Chapter 4

Population: World Patterns, Regional Trends

Population geography:

- Focuses on the number, composition, & distribution in relation to variations in the conditions of earth space

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Demography differs:

- Statistical study of human population
- Spatial analysis of the relationship of numbers to area
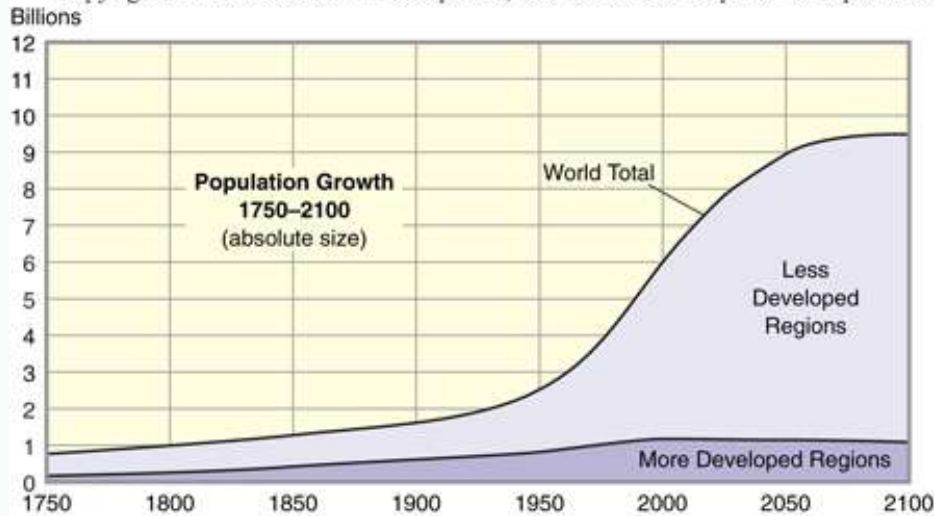- ratio – proportion – normalized data

Geographic analysis…

- Regional considerations include:
  - Resources
  - Type of economic development
  - Level of living
  - Food supply
  - Conditions of health & well-being
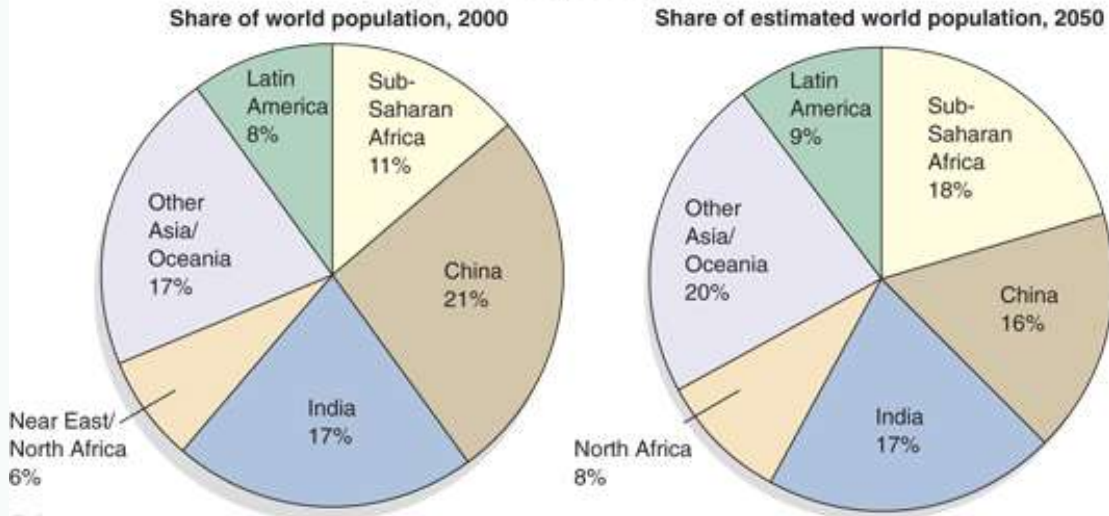
Why is this important?

- 12,000 years ago = 5 to 10 million
- 2006 = over 6.5 billion humans
- UN projection for 2050 = 9.1 billion
- Remember 1 billion = 1,000 million

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Population Growth 1750–2100 (absolute size)

World Total

Less Developed Regions

More Developed Regions

(a)

Less–developed regions

Share of world population, 2000

- Latin America 8%
- Sub-Saharan Africa 11%
- China 21%
- India 17%
- Near East/North Africa 6%
- Other Asia/Oceania 17%

Share of estimated world population, 2050

- Latin America 9%
- Sub-Saharan Africa 18%
- China 16%
- India 17%
- North Africa 8%
- Other Asia/Oceania 20%

(b)

Sources: (a) Estimates from Population Reference Bureau and United Nations Population Fund; (b) Based on United Nations and U.S. Bureau of the Census data and projections.

Population growth/decline

- Births must exceed deaths for growth
  - Consider the scale
  - 2.1 TFR needed to replace present population
- Looking at regional growth or decline includes human migration

Three measures of change

- 1. Fertility rates
  - Crude birth rate
  - Total fertility rate
- 2. Mortality rates
  - Crude death rate
 - Infant mortality rate
- 3. Migration

Population definitions

- Rates:
  - Simply record a frequency of an occurrence during a give time frame for a designated population

- Cohort measures:
  - Refer data to a population group unified by a specified common characteristic

Crude birth rate

- Annual number of live births per 1000 population
    - Considered 'high' – 30 > per 1000
    - Considered 'low' – 18 < per 1000
    - Transitional birth rates – 18 to 30 per 1000

Live Births per 1000 Population

- 43 or more
- 33–42
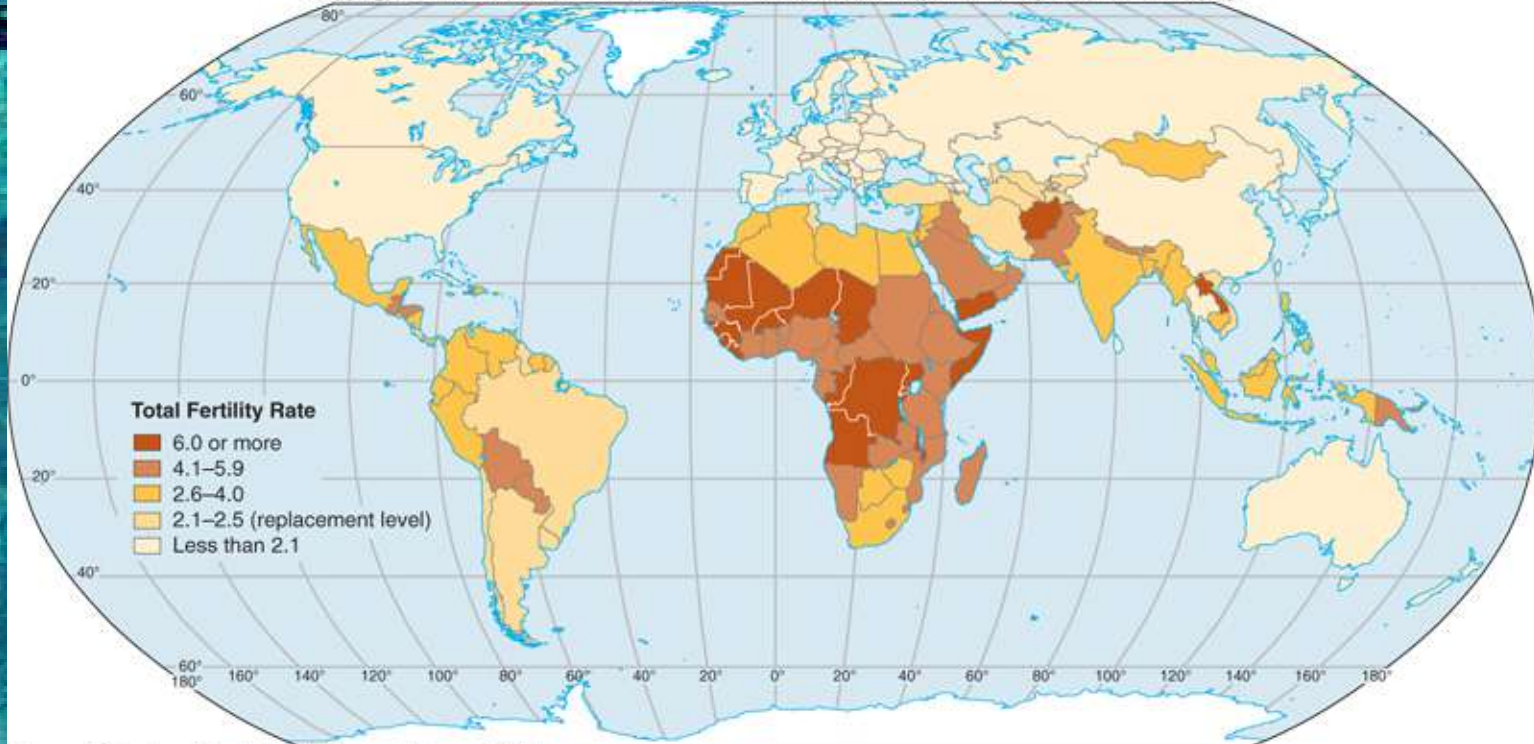- 23–32
- 13–22
- 12 or fewer
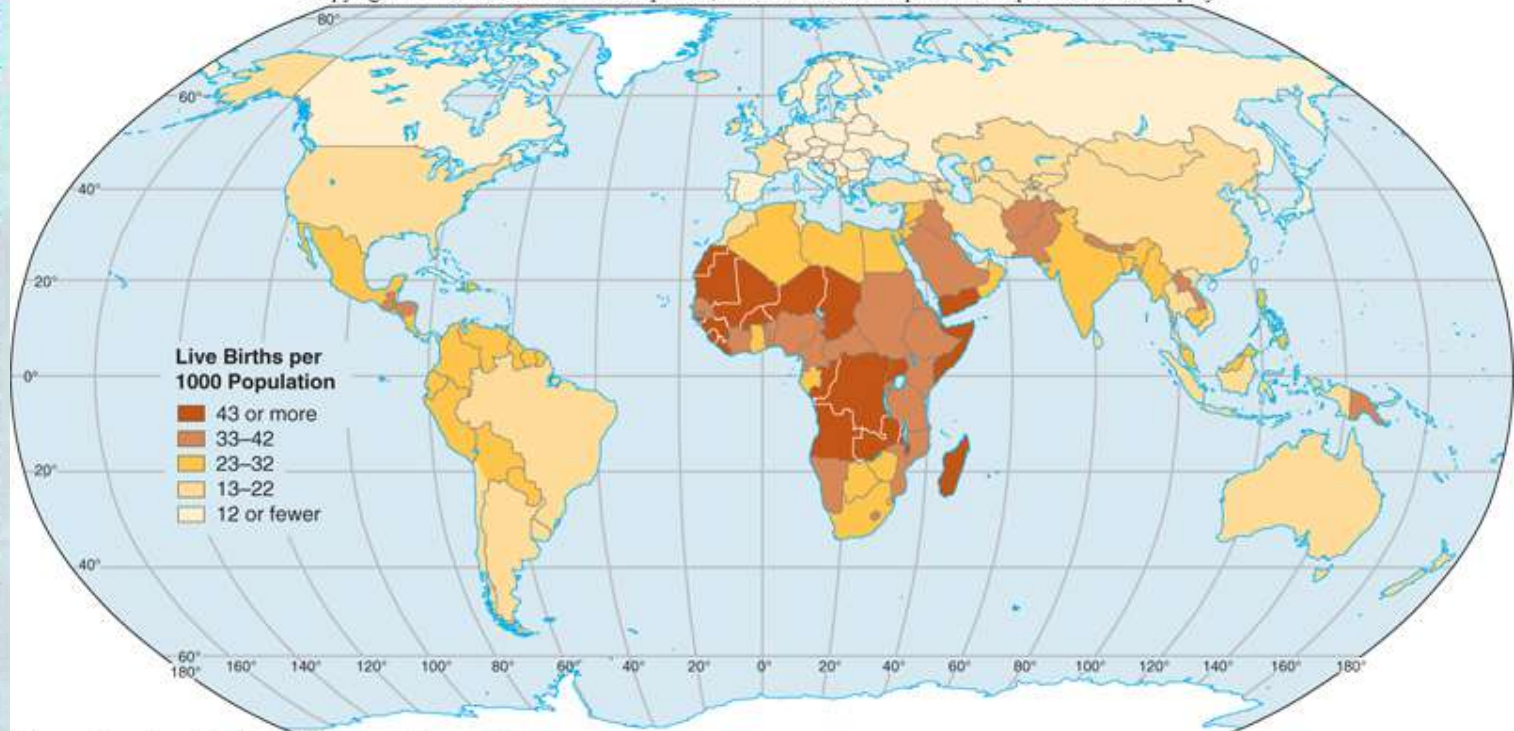
Source: Data from Population Reference Bureau, 2003.

Total fertility rate (TFR)

- Average number of children that would be born to each woman, if during her childbearing years, she bore children at the current year's rate
- Childbearing ages: 15 to 45
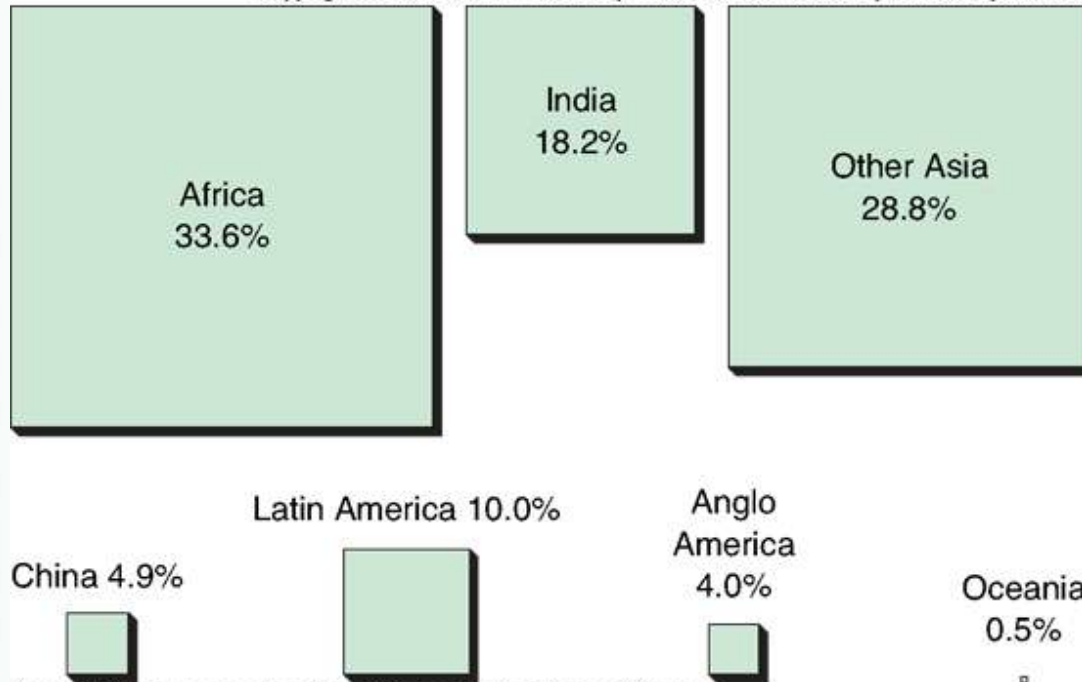- TFR of 2.1 to 2.5 per woman = 'replacement level'

Total Fertility Rate
- 6.0 or more
- 4.1–5.9
- 2.6–4.0
- 2.1–2.5 (replacement level)
- Less than 2.1

Source: Data from Population Reference Bureau, 2003.

Total fertility rate (TFR)

India
18.2%

Other Asia
28.8%

Africa
33.6%

Latin America 10.0%

Anglo
America
4.0%

China 4.9%

Oceania
0.5%

Sources: Projections based on World Bank and United Nations figures.

Projected % contributions to world population growth by region, 2000-2050

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FAMILY PLANNING—A BASIS NATIONAL POLICY OF CHINA

Crude death rate (mortality rate)

- Annual number of events per 1000 population
  - 'high' = > 20 per 1000
  - 'low' = <10 per 1000
- Post WWII: antibiotics, immunization, pesticides, sanitation, safe water supplies

Infant mortality rate

- Deaths age one year or less per 1000 live births
- This greatly reflects decline in general death rate numbers
- Regional variations can occur within countries

Infant deaths per 1000 live births

1932
2003

Chile   Egypt   India   Japan   Italy   Nicaragua   France   United States
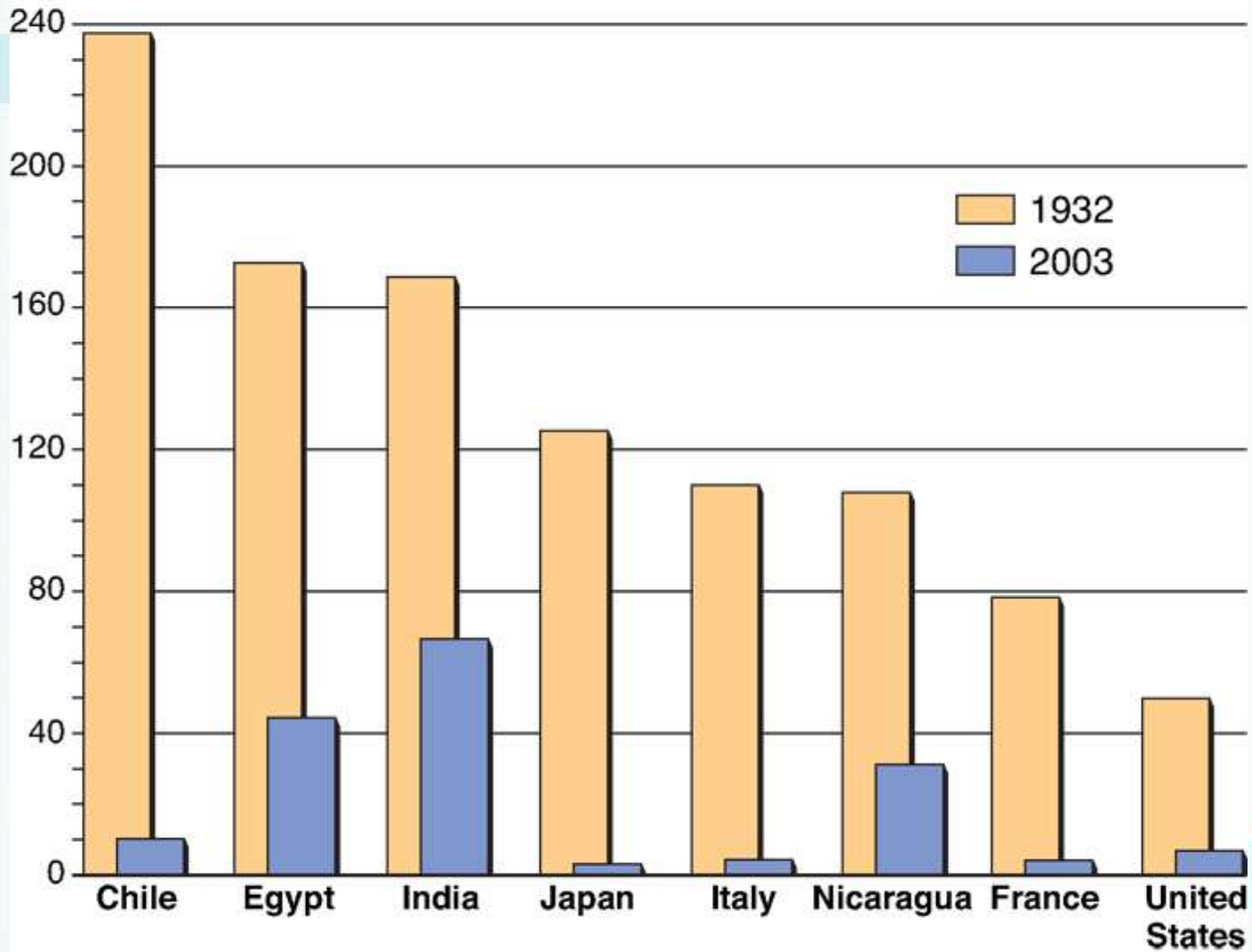
Sources: Data from U.S. Bureau of the Census and Population Reference Bureau.

Maternal mortality ratio

- Maternal deaths per 100,000 live births

- Single largest health disparity between developing and developed nations

- Pregnancy complications, childbirth, abortions = leading killers of women in the 3rd World

statistics

- Developing world:
  - Africa: 1 in 20
  - Sub-Saharan Africa: 1 out of 16 (45% of worldwide deaths)
  - Latin America & the Caribbean: 1 out of 160
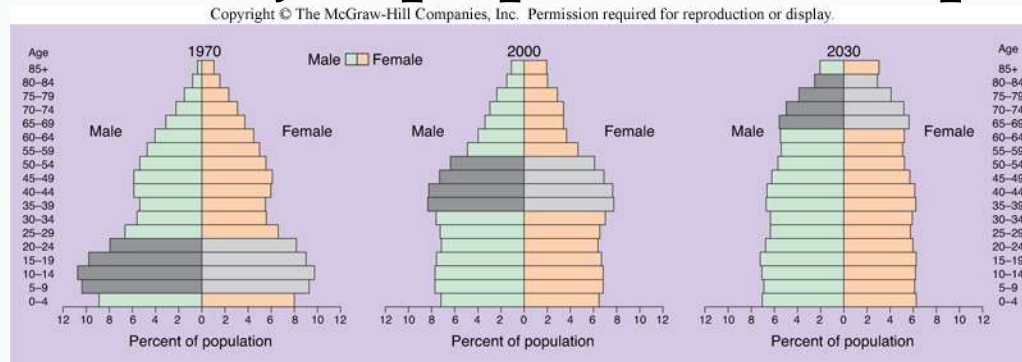 - Angola: 1 in 7
- Europe: 1 in 2400
  - Sweden: 1 in 30,000

Life expectancy

- Modern medicine & sanitation
- Largest killers today:
  - Malaria
  - Intestinal infections
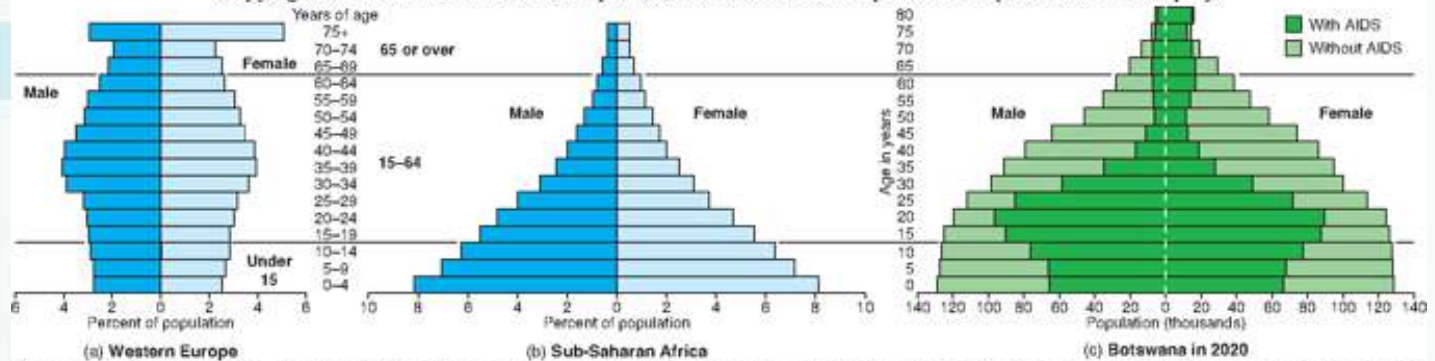 - Typhoid
  - Cholera
- AIDS/HIV

Population pyramids

- Population composition by age & sex
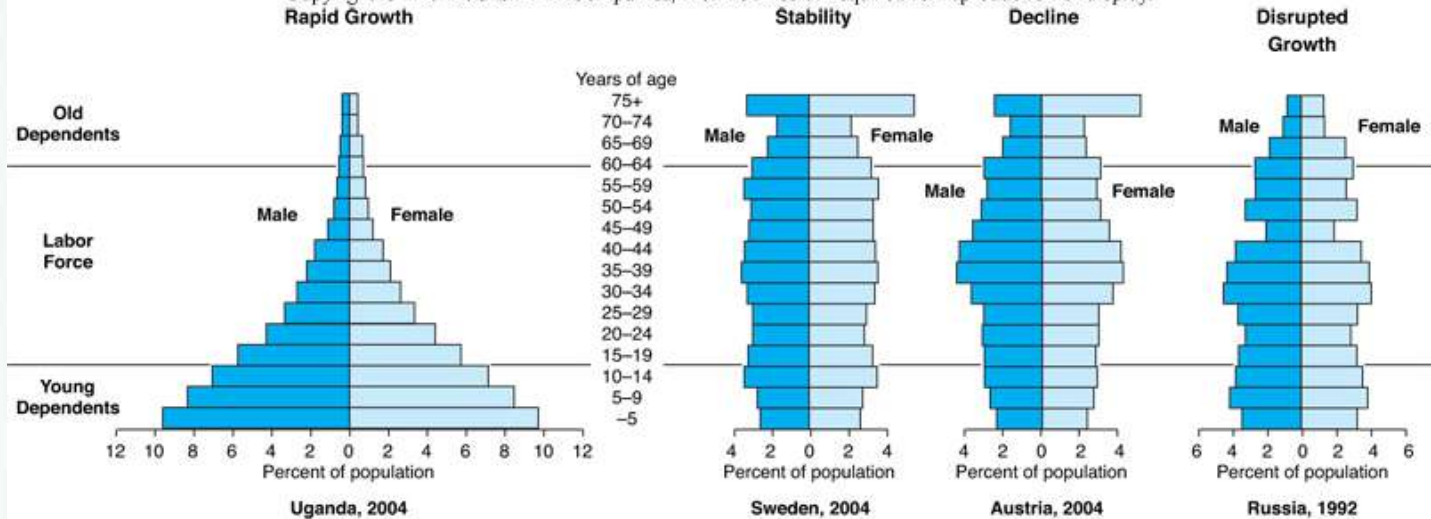- During 1800s populations: pyramid shape
- Reflects major population impacts

Source: Redrawn from Christine L. Himes, "Elderly Americans." Population Bulletin 56, no. 4 (Dec. 2001), Fig. 1, by permission of Population Reference Bureau.

Years of age
75+
70–74 65 or over
65–69
60–64
55–59
50–54
45–49
40–44
35–39 15–64
30–34
25–29
20–24
15–19
10–14
5–9 Under
0–4 15

Female

Male

Percent of population

(a) Western Europe

With AIDS
Without AIDS

Male   Female

Population (thousands)

(b) Sub-Saharan Africa

Age in years

Male   Female

Population (thousands)

(c) Botswana in 2020

Sources: (a) and (b) U.S. Bureau of the Census, International Data Base; (c) U.S. Bureau of the Census, World Population Profile 2000.

Rapid Growth   **Stability**   **Decline**   **Disrupted Growth**

Old Dependents

Labor Force

Young Dependents

Male   Female

Years of age
75+
70–74
65–69
60–64
55–59
50–54
45–49
40–44
35–39
30–34
25–29
20–24
15–19
10–14
5–9
–5

Percent of population

Uganda, 2004

Male   Female

Percent of population

Sweden, 2004

Male   Female

Percent of population

Austria, 2004

Male   Female
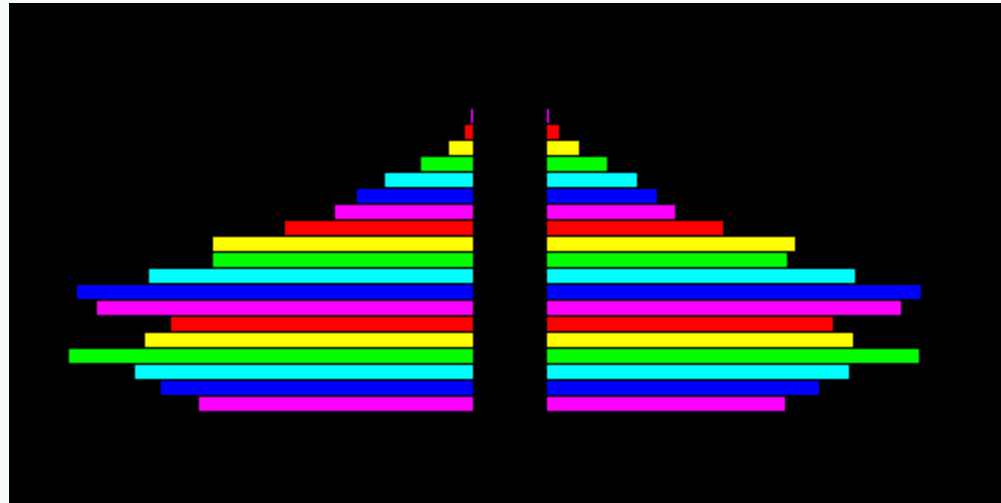
Percent of population

Russia, 1992

Sources: The 2004 pyramids for Uganda, Sweden, and Austria: U.S. Bureau of the Census, International Data Base; and for Russia: Carl Haub, "Population Change in the Former Soviet Republics," Population Bulletin 49, no. 4 (1994).
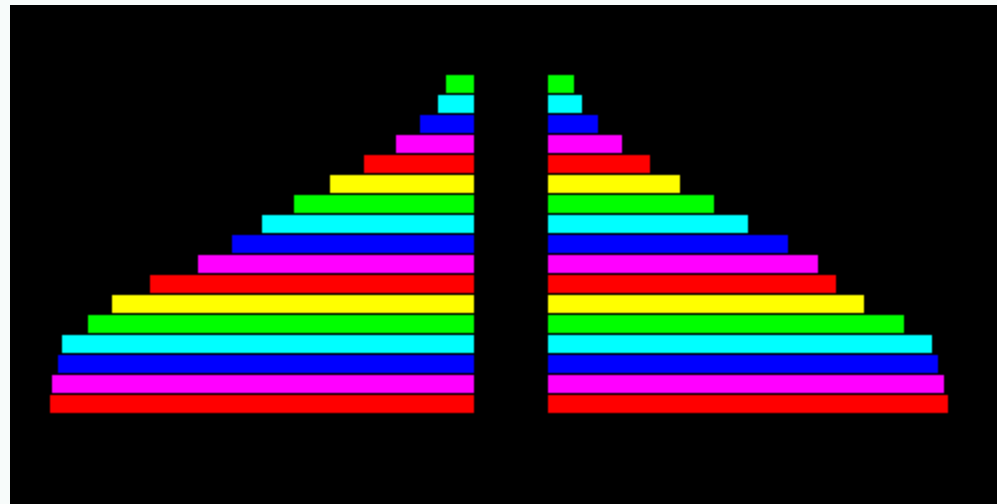
Missing Females….

- 100 million females missing
    - Aborted
    - Neglected
    - Killed
- Birth ratio: 106 male babies to 100 females
- China, India, Pakistan, New Guinea, other developing nations
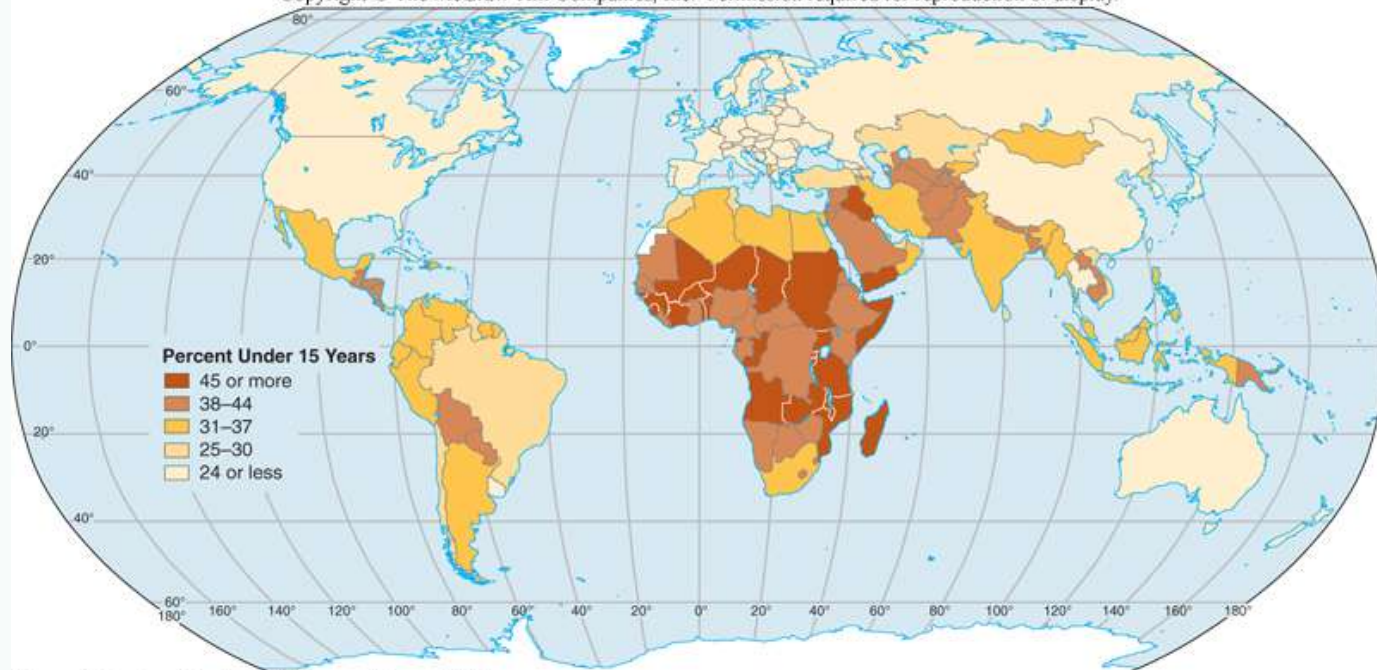
China, 2005

India, 2005

Dependency ratio

- Simple calculation to measure number of dependents old or young that each 100 people (age 15-64) must support

Percentage of population under 15 years of age

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Percent Under 15 Years
- 45 or more
- 38–44
- 31–37
- 25–30
- 24 or less

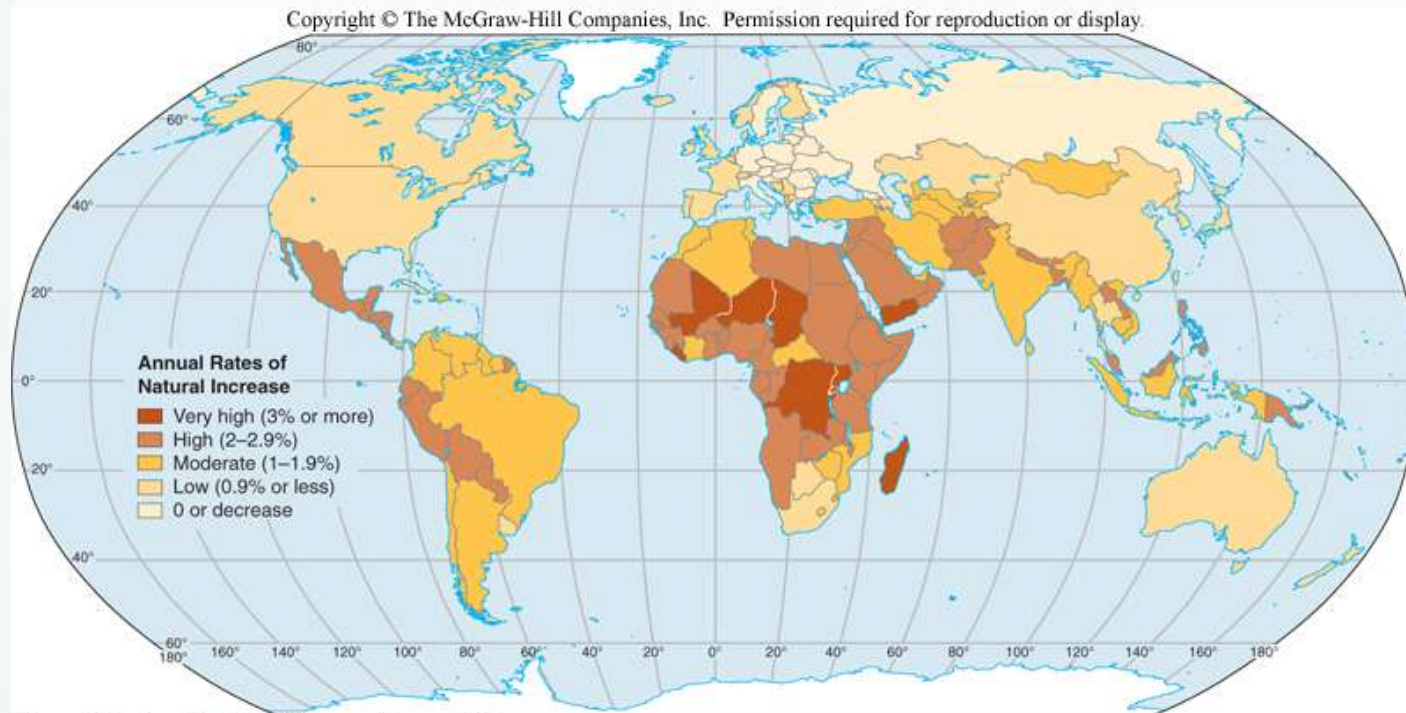Source: Data from Population Reference Bureau, 2003.

Rate of natural increase

- Derived by subtracting the crude death rate from the crude birth rate (not including change from migration factors)

- Expressed as %:
  - Birth rate of 22 (per 1000) – death rate of 12 (per 1000) = 10 per 1000 or 1%

Doubling time

- Rate of increase can be related to the time it takes for a population to double

- 1% rate of natural increase = 70 to double

  - Population growth: geometric (1, 2, 4, 8, 16…) not arithmetic (1, 2, 3, 4, 5,…)

  - Rule of 70 = 70/growth rate

2004 Annual rates of natural increase

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Annual Rates of Natural Increase
- Very high (3% or more)
- High (2–2.9%)
- Moderate (1–1.9%)
- Low (0.9% or less)
- 0 or decrease

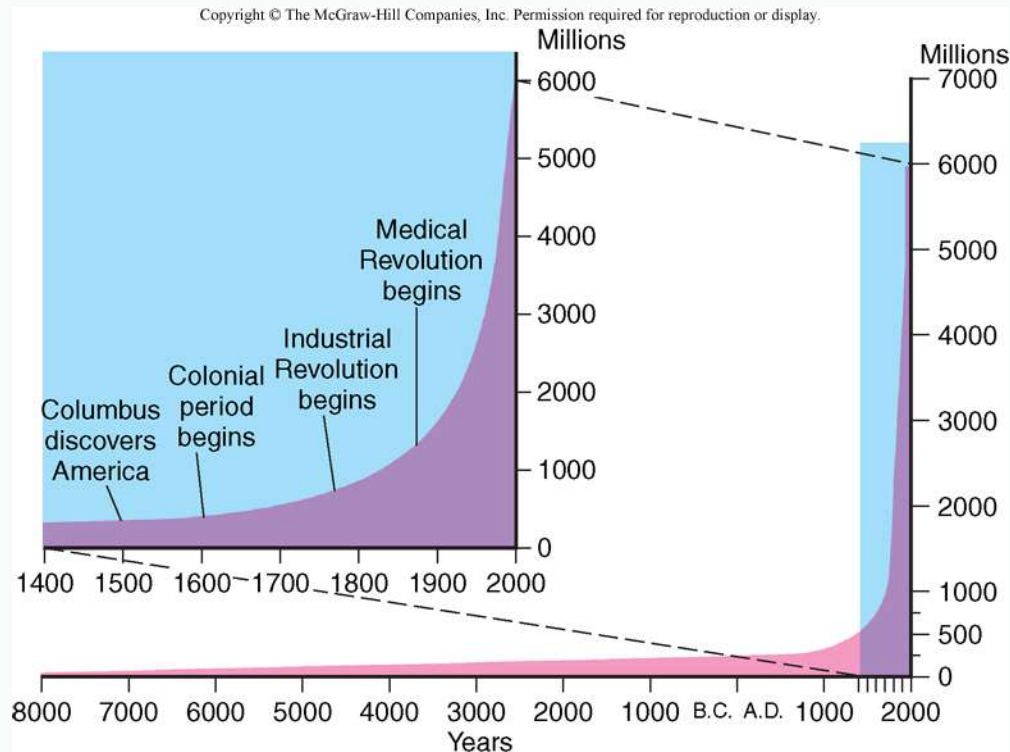Source: Data from Population Reference Bureau, 2003.

- Remember:
  - » Birth rates, death rates, age structure, collective family size decisions, and migration <u>all</u> effect population growth

Global Calculation for Doubling Time
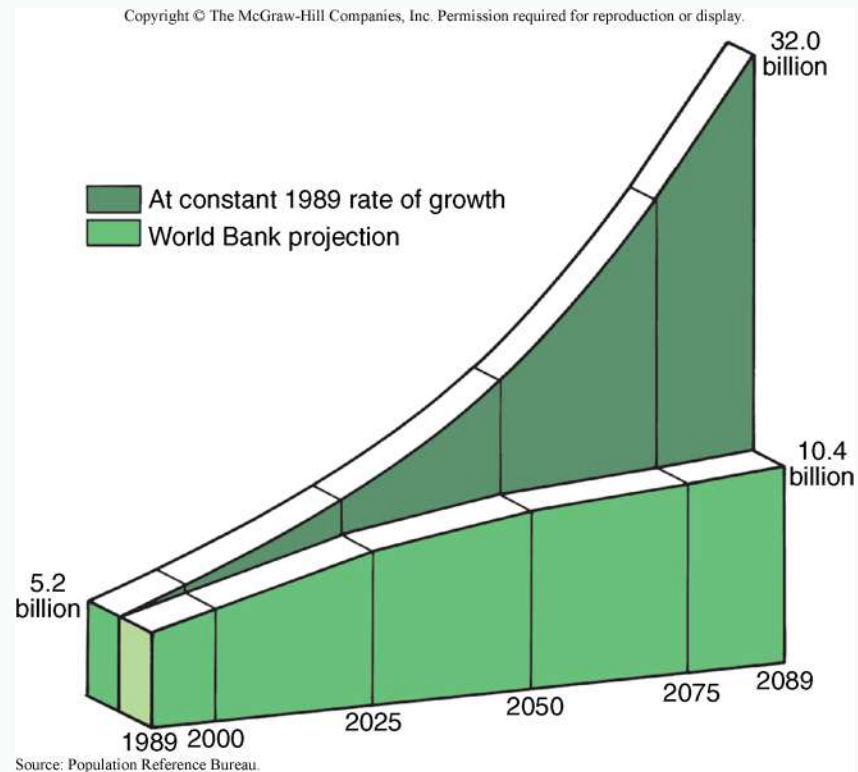
- Mid-1700s changes really took hold….
  - » Revolutionary changes in agriculture & food supply
  - » Improvements in medical science, nutrition, & sanitation

World Population Growth

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Demographic Transition

- Portraits the changing levels of human fertility and mortality associated with industrialization & urbanization
  - Voluntary relationship between population growth & economic development

Stages

- 1. High birth rate/high death rate
    - Population estimated 5-10 million, 11,000 years ago
    - Period of equilibrium
        - » Up and down with wars, famines

Stages

- 2. Declining death rates, continuing high birth rates
  - High dependency ratio
  - Occurred worldwide without universal conversion to industrial economies
    - » Life expectancy
    - » Low death rates
  - Birth rates don't fall due to:
    - » Culture
    - » Agrarian societies
    - » Low status of women

Stages

- 3. Birth rates decline, death rates remain low
  - Industrialization
  - Urbanization
  - Birth control

Stages

- 4. Very low birth rates & death rates
    - Back to equilibrium
    - Natural rate of increase (not migration)
- 5. Declining populations
    - Rich industrialized nations
    - Heavy burden on small work force
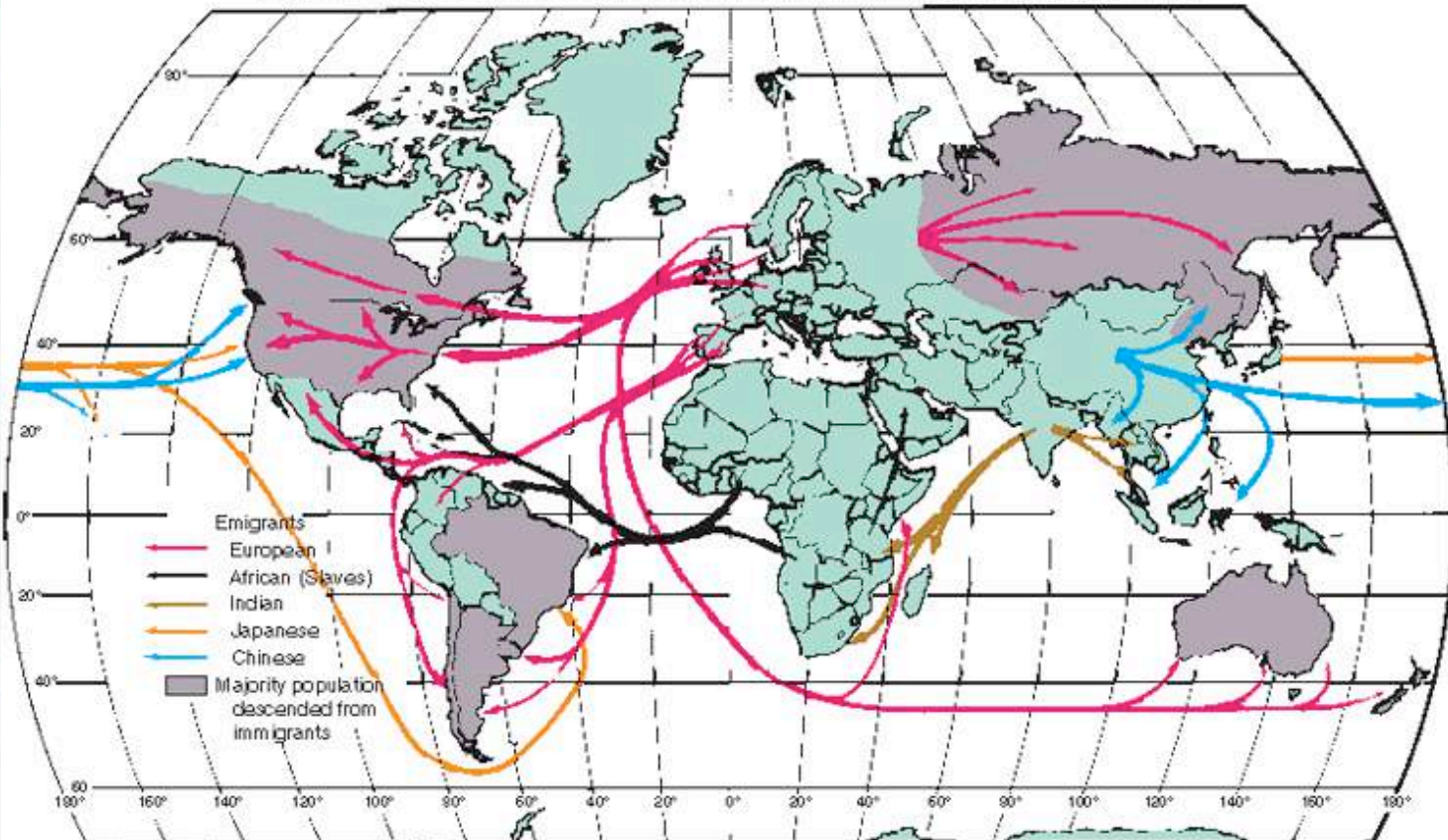   - Reverse population pyramids

Demographic equation

- Natural change (births – deaths) + net migration (in-migration – out-migration)
- In past – emigration was a relief valve for escalating population growth

Immigration impacts

- Cross border movements
- Past European & African migrations
  - populated Western Hemisphere & Austral-Asia
- Great migration into U.S. during late 1800s, early 1900s
  - 30-40% population increase
  - Can cause skewed population balance
  - Age/gender disparities

Principle migrations of recent centuries

Emigrants
- European
- African (Slaves)
- Indian
- Japanese
- Chinese
- Majority population descended from immigrants

Source: Shaded zones after Daniel Noin, Geographie de la Population (Paris: Masson, 1979), p. 85.
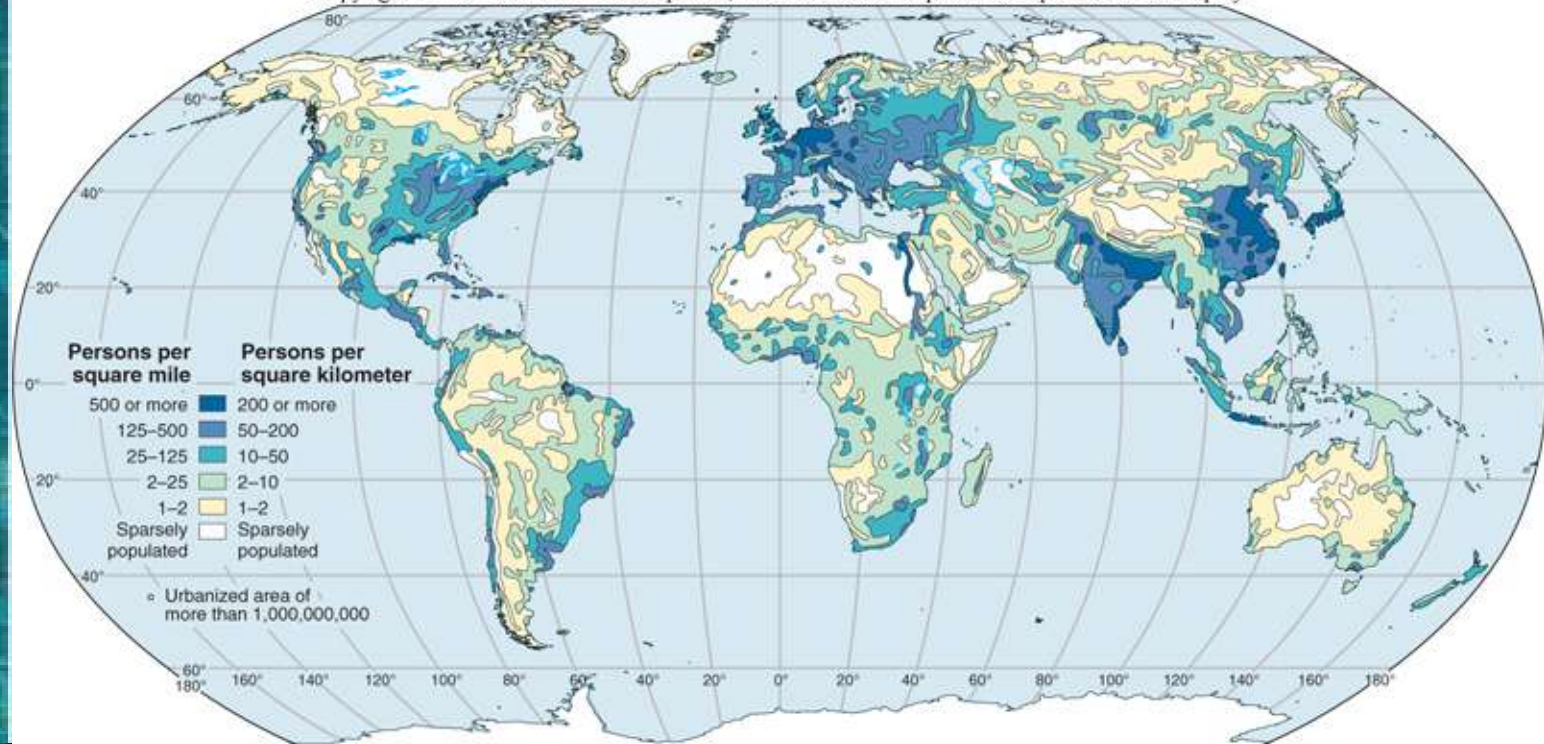
Population density

- The relationship between number of inhabitants and the areas they occupy

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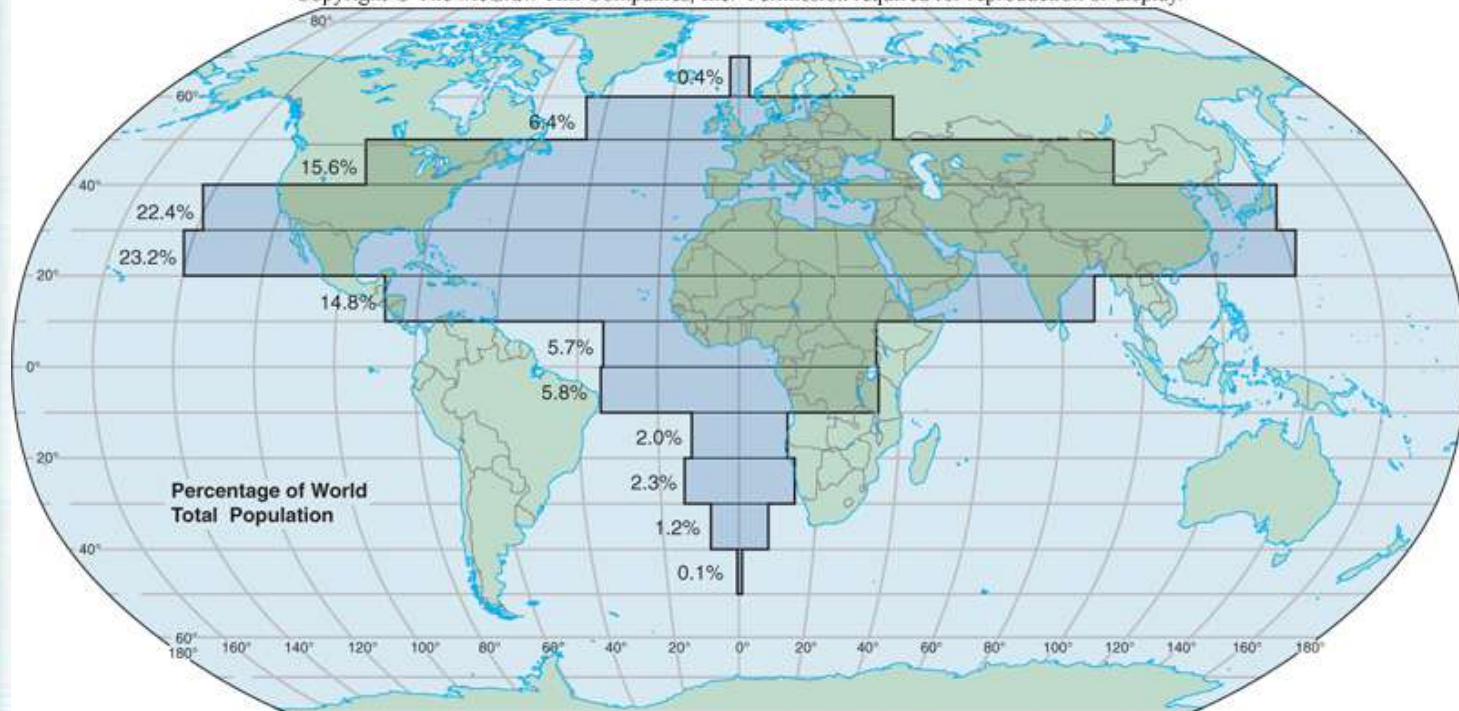
World Population Density

Persons per square mile

- 500 or more
- 125–500
- 25–125
- 2–25
- 1–2
- Sparsely populated

Persons per square kilometer

- 200 or more
- 50–200
- 10–50
- 2–10
- 1–2
- Sparsely populated

○ Urbanized area of more than 1,000,000,000

Population dominance
of the Northern Hemisphere

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Terms

- Arithmetic density (crude density)
  - Calculation of the number of people per unit area of land – usually within political boundaries

- Physiological density
  - Population is divided by arable land
    - » Difficult to define arable land

- Arithmetic density
  - Non-ecumenes: tundra landscapes = 1/3+
  - Due to climate, soils, precipitation factors: non-arable land

Northwest Territories, Canada

- Physiological density
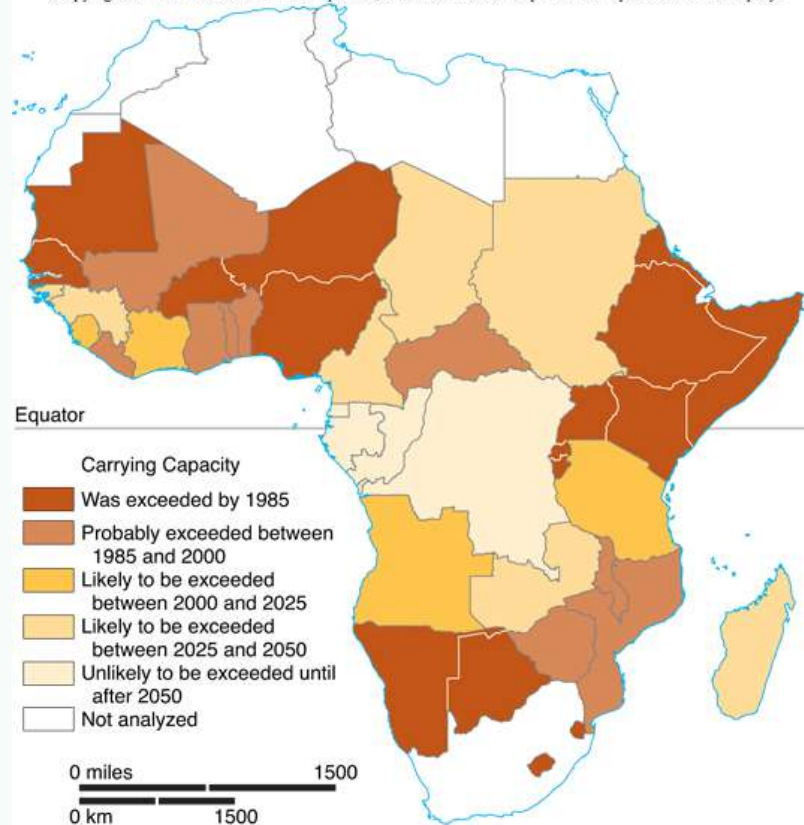 - Terracing hillside extends arable land

Honshu, Japan

Carrying capacity

- Number of people an area can support on a sustained basis given the prevailing technology
- Concepts:
  - Overpopulation & density
  - Technology & carrying capacity
  - Urbanization

– Over population & density

» 1. All cultivated land is used for growing food

» 2. Food imports are insignificant

» 3. Agriculture is conducted by low-tech methods

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Equator

Carrying Capacity

Was exceeded by 1985

Probably exceeded between 1985 and 2000

Likely to be exceeded between 2000 and 2025

Likely to be exceeded between 2025 and 2050

Unlikely to be exceeded until after 2050

Not analyzed

0 miles   1500

0 km   1500

Sources: World Bank; United Nations Development Programme. Food and Agriculture Organization (FAO); and Bread for the World Institute.

– Urbanization

• Population shift is largest in world

» 1950 = urban population, 750 million worldwide

» Early 21st century = nearly 3 billion urbanites

» 2030 projection = 5.1 billion

» Growth of shantytowns, slums

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Urban and rural population growth, 1950–2030

Urban, less-developed countries
Urban, developed countries
Rural

Population in billions
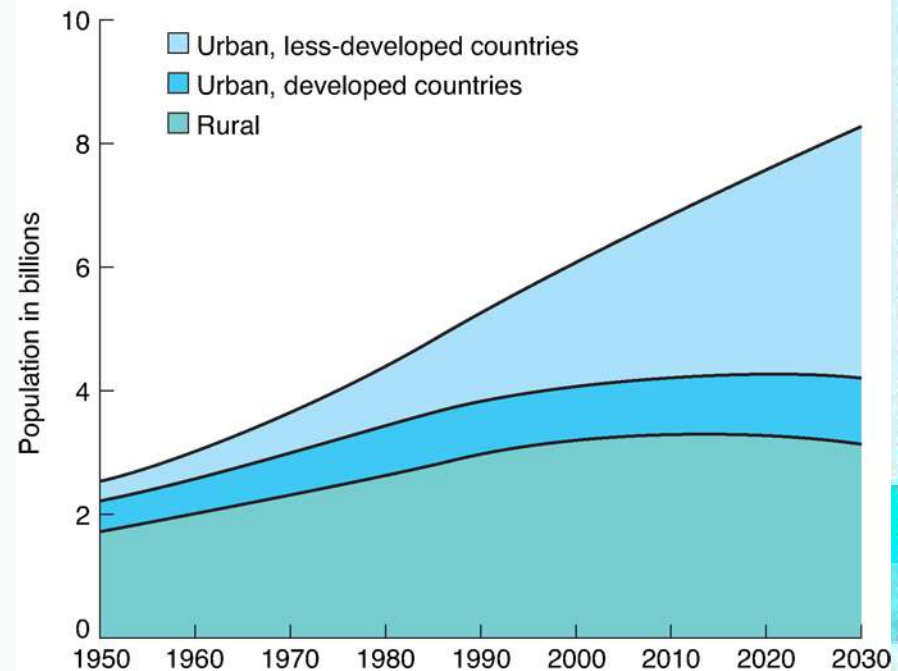
Data source: United Nations, World Urbanization Prospects: The 2003 Revision; redrawn from Population Bulletin 53, no. 1 (1998).

Percentage of national population that is classified as urban

Percent Urban
- 80 or more
- 65–79
- 45–64
- 31–44
- 30 or less
- No data
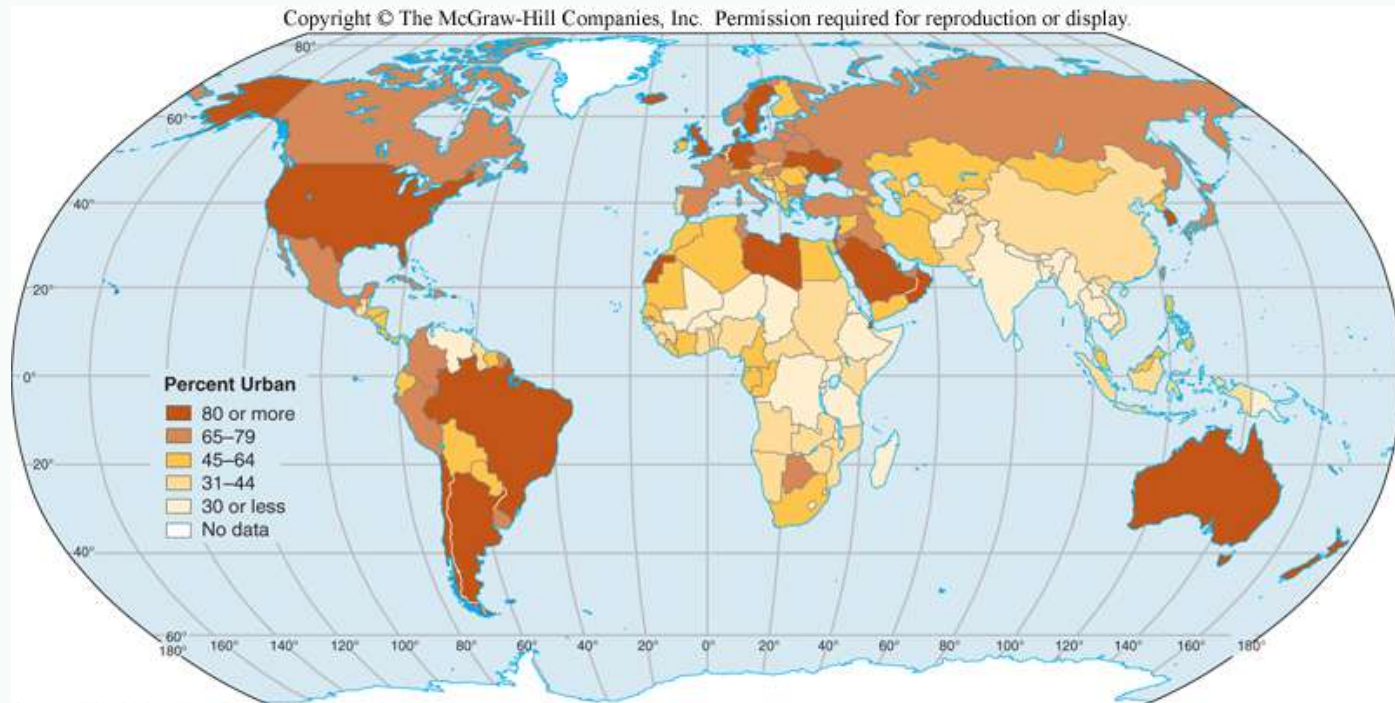
Source: Data from Population Reference Bureau.

Population Controls

- Female sterilization is most common
  – India, Brazil, China = > 1/3 married women
  – Worldwide married male sterilization rate = 4%
  – Cultural barriers remain
    » Low status of women / high infant death rates
    » Religions views
    » Agrarian societies