

Chapter Two: Population

In order to maintain a stable population overtime without immigration, a country must have its women of childbearing age maintain a **total fertility rate (TFR)** of 2.1 children per mother. **TFR** reports the average number of children born to a woman of childbearing age. Currently, 60 countries containing 45% of the world's total population have fallen below this replacement level. Some notable TFR's: Parts of Italy today have a TFR level of .8 children per mother. After reaching a record high of 8.1, Kenya has decreased to 5.0. All of Europe is below 2.1, as is China and Japan.

Reasons that advanced economies have a lower population: Women are choosing to stay in school, work on careers, marry later, and are concerned about the high cost of child-rearing. Some countries, such as the US, make up for the lower TFR by immigration.

Some effects of a low TFR: As the population ages, younger workers are needed to financially support the social programs that assist the elderly, such as medicare and social security. Fewer young people means more financial burden on those young people that are working.

Due to fear of a low TFR causing a population decline, some countries are actually offering childbirth incentives. An example would be Australia offering \$2000 per child stipend.

Interestingly, the paradox is that while we know overpopulation can be harmful, we need continued population growth to sustain economic growth and programs. That is a real catch-22.

Where in the World do People Live and Why?

Demography is the study of population. Demographers report the **population density** of a country. Population density assumes an even distribution of the population over the land. For example, the US has a population of 295 million in 2004 living on 3.7 million square miles of land. This yields a population density for the US of just over 79 per square mile. This figure is also known as the **arithmetic population density**. Population density can be misleading, because there are large parts of the US with virtually nobody living in them while there are other parts that are intensely populated. Egypt has a population density of 190 per square mile, but 98% of the population lives only on 3% of the land.

Thus, a better index of population density is the **physiologic population density**, which relates the total population of a country to the area of **arable** (farmable) land in that country. Taking Egypt as an example again, since most of the population is concentrated on a relatively small area of arable land, its physiologic population density is 6319 per square mile. This number is much more reflective of Egypt's population problem than population density would be. Even though China and India have over a billion people each, since India has much more arable land than China, its physiologic population density is ten times lower than that of China.

Because people are not distributed evenly across the world or a country, it is useful to study **population distribution**, which analyzes which places of the Earth's surface (depending on the scale) where people live. **Dot maps** are the preferred map to show population distribution. On a global scale, one dot on a dot map represents 100,000 people. Historically, people have tended to settle where there is arable land or on transportation routes.

East Asia is the most extensive population concentration, primarily in eastern China, Korea, and Japan. China's population is concentrated in large cities, but also follows the Yangtze and Yellow River valleys.

South Asia is the second largest, with the heart of the cluster being India, but also stretching into Bangladesh, Pakistan and Sri Lanka. The cluster is hemmed in by the Himalayan Mountains in the north and by the Indian Ocean in the South. Bangladesh has a population of 141 million crammed into a space the size of Iowa, giving it a population density of 4000 per square mile. Incidentally, Iowa has a population of 3 million, and its density is 30 people per square mile. The population of Africa, South America, and Australia combined barely exceed that of India alone.

Europe is the third largest cluster. Unlike the Asian clusters where population tends to be where arable land is, the European population is spread all over, even in mountainous areas. Also, the population is much more urban, with 88% of Germans living in cities. The rural areas of Europe are more sparsely occupied.

North America is the fourth largest cluster, focused around the north eastern/mid-Atlantic **megalopolis**, which is an agglomeration of huge urban areas stretching from Washington DC to Boston, including Philly, Baltimore, and NYC.

How reliable is population measuring? Even in the US, with all of our technology and organization, there were claims that the year 2000 **census**, or official measurement, was off by 3 million. The United Nations, World Bank, and others gather the data from other parts of the world. Not surprisingly, the data from these groups is inconsistent.

Why do Populations Rise or Fall in Particular Places?

Books such as the late 1960's *The Population Bomb* written by Paul Ehrlich and the much older *Essay's on the Principles of Population* by Thomas Malthus (1798) have admonished that the world's population was growing faster than the Earth's ability to sustain the population. Malthus theorized a **Malthusian catastrophe**; once population outstripped food production, society would crash back to a subsistence level. Malthus reasoned that food supplies grew at a somewhat constant, *linear* rate. However, population was growing *exponentially*, compounding on the year before. The problem with Malthus' theory is that he did not foresee how globalization and technology could allow the more efficient production and distribution of foodstuffs worldwide. Indeed, thanks to fertilizers, improved seed, and genetic modification, food production has grown exponentially as well.

To calculate natural increase in a country's population, simply subtract deaths from births. However, one must factor immigration and emigration as well. If so many countries have a TFR that is below the point needed to sustain population, then how come the Earth's population continues to grow? Because many countries continue to have a high TFR, such as India, Indonesia, Bangladesh, Pakistan, and Nigeria. Indeed, the Earth's TFR was 2.8 in 2004, above the replacement level of 2.1. The global population is estimated to reach 7.9 billion by 2025.

One way to measure population growth is by **doubling time**. Two thousand years ago, the world's population was estimated to be 250 million. It took 16 centuries to double to 500 million (1650). It took 170 years to double again to 1 billion (1820), then 110 years to double to 2 billion (1930), then 45 more years to double to 4 billion (1975). The good news is that the doubling has slowed a bit, with the next doubling estimated to take 51 years. Eventually, the population of the Earth is expected to reach a steady level.

Different regions go through stages of expansion and decline at varying times. Currently Africa has a higher growth rate than India, but due to the AIDS epidemic in Africa, its growth rate is slowing. There is substantial growth in Islamic sub-Saharan Africa and the Middle East. Geographers note a correlation between high birth rates and the low standing of women; when women have fewer opportunities, they tend to stay home and have families.

Although lower birth rates tend to take place in wealthier countries, that is not a firm rule. For example, some of the former Soviet Union countries such as Russia and Ukraine are not among the wealthiest countries, but still have lower growth rates due to problems (economic dislocation, alcoholism) associated with the transition from a communist/command economy toward a more open market economy.

Generally, the higher the urban population, the lower the natural population increase. Religion also plays a role in birth rate, with Islamic, Catholic, and Hindu cultural traditions being more conducive to births.

When thinking about population, one must consider scale. Even though India as a country has a high birth rate, some states within India have lower birth rates. Some states in India enforced sterilization programs in the 1970's when it became apparent that India was experiencing a birth boom; this led to rioting. Then other states created a program where one could obtain a gun license in exchange for the sterilization of a certain number of people. Abuse arose when wealthy landowners forced their laborers to be sterilized in exchange for licenses. Now India is taking a milder approach by offering incentives for voluntary rather than forced sterilizations. As one would expect, the states in India with the lowest birth rates are those with higher incomes and education. **Remember to consider scale: From a population dot map showing the whole planet (large scale), one cannot see the complexity that is India's population situation unless you look at a map of the country (smaller scale).**

Fluctuations in birth and death rates over time were studied in Great Britain. Demographers expected to see the rate of **natural increase**, the difference between the number of births and the number of deaths, to vary over time. They

calculated the **crude birth rate (CBR)**, the number of live births per year per thousand people in the population, and the **crude death rate (CDR)**, the number of deaths per year per thousand people. By looking at Britain's experience, demographers have created a sequence of stages in population growth known as the **demographic transition model**. Why countries move from one stage to another has varied through time.

1) low-growth stage: high birth rate and high death rate>>>little long term population growth

High death rates accompanying high birth rates can be seen in the bubonic plague (the Black Death) of the 1300's, spread by the travel of rats and the fleas that carried the plague. The plague came in waves over some years, leading to the deaths of 25%-50% of populations. Britain fell from 4 million to 2 million. Famines caused by such things as drought also have played a large role, such as in India and China during the eighteenth and nineteenth centuries. War plays a large role as well; 20 million Soviets died between 1940 and 1945 in WWII.

2) high-growth rate: high birth rate and declining death rate>>>significant population increase

During the 1700's and 1800's in Europe, an agricultural revolution set the stage for an industrial revolution. Improved farming techniques such as crop rotation and seed selection allowed enough food to be grown by a smaller population, freeing additional population to begin working in factories. Industrial production in turn led to improved sanitation in cities and even more crop producing technologies. Better nutrition and sanitation led to a lower death rate. In the late 19th century Europe began to colonize the world; as they did, they brought with them improved medical and sanitation techniques, which helped reduce the death rate of the colonies as well.

The transition occurs between stages 2 and 3

3) moderate-growth stage: declining birth rate combined with already low death rate>>>continued population growth but at a lower rate

As the industrial went on, urbanization occurred and the economy diversified. As people, especially women, had increased prosperity and opportunities, they began to delay marriage and childbirth until later in life. Also technology has led to improved methods of birth control. Thus, birth rates begin to fall.

4) low-growth rate or stationary stage: low birth rate and low death rate>>>low growth rate.

At this stage, some countries actually develop a TFR lower than that needed to maintain a stable population; these are the countries where women are the most educated and involved in the labor force.

The future? Most demographers believe that at some time during the 21st century, most if not all countries will reach a **stationary population level (SPL)**. The UN suggests that the world population will stabilize at 9 billion in 300 years. This is conjecture of course; many things could happen to make this number incorrect.

Why does Population Composition Matter?

It is one thing to say that a population has reached a particular number. But it is important to break that number down so that we get a better picture of how many men and women there are, or what the average age is. These important aspects of population are called **population composition**. A population with a huge number of children will have different challenges than a population with huge numbers of elderly. **Population pyramids** are used to visually represent these aspects. In poorer countries, where birth and death rates are high, the population pyramid resembles an evergreen tree; they youngest have the largest populations, and there are not very many elderly. Countries such as Pakistan, Guatemala, Congo, etc have this kind of map. Wealthier countries such as those in Europe and the US have a pyramid that resembles a vase, with the largest number of people in the middle.

The **infant mortality rate (IMR)** records deaths during the baby's first year. Poor health of the mother is a leading cause of infant mortality, as is diarrhea (due to poor sanitation) and malnutrition. Whereas Sweden has a low IMR of 2.8 (that is 2.8 deaths per 1000 live births), Sierra Leone has a IMR of 179.5. **Once again, scale is important; from a national perspective, South Africa has a European like average; but from a smaller scale based on race, South Africa's whites have a European low IMR but its blacks have an African high IMR.**

The **child mortality rate (CMR)** reflects deaths of children from age 1-5. Malnutrition, especially lack of protein, is a major cause of child mortality, which is particularly high in Africa and Asia.

Another indicator of a society's well-being lies in **life expectancy**, of the number of years, on average, that a person may expect to remain alive. Women tend to live longer, as do Japanese. Africa has the lowest life expectancies; some African countries have a life expectancy below 40 due to **AIDS, or Acquired Immune Deficiency Syndrome**. The rapid spread of AIDS: In 1980, there were 200,000 people worldwide infected by HIV; by 2004, the number was 37 million, with 67% of those people in Sub-Saharan Africa. In Zimbabwe alone, 25% of people aged 15 to 49 are infected with AIDS, which is the leading cause of death. Not only does AIDS cause premature death, but also a huge orphan problem. As a result of AIDS effect on middle aged people, the population pyramid changes to resemble a **population chimney**.

Even though the prosperous populations of Europe and US avoid many of the killers of the developing countries, they experience diseases related to older age and higher living: heart disease and diabetes is caused by overconsumption of red meat and sugar, a problem not present in poorer countries suffering from lack of food.

How do Governments Affect Population Change?

Some countries have pursued **expansive population policies**, which encourage large families and raise the rate of natural increase. Mao's China had such a policy in the 1940's and 50's. In Europe, some countries now are following an expansive population policy by giving tax incentives to have more children because of low TFR.

Some governments have followed **eugenic population policies**, designed to favor one racial or cultural sector over another. Nazi Germany is an example, but some have accused the US for having a similar policy against African Americans up until the 1960's and Japan in modern times through policies that do not overtly favor one group over another but do so indirectly through discrimination, etc.

Today most governments follow a **restrictive population policies**, seeking to slow overpopulation. China's 'one-child-only' policy is an example of this. This policy shows how a country can go from an expansive policy to a restrictive policy in the span of a single generation.

There is only so much a government can do to influence birth rates. Sweden created policies to increase childbirth in the 1980s through cash payments and tax incentives. However, due to economic slowdown the baby boom ended not long after it started despite the government's efforts.

Sometimes government's efforts are stymied by other factors such as religion. In the Philippines, the government wants slower population growth, but the country's Catholic faith opposed birth control.