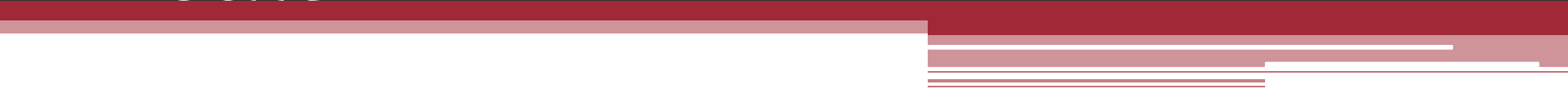


Chapter 2: Population and Health

A decorative graphic consisting of several horizontal bars. A thick red bar spans the width of the slide. Below it, on the right side, are several thinner bars in white and red, creating a stepped, architectural look.

Introduction:

- Demography: scientific study of population
 - Look statistically at how people are distributed spatially by age, gender, occupation, fertility, and health.
- Study of population is important for 3 reasons:
 1. More people are alive at this time (7 billion+)
 2. The world's population increased at a faster rate during the 2nd half of the 20th century.
 3. Virtually all global population growth is concentrated in *developing* countries.
- Overpopulation: occurs when the number of people exceeds the capacity of the environment to support life at a decent standard of living.
 - Can be a threat to some regions in the world, but not others.

Key Issue 1: Where Is the World's Population Distributed?

- Humans are not distributed across the Earth uniformly.
 - Understanding population distribution by examining **concentration** and **density**.
- Number of people determined by a census



FIGURE 2-2 POPULATION CARTOGRAM In a cartogram, countries are displayed by size of population rather than land area.

Population Clusters

East Asia

- 1/4 of the world's people live in East Asia.
 - Eastern China, Japan, Korean Peninsula, & Taiwan.
- *People's Republic of China*: most populous country and the 4th largest country in land area.
 - Population clustered near Pacific Coast and several fertile river valleys.
 - Most interior is sparsely inhabited mountains and deserts.
 - 1/2 live in rural areas (farmers)
- 3/4 of Japanese and Koreans live and work in urban areas (industrial or service jobs)

South Asia

- 1/4 of world's people live in South Asia.
 - India, Pakistan, Bangladesh, island of Sri Lanka,.
- Largest concentration of people live along a corridor from Lahore, Pakistan through India and Bangladesh to the Bay of Bengal.
- Population clustered along the plains of the Indus and Ganges Rivers
- India:
 - Heavy clustering along the Arabian Sea to the west and the Bay of Bengal to the East.
- Most people rural (farmers)

Population Clusters

Europe

- Includes 4 dozen countries
 - Monaco (.7 square miles) to Russia (world's largest land area)
- 3/4 people live in cities
- Fewer than 10% are farmers
- Highest population concentration:
 - Major rivers and coalfields of Germany and Belgium
 - London and Paris (Capitol cities)

Southeast Asia

- 600 million people live in SE Asia.
 - Series of islands that lie between the Indian and Pacific oceans.
- Indonesia:
 - 13,677 islands
 - World's 4th most populous country.
 - Largest concentration on island of Java.
- High population concentration in the Philippines
 - Population clustered along river valleys and deltas at the SE tip of Asian mainland (Indochina)
- Farmers

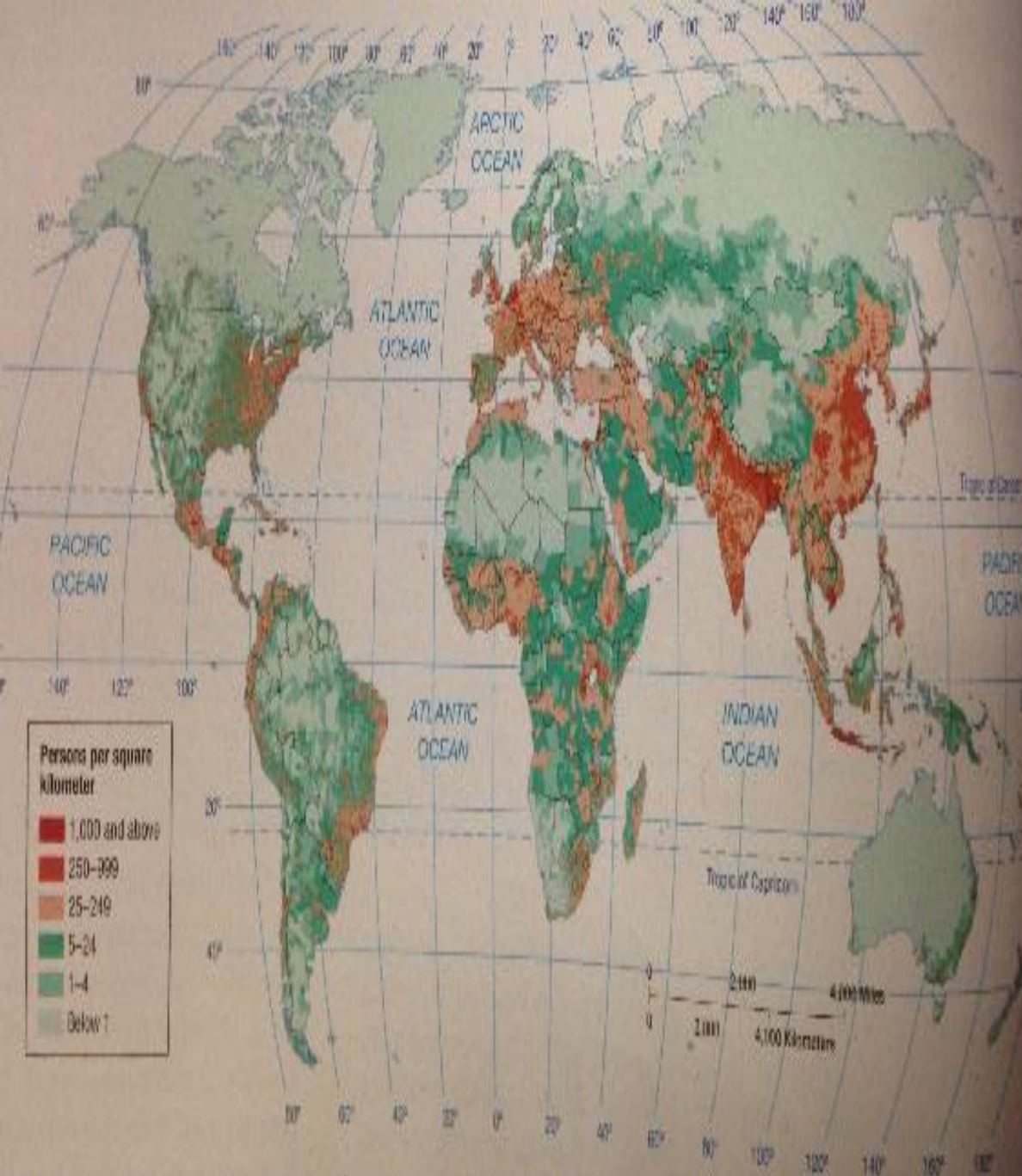


FIGURE 2-3 POPULATION DISTRIBUTION People are not distributed uniformly across Earth's surface

Other Clusters

- Largest population concentration in the Western Hemisphere is in the northeastern United States and Southeastern Canada.
 - Atlantic Coast from Boston to Newport News, Virginia and westward along the Great Lakes to Chicago.
- Africa:
 - Largest cluster is along the Atlantic Coast
 - Nigeria most populous country.
 - West Africans work in agriculture

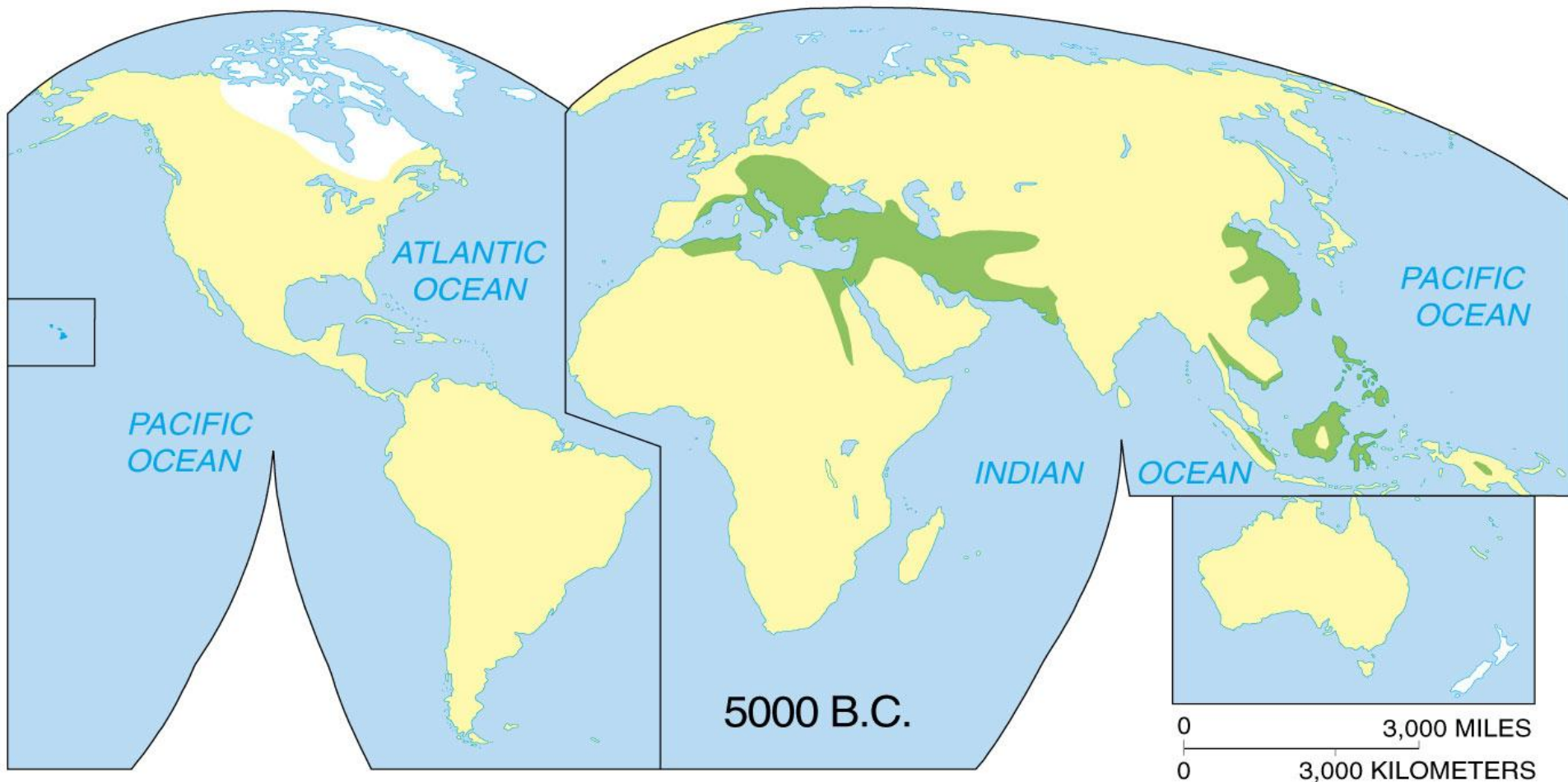
Pause and Reflect:

- Why isn't North America one of the four major population clusters?

Sparsely Populated Regions

- Humans avoid clustering in certain physical environments.
- **Ecumene:** The areas of Earth that humans consider too harsh for occupancy have diminished over time, whereas the portion of Earth's surface occupied by permanent settlement.

Dry Lands	Wet Lands	Cold Lands	High Lands
<ul style="list-style-type: none">• too dry for farming occupy 20% of the Earth's surface.• Deserts lack sufficient water to grow crops that could sustain a population.• Contain oil reserves	<ul style="list-style-type: none">• receive very high levels of precipitation• Located near the equator• Combination of rain and heat rapidly depletes nutrients from the soil.	<ul style="list-style-type: none">• Much of the land nearer the North and South poles covered with ice or <i>permafrost</i>.• Unsuitable for agriculture.• Few animals and humans survive climate.	<ul style="list-style-type: none">• mountains are steep, snow covered, sparsely settled.• High altitude: densely populated.• Low latitude: densely populated where agriculture is possible.



ECUMENE



Intensive settlement



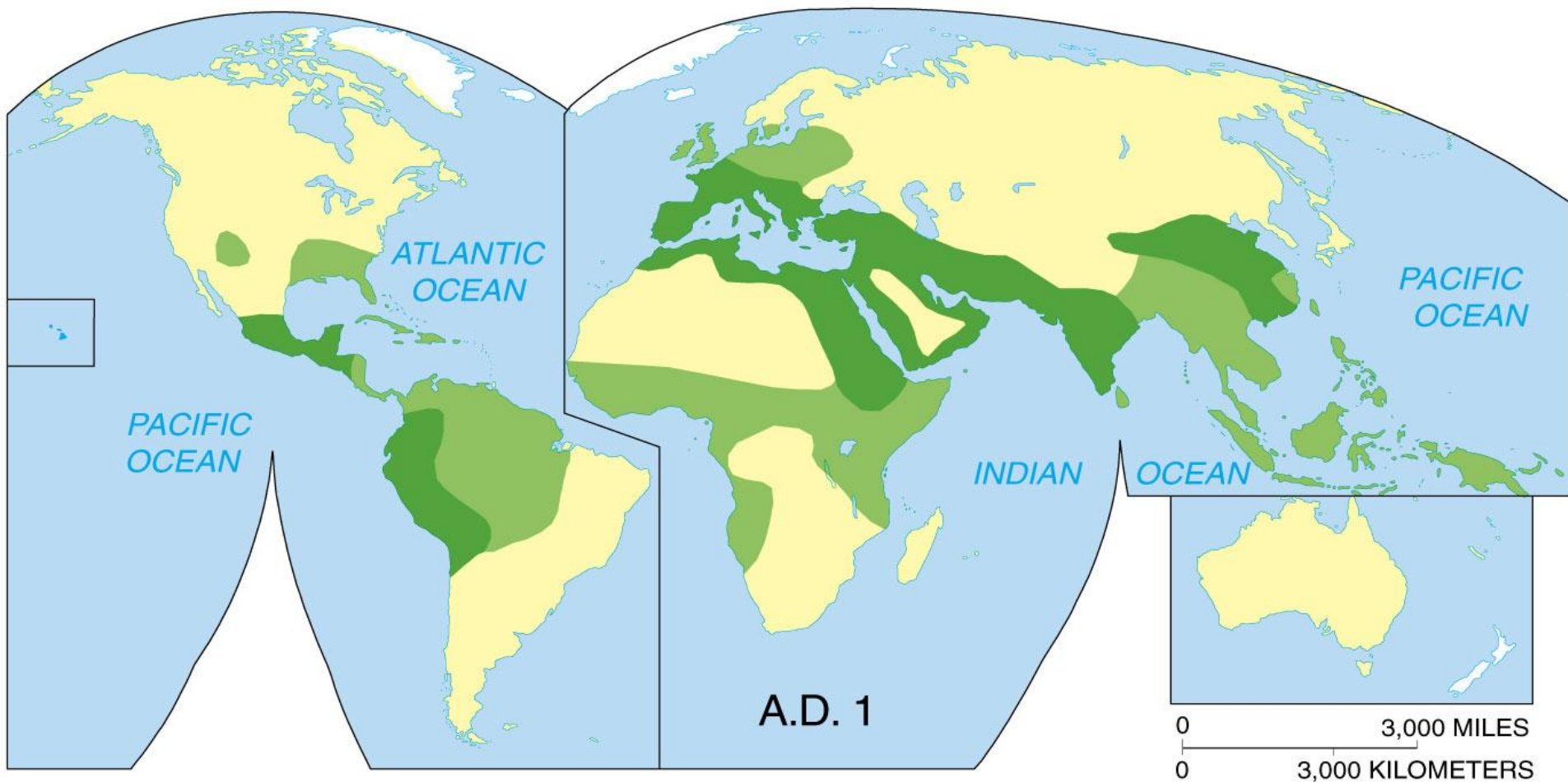
Hunting and gathering



Small-scale agriculture



Uninhabited (mainly ice)



ECUMENE



Intensive settlement



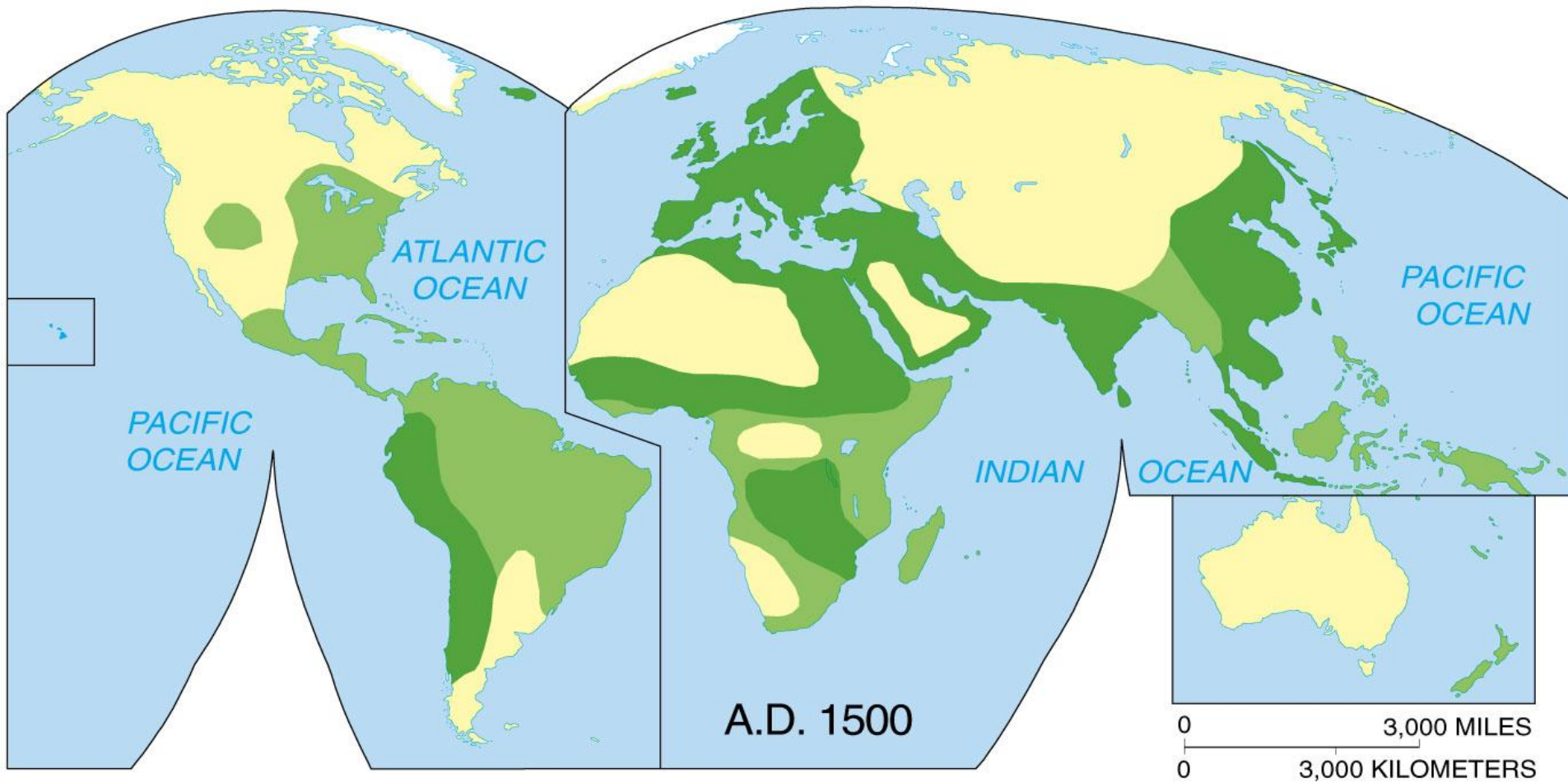
Hunting and gathering



Small-scale agriculture



Uninhabited (mainly ice)



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Intensive settlement



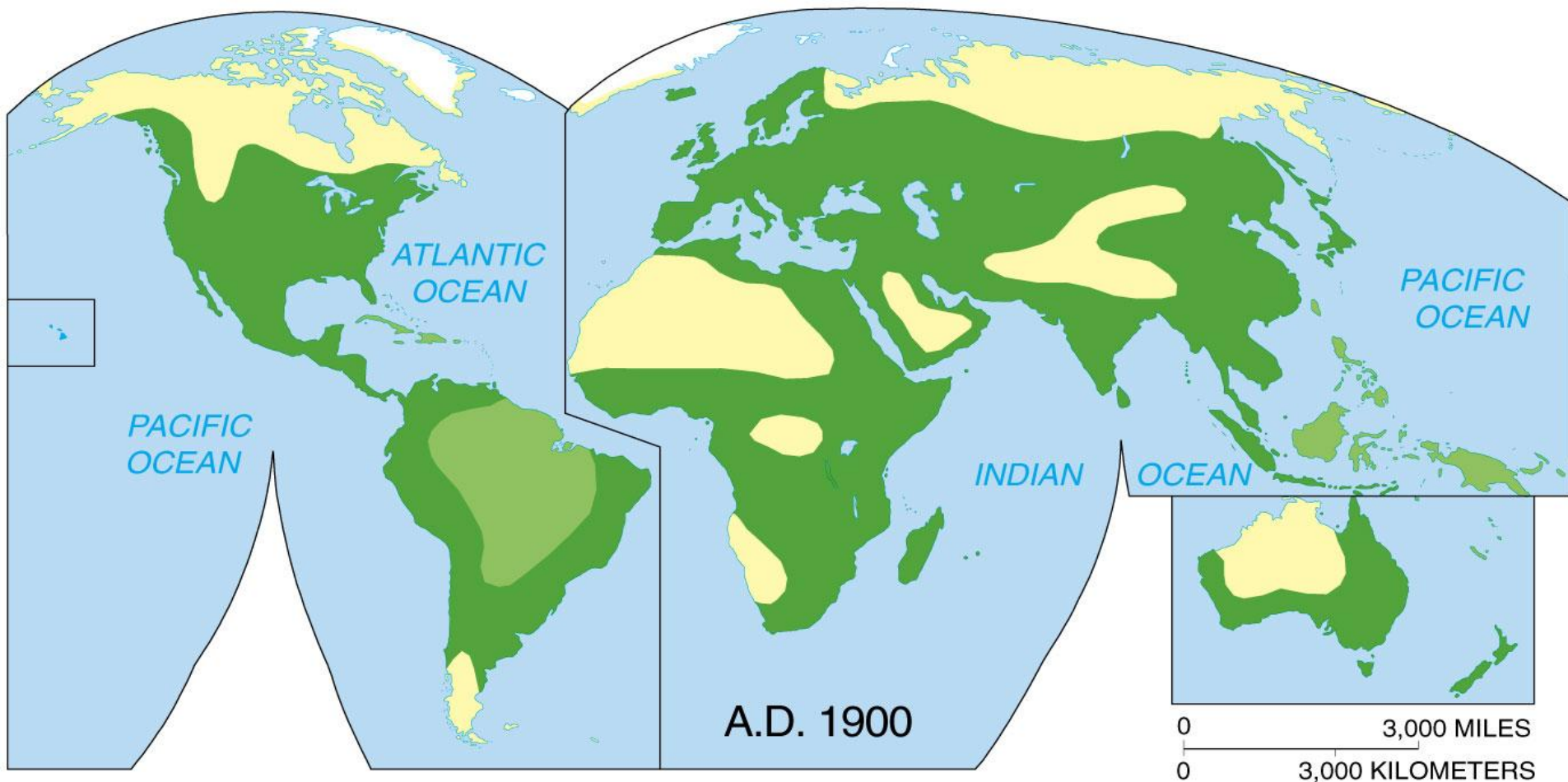
Hunting and gathering



Small-scale agriculture



Uninhabited (mainly ice)



ECUMENE



Intensive settlement



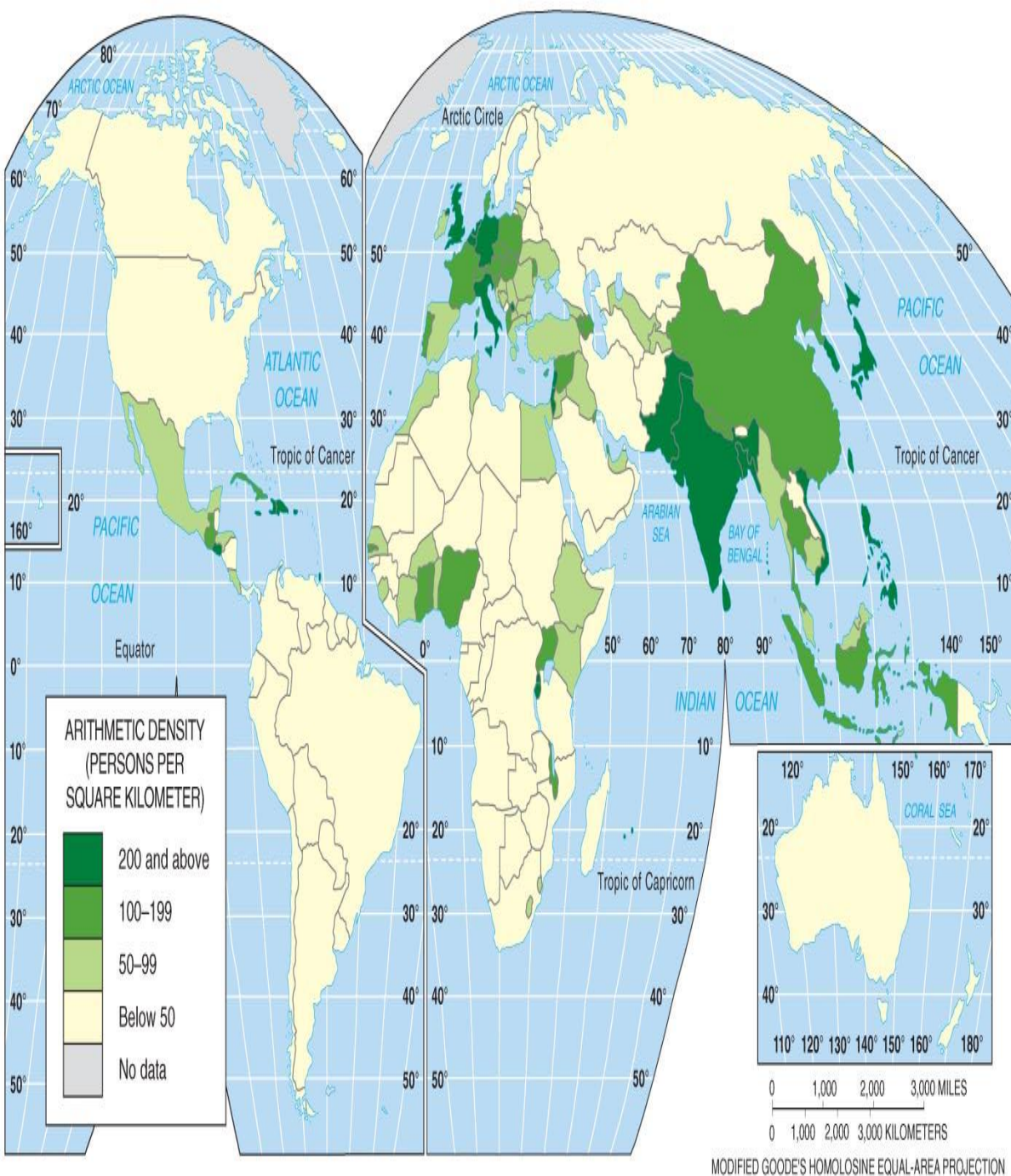
Hunting and gathering



Small-scale agriculture



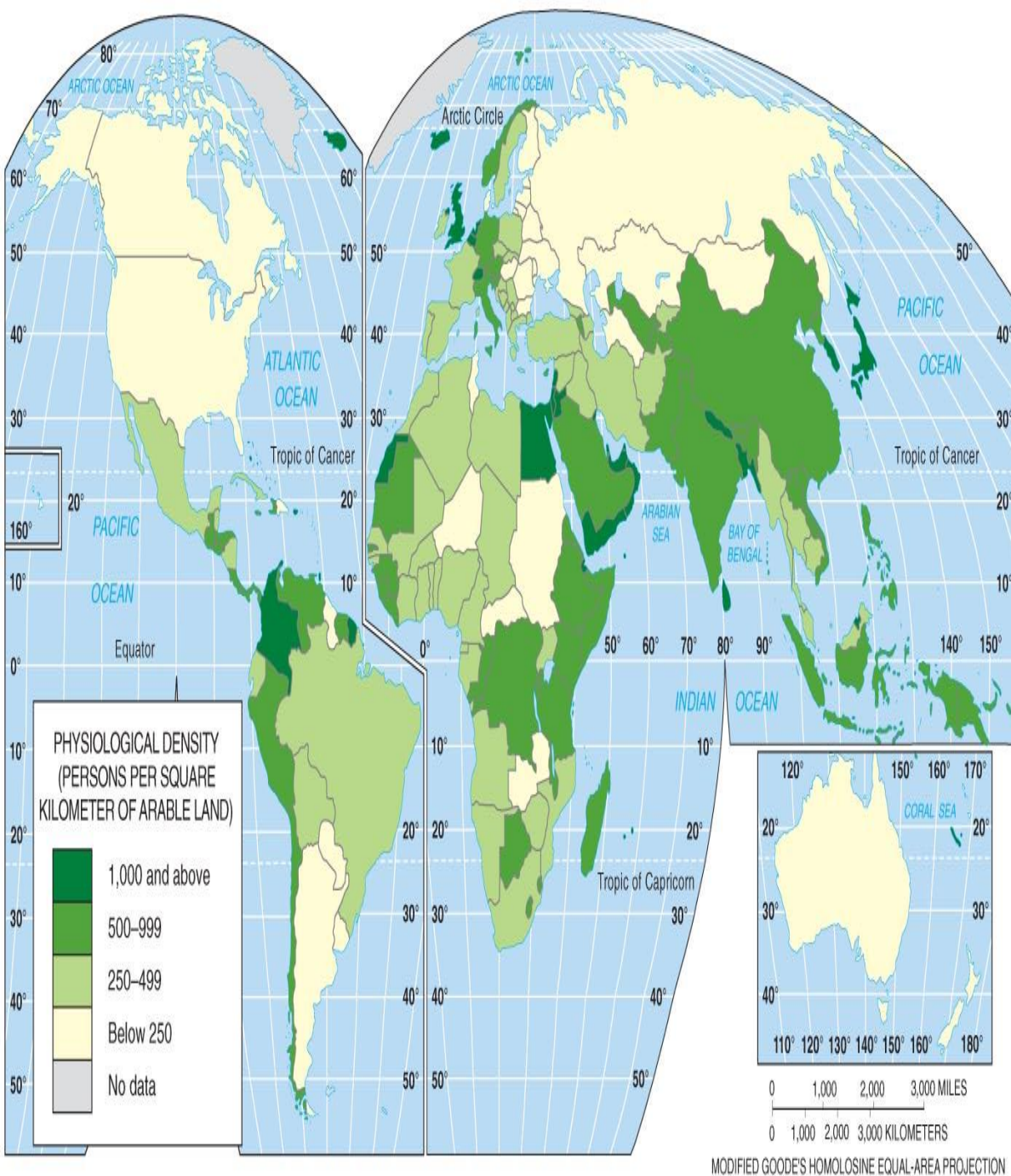
Uninhabited (mainly ice)



Arithmetic Density

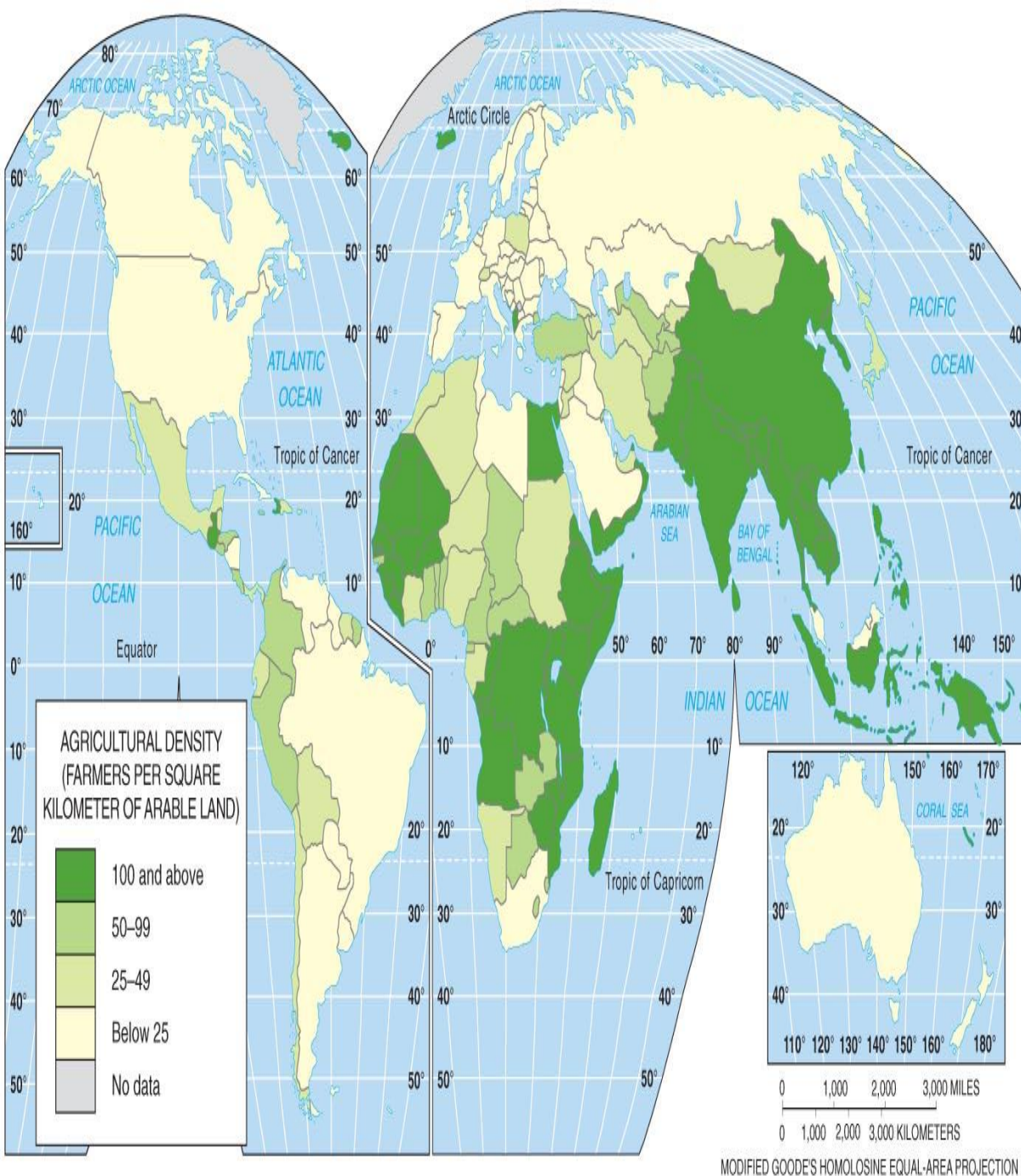
- TOTAL NUMBER OF OBJECTS IN AN AREA.
- **Refers to the total number of people divided by total land area.**

- **Computing:** divide the population by the land area.
- **Importance:**
 - Allows geographers to compare the number of people trying to live on a given piece of land in different regions of the world.
 - Explains why people are not uniformly distributed across Earth's surface.



Physiological Density

- Looking at the # of people per area of a certain type of land in a region provides more meaningful population measure.
- **Number of people supported by a unit area of arable land.**
 - Arable: land suited for agriculture.
- Importance:
 - Allows geographers to understand the capacity of the land to yield enough food for the needs of the people.



• **The ratio of the number of farmers to the amount of arable land.**

- **Arable:** land suited for agriculture.

Agricultural Density

Importance:

- Helps account for economic differences.
- Developed: lower agricultural densities because technology and finance.
- Geographers examine physiological and agricultural densities together.

Key Issue 2: Why is Global Population Increasing?

Population increases rapidly in places where many more people are born than die, declines in places where deaths outnumber births.

Components of Population Growth

Geographers most frequently measure population change by three measures:

1. Crude Birth Rate (CBR):

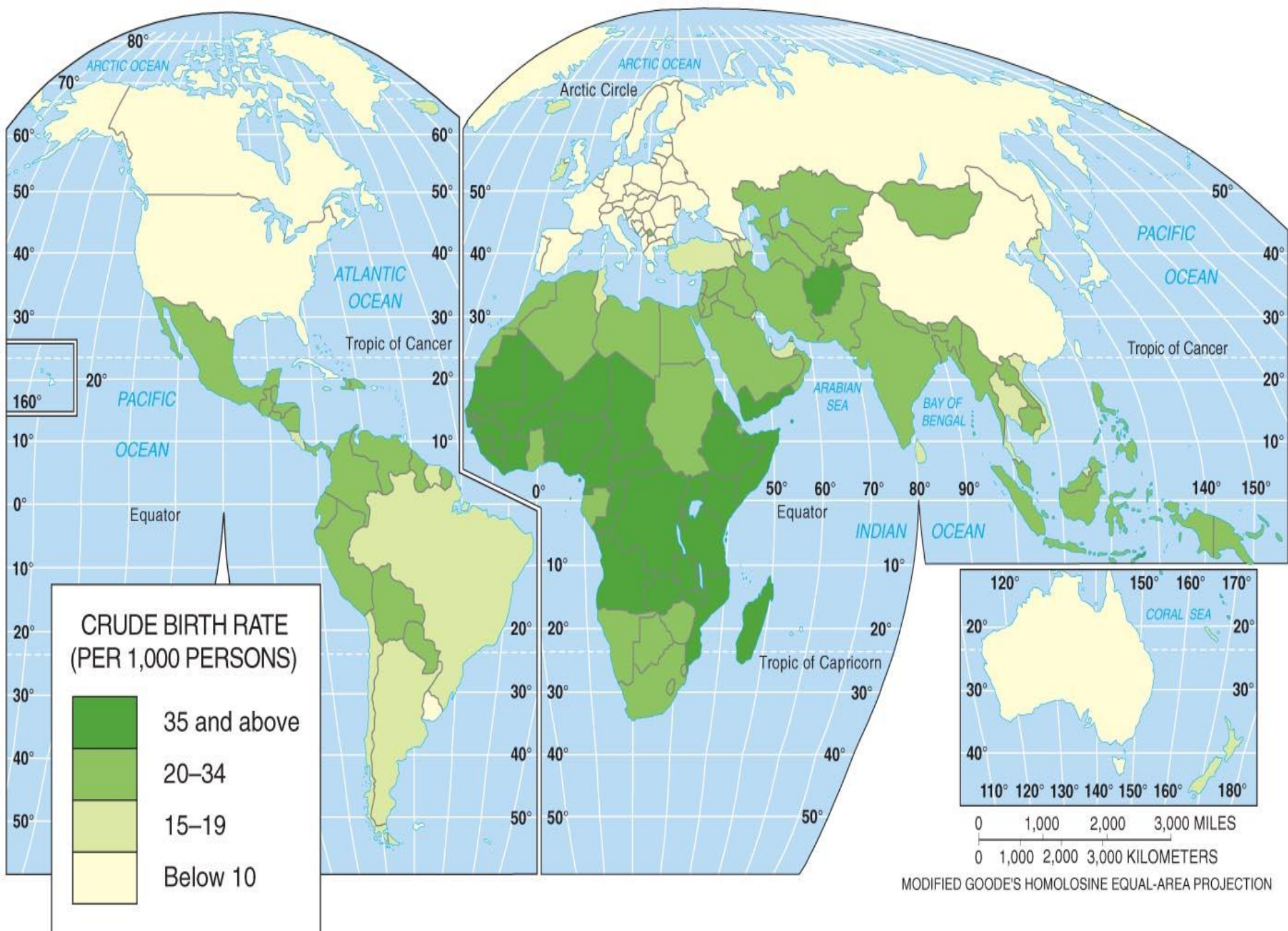
- Total number of live births in a year for every 1,000 people alive in the society.
 - Example: CBR 20 means that for every 1,000 people in a country, 20 babies are born over a 1 year period.

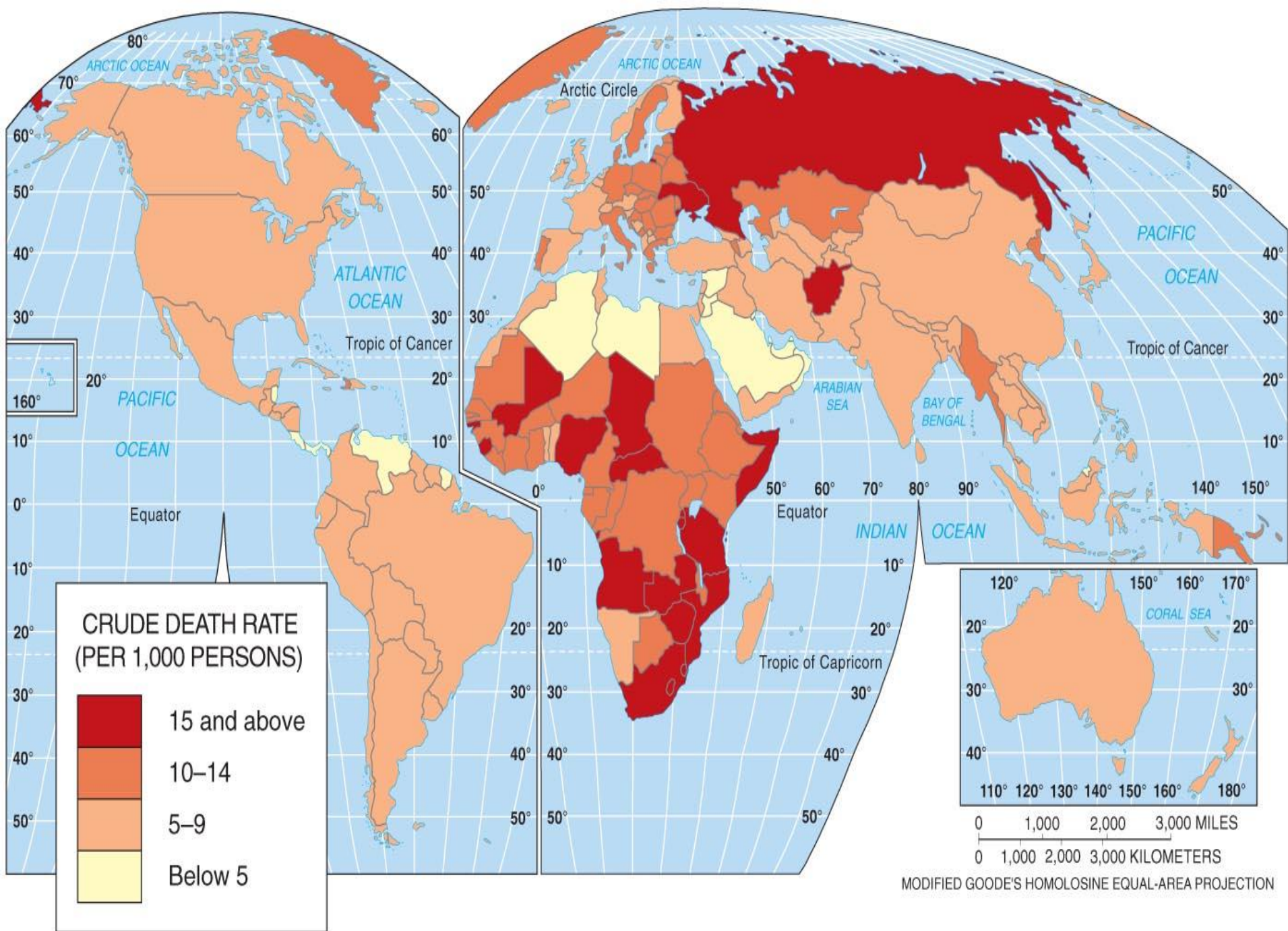
2. Crude Death Rate (CDR):

- Total number of deaths in a year for every 1,000 people alive in the society.

3. Natural Increase Rate (NIR):

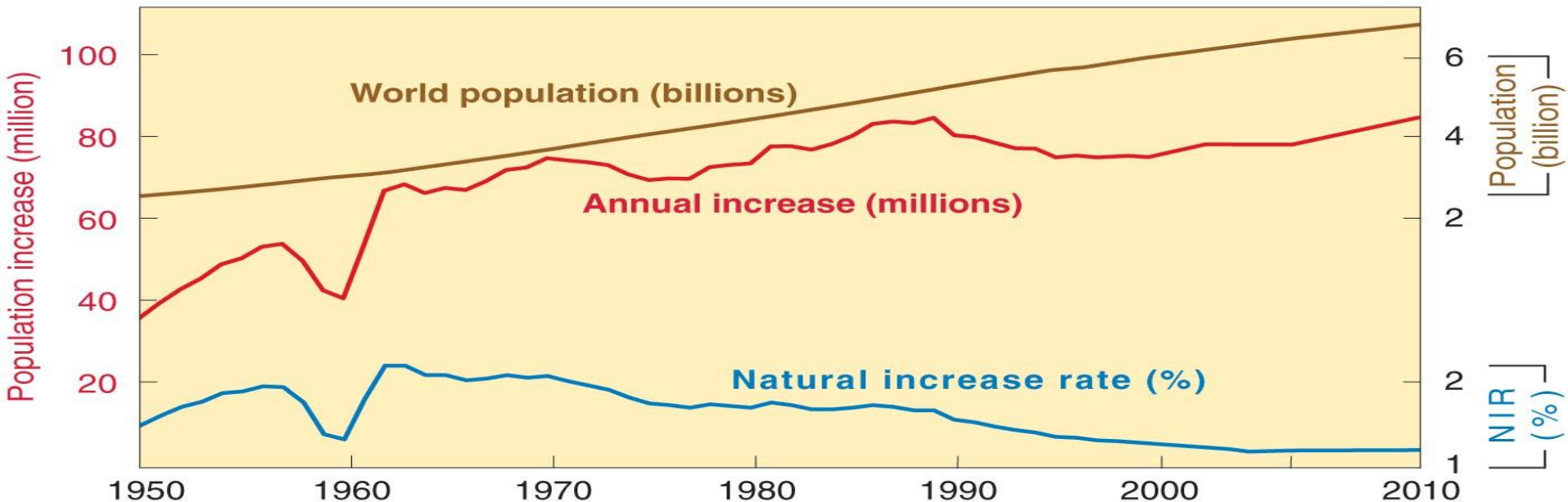
- Percentage by which a population grows in a year.
- Computing: subtracting CDR from CBR (has to be converted into a percentage)
 - Example: CBR 20 and the CDR 5 (both per 1,000), then the NIR is 1.5% or 15 per 1,000.
- EXCLUDES MIGRATION!

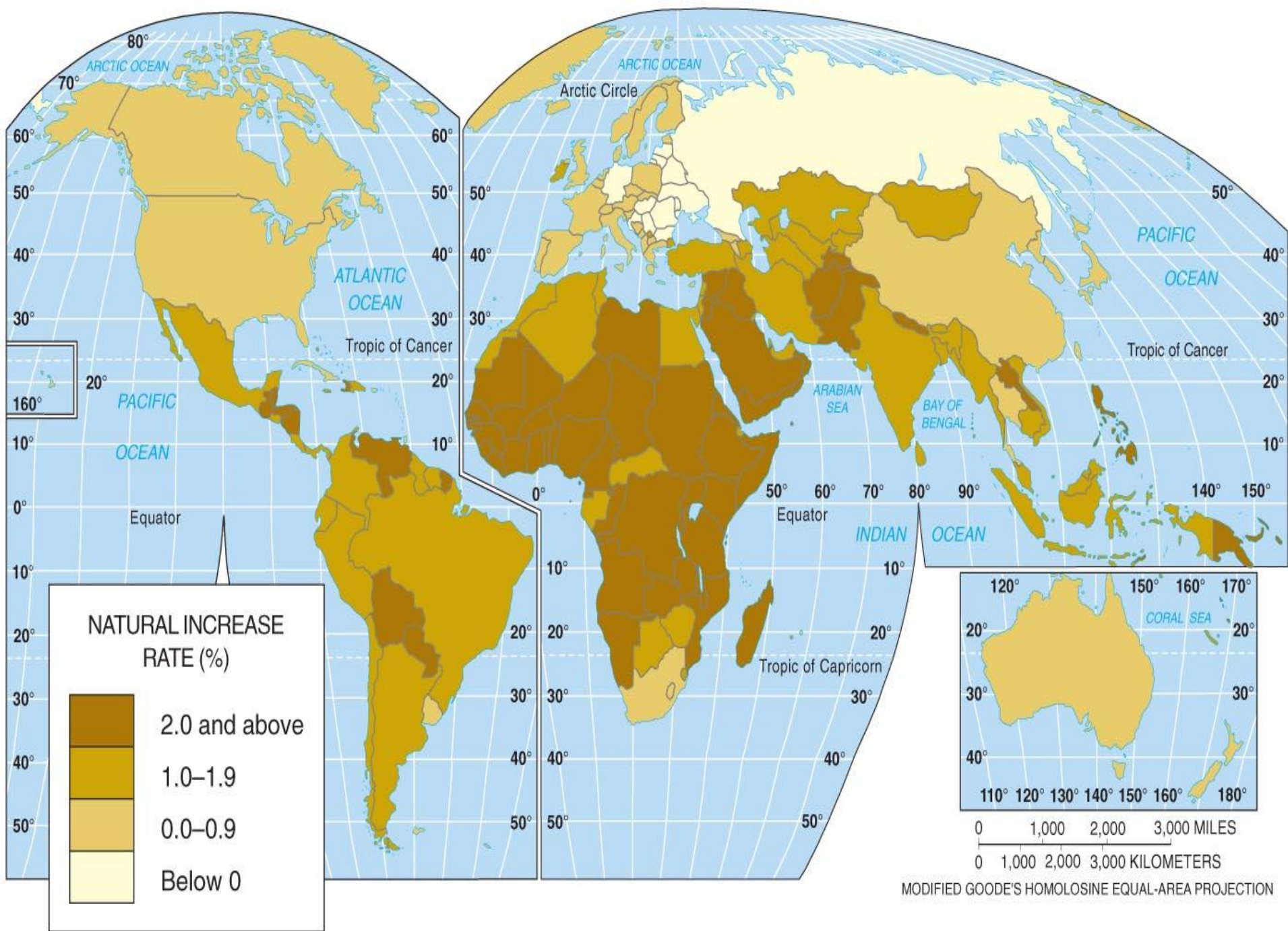




Natural Increase

- 21st Century: NIR has been 1.2
 - Means: population of the world has been growing each year by 1.2%.
- 95% of the natural increase is clustered in developing countries.
 - 2.0% in most countries of sub-Saharan Africa, whereas its negative in Europe.
- Doubling Time:
 - Number of years needed to double a population, assuming a constant rate of natural increase.
 - Example: at rate of 1.2% per year, it would take 54 years for the world population to double.
 - 2100 would reach 24 billion





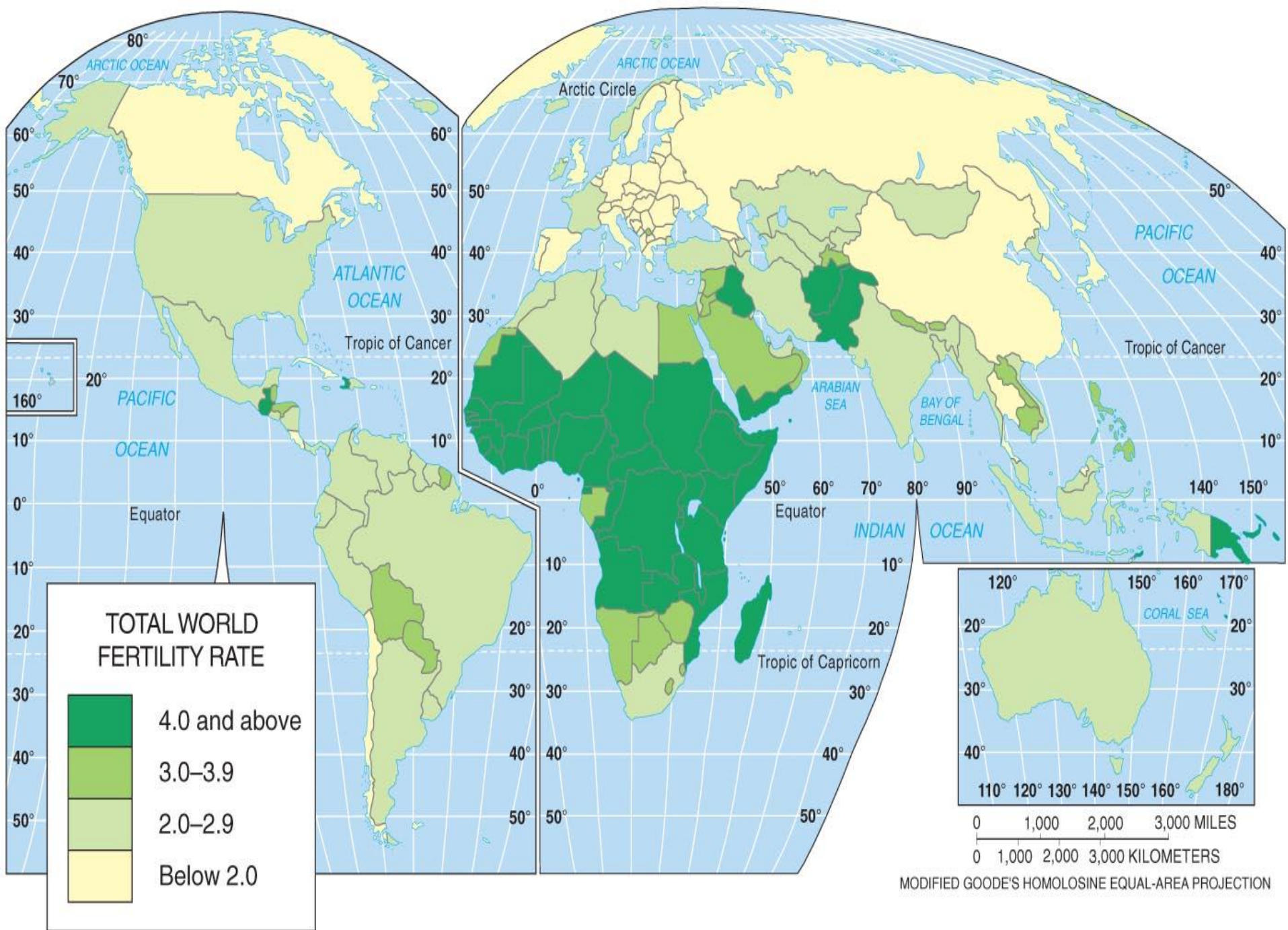
Fertility

- Highest CBRs are in sub-Saharan Africa (CBR=40+), lowest in Europe (CBR=10-)
- **Total Fertility Rate (TFR):**
 - The average number of children a woman will have throughout her childbearing years (15-49 years old)
Measure the number of births in a society.
- TFR for the world: 2.5
- **TFR: Activity!**

Mortality

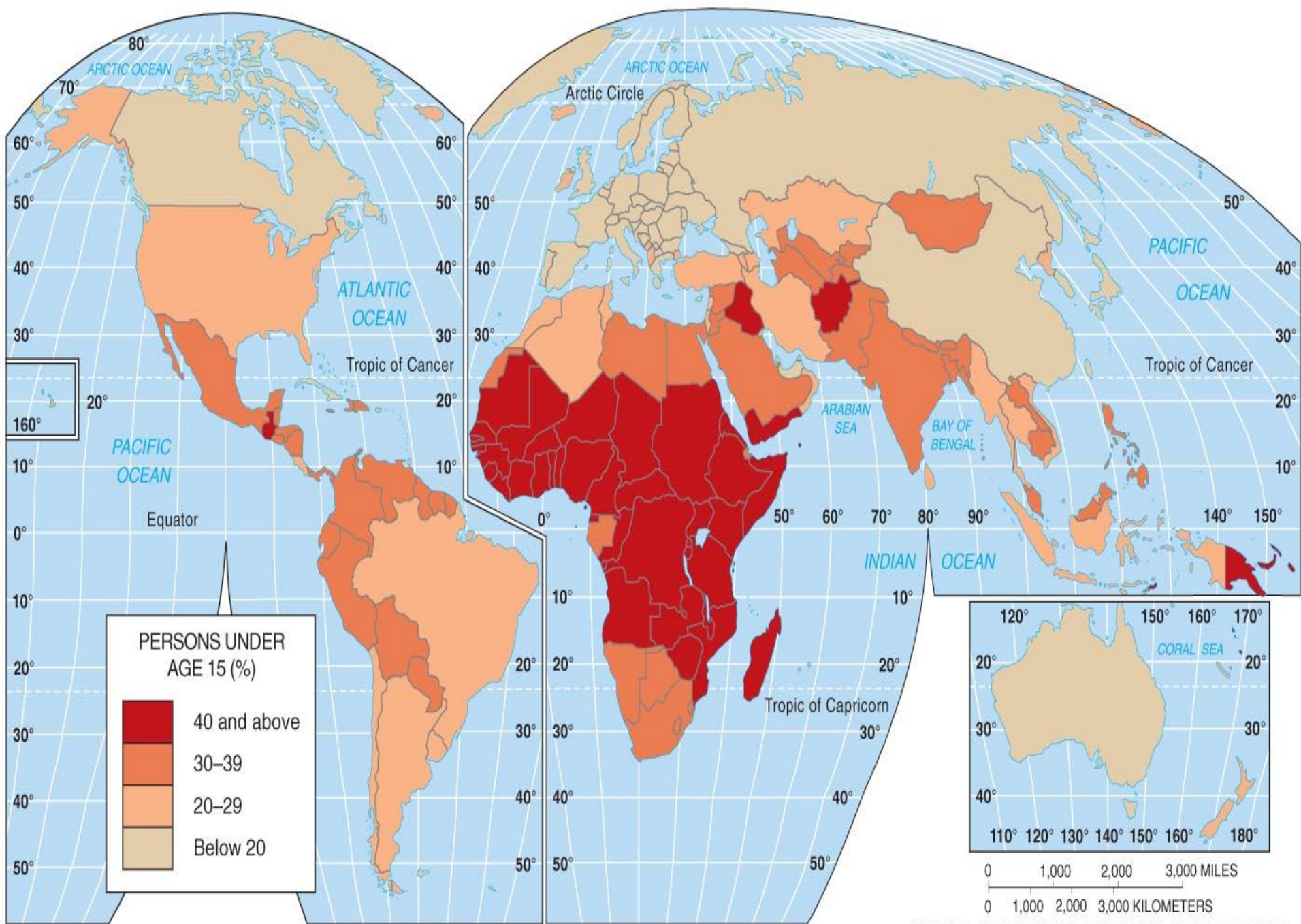
- Developed Countries:
 - Lower rates of NIR, CBR, TFR
- Developing Countries:
 - High rates of NIR, CBR, TFR
- CDR:
 - Combined CDR for all developing countries is actually lower than the combined rate for all developed countries.

	Developed Countries	Developing Countries
Natural increase rate	0.2	1.4
Crude birth rate	11	22
Total fertility rate	1.7	2.6
Infant mortality rate	5	48
Life expectancy (years)	78	68
Crude death rate	10	8
Under age 15 (percent)	16	29
Age 65 (percent) and above	16	6

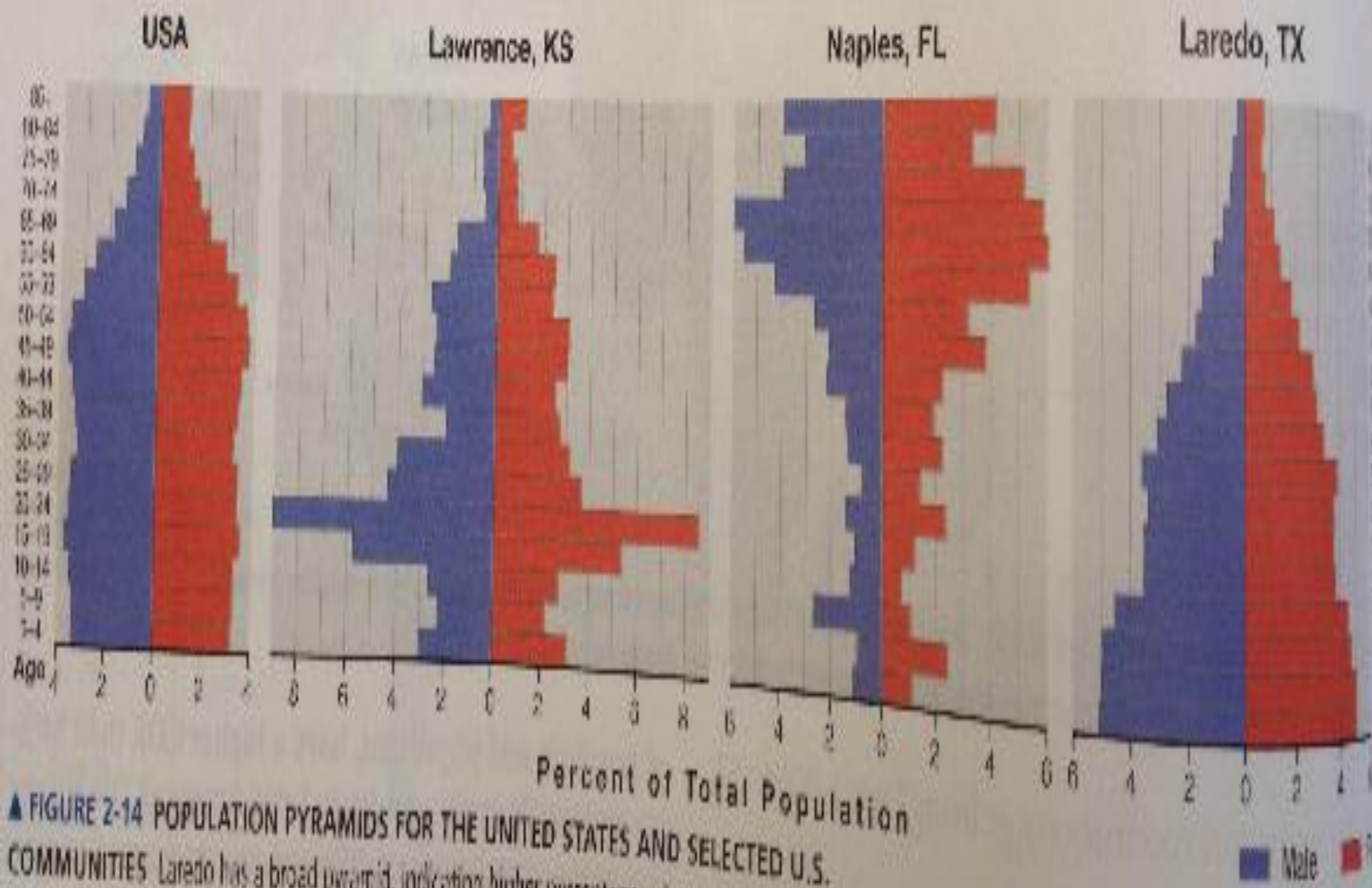


Population Structure:

- Population Pyramids:
 - Population structure displayed on a bar graph
 - Shows the percentage of the total population in five-year age groups, with the youngest group (0-4 yrs old) at the base of the pyramid and the oldest group at the top.
- Dependency Ratio:
 - Number of people who are too young (0-14) or too old (65+) to work.
 - Financial burden
 - “Gray Power”
- Sex Ratio:
 - Number of males per 100 females in the population.
 - Developed Countries have more females than males because women live an average 7 years longer than men.
 - Asian countries have more men than women (male babies outnumber female babies)
 - Female babies being aborted (China and India)



MODIFIED GOODE'S HOMOLOGINE EQUAL-AREA PROJECTION



Key Issue 3: Why Does Population Growth Vary among Regions?

The Demographic Transition: process of change in a society's population from high crude birth and death rates and low rate of natural increase to a condition of low crude birth and death rates, low rate of natural increase, and higher total population.

Demographic Transition:

Stage 1: Low Growth

- **VERY HIGH BIRTH AND DEATH RATES**
- **PRODUCE VIRTUALLY NO LONG-TERM NATURAL INCREASE**
- People in stage 1:
 - Relied on hunting and gathering for food.
 - When food became easily obtained population grew
 - Declined when people could not locate food.
- **NO country remains in stage; every nation have moved to at least stage 2 of the DTM.**

Stage 2: High Growth

- **RADIDLY DECLINING DEATH RATES**
- **VERY HIGH BIRTH RATES**
- **VERY HIGH NATURAL INCREASE.**
- **1750s:**
 - Europe and North America entered stage 2 as a result of **the Industrial Revolution**.
 - Major improvements in manufacturing foods and delivering them to the market.
 - Created wealth, which made healthier communities.
- **1950s:**
 - Stage 2 diffused to Africa, Asia, and Latin America.
 - Push into stage 2 due to **Medical Revolution**.
 - Eliminated many of the traditional causes of death in developing countries and enabled more people to live healthier & longer.

Demographic Transition:

Stage 3: Decreasing Growth

- **BIRTH RATES RAPIDLY DECLINE**
- **DEATH RATES CONTINUE TO DECLINE**
- **NATURAL INCREASE RATES BEGIN TO MODERATE.**
- A country leaves stage 2 and moves into stage 3 when the CBR begins to drop sharply.
- CDR continues to fall, but at a slower rate.
- NIR more modest and the gap between CDR and CBR narrows.
- **How does a country enter stage 3?**
 - People choose to have fewer children.
 - Economic changes
 - Live in cities and work
 - Farmers view children as assets

Stage 4: Low Growth

- **VERY LOW BIRTH RATES**
- **VERY LOW DEATH RATES**
- **VIRTUALLY NO LONG-TERM NATURAL INCREASE**
- **POSSIBILITY FOR DECREASE!**
- CBR declines to the point where it equals CDR
- NIR approaches ZERO
 - **Zero Population Growth**
 - Occurs when the CBR is still slightly higher than the CDR because some women die before childbearing years.
 - TFR 2.1 produces ZPG
- **Characterized by two “big breaks”:**
 - *Sudden drop in the death rate that comes from technological innovation.*
 - *Sudden drop in the birth rate that comes from changing social customs*
- **Social Change:**
 - Women enter labor force
 - People have more access to birth control.
 - Example: Denmark

CAPE VERDE

CHILE

DENMARK

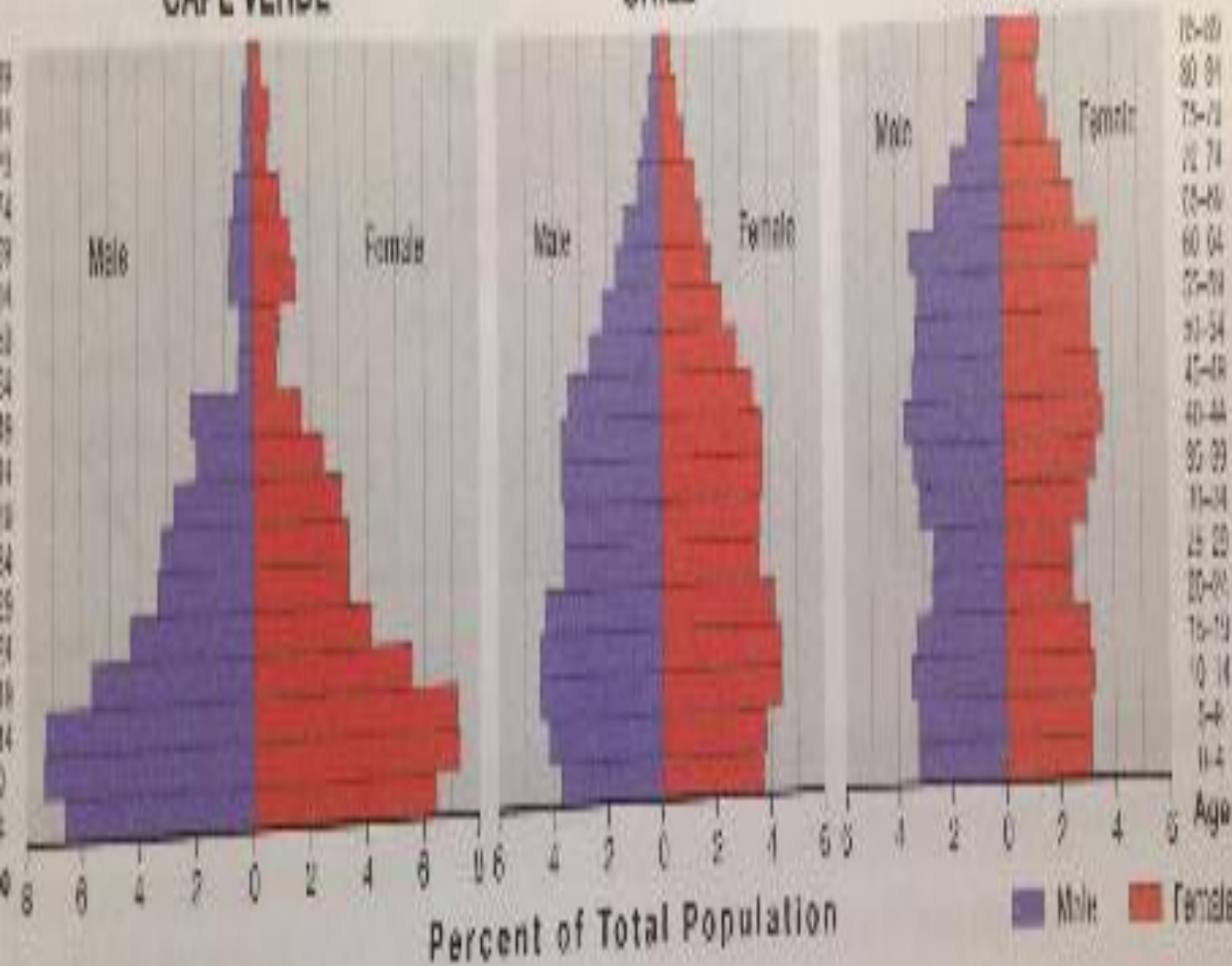


FIGURE 2-21 POPULATION PYRAMIDS As a country moves through the demographic transition, the shape of the pyramid flattens. (left) Cape Verde's pyramid has a broad base, as is typical of a stage 2 country. (center) Chile's graph still resembles a pyramid. (right) Denmark's pyramid is flat, an indication of the aging of the population.

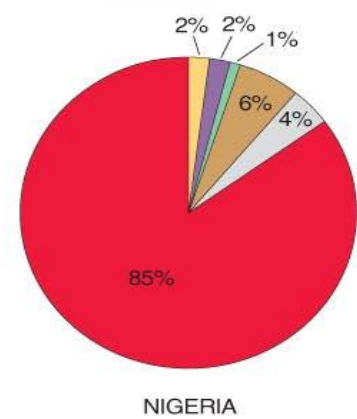
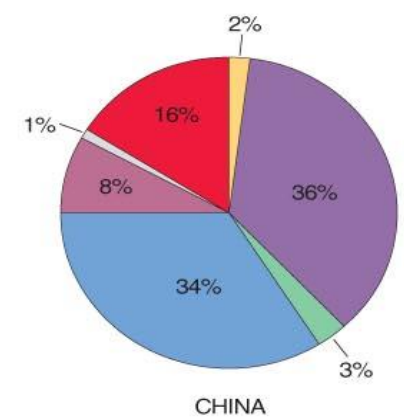
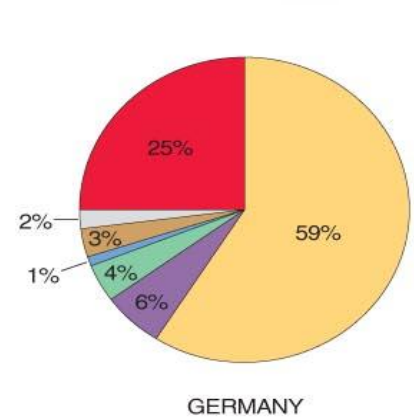
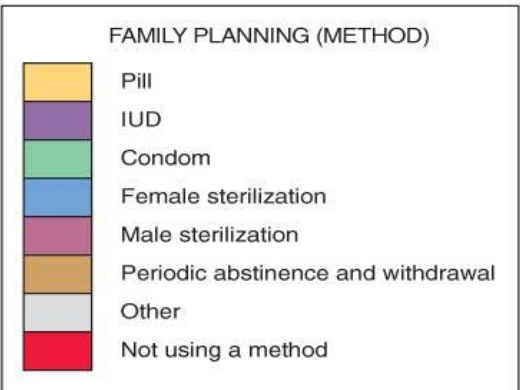
Declining Birth Rates:

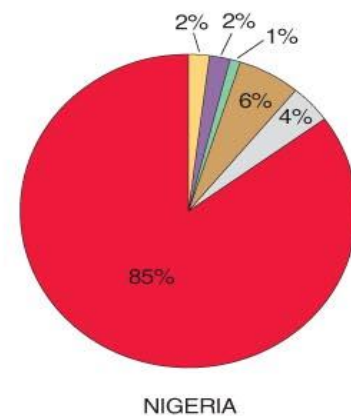
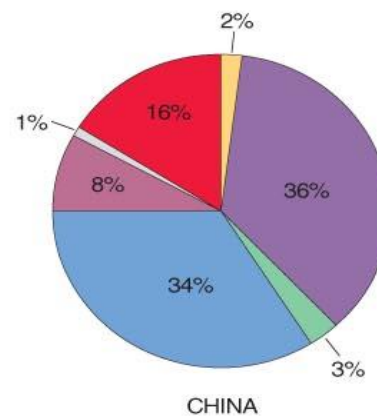
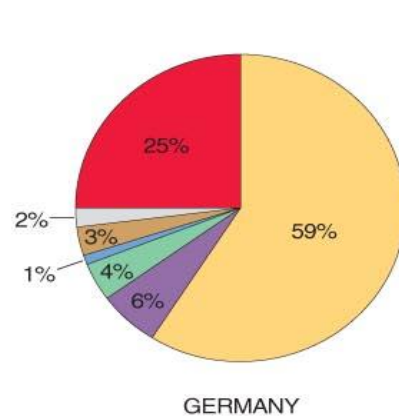
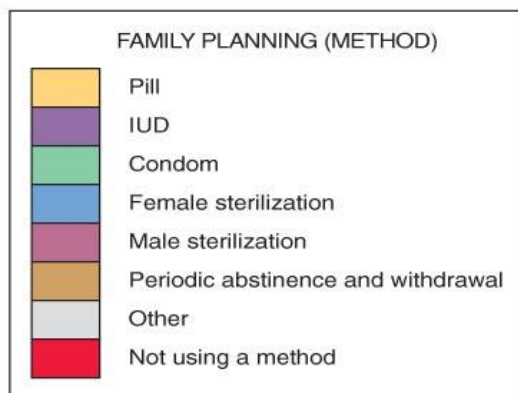
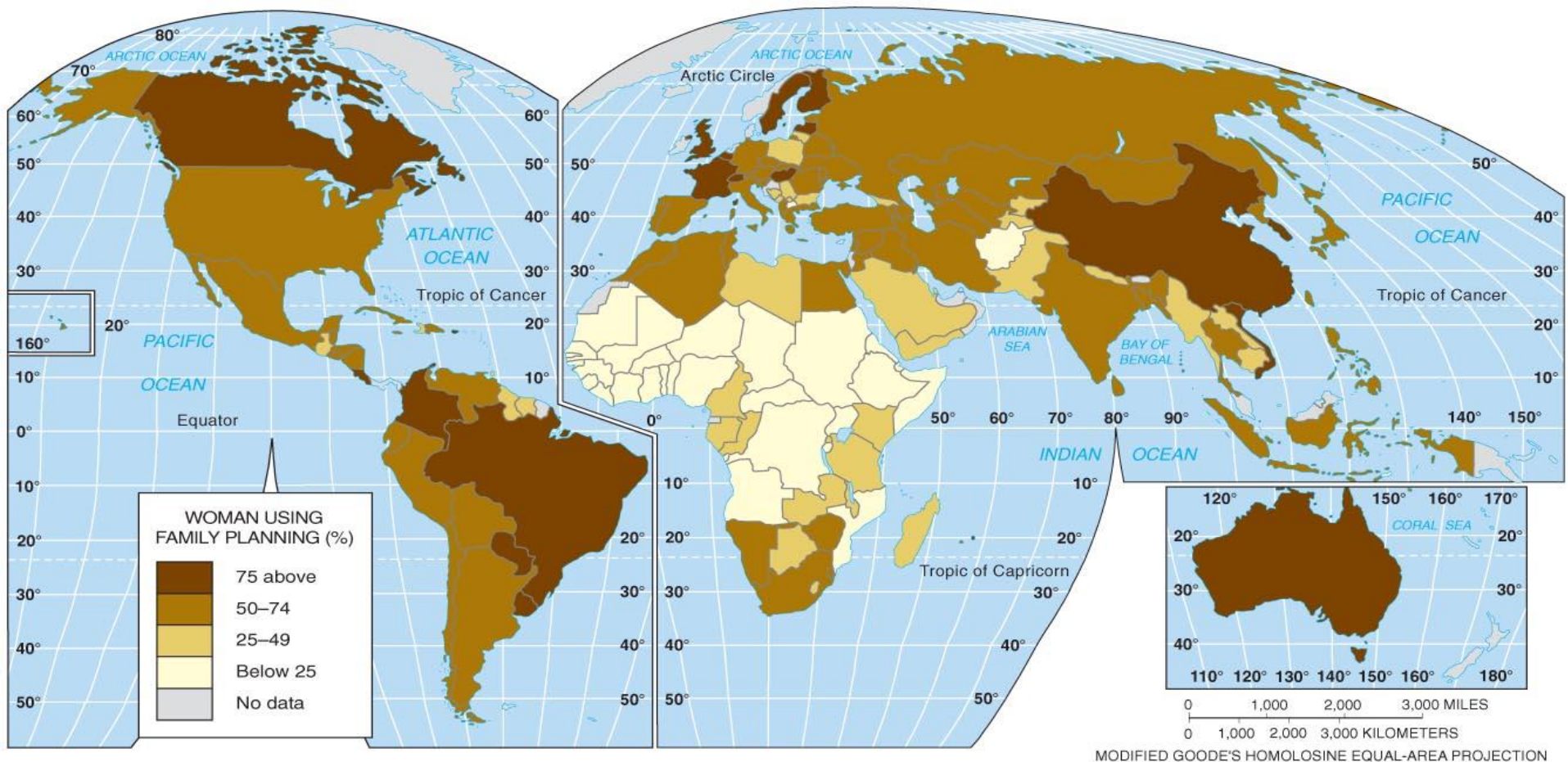
Lowering Birth Rates through Education and Health

- One approach to lowering birth rates emphasizes the importance of improving economic condition.
- Wealthier communities have more money to spend on education and health-care programs that promote lower birth rates.
 - Women in school = entering workforce.
 - Better education = better understanding of their reproductive rights.
 - Infant Mortality Rates decline through natal care, counseling about STDs, and vaccinations.
 - Survival of infants encourages women to use birth control methods.

Lowering Birth Rates through Contraception.

- Importance of diffusing modern contraceptive methods.
- Economic development may promote lower birth rates.
- Putting resources into family planning programs can reduce birth rates rapidly.
- Developing countries demand for contraceptive devices is greater than the available supply.
- Issue with contraception:
 - Religious reasons
 - Political reasons



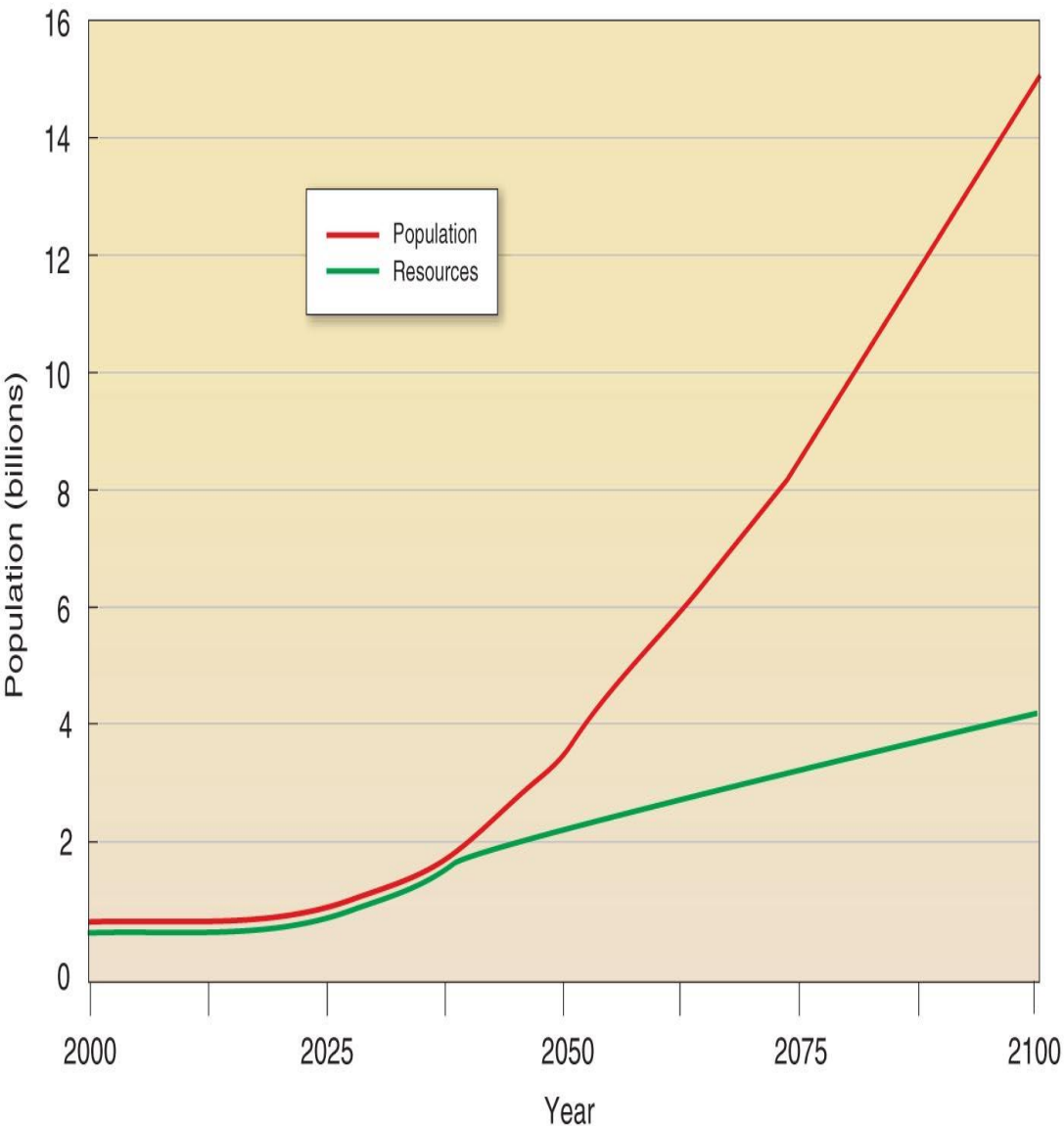


Malthus on Overpopulation

- Thomas Malthus (1766-1834):
 - Argued: the world's rate of population increase was far outrunning the development of food supplies.
 - Made claims decades after England became the first country to enter stage 2 of DTM.
 - Concluded: population growth would press against available resources in every country unless “**moral restraint**” produced a lower CBR or **disease/famine/war** produced higher CDRs.
- Work: *An Essay on the Principle of Population* (1798).
 - Claimed: population was growing much more rapidly than Earth's food supply because population increased geometrically, where as food supply increased arithmetically.

Today:	1 person, 1 unit of food
25 years from now:	2 persons, 2 units of food
50 years from now:	4 persons, 3 units of food
75 years from now:	8 persons, 4 units of food
100 years from now:	16 persons, 5 units of food

Malthus's Theory



- Malthus expected population grow more rapidly than food supply.

Contemporary Neo-Malthusians

- Neo-Malthusians argue that two characteristics of recent population growth make Malthus's thesis even more frightening than when it was first written more than 200 years ago.
 1. During Malthus's time only a few countries had entered stage 2 of the DTM (rapid population growth).
 - Malthus failed to anticipate that relatively poor countries would have the most rapid population growth because of transfer of medical technology (but not wealth) from developed countries.
 - **Result:** gap between population growth and resources is wider in some countries.
 2. World population growth is outstripping a wide variety of resources, not just food production.
 - Neo-Malthusians paint a frightening picture of a world in which billions are engaged in a desperate search for food, water, and energy.

Malthus's Critics

Resource Depletion

- Many geographers consider Malthusians beliefs unrealistic because it is pessimistic because they are based on a belief that the world's supply of resources is fixed rather than expanding.

Unjust Social and Economic Institutions

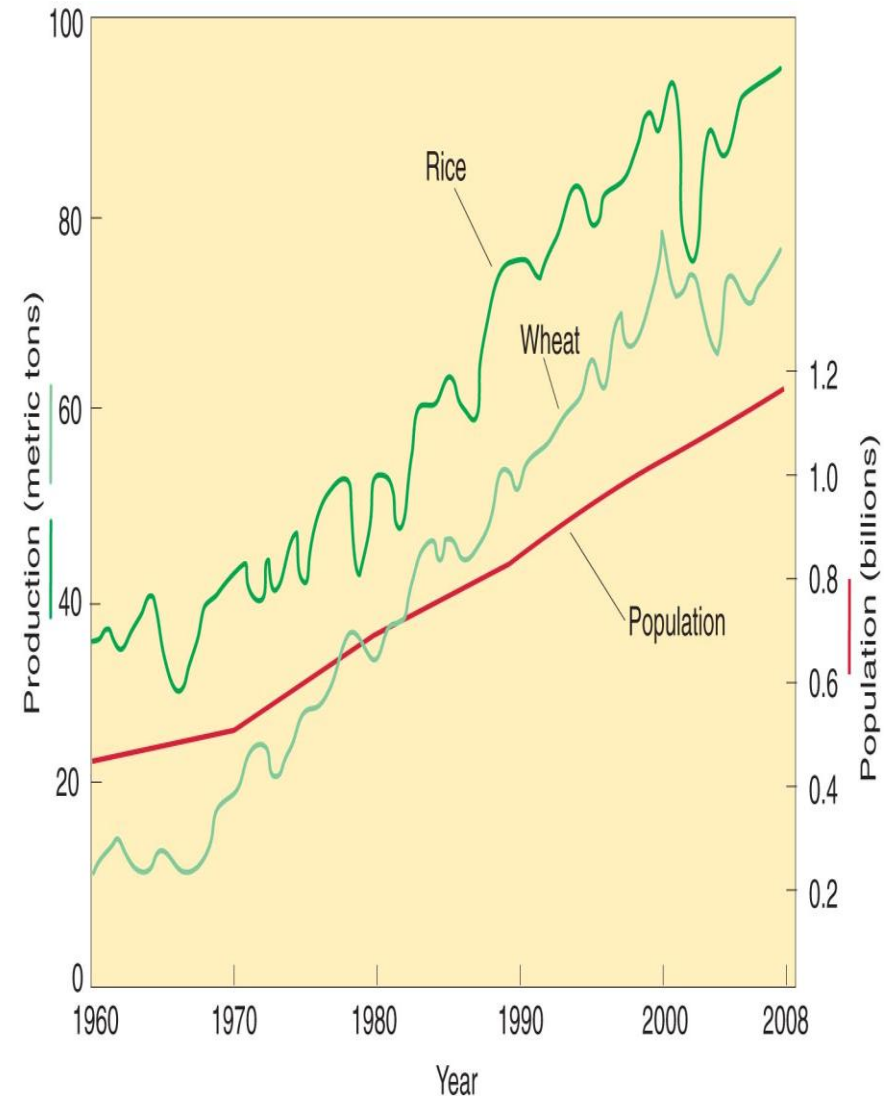
- Poverty, hunger, and other social welfare problems associated with lack of economic development are a result of unjust social and economic institutions.
- Argue that the world possesses sufficient resources to eliminate global hunger and poverty if everything was shared equally.

Population Growth

- Critics disagree with Malthus's theory that population growth is a problem.
 - A larger population could stimulate economic growth and , therefore, production of more food.
 - Larger consumer population can generate demand for more goods = more jobs.
 - More people, more brains, more ideas for improving life.
 - More people to defend a country.

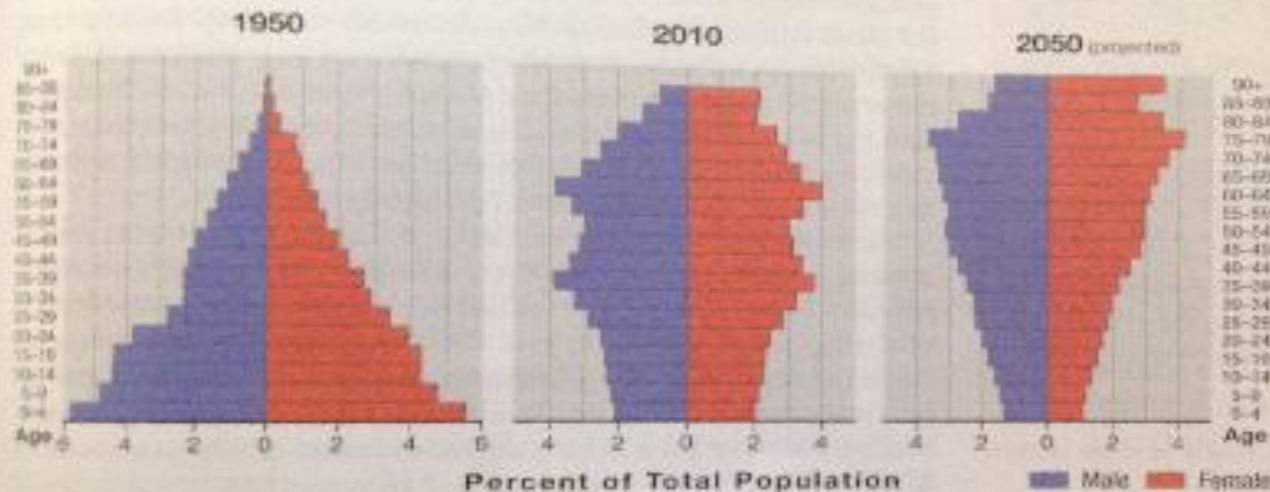
Malthus's Theory and Reality:

- Human population has grown at its most rapid rate ever, world food production has consistently grown at a faster rate than the NIR since 1950.
- Malthus close to the mark on food production, but too pessimistic on population growth.
 - Last half-century food production has increased more rapidly than Malthus predicted.
 - Example: India production of rice & wheat.
 - Contributed to expansion of food supply:
 - Better growing techniques
 - Higher yielding seeds
 - Cultivation of more land
- Population side of the equation
Malthus was inaccurate:
 - Population has increased more slowly than food supply.



Japan's Declining Population

- Japan is an example of a country that faces the prospect of population decline in future, from 127 million (2010) to 95 million (2050).
 - Decline = major shift in the country's population structure.
 - Japan discourages migration (does not welcome outsiders)
- **Issue:** faces a shortage of workers, but making older people and women to work (can lower birth rate and even lower NIR).
 - Women are being forced to choose work or have kids.
 - **Benefit:** Japan offers more health-care services at home instead of hospitals

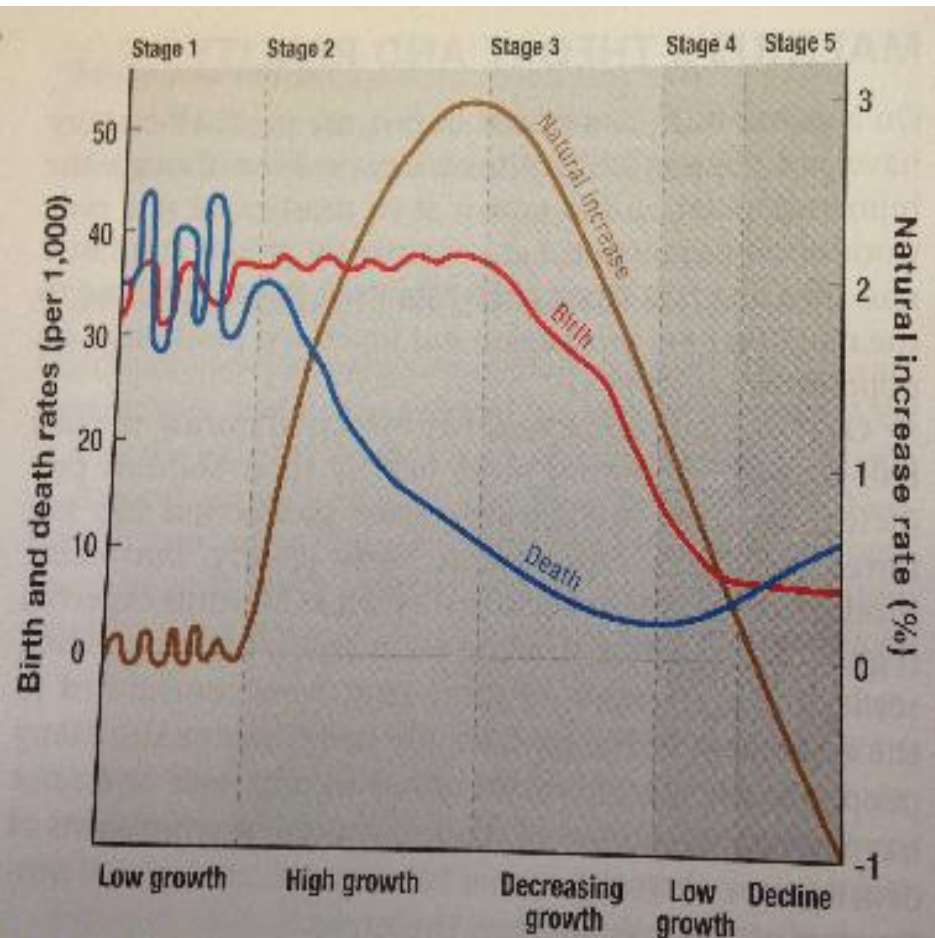


◀ **FIGURE 2-28 JAPAN'S CHANGING POPULATION PYRAMIDS** Japan's population pyramid has shifted from a broad base in 1950 to a rectangular shape. In the future, the bottom of the pyramid is expected to contract and the top to expand.

Population Futures

- NIR is expected to be much slower in the 21st century than in the 20th, but population will continue to grow.
 - 7 Billion (2011) to 9.5 Billion (2050)
- 97% of this increase is expected to be in developing countries.
 - Developed countries may move into a possible stage 5 of the demographic transition.
- Future population depends on fertility.
 - TFR remains at 2.5 the population would reach 12 billion (2050)
 - TFR decreases to 1.5 the population would decline to 8 billion (2050)

Demographic Transition Possible Stage 5: Decline



▲ FIGURE 2-30 POSSIBLE DEMOGRAPHIC TRANSITION STAGE 5 Stage 5 of the demographic transition would be characterized by a negative NIR, because the CDR would be greater than the CBR.

- Predicted for SOME developed countries.
- **VERY LOW CBR**
- **INCREASING CDR**
- **NEGATIVE NIR**
- Stage 5 countries would face:
 - *very small percent of young women aging into child-bearing years.*
 - If women keep choosing to not have children birth rate will continue to fall.
 - *Future population will be older.*
 - **Result:** relatively few people can work and contribute to pensions, health care, and other support old people need.
 - High CDR cause of old people.
- Several European countries:
 - Russia and other former communist countries have negative NIRs.
 - *Low CBR may stem from a long tradition of strong family-planning programs*
 - *Deep-seated pessimism about have children in an uncertain world.*
 - High CDR may be inadequate pollution controls

China and India

India's Population Policy

- Remained in stage 1 of the DTM until the late 1940s.
- 1st half of the 20th century India's population increased modestly and even decreased because of disease (malaria, famine, plagues, cholera).
 - Gaining independence in 1947 from England, India's death rate dropped (20:1,000), whereas the birth rate stay high (40:1,000).
 - NIR: 2% each year.
- First country to embark on a national family-planning program (1952).
 - Government established clinics, provided education about birth control methods, free birth control, abortions (1972).
 - Controversy:
 - Camps established in 1971 to perform sterilization
 - Participant was paid
 - 8.3 million sterilizations performed in a 6-month period mostly on women.
 - Widespread opposition: people scared they would be forced into program.
 - “family planning” vs. “family welfare”
- Now: Education, advertisements, information, and still sterilization.

China's Population Policy

- 2000 China had a lower CBR than the United States.
- Chinese Government Policy (1980)
 - One Child Policy:
 - Couple needs a permit to have a child.
 - Couple receives financial subsidies, a long maternity leave, better housing, and more land if they agree to just 1 child (rural).
 - Men prohibited to get married until 22 and women 20.
 - People receive free contraceptives, abortions, sterilizations.
- Rules have been relaxed for wealthier families.
 - Forced to pay “family planning fee” to cover the cost to the government of supporting the additional person.

Pause and Reflect:

- Why might China's One Child Policy result in Many more male than female children?

Key Issue 4: Why Do some Regions Face Health Threats?

Epidemiologic Transition:

focuses on the distinctive health threats in each stage of the demographic transition.

Epidemiologic Transition

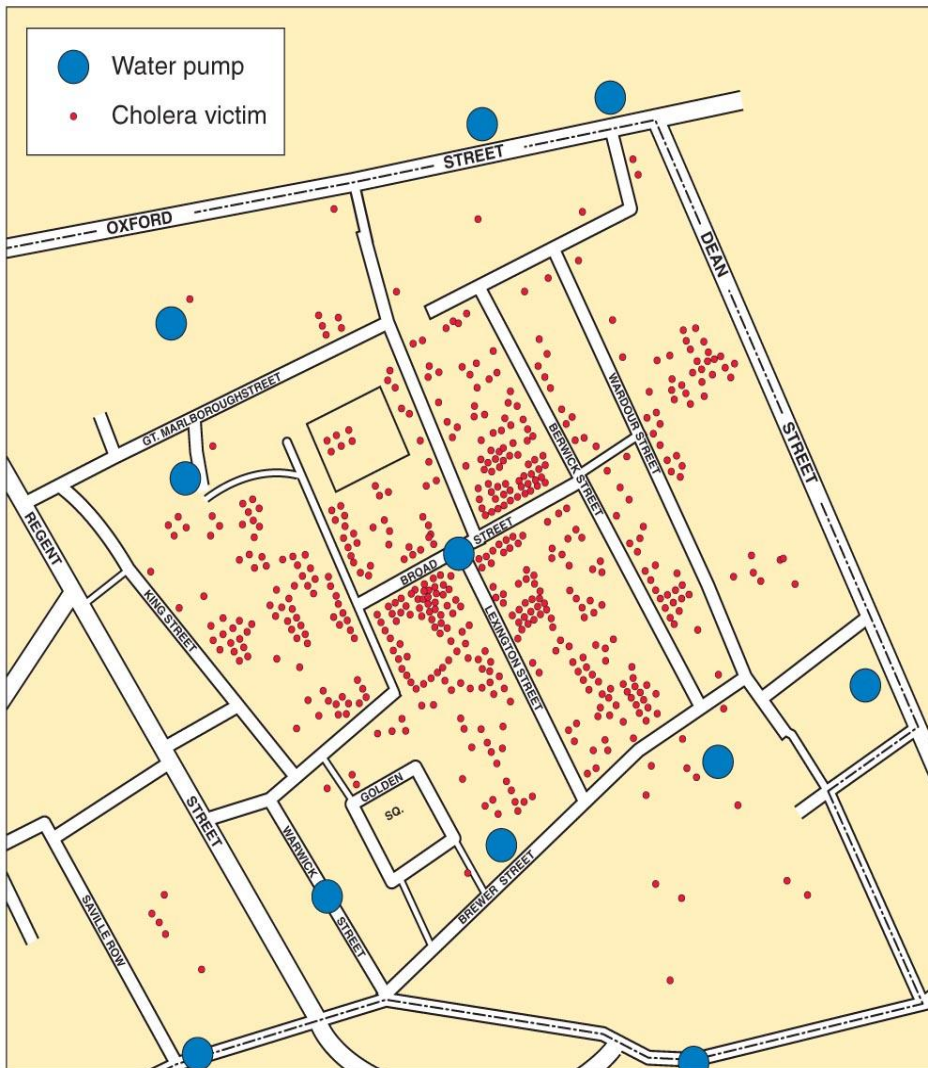
- **Epidemiology:** branch of medical science concerned with the incidence, distribution, and control of diseases that are prevalent among a population at a special time and are produced by some special causes not generally present in the affected locality.
 - Formulated by Abdel Omran (1971)
 - 5 stages!

Stage 1: Pestilence and Famine (High CDR)

- Infectious and parasitic diseases were principal causes of human death, along with accidents and attacks by animals and other humans.
- Malthus's idea of “**Natural Checks**” on the growth of the population in stage 1 of the DMT.
- History's most violent stage 1 epidemic was “**Black Plague**”
 - Transmitted to humans by fleas from migrating infected rats.
 - 25 million Europeans (1/2 population died – 1347-1350)
 - 13 million died in China (1380)



Stage 2: Receding Pandemics (Rapidly Declining CDR)



- Pandemic: disease that occurs over a wide geographic area and affects a very high portion of the population.
- Improvements in sanitation, nutrition, and medicine during the Industrial Revolution reduced the spread of infectious diseases.
- Poor people crowded into rapidly growing industrial cities had high death rates.
 - Cholera
 - Persists in several developing regions in stage 2 of DTM.
 - Areas that lack clean drinking water.
 - GIS helped explain and battle stage 2 pandemics.
 - Dr. John Snow created a hand-made GIS.
 - Showed cholera victims and the water pump locations.
- People used to believe epidemic victims were pushed for sinful behavior.

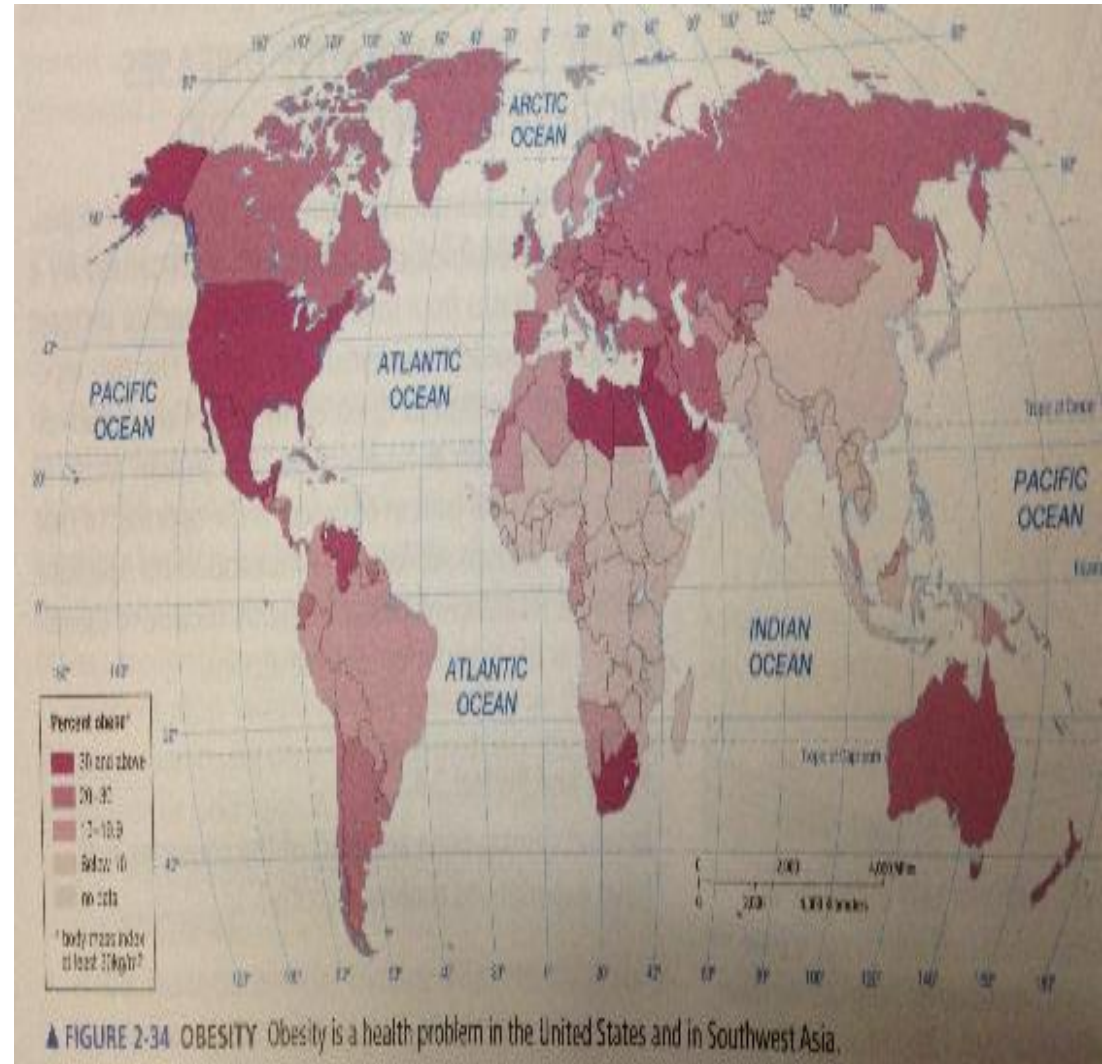
Stage 3: Degenerative Disease (Moderately Declining CDR)



- Stage of degenerative and human-created diseases
- Decrease in death from infectious diseases and an increase in chronic disorders associated with aging.
 - Cardiovascular disease (heart attacks)
 - Various forms of cancer
- Sub-Saharan Africa and South Asia have low instances of cancer because of low life expectancy.

Stage 4: Delayed Degenerative Diseases (Low But Increasing CDRs)

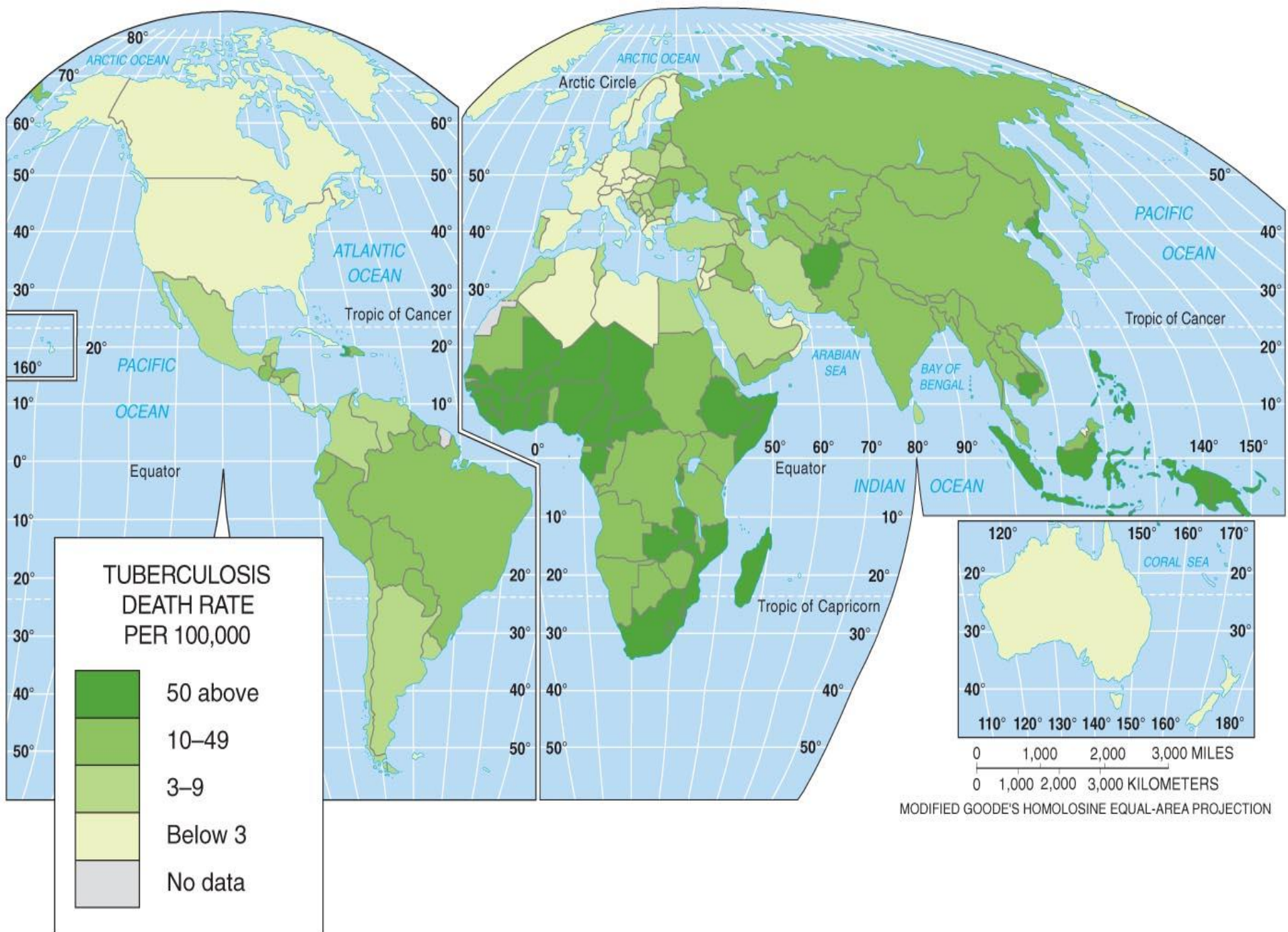
- Stage 4 created by S. Jay Olshansky and Brian Ault.
- Major degenerative causes of death – cardiovascular diseases and cancers, but life expectancy of older people have been extended through medical advances.
 - Operations such as bypasses repair deficiencies in the cardiovascular system.
 - Improving health through behavior changes.
- Increase obesity



Possible Stage 5: Infectious Diseases

- Medical analysts argue that the world is moving into stage 5 of the epidemiologic transition.
 - **Reemergence of infectious and parasitic diseases**
 - **Three reasons for reemergence: poverty, evolution, and increased connections.**

Evolution	Poverty	Connections
<ul style="list-style-type: none">• infectious disease microbes evolved in response to environmental pressures by resistance to drugs and insecticides.• Contributing to new strands of viruses and bacteria.• Example: Malaria – DDT resistant mosquitoes.	<ul style="list-style-type: none">• More prevalent in poor areas than other places due to unsanitary living conditions.• People can't afford drugs or vaccines.• Example: TB (Tuberculosis)	<ul style="list-style-type: none">• Several dozen “new” pandemics such as H1N1 (swine) flu and severe acute syndrome (SARS) have emerged over the past 3 decades due to relocation diffusion.• Most Lethal:• AIDS (30 million died from the beginning of the epidemic through 2010, 34 million living with HIV)• Sub-Saharan Africa: 23 of the 34 million HIV-positive people.• AIDS diffused by relocation from Africa and visitors of Africa.• AIDS entered the US during the 1980s through NY, CA, FL.• Decreased due to rapid diffusion of preventative methods and medicines (AZT)





Health Care

Indicators of Health

- Two indicators:
 - **Infant Mortality Rate (IMR:**
 - Annual number of death of infants under one year of age.
 - **Life Expectancy:**
 - Measures the average number of years a newborn infant can expect to live at current mortality levels.

Provisions of Health Care

- Children remain at risk in developing countries.
 - 17% of children are not immunized against measles compared to 7% in developed countries.
- Developed Countries use their wealth to protect people who can't work.
 - Developed countries spend more on health care and spend a higher percentage of their wealth on healthcare.



Medical Services:

- Countries possess different resources to care for people who are sick.
- High expenditure on health care in developed countries is reflected in medical facilities.
- Example:
 - Europe: 50+ hospital beds per 10,000 people, compared to fewer than 20 in sub-Saharan Africa, South and Southwest Asia.
 - Europe has 30+ physicians per 10,000 population, compared to fewer than 5 in sub-Saharan Africa.
- **Developed Countries:**
 - Health care is a public service that is available at little or no cost.
 - Government programs pay more than 70% of health-care costs in most European countries, and private individuals must pay more than half of the cost of health care.
 - Exception: United States where private individuals are required to pay 55% of health care, more closely resembling developing countries.
- **Developing Countries:**
 - rapid economic growth permitted states to finance generous programs with little difficulty. But recently economic growth has slowed, but the percentage of people needing public assistance has increased.



SUSTAINABILITY AND INEQUALITY IN OUR GLOBAL VILLAGE

Overpopulation in Sub-Saharan Africa

Overpopulation—too many people in the available resources—does not appear to be an immediate threat to the world, even in India, where the seven-billionth human was said to have been born on October 31, 2011 (Figure 2-47). However, it does threaten areas within sub-Saharan Africa.

Sub-Saharan Africa was not classified in Key Issue 1 as one of the world's population concentrations. Geographers caution that the size, density, or clustering of population in a region is not an indication of overpopulation. Instead, overpopulation is a relationship between population and a region's level of resources. The capacity of the land to sustain life derives partly from characteristics of the



▲ FIGURE 2-47 THE WORLD'S SEVEN BILLIONTH HUMAN

Nisha Kumar, born October 31, 2011, to Nisha and Ajay Kumar, of Lucknow, India, was declared the world's seven-billionth person by Plan International, a nongovernmental organization for children's welfare.

natural environment and partly from human actions to modify the environment through agriculture, industry, and exploitation of raw materials. See for example, the image of Mali on page 44.

The track toward overpopulation may already be irreversible in Africa. Rapid population growth has led to the inability of the land to sustain life in parts of the region. As the land declines in quality, more effort is needed to yield the same amount of crops. This extends the working day of women, who have the primary responsibility for growing food for their families. Women then regard having another child as a means of securing additional help in growing food.