



POPULATION

An Introduction to Demography

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INTRODUCTION

MORE PEOPLE ARE ALIVE IN THIS EXACT MOMENT THAN AT ANY PREVIOUS TIME IN HISTORY.

In the next 60 seconds, 267 babies will be born, and 110 people will die. By the time you've finished reading this introduction, the world's population will have increased by around 600 people. By 2050, our planet will be home to nearly 10 billion humans, compared with fewer than eight billion people in 2020. But population is about more than facts and figures. The world's population is composed of individuals of all ages whose actions and stories collectively shape our future.



By 2050, our planet will be home to nearly 10 billion humans, compared with fewer than eight billion people in 2020.

Population growth and decline, as well as changes in the composition and distribution of the global population, have a profound impact on many aspects of our lives. A strong understanding of Earth's ever-changing population is essential in tackling many of our greatest challenges, among them hunger and malnutrition, poverty, disease, conflict and war, climate change, and natural resource shortages. At its most fundamental level, population change comes down to three demographic processes: fertility, mortality, and migration.

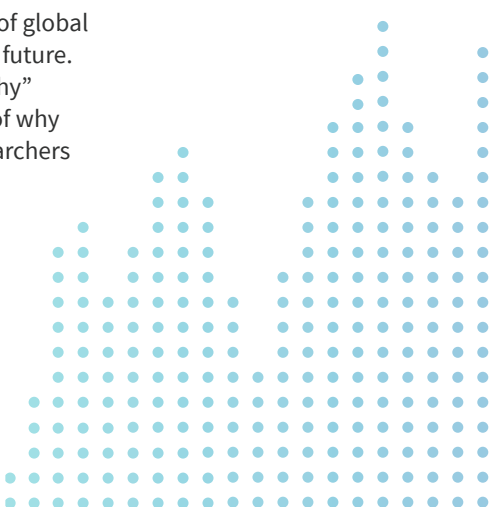
Demography is the scientific study of human populations—their size, their composition, and how they change through births, deaths, and the movement by people from one place to another. Demographers study the composition or characteristics of populations to compare social, economic, and demographic differences between different groups of people. Understanding these demographic patterns and trends can help policymakers and others make decisions about important social, political, economic, and environmental issues.

When were you born? Where do you live? Are you rich or poor? Did you finish school? Are you married? Do you have children? Have you moved in the past year? What is your job? How long will you live? These may seem like mundane questions, but to demographers the answers yield data that are critical to understanding past trends and forecasting the future.

Today, some six millennia after the first census was taken, population data are more important than ever and constitute a vital tool for business and political leaders, researchers, planners, and others.

For the last 90 years, Population Reference Bureau (PRB) has been analyzing and translating population data. We published the first edition of this guide, then titled “Population: A Lively Introduction,” back in 1991. Authored by Joseph A. McFalls Jr., this popular work’s goal of providing readers with a basic understanding of demography and demographic processes remains relevant today. We have retitled this sixth edition “Population: An Introduction to Demography” and thoroughly revised it for today’s audiences. All revisions were handled by PRB demographers and staff, who are solely responsible for the content of this work.

These pages contain an overview of important demographic processes including fertility, mortality, and migration, and their effects on population growth, decline, and composition. We describe changes in the geographic distribution of the world’s population, historical patterns of global population growth, and projections for the future. “Population: An Introduction to Demography” helps us develop a greater understanding of why population trends matter—not just to researchers and academics but to all of us.



FERTILITY



The study of population change starts with fertility: the number of births that occur to an individual or in a population. In 2019, 140,108,052 people were born, which works out to about 267 babies per minute. Globally, women have an average of 2.3 children each, but this number varies considerably by country, ranging from an average of 7.1 children per woman in Niger to a low of 0.9 children per woman in South Korea. In the United States, nearly 3.8 million babies were born in 2018. Women in the United States currently have an average of 1.7 children in their lifetime, putting the national total fertility rate at its lowest level in recorded history.

How We Measure Fertility

There are several different ways of measuring and analyzing fertility. Here are some of the most common measures:

Crude Birth Rate

The crude birth rate is the most easily obtained and most often reported fertility measure. It is calculated from the number of babies born in a given year (or any other time period) divided by the total midyear population and multiplied by 1,000. So, if there were 30,000 births in a population of 1 million people, we would say the crude birth rate was 30 births per 1,000 people (30,000 divided by 1,000,000 multiplied by 1,000). In 2019, the estimated crude birth rate in the United States was 12 births per

1,000, while the global rate was 19 births per 1,000. National crude birth rates ranged from around 6 in Monaco and South Korea to 48 in Niger.

As the name implies, demographers consider the crude birth rate less precise than other metrics because it doesn't take into account the age and sex structure of a population, which greatly affects how many children are born to a population in a given year or at a particular time. The most crucial factor is the percentage of young women of reproductive age because they produce most of the babies. Thus, we would expect a population with a higher proportion of young people to have a higher crude birth rate than a population with a higher proportion of older people.

Total Fertility Rate

The total fertility rate, or TFR, is considered a more refined measure than the crude birth rate and is commonly used because it is easy to visualize what it means: the average number of children a woman would have in her lifetime based on the child-bearing rates of women in a population in a given year. This average makes it a valuable measure for gauging fertility trends and comparing different populations.

Often cited as a measure of the average number of children in a family, the TFR is a "synthetic" measure that doesn't really apply to any specific woman or group of women. The TFR measures the fertility of an imaginary group of women who throughout

TABLE 1

HOW TO CALCULATE THE U.S. TOTAL FERTILITY RATE (TFR) FOR 2018

Age of Women	Number of Women (Thousands)	Births to Women in Age Group (Thousands)	Age-Specific Birth Rate (Column 2/Column 1)
15-19	10,322	182	0.018
20-24	10,672	726	0.068
25-29	11,543	1,099	0.095
30-34	10,944	1,091	0.100
35-39	10,773	567	0.053
40-44	9,917	127	0.013
Sum			0.346
TFR = Sum * 5			1.73

Notes: The category “Births to women ages 15 to 19” includes births to those under age 15; “births to women ages 40 to 44” includes births to those age 45 or older.

Source: Centers for Disease Control and Prevention (CDC), CDC WONDER.

their reproductive lives are subject to the rates of childbearing experienced by real women in a specific year. For example, the U.S. TFR for 2018 (1.73) measures the average number of children American women would have assuming that, at every age, they have children at the same rate as women did in 2018. The TFR is the sum of the age-specific rates for each five-year age group multiplied by five, as illustrated in Table 1.

Replacement-Level Fertility

The TFR is used in determining replacement-level fertility, or when couples have an average of about two children who will then replace them in the population. We might think that two children per couple would be enough for a couple to replace themselves, but some children will die before they grow up to have their own two children. These deaths mean that replacement-level fertility requires a TFR slightly above 2. In a country with low

mortality (death) rates, replacement-level fertility may be closer to 2.05. In a country with a higher mortality rate, replacement-level fertility can require a TFR greater than 3. Whether the TFR is high or low, a population with only replacement-level fertility will eventually stop growing.

Net Reproduction Rate

The net reproduction rate is a slightly different way of examining the extent to which a population is replacing itself. The net reproduction rate is defined as the number of daughters born to a woman during her lifetime given current age-specific birth rates and her chances of living to the end of her childbearing years. A net reproduction rate of 1 means that each generation of mothers is having exactly enough daughters to replace themselves in the population. If less than 1, the reproductive performance of the population is below replacement level.

General Fertility Rate

The general fertility rate tracks the number of births per 1,000 women of childbearing age (typically ages 15 to 49 but sometimes ages 15 to 44). Like the TFR and age-specific fertility rates, the general fertility rate allows demographers to compare the fertility of different countries more accurately and analyze fertility trends over time.

Completed Fertility Rate

What if we want to measure the fertility of a certain group of women, such as those born between 1960 and 1965? For women at the end of their reproductive years (ages 45 to 49), a completed fertility rate is determined from the average number of children they have had. This measure is a useful way to compare the fertility levels of different generations. For example, in the United States, completed fertility reached its peak in 1980 at 3.2 children per woman for the cohort of women born in the years 1931 to 1935. This high completed fertility rate reflects the babies born during the post-World War II baby boom. However, the women born during the baby boom eventually had fewer children than their parents. By 2002, women born from 1953 to 1957 had a much lower completed fertility rate of just 2.0 children per woman.

Cohort Rates Versus Period Rates

Completed fertility is a cohort measure of fertility because it describes the fertility of a specific birth cohort of women. The TFR and crude birth rate are period rates because they measure fertility for a given period of time. Cohort rates tell us nothing about current fertility, and period rates cannot be used to predict future completed fertility. The difference between cohort and period rates explains how it is possible that, during the height of the U.S. baby boom in 1957, the TFR reached 3.7 children per woman, yet no cohort of women born in the 20th century has recorded a completed fertility rate of more than 3.2 children.

Factors Impacting Fertility

Many factors contribute to the probability that a woman of reproductive age (roughly ages 15 to 49) will have a child.

Four Proximate Determinants of Fertility

Demographers pay the closest attention to four factors that impact fertility, which are known as the proximate determinants because statistically they account for nearly all differences in fertility levels among populations. These determinants are:

1. Proportion of women who are permanently or temporarily unable to conceive (infecund).
2. Proportion of women either married or in a sexual union.
3. Percentage of women using contraception.
4. Level of induced abortion.

The importance of each proximate determinant differs depending on social, economic, and health factors within a population or country (see Box 1, p. 9). In high-income nations like the United States, contraceptive use and abortion are the key proximate determinants of fertility levels. In 2019, South Korea had one of the lowest total fertility rates on record for a nation—0.9 births per woman—which can be attributed to a relatively high rate of contraceptive use at 82%.

Where contraceptive use and abortion are less prevalent, marriage rates and either permanent or temporary inability to conceive (infecundity) are more important contributing factors to the birth rate. For example, the Hutterites, a North American religious sect, averaged 12 children per woman in the 1930s by promoting early and universal marriage and discouraging contraception and abortion.

In many African countries, more than one-fourth of women would like to limit or delay childbearing but are not using a family planning method. This discrepancy between fertility preferences and contraceptive use is known as unmet need for contraception. In some cases, women don't use contraceptives because they cannot find or afford them or must travel too far to get them. Other reasons for not using family planning methods include personal, cultural, or religious objections; fear of side effects; health concerns; and lack of knowledge.