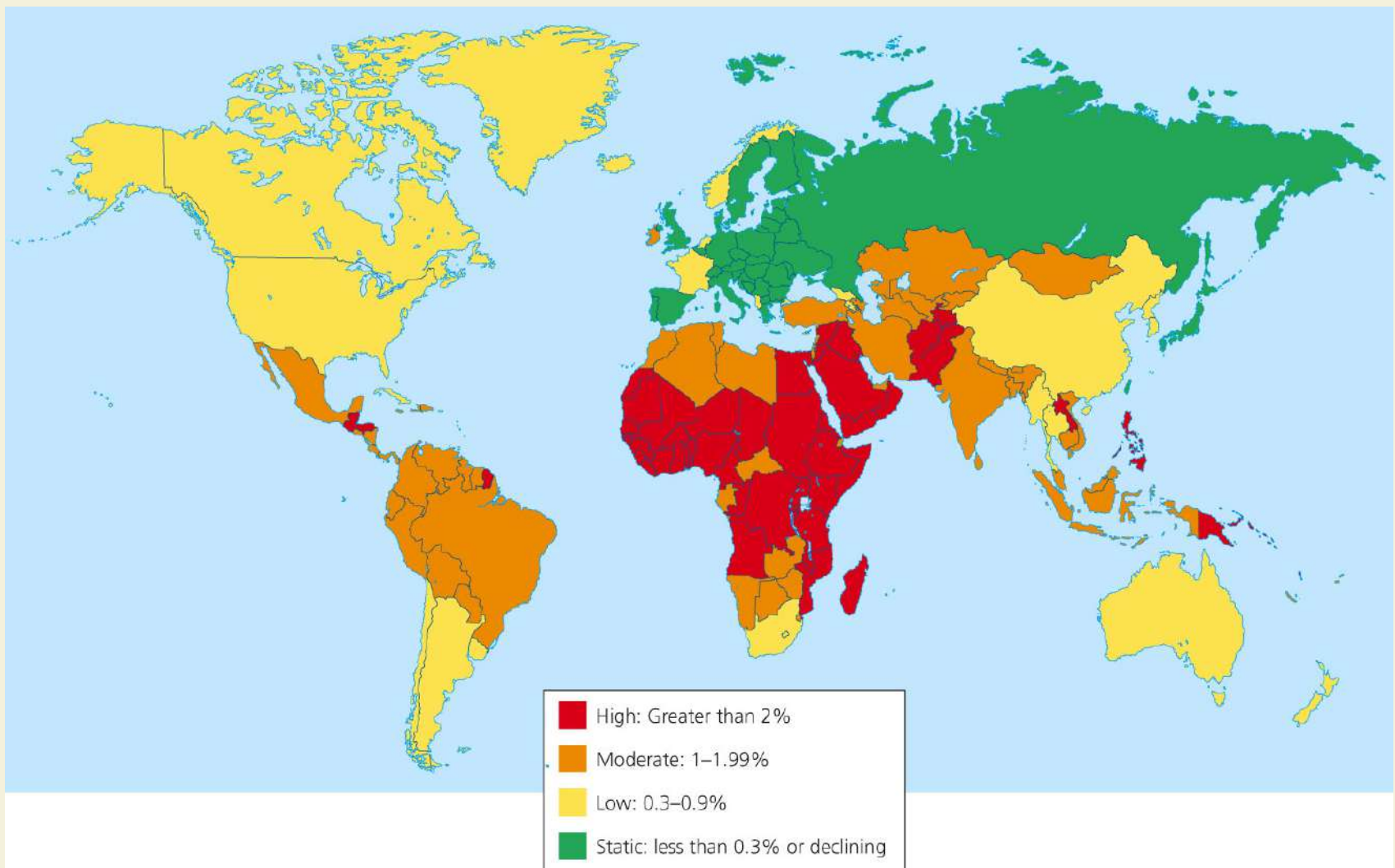


Figure 11, Supplement 8

Total Fertility Rate

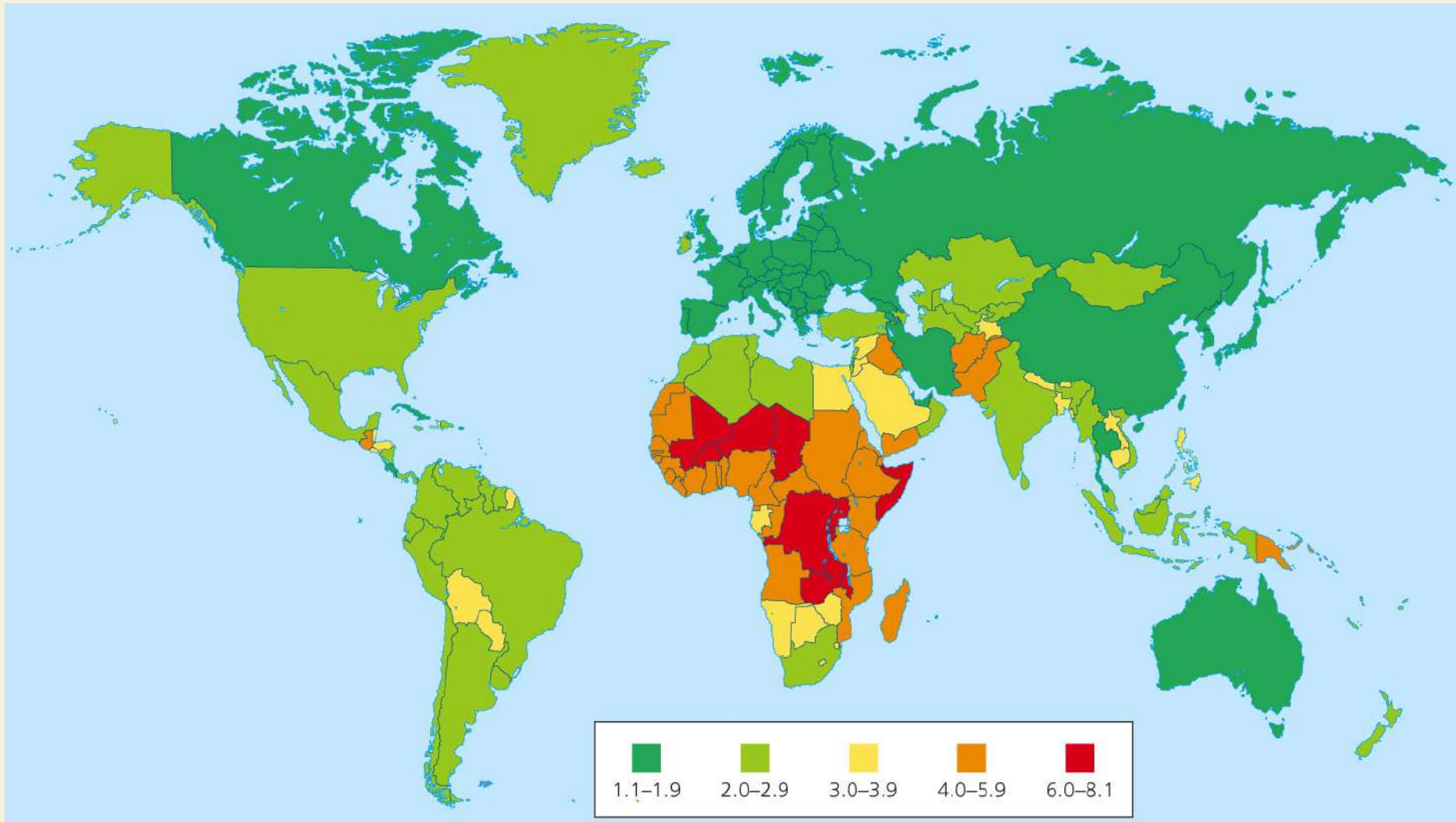
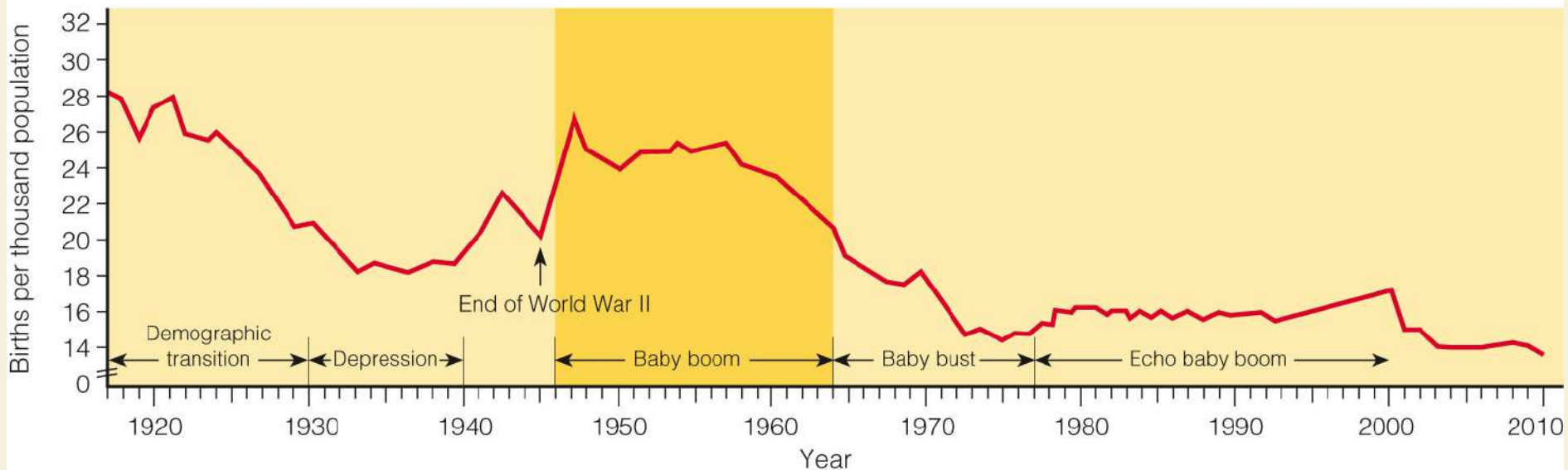
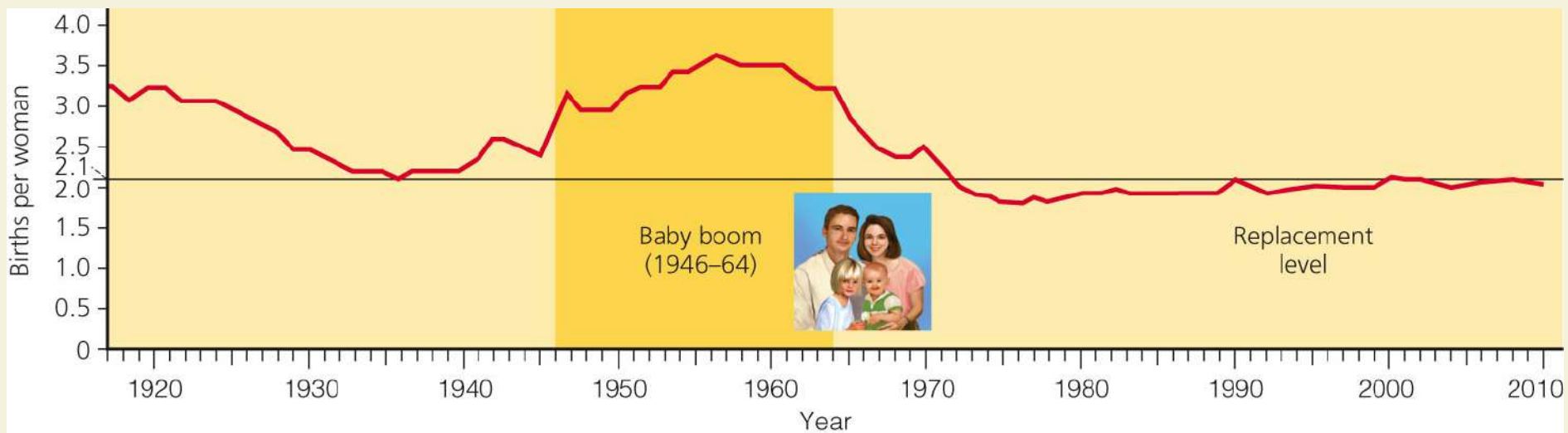


Figure 12, Supplement 8

Case Study: The U.S. Population Is Growing Rapidly

- Population still growing and not leveling off
 - 76 million in 1900
 - 310 million in 2010
- 1957 TFR – 3.7
- 2010 TFR – 2.1 (China TFR – 1.5)
- Drop in TFR in U.S.
 - Rate of population growth has slowed
- Changes in lifestyle in the U.S. during the 20th century
 - much larger ecological footprint

U.S. TFRs and birth rates 1917-2010



20th Century Lifestyle Changes in the U.S.

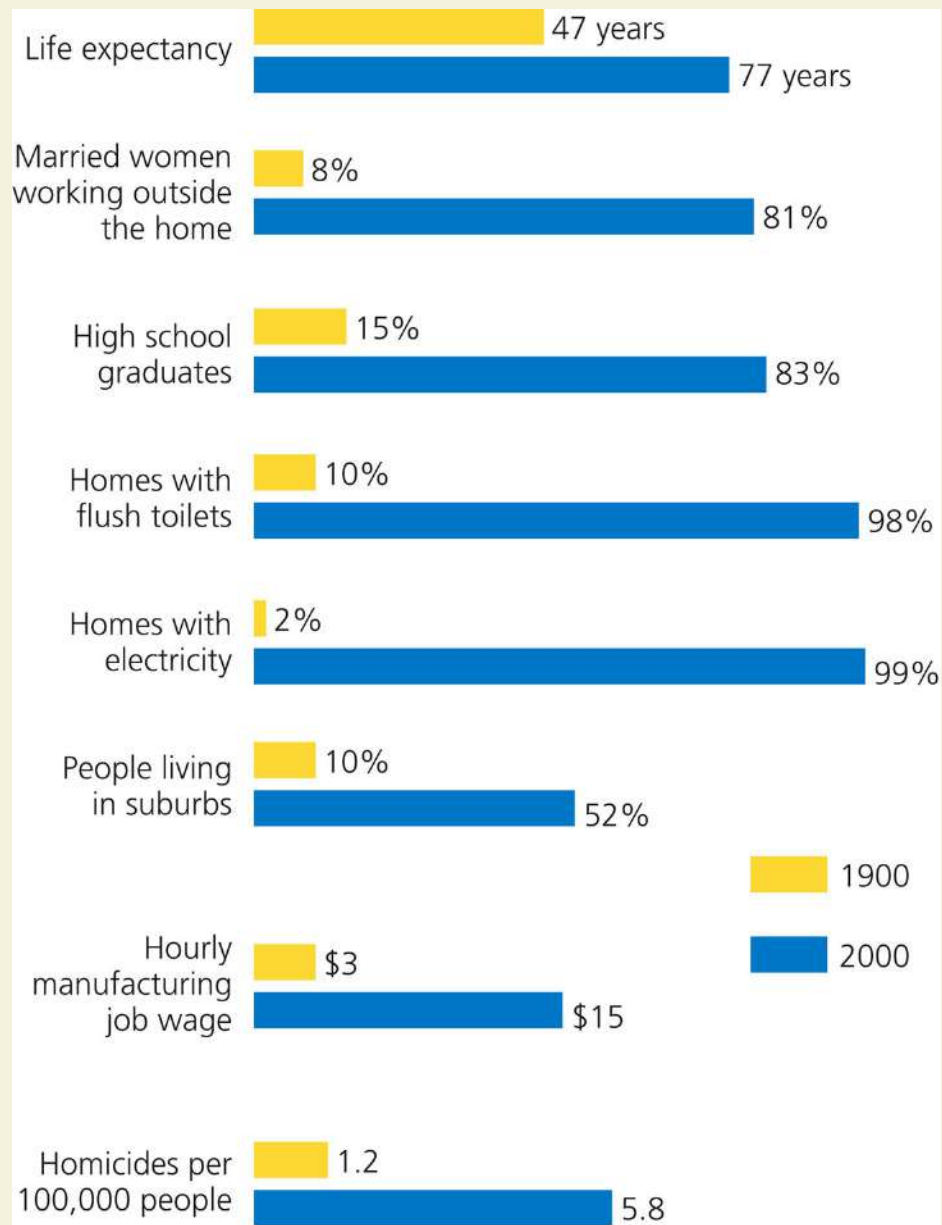


Fig. 6-7, p. 132

Several Factors Affect Birth Rates and Fertility Rates

- Factors that affect birth and fertility rates
 - Children as part of the labor force
 - Cost of raising and educating children
 - Availability of private and public pension
 - Urbanization
 - Educational and employment opportunities for women
 - Average age of a woman at birth of first child
 - Availability of legal abortions
 - Availability of reliable birth control methods
 - Religious beliefs, traditions, and cultural norms

Girl Carrying Well Water in India



Fig. 6-8, p. 132

Child Laborers in India



Several Factors Affect Death Rates (1)

- **Life expectancy**
 - Average number of years a newborn infant can be expected to live
- **Infant mortality rate**
 - Number of live births that die in first year
- People are living longer
 - Increased food supply and distribution
 - Better nutrition
 - Medical advances
 - Improved sanitation

Several Factors Affect Death Rates (2)

- High infant mortality rate is a measure of a country's quality of life
- U.S. is 54th in world for infant mortality rate
- U.S. infant mortality rate high due to
 - Inadequate health care for poor women during pregnancy and their infants
 - Drug addiction among pregnant women
 - High birth rate among teenagers

Infant Mortality Rates, 1950-2010

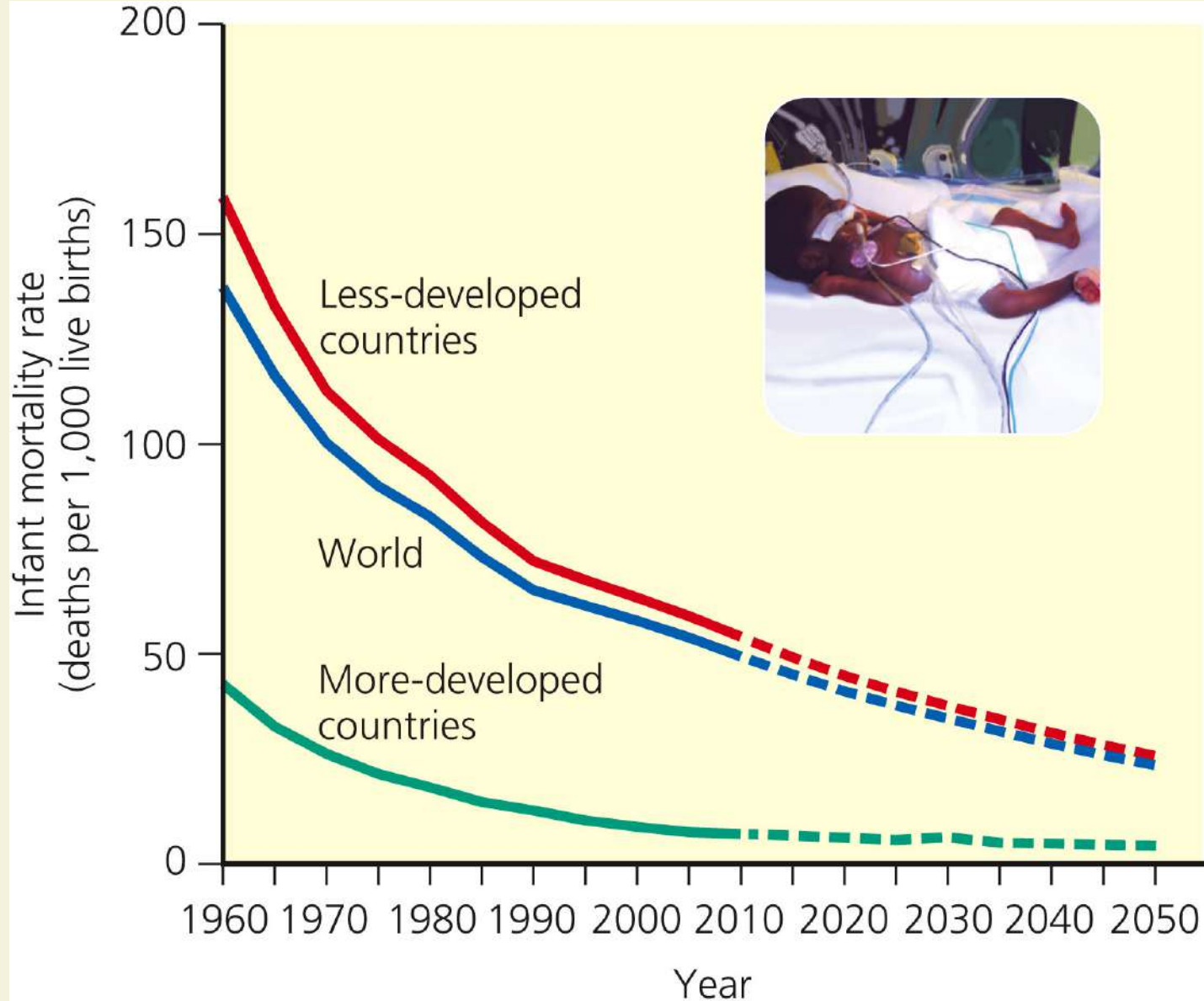


Fig. 6-10, p. 134

Infant Mortality Rates in 2010

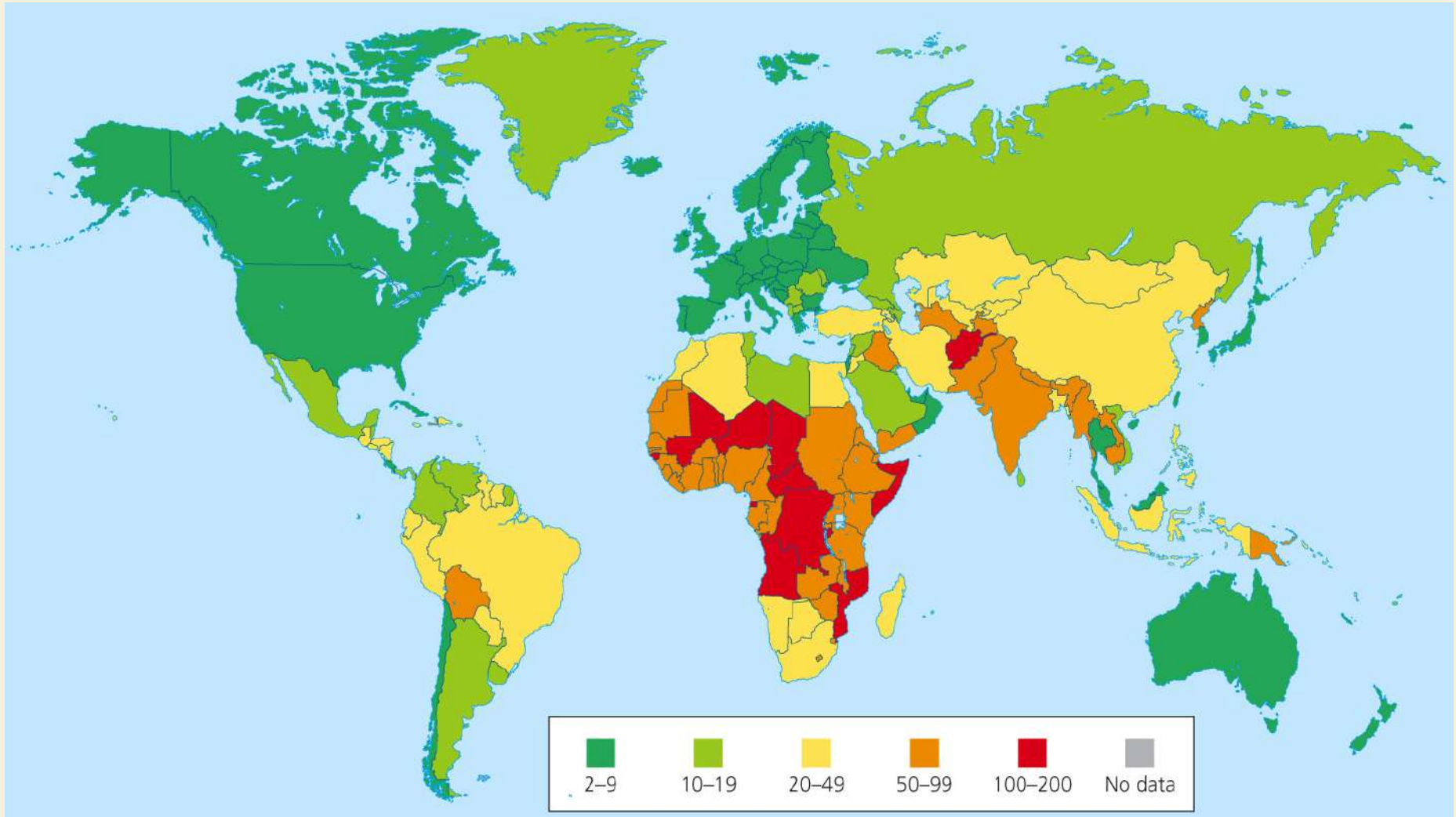


Figure 13, Supplement 8

Migration Affects an Area's Population Size

- **Migration**
 - The movement of people into (immigration) and out of (emigration) specific geographic areas
- Results of migration
 - Economic improvement
 - Religious freedom
 - Political freedom
 - Wars
 - Environmental refugees

Case Study: The United States: A Nation of Immigrants

- Historical role of immigration in the U.S.
 - Since 1820 US has admitted twice as many immigrants and refugees as all other countries combined
 - 1820-1960 most legal immigrants came from Europe
 - Since 1960 most have come from Latin America
 - This has caused a controversy in the US over immigration issues

Legal Immigration to the U.S. between 1820 and 2006

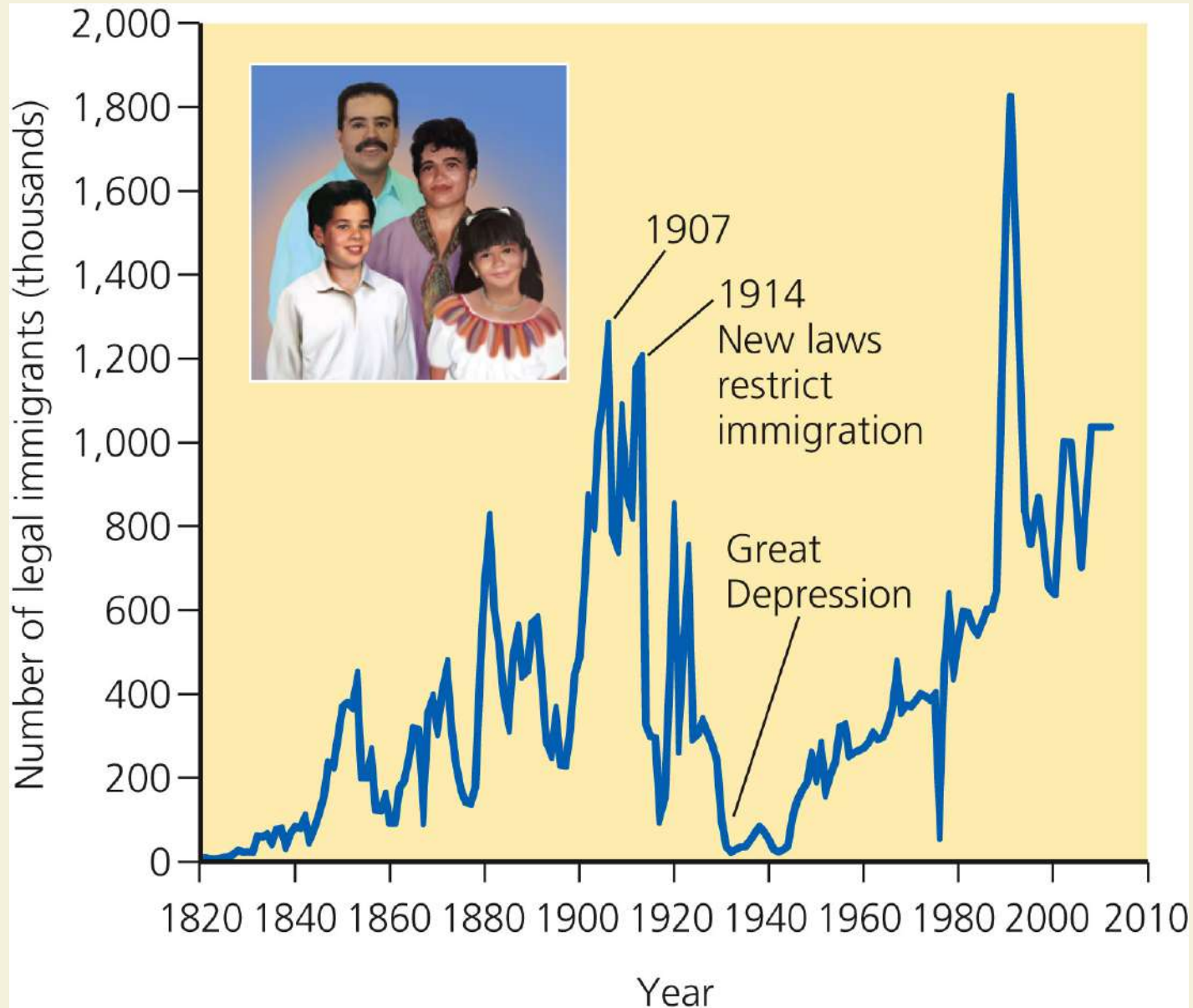


Fig. 6-11, p. 135

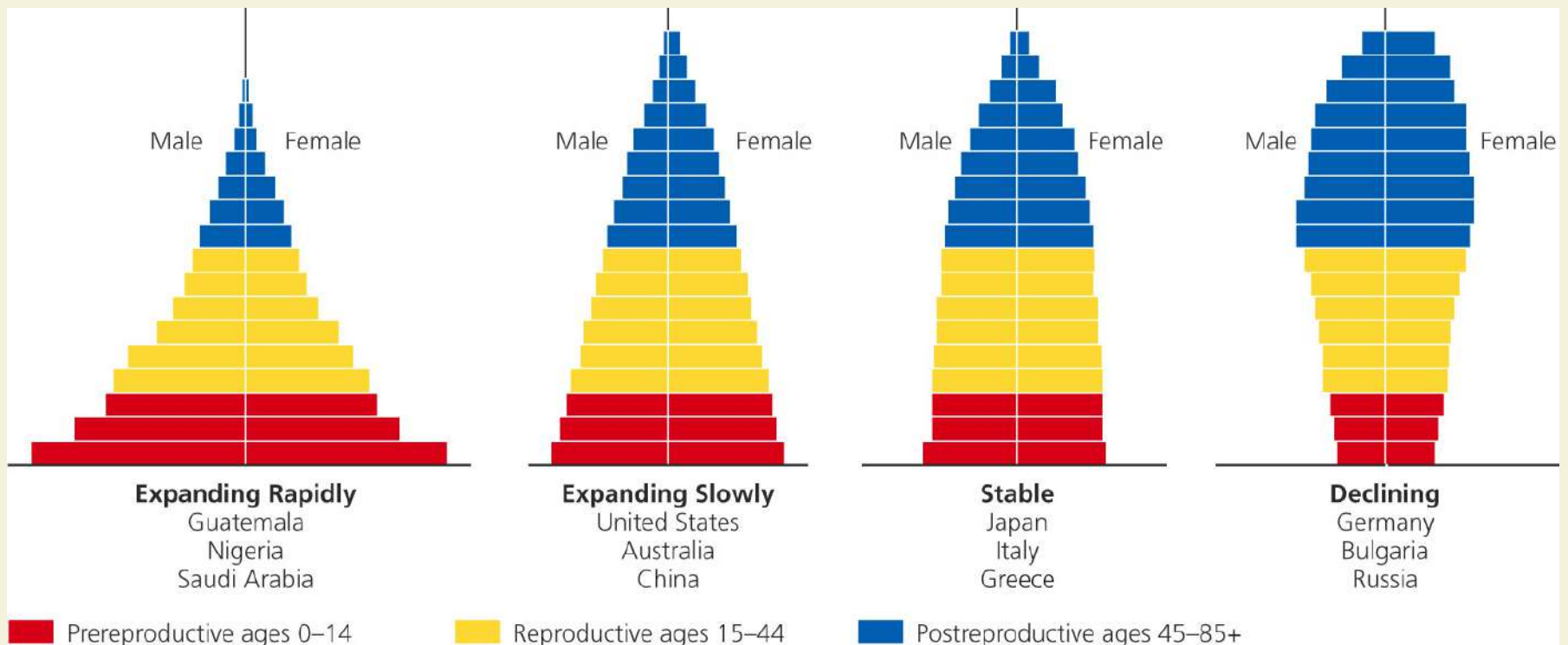
6-3 How Does a Population's Age Structure Affect Its Growth or Decline?

- **Concept 6-3** *The numbers of males and females in young, middle, and older age groups determine how fast a population grows or declines.*

A Population's Age Structure Helps Us Make Projections

- **Age structure**
 - Numbers or percentages of males and females in young, middle, and older age groups in a population
- Categories:
 - Prereproductive ages (0-14)
 - Reproductive ages (15-44)
 - Postreproductive ages (45 and older)
- Seniors are the fastest-growing age group

Generalized Population Age-Structure Diagrams



Population Structure by Age and Sex in Developing and Developed Countries

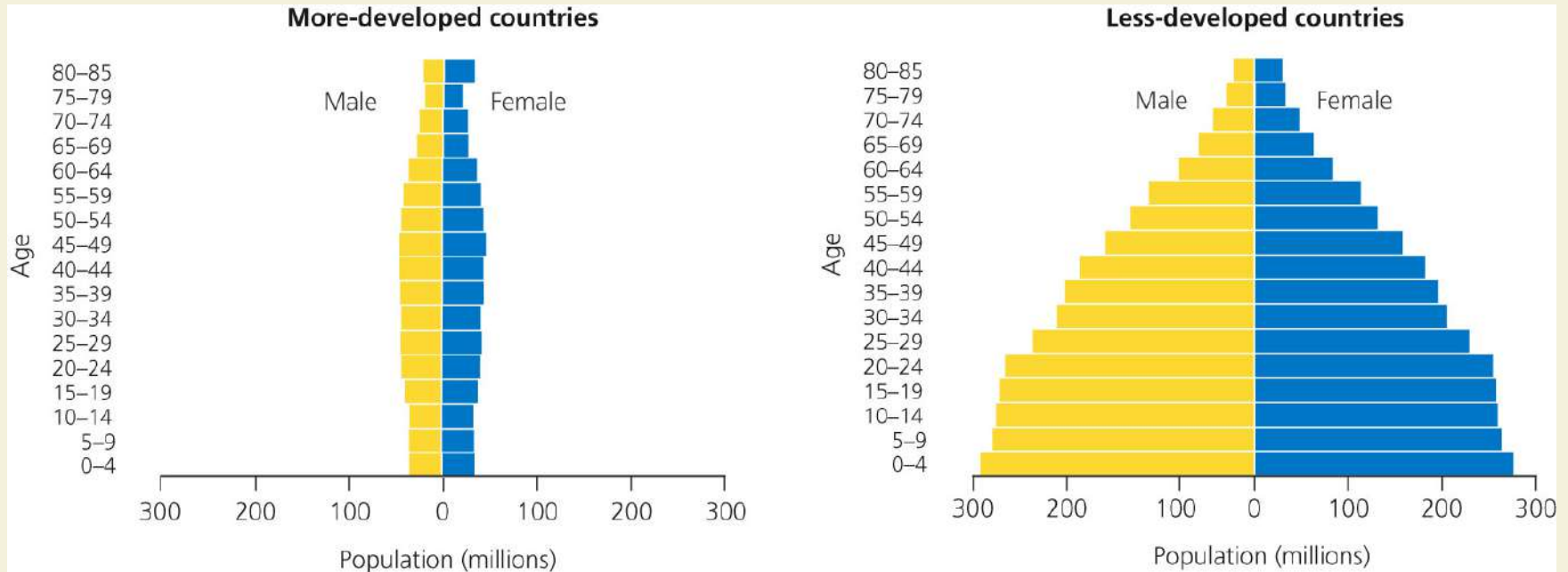


Fig. 6-13, p. 136

Case Study: The American Baby Boom

- The bulk of America's population was at reproductive age
 - 79 million people, 36% of adults
 - Affect politics and economics
 - Now becoming senior citizens
 - Graying of America

Tracking the Baby-Boom Generation in the United States

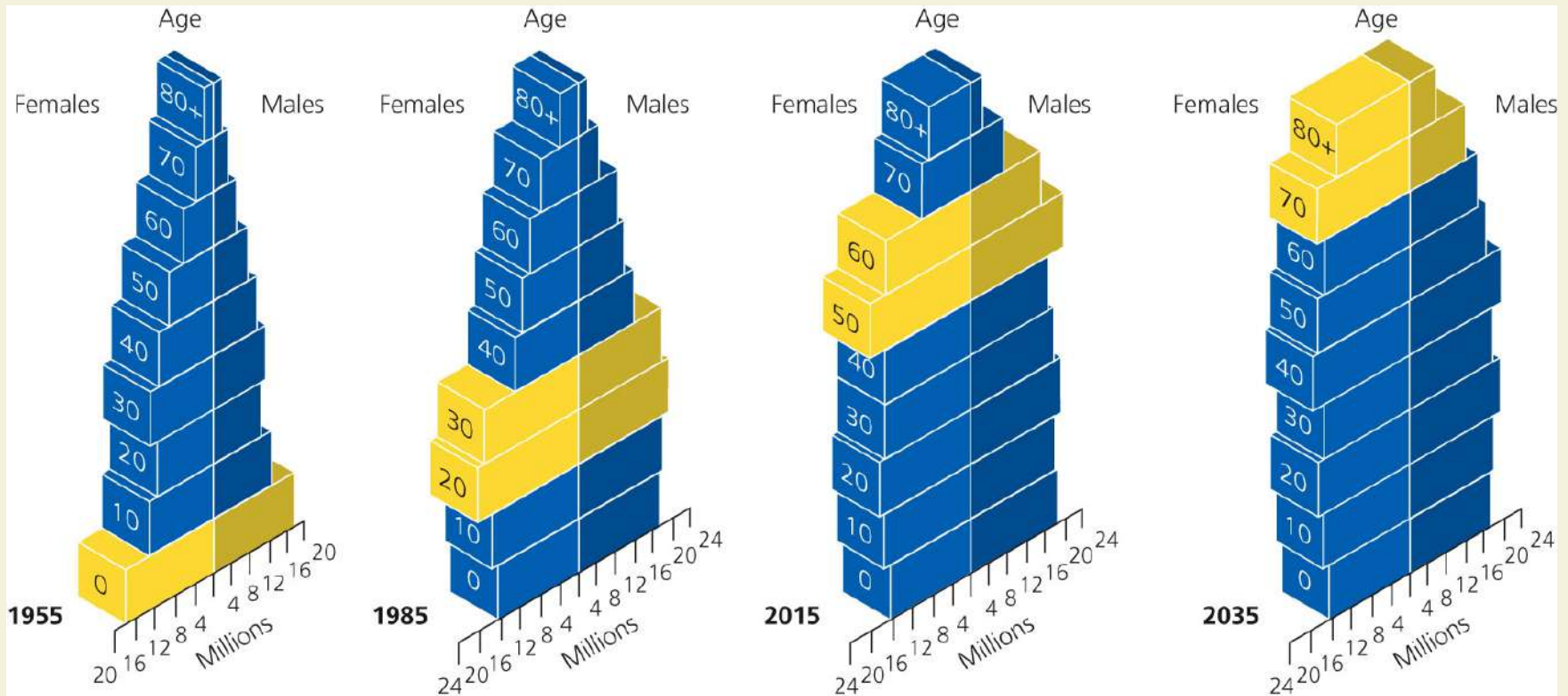


Fig. 6-14, p. 137

Populations Made Up of Mostly Older People Can Decline Rapidly

- Consequences of a large aging population
 - Slow decline
 - Manageable
 - Rapid decline
 - Severe economic problems
 - How pay for services for elderly
 - Proportionally fewer young people working
 - Labor shortages
 - Severe social problems

Some Problems with Rapid Population Decline

Some Problems with Rapid Population Decline

Can threaten economic growth

Labor shortages

Less government revenues with fewer workers

Less entrepreneurship and new business formation

Less likelihood for new technology development

Increasing public deficits to fund higher pension and health-care costs

Pensions may be cut and retirement age increased



Populations Can Decline from a Rising Death Rate: The AIDS Tragedy

- Disease (AIDS) can have a devastating affect on a population
 - 27 million killed: 1981-2009
 - Many young adults die: loss of most productive workers
 - Sharp drop in life expectancy
 - International community
 - Reduce the spread of HIV through education and health care
 - Financial assistance and volunteers

Botswana Age Structure, With and Without AIDS

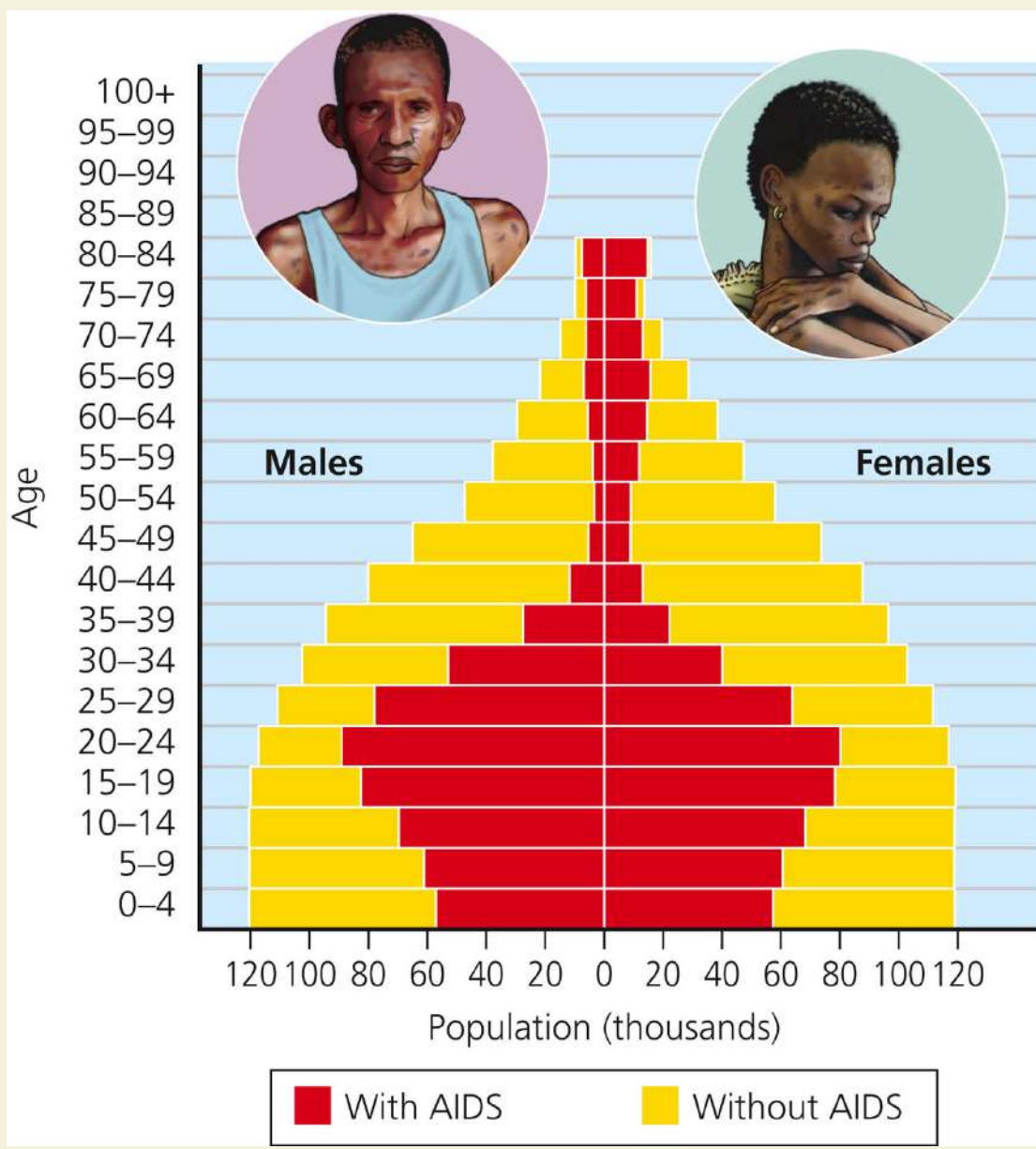


Fig. 6-16, p. 139

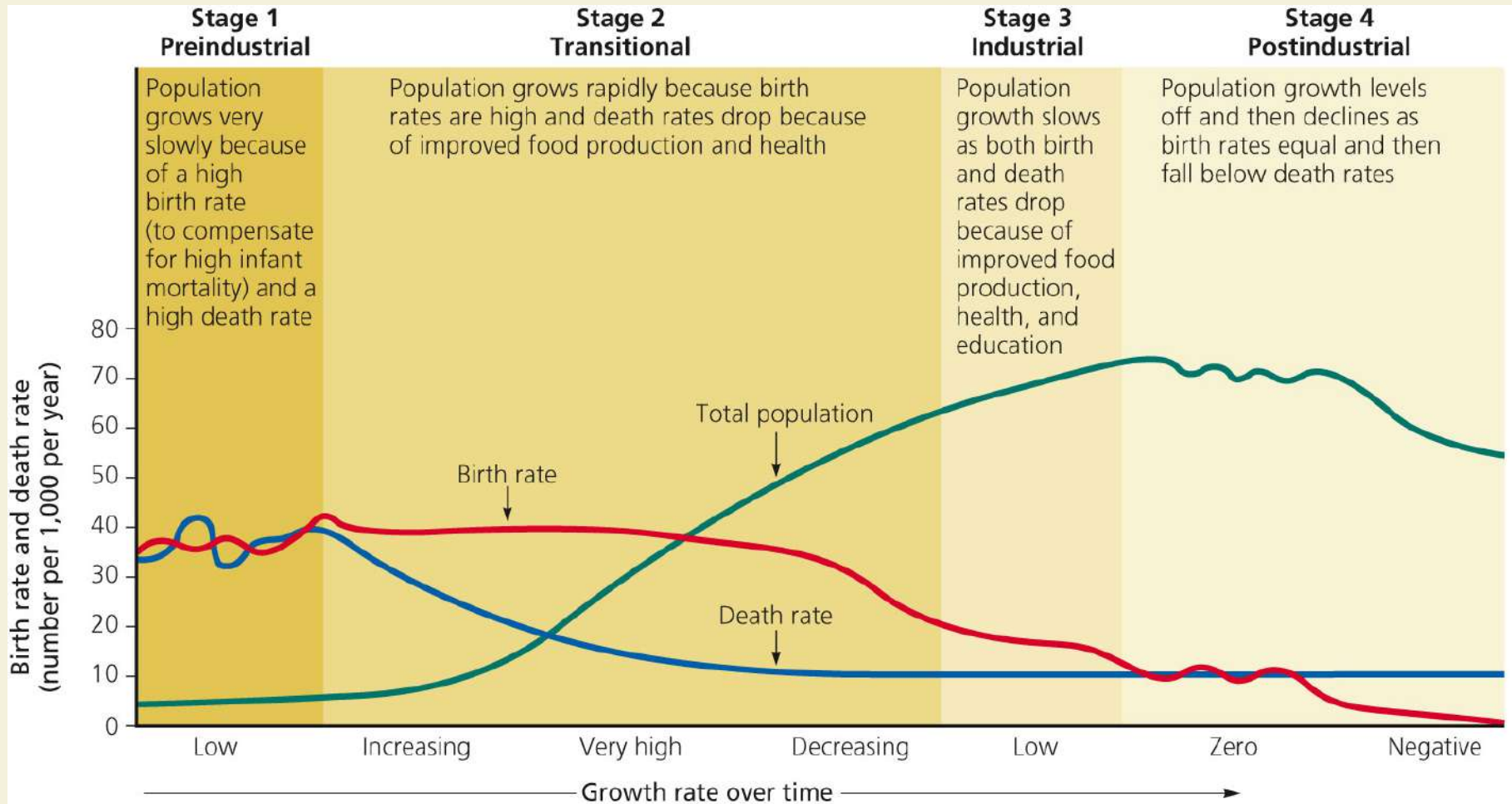
6-4 How Can We Slow Human Population Growth?

- ***Concept 6-4*** *We can slow human population growth by reducing poverty, elevating the status of women, and encouraging family planning.*

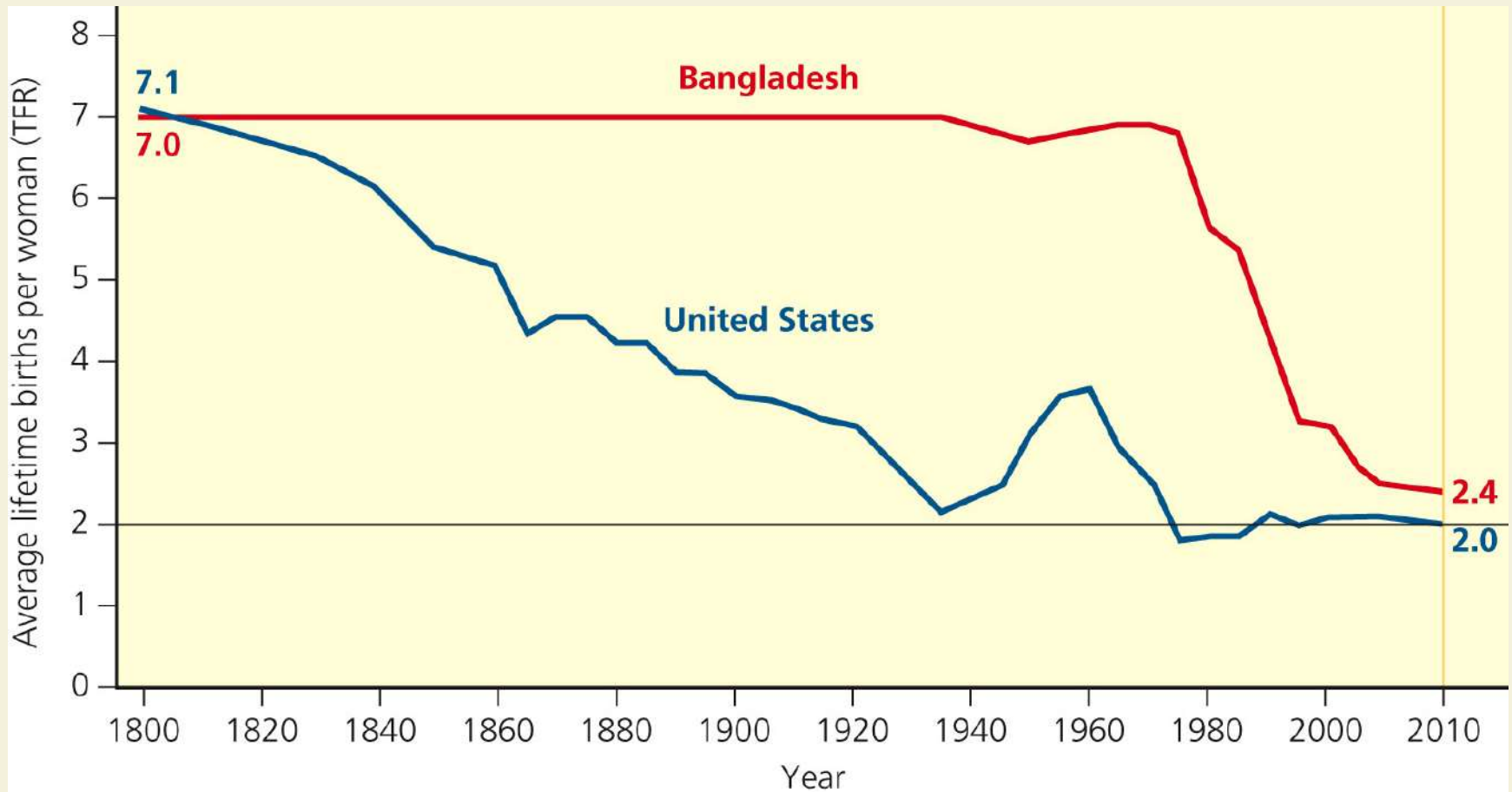
As Countries Develop, Their Populations Tend to Grow More Slowly

- **Demographic transition**
 - As countries become industrialized and economically developed:
 - First death rates decline
 - Then birth rates decline
 - Takes place in 4 stages
 1. Preindustrial
 2. Transitional
 3. Industrial
 4. Postindustrial

Four Stages of the Demographic Transition



TFR in Bangladesh and U.S., 1800-2010



Slum in India



Fig. 6-19, p. 141

Empowering Women Can Slow Population Growth

- Factors that decrease total fertility rates:
 - Education
 - Paying jobs
 - Ability to control fertility
- Women
 - Do most of the domestic work and child care
 - Provide unpaid health care
 - 2/3 of all work for 10% of world's income
 - Discriminated against legally and culturally

Burkina Faso Women Hauling Fuelwood



Fig. 6-20, p. 141

Promote Family Planning

- Family planning in less-developed countries
 - Responsible for a 55% drop in TFRs
 - Financial benefits: money spent on family planning saves far more in health, education costs
- Two problems
 1. 42% pregnancies unplanned, 26% end with abortion
 2. Many couples do not have access to family planning

Case Study: Slowing Population Growth in India

- India
 - 1.2 billion people
 - most populous country in 2015
 - Problems
 - Poverty
 - Malnutrition
 - Environmental degradation
 - Bias toward having male children
 - Poor couples want many children
 - Only 48% of couples use family planning

Homeless Woman and Child in India



Fig. 6-21, p. 143

Three Big Ideas

1. The human population is increasing rapidly and may soon bump up against environmental limits.
2. Even if population growth were not a serious problem, the increasing use of resources per person is expanding the overall human ecological footprint and putting a strain on the earth's resources.
3. We can slow population growth by reducing poverty through economic development, elevating the status of women, and encouraging family planning.