

THE PEOPLE CONNECTION

background reading | population dynamics unit

EARTH matters

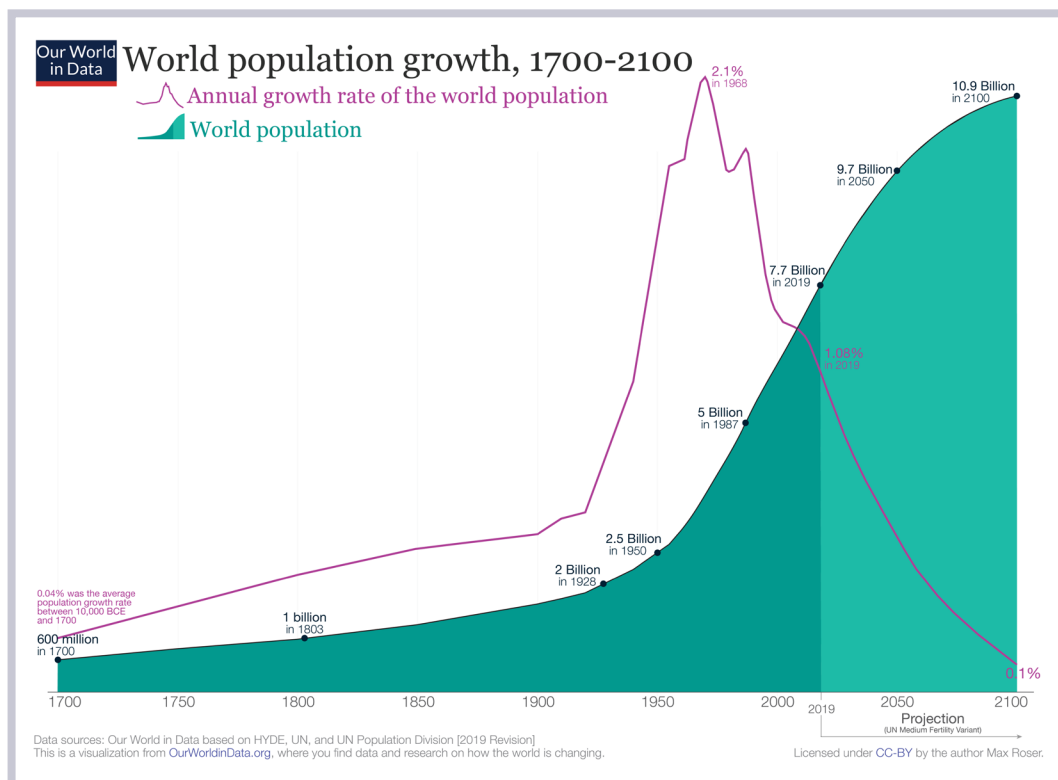
Studies For Our Global Future

Central to so many of the environmental, social and economic issues facing the planet today are people – our numbers and our behaviors. Although barely noticeable on a day-to-day basis, human population pressures threaten the health of our ecosystems and the quality of life for Earth’s inhabitants.

Consider that in the six seconds it takes to read this sentence, 15 more people will join the human family. In fact the world’s population adds the equivalent of a Rio de Janeiro every month and a Germany each year. There are now 7.8 billion people and counting. This growth in human numbers has been described as a “population explosion,” doubling ever faster over much of the past 200 years.

What ignited the explosion?

Rapid population increases have been a very recent development in the scope of human history. People lived on Earth for about 3 million years before the world population reached 500 million in the 16th century. Until then, **birth rates** and **death rates** were in balance, keeping the population stable. Although birth rates were high, death rates – particularly among children – also remained high.

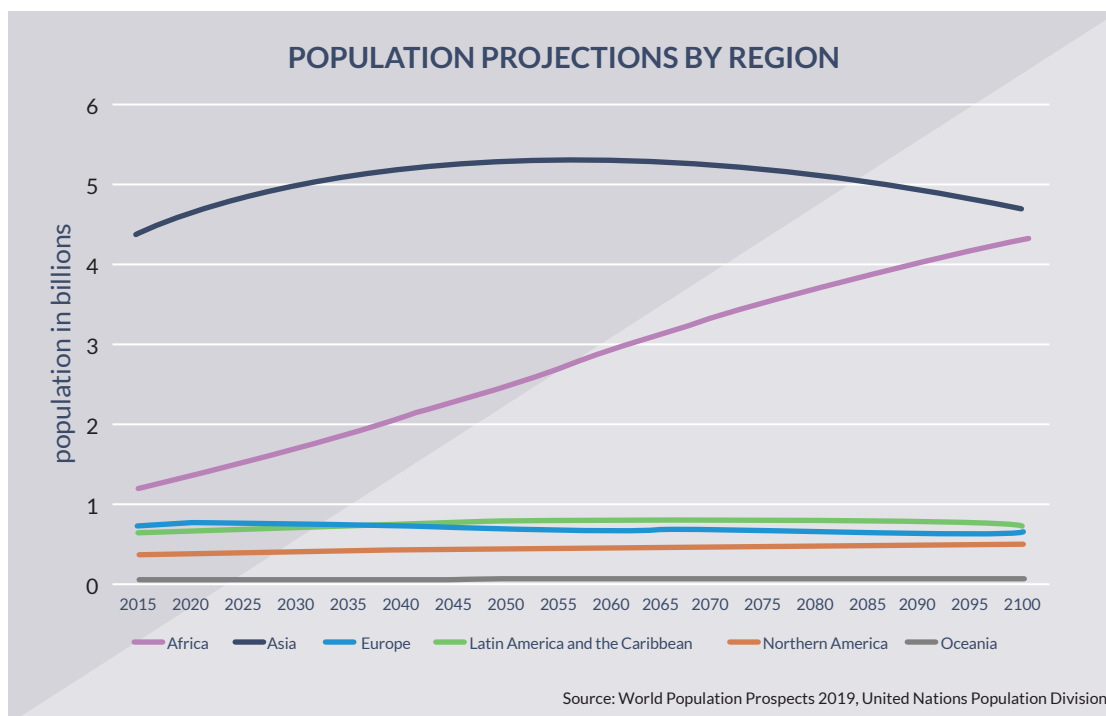


By the 17th century, this balance of birth and death rates began to change as advances in medical care, sanitation, food production and nutrition increased **life expectancy** for children and adults. Death rates dropped but birth rates remained high and the population grew steadily. By the turn of the 19th century, at the height of the **Industrial Revolution** in North America and Europe, global population reached 1 billion.

As industrialization grew throughout the Western world, people exchanged their agrarian lifestyles for homes and jobs in burgeoning cities. Without land to farm, large families became neither necessary nor practical. Slowly, birth rates dropped in rapidly industrializing nations. This three-part population pattern – from high birth and death rates, to high birth and low death rates, and finally to low birth and death rates – is now referred to as the **demographic transition**. In the non-industrialized nations, primarily in Africa, Latin America and Asia, however, birth rates remained high while at the same time death rates dropped because of new agricultural and medical technologies imported from **more developed countries**. Economic conditions in these nations did not always improve as life spans increased. This resulted in a pattern throughout much of the globe of explosive population growth as the **least developed countries** stagnated in the middle stage of the demographic transition – high birth rate and low death rate. By 1960, the world population reached 3 billion. Just 14 years later, in 1974, the population soared to 4 billion, topped 5 billion in 1987, reached 6 billion in 1999, and 7 billion in 2011, completely doubling in less than 40 years.

The demographic divide

It now appears that global population growth is finally turning a corner as birth rates are falling worldwide. Even so, **demographers** project that the global population will continue to grow, albeit more slowly than in the past century, adding an additional 3 billion more people by the end of this century.¹ This population growth will be uneven across the globe with the most rapid growth in the least developed countries and little or no growth in the most developed countries.



The **fertility rates** (the average number of children women bear) is the main driver of population growth. At the peak of global population growth in the early 1960s, the fertility rate was five children per woman. Since the 1960s fertility rates have dropped dramatically across most of the world, due in part to improved global

health, education and income. In 2020, the global fertility rate was down to 2.3 children per woman.² But in many countries within Sub-Saharan Africa the fertility rate remains high at five children per woman. According to the UN, the population in Sub-Saharan Africa could quadruple to over 4 billion by 2100, becoming more densely populated than China.³

At the same time, many industrialized countries are experiencing a rapidly aging population and below-replacement fertility rates. This trend would eventually lead to population decreases in parts of Europe and Asia in the coming decades. Much has been written in recent years about the challenges of a “graying” population, including an aging workforce and increased need for services for the elderly.

Crowding the Earth

How does the quality of life on Earth vary now from what it was when there were half as many people? How might it be in the future when there are many more of us? How many people can the Earth support sustainably? While no one knows for sure, every environment has a **carrying capacity** – the point at which there are not enough natural resources to support any more members of a given species. In “How Many People Can the Earth Support?” Rockefeller University Professor Joel Cohen attempted to answer that very question by collecting dozens of expert estimates made in recent decades. Finding the Earth’s carrying capacity is difficult because the number of people the Earth can support depends greatly on how people use the Earth’s resources and how technology changes to meet people’s needs. Although estimates varied, Cohen was able to conclude from scholars that,

The possibility must be considered seriously that the number of people on Earth has reached, or will reach within the next century, the maximum number the Earth can support in modes of life that we and our children and their children will choose to want.⁴

The population issue, then, is not one of numbers but of carrying capacity. The entire world population could fit into Texas and each person could have an area equal to the floor space of a typical North American home. But this ignores the amount of land required to provide each of us with the raw materials for survival (food, water, shelter, clothing and energy) and all that has become essential to our modern



lifestyles (transportation, electronic communication and consumer goods and services). In the 1990s, scientists in Vancouver, Canada, tried to calculate local residents' **ecological footprint**, the land and water area that would be required to support the area's population and material standard indefinitely. They found that the Vancouver area's population required an area 19 times larger than its home territory to support its consumer lifestyles – wheat fields in Alberta, oil fields in Saudi Arabia, tomato fields in California.⁵

While the continents are vast, only a small fraction (1/10) of all the land in the world is **arable**.⁶ The rest has been built up into cities and towns or is inhospitable to growing crops. While the number of people continues to grow, the small portion of land which must support these people remains the same or shrinks as cities expand. The size of the human population affects virtually every environmental condition facing our planet. As our population grows, demands for resources increase, adding to pollution and waste. More energy is used, escalating the problems of climate change, acid rain, oil spills and nuclear waste. More land is required for agriculture, leading to deforestation and soil erosion. More homes, factories and roads must be built, occupying habitat lost to other species that share the planet, leading increasingly to their extinction. Simply put, the more people inhabiting our finite planet, the greater stress on its resources.

Meeting people's basic needs



Shibuya Crossing in Tokyo, Japan.

This strain on Earth's finite natural resources makes it more difficult for people to meet their basic needs for food and clean water. Chronic hunger and malnutrition are already the greatest risks to health worldwide. One in ten people does not get enough food to be healthy and lead an active life.⁷ As the world population grows, it will be a challenge for food production to keep pace, yet we continue to lose arable land. About 4 billion of the world's people now face severe water shortages at least one month out of the year.⁸ As the population grows, more water is needed for

agriculture and industry, as well as for domestic uses. Meanwhile, as rapidly **developing countries** aspire to more affluent lifestyles, the demand for natural resources increases.

People on the move

The necessity of meeting people's basic needs is further amplified by the number of **refugees** migrating from country to country, or from rural to urban locations. This **migration** is fueled by various "push-pull" factors. For instance, civil strife and warfare in Syria, Iraq and Libya in recent years has displaced millions of people from their homes, pushing them toward refugee camps in neighboring countries or toward possible asylum in Europe. The

changing global climate is creating a population of environmental refugees, being pushed from their homes due to rising sea levels or droughts. For many people in **less developed countries** the “pull” of economic opportunities leads them from subsistence farms to urban factories or across national borders to seek a better life.

While migration has been part of the human existence for millennia, the number of migrants is on the rise. In 2019, 272 million people (3.5 percent of the world’s population) lived outside their country of origin, up from 175 million people in 2000 – a 55 percent increase.⁹ Migrations of people from one country to another can bring benefits to the destination country, such as cultural diversity or a renewed labor force. It can also present challenges, such as needing to provide the social services and infrastructure for new residents requiring jobs, homes, schools and healthcare.



Refugees from Syria, Iraq and other war-torn countries travel through Serbia to other parts of Europe, 2015.

The movement of people from rural to urban areas has contributed to the explosive growth of cities around the globe. The world is undergoing the largest wave of urban growth in history. More than half of the world’s population now lives in towns and cities, and by 2030 this number will swell to about 5 billion.¹⁰ Much of this **urbanization** will unfold in Africa and Asia, bringing huge social, economic and environmental transformations. And while urbanization can hasten development, it can also create large concentrations of poverty.

What can be done?

There is much that can and has been done toward stabilizing the world population and preserving the environment. It only takes very small changes in fertility rates to make a big difference in when the population will stabilize, as well as how many people there will be when that happens. According to the United Nations, a drop in the average number of children a woman has in her lifetime by half a child per woman could mean a difference of 4 billion people in the projected population for 2100!¹¹ In order to achieve **zero population growth** (stable population) while maintaining low death rates, average births will need to total only about two children per woman worldwide in the years to come.

The good news is that the very conditions that will help the population stabilize are those that help people live longer, healthier lives, raise healthier children and have more opportunities to contribute to their nations’ and families’ prosperity. Programs that expand access to health care, education and **family planning** services that enable women to choose the timing and number of their children, as well as those that have improved the status of women and employment opportunities, all work to lower fertility levels.

While considerable progress has been made, stabilizing global population requires a sustained effort on the part of national governments and aid organizations. The Guttmacher Institute estimates that there are still 218 million women worldwide with “unmet need” for modern contraceptives.¹² According to UNESCO, 59 million children of primary age receive no schooling.¹³ Providing universal access to reproductive healthcare and education will go a long way toward lowering fertility rates and increasing prosperity in the world’s poorest countries.

^{1,3,11}United Nations DESA/Population Division. (2019). World population prospects 2019. Retrieved from <https://esa.un.org/unpd/wpp/>

² Population Reference Bureau. (2020). *World Population Data Sheet 2020*. Retrieved from <https://prb.org>

⁴ Cohen, J.E. (1996). *How many people can the earth support?* New York: W.W. Norton and Co.

⁵ Rees, W. and Wackernagel, M. (1996). *Our ecological footprint: Reducing human impact on the earth*. Canada: New Society Publishers.

⁶ Food and Agriculture Organization of the United Nations, electronic files and web site. Retrieved from <http://www.fao.org/home/en/>

⁷ Food and Agriculture Organization of the United Nations. (2021). *The State of Food Insecurity in the World 2021*. Rome, Italy: FAO.

⁸ Mekonnen, M.M., Hoekstra, A.Y. (2016). Four billion people facing severe water scarcity. *Science Advances*, 2(2). doi:10.1126/sciadv.1500323; United Nations Population Fund. (n.d.). *Migration*. Retrieved March 16, 2016 from <https://www.unfpa.org/migration>

⁹ United Nations, Department of Economic and Social Affairs, Population Division. (2019). *International Migration 2019: Wall Chart*. (ST/ESA/SER/A/431). Retrieved from https://www.un.org/en/development/desa/population/migration/publications/wallchart/docs/MigrationStock2019_Wallchart.pdf

¹⁰ United Nations Population Fund. (n.d.). *Urbanization*. Retrieved 2021, July 22 from <https://www.unfpa.org/urbanization>

¹² Sully, E., et. al. (2020, July). *Adding It Up: Investing in Sexual and Reproductive Health 2019*. Guttmacher Institute. Retrieved from <https://www.guttmacher.org/report/adding-it-up-investing-in-sexual-reproductive-health-2019>

¹³ UNESCO Institute for Statistics. (2019). *New Methodology Shows that 258 Million Children, Adolescents and Youth Are Out of School*. [Fact sheet]. Retrieved from <http://uis.unesco.org/sites/default/files/documents/new-methodology-shows-258-million-children-adolescents-and-youth-are-out-school.pdf>