

## What is a Population?

"A population is a group of organisms of the same species occupying a given geographic location at the same time."

## Factors that affect the growth of Populations

### What is population "growth"?

What we might talk about as population size is actually population **density**, the number of individuals per unit area (or unit volume).

Population growth is based on four fundamental factors: **birth rate**, **death rate**, **immigration**, and **emigration**.

**Population growth rate = (birth rate + immigration) - (death rate + emigration)**

"Per capita rates" are calculated as the number of events (births, deaths, or growth) divided by the number of individuals in the population over a specific time period.

## Population Regulation & Environmental limits

### Environmental Resistance Factors that Affect Birth and Death Rates

Obviously, populations cannot realistically grow exponentially. There are environmental limits, called **environmental resistance factors** that affect the number of individuals that can survive and reproduce in a given habitat.

*"The power of population is so superior to the power of the earth to produce subsistence for man, that premature death must in some shape or other visit the human race. The vices of mankind are active and able ministers of depopulation. They are the precursors in the great army of destruction, and often finish the dreadful work themselves. But should they fail in this war of extermination, sickly seasons, epidemics, pestilence, and plague advance in terrific array, and sweep off their thousands and tens of thousands. Should success be still incomplete, gigantic inevitable famine stalks in the rear, and with one mighty blow levels the population with the food of the world." Thomas Malthus, 1798*

**Environmental resistance factors** fall into two categories:

1: **density dependent**

2: **density independent.**

**Density dependent factors** include the environmental resources needed by the individuals of a population. Competition for food, water, shelter, etc., results as the population density increases.

The survival, health, and reproduction of individuals will be affected if they cannot acquire the basic requirements of life.

**Density dependent factors** also include environmental factors, such as **predators, infectious disease organisms, and parasites** that do not necessarily result in competition for needed resources, but do affect the health, survival, and reproduction of individuals in the population as population density increases. Individuals that are diseased may have a reduced ability to reproduce. Dead individuals cannot reproduce.

Density dependent factors are referred to as **Environmental Resistance Factors** that determine the **Carrying Capacity** of the environment for a population.

**Carrying Capacity** - "The theoretical maximum number of individuals that an environment can support for an indefinite time period is its **carrying capacity**."

In the presence of density dependent environmental factors, population growth is constrained at high population densities. This is because the impact of density dependent factors **depends on the density** of the population.

At low population densities, density dependent factors exert little influence on population growth, which initially grows rapidly.

This is to say that individuals have an abundance of resources so their health is good. They have a high capacity to reproduce and are less likely to die.

At high population densities, density dependent factors exert an increasing negative effect on population growth which slows and finally stops at the carrying capacity.

The health of individuals is stressed because of lack of resources, crowding, prevalent diseases, etc. Their reproductive capacity is reduced and their likelihood of dying is greater.

### **Environmental resistance Factors**

**Density Independent** factors are **Environmental Resistance Factors** that occur or have an effect on a population regardless of the density of the population.

Density independent factors include weather phenomena and natural disasters that affect the population, but the chance of their occurrence or level of severity is unrelated to the density of the population.

Density independent factors may affect the availability of resources that are required by the population (density dependent factors), indirectly affecting the carrying capacity of the environment.

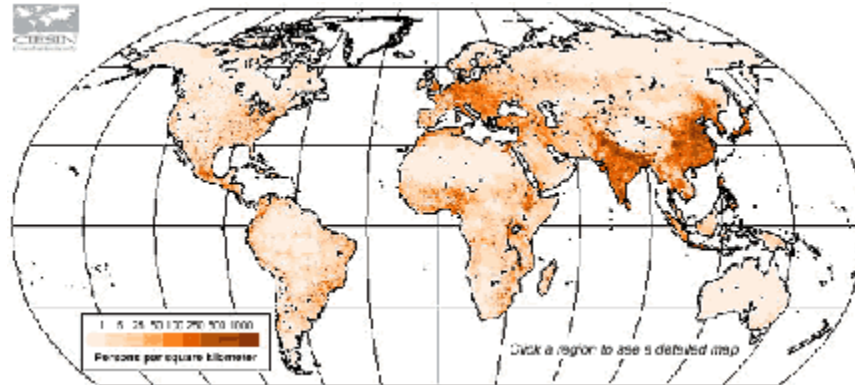
### **Population Distribution**

**Population distribution** means the pattern of where people live. World population distribution

is uneven. Places which are **sparsely** populated contain few people. Places which are **densely** populated contain many people. Sparsely populated places tend to be difficult places to live. These are usually places with hostile environments e.g. Antarctica. Places which are densely populated are habitable environments e.g. Europe.

### Population Density

**Population density** is a measurement of the number of people in an area. It is an average number. Population density is calculated by dividing the number of people by area. Population density is usually shown as the number of people per square kilometer.



Source: Columbia University's Center for International Earth Science Information Network  
 Page URL: <http://sedac.ciesin.columbia.edu/plue/gpw/index.html?main.html&2>

The map above shows that world population distribution is uneven. Some areas have a high population density while others have a low population density. Areas of high population density tend to be located between 20° and 60°N. This area contains a large land area and a relatively temperate climate.

### Factors Affecting Population Density

There are a range of **human** and **natural** factors that affect population density. The tables below illustrate this.

Physical Factors	High Density	Low Density
<b>Relief</b> (shape and height of land)	Low land which is flat e.g. Ganges Valley in India	High land that is mountainous e.g. Himalayas
<b>Resources</b>	Areas rich in resources (e.g. coal, oil, wood, fishing etc.) tend to be densely populated e.g. Western Europe	Areas with few resources tend to be sparsely populated e.g. The Sahel
<b>Climate</b>	Areas with temperate climates tend to be densely populated as	Areas with extreme climates of hot and cold tend to be

	there is enough rain and heat to grow crops e.g. UK	sparsely populated e.g. the Sahara Desert
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Human Factors	High Density	Low Density
Political	Countries with stable governments tend to have a high population density e.g. Singapore	Unstable countries tend to have lower population densities as people migrate e.g. Afghanistan.
Social	Groups of people want to live close to each other for security e.g. USA	Other groups of people prefer to be isolated e.g. Scandinavians
Economic	Good job opportunities encourage high population densities, particularly in large cities in MEDCs and LEDCs around the world.	Limited job opportunities cause some areas to be sparsely populated e.g. Amazon Rainforest

## What is Overpopulation?

Overpopulation is an undesirable condition where the number of existing human population exceeds the carrying capacity of Earth. Overpopulation is caused by number of factors. Reduced mortality rate, better medical facilities, depletion of precious resources are few of the causes which results in overpopulation. It is possible for a sparsely populated area to become densely populated if it is not able to sustain life.

Growing advances in technology with each coming year has affected humanity in many ways. One of these has been the ability to save lives and create better medical treatment for all. A direct result of this has been increased lifespan and the growth of the population. In the past fifty or so years, the growth of population has boomed and has turned into overpopulation. In the history of our species, the birth and death rate have always been able to balance each and maintain a population growth rate that is sustainable.

Since the time of the Bubonic Plague in the 1400's, the growth of population has been on a constant increase. Between the time of the plague and the 21st century, there was been hundreds and thousands of wars, natural calamities and man-made hazards. However, none of these have made a dent on the population. Developing nations face the problem of overpopulation more

than developed countries, but it affects most of the Earth as of now. When we are talking about overpopulation, we should first understand the causes of it.



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### **Causes of Overpopulation**

**Decline in the Death Rate:** At the root of overpopulation is the difference between the overall birth rate and death rate in populations. If the number of children born each year equals the number of adults that die, then the population will stabilize. Talking about overpopulation shows that while there are many factors that can increase the death rate for short periods of time, the ones that increase the birth rate do so over a long period of time. The discovery of agriculture by our ancestors was one factor that provided them with the ability to sustain their nutrition without hunting. This created the first imbalance between the two rates.

**Better Medical Facilities:** Following this came the industrial revolution. Technological advancement was perhaps the biggest reason why the balance has been permanently disturbed. Science was able to produce better means of producing food, which allowed families to feed more mouths. Medical science made many discoveries thanks to which they were able to defeat a whole range of diseases. Illnesses that had claimed thousands of lives till now were cured because of the invention of vaccines. Combining the increase in food supply with fewer means of mortality tipped the balance and became the starting point of overpopulation.

**More Hands to Overcome Poverty:** However, when talking about overpopulation we should understand that there is a psychological component as well. For thousands of years, a very small part of the population had enough money to live in comfort. The rest faced poverty and would

give birth to large families to make up for the high infant mortality rate. Families that have been through poverty, natural disasters or are simply in need of more hands to work are a major factor for overpopulation. As compared to earlier times, most of these extra children survive and consume resources that are not sufficient in nature.

**Technological Advancement in Fertility Treatment:** With latest technological advancement and more discoveries in medical science, it has become possible for couple who are unable to conceive to undergo fertility treatment methods and have their own babies. Today there are effective medicines which can increase the chance of conception and lead to rise in birth rate. Moreover, due to modern techniques pregnancies today are far more safer.

**Immigration:** Many people prefer to move to developed countries like US, UK, Canada and Australia where best facilities are available in terms of medical, education, security and employment. The end result is that those people settle over there and those places become overcrowded. Difference between the number of people who are leaving the country and the number of people who enter narrows down which leads to more demand for food, clothes, energy and homes. This gives rise to shortage of resources. Though the overall population remains the same, it just affects the density of population making that place simply overcrowded.

**Lack of Family Planning:** Most developing nations have large number of people who are illiterate, live below the poverty line and have little or no knowledge about family planning. Getting their children married at an early age increase the chances of producing more kids. Those people are unable to understand the harmful effects of overpopulation and lack of quality education prompts them to avoid family planning measures.

## **Effects of Overpopulation**

**Depletion of Natural Resources:** The effects of overpopulation are quite severe. The first of these is the depletion of resources. The Earth can only produce a limited amount of water and food, which is falling short of the current needs. Most of the environmental damage being seen in the last fifty odd years is because of the growing number of people on the planet. They are cutting down forests, hunting wildlife in a reckless manner, causing pollution and creating a host of problems. Those engaged in talking about overpopulation have noticed that acts of violence and aggression outside of a war zone have increased tremendously while competing for resources.

**Degradation of Environment:** With the overuse of coal, oil and natural gas, it has started producing some serious effects on our environment. Rise in the number of vehicles and industries have badly affected the quality of air. Rise in amount of CO<sub>2</sub> emissions leads to global warming. Melting of polar ice caps, changing climate patterns, rise in sea level are few of the consequences that we might have to face due to environment pollution.

**Conflicts and Wars:** Overpopulation in developing countries puts a major strain on the resources it should be utilizing for development. Conflicts over water are becoming a source of tension between countries, which could result in wars. It causes more diseases to spread and makes them harder to control. Starvation is a huge issue facing the world and the mortality rate for children is being fuelled by it. Poverty is the biggest hallmark we see when talking about overpopulation. All of this will only become worse if solutions are not sought out for the factors affecting our population. We can no longer prevent it, but there are ways to control it.

**Rise in Unemployment:** When a country becomes overpopulated, it gives rise to unemployment as there are fewer jobs to support a large number of people. Rise in unemployment gives rise to crime as people will steal various items to feed their family and provide them basic amenities of life.

**High Cost of Living:** As the difference between demand and supply continues to expand due to overpopulation, it raises the prices of various commodities including food, shelter and healthcare. This means that people have to pay more to survive and feed their families.

#### Solutions to Overpopulation

**Better Education:** One of the first measures is to implement policies reflecting social change. Educating the masses helps them understand the need to have one or two children at the most. Similarly, education plays a vital role in understanding latest technologies like [CloudDesktopOnline](#) that are making huge waves in the world of computing. Families that are facing a hard life and choose to have four or five children should be discouraged. Family planning and efficient birth control can help in women making their own reproductive choices. Open dialogue on abortion and voluntary sterilization should be seen when talking about overpopulation.

**Making People Aware of Family Planning:** As population of this world is growing at a rapid pace, raising awareness among people regarding family planning and letting them know about serious after effects of overpopulation can help curb population growth.

**Tax Benefits or Concessions:** Government of various countries might have to come with various policies related to tax exemptions to curb overpopulation. One of them might be to waive off certain part of income tax or lowering rates of income tax for those married couples who have single or two children. As we humans are more inclined towards money, this may produce some positive results.

**Knowledge of Sex Education:** Imparting sex education to young kids at elementary level should be a must. Most parents feel shy in discussing such things with their kids which result in their children going out and look out for such information on internet or discuss it with their peers.