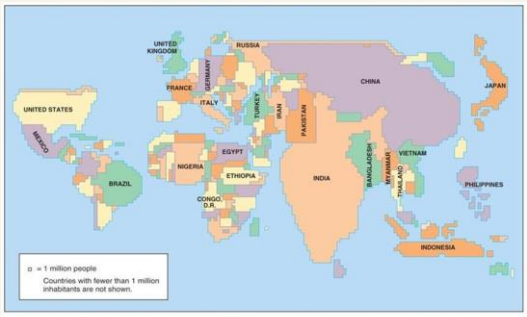
POPULATION

Population Basics

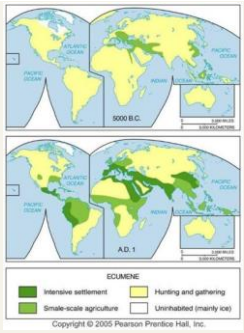
- Food production and hunger
- Population pressure (Egypt)
- Population basics
- Gender issues

World Population Cartogram



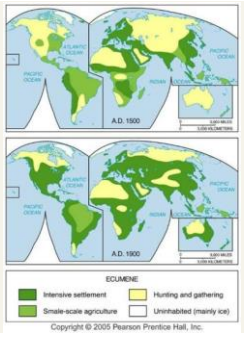
Expansion of the Ecumene 5000 B.C.– A.D. 1

- The ecumene, or the portion of the Earth with permanent human settlement, has expanded to cover most of the world's land area



Expansion of the Ecumene A.D. 1500 – A.D. 1900

- The ecumene, or the portion of the Earth with permanent human settlement, has expanded to cover most of the world's land area



Food Resources

- Where? Sunshine, water, soil
- Population doubled since 1950
- Who has food production
- But, in a different set of places
- And, with expensive inputs

Food Resources

- 30,000 edible species
- 90% of food comes from 15 plants and 8 animals
- Four crops total over 50% of calories
- 90% of caloric energy is lost by going up a step in the food chain

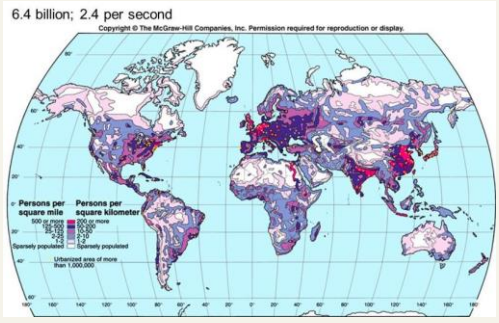
Hunger, malnutrition, and famine

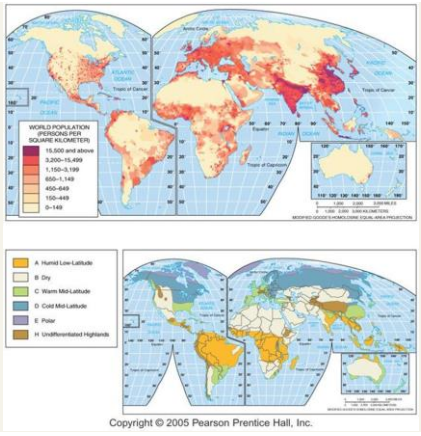
- Hunger: insufficient food
- Malnutrition: wrong kind of food
  - Insufficient protein, Vitamin A, etc.
  - Too much or not enough
  - Long-term problem

Hunger, malnutrition, and famine

- Famine: inability to get food
  - More localized, temporary
  - Poverty > food shortage
  - Drought or natural disaster
  - Political conflict or displacement
- Disease, not starvation, kills

World Population

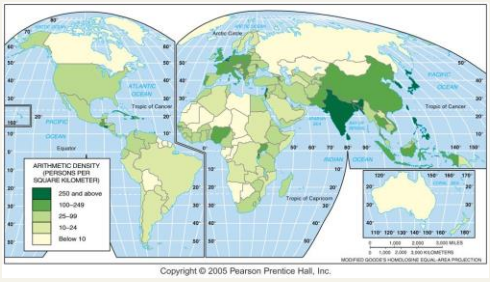




Density

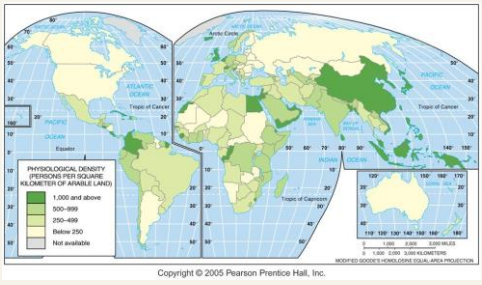
- **Arithmetic Density** – the total number of people per a unit of land area.
  - U.S. = 76/mi2
  - NYC=1,000,000/mi2
  - Australia = 7/mi2
- **Physiological Density** – the total number of people per a unit of arable (farmable) land.

Arithmetic Density



Arithmetic population density is the number of people per total land area or per square mile/km.

Physiological Density

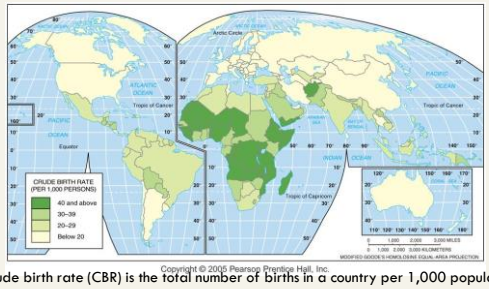


Physiological density is the number of people per arable land area. This is a good measure of the relation between population and agricultural resources in a society.

Basic Demographics

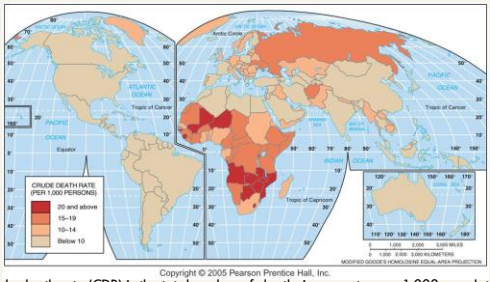
- **Crude Birth Rate:** The total number of live births in a year for every 1,000 people alive in the society.
- **Crude Death Rate:** The total number of deaths in a year for every 1,000 people alive in the society.
- **Natural Increase:** The percentage growth of a population in a year, computed as the crude death rate minus the crude birth rate.

Crude Birth Rate



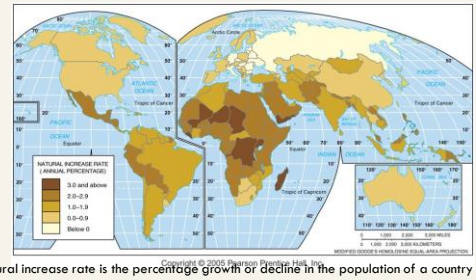
The crude birth rate (CBR) is the total number of births in a country per 1,000 population per year. The lowest rates are in Europe, and the highest rates are in Africa and several Asian countries.

Crude Death Rate



The crude death rate (CDR) is the total number of deaths in a country per 1,000 population per year. Because wealthy countries are in a late stage of the demographic transition, they often have a higher CDR than poorer countries – more older people than younger people.

Rate of Natural Increase

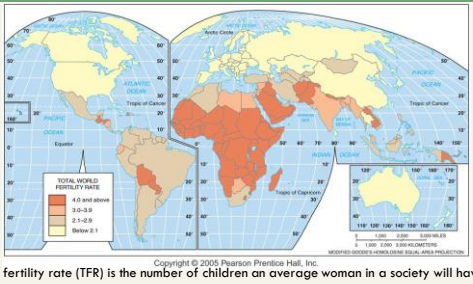


The natural increase rate is the percentage growth or decline in the population of a country per year (not including net migration). i.e. natural increase or decrease is the difference btw birth and deaths. Countries in Africa and Southwest Asia have the highest current rates, while Russia and some European countries have negative rates.

Total Fertility Rate

- **Total Fertility Rate** - the average number of children a women will have in her childbearing years
  - This rate varies from just over 1 (Japan, Italy) to around 7 (Niger, Mali)
  - The U.S. rate is 2
- 2.1 is generally regarded as the replacement rate (the rate at which a population neither grows nor shrinks) in the developed world
- In less developed countries this rate should be higher to account for so many children not reaching childbearing age

Total Fertility Rate

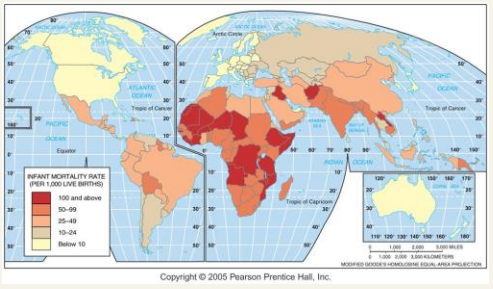


The Total fertility rate (TFR) is the number of children an average woman in a society will have through her childbearing years. The lowest rates are in Europe, and the highest are in Africa and parts of the Middle East, due mainly to Social Reasons. In traditional societies, CHILDREN take care of their parents, not Social Security.

Infant Mortality Rate

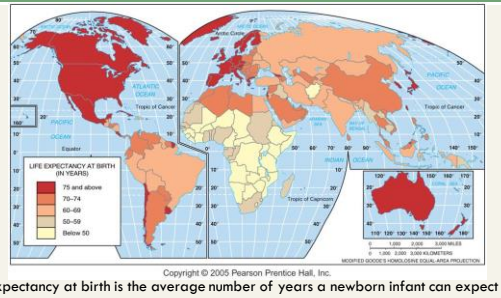
- **Infant Mortality Rate** – the number of deaths of children under the age of one per thousand live births
- The rate ranges from as low as 3 (Singapore, Iceland) to as much as 150 (Sierra Leone, Afghanistan)
- The U.S. rate is just over 6
- High infant mortality tends to result in higher fertility rates as families seek "insurance" for the loss of children

Infant Mortality Rate



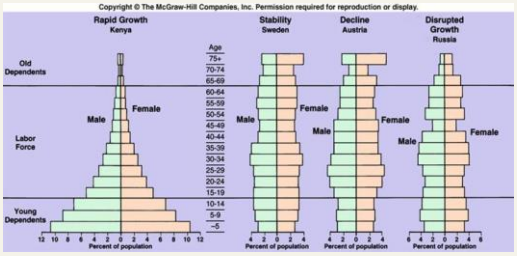
The infant mortality rate is the number of infant deaths per 1,000 live births per year. The highest infant mortality rates are found in some of the poorest countries of Africa and Asia.

Life Expectancy at Birth

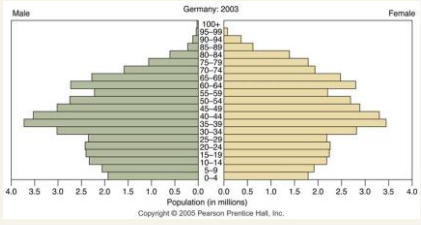


Life expectancy at birth is the average number of years a newborn infant can expect to live. The highest life expectancies are generally in the wealthiest countries, and the lowest in the poorest countries.

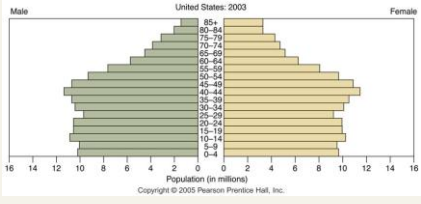
Population pyramids of Kenya, Sweden, Austria, and Russia



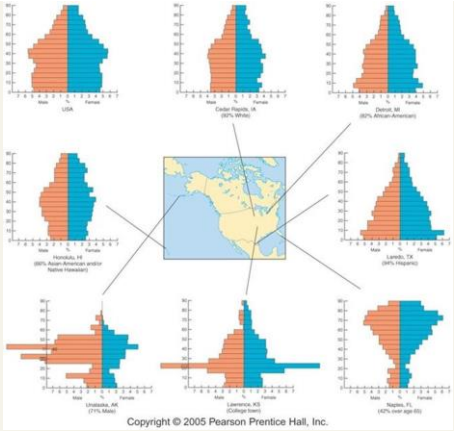
Population pyramid Germany



Population pyramid United States



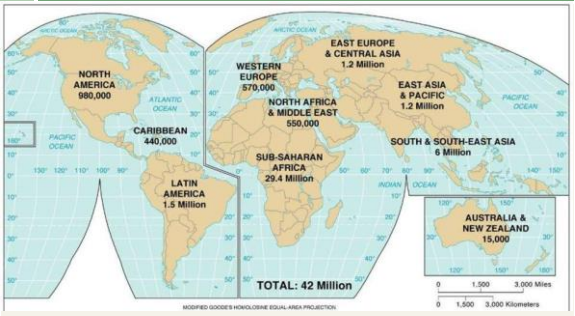
Population pyramids of Western Europe, Sub-Saharan Africa, and Botswana



World Death Rates

- Infectious diseases
  - HIV/AIDS
  - SARS
- Degenerative diseases
  - Obesity
  - Tobacco use
- Epidemiology
- Epidemiological transition

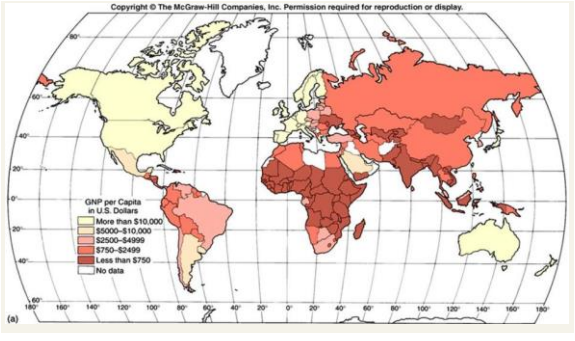
Adults and Children Living with AIDS, 2004



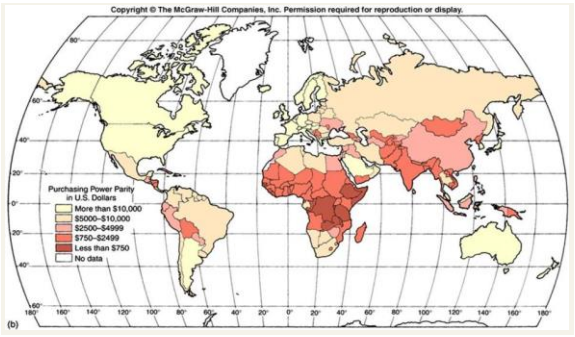
Measuring Prosperity

- GDP: gross domestic product
- Measures all goods and services produced within a country
- "Economic growth" means GDP growth
- What's wrong with GDP?
  - Only measures money changing hands
  - No quality of life measures
  - No subtraction for resource use

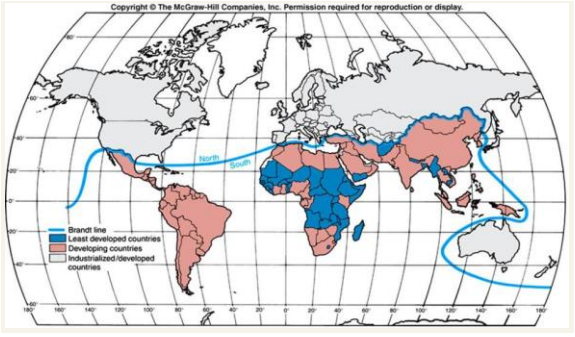
GNP per capita



GNP per capita, adjusted for prices



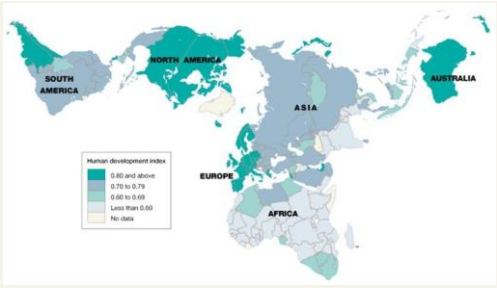
Comparative Development Levels (Brandt Line)



Measuring Prosperity

- HDI: human development index
- Life expectancy at birth
- Education (literacy and years of school)
- Standard of living (GDP per capita)

Human Development Index (HDI)



Gender and Population

- Social, not biological, difference
- Gender roles tied to economic activity
  - Pre-agriculture, even responsibilities
  - Plow agriculture gave men land rights
  - Industrialization kept women at home

Gender and Population

- Fertility rate from 4.5 in 1970 to 2.7
- But 840 million to 1.5 billion women; 80% in developing countries
- Low fertility rate correlates with high GDP
- And high female literacy correlates with low fertility

Gender and Health

- Maternal mortality ratio as health disparity
- From 1 in 16 pregnancies (Africa) to 1 in 2000 (Europe)
  - 60% iron deficiency
- 100 million "missing females"
  - Cultural preference, not poverty

Gender and Subsistence Farming

- Men own land and plow
- Women do everything else
  - Planting, weeding, harvesting
  - Kitchen gardens
  - Water and fuelwood
- Environmental degradation affects women first

Gender and Commercial Farming

- Wage labor is more highly valued
- Men migrate to cities; women head the household
- But men still own the land and credit
- Paid crops discourage subsistence crops
- And men contribute 75% of wages

Population II

- Future predictions: Malthus vs. Boserup
- The demographic transition
- Urbanization and world cities (Delhi)

Will the World Face an Overpopulation Problem?

- Malthus on overpopulation
  - Population growth and food supply
  - Malthus' critics
- Declining birth rates
  - Malthus theory and reality
  - Reasons for declining birth rates
- World health threats
  - Epidemiological transitions

Future population

- Doubling time = 70 ÷ rate of natural increase

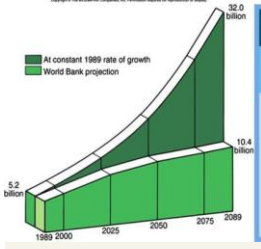


TABLE 6.1

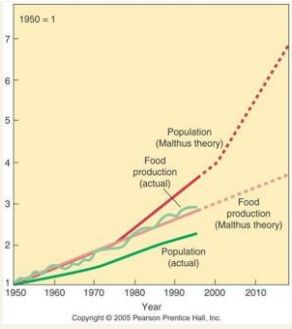
Doubling Time in Years at Different Rates of Increase

Annual Percentage Increase	Doubling Time (Years)
0.5	140
1.0	70
2.0	35
3.0	24
4.0	17
5.0	14
10.0	7

Future Population: Thomas Malthus

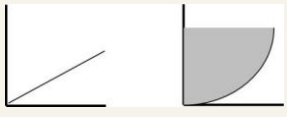
- Essay on the Principle of Population (1798)
- Observing the Industrial Revolution
- Food is necessary for human existence
- "The passion between the sexes is necessary and constant"

Future Population: Malthus



Future Population: Malthus

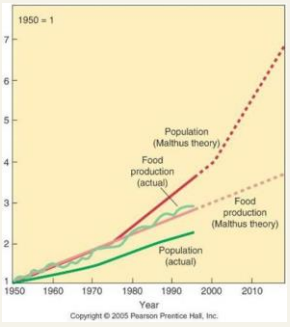
- Food production grows arithmetically, but population grows geometrically



- Therefore, the human population will self-regulate by means of famine
- Ecological view of humanity

Food and Population, 1950–2000

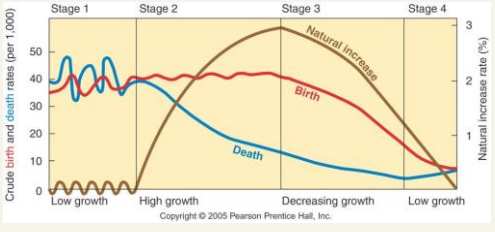
- Malthus predicted population would grow faster than food production, but food production actually expanded faster than population in the second half of the twentieth century.



Demographics

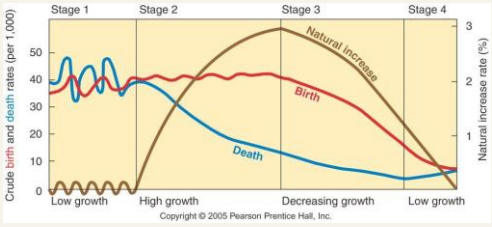
Demographic Transition

- Shift from high birth and death rates to low birth and death rates



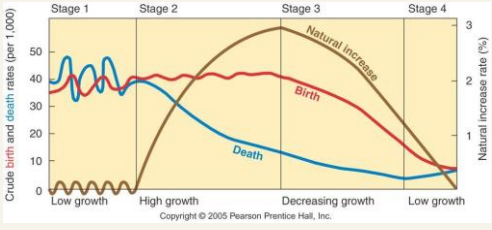
Demographic Transition

- Stage 1: pre-industrial
- High birth rate; high, fluctuating death rate



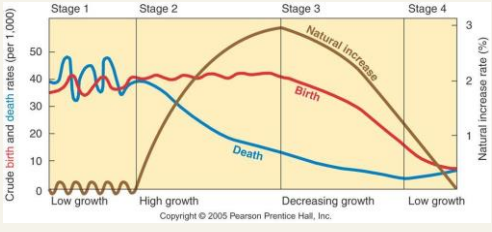
Demographic Transition

- Stage 2: industrial
- Birth rate stays high
- Death rate drops with better living conditions



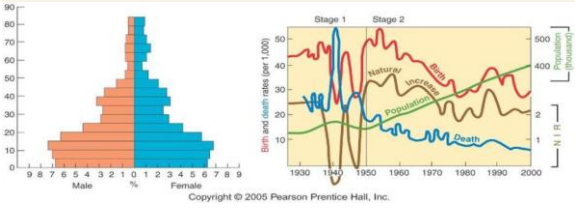
Demographic Transition

- Stage 3: urbanized
- Birth rate drops; death rate stays low
- Growth begins to taper off



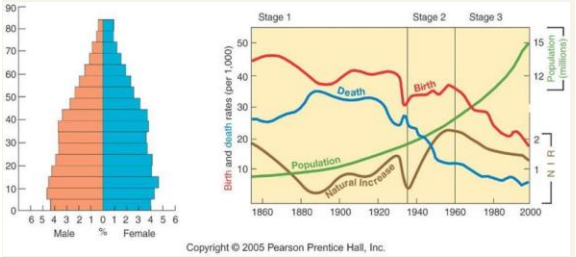
Rapid Growth in Cape Verde

- Cape Verde, which entered stage 2 of the demographic transition in about 1950, is experiencing rapid population growth.
- Its population history reflects the impacts of famines and out-migration.



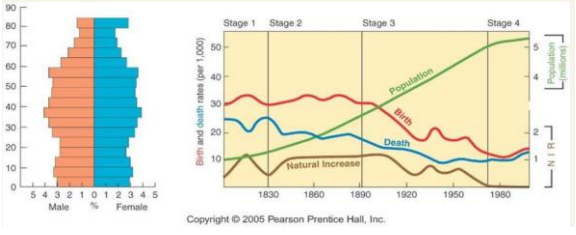
Moderate Growth in Chile

- Chile entered stage 2 of the demographic transition in the 1930s, and it entered stage 3 in the 1960s.



Low Growth in Denmark

- Denmark has been in stage 4 of the demographic transition since the 1970s, with little population growth since then
- Its population pyramid shows increasing numbers of elderly and few children



Demographic transition in Sweden & Mexico

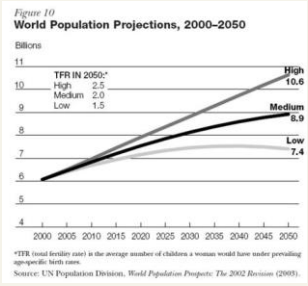
Future population: Ester Boserup

- Conditions of Agricultural Growth (1965)
- Technological improvements keep food production ahead of population
- "Overpopulation" actually drives agricultural improvement
- Social scientists' view of humanity

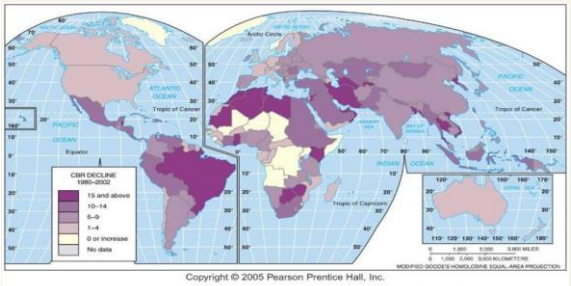
Future Population

- Increasing emphasis on quality of life
- Reproductive health care
- Women's rights and development

Future Population



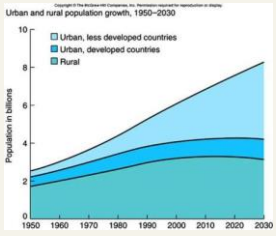
Crude Birth Rate Decline, 1981–2001



Crude birth rates declined in most countries between 1981 and 2001 (though the absolute number of births per year increased from 123 to 133 million)

Urbanization

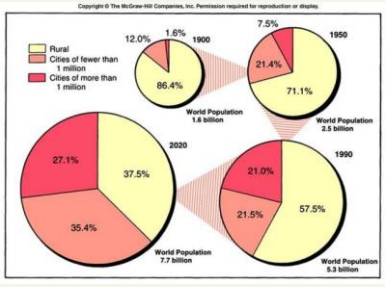
- Just under half world population
- But most growth is in cities
- Overcrowding, food security, health



Urbanization

- Historically follows industrialization
- Industrial Revolution: Europe from 12% to 36%
- 1850-1910, North America from 16% to 40%

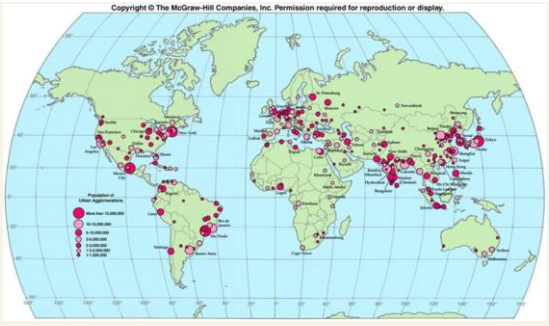
Rural or Urban ?



Urbanization

- 1950-1990, Third World from 17% to 37%
- Most rapid in history
- But without economic growth
- And without urban decentralization

Population of Urban Agglomerations



Cities with 10 million or more inhabitants

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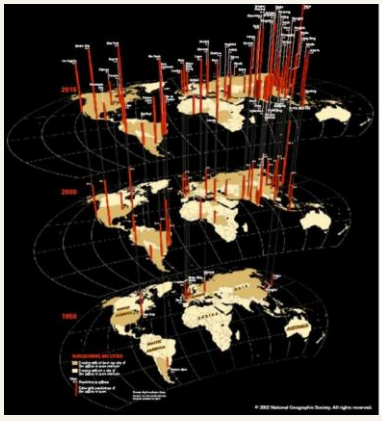
TABLE 12.1

Cities with 10 Million or More Inhabitants (Megacities), 2000 and 2015 (Population in Millions)

Rank	City in 2000	Population	Rank	City in 2015	Projected Population
1	Tokyo, Japan	26.4	1	Tokyo, Japan	26.4
2	Mexico City, Mexico	18.1	2	Mumbai, India	26.1
3	Mumbai (Bombay), India	18.1	3	Lagos, Nigeria	23.2
4	São Paulo, Brazil	17.8	4	Dhaka, Bangladesh	21.1
5	Shanghai, China	17.0	5	São Paulo, Brazil	20.4
6	New York, United States	16.6	6	Karachi, Pakistan	19.2
7	Lagos, Nigeria	13.4	7	Mexico City, Mexico	19.2
8	Los Angeles, United States	13.1	8	Shanghai, China	19.1
9	Calcutta, India	12.9	9	New York, United States	17.4
10	Buenos Aires, Argentina	12.6	10	Jakarta, Indonesia	17.3
11	Dhaka, Bangladesh	12.3	11	Calcutta, India	17.3
12	Karachi, Pakistan	11.8	12	Delhi, India	16.8
13	Delhi, India	11.7	13	Manila, Philippines	14.8
14	Jakarta, Indonesia	11.0	14	Los Angeles, United States	14.1
15	Osaka, Japan	11.0	15	Buenos Aires, Argentina	14.1
16	Manila, Philippines	10.9	16	Cairo, Egypt	13.8
17	Beijing, China	10.8	17	Istanbul, Turkey	12.5
18	Rio de Janeiro, Brazil	10.6	18	Beijing, China	12.3
19	Cairo, Egypt	10.6	19	Rio de Janeiro, Brazil	11.9
			20	Osaka, Japan	11.0
			21	Tianjin, China	10.7
			22	Hyderabad, India	10.5
			23	Bangkok, Thailand	10.1

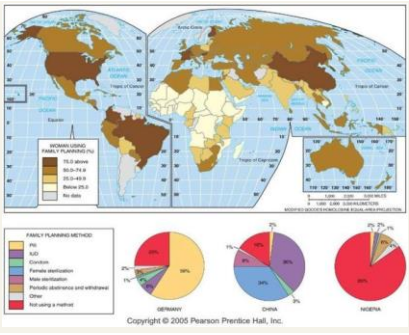
Urbanization: mega-cities

- Population over 10 million
- Disproportionately large economic activity
- From 5 in 1970 to 26 in 2015
- Strong income disparities
- Environmental and health problems
- Lack of infrastructure



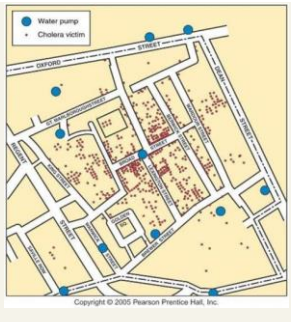
Urbanization: mega-cities

Use of Family Planning

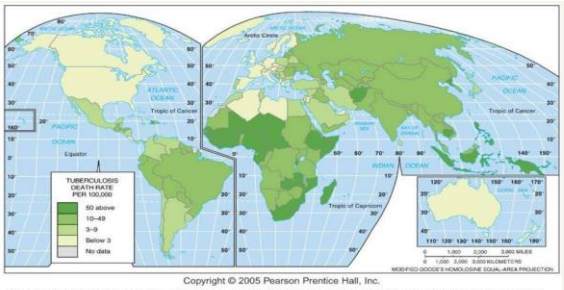


Cholera in London, 1854

- By mapping the distribution of cholera cases and water pumps in Soho, London, Dr. John Snow identified the source of the waterborne epidemic



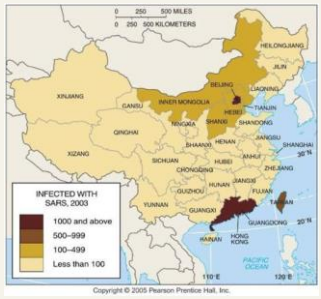
Tuberculosis Death Rates, 2000



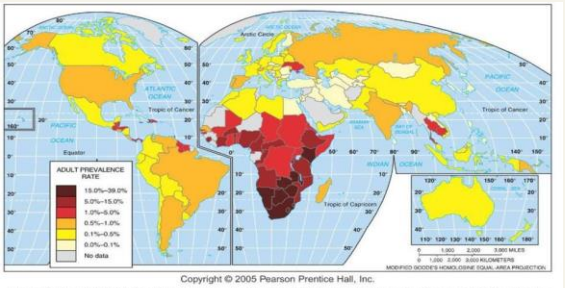
The tuberculosis death rate is a good indicator of a country's ability to invest in health care. TB is still one of the world's largest infectious-disease killers

SARS Infections in China, 2003

- China had 85 percent of the world's SARS cases in 2003
- Within China, the infection was highly clustered in Guangdong Province, Hong Kong, and Beijing



HIV/AIDS Prevalence Rates, 2002



The highest HIV infection rates are in sub-Saharan Africa. India and China have large numbers of cases, but lower infection rates at present