

Global Human Population

It took the human population about 3M years to reach 500M around 1600 AD. In 1830 it doubled to 1B, then 2B in 1930, and doubled again to 4B in 1975. In 1999 our population reached 6B. The current growth rate is about 1.13% which means the doubling time is 62 years. That means we will reach 14B in 2072-2080.

What caused the explosion?

1. ~1600 - medical care, sanitation, food production and nutrition began to improve dramatically. The death rate dropped but the birth rate remained the same.
2. ~1800 - some major diseases began to come under control
3. ~1850 - the Industrial Revolution
 - a. People no longer had to work as hard at farming so large families were unnecessary so the birth rate began to drop except in developing countries where remained high even as technology lowered the death rate.
 - b. In these countries, as lifespan increased, the economy often did not so large families were still needed to help work and to care for parents later in life
 - c. Agriculture and food distribution improved so that a larger population was possible.
 - d. Infant mortality was lowered and life expectancy was increased because of
 - i. improved water quality
 - ii. sewage treatment
 - iii. medicine - especially the discovery of antibiotics in 1930
 - iv. personal hygiene and sanitation
 - e. Overall, the fertility rate is decreasing but there is a large population still in reproductive age so the population continues to increase.

Population Profiles

Demographics is the science of collecting information about a population. A **population profile** is a bar graph which shows the number of people, males and females, at each age in a population. It is one way of showing this demographic information. The profile gives some idea of how the population has changed and makes it easier to predict the demand for services in the future. This type of information is very useful for governments and companies. A profile makes it quite simple to see if a population is growing or not.

To control population growth, people need to lower fertility (*i.e.*, reduce family size). Most population growth is in developing countries because they still have a large population yet to enter childbearing years. Also, in developing countries, females tend to have children in their early teens, whereas females in developed countries wait until they are in their mid-twenties. Developing countries have a high birth rate because of the high death rate among children. Developed countries have lower birth rate because the child death rate is quite low.

This can be illustrated using a graph of the **demographic transition**, which shows the change from a primitive to a modern fertility. The phases are:

- a. Phase I - Infant mortality is high so couples have many children to ensure some survive.
- b. Phase II - With increased sanitation and food, the death rate drops. Infant mortality decreases so more children survive.
- c. Phase III - Population growth begins to level off. The death rate declines further and couples have fewer children because the infant mortality rate is low.

- d. Phase IV - The birth and death rate are both low and the rate of population increase continues to decrease.
- e. Phase V - In some countries, the birth rate continues to drop below replacement level.

Developed countries are in Phase IV. Some population growth is still occurring because of population momentum. Most developing countries are in Phase III, where both the birth rate and death rate are decreasing, but fertility is still above replacement level and population momentum will carry growth for at least a generation.

Population Growth in Rich vs. Poor Nations

Globally, 21% of the population holds 80% of the wealth. 90% of population growth is in developing nations and the primary factor contributing to it is total fertility.

Two basic factors are involved in population growth:

1. Total fertility is the average number of children each female has in her lifetime. In theory, 2 children per couple would result in a stable population. The world average is currently 2.7.
2. Replacement fertility is the number of children it takes to replace the parents. This number is not 2 because some children die and some people do not reproduce. For developed countries, replacement fertility is 2.03 while in developing countries it is 2.16. Any rate greater than this will result in population growth.

Fertility rates have declined in all regions of the world except Africa over the last 50 years. The World Health Organization says that over 60 of the world's 190 countries are now below replacement fertility and even some of the poorest countries have been able to decrease their fertility. The basic problem in developing countries is that parents do not know how many children will survive so they must have more than the replacement number. The fertility rate in developing countries is stable or decreasing. The problem is that ~75% of the world's population is in developing countries and it is predicted that this will be over 90% by 2075.

Is population *per se* the problem?

Actually, no. The overall problem is one of consumption rather than actual population. Consumption contributes to pollution, ozone depletion, global warming, toxic waste, solid waste, energy use, deforestation, *etc.*

We need to regulate three factors in order to achieve sustainability:

1. population growth
2. consumption
3. environmental regard

How do people in developing countries cope with decreasing land for food production?

1. **Subdivide farms and intensify cultivation.**
 - a. More than 1B people live without enough land to grow food for themselves, let alone have enough surplus to barter.
 - b. ~3B people use firewood for heating and cooking. This practice leads to
 - i. deforestation which in turn causes flooding and decreased groundwater
 - ii. soil erosion which increases sediment in streams and rivers, killing aquatic life
 - iii. desertification which threatens food supply

- c. Land is not allowed to rest because of the high demand for food. This practice eventually leads to loss of soil quality and lower productivity.
- d. Over-grazing by domestic animals is destroying land as well.

2. **Create new land for cultivation**

- a. This usually means clear cutting or burning forest.
- b. Because the soil in tropical rain forests is of poor quality and thin, the land is productive for 2-3 years then the soil is eroded away.
- c. This causes increased desertification, loss of habitat and decreased biodiversity.

3. **Migrate to cities**

- a. People try to escape rural poverty as the population grows faster than opportunity.
- b. Crowded conditions in cities lead to a lack of a clean water supply and adequate sewage so disease often becomes rampant.
- c. The lack of employment causes people to resort to begging, stealing, or scavenging in dumps.

4. **Illicit activities.** If people cannot grow food, they must earn money to buy it.

- a. In many cases, a farmer cannot make a living growing food crops but can growing drugs.
- b. Poaching is the practice of trapping or killing illegal animals for food, products, or trophies. This activity is second only to drugs on the black market. The irony here is that it is affluent people who provide the demand for these products, making the problem worse.
- c. By turning to petty theft, people can earn money to buy food.
- d. By growing cash crops (*e.g.* sugar, cotton, drugs, coffee), a farmer can earn more than by growing food.

5. **Emigrate**

- a. People who can't make a living in their homeland often choose to move somewhere else.
- b. This is generally a good way for us to increase our population because we have lots of space and can expand our economy in this way.
- c. The problem is that many immigrants are unskilled and uneducated so can place a drain on the social system.
- d. Sometimes, immigrants become frustrated with poverty and add to gang problems. This is why many gangs are visible minorities.
- e. Furthermore, skilled, educated people are the ones which developing countries can least afford to lose.

6. **Impact on Women and Children**

- a. In many cultures, men are free to roam and find work, taking no responsibility for pregnant women and children.
- b. It is usually the responsibility of women to care for the children and married men often abandon their family to escape the hopeless poverty.
- c. As a result, women can't cope, abandon their children, and turn to begging, stealing, or prostitution.
- d. The children are then forced into child labor, child prostitution, or are sold for adoption in developed countries.
- e. These factors build a nearly inescapable cycle of poverty and illiteracy.

How does affluence contribute to global problems?

We are isolated from environmental damage so we don't realize it is occurring. Our waste is removed to a remote location so we don't think about it. Also, resource extraction happens far from us so we don't see the damage caused by it. Examples include, clear cutting Brazilian rain forests, other South American rain forests cut for paper production, oil spills, exotic pets, accessories made from animal parts.

On the other hand, affluence allows the provision of clean drinking water, sewage treatment, environmental protection, proper garbage disposal, efficient technology, wildlife preserves, recycling, forests are not destroyed for fuel wood, enforcement of environmental laws. Basically, affluence allows choice.

Factors Influencing Family Size

1. Old age security
 - a. If citizens are cared for in old age they won't need as many children for this purpose as children can be the only source of support for elderly family members. Where infant and child mortality rates are high, couples may need to have several children to be sure some survive to take care of them when they are old.
2. Infant and child mortality
 - a. A higher rate means parents tend to have more children to ensure that some survive.
3. Child seen as asset rather than liability
 - a. In developed countries children are seen as a liability because of the cost associated with raising them. In developing countries they are seen as an asset because they contribute to the family by working. Children often are important for contributing money and labor (chores) to the family. In many developing countries children as young as six tend livestock and younger siblings, fetch water, gather firewood and help grow crops or sell things in the marketplace.
4. Education
 - a. Education is expensive and while in school children can't work. Note that education does not generally solve other environmental issues as developed countries have among the highest education rates but cause the most environmental damage.
 - i. Improving resource management must be a part of education. Most poor people are dependent on local resources. If these resources are exploited and depleted, poverty will continue.
 - b. Women who can earn a salary are less likely to stay at home and have children. This is not always the case in developing countries, where, with the higher income that comes with education, couples can afford to have the number of children they want. This is usually a short term effect and fertility decreases as parents see that children are more likely to survive.
 - c. Improving literacy and educating girls is of greatest importance.
5. Status of women
 - a. Women don't work so they don't need to be educated. Boys are often more valuable than girls because they carry on the family name and contribute to family finance and support parents in old age. Couples may have more children than they need in hopes of having a boy. Women often report that they do not want more children but have little input or control over their own life.

6. Availability of contraception

- a. Contraception must be available and accessible. Sometimes contraception is free but the medical clinic is too far away, too crowded, or runs out of supplies.
- b. Providing free or low cost contraceptives and/or sterilization are important measures.

In well-developed countries the problem is the opposite - fertility has dropped below replacement. The governments of some developed countries offer incentives to encourage women to have children. Remember though that a decrease in North American and European countries is good news for the environment and resource consumption.