

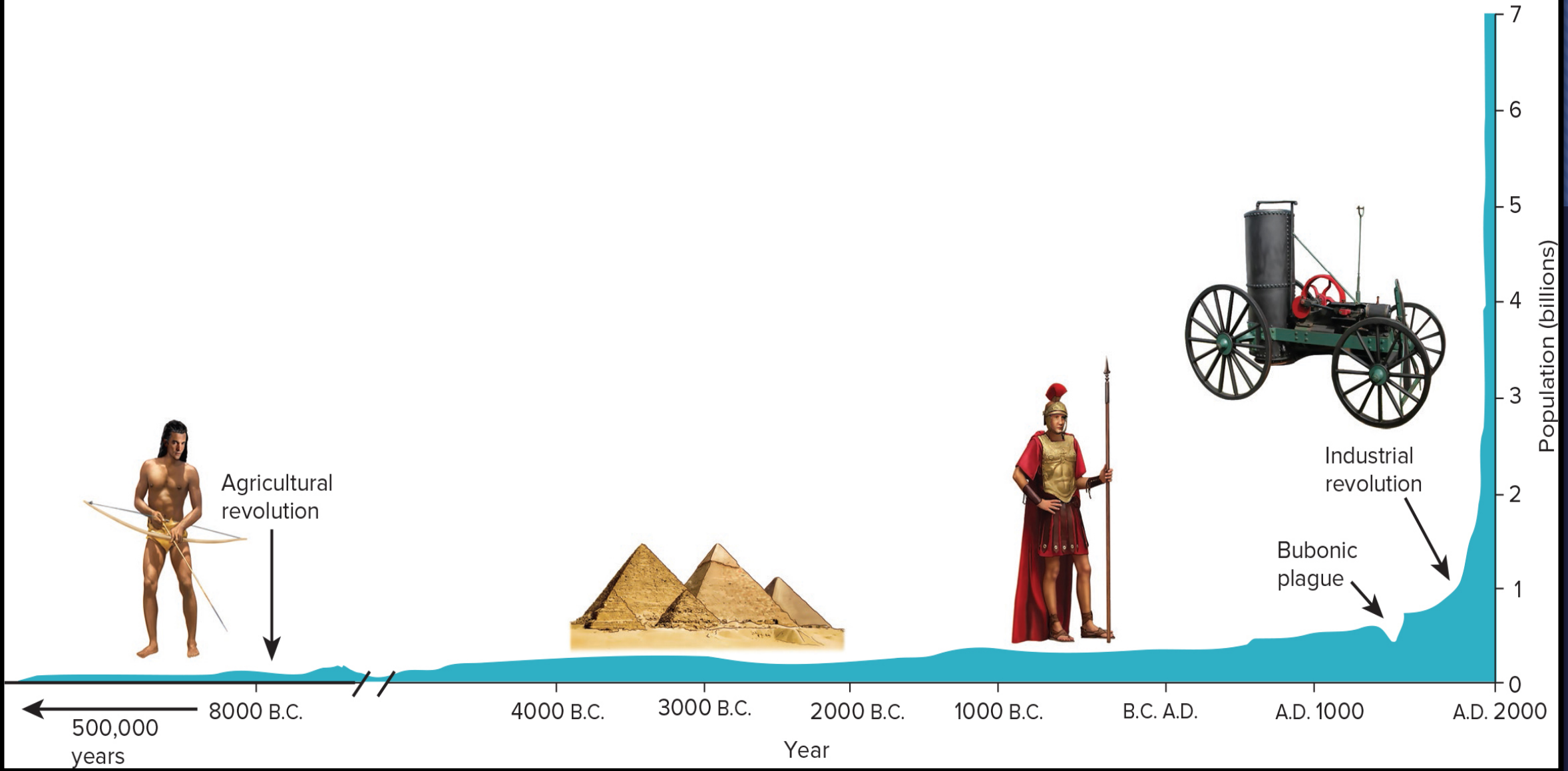


Human Population

Lecture 7

Past and Current Population Growth are Very Different

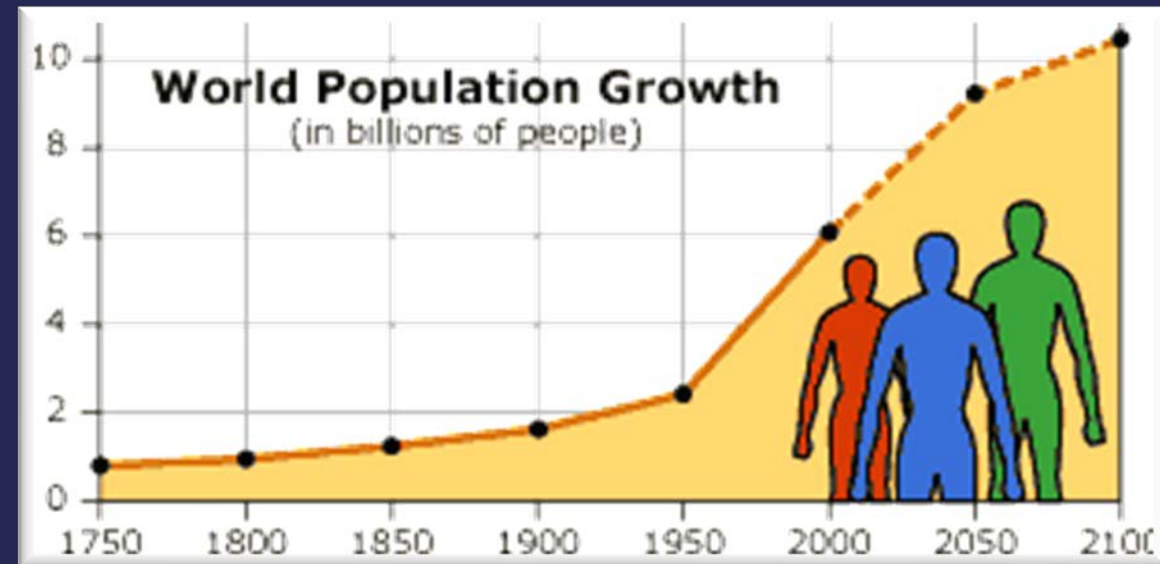
- Every second, on average, four or five children are born, somewhere on the earth. In that same second, one or two other people die.
- In 2011 the United Nations announced that we had reached 7 billion people, having added the most recent billion in only 12 years. We're now growing at 1.05 % per year.



Human Populations Grew Slowly Until Recently

Human Population Growth

- Rate of population growth has slowed since 1960 to 1.05%
 - World's population is still growing
 - In 2015, 241,000 people were added every day
- Human population growth is unevenly distributed geographically
 - 2% added to more developed countries
 - 98% added to less developed countries
- People are moving from rural to urban areas
 - In 2018, 55% of the world's population lived in urban areas, and it is increasing
 - Urban dwellers are living in less developed countries where resources for dealing with the growing population are limited



Perspectives on Population Growth



As with many topics in environmental science, people have widely differing opinions about population and resources.



Some believe that population growth is the ultimate cause of poverty and environmental degradation.



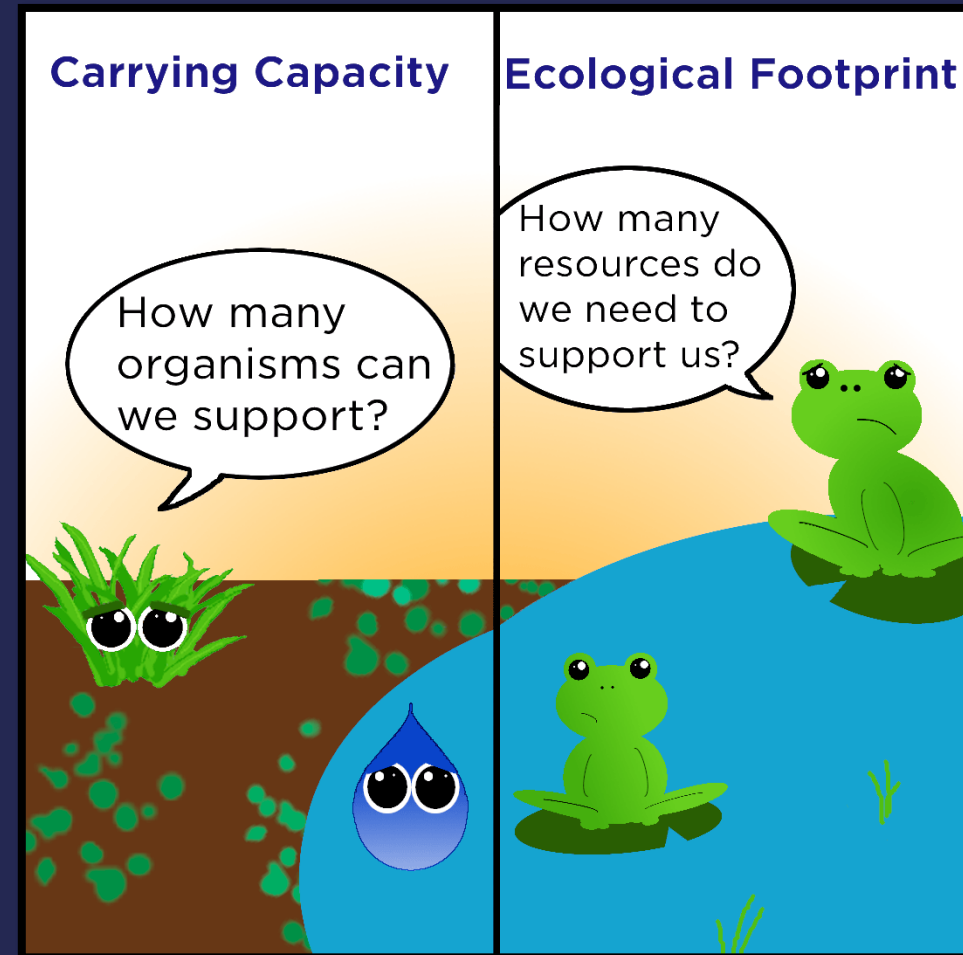
Others argue that poverty, environmental degradation, and overpopulation are all merely symptoms of deeper social and political factors.



The worldview we choose to believe will profoundly affect our approach to population issues.

What is the Carrying Capacity for Humans?

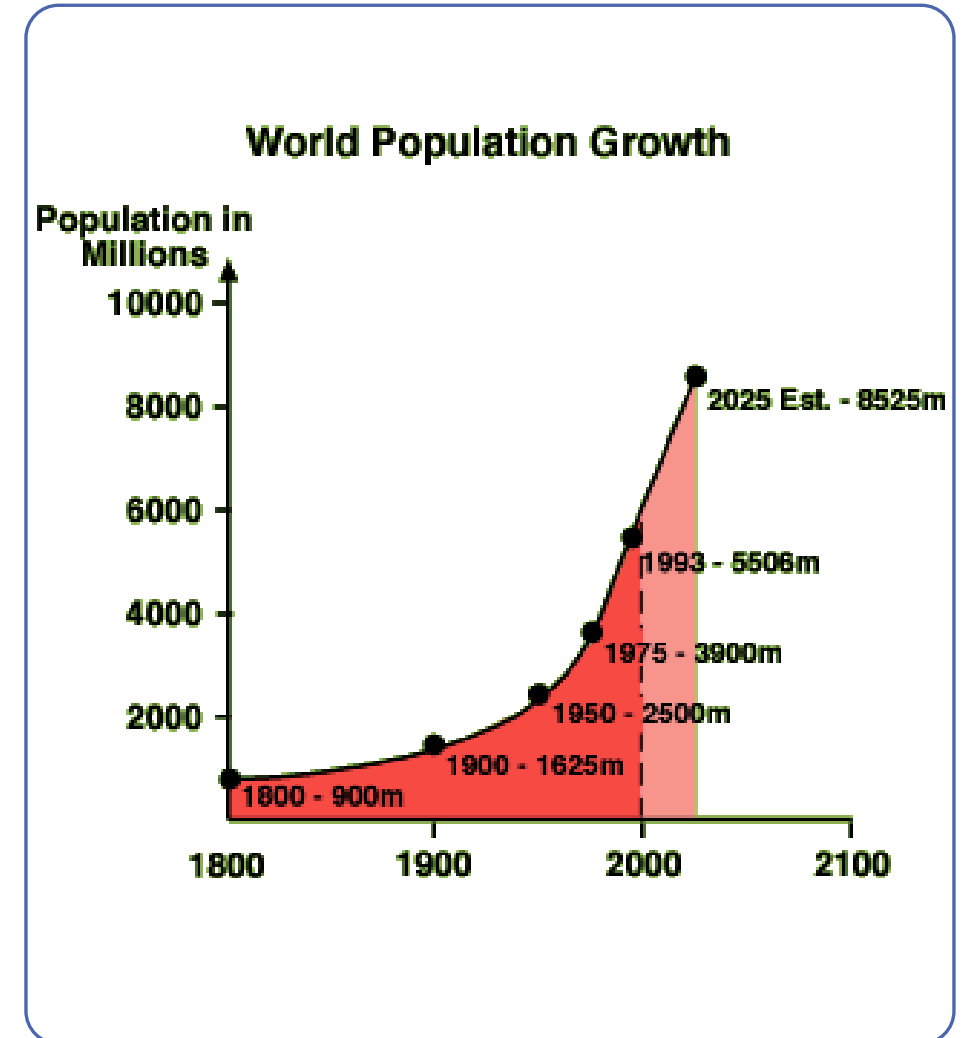
- We are approaching, or may have surpassed, the earth's carrying capacity.
- Maximum number of people who could live in reasonable freedom and comfort indefinitely, without decreasing the ability of the earth to sustain future generations
- Joel Cohen, at Rockefeller University reviewed published estimates of the maximum human population size the planet can sustain. 300 years of thinking, converged on a median value of 10 to 12 billion.
- David Pimental states that "By 2100, 12 billion miserable humans will suffer a difficult life on Earth."



Many Factors Determine Population Growth

Demography encompasses vital statistics about people, such as births, deaths, and where they live, as well as total population size.

- Population size increases through births and immigration
 - Decreases through deaths and emigration
- Key factor that determines population size
 - Average number of children born to women in a population (total fertility rate)



The Human Population Can Grow, Decline, or Stabilize

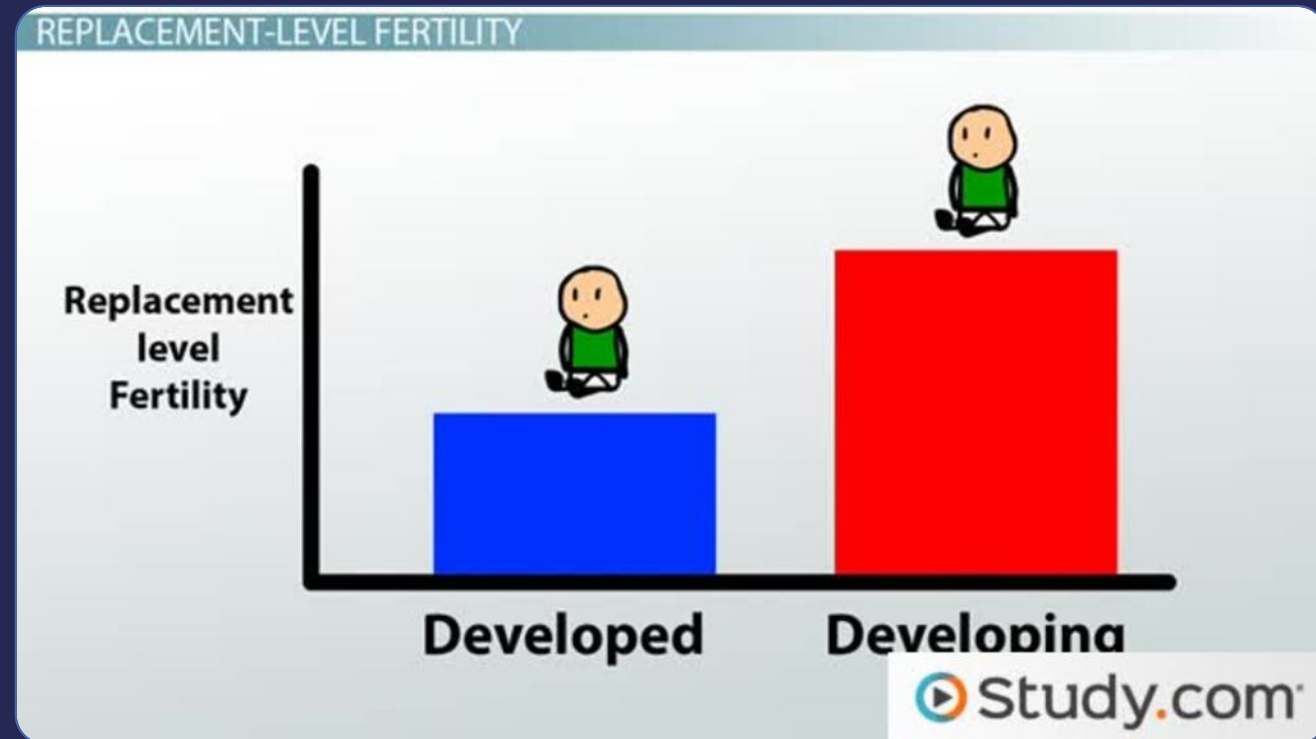
- Crude birth rate
 - Number of live births per 1,000 people in a population per year
- Crude death rate
 - Number of deaths per 1,000 people in a population per year
- Population change = (Births + Immigration) – (Deaths + Emigration)

$$\frac{\text{\# births in 1 year}}{\text{\# thousand total population}} = \text{Crude Birth Rate}$$

$$\frac{\text{\# deaths in 1 year}}{\text{\# thousand total population}} = \text{Crude Death Rate}$$

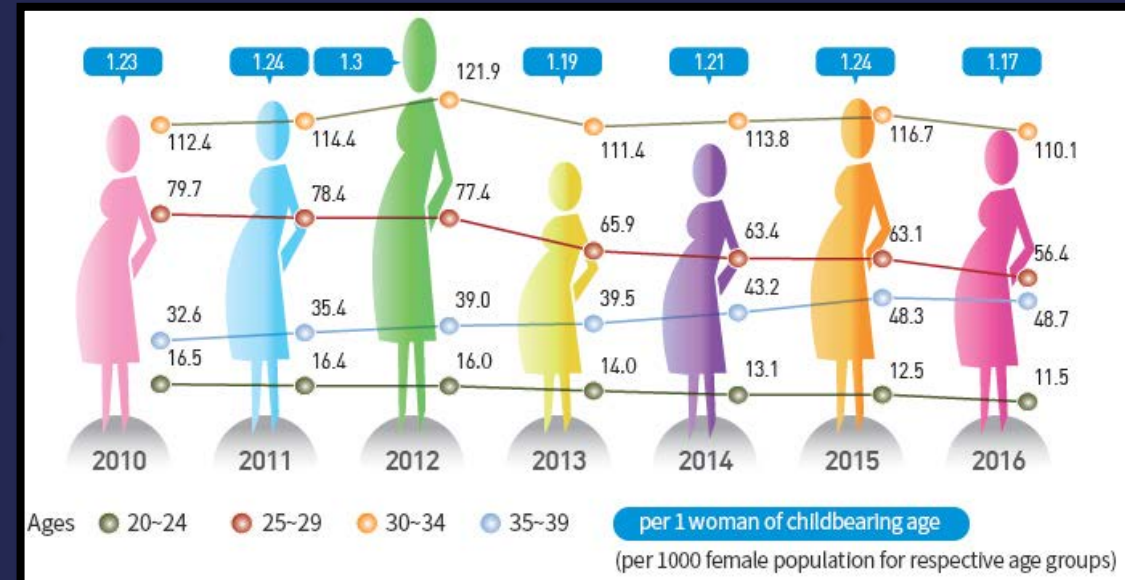
Fertility Rates

- Replacement-level fertility rate
 - Average number of children a couple must bear to replace themselves
- Approximately 2.1
 - Higher than 2 because some children die before reaching reproductive years



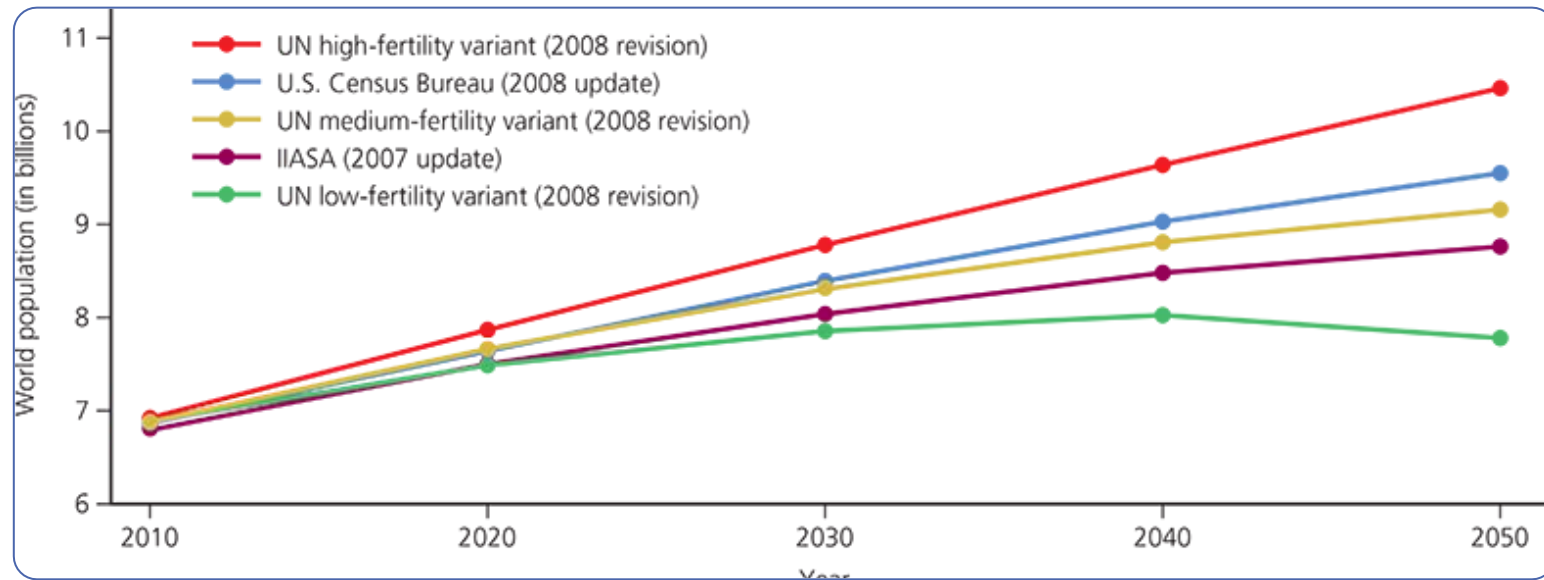
Total Fertility Rate is Impacted by Culture

- Total fertility rate (TFR)
- The number of children born to an average woman in a population during her entire reproductive life.
- This rate varies due to education, access to modern health care, and religious practices.
 - Between 1955 and 2018, the global TFR dropped from 5 to 2.4
 - To eventually halt population growth, the global TFR must drop to the fertility replacement level of 2.1



Predicting Population Change

- Human population size in 2050 is estimated to be between 7.8 billion and 10.8 billion people
- Factors influencing the range of estimates
 - Reliability of current population estimates
 - Assumptions about trends in fertility
 - Different organizations who estimate populations use different methods and data



People Want Children for Many Reasons

- Importance of children as part of the labor force
 - Especially in less developed countries
- Cost of raising and educating children
- Availability of pension systems
- Urbanization
- Educational and employment opportunities for women



Fertility is Influenced by Culture

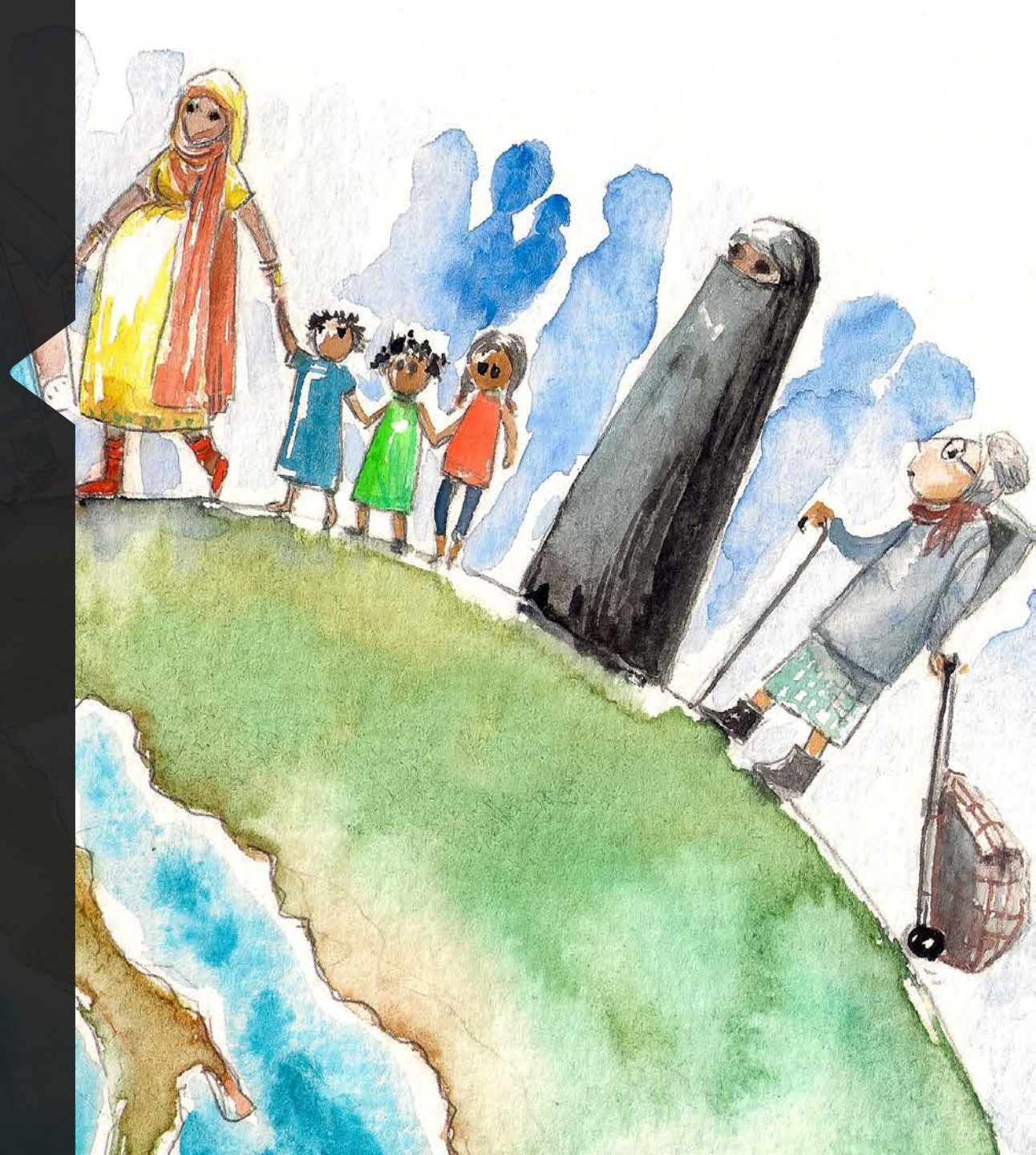
- Average age at marriage
- Availability of reliable birth control methods
- Religious beliefs, traditions, and cultural norms

Life Expectancy is Rising Worldwide

- Life span is the oldest age to which a species is known to survive.
 - The average age that a newborn infant can expect to attain in any given society.
- Worldwide, average life expectancy rose from 48 to 72 yrs between 1955 and 2018.
- Infant mortality rate
 - Number of babies out of every 1,000 who die before their first birthday
- Poverty is the single most important factor affecting life expectancy.
- Factors that cause high infant mortality:
 - Insufficient food, poor nutrition, and infectious disease.

Migration

- The movement of people into and out of specific geographic areas
- Reasons for migration
- Jobs and economic improvement
- Religious persecution or ethnic conflict
- Political oppression or war
- Environmental refugees

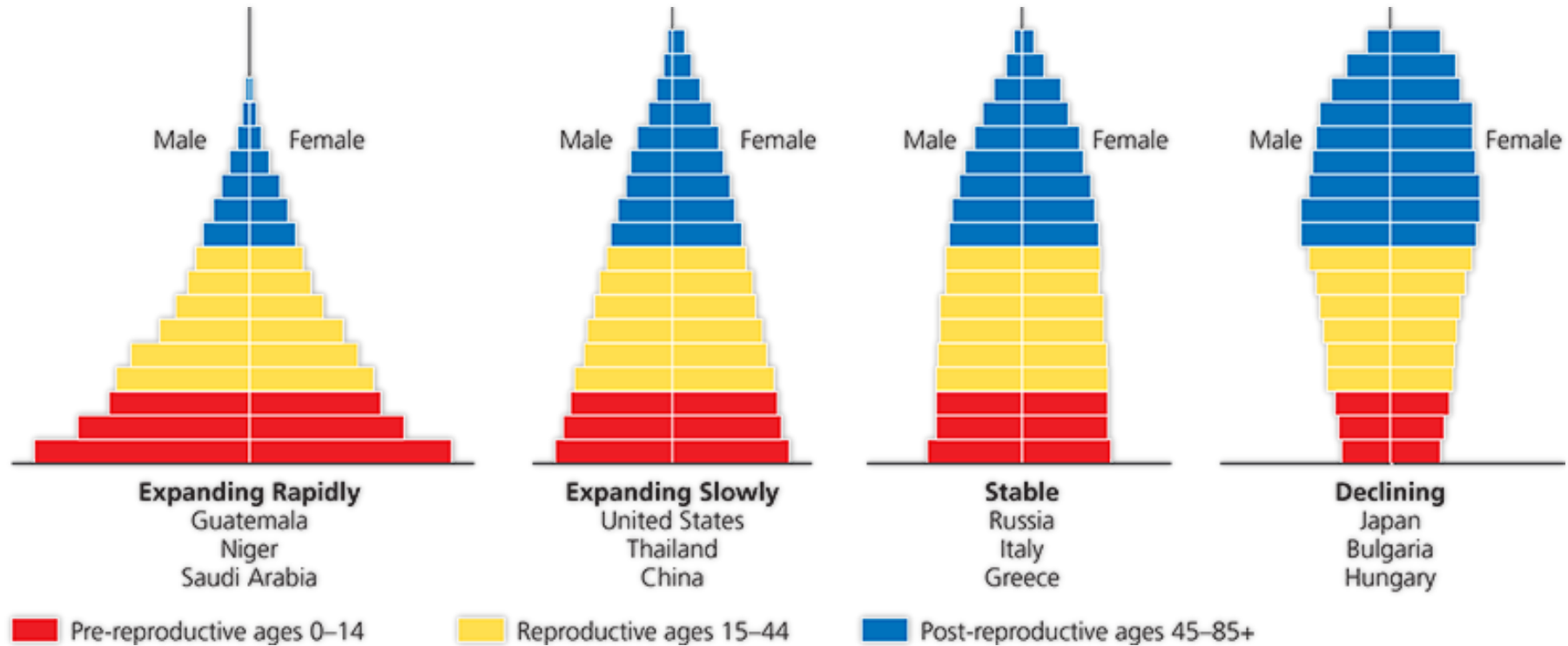


How Does a Population's Age Structure Affect Its Growth or Decline?

- Age structure is the number and percentages of males and females in young, middle, and older age groups in a population.
- It is an important factor in determining how fast a population grows or declines.

Age Structure

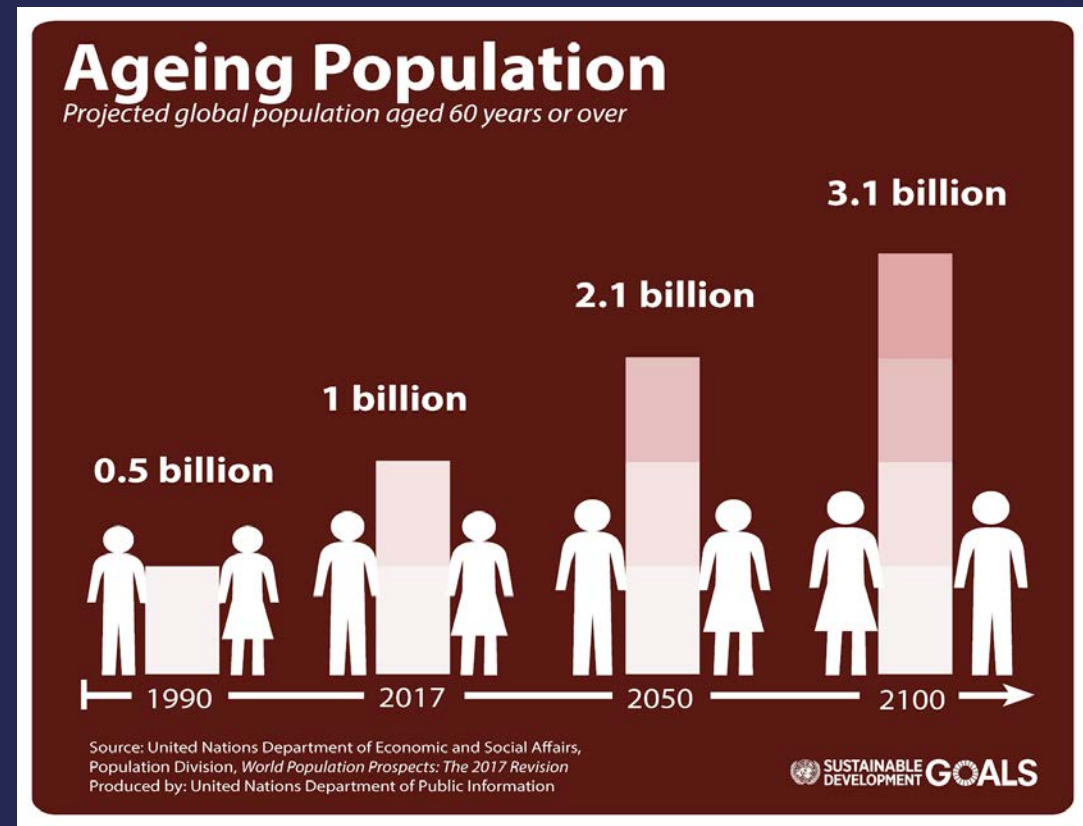
- Age structure categories
 - Pre-reproductive (ages 0–14) – too young to have kids
 - Reproductive (ages 15–44)
 - Post reproductive (ages 45 and older)
- Country with large percentage of people younger than age 15 will experience rapid population growth
- Global population of seniors expected to triple between 2018 and 2050
- Most future population growth will happen in less developed countries because of youthful age structure and rapid population rates.



Age Class Histograms

Aging Populations Can Decline Rapidly

- Graying of the world's population is due to declining birth rates and medical advances that have extended life spans.
- As the percentage of people over 65 increases, more countries will experience population declines.
- Slow population decline is generally manageable.
- Rapid decline leads to economic problems:
 - Proportionally fewer young people working
 - Labor shortages
- Some countries with rapidly declining populations:
 - Japan, Germany, Italy, Bulgaria, Hungary, Romania, Cuba, and Portugal



How Can We Slow Human Population Growth?

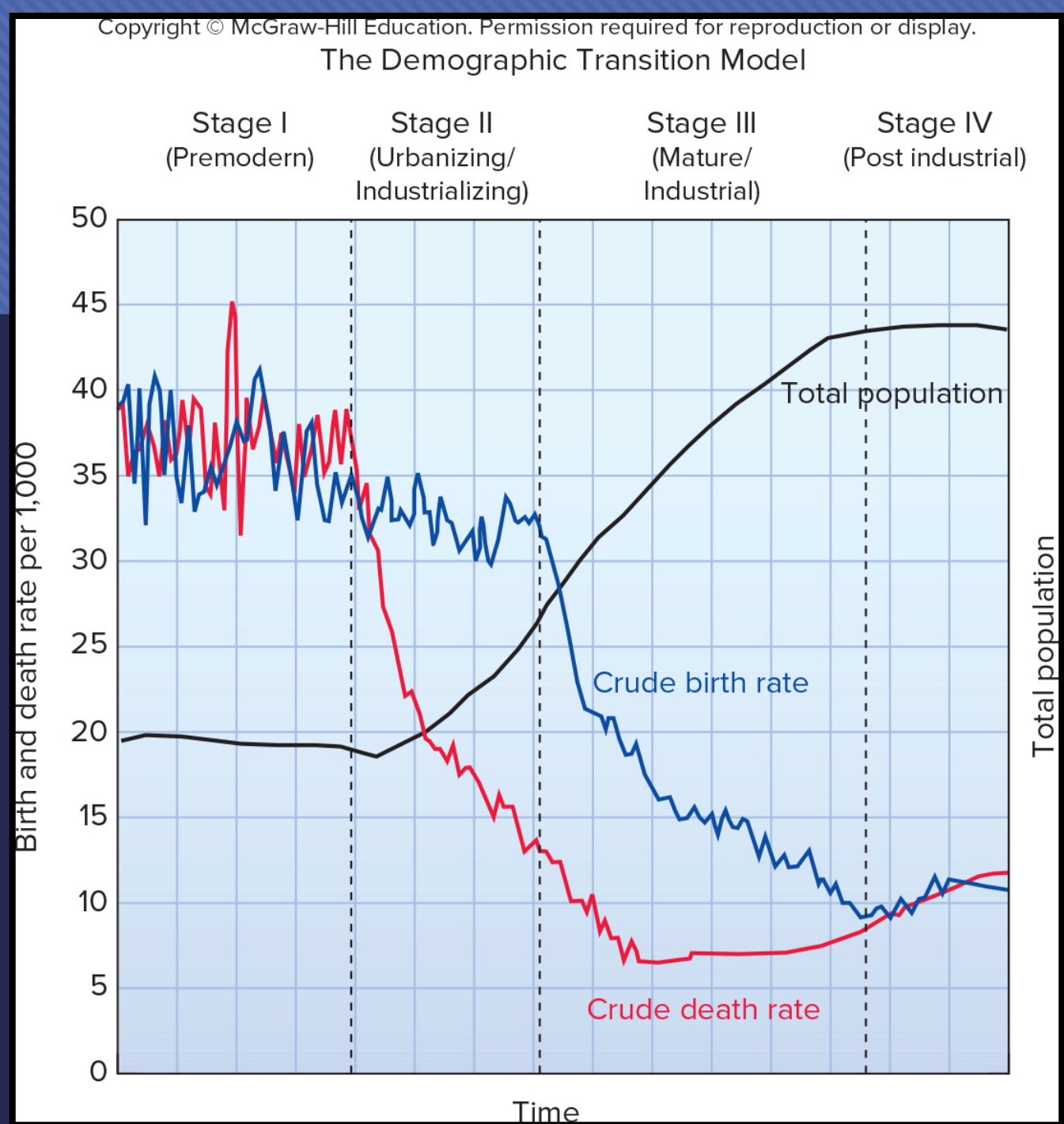
- There is argument on whether population growth needs to slow:
 - Some say environmental degradation can be linked to population growth
- Ways to slow human population growth:
 - Reduce poverty through economic development
 - Elevate the status of women
 - Encourage family planning

Economic Development

- Demographic transition:
 - As countries become industrialized and economically developed, poverty declines (this results in populations that tend to grow more slowly).
 - Several countries are experiencing a stabilized or declining population.
 - Reducing poverty is key to improving human health and stabilizing the population.
 - It takes 4 stages.

Stage I

- Economic and social conditions change mortality and births.
- Stage I represents the conditions in a premodern society.
- Malnutrition, illness, accidents and other hazards keep high death rates but high birth rates keep population relatively constant.

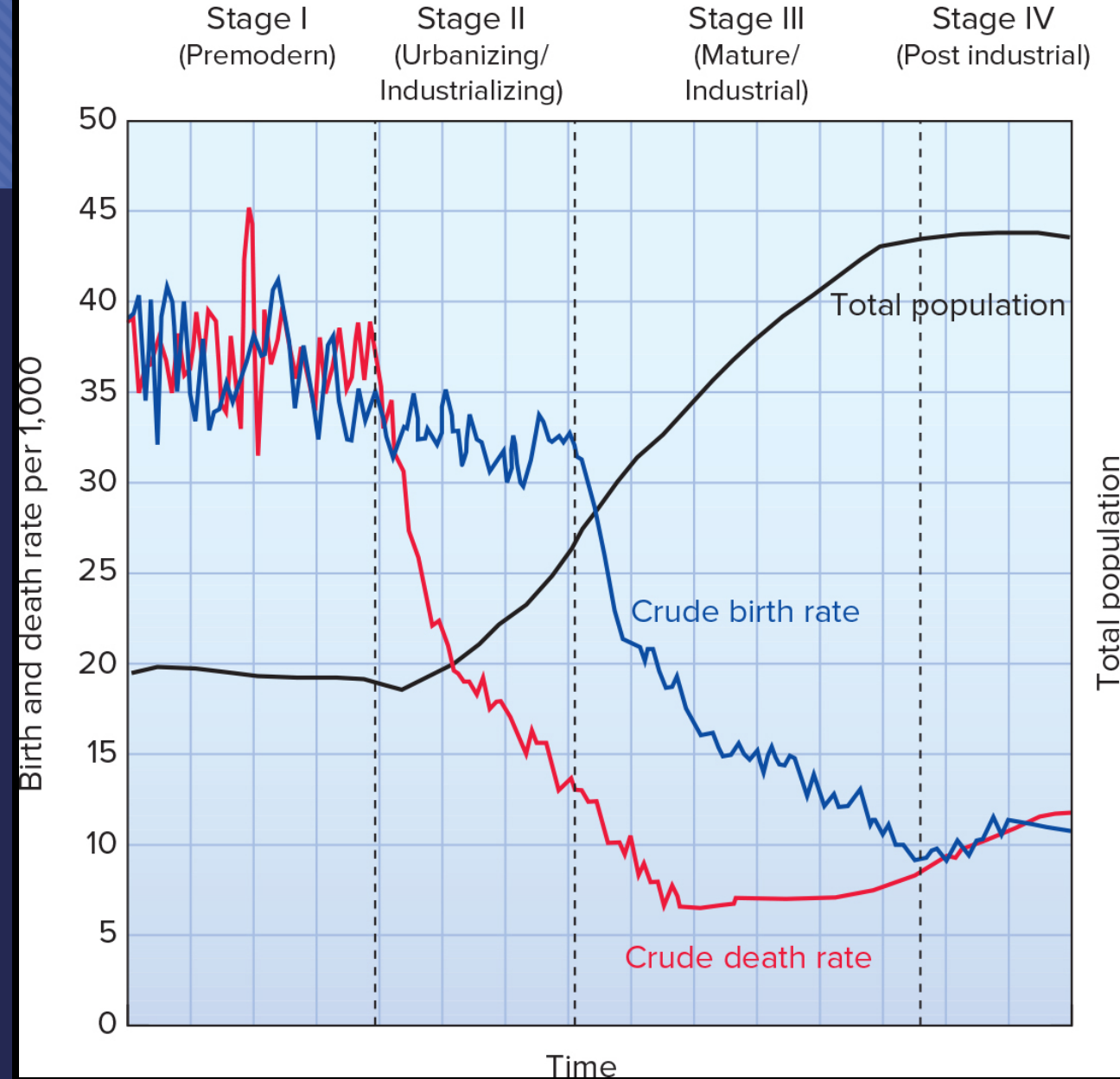


Stage II

- Economic development in Stage II brings better jobs, medical care, sanitation, and a generally improved standard of living, and death rates often fall very rapidly.
- Birth rates may rise at first, with money and nutrition, people might want more children. Later, birth rates fall as people concentrate their resources on fewer children.

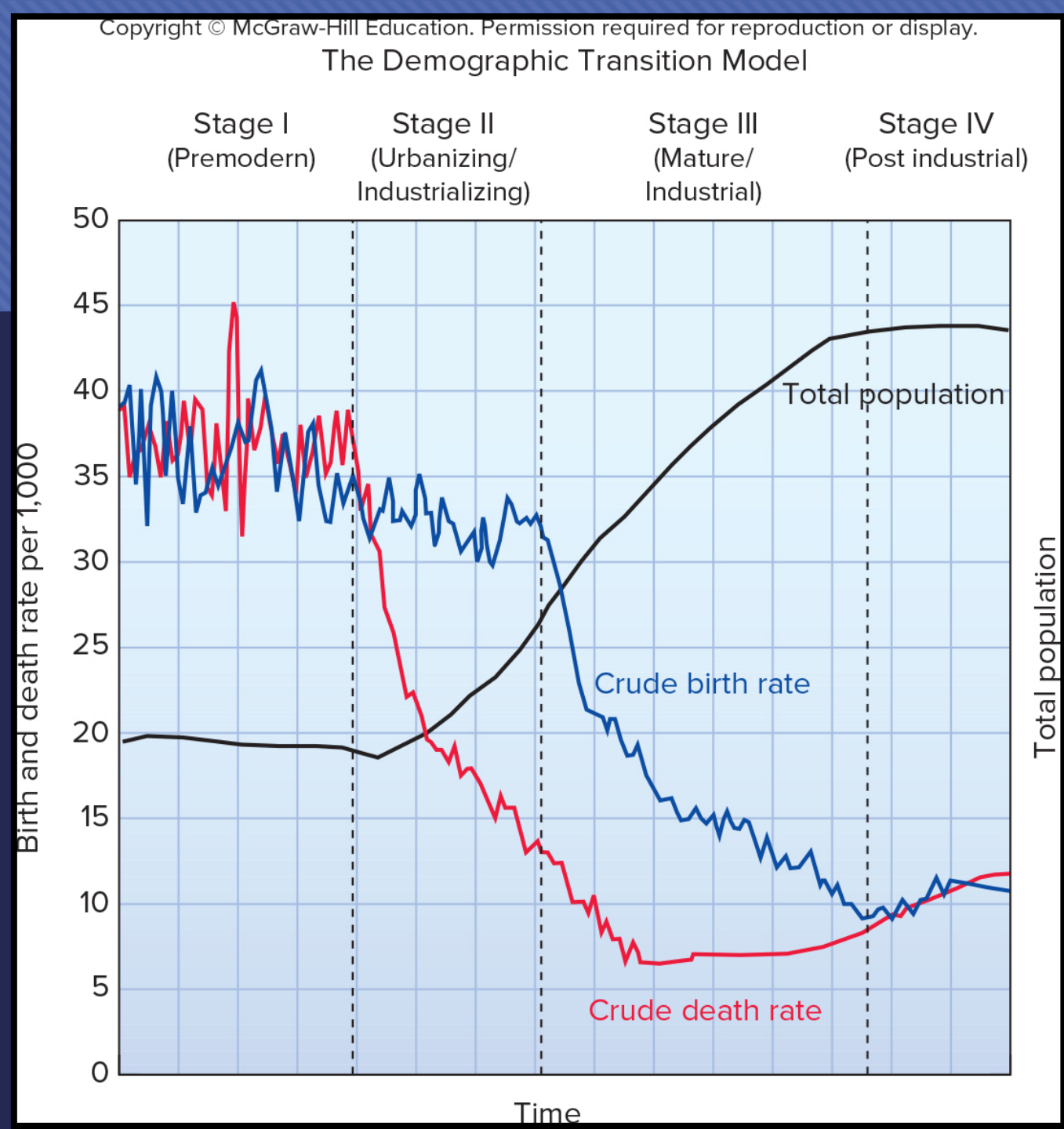
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The Demographic Transition Model



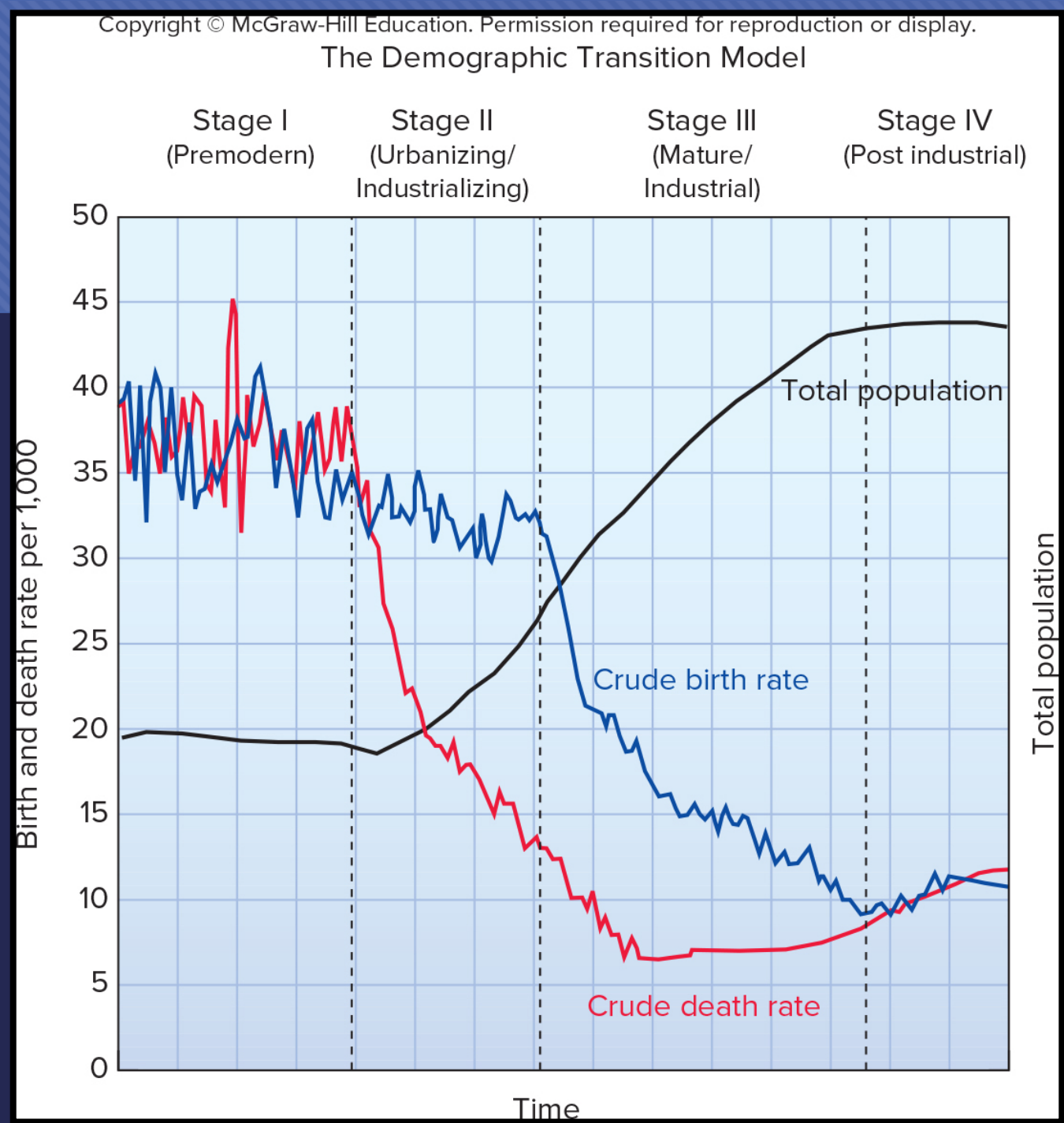
Stage III

- Note that populations grow rapidly during Stage III when death rates have already fallen but birth rates remain high.
- Population may go one or more rounds of doubling before coming to balance again.



Stage IV

- Stage IV represents conditions in developed countries, where the transition is complete and both birth rates and death rates are low, often a third or less than those in the predevelopment era.
- Most of northern and western Europe went through a demographic transition in 19th and early 20th century.



Improving Women's Lives Helps Reduce Birth Rates

- Women have fewer children if:
 - Educated
 - Able to earn an income
 - Society does not suppress their rights
- Women:
 - Do most of the domestic work and childcare
 - Provide unpaid health care
 - Have fewer rights and educational opportunities than men



Family Planning Gives Us Choices

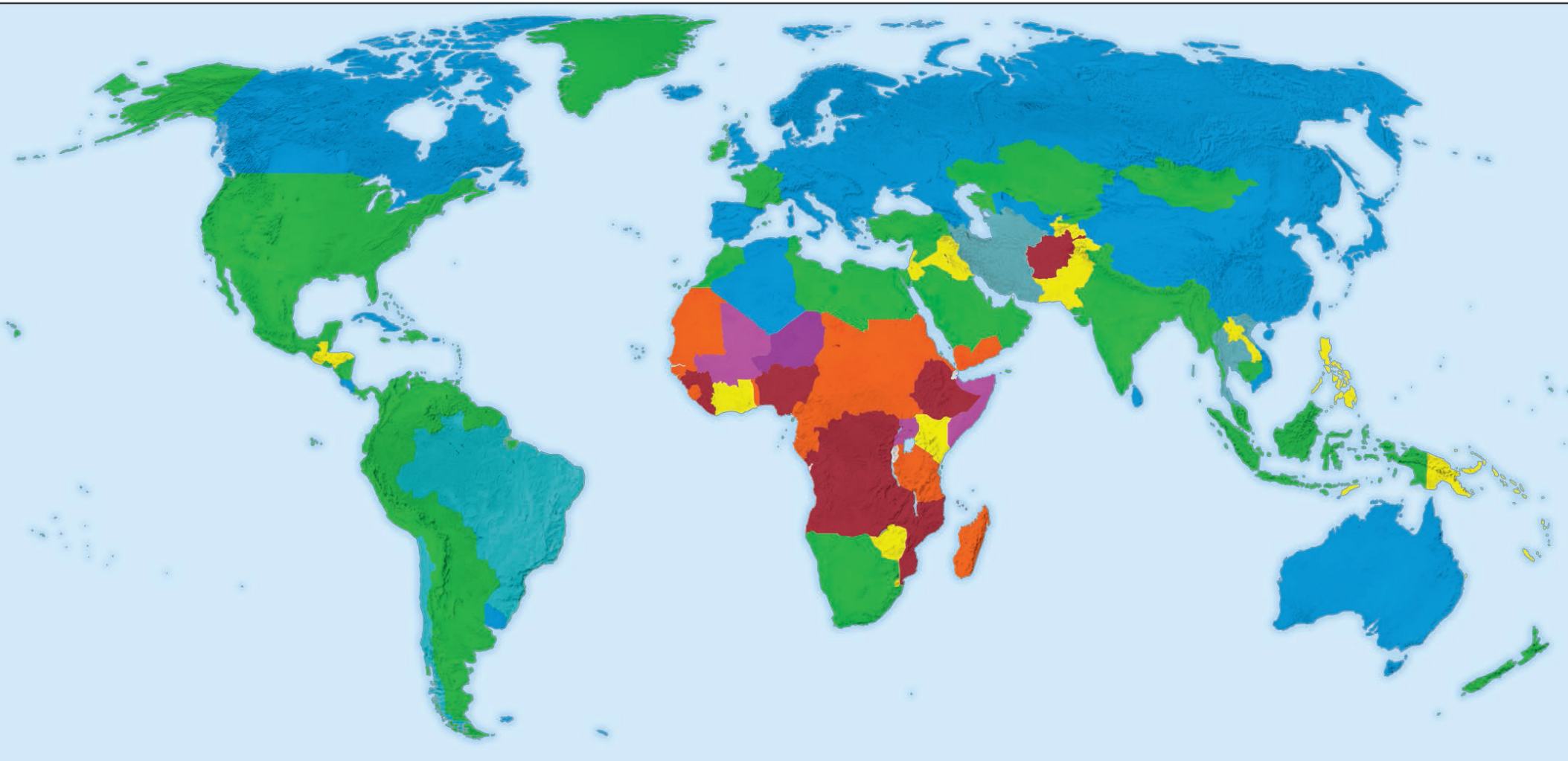
- **Family planning** allows couples to determine the number and spacing of their children.
- **Birth control** usually means any method used to reduce births including celibacy, delayed marriage, contraception, and methods that prevent embryo implantation and other methods like induced abortions.

Successful Family Planning Programs Often Require Significant Societal Changes

- Important societal changes to affect population growth include:
- Improved social, educational, and economic status for women.
- Improved status for children.
- Acceptance of calculated choice as a valid element in life in general and in fertility in particular.
- Social security and political stability that give people the means and the confidence to plan for the future.
- The knowledge, availability, and use of effective and acceptable means of birth control.

Fertility Rates by Country

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7-8 children
6-7 children

5-6 children
4-5 children

3-4 children
2-3 children

1-2 children
0-1 children