

ECON 256: Poverty, Growth & Inequality

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Population Growth

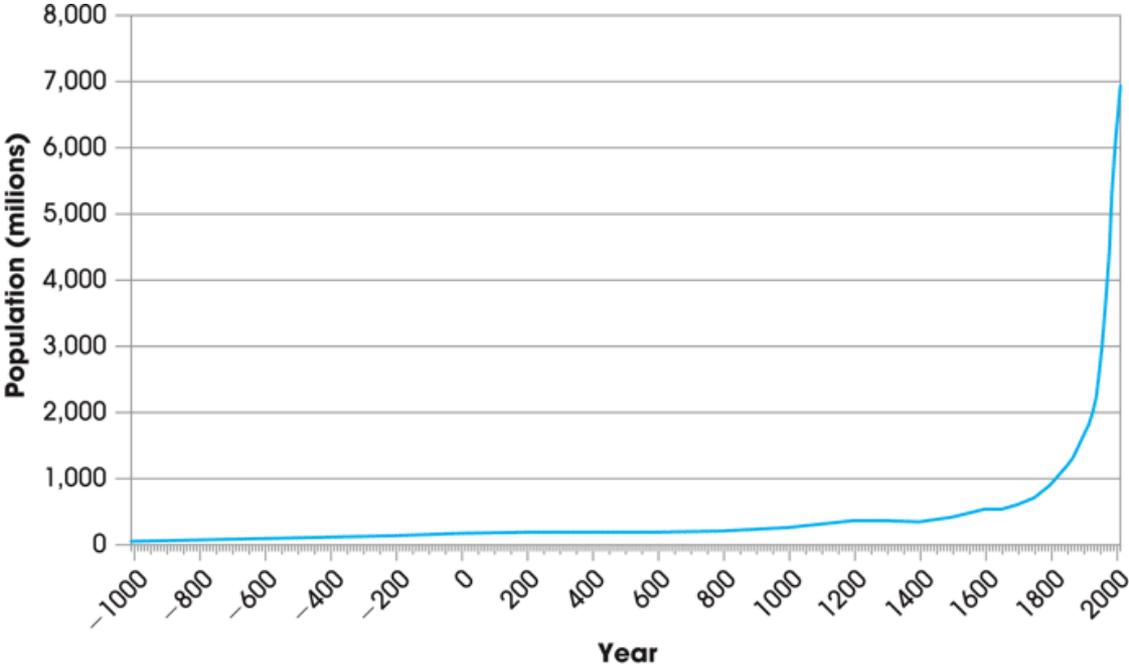
Huge increase in world population since the industrial revolution

- In 1800, there were approximately 1 billion people in the world
- Today there are an estimated 7 billion people (increases by 1 million every 4 days)

Population has grown disproportionately in the poorest countries

- Raises the question: Does population growth limit economic growth?
- Keep that question in the back of your mind for next time, today we will focus on population dynamics in isolation

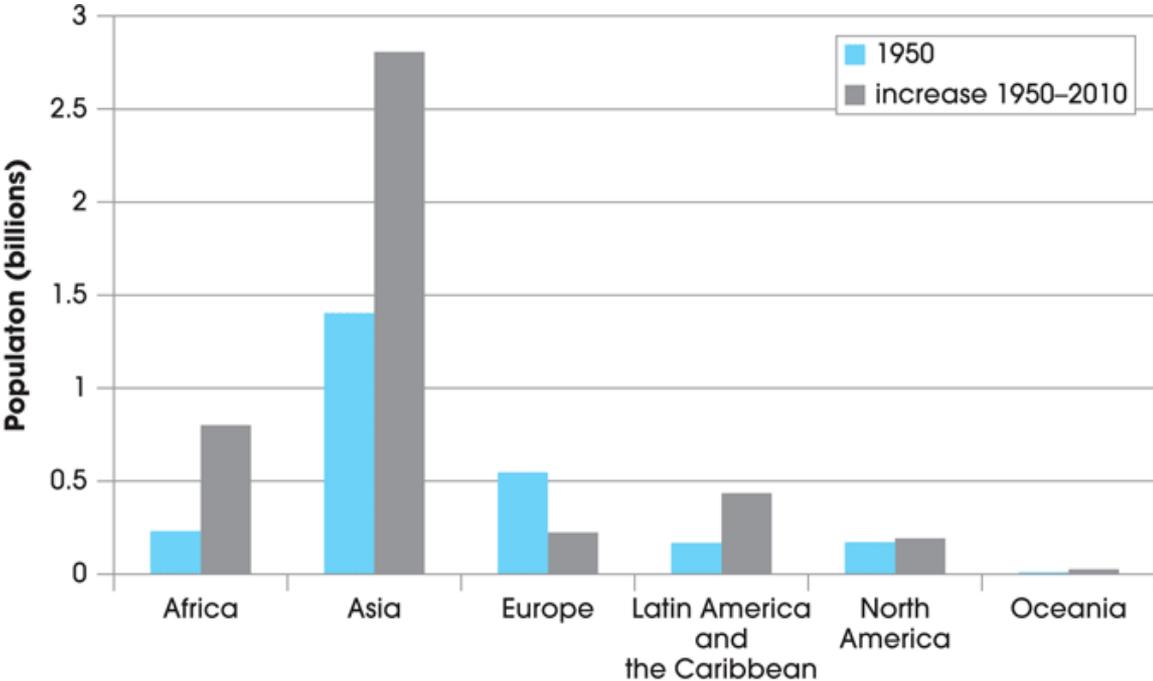
Exponential Population Growth



The world population has grown exponentially since the beginning of the Industrial Revolution at the end of the 18th century.

Source: For the years before 1920, Colin McEvedy and Richard Jones, *Atlas of World Population History* (New York: Penguin, 1978); after 1920, *United Nations Statistical Yearbook*, available online from 1950 onward, at <http://esa.un.org/wpp/Excel-Data/population.htm>.

Disproportionate Population Growth for Developing Areas



The population increase between 1950 and 2010 has been higher than the 1950 population levels in Africa, Asia, and Latin America. Population growth in the last 60 years has been the highest in developing countries.

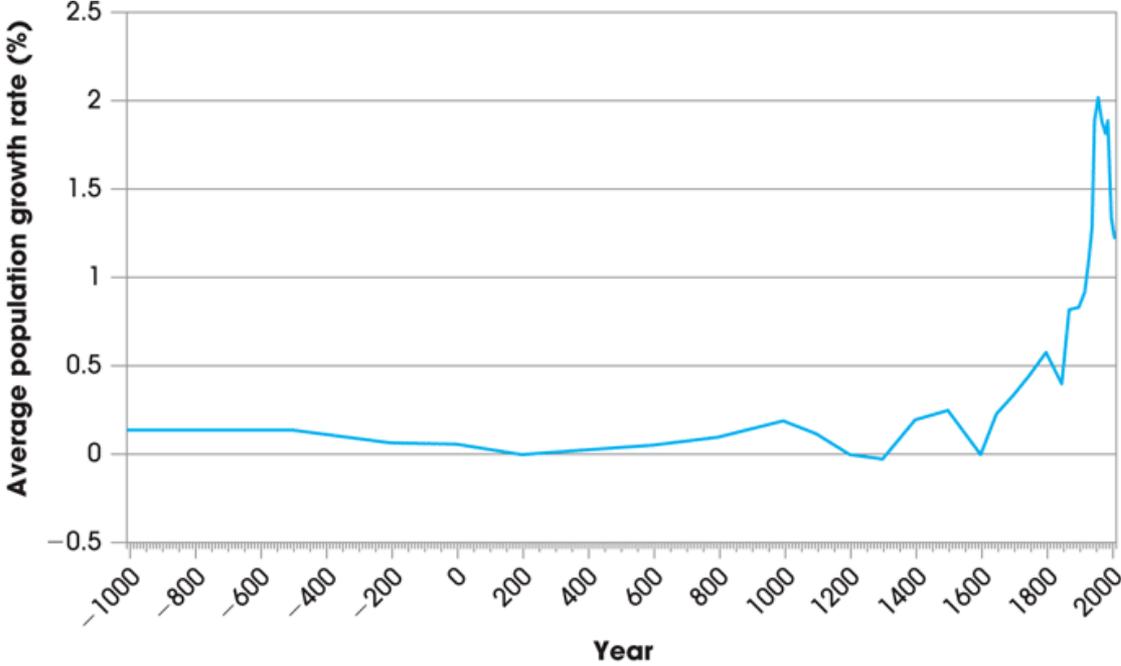
Source: United Nations, <http://esa.un.org/wpp/Excel-Data/population.htm>.

Population Growth Rates

Both population and the **population growth rate** increased following the industrial revolution

- Increased from below 0.5% per year before 1800 to a peak of 2% per year around 1960
- Currently around 1.5% per year, but growth rates still high for many developing countries

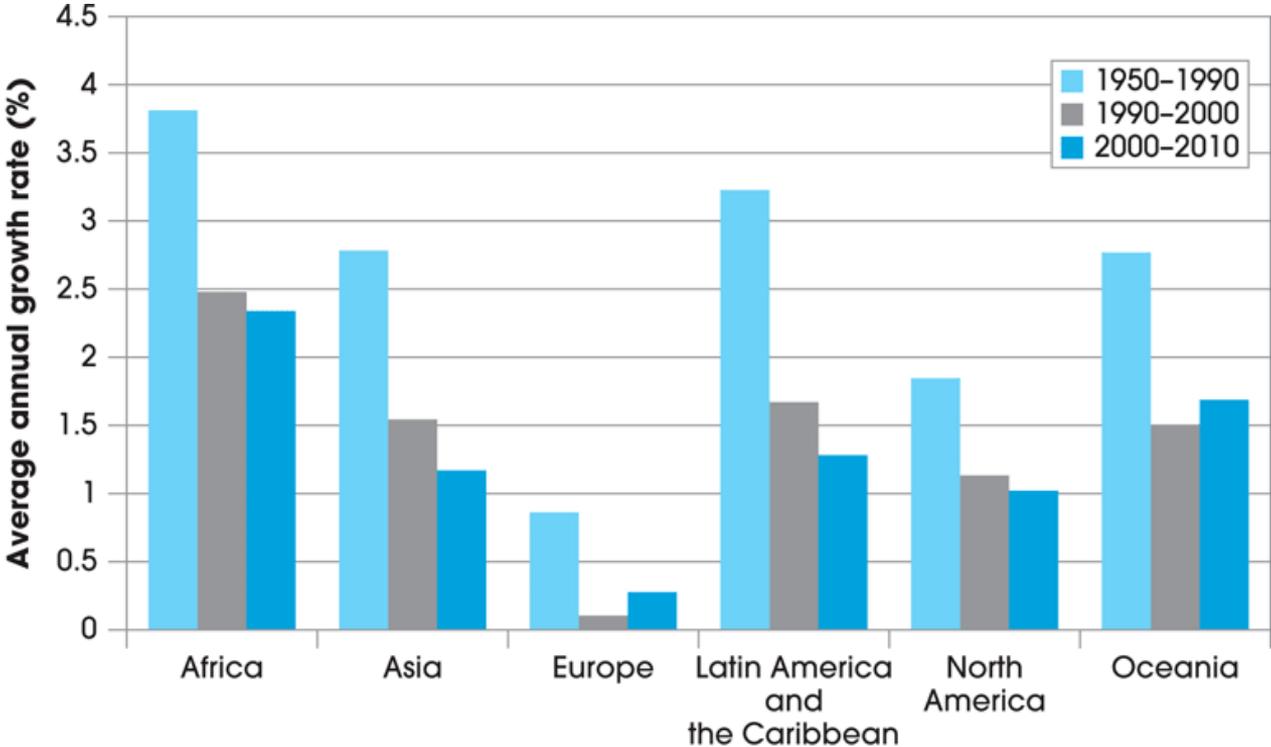
Population Growth Rates



Population growth rates have been below 0.2% per year for most of human history, but they have grown enormously since the beginning of the Industrial Revolution at the end of the 18th century. Population growth rates started to decline in recent decades because of the demographic transition.

Source: McEvedy and Jones, *Atlas of World Population History*, 1978; United Nations Statistical Yearbook, <http://esa.un.org/wpp/Excel-Data/population.htm>.

Population Growth Rate Decline by Continent



Population growth rates have declined worldwide since 1990.

Source: United Nations, <http://esa.un.org/wpp/Excel-Data/population.htm>.

Determinants of Population Growth

Population growth has several components, fit into three categories

Birth (can be measured in two ways)

- **Total Fertility Rate**: average number of children born to a woman of childbearing age (15-44)
- **Birth Rate**: number of babies born each year per 1000 people

Death

- **Death Rate**: number of deaths each year per 1000 people

Migration

- **Net Migration Rate**: (# of people entering) – (# of people exiting); per 1000 people

Determinants of Population Growth

Population Growth Rate can be determined by:

$$\text{Population Growth Rate} = \text{Birth Rate} - \text{Death Rate} + \text{Net Migration Rate}$$

Caution:

- In official statistics (e.g. from United Nations), the growth rates may be reported as per 1000 or as percentages, i.e. per 100.
- Need to make sure units are comparable when using the above formula
- Fertility rate isn't here, but that is often reported as births per woman

Age Distribution and Population Growth

Developing countries tend to have more young people

- Having more young people increases population growth rates
- Young people less likely to die in any given year \Rightarrow Lower death rate
- A younger population also increases the Birth Rate, holding fixed the fertility rate

$$\text{Birth Rate} = \text{Fertility Rate} \times \left(\frac{\text{\# of Women Age 15-44}}{\text{Total Population}} \right)$$

Simple Illustrative Example of Age Distribution Effects

| | Initial age distribution in A and B | Fertility rate | Mortality rate (%) | Population second period |
|------------|-------------------------------------|----------------|--------------------|--------------------------|
| Young in A | 70 | 2.2 | 10 | 77 |
| Old in A | 30 | 0 | 100 | 63 |
| Young in B | 50 | 2.2 | 10 | 55 |
| Old in B | 50 | 0 | 100 | 45 |

Countries A and B have identical fertility and mortality rates but country A is younger than country B. The population in country A therefore grows by 40%, while the population in country B does not grow at all.

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$$(70 \text{ million young people}) \times \left(\frac{1 \text{ woman}}{2 \text{ people}}\right) \times (2.2 \text{ births per young woman}) = 77 \text{ million young people}$$

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Age Pyramids and Demographic Transitions

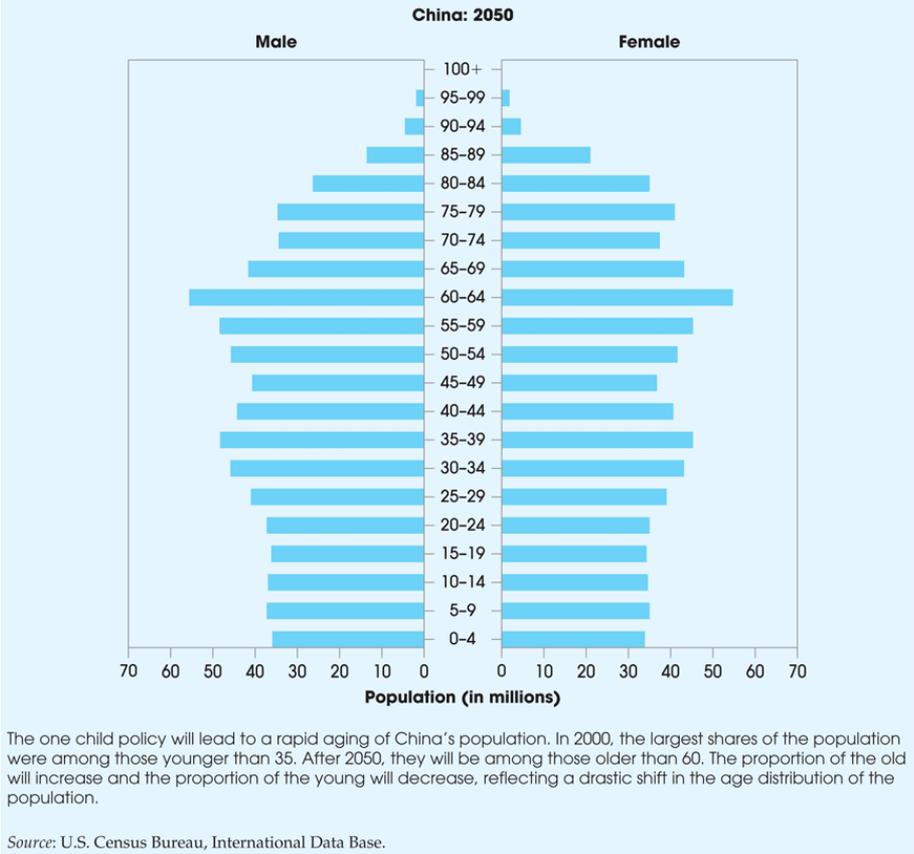
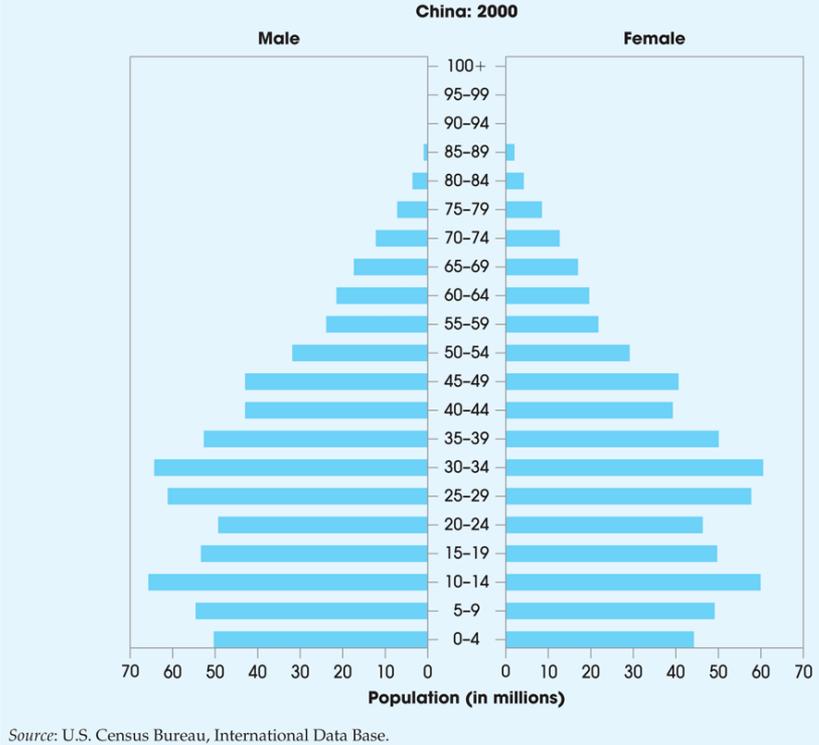
When changes in fertility or death rates occur, takes time to see effects

- **One Child Policy** was implemented in China in late 1970's
- Gender imbalance has furthered low birth rates since fewer women relative to men
- Age distribution for China has yet to stabilize

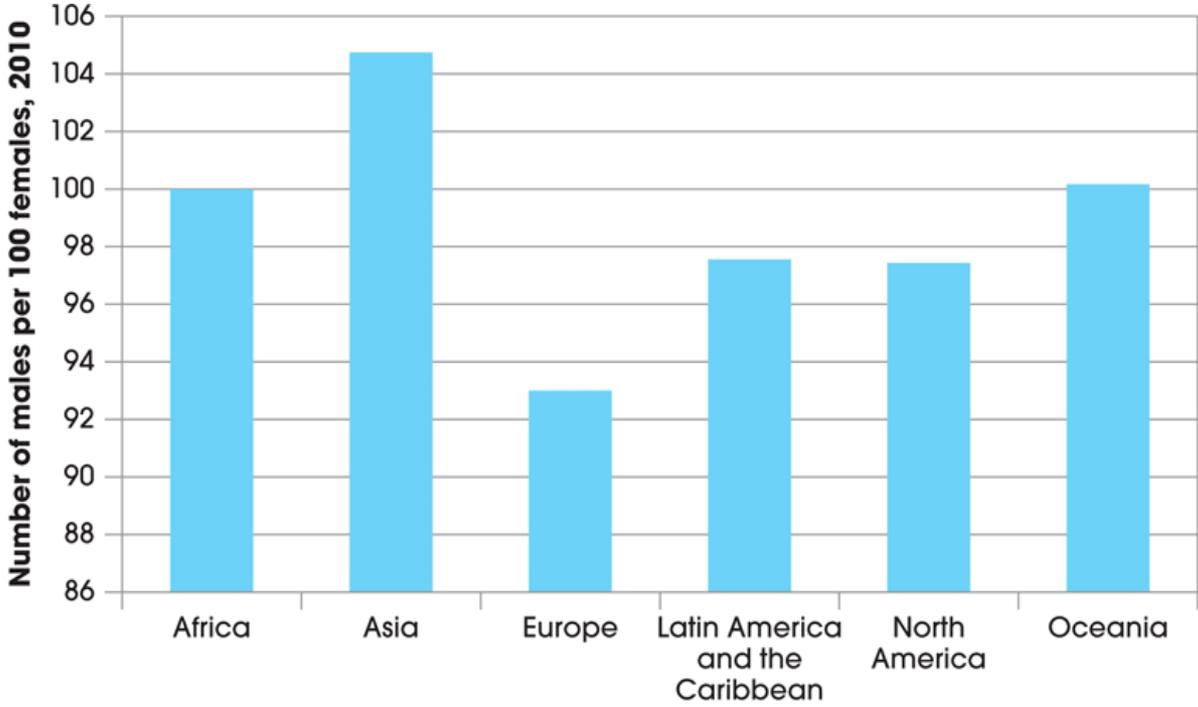
There can be reverberations and delays with changes to population birth and death rates

- For example, return from WWII led to baby boom and baby boom echo

Current and Projected Age Pyramid for China



Population Sex Ratios by Continent



The sex ratio (the number of males per 100 females) is the highest in Asia and the lowest in Europe. Among other factors, this reflects differences in preferences for boys over girls in various regions of the world.

Source: United Nations, <http://data.un.org/Data.aspx?q=world+population&d=PopDiv&f=variableID%3A13%3BcrID%3A900>.

Long Run Population

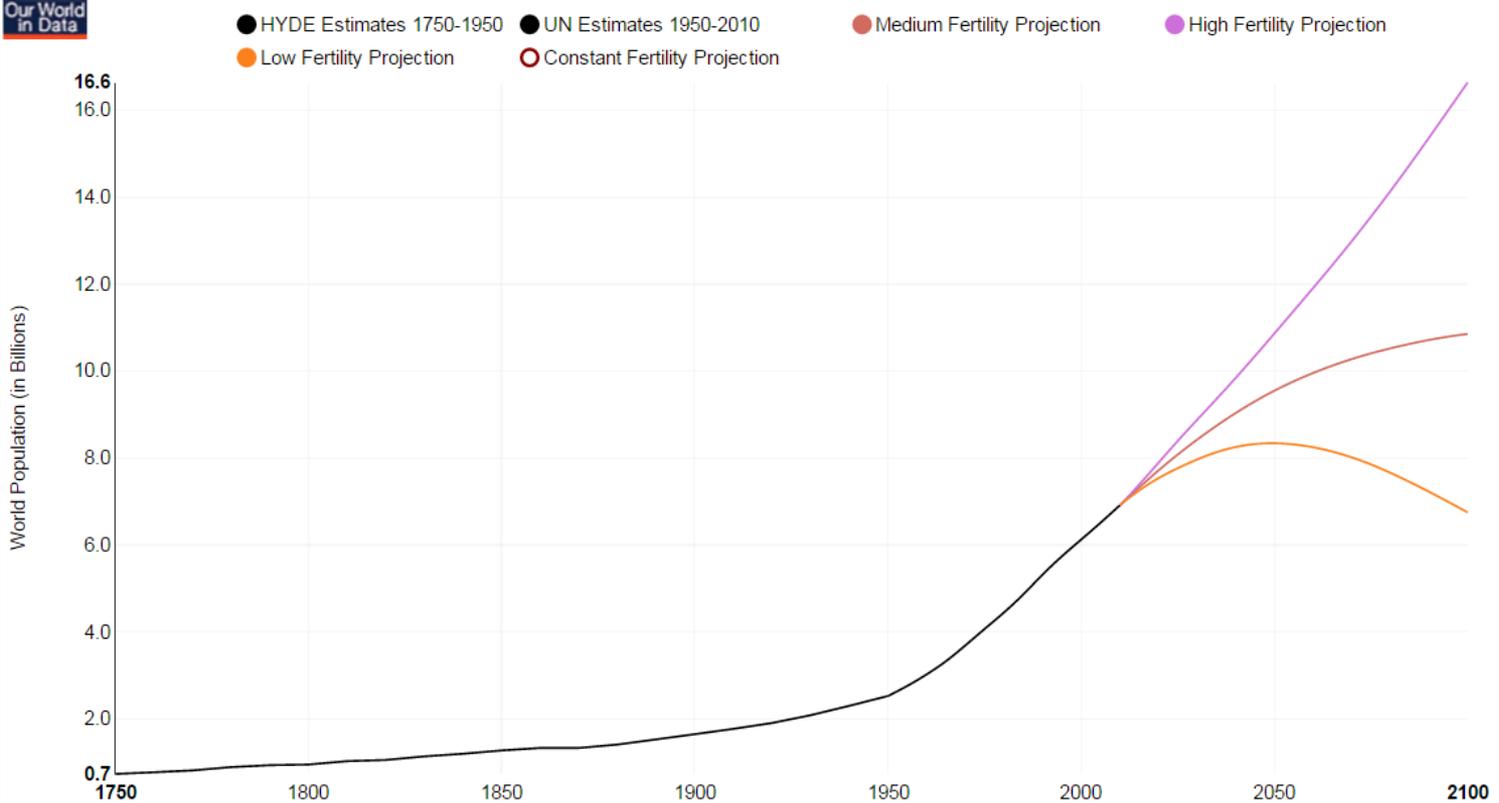
Demographers predict population will stabilize around 8-12 billion in next century or two

- Expect population growth rates in developing countries to converge to developed countries

Why would population growth rates decrease?

- Age pyramids of countries will stabilize with fewer younger people
- May hit limits in extending life expectancy \Rightarrow death rate will stabilize
- People alter their fertility decisions as they become richer

Long Run Population Predictions



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Data source: HYDE until 1950 & United Nations Population Division (2012 Revision) – after 1950 including the projections after 2010