POPULATION

An Introduction to Demography

POPULATION BULLETIN • **VOL. 75, NO. 1** • 2021

PRB

Population Bulletin VOL. 75, NO. 1 • JANUARY 2021

POPULATION

An Introduction to Demography

ABOUT THE AUTHORS

This *Population Bulletin* was written by PRB staff including **MARK MATHER**, associate vice president of U.S. Programs; **LINDA A. JACOBSEN**, vice president of U.S. Programs; and **PAOLA SCOMMEGNA**, senior writer in U.S. Programs. Editing provided by **NANCY MATUSZAK**, senior editor; **LESLIE AUN**, vice president of communications and marketing; and creative design provided by **JOHN HERNE**, creative director; and **ANNEKA VAN SCOYOC**, graphic designer. Data review provided by **KELVIN POLLARD**, senior demographer in U.S. Programs; and **LILLIAN KILDUFF**, research analyst in U.S. Programs.

This Bulletin is the successor publication to "Population: A Lively Introduction," 5th edition (2007) by Joseph A. McFalls Jr.

PRB is exclusively responsible for the content of this document.

ABOUT THIS PUBLICATION

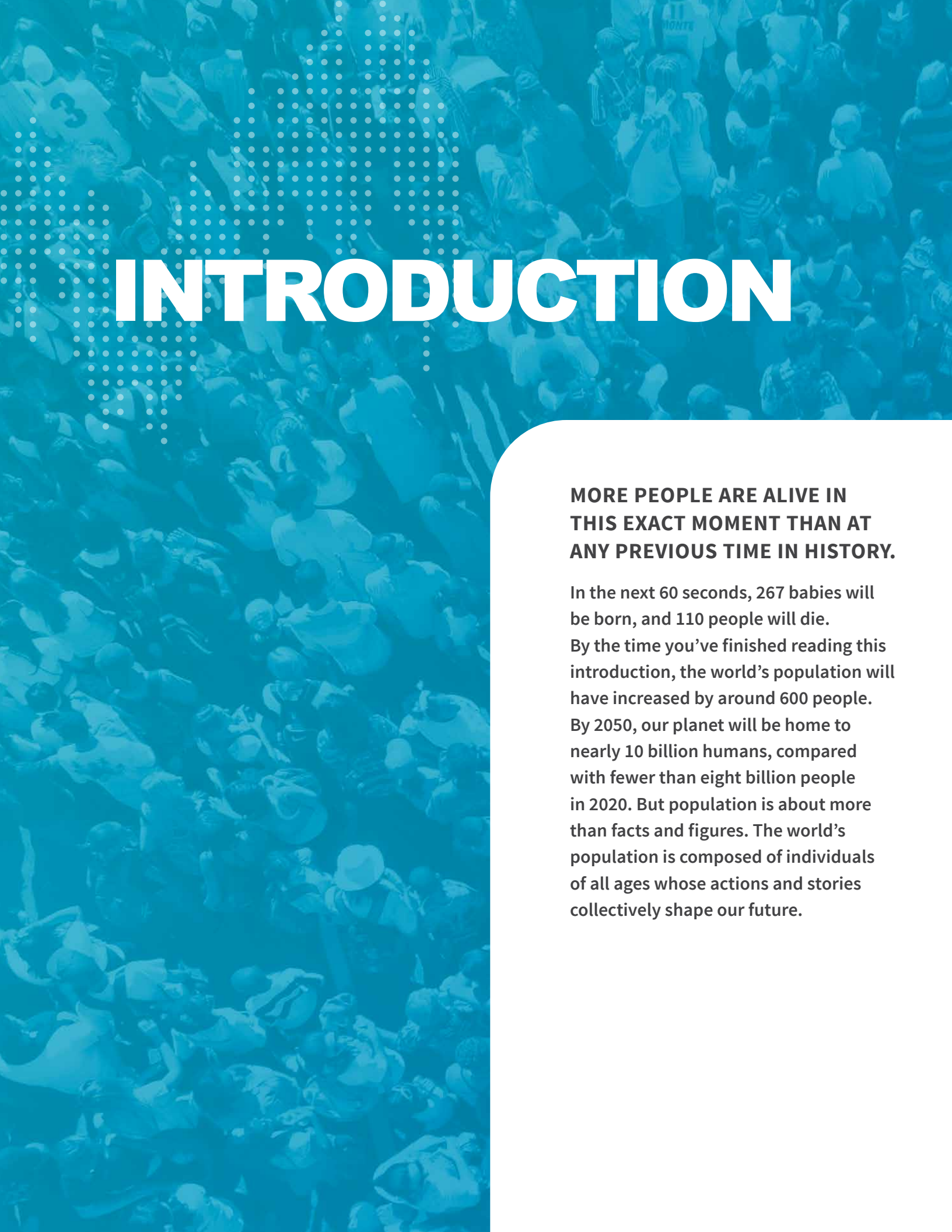
Population Bulletins are published periodically by PRB for its members and subscribers and are available for purchase at PRB.org and Amazon.com.

For information about bulk pricing, email us at communications@prb.org. To become a PRB member or to support our work with a tax-deductible donation, please visit PRB.org.

SUGGESTED CITATION:
Mark Mather, Linda A. Jacobsen, and Paola Scommegna, "Population: An Introduction to Demography," *Population Bulletin* 75, no. 1 (2021).

PRB

Contents



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.[1] 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.[2] 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.[3]

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.[4]

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

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.

of an imaginary group of women who throughout 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.[5] 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.[6] 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.[7]

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.[8]

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%.[9]

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.[10] 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.[11]

Fecundity, or Physiological Limits to Childbearing

People often confuse fertility with the related term fecundity, which is one of the variables that affects fertility. While fertility refers to the number of births that do occur, fecundity refers to the physiological ability to have children. When a woman is infecund, it means she is unable to have children because of a physiological issue. New mothers may be temporarily infecund because of natural hormones released by their bodies when they are breastfeeding.

Documented evidence shows that some women have given birth to 30 or more children (usually including twins, triplets, and other multiple births).[12] So, for an individual woman, fecundity probably ranges from zero to about 30 children. The maximum fecundity of a population, which is composed of individuals with varying levels of fecundity, is thought to be about 15 children per woman.[13] Fifteen, then, is the theoretical maximum average number of children a population of women could produce if they engaged in regular sexual intercourse from menarche, at around age 12, until they reached menopause, at around age 50, and never used any form of birth control.

The theoretical maximum of 15 children is a far cry from real-life levels. Even in the world's highest-fertility countries, the average has rarely exceeded eight children per woman. What accounts for this large gap? In every society a variety of cultural, economic, and health factors interfere with the process of human reproduction. These factors include cultural values regarding childbearing (Does the society value large or small families?); social roles (Do couples divide income-earning and child-care responsibilities?); economic realities (Do parents rely on children to look after them in old age?); and the prevalence of diseases such as gonorrhea that impair fecundity.

U.S. Fertility Rates and Trends

American women averaged more than seven children each until the early decades of the 19th century. After 1900, average fertility declined gradually, interrupted only by the baby boom following World War II. Another drop in the TFR came in the 1970s, due in large part to delayed marriage, widespread contraceptive use, and changes in abortion laws. In 2018, the U.S. TFR dropped to 1.7, the lowest level ever recorded.[14]

BOX 1

The Intermediate Variables That Affect Fertility

The four most significant or "proximate" determinants of fertility appear in **bold**.

Fecundity

- Ability to have intercourse.
- **Ability to conceive.**
- Ability to carry a pregnancy to term.

Sexual Unions

- The formation and dissolution of unions.
- Age at first intercourse.
- **Married or in a sexual union.**
- Time spent outside a union (separated, divorced, or widowed, for example).
- Frequency of intercourse.
- Sexual abstinence (religious or cultural customs, for example).
- Temporary separations (military service, for example).

Contraceptive Use and Abortion

- **Percentage of women using contraception.**
- Contraceptive sterilization.
- **Induced abortion.**

Note: Sexual unions include marriage as well as long-term and casual relationships.

Sources: John Bogaarts, "A Framework for Analyzing the Proximate Determinants of Fertility," *Population and Development Review* 4, no. 1 (1978), https://www.popcouncil.org/uploads/pdfs/councilarticles/pdr/PDR041Bongaarts.pdf; and Joseph A. McFalls Jr. and Marguerite McFalls, *Disease and Fertility* (New York: Academic Press, 1984).

What Contributes to Changing Fertility Patterns?

Historically, fertility in the United States has dropped temporarily during periods of economic decline, such as the Great Depression of the 1930s and the 1970s oil shocks. Such drops have typically lasted two to five years, affecting the timing of fertility but not the overall number of children that a woman would have in her lifetime.[15] But in the decade following the 2008 Great Recession, fertility rates continued to fall, with the exception of 2013 to 2014 when they increased slightly.

Between 2004 and 2018, the TFR in the United States declined from 2.1 to 1.7.[16] This decline may signal a longer-term drop in lifetime fertility shaped by broader social factors, including postponement

of marriage and childbearing to older ages and long-term increases in women's educational attainment and labor force participation.[17] Although most American women say they expect to have at least two children, many women delay childbearing whether by choice or circumstance to the point that they may end up having only one child or no children at all.[18] Fifteen percent of U.S. women ages 40 to 44 in 2018 were childless.[19]

In 2011-2015, among American women ages 15 to 44, 20% had two children; 17% had one child; 18% had three or more children, and 45% had not had any children.[20] What accounts for these differences? The most predictable and obvious fertility differential is age. For example, in 2011-2015, 83% of women ages 15 to 24 had not had any children, compared with only 15% of women ages 40 to 44. But education, race, religion, and many other social, economic, and cultural factors also influence childbearing.

While modern technology has expanded the age span in which women can have children, few women give birth before age 15 or after age 50. Birth rates by the age of the mother follow the same general pattern in most societies regardless of overall fertility levels: Rates are low for women in their teens, peak for women in their 20s or early 30s, and decline thereafter. But comparisons of the age-specific rates in different countries reveal significant variations (see Figure 1).

Similar trends occur in many of the world's wealthy countries. In South Korea, the birth rate peaks among women in their early 30s. But in low-income countries with higher fertility rates such as Mali, where the TFR was an estimated 6.3 in 2018, rates typically peak among women in their early 20s and are higher for women of every age.[21]

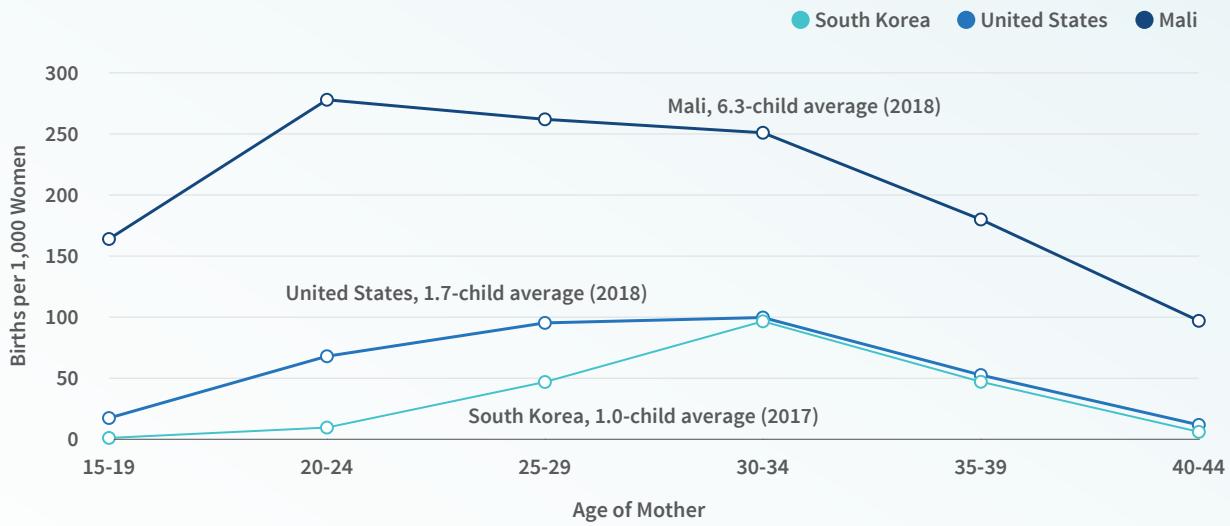
During the 1960s and 1970s, postponement of childbearing resulted in a steep drop in the birth rate among American women ages 20 to 24 (see Figure 2, p. 11). After 1975, U.S. birth rates rose for women in their 30s as older mothers had the children they had postponed earlier in life. Today, U.S. birth rates are highest for women in the age groups of 25 to 29 and 30 to 34.[22]

The birth rate for women ages 40 to 44 is lower in the United States today than it was during the baby boom years of the 1950s and early 1960s. However, the birth rate for women ages 40 to 44 has risen

FIGURE 1

AGE-SPECIFIC BIRTH RATES VARY WIDELY ACROSS COUNTRIES

Births per 1,000 Women in Mali, South Korea, and the United States by Age of Mother

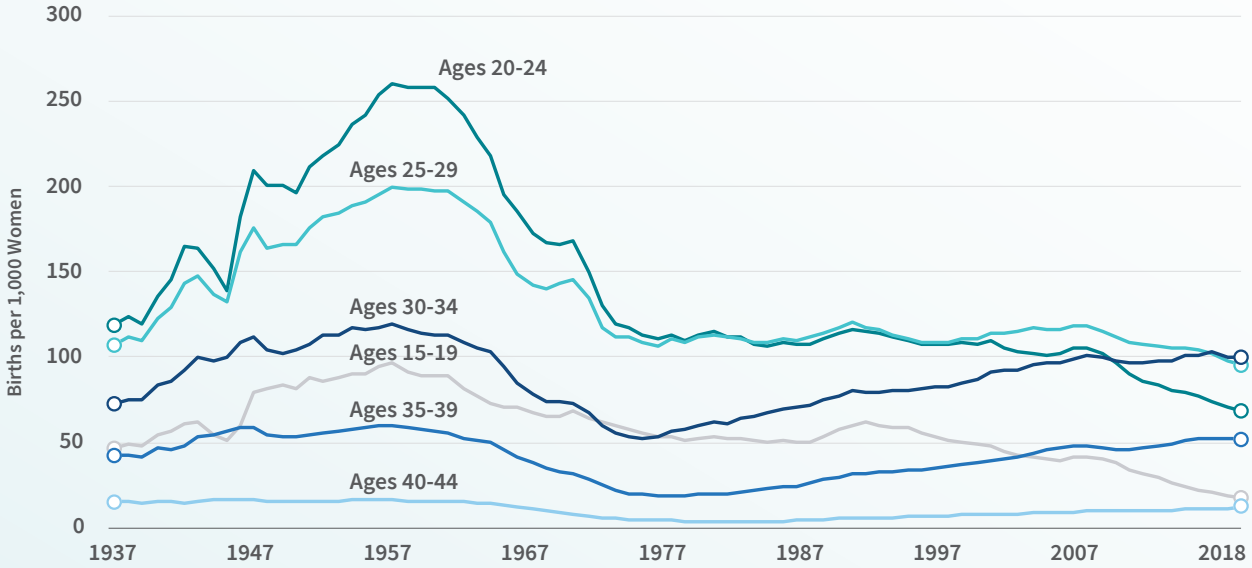


Sources: Institut National de la Statistique, Cellule de Planification et de Statistique Secteur Santé-Développement Social et Promotion de la Famille, and ICF, Mali Enquête Démographique et de Santé 2018: Rapport de synthèse (2019); CDC, National Center for Health Statistics, National Vital Statistics Reports; and United Nations (UN), *Demographic Yearbook 2017* (New York: UN, 2017).

FIGURE 2

BIRTH RATES FALL FOR WOMEN IN THEIR 20s, RISE FOR WOMEN IN THEIR 30s AND 40s IN RECENT DECADES

U.S. Birth Rates per 1,000 Women by Age of Mother, 1937-2018



Source: CDC, National Center for Health Statistics.

almost continuously since 1985 due to delays in childbearing at younger ages. The higher birth rates at older ages during the baby boom largely reflected women having third, fourth, or higher-order births rather than first or second births.

Teen birth rates remained relatively low in the 1970s and 1980s (see Figure 2), despite large increases in the proportion of teenagers who were sexually active. The teen birth rate edged up around 1990. But, by 2018 increases in contraceptive use and a leveling of the share of teens who were sexually active helped reduce the teen birth rate to 17.4—the lowest level ever recorded in the United States.

Education and income also play a significant role in fertility. In nearly every contemporary society, people who are more educated and have higher incomes have fewer children than those who are less educated and have lower incomes.

In 2017, U.S. women ages 25 and older with an advanced degree had an average of 1.80 children, compared with 2.25 children for women with a high school diploma and 2.70 children for women without a high school diploma.[23]

Fertility Rates Are Falling Among Racial and Ethnic Minorities and Immigrants

In many countries, racial and ethnic minorities have higher fertility rates than the racial/ethnic majority. Often these differences arise from religious beliefs and cultural norms. Immigrants often maintain the childbearing patterns of their homelands when they arrive in a new country. For example, fertility rates for Arabs in Israel and Asians in Russia remain higher than average for the country. But over time, immigrants and their children tend to incorporate the fertility patterns of their adopted country. In the United States, fertility rates have fallen since 1990 among all major racial/ethnic groups, declining fastest among African Americans and Latinas. In 2018, the TFR was 1.64 children per woman for non-Hispanic white women, compared with 1.53 for Asian and Pacific Islander women, 1.79 for African American women, and 1.96 for Latinas.[24]

MORTALITY

Mortality is the second component of population change. The simplest mortality measure is the number of deaths in a population, but this number depends heavily on total population size. So, demographers typically measure mortality using rates.

Much like the crude birth rate, the crude death rate is usually expressed as the number of deaths per 1,000 people in a given year and is determined by dividing the number of deaths by the mid-year population. In 2019, 58 million people of a world population of 7.7 billion died, resulting in a crude death rate of 7 per 1,000.[25] Country death rates in 2019 ranged from just 1 per 1,000 people in Qatar and the United Arab Emirates to 16 in Bulgaria.[26] More than 2.8 million people died in the United States in 2018, yielding a crude death rate of 9.[27]

What Death Rates Tell Us

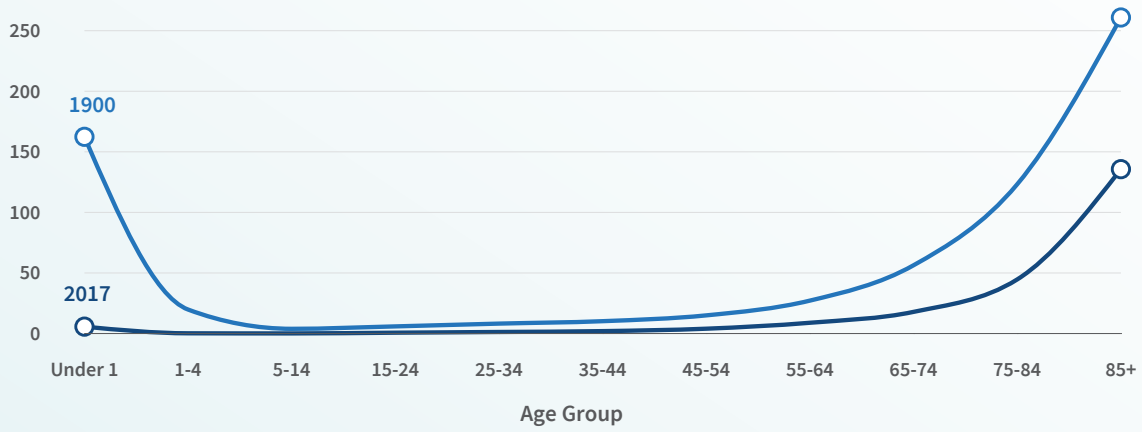
Comparing crude death rates among populations doesn't tell us whether the people in one country are healthier or live longer than in another. That's because a country's crude death rate is strongly influenced by the age structure of the population. Even though higher-income countries tend to offer healthier environments and better medical services, their crude death rates are often higher because their populations are older and in the age groups in which most deaths occur. Countries such as Japan, Finland, Denmark, Germany, and Italy are home to some of world's oldest populations and highest crude death rates.[28] Kenya, Rwanda, Guatemala, Jordan, and Tajikistan have some of the youngest populations and lowest crude death rates in the world.

When death rates are plotted by age on a graph, they form the characteristic J-shaped curve of mortality (see Figure 3, p.13). The J-curve is found in all societies, but it is most pronounced where mortality is high, as it was in the United States in 1900. The death rate is relatively high during the vulnerable first year of life, and then it declines throughout childhood and early adolescence before gradually but surely peaking after age 85. The rates displayed in Figure 3 are called age-specific death rates because they show the number of deaths of people in specific age groups divided by the populations in those age groups.

FIGURE 3

U.S. DEATH RATES FOR CHILDREN AND OLDER ADULTS WERE MUCH HIGHER IN 1900 THAN THEY ARE TODAY

U.S. Deaths per 1,000 People, by Age Group, 1900 and 2017



Sources: U.S. Bureau of the Census, Vital Statistic Rates in the United States, 1900-1940; and CDC, National Center for Health Statistics, National Vital Statistics Reports.

Understanding Life Expectancy

To better gauge the life chances of individuals in a population and compare mortality conditions among countries, we look at life expectancy—the average number of years of life remaining at birth or at other ages. Life expectancy is one of those concepts that many people talk about but few understand.

Both biological and social factors influence how long people live, and life expectancy at birth varies widely around the world. In 2019, the Central African Republic, Lesotho, Mozambique, Nigeria, and Sierra Leone had some of the world's lowest life expectancies at birth, at around 55 years.[29] Japan had one of the world's highest life expectancies at birth—just above 84 years—but also a high crude death rate of 11 per 1,000 people because of its aging population.

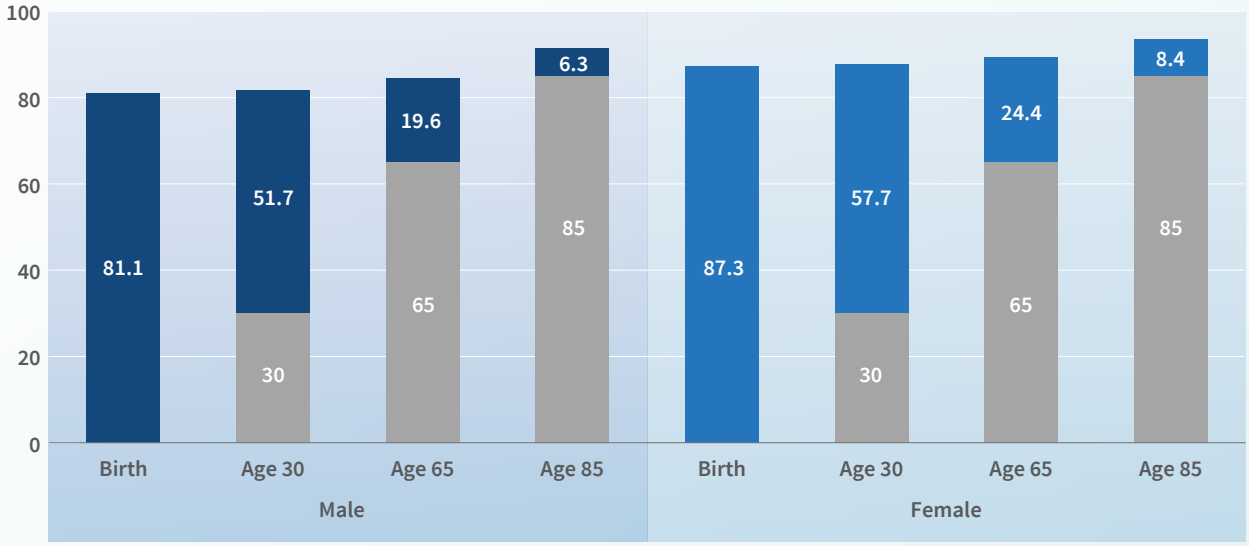
Much like the TFR, life expectancy at birth in any given year applies not to actual people but to a hypothetical group of people who are subject to the mortality rates in a given year at each age of their lives. Age-specific mortality rates refer to the number of deaths of people within a specific age group divided by the total number of people who reach that age group. An age-specific mortality rate can also be expressed as the probability of dying in a given age interval, which can be used to construct a life table, or actuarial table. Life tables are used to calculate life expectancy at birth or at any other age.[30]

For example, the life expectancy at birth for newborn girls in Japan is 87 years. But the life table shows that by the time they reach age 65, they have an average of 24 years of life remaining, suggesting a life expectancy of 89 years (65 + 24) rather than 87 (see Figure 4, p. 14). Why? Since some people die at younger ages, particularly in the first year of life, the life expectancy at birth (age 0) is lower than it would be at age 65, when people have already survived the major causes of death for younger ages. Thus, adding the average number of years of life remaining at a particular age to that age produces a new estimate of expected age at death: that is, 65 (current age) + 24 (average number of years of life remaining from a life table) = 89 (new estimate of life expectancy). Life expectancy at ages older than 5 is usually higher than life expectancy at birth.

FIGURE 4

PEOPLE WHO REACH CERTAIN AGES TEND TO LIVE LONGER THAN THE LIFE EXPECTANCY AT BIRTH

Additional Years of Life at Selected Ages for Males and Females in Japan, 2017



Source: Ministry of Health, Labour, and Welfare, Government of Japan.

People Are Living Longer

In nearly every country around the world, people are living much longer now than in the past. In 1900, the average worldwide life expectancy at birth was less than 30 years of age; in 2019, it was about 73 years.[31] Longer life expectancies and declining fertility are contributing to global population aging. In 2018, for the first time in recorded human history, people ages 65 years and older outnumbered children under age 5 worldwide.[32]

In the United States, life expectancy at birth in 1900 was only 47. By 2018, it had risen to 79 (81 for females and 76 for males).[33] Still, U.S. life expectancy at birth lags behind that of many other high-income countries in Europe and elsewhere.[34]

Much of the increase in longevity worldwide can be attributed to medical advances and improvements in personal hygiene and public health practices. Antibiotics, immunization, and clean drinking water have drastically reduced the incidence and severity of infectious diseases such as tuberculosis, measles, and cholera in many countries. As health services have expanded throughout low-income countries, mortality from infectious disease has fallen quite rapidly.[35] But despite enormous progress, a widening health gap exists between countries in sub-Saharan Africa and those in the rest of the world. Child mortality, maternal mortality, HIV, tuberculosis, and malaria remain the dominant sources of disease and causes of death in the region.[36]

Humans Have Life Span Limits

The upper limit of life expectancy is governed by the maximum life span for the human species, a theoretical number that is the highest age the most robust humans could reach.[37] Many individuals outlive the life expectancy at birth for their population (about 13 million Americans were age 80 or older in 2019), but no one outlives the maximum human life span.[38] Experts disagree about whether it is possible to increase the maximum life span through medical technology or bioengineering.[39]

The longest anyone is known to have lived is 122 years and five months, the age of Jeanne Calment of France who died in 1997. While reports have been made of people living longer, such claims are difficult to substantiate because exact birth dates were not systematically recorded at the country level until well into the 20th century, even in high-income countries. The number and percentage of older adults who become centenarians is increasing, and eventually someone is likely to break Madame Calment's record.[40]

Life Expectancy: What Goes Up Can Come Down

National mortality levels can increase—and life expectancy can decline—for a variety of reasons. Life expectancy in Russia declined sharply when the breakup of the Soviet Union left public health systems in chaos and many Russians in poverty.[41] AIDS-related deaths caused life expectancy at birth to fall in several sub-Saharan African countries in the 1990s and 2000s, prompting a massive international effort to expand the use of antiretroviral drugs in the region. The HIV/AIDS epidemic along with more recent Ebola epidemics, the mosquito-borne Zika virus, and the novel coronavirus SARS-CoV-2 in 2020 are grim reminders that the battle against infectious diseases will probably never be over.

Natural disasters and violence can also produce a spike in the number of deaths, but they usually have little long-term effect on mortality rates at the national level. When low-income countries get hit with natural disasters, they can be impacted more severely than populations of high-income countries because of limited emergency response capabilities and health care systems and low-quality housing. Disasters tend to take a higher toll among the most vulnerable people; a majority of deaths (70%) in the wake of 2005's Hurricane Katrina in New Orleans were among people ages 65 and older.[42]

What's Killing Us Today

Since 1990, there's been a dramatic shift in the types of ailments that are killing humans across the globe. As deaths from infectious diseases have declined in many parts of the world, noncommunicable diseases such as heart disease, cancer, diabetes, and chronic lung disease have become the main cause of death in every world region except sub-Saharan Africa, although they're gaining there too.[43]

Several interrelated demographic and health trends have contributed to the shift from infectious diseases to noncommunicable diseases as the leading cause of death worldwide:

- Improvements in nutrition, public health, and medicine that have reduced infectious disease deaths.
- Longer life expectancies as more children survive into adulthood.
- Population aging, as women have fewer children and older people represent a greater proportion of the total population.
- Urbanization, with more sedentary lifestyles and limited fresh food contributing to increases in obesity, diabetes, and other health conditions.[44]

Informed by demographic and health trends such as these, public health campaigns are targeting youth before habits are formed, focusing on changing behaviors that increase risks for these conditions, such as use of and exposure to tobacco, physical inactivity, the harmful use of alcohol, and unhealthy diets.[45]

Causes of Death in the United States

Table 2, p. 16, lists the 15 leading causes of U.S. deaths, which accounted for 80% of all deaths in 2017. Heart disease and cancer were the two biggest killers, responsible for more than 40% of all deaths, typically striking after age 50 rather than during childhood.

After rising steadily from 1900 until 2014, U.S. life expectancy declined slightly between 2014 and 2017, reflecting increases in most major causes of death, with women experiencing more deterioration related to chronic diseases (such as heart disease, diabetes, and Alzheimer's disease) than men. Opioid deaths, which occur at relatively young ages, have also contributed to overall trends. Among the 50 countries with the highest life expectancies worldwide, the United States fell from 20th in 1980 to 43rd in recent years.[46] Premature deaths related to higher rates of tobacco use and obesity are major causes of that decline.[47]

Mortality Differentials: Who Dies First?

Death rates differ by age, sex, socioeconomic status, race, and ethnicity. Cultural, political, and other social factors help explain the gaps in life expectancy among different groups of people.[48] Genetic factors also explain why individuals with similar background characteristics die of very different causes and at different ages. For example, individuals can inherit a predisposition to develop a potentially lethal disease such as breast cancer. Demographic factors—especially age, sex, and ethnicity—are also closely tied to mortality.

Death Rates Are Relatively High Among the Young

Death in the first year of life (infant mortality) is an important demographic variable and is often used as a key measure of a society's quality of life. The infant mortality rate (IMR)—the number of deaths among infants under age 1 per 1,000 live births—declined tremendously in the United States during the 20th century. In 1900, about 120 newborns died for every 1,000 babies born alive, compared with 6 in 2018. Still, the U.S. infant mortality rate is higher than that of many other high-income countries.[49] In countries where health-care systems are inadequate and infectious diseases are widespread, the IMR often exceeds 50 deaths per 1,000 live births.

Once children survive that crucial first year and the next few years of childhood, their life chances improve substantially. Americans have a less than 1% chance of dying between ages 15 and 24. One percent sounds low, but in 2018 it meant that some 30,000 people in that age range would not live to celebrate their 25th birthday. The causes of death for 15-to-24-year-olds are very different from those shown in Table 2 for the entire population, and most

TABLE 2

HEART DISEASE WAS THE MOST COMMON CAUSE OF DEATH IN THE UNITED STATES IN 2017

Leading Causes of Death in the United States, 2017

Rank	Cause of Death	Deaths per 100,000	Percent of All Deaths	Ratio of Male to Female Deaths
1	**Heart disease**	**198.8**	**23%**	**1.2**
2	Cancer	183.9	21%	1.1
3	Accidents (unintentional injuries)	52.2	6%	1.9
4	Chronic lower respiratory diseases (emphysema, bronchitis)	49.2	6%	0.9
5	Stroke	44.9	5%	0.7
6	Alzheimer's disease	37.3	4%	0.5
7	Diabetes mellitus	25.7	3%	1.3
8	Influenza and infectious pneumonia	17.1	2%	0.9
9	Kidney diseases	15.5	2%	1.1
10	Suicide	14.5	2%	3.6
11	Liver disease and cirrhosis	12.8	1%	1.8
12	Septicemia (blood poisoning)	12.6	1%	0.9
13	Chronic high blood pressure (hypertension) and related disease	10.8	1%	0.8
14	Parkinson's disease	9.8	1%	1.6
15	Aspiration pneumonia	6.2	1%	1.3

Note: Data for kidney diseases do not include those that are hypertension-related.
Source: CDC WONDER.

of these deaths are preventable. Injuries, suicide, and homicide accounted for more than 75% of deaths in the 15-to-24-year-old age group in 2018.[50]

The Female Advantage

Pick literally any age and women are less likely to die than men. Even before birth, fewer female than male fetuses die in the womb. The net result of this female advantage is that women live longer than men, as illustrated in Figure 4, and people in the oldest age groups are predominantly women. In the United States, female life expectancy at birth was 81 years in 2018, five years higher than that of men, and nearly 80% of U.S. centenarians (age 100 or older) are women.[51] The overall female life expectancy advantage is probably due to a combination of social, behavioral, and genetic influences. However, the gender gap has narrowed in recent decades, reflecting an increase in smoking-related deaths among women.[52]

The sex differential in mortality rates is greatest for young adults. The death rate for 15-to-24-year-old males in the United States is more than twice that of their female counterparts.[53] Suicide claims about four times as many male than female lives in this age group. And compared with young women, young men are more likely to engage in risky behaviors, such as drug and alcohol abuse and reckless driving, that increase their chances of dying.

Those With More Education and Higher Incomes Live Longer

People with more education and higher incomes live healthier and longer lives in virtually every society, including the United States, where wide disparities in life expectancy among individuals of varying education levels have existed for more than a century. The remaining life expectancy at age 25—an important indicator of adult population health—is about a decade shorter for people who do not have a high school degree compared with those who have completed college, and this gap has been widening in recent decades.[54] Educational attainment—which is often related to less physically demanding jobs, higher incomes, and access to health insurance and even gym memberships—appears to be very important in determining U.S. adults' prospects for long life.

Race and Ethnicity: Some Surprising Differences

At age 50, white men in the United States can expect to live (on average) another 30 years. White women can expect to live another 33 years when they reach age 50. Black men and women at age 50 may not expect to live as long—only 27 more years for men and 31 more years for women.[55]

However, the advantage shifts with age. Black Americans who survive to age 85 can expect to live slightly longer than white Americans of the same age.

The Black/white mortality gap has been around for a long time, but it is narrowing. Mortality rates for Black Americans and Latinos overall have fallen slightly in recent years, whereas mortality rates have increased among white middle-aged men and women in the United States. Some of this increase can be attributed to rising rates of death from drug and alcohol abuse (including prescription painkillers), suicide, and chronic liver disease.

The Hispanic Health Paradox

U.S. Latinos tend to defy the odds: They outlive non-Hispanic whites by three years on average, despite having lower income and education levels. In 2017, life expectancy at birth for the U.S. Latino population was 81.8 years, compared with 78.5 years for the U.S. non-Hispanic white population.[56] Demographers call this the Hispanic health paradox. Mounting evidence suggests these advantages are driven in large part by migration dynamics: Latino immigrants to the United States tend to be healthier than average, whereas Latino immigrants who return to their countries of origin tend to be older and less healthy.[57] In addition, U.S. Latinos show low rates of cigarette smoking.

MIGRATION

The third component of population change is migration—the movement of people into or out of a specific geographic area. Migration is one of the most complex and volatile of the demographic variables and far more difficult to measure and track than fertility and mortality. Most countries do not have an easy and accurate way to track population movements.

Types of Migration

We tend to think of migration in terms of people moving from one country to another. In the context of demography, migration refers to any permanent change in residence between designated political or statistical areas, which can take place within the same country as well as between countries. Migration that occurs within a country is called internal migration; international migration involves moving across a national border.

Globally, an estimated 272 million people lived outside their country of birth in 2019—about 3.5% of the world's population.[58] People who leave a country are emigrating, and those coming into a country are immigrating. Someone migrating from Germany to the United States would be emigrating from Germany and immigrating to the United States.

Most moves are local and occur over short distances. International moves are the least common. Between 2018 and 2019, nearly 10% of Americans (ages 1 and older) moved to another residence, but only 1.5% moved from another state, and 0.4% moved from another country (see Table 3).

The terms in-migration and out-migration refer to movement into or out of a specific county, state, or other political jurisdiction within a country. Net migration, the difference between the number of people moving in and the number moving out, may be positive or negative.

Between 2010 and 2019, the United States experienced a net immigration of 7.9 million people from

TABLE 3

PERCENTAGE OF U.S. POPULATION THAT MOVED, BY TYPE OF MOVE, 2018-2019

Type of Move	Percent
Nonmovers	**90.2%**
Movers	**9.8%**
Within same county	5.9%
Different county, same state	2.1%
Different state	1.5%
From abroad	0.4%

Note: Ages 1 or older in 2019.

Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

abroad. During that same period, Florida had a net gain of 2.4 million people through immigration from abroad and in-migration from other states, becoming the third most populous state and displacing New York, which had a net loss of nearly 700,000 people due to out-migration.[59]

In low-income countries, where internal migration is dominated by moves from the countryside to the cities, rural areas often experience high net out-migration while urban areas undergo high rates of net in-migration. In China, the population living in urban areas increased from 19% in 1980 to 60% in 2019 because of a rapid increase in rural-to-urban migration.[60]

Why Do People Migrate?

Migration occurs for a whole host of reasons, ranging from the personal to the political. Migration can occur in great waves in response to major events—such as the mass exodus from East to West Germany after these countries were reunited in 1990—or as a slow trickle, such as movement away from small-town and rural America. For several decades, young Americans have migrated from rural areas to cities and suburbs in search of better jobs and improved educational opportunities.

People are more likely to move at certain stages of their lives, especially when they marry, divorce, or retire. Local, or intracounty, movers generally are making housing adjustments or responding to major life changes such as leaving the parental home or getting married or divorced.[61] Longer-distance moves are primarily made for economic reasons, such as a new job, but people also move to attend school, find a more amenable climate, adopt a new lifestyle, or live closer to family members.

People Migrate for Economic and Political Reasons

Traditionally, migrations occurred because migrants either wanted to upgrade their lot in life or escape harsh, often intolerable circumstances or both. Researchers often describe migration as a push-pull process: Migrants may be "pushed" from their homeland by difficult conditions and "pulled" to a new country where conditions appear to be better.

In recent decades, international forced migration has made headlines around the world: Syrians fleeing prolonged civil war and migrating to Turkey, Jordan, Lebanon, and elsewhere; Rohingya crowding displacement camps in Bangladesh to escape violence and persecution in Myanmar; and Central Americans at the U.S. border seeking refuge from violence and poverty.

Migrants who leave home to avoid persecution because of their political, religious, or ethnic backgrounds are classified as refugees or asylum seekers. In 2019, the number of people fleeing violence worldwide had reached levels not seen since World War II, with an estimated 70.8 million displaced people, including 25.9 million refugees under the protection of the United Nations High Commissioner for Refugees.[62]

These involuntary migrants are protected by international law, although they are not always welcomed by the countries in which they seek protection. National governments must decide who is or is not a legitimate refugee or asylum seeker, and they sometimes send such migrants back to their country of origin.

Who Migrates?

People in Their 20s Migrate Frequently

In the United States and most other countries, geographic mobility is relatively high for children under age 5, relatively low for those in their mid-teens, and extraordinarily high for people in their early 20s. Mobility rates then begin to decline with age, rapidly at first and plateauing after about age 75 (see Figure 5, p. 20). Mobility is highest for individuals between their late teens and early 30s as they leave their parents' homes to attend college, find jobs, get married, and build families. The children of these young parents have high mobility as well. As these parents buy homes and settle into neighborhoods and careers, their mobility and that of their children (by this time, in their teens) declines. Most older people stay put, but a sizable minority trade their homes for smaller residences or assisted living communities or move to faraway retirement areas.[63]

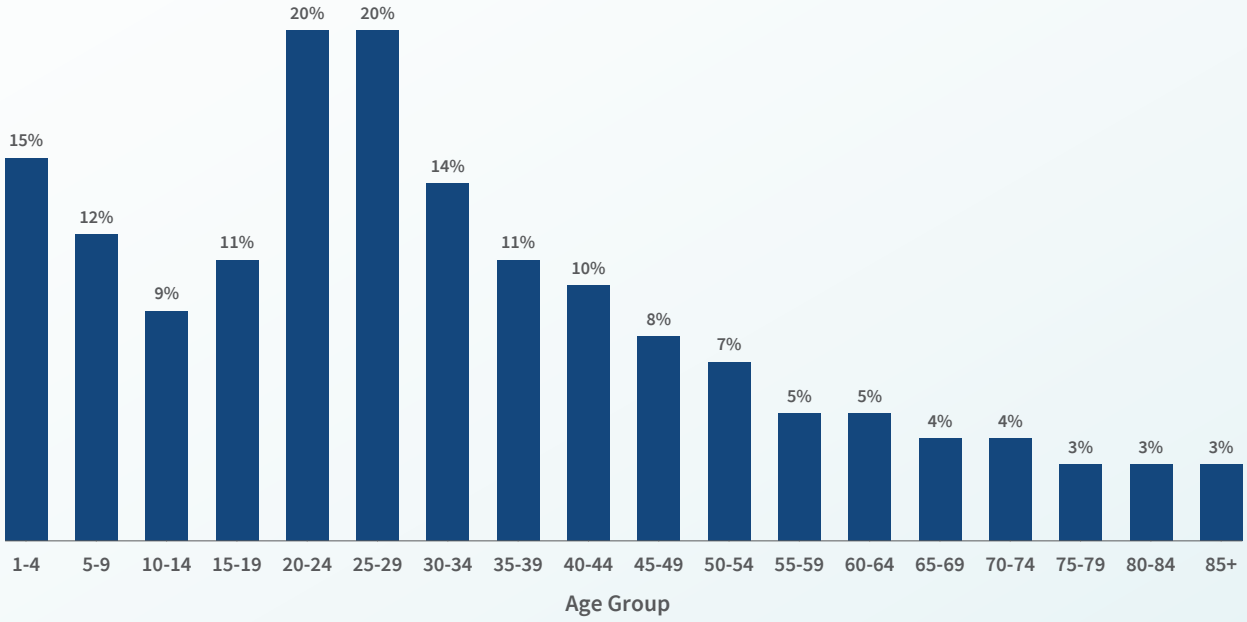
Do Men or Women Immigrate More?

Men have traditionally outnumbered women among immigrants. An extreme example of this phenomenon was the 27-to-1 male-to-female ratio among Chinese immigrants to the United States in the early 1900s. Today 52% of international migrants are male, and 48% are female.[64] The sex ratio of immigrants varies throughout the world depending on the types of jobs available in the country of destination and the cultural climate in the country of origin. Labor immigrants to the Middle East and North Africa are predominantly men, for example, in part because the region offers few jobs for women.[65]

FIGURE 5

GEOGRAPHIC MOBILITY IS HIGHEST AMONG YOUNG ADULTS AND DECLINES WITH AGE

Percent of U.S. Population That Moved Last Year, by Age Group, 2018



Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

Social Networks Determine Where Migrants Move

The world is a big place, so how do migrants decide where to go? Typically, family ties and connections with people from their countries of origin will dictate migrants' new locations.

Historically, a few bold immigrants will blaze a trail to a new country, such as the United States, and establish a foothold. Through a process known as family reunification they then send for family members to join them by providing information about job opportunities, transportation, and housing in the new community. Upon arrival, immigrants will often form small ethnic communities, such as Chinatowns or Greektowns, which act as magnets (or pull factors) for others in the countries of origin. U.S. immigration policy strengthens migration networks by granting entrance visas to close relatives of current residents.

Social networks also play an important role in migration within a country. The presence of a network of relatives and friends in a city or town can help ease the financial and social problems associated with relocation. In the United States, 27% of Americans cited family-related reasons for moving to a new residence between 2018 and 2019.[66]

While both domestic and international migration may provide new opportunities, migration can be a wrenching process that separates people from their networks of friends and family back home.[67] So, it's not surprising that migrants of all ethnicities and backgrounds seek out neighborhoods and communities offering familiar customs and social connections.

Impact of Migration

Migration usually has the greatest impact on population change in small geographic areas and locations that have little or no natural increase from an excess of births over deaths. Migration trends can also shift the population distribution within a country.

High levels of geographic mobility can create challenges for local policymakers, especially if the moves dramatically change the age, racial, ethnic, or socioeconomic characteristics of the population in the place of origin or destination. An oil boom in the mid-2010s in western North Dakota led to greater demand for housing, health care, transportation, roads, and other services. Many of those moving to North Dakota were young adults looking for work, while long-term residents were more likely to be older and retired.[68]

Immigration often adds racial and ethnic diversity to a country. The majority of immigrants to the United States between the early 1800s and the mid-1960s were Europeans. By 2019, Europeans accounted for only about 9% of legal immigrants, with the majority coming from Asia and Latin America.[69]

Immigration has fueled the long-term increase in the numbers of Latinos and Asian Americans in the U.S. population. The Latino population increased from 12.5% in 2000 to 18.5% in 2019, and the Asian American population increased from 3.6% to 5.8% during the same period.[70] Increasingly, however, growing racial/ethnic diversity in the United States is driven by natural increase—the number of births relative to deaths in a population.

U.S. Immigration Trends

More than 44 million people living in the United States were born in a different country. In 2019, 1 million people obtained U.S. permanent resident status, a process that can be lengthy and expensive.[71] Immigrant flows to the United States traditionally have been dominated by young adults, but that's changing. Current U.S. immigration policy gives preference to the spouses, children, or siblings of recent immigrants, reducing the number of young adult immigrants. Proposals to give preference to immigrants with particular skills could increase the number of young adult immigrants in the future.

For several decades, the United States admitted more refugees annually than all other countries combined, but the number of refugee admissions has dropped sharply in recent years. Only 30,000 refugees resettled in the United States in fiscal year 2019, nearly a record low.[72] Depending on the circumstances that caused them to flee their home country, refugees can be of any age and may include more families with small children, older adults, or young men.

U.S. Immigrant Education Levels Are Rising

Immigrants tend to be more educated than others in their home community but less educated than the residents of the country to which they are moving. Immigration laws can affect the types of people allowed to enter, for example, by restricting visas for unskilled workers, encouraging the entry of highly educated professionals, or accepting refugee families from a specific country. Legal immigrants tend to have higher educational attainment than unauthorized immigrants, and refugees tend to have lower average attainment than other legal immigrants.[73]

The educational attainment of the U.S. foreign-born population has increased in recent decades, partly because of the rising share of immigrants from Asia, who are more likely to have college degrees compared with immigrants from Latin America. In 1980, only 16% of U.S. foreign-born residents had at least a bachelor's degree, but by 2018 that number had risen to 32%, just one percentage point less than the share of U.S.-born residents with at least a bachelor's degree (33%).[74]

When educated and highly skilled people emigrate, their home country loses not only its investment in raising and educating those people but also their potential future social and economic contributions.[75] This brain drain can slow economic development, but losses may be partially offset by remittances from those sending money home.

Emigrants Leave the United States

People also move out of the United States. Most are immigrants returning to their countries of origin or moving on to other countries. Some are U.S. citizens taking jobs abroad or retirees moving to countries with lower costs of living. Measuring emigration is difficult because after a person leaves the United States, they cannot be measured directly using a U.S. census or survey.

HOW POPULATIONS GROW AND SHRINK

Whether a population grows or declines, the changes can be traced back to the net effects of fertility, mortality, and migration (see Box 2, p. 23). Using the United States as an example, let's examine how these three factors work together.

There were almost 953,000 more births than deaths in the United States in 2018.[76] The death rate can be subtracted from the birth rate to find the rate of natural increase. The estimated crude death rate for the United States in 2018 was nine deaths per 1,000 inhabitants. Subtracting this number from the 2018 crude birth rate of 12 yields a rate of natural increase of three additional people per 1,000 inhabitants, or as it is more commonly expressed, 0.3%. The birth rate and the death rate for the world in 2019 were 19 and 7, respectively, which produced a rate of natural increase of 1.1%, nearly four times the U.S. rate.[77]

The rate of natural increase is added to the rate of net migration to generate the overall population growth rate. Populations increase through migration and natural increase in most places, but populations may also decline, as they have recently in Venezuela and Puerto Rico.[78] Births, deaths, and in- and out-migrants sometimes cancel one another out and produce neither growth nor decline. The rate of growth can be used to estimate a population's hypothetical doubling time, which is the number of years until the population will double in size if the rate of growth remains constant.

Doubling time is estimated by dividing the number 69 by the growth rate multiplied by 100. A population growing at 2% annually, for example, would double in about 35 years, and a population growing at 1% annually would double in 69 years. Comparing doubling times between different countries provides a more intuitive understanding of differences in their growth rates. When the rate of population growth is negative or zero, of course, the population will never double.

World Population Trends

We use the same formula to look at the world population growth rate—though until we start colonizing space, we don't have to worry about net migration since no one has yet figured out how to emigrate from Earth!

World population in 2020 was 7.8 billion, and births exceeded deaths by 81 million, putting the population growth rate at about 1.1% annually.[79] At this rate of growth, the world population would double in 63 years (69 divided by 1.1).

The actual world population in 2050 and beyond is unknown. But demographers can project the future population of the world or a country. Beginning with current estimates of population size and growth rates, they make assumptions—educated guesses, really—about how much fertility, mortality, and migration rates will change.

A country's projected population in 2050, for example, equals its current size plus the total births and immigrants expected from now until 2050 (under the assumed rates) and minus the expected deaths and emigrants. Using these basic principles, PRB projected in 2020 that the world population will be about 9.9 billion by 2050, with the assumption that declines in fertility and mortality rates will continue.[80]

China is the world's most populous nation, with a 2019 population of 1.398 billion. But China's rate of natural increase is low at 0.4%. India has 7 million fewer inhabitants (1.392 billion) but a higher rate of natural increase at 1.3%. India is likely to surpass China as the world's most populous country by 2027.[81]

Most of the world's fastest-growing countries are in Africa. Niger's 2019 population of 23.3 million is growing by about 3.8% per year, which means its population will double in 18 years unless there is a significant decline in fertility or a drastic increase in emigration.[82] The population of neighboring Nigeria is growing at 2.5%, yielding a doubling time of 28 years.

In contrast, many countries around the world are experiencing extremely slow growth—and even natural decrease—because death rates have risen above birth rates. As a region, Europe's deaths exceeded births in 2019, leading to a negative rate of natural increase. Deaths also exceeded births in 21 individual European countries (including Germany, Italy, and Russia) in 2019. In some countries, net immigration provides the only source of population growth.

BOX 2

The Demographic Balancing Equation

Populations grow or decline as the result of three processes: fertility, mortality, and migration. These three variables are components of population change and often are depicted in the population balancing equation. To show population change between 2018 and 2019, the equation would look like this:

Population in 2018
+ Births
– Deaths
+ Immigrants
– Emigrants
= **Population in 2019**

Births minus deaths constitute natural increase. When deaths exceed births, as they do in Germany, the result is natural decrease. Subtracting emigrants from immigrants yields net migration, which also can be either positive or negative.

Births – deaths = natural increase/decrease
Immigrants – emigrants = net migration

The balancing equation for the state of New York is:

Starting population, July 1, 2018	**19,530,351**
+ Births	+222,924
– Deaths	–164,817
Natural increase	+58,107
Net migration	–134,896
Ending population, July 1, 2019	**19,453,561**

Note: Numbers do not sum to total due to rounding.

Sources: U.S. Census Bureau, Population Estimates: Annual Population Estimates (Table 1) and Components of Change (Table 5), https://www.census.gov.

U.S. Population Trends

The United States is the third most populous nation in the world, trailing only China and India. It may fall to fourth place by 2050, however, when Nigeria is projected to displace it.[83]

The U.S. Census Bureau estimated that the U.S. population increased by 1.6 million between 2018 and 2019 because the number of births and immigrants exceeded the number of deaths and emigrants.[84] Net international migration accounted for nearly 40% of U.S. population growth between 2018 and 2019. Because fertility and mortality are expected to remain at relatively low levels, the most uncertain demographic variable impacting future growth is immigration. By 2050, the U.S. population is projected to reach 389 million, up from 328 million in 2019.[85]

POPULATION COMPOSITION

Births, deaths, and migration not only determine the rate of population change but can also affect the social, economic, and demographic characteristics of a population. A population's composition is based on the personal traits of its individual members—including age, sex, race, ethnicity, and many other characteristics (see Box 3, p. 25).

Measuring and studying these characteristics is important because it provides insights that can be used for a variety of purposes by policymakers, researchers, and others. In the United States, for example, African Americans, Latinos, and American Indians are lagging behind whites and Asian Americans across a broad range of social, economic, housing, and health measures. Data gathered by race/ethnicity provide benchmarks for initiatives aimed at closing gaps and addressing disparities in health care access, educational attainment, and other areas.

Age Structure Determines the Shape of Societies

Population Pyramids

The age and sex composition of a society can be depicted by a population pyramid, which shows either the number or the proportion of the male and female population in each age group. The three general types of population pyramids are rapid growth, slow growth, and decline.

Of the three, the rapid-growth pyramid is the only one that really looks like a pyramid because each age cohort is larger than the one born before it. This pyramid shape results primarily from sustained high fertility. If couples in one generation average eight children, for example, their children's generation will be about four times larger than their own. The pyramid's base would be about four times as wide as its middle. In 2018, about 20% of Nigeriens were under age 5, and only about 3% were age 65 or older (see Figure 6, p. 26).

The distinctive pyramid shape also results from declines in mortality. Because of high mortality in the past, older age groups have relatively few surviving members and occupy a small section of the pyramid. The base is broadened by the fact that mortality, particularly infant mortality, is declining. This decline increases the proportion of the younger birth cohort that will survive to enter the next age group.

BOX 3

Where Do Demographic Data Come From?

Most demographic measures are based on counts of people or demographic events (for example, births) in a specific area during a specific time period. The United States had 308,758,105 residents on April 1, 2010, for example. Counts come from population censuses, vital registration systems, national registers, and surveys. Their accuracy varies greatly by country and even by region within countries.

It All Starts With a Census

In many countries, the census—an enumeration of the entire population in a given area—is the main source of national population data. The United States has used a census to count its residents every 10 years since 1790, as required by the U.S. Constitution.

However, censuses usually miss a small percentage of the population, especially in hard-to-enumerate areas such as low-income neighborhoods within some U.S. cities. Past U.S. censuses have also disproportionately overlooked children and minorities, resulting in an undercount of those groups. In the 2010 U.S. Census, children under age 5 were more likely to be missed than any other age group. Census Bureau research shows the net undercount rate for young children (the percentage of children who were missed minus the percentage who were erroneously included) was nearly 5%.

Getting an accurate count is important because census numbers are often used to determine how much federal funding is allocated for important projects and services that benefit local communities. The U.S. decennial census also plays a vital role in the country's system of government by determining how many representatives will be sent to Congress from each state.

Other Public Records Supplement Census Data

Countries keep track of births, deaths, marriages, and divorces in vital registration systems, which are the primary source for calculating fertility, mortality, marriage, and divorce rates. But less than half of the world's population lives in countries that have "complete" vital registration systems. Barriers to registration include lack of knowledge or awareness about birth registration, monetary cost, and distance to registration facilities.

A few countries have comprehensive registration systems, or national population registers, that track individuals from birth to death and record changes in their residence or marital status. Population registers are most often used for government administrative purposes but can also be used to monitor changes in a country's population size and composition, keep track of trends in fertility and mortality, or select random samples of individuals from the population for surveys.

Surveys Help Provide Data

Unlike a census, which is designed to enumerate everyone, a survey canvasses a selection of people to infer characteristics for the population as a whole.

Surveys usually collect data for a sample group within a specific geographic area. In the United States, a monthly national survey is used to track the unemployment rate as well as many demographic indicators. But surveys suffer from many of the same accuracy problems as censuses and registration systems, and their data are subject to varying degrees of error.

The American Community Survey (ACS) is an annual survey of 3.5 million addresses conducted by the Census Bureau. The ACS is the first U.S. survey to provide continuous data on social, economic, and demographic characteristics for states and local areas.

Big Data Bring a New Dimension to Demography

As our world has become more digital, new tools have become available to demographers. The term "big data" refers to our ability to analyze massive amounts of information about millions of people.

Credit and debit card use, internet search histories, medical records, satellite images, and social media interactions can be used to study the behavior and characteristics of individuals and populations. The growing use of smartwatches that collect health data has big potential to improve health tracking and patient care.

However, use of these data is controversial due to concerns about privacy and misuse of information. Many demographers also have concerns about the validity and reliability of big data as compared with data collected by traditional means.

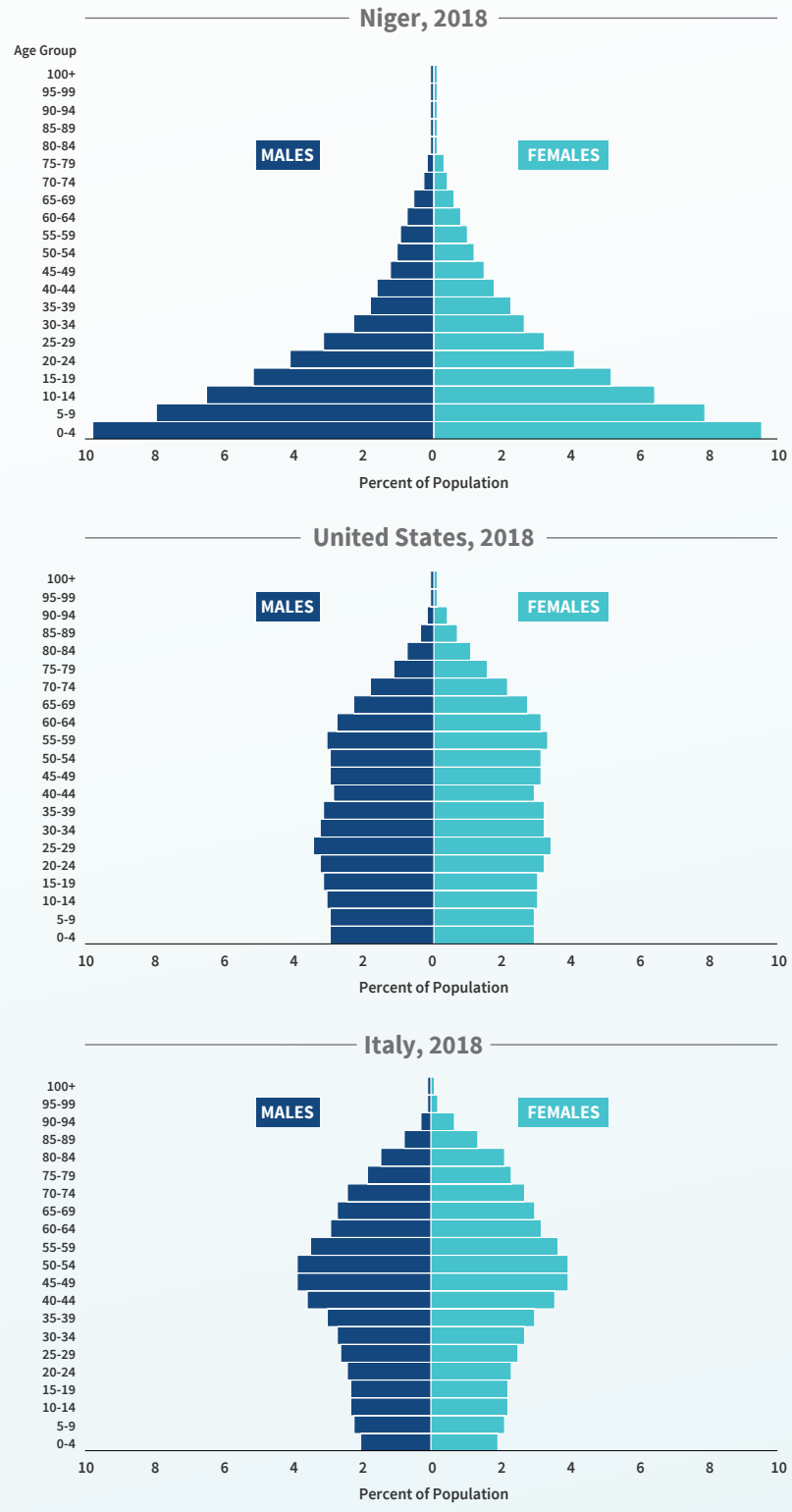
Statistical Techniques Help Overcome Basic Data Shortcomings

Demographers have developed statistical techniques to help overcome the shortcomings of the basic data with which they work. They apply these techniques to the best data available to compute estimates of the actual population counts and measures. Although estimates based on good data can be quite accurate, users of these estimates should not forget that estimates are only approximations of the true number.

Likewise, users of demographic data should always question the source and quality of the data that underlie the rates, ratios, and proportions they cite. Judging the quality of data is one of the most important skills demographers must learn.

FIGURE 6

THE AGE COMPOSITION OF A POPULATION CAN RESEMBLE A PYRAMID (FAST-GROWING) OR A PILLAR (SLOW-GROWING OR DECLINING)



Sources: U.S. Census Bureau, Population and Housing Unit Estimates; and UN, Department of Economic and Social Affairs (DESA), *World Population Prospects 2019*, https://population.un.org/wpp/Download/Standard/Population/.

Momentum for Future Growth

The majority of people in rapid-growth societies are young, creating tremendous population momentum because that large pool of young people will be the parents of the future. Even if they have only four children each (the average in some low-income countries), their children's generation would be twice the size of their own. Niger's population age structure is typical of a young, rapid-growth society.

Lower Fertility Narrows the Base of the Pyramid

A population that is not growing or is decreasing produces a very different shape, not really a pyramid at all. The base of Italy's population "pyramid" is narrowing because its birth rate has been falling (see Figure 6). The 2014 to 2018 birth cohort was barely one-half the size of the 1964 to 1968 cohort. If fertility remains below replacement level, the pyramid's base will continue to shrink and the population will undergo a natural decrease. If Italy's TFR rises to the replacement level of 2.1, its age and sex structure would eventually assume a rectangular shape because similar numbers of births would occur each year.

This shape would be maintained until the older ages, when mortality would shorten the top bars. At the very top, the female bar is almost always longer than the male bar because women live longer on average than men. A slow-growth population is generally in the process of changing from a rapid-growth to a near-zero-growth shape in response to changes in fertility and mortality. The United States is typical of these "middle-age," slow-growth societies.

Population pyramids can also be shaped by migration. Because migration is age selective, it alters the shape of age-sex pyramids in both the place of origin and destination. Migrants tend to be young adults; a steady migration stream is likely to make the place-of-origin population older and the place-of-destination population younger. There are plenty of exceptions to this pattern.

Pyramids reflect historical events—wars, famines, baby booms or busts, and changes in immigration policies—that have affected one of the three demographic variables. Consider the tumultuous events portrayed in the pyramid for Germany in Figure 7. Births plummeted during the two world wars and then rose sharply during a postwar baby boom. Migration streams that are predominantly male—as is labor migration to Middle Eastern countries—create an unbalanced pyramid, as illustrated in Figure 8.

The U.S. Age Pyramid Resembles a Bowling Pin

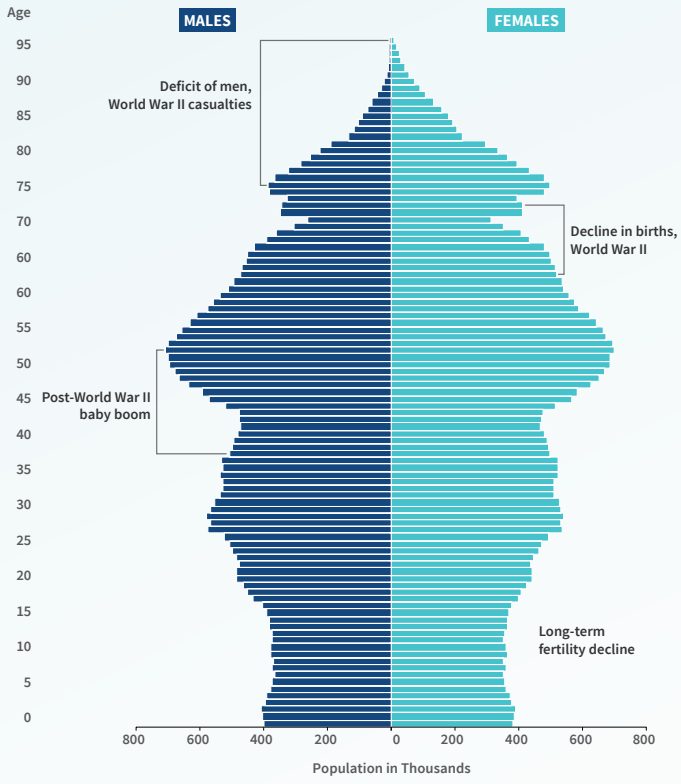
The age structure of the United States looks more like a bowling pin than a pyramid (see Figure 6). This shape was created by drastic swings in the number of births—from the historic low of the 1930s to the baby boom peak of 1957 to the baby-bust low of the mid-1970s and then to the baby boomlet of the 1980s and early 1990s.

The pyramid's upper bulge is composed of members of the baby boom cohort who are now reaching retirement age (ages 54 to 72 in 2018). The narrower bars at ages 40 to 49 reflect the baby-bust cohorts of the 1970s, while the very narrow base results from the low birth rates of the last 10 years. Each year the median age of the U.S. population increases as baby boomers age and fertility rates remain low. Increases in life expectancy at birth and older ages have also contributed to the aging of the population. The U.S. median age was 38 in 2018, up from 28 in 1970. The U.S. median age could reach 42 years by 2050.[86]

FIGURE 7

GERMANY'S POPULATION PYRAMID ILLUSTRATES THE COUNTRY'S TURBULENT EVENTS OVER THE PAST CENTURY

Germany's Population by Age and Sex, 2018

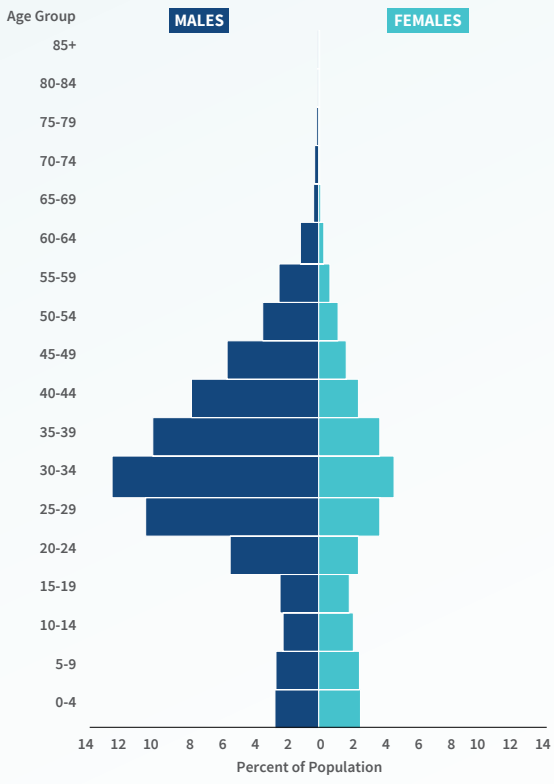


Source: Federal Statistical Office of Germany, https://www.destatis.de.

FIGURE 8

MIGRATION AFFECTS THE POPULATION AGE STRUCTURE IN THE UNITED ARAB EMIRATES, PARTICULARLY IN THE WORKING AGES

United Arab Emirates' Population (%), by Age Group and Sex, 2018



Source: UN, DESA, *World Population Prospects 2019.*

The Baby Boom Effect

The U.S. baby-boom generation provides a great example of the varied effects of changing age structure on society. The 76 million Americans born between 1946 and 1964 were more numerous than the cohorts that preceded and followed them, producing the bulge in the age pyramid in Figure 6. As they passed through each stage of their life cycle, the baby boomers faced shortages—in elementary schools, colleges, housing, and employment—because the generation that came before them was so much smaller.

But the baby-boom generation left excess supply in its wake. By the time there were enough houses, schools, teachers, and colleges to accommodate their numbers, the baby boomers were grown and no longer needed them. The mid-1980s found colleges scrambling for enough students to fill all the classrooms that had been created for this large cohort. When baby boomers began buying homes, real estate prices soared because of competition for a limited housing supply.

Baby boomers are living longer than the generations that came before them, and as they age, the proportion of the U.S. population that is disabled or chronically ill will increase, straining the nation's health and pension systems. Although U.S. policymakers and others have had many decades to plan for the inevitable aging of the baby boom cohort, it is not clear that sufficient preparations have been made to meet baby boomers' anticipated needs in old age.

Sex Ratio: Comparing the Number of Men and Women

The sex composition of a population is described by the sex ratio, which is usually expressed as the number of males for every 100 females. Overall, males outnumber females in the global population, and in 2020, the world's sex ratio was 101.7 (that is, for every 100 females in the world, there were 101.7 males). The ratio for more-developed regions of the world was 95, which means women tend to outnumber men. In less-developed regions, the reverse is true, with 103 men for every 100 women.[87] Sex ratios are driven by the same forces that drive population overall: fertility, mortality, and migration.

Why Do Sex Ratios Matter?

The sex ratio matters because, for one thing, it affects the availability of marriage partners. An

unbalanced sex ratio in the young-adult years—because of migration, fertility swings, or war casualties, for example—means there may not be enough spouses to go around. The scarcity of potential marriage partners is not merely a personal disappointment for individuals who want to get married; it also affects the social and economic structure of a society (see Box 4, p. 30).[88]

China's one-child population policy (1979-2015) led to a number of unique demographic events and transitions, including an imbalance in the sex ratio at birth. Millions of "extra" boys were born, and as they reached adulthood, many men have been unable to find a woman to marry.[89]

The United States had a dramatic increase in the proportion of births outside of marriage among Black women during the latter part of the 20th century, along with a corresponding increase in Black families headed by single women. Sociologists have suggested that these trends are linked to a shortage of marriageable Black males in low-income areas.[90] In these neighborhoods, the pool of Black men with the potential to support a family has been depleted by higher-than-average rates of unemployment, incarceration, and premature death.

How Mortality Patterns Affect the Sex Ratio

Males have higher death rates than females at nearly every age, beginning with conception. As many as 150 male fetuses are conceived for every 100 female fetuses, but a large percentage of pregnancies spontaneously abort within the first few weeks, and a woman is more likely to miscarry a male fetus than a female fetus, resulting in a global sex ratio at birth of 105 (that is, 105 male babies are born for every 100 female babies).

In the United States, the ratio of men to women is about equal (a sex ratio of 100) between ages 30 and 39, and then it begins to fall. By age 85, there are nearly two women for every man. Among centenarians, there are more than three women per man. This preponderance of older women can be seen in the pyramids for Italy and the United States in Figure 6.

In some nations, cultural factors override the biological advantage that women usually have. In Indian culture, for example, boys are traditionally accorded a high status, which may result in girls receiving less food, medical care, and familial attention than boys.[91] This discrimination is reflected in India's sex ratio—estimated at 108.2 in 2020.[92] This sex ratio imbalance exists in many other Asian countries as well. The sex ratio for all of Asia was 104.7 in 2020, compared with 99.9 in Africa and 96.8 in Latin America and the Caribbean.[93]

How Migration Can Impact Sex Ratios

The United Arab Emirates (UAE) has one of the most unbalanced sex ratios in the world. This imbalance occurred when thousands of migrants—mostly men without families—traveled from Asia and other parts of the Middle East to work in the country's oil fields and construction sites. The UAE was not looking for these men to become permanent residents, so they sought those who left families back home. The effects of this extremely unbalanced immigration pattern are evident in the age-sex structure shown in the population pyramid for the UAE in Figure 8. In 2018, the UAE had a sex ratio of 226.4, or more than 226 men for every 100 women.[94]

Race and Ethnicity: Socially Defined Characteristics

Unlike many other population characteristics, race and ethnicity are tough to quantify because they are not scientific terms and no consensus exists about how many races there are or exactly what distinguishes a race from an ethnic group. While race may have a biological or genetic component, it is defined primarily by society, not by genetics. Race has no universally accepted categories, and the physical characteristics such as facial features, hair texture, and skin color often used to identify racial groups are highly subjective identifiers.[95]

Ethnicity is usually defined by cultural practices, language, and traditions rather than biological or physical differences. In the United States, ethnicity often refers to the national origin of immigrant groups. The United Nations publishes data on racial, ethnic, and tribal composition as reported by individual countries but warns that "by the very nature of the subject, these groups will vary widely from country to country; thus, no internationally relevant criteria can be recommended."[96]

Although exact definitions are elusive, race and ethnicity are important variables in the United States and most other countries. The relative size of individual groups sometimes determines their political power and socioeconomic status. Shifts in racial and ethnic composition can alter the social structure and generate prejudice and social unrest.

BOX 4

Households and Families

Households and families are basic units of analysis in demography, but they are not the same thing. A household is composed of one or more people who occupy a housing unit.[1]

Not all households, however, contain families. Under the U.S. Census Bureau definition, family households consist of two or more individuals who are related by birth, marriage, or adoption, although they also may include other unrelated people. Nonfamily households consist of people who live alone or who share their residence only with unrelated individuals. These official definitions do not necessarily reflect changing attitudes about marriage, childbearing, and gender roles. Households that consist of unmarried same-sex or opposite-sex couples living together, for example, would be counted as nonfamily households even though they might share many characteristics of a family. If these couples live with children from their current relationship, the household moves into the family category.

Life Stage Determines Living Arrangements

Living arrangements usually change at different stages of life—from moving out of a childhood home to marriage and family formation to empty nest to retirement. Of course, not everyone follows this pattern; many people skip or repeat stages. In the United States, changes in marriage, divorce, cohabitation, and nonmarital childbearing have transformed the sequence and patterns of family formation. Compared to the 1950s, men and women today have fewer restrictive social norms about how, when, and with whom to form intimate relationships and in what context to have children. No longer do marriage, co-residence, and parenting always go together, nor is marriage necessarily viewed as a lifelong commitment.

The aging of the U.S. baby-boom cohort is contributing to growth in the shares of both married-couple households without children and one-person households. At younger ages, delays in marriage and childbearing and increases in cohabitation among young adults have contributed to a decline in the share of family households—particularly married couples with children—and a steep rise in the share of nonfamily households.

Smaller U.S. Households/Families Driven by More Adults Living Alone

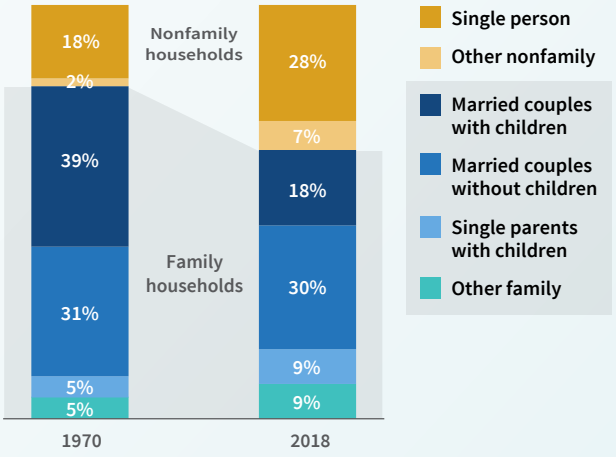
In 1970, 80% of all U.S. households were family households, but this share fell to 65% by 2018.

In 2018, 28% of all U.S. households consisted of just one person, compared with 18% in 1970 (see figure). The rapid growth of one-person households is largely due to increases in the share of older adults living alone, particularly women. Many European countries have seen a similar rise in single-person households for the same reasons.

Delays in marriage and childbearing and increases in cohabitation among young adults have also contributed to the decline in the share of family households—particularly married couples with children—and the steep rise in the share of nonfamily households. In 1970, 89% of women ages 25 to 29 had been married at least once. In 2018, only 42% of women ages 25 to 29 had been married.[3] The choices people make about marriage and childbearing help determine the present and future makeup of U.S. families and households.

THE SHARE OF U.S. FAMILY HOUSEHOLDS HAS FALLEN WHILE THE SHARE OF SINGLE-PERSON HOUSEHOLDS HAS INCREASED

U.S. Household Types, 1970 and 2018



Sources: U.S. Census Bureau, decennial census and American Community Survey.

References

1 Alicia VanOrman and Paola Scommegna, "Understanding the Dynamics of Family Change in the United States," *Population Bulletin* 71, no. 2 (2016), https://www.prb.org/wp-content/uploads/2016/08/prb-population-bulletin-71.1-complex-families-2016.pdf.

2 Lynne M. Casper and Suzanne M. Bianchi, *Continuity and Change in the American Family* (New York: Russell Sage Foundation, 2002).

3 U.S. Census Bureau, "America's Families and Living Arrangements: 2018," https://www.census.gov/data/tables/2018/demo/families/cps-2018.html.

Such problems often arise from one group's basic concern that some other group will grow faster and, consequently, increase its importance within the society.

Major shifts in racial and ethnic composition are occurring in countries throughout the world. In South Africa, white residents are becoming an ever-smaller minority, owing to a lower birth rate and a higher emigration rate than rates for Black and other nonwhite South Africans. And in many European countries, immigrant populations from lower-income countries are growing faster than that of the European nationals in those countries, leading to anti-immigrant backlashes.[97]

U.S. Census Race and Ethnic Categories

U.S. decennial census questions about race and ethnicity have evolved over time, reflecting Americans' shifting views about racial and ethnic identification. Nearly a century ago, enumerators for the 1920 Census were instructed to identify people as "White," "Black," "Mulatto," "Chinese," "Japanese," "American Indian," "Filipino," "Hindu" (Asian Indian regardless of religion), "Korean," or "Other."[98] Enumerators' personal observations, rather than individuals' self-identification, determined most racial/ethnic classification through the 1950 Census.

The 2000 Census was the first to allow people to select more than one race. That year, 2.4% of the population—6.8 million Americans—identified as multiracial.[99] In earlier censuses, mixed-race Americans were asked to indicate the race they most closely identified with. In the 2020 Census, people could select one or more races from among 14 categories or write in races not listed on the form.

Latino Reporting Highlights Difficulties in Distinguishing Between Race and Ethnicity

Since 1970, the census questionnaire has included a second, separate question asking U.S. residents whether they are of Hispanic origin, and if so, which broad Hispanic group they identify with. Hispanic (or Latino) is considered an ethnic group, not a race, but this distinction confuses many Americans. The Census Bureau classifies as Hispanic anyone who traces their ancestry to Spain, the Spanish-speaking countries of Latin America and the Caribbean, or any other Spanish culture. Latinos may be of any race.

Most Latinos report themselves as white, but a large number report their race as "other," which underscores the confusion about race and ethnic definitions. In the 2010 Census, 37% of Latinos checked the "Some Other Race" box.[100] Many Dominican Americans and Puerto Ricans have African ancestry, for example, and might choose Black and Hispanic. Some Filipino Americans with Spanish surnames identify themselves as Hispanic but also as Asian.

U.S. Racial and Ethnic Trends

Racial and ethnic diversity has been a hallmark of the United States since colonial times, with waves of immigrants as well as enslaved people from different parts of the globe keeping the country's racial and ethnic composition in flux. This growth in diversity continues despite shifts in immigration policies, driven by the differences in fertility, mortality, and migration discussed earlier.

In 2019, half of U.S. residents traced their ancestry to Europe.[101] The latest Census Bureau projections indicate that non-Hispanic whites will no longer account for the majority of the U.S. population by 2045.[102]

Latinos and African Americans are the nation's largest minority groups, but Latinos are growing at a much faster pace due to their population's younger age structure and higher fertility rates. Asian Americans who once represented a small slice of the population have grown to a sizable minority. However, with the rapid growth of people who identify themselves as multiracial and multiethnic, the dividing lines among groups are becoming less distinct.

If multiracial people who identify partially as white are included with non-Hispanic whites in the majority, then whites would not drop below 50% of the population until 2056. By 2060, about 6% of the total population—and 11% of children under age 18—are projected to be multiracial. The racial and ethnic categories used in the 2060 Census are likely to be very different from those used today.

The United States' evolving ethnic composition has a profound impact on almost every aspect of its society, from social values and culture to education, politics, and industry. Schools are adapting to more students from a wide variety of cultural backgrounds. In many big-city school districts, white non-Hispanic students are already a racial minority. Because Latinos, in particular, have a younger age structure than the non-Hispanic white population, they make up a rapidly increasing share of the new job entrants in the U.S. labor force.

POPULATION DISTRIBUTION

Where do the world's 7.8 billion inhabitants live? In 1950, 68% of Earth's population lived in developing regions. By 2019, that number had climbed to 83%, and it is projected to increase to 87% by 2050.

The geographic distribution of population is determined by fertility, mortality, and migration, and as the data cited here show, some regions are growing much faster than others, causing the distribution of the world's population to become increasingly uneven (see Figure 9).

The Changing Distribution of World Population

Fertility is the primary cause of variations in population growth rates among world regions, but migration also plays an important role. International migration is at an all-time high. People move from developing to more-developed countries as well as within countries for better living conditions.[103]

Besides influencing various characteristics of the destination populations (race, ethnicity, socioeconomic factors), immigrants also often change the age composition of populations. Because immigrants are often young and in their reproductive years, they and their children generally make the populations they join younger. International migration can also have significant implications for home countries. Remittances that migrants send home can amount to a substantial portion of Gross Domestic Product in some countries.

Urbanization Is Increasing

Rural-to-urban migration is also redistributing populations within developing countries. Large cities, which are hubs of technology, jobs, and information, attract working-age populations in developing countries, where urban populations rose from 305 million to 4.2 billion between 1950 and 2018.[104] This trend seems likely to continue. The share of the world's population living in urban areas is projected to rise from about 55% today to 68% by 2050, with nearly 90% of the increase occurring in Asia and Africa.[105]

But while urban centers bring migrants access to economic opportunity and municipal services, rapid population growth can quickly overwhelm public services (health care and education) and create job and housing shortages. Around the world, millions of people survive by building makeshift shelters on open land, and gigantic shantytowns have sprung up around major cities throughout low-income countries, further testament to explosive population growth. But access to adequate housing has improved; between 2000 and 2014, the share of the world's urban population living in such shelters decreased from 28.4% to 22.8%.[106]

A Shifting U.S. Population

Like populations in the rest of the world, the U.S. population is unevenly distributed. About 30% of Americans (95 million) live in coastline areas, counties directly adjacent to the Atlantic Ocean, Pacific Ocean, or Gulf of Mexico.[107] Geographic terrain, availability of natural resources and infrastructure, and economic factors limit population growth in many other parts of the United States.

The South is the most populous region of the country, accounting for 38% of the population. The

West accounts for 24% of the population, whereas the Midwest comes in at 21% and the Northeast at 17%.[108] Population density ranges from a low of one inhabitant per square mile in Alaska to a high of 1,196 inhabitants per square mile in highly urban New Jersey.[109]

Migration Affects U.S. Population Distribution

In recent decades, southern and western states have seen significant population growth while populations in the Midwest and Northeast have been stagnating or declining.

International and internal migration are the main determinants of population redistribution in the United States, but the components of population change differ across states. In California, natural increase was the main driver of population growth between 2010 and 2019, whereas in Florida, migration played a much bigger role in the state's growth.

Within the United States, migrants tend to follow several long-established migration streams. The first stream flows from the Eastern Seaboard states westward, a demographic process that has occurred since colonial times and that ultimately pushed U.S. borders out to the Pacific Coast.

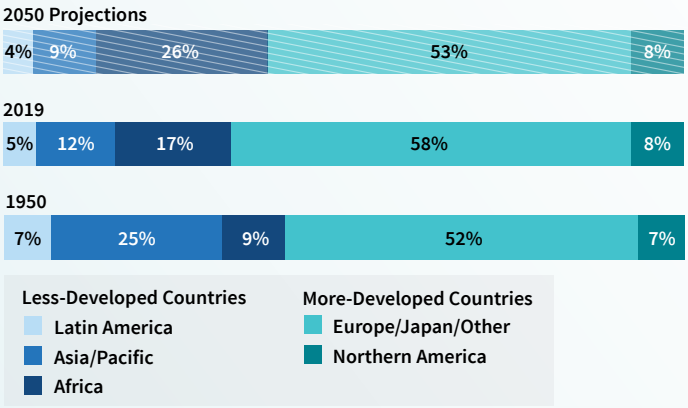
The second stream runs from nonmetropolitan to metropolitan areas. Metropolitan areas are core areas "containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core."[110] Between 1910 and 2018, the percentage of the U.S. population living in metropolitan areas increased from 28% to 86%.[111] Part of this metropolitan area growth has been driven by people moving away from sparsely populated areas to seek better employment opportunities in large cities and their suburbs. Changes in the classification of metropolitan areas over time have also contributed to the rising share of the population living in those areas.

A third major migration stream, which accelerated during the Great Depression of the 1930s, led people from economically depressed areas in the South to the cities of the Northeast and North Central states. This exodus brought millions of Black Americans to Chicago, Detroit, New York, Philadelphia, Washington, D.C., and other cities that still have large Black populations today. Since the 1970s, however, there has been return migration to the South, which has seen net in-migration of Black Americans and an even greater influx of other Americans. This phenomenon is part of a fourth and now major stream: the movement from the Rust Belt and Snowbelt states to the Sun Belt states.

FIGURE 9

CURRENT PROJECTIONS HAVE 87% OF THE WORLD'S POPULATION LIVING IN LESS-DEVELOPED COUNTRIES BY 2050

World Population by Region, 1950, 2019, and 2050



Note: Categories for more-developed and less-developed countries follow current United Nations classifications.

Sources: Toshiko Kaneda, Charlotte Greenbaum, and Kaitlyn Patierno, *2019 World Population Data Sheet* (Washington, DC: Population Reference Bureau, 2019); and UN, DESA, *World Population Prospects 2019.*

Urban-Area Populations Come and Go

The redistribution of population within and around U.S. metropolitan areas has been even more dramatic. In the 20th century, increasing racial diversity in cities led to "white flight"; many white city-dwellers moved to more racially exclusive suburbs. More recently, in some cities gentrification, or high housing prices following an influx of residents composed of highly educated, affluent professionals, has destabilized working and middle-class neighborhoods in less than a decade.[112]

Rolling farmland 30 miles from downtown can quickly sprout dense townhouse developments as metropolitan areas expand outward, known as urban sprawl, from the original central cities, gobbling up additional cities and counties in their paths. The City of Los Angeles, for instance, has more incorporated cities within its sprawl than do some states. Because these changes affect a community's tax base, public school enrollment, student body composition, traffic congestion, and public services, they often spark contentious political battles.

POPULATION DYNAMICS AND GLOBAL CHANGE

For most of human history, the death rate was about as high as the birth rate, and the rate of population growth was scarcely above zero (see Figure 10).

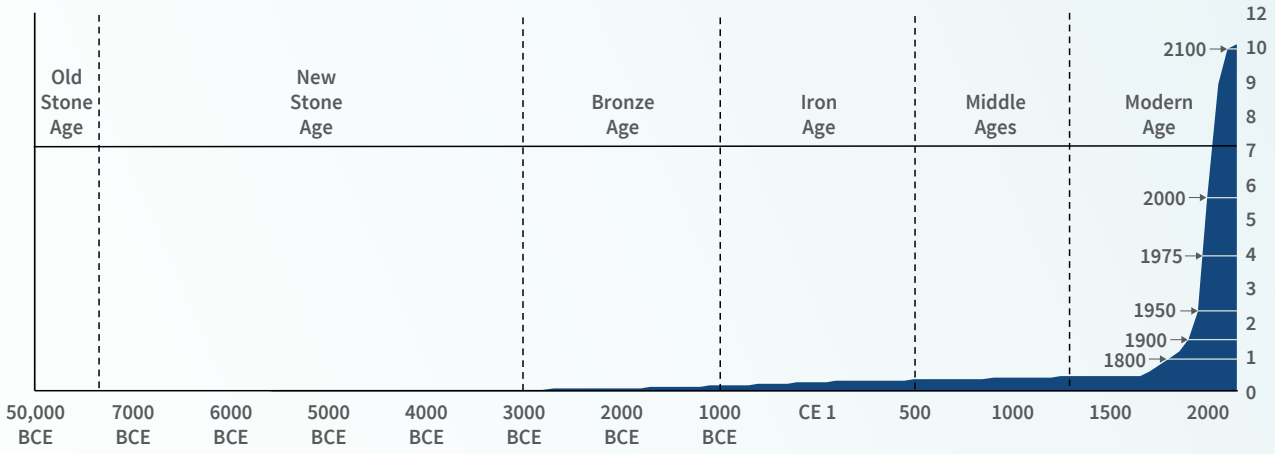
The first significant population growth started around 8000 BCE, when humans began to farm and raise animals. It took 10,000 or so years for the global population to increase from 10 million to 500 million in 1650. But as growth accelerated, it took only 150 years for the population to double, reaching one billion in 1800. A scant 130 years later, the population doubled again, and Earth was home to two billion people. Only 30 years later, in 1960, another billion was added, followed by a fourth billion in 1975, just 15 years later.

The fifth, sixth, and seventh billion (attained in 1987, 1999, and 2011) were reached even faster, taking just over a decade each.[113] The world population reached 7.8 billion in 2020, and while the rate of growth has slowed, the world population is expected to reach 8 billion before 2025.[114] The population growth rate is expected to slow dramatically by 2100, when the world population is projected to be just shy of 11 billion.[115]

FIGURE 10

RAPID POPULATION GROWTH IS A MODERN-AGE PHENOMENON

World Population Growth Through History in Billions of People

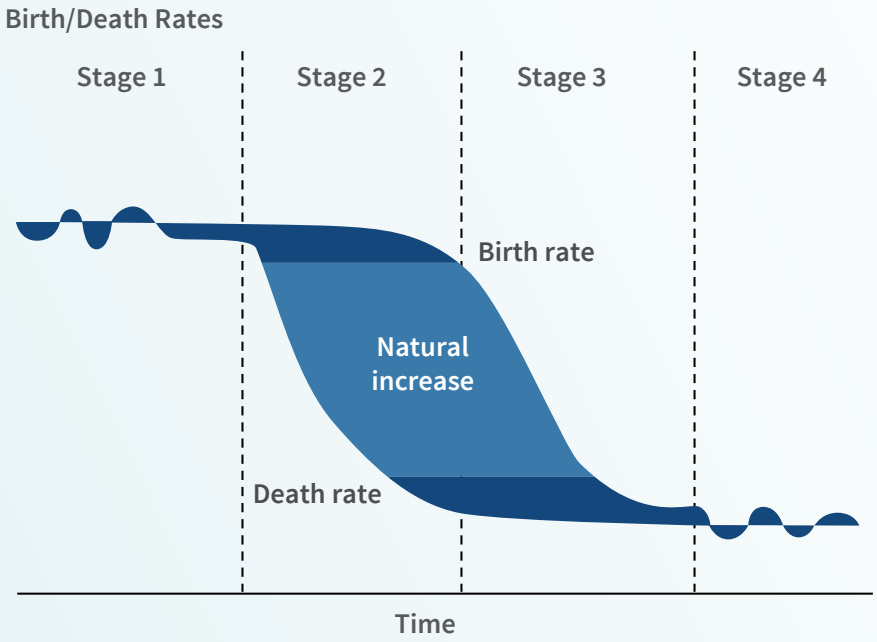


Sources: Toshiko Kaneda and Carl Haub, "How Many People Have Ever Lived on Earth?" Population Reference Bureau (2018); and UN, DESA, *World Population Prospects 2019*.

FIGURE 11

MANY DEMOGRAPHERS QUESTION WHETHER THE CLASSIC DEMOGRAPHIC TRANSITION MODEL IS STILL APPLICABLE

The Classic Stages of Demographic Transitions



Note: Natural increase or decrease is produced from the difference between the number of births and deaths.

Demographic Transition to Lower Fertility and Mortality

In ancient times, the birth and death rates fluctuated around a relatively high level, essentially cancelling each other out. Over time, births began to outnumber deaths, leading to the unprecedented growth seen in the modern era. These trends are described as the demographic transition (see Figure 11). The demographic transition model evolved from the history of population growth in Europe and the United States and has been applied to populations everywhere.

Stage 1: High Birth and Death Rates

The death rate is extremely high in Stage 1 of the demographic transition model due to harsh living conditions and poor health, which result in a life expectancy at birth of less than 30 years. If birth rates had not also been high, societies would simply have died out, and many did. The cultures in these societies encouraged high birth rates through religious teachings and social pressure. Large families served a practical function, with children furnishing labor for family farms and supporting their parents in old age. Large families also increased the economic, political, and military power of their tribe or nation.

Stage 2: Falling Death Rates

In Stage 2, the death rate begins to drop, probably because of improved living conditions and health practices, while the birth rate remains high and may even increase because women are healthier. With births outpacing deaths, the population begins to grow as societies take advantage of technological and medical innovations, such as antibiotics, immunizations, and other aspects of modernization, to reduce deaths. Large families continue to be valued as parents still need children to work on family farms and businesses and care for them in old age.

Stage 3: Falling Birth Rates

As societies continue to develop, the birth rate declines, eventually nearing the death rate. Population growth remains relatively high during the early part of the third stage but falls to near zero in the later part. Most developing nations are found in Stage 2 or the early part of Stage 3. Excluding China, the population growth rate for developing countries was 1.5% in 2019.[116] If growth were to continue at that rate, the population of these countries would double in about 46 years.

Stage 4: Low Birth and Death Rates

In Stage 4, the birth and death rates are similar again, but now they fluctuate at a relatively low level, leading to a more stationary population. The United States and other high-income countries in Europe and Asia have completed the four stages of demographic transition. Some scholars have also suggested a Stage 5 in which birth and death rates remain low with a declining population, or a low death rate combined with a rising birth rate.

While these stages can be used to describe broad demographic trends, the speed and order of these transitions differ across countries. Migration is also an important component of population change, and it is not explicitly covered by this model.

Population Futures: Where Are We Headed?

The geographic variation in population growth seen over the last century will only intensify in the coming decades.

Less-developed countries accounted for nearly 90% of global population growth during the 20th century, and that trend is expected to continue over the next three decades. The small amount of population growth projected for more-developed countries will be largely accounted for by the United States, Canada, and Australia, and most of this growth will likely be driven by international migration rather than natural increase. While the population in less-developed countries is projected to increase from 6.5 billion in 2020 to 8.6 billion in 2050, the population in more-developed countries is projected to remain at around 1.3 billion.[117]

The Promise of a Demographic Dividend

It's unclear if and when countries with high fertility will experience a decline that helps open up a window of opportunity to reap the benefits from the demographic dividend. While population growth slowed in many developing countries in the 1980s and 1990s, birth rates in Africa overall were high enough to keep the region's growth rate above 2% annually.

A number of countries with declining birth rates have enjoyed a period of accelerated economic growth known as the demographic dividend.[118] When a country's fertility rate declines, the changing population age structure means that each working-age adult has proportionately fewer children to support. This dynamic, when coupled with sustained investments in health and education policies to promote economic growth and good governance has resulted in significant social and economic gains for countries, including Brazil, Mexico, South Korea, and Thailand. The potential of the demographic dividend is creating a sense of optimism for improving the economic well-being of developing countries with high fertility and sparking new interest in family planning policies among government leaders, especially in sub-Saharan Africa.

Population Declines Create Challenges

Population declines can present a different set of challenges. When fewer children are being born, the proportion of older people in the population can rise dramatically, and older people consume a disproportionate share of medical and other costly public services. Labor force shortages also may develop.[119]

Countries experiencing natural population decreases (fewer births than deaths) include Bulgaria, Germany, Italy, Japan, and Ukraine, among others.[120] The rate of decline is slow, but many leaders fear that their falling populations eventually will threaten their economies, their defense systems, and even their national identities. Some European governments have offered incentives to encourage couples to have more children, including housing benefits, stipends, and lengthy paid maternity and paternity leaves. But these financial incentives are expensive and have not boosted birth rates to high enough levels to offset population decline.

Most countries do not regard mass immigration as an acceptable solution to population decline. Some European countries have imposed strict controls against immigration, whereas others have encouraged immigrants to leave. Long-term population decline appears likely for most of Europe, but it will occur very slowly.[121] Were it not for relatively high immigration levels, the United States also would face population decline in the 21st century because of low mortality and below-replacement fertility.

WHY POPULATION TRENDS MATTER

Global population trends matter because they provide insights into the important demographic, social, and economic developments shaping our world.

Declining fertility and rising life expectancy at birth and older ages are leading to a growing share of older people in the population and what the United Nations (UN) calls a global "longevity revolution."[122] In some countries, rapid fertility decline has led to an increase in the proportion of working-age adults, creating new opportunities for economic growth. In other countries, population aging and a decline in the proportion of working-age adults are putting pressure on social welfare programs.

The number of international migrants is increasing, and more people are moving to cities—especially in rapidly developing countries like China. Rapid urbanization and globalization have contributed to the spread of infectious diseases like Ebola and COVID-19.

One of the most pressing issues linked to population growth is the rising use of fossil fuels such as oil and coal. This use has contributed to climate change through the release of enormous amounts of heat-absorbing gases into the atmosphere. Population growth, however, is not solely responsible for environmental degradation, which is also affected by factors like economic growth, urbanization, patterns of land and water use, and energy consumption. The United States represents about 4% of the world population, but it consumes disproportionately larger amounts than any other nation in the world—about 17% of total energy consumption worldwide.[123] And because it is the only high-income country in the world still experiencing significant population growth, this high rate of resource consumption is expected to continue.

Some of the fastest-growing parts of the world are also least equipped to support rapidly growing populations. According to the UN, "population growth brings additional challenges in the effort to eradicate poverty, achieve greater equality, combat hunger and malnutrition and strengthen the coverage and quality of health and education systems to ensure that no one is left behind."[124]

Expanding access to voluntary family planning services is one proven way to help reduce poverty, slow population growth, and ease pressures on the environment. Yet family planning services often fail to reach those with the greatest need: people who have little income, live in remote areas and urban slums, and have little education. The UN's 2030 Agenda for Sustainable Development calls on countries to "ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes."[125] Enabling families everywhere to be able to choose whether and when to have children would not only improve the health and economic well-being of families but would also reduce global population pressures in the coming decades.

REFERENCES

1 United Nations (UN), Department of Economic and Social Affairs (DESA), *World Population Prospects 2019*, Standard Projections, 2019, https://population.un.org/wpp/Download/Standard/Interpolated/.

2 Toshiko Kaneda, Charlotte Greenbaum, and Kelley Kline, *2020 World Population Data Sheet* (Washington, DC: Population Reference Bureau, 2020).

3 Population Reference Bureau (PRB), "U.S. Fertility Drops to Historic Low in 2019," https://www.prb.org/u-s-fertility-drops-to-historic-low-in-2019/.

4 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

5 Stuart Gietel-Basten and Sergei Scherbov, "Exploring the 'True Value' of Replacement Rate Fertility," *Population Research and Policy Review* 39 (2020): 763-72.

6 Sharon E. Kirmeyer and Brady E. Hamilton, "Childbearing Differences Among Three Generations of U.S. Women," *NCHS Data Brief* 68 (2011), https://www.cdc.gov/nchs/data/databriefs/db68.pdf.

7 Kirmeyer and Hamilton, "Childbearing Differences Among Three Generations of U.S. Women."

8 John Bongaarts, "The Fertility-Inhibiting Effects of the Intermediate Fertility Variables," *Studies in Family Planning* 13, no. 6/7 (1982): 179-89.

9 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

10 Guttmacher Institute, "Reasons for Unmet Need for Contraception in Developing Countries," 2016, https://www.guttmacher.org/fact-sheet/unmet-need-for-contraception-in-developing-countries.

11 Population Reference Bureau, "Unmet Need for Contraception: Fact Sheet," March 28, 2012, https://www.prb.org/unmet-need-factsheet/.

12 Raymond Pearl, *The Natural History of Population* (New York: Oxford University Press, 1939), 36; and Joseph A. McFalls Jr. and Marguerite McFalls, *Disease and Fertility* (New York: Academic Press, 1984).

13 John Bongaarts, "A Framework for Analyzing the Proximate Determinants of Fertility," *Population and Development Review* 4, no. 1 (1978): 105-32; and William Petersen, *Population* (New York: Macmillan, 1975).

14 PRB, "U.S. Fertility Drops to Historic Low in 2019."

15 Tomáš Sobotka, Vegard Skirbekk, and Dimiter Philipov, "Economic Recession and Fertility in the Developed World," *Population and Development Review* 37, no. 2 (2011): 267-306.

16 PRB, "U.S. Fertility Drops to Historic Low in 2019."

17 Martin O'Connell, "Childbearing," in *Continuity and Change in American Families*, ed. Lynne M. Casper and Suzanne M. Bianchi (Thousand Oaks, CA: Sage Publications, 2001).

18 Eve Beaujouan and Caroline Berghammer, "The Gap Between Lifetime Fertility Intentions and Completed Fertility in Europe and the United States: A Cohort Approach," *Population Research and Policy Review* 38 (2019): 507-35, https://link.springer.com/article/10.1007/s11113-019-09516-3.

19 U.S. Census Bureau, "Fertility Historical Time Series," updated January 12, 2018, https://www.census.gov/library/visualizations/time-series/demo/fertility-time-series.html.

20 Gladys Martinez, Kimberly Daniels, and Isaedmarie Febo-Vazquez, "Fertility of Men and Women Aged 15-44 in the United States: National Survey of Family Growth, 2011-2015," *National Health Statistics Reports*, no. 113 (2018), https://www.cdc.gov/nchs/data/nhsr/nhsr113.pdf.

21 Institut National de la Statistique (INSTAT), Cellule de Planification et de Statistique Secteur Santé-Développement (CPS/SS-DS-PF), and ICF, Mali Demographic and Health Survey 2018 (Bamako, Mali: INSTAT/CPS/SS-DS-PF and ICF, 2019), http://dhsprogram.com/pubs/pdf/FR358/FR358.pdf.

22 Beaujouan and Berghammer, "The Gap Between Lifetime Fertility Intentions and Completed Fertility in Europe and the United States."

23 T.J. Matthews and Brady E. Hamilton, "Educational Attainment of Mothers Aged 25 and Over: United States, 2017," *NCHS Data Brief* no. 332 (2019), https://www.cdc.gov/nchs/data/databriefs/db332-h.pdf.

24 Joyce A. Martin et al., "Births: Final Data for 2018," *National Vital Statistics Report* 68, no. 3 (2019), https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_13-508.pdf.

25 UN, DESA, *World Population Prospects 2019*.

26 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

27 CDC, National Center for Health Statistics, "Deaths and Mortality," reviewed October 30, 2020, https://www.cdc.gov/nchs/fastats/deaths.htm.

28 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*, Annual and Single Age Data.

29 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

30 Haupt, Kane, and Haub, *PRB's Population Handbook*.

31 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

32 UN, DESA, *World Population Prospects 2019: Highlights*.

33 Elizabeth Arias and Jiaquan Xu, "United States Life Tables, 2017," *National Vital Statistics Reports* 68, no. 7 (2019), https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_07-508.pdf.

34 Elizabeth Arias and Jiaquan Xu, "United States Life Tables, 2017"; and UN, DESA, *World Population Prospects 2019*, Mortality Data.

35 Dean Jamison et al., eds., *Disease Control Priorities in Developing Countries*, 2d ed. (Washington, DC: World Bank, 2006), https://dcp-3.org/sites/default/files/dcp2/DCPFM.pdf. Throughout this Bulletin you will find references to *developing countries* and *developed countries*, *low-income countries* and *high-income countries*. Which term is used when often depends on how data's source material categorizes countries.

36 Hebe N. Gouda et al., "Burden of Non-Communicable Diseases in Sub-Saharan Africa, 1990-2017: Results From the Global Burden of Disease Study 2017," *The Lancet Global Health* 7, no. 10 (2019), https://www.thelancet.com/journals/laninf/article/PIIS2214-109X(19)30374-2/.

37 James R. Carey, "Life Span: A Conceptual Overview," in *Life Span: Evolutionary, Ecological, and Demographic Perspectives*, ed. James R. Carey and Shripad Tuljapurkar (New York: Population Council, 2003): 1.

38 U.S. Census Bureau, Population and Housing Unit Estimates, https://www.census.gov/programs-surveys/popest.html.

39 Kenneth W. Wachter and Caleb E. Finch, eds., *Between Zeus and the Salmon: The Biodemography of Longevity* (Washington, DC: National Academies Press, 1997).

40 Gerontology Research Group (GRG), World Supercentenarian Ranking List, updated August 2, 2017, https://grg.org/SC/WSRL.htm.

41 Yuka S. Minagawa, "Changing Life Expectancy and Health Expectancy Among Russian Adults: Results From the Past 20 Years," *Population Research and Policy Review* 37 (2018): 851-69, https://link.springer.com/article/10.1007/s11113-018-9478-0.

42 William Donner and Havidán Rodríguez, "Disaster Risk and Vulnerability: The Role and Impact of Population and Society," Population Reference Bureau, Jan. 8, 2011, https://www.prb.org/disaster-risk/.

43 World Health Organization (WHO), "Noncommunicable Diseases: Key Facts," June 1, 2018, https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases; and Hebe N. Gouda et al., "Burden of Non-Communicable Diseases in Sub-Saharan Africa, 1990-2017."

44 Paola Scommegna, "Noncommunicable Diseases Among Older Adults in Low- and Middle-Income Countries," *Today's Research on Aging* 26 (2012), https://www.prb.org/wp-content/uploads/2012/08/TodaysResearchAging26.pdf.

45 Toshiko Kaneda, "PRB Data Center Highlights Role of Youth in Combatting Noncommunicable Diseases," Population Reference Bureau, Sept. 11, 2020, https://www.prb.org/prb-data-center-highlights-role-of-youth-in-combatting-noncommunicable-diseases/.

46 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

47 Eileen Crimmins, "Trends in Mortality, Disease, and Physiological Status in the Older Population," in F*uture Directions for the Demography of Aging: Proceedings of a Workshop*, ed. National Academies of Sciences, Engineering, and Medicine (Washington, DC: National Academies Press, 2019).

48 Samuel H. Preston and Paul Taubman, "Socioeconomic Differences in Adult Mortality and Health Status," in *The Demography of Aging*, ed. Samuel H. Preston and Linda G. Martin (Washington, DC: National Academies Press, 1994), 279-318.

49 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

50 U.S. Centers for Disease Control and Prevention, "10 Leading Causes of Death by Age Group, United States, 2018," https://www.cdc.gov/injury/images/lc-charts/leading_causes_of_death_by_age_group_2018_1100w850h.jpg.

51 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*; and U.S. Census Bureau, Population and Housing Unit Estimates.

52 Samuel Preston and Haidong Wang, "Sex Mortality Differences in the United States: The Role of Cohort Smoking Patterns," *Demography* 43, no. 4 (2006): 631-46.

53 CDC WONDER, "About Underlying Cause of Death, 1999-2018," https://wonder.cdc.gov/ucd-icd10.html.

54 Robert A. Hummer and Elaine M. Hernandez, "The Effect of Educational Attainment on Adult Mortality in the United States," *Population Bulletin* 68, no. 1 (2013), https://www.prb.org/wp-content/uploads/2013/07/us-education-mortality.pdf.

55 Kenneth D. Kochanek et al., "Deaths: Final Data for 2017." *National Vital Statistics Reports* 68, no. 9 (2019), https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_09-508.pdf.

56 Kenneth D. Kochanek et al., "Deaths: Final Data for 2017."

57 Paola Scommegna, "New Studies Link U.S. Hispanics' Longer Life Expectancy to Migration Patterns, Less Smoking," Population Reference Bureau, Sept. 12, 2017, https://www.prb.org/hispanics-life-expectancy-migration-patterns/.

58 International Organization for Migration (IOM), *World Migration Report 2020*, https://www.un.org/sites/un2.un.org/files/wmr_2020.pdf.

59 U.S. Census Bureau, Tables: Population, Population Change, and Estimated Components of Population Change: April 1, 2010 to July 1, 2019, https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-total.html#par_textimage_1574439295.

60 UN, DESA, *World Urbanization Prospects 2018*, Annual Percentage of Population at Mid-Year Residing in Urban Areas, https://population.un.org/wup/DataQuery/.

61 D.A. Plane, C.J. Henrie, and M.J. Perry, "Migration Up and Down the Urban Hierarchy and Across the Life Course," *Proceedings of the National Academy of Sciences* 102, no. 43 (2005): 15313-18.

62 United Nations High Commissioner for Refugees (UNHCR), "Global Trends: Forced Displacement in 2018," https://www.unhcr.org/globaltrends2018/; and "Number of People Fleeing Conflict Is Highest Since World War II, U.N. Says," *The New York Times*, June 19, 2019, https://www.nytimes.com/2019/06/19/world/refugees-record-un.html.

63 Andrew W. Roberts et al., "The Population 65 Years and Older in the United States," U.S. Census Bureau, October 2018, https://www.census.gov/content/census/en/library/publications/2018/acs/acs-38.html.

64 IOM, *World Migration Report 2020*.

65 The World Bank, "Middle East and North Africa: Women in the Workforce," March 10, 2010, https://www.worldbank.org/en/news/feature/2010/03/10/middle-east-and-north-africa-women-in-the-workforce.

66 U.S. Census Bureau, "Geographic Mobility: 2018 to 2019," Table 17, https://www.census.gov/data/tables/2019/demo/geographic-mobility/cps-2019.html.

67 Philip Martin and Elizabeth Midgley, "Immigration: Shaping and Reshaping America, 2d ed.," *Population Bulletin* 61, no. 4 (2006): 18.

68 Mark Mather and Beth Jarosz, "U.S. Energy Boom Fuels Population Growth in Many Rural Counties," Population Reference Bureau, March 28, 2014, https://www.prb.org/us-oil-rich-counties/.

69 U.S. Department of Homeland Security (DHS), "Table 2. Persons Obtaining Lawful Permanent Resident Status by Region and Selected Country of Last Residence: Fiscal Years 2017 to 2019," *2019 Immigration Statistics Yearbook*, https://www.dhs.gov/immigration-statistics/yearbook/2019/table2.

70 U.S. Census Bureau, Population and Housing Unit Estimates, https://www.census.gov/programs-surveys/popest.html.

71 DHS, "Table 1. Persons Obtaining Lawful Permanent Resident Status: Fiscal Years 1820 to 2019," *2019 Yearbook of Immigration Statistics*, https://www.dhs.gov/immigration-statistics/yearbook/2019/table1.

72 Jens Manuel Krogstad and Ana Gonzalez-Barrera, "Key Facts About U.S. Immigration Policies and Proposed Changes," Pew Research Center, May 17, 2019, https://www.pewresearch.org/fact-tank/2019/05/17/key-facts-about-u-s-immigration-policies-and-proposed-changes/.

73 Jeffrey S. Passel and D'Vera Cohn, "U.S. Unauthorized Immigrants Are More Proficient in English, More Educated Than a Decade Ago," Pew Research Center, May 23, 2019, https://www.pewresearch.org/fact-tank/2019/05/23/u-s-undocumented-immigrants-are-more-proficient-in-english-more-educated-than-a-decade-ago/; and Jeffrey S. Passel, *Unauthorized Migrants: Numbers and Characteristics* (Washington, DC: Pew Hispanic Center, 2005).

74 Abby Budiman, "Key Findings About U.S. Immigrants," Pew Research Center, August 20, 2020, https://www.pewresearch.org/fact-tank/2020/08/20/key-findings-about-u-s-immigrants/.

75 IOM, *World Migration Report 2000*, 11-19, https://www.iom.int/world-migration-report-2000.

76 CDC, National Center for Health Statistics, "Births and Natality," https://www.cdc.gov/nchs/fastats/births.htm; and Jiaquan Xu et al., "Mortality in the United States, 2018," *NCHS Data Brief*, no. 355 (2020), https://www.cdc.gov/nchs/data/databriefs/db355-h.pdf.

77 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

78 UN, DESA, *World Population Prospects 2019: Volume I: Comprehensive Tables* (New York: United Nations, 2019), https://population.un.org/wpp/Publications/Files/WPP2019_Volume-I_Comprehensive-Tables.pdf.

79 UN, DESA, *World Population Prospects 2019*, Standard Projections; and Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

80 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

81 UN, DESA, *World Population Prospects 2019: Highlights.*

82 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

83 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

84 U.S. Census Bureau, "State Population Totals and Components of Change: 2010-2019," https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-total.html#par_textimage_1574439295.

85 U.S. Census Bureau, "State Population Totals and Components of Change: 2010-2019," and U.S. Census Bureau, "Projected Population Size and Births, Deaths, and Migration (Table 1)," https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html.

86 U.S. Census Bureau, "Detailed Age and Sex Composition of the Population (Table 3)," https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html.

87 UN, DESA, *World Population Prospects 2019*, Population Data, https://population.un.org/wpp/Download/Standard/Population/.

88 Diane J. Macunovich, *Birth Quake: The Baby Book and Its Aftershocks* (Chicago: University of Chicago Press, 2002), 1-31; and Marcia Guttentag and Paul F. Secord, *Too Many Women? The Sex Ratio Question* (Newbury Park, CA: Sage Publications, 1983).

89 Dudley L. Poston Jr., Eugenia Conde, and Bethany DeSalvo, "China's Unbalanced Sex Ratio at Birth, Millions of Excess Bachelors, and Societal Implications," *Vulnerable Children and Youth Studies: An International Interdisciplinary Journal for Research, Policy and Care* 6, no. 4 (2011): 314-20, https://www.tandfonline.com/doi/abs/10.1080/17450128.2011.630428.

90 William Julius Wilson, *When Work Disappears: The World of the New Urban Poor* (New York: Alfred A. Knopf, 1997); William Julius Wilson, *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy* (Chicago: University of Chicago Press, 1987); and Guttentag and Secord, *Too Many Women?*

91 Lori S. Ashford, "New Population Policies: Advancing Women's Health and Rights," *Population Bulletin* 56, no. 1 (2001).

92 UN, DESA, *World Population Prospects 2019*, Population Data.

93 UN, DESA, *World Population Prospects 2019*, Population Data.

94 UN, DESA, *World Population Prospects 2019*, Population Data.

95 Joel Perlmann and Mary Waters, *The New Race Question: How the Census Counts Multiracial Individuals* (New York: Russell Sage Foundation, 2002); and Paul R. Spickard, "The Illogic of American Racial Categories," in *Racially Mixed People in America*, ed. Maria P. P. Root (Newbury Park, CA: Sage Publications, 1992), 12-16.

96 UN, DESA, "Ethnocultural Characteristics," https://unstats.un.org/unsd/demographic/sconcerns/popchar/popcharmethods.htm.

97 Philip Martin and Jonas Widgren, "International Migration: Facing the Challenge," *Population Bulletin* 57, no. 1 (2002).

98 U.S. Census Bureau, *Fourteenth Census of the United States, January 1, 1920: Instructions to Enumerators* (Washington, DC: Government Printing Office, 1919), www.census.gov/history/pdf/1920instructions.pdf.

99 U.S. Census Bureau, "Overview of Race and Hispanic Origin: 2010," *2010 Census Briefs*, March 2011, https://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf.

100 U.S. Census Bureau, "Overview of Race and Hispanic Origin: 2010."

101 U.S. Census Bureau, American Community Survey, 2019. Table C04006, https://data.census.gov.

102 Jonathan Vespa, David M. Armstrong, and Lauren Medina, *Demographic Turning Points for the United States: Population Projections for 2020 to 2060* (Washington, DC: U.S. Census Bureau, 2018).

103 IOM, *World Migration Report 2018.*

104 UN, DESA, *World Urbanization Prospects 2018*, Urban and Rural Populations, https://population.un.org/wup/Download/.

105 UN, DESA, "68% of the World Population Projected to Live in Urban Areas by 2050, Says UN," May 16, 2018, https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html.

106 UN, DESA, *World Urbanization Prospects 2018* (New York: United Nations, 2019), https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf.

107 Darryl Cohen, "About 60.2M Live in Areas Most Vulnerable to Hurricanes," U.S. Census Bureau, July 15, 2019, https://www.census.gov/library/stories/2019/07/millions-of-americans-live-coastline-regions.html.

108 U.S. Census Bureau, Population and Housing Unit Estimates.

109 U.S. Census Bureau, 2010 Census: Population Density Data, https://www.census.gov/data/tables/2010/dec/density-data-text.html.

110 U.S. Census Bureau, Metropolitan and Micropolitan, https://www.census.gov/programs-surveys/metro-micro/about.html.

111 Frank Hobbs and Nicole Stoops, "Demographic Trends in the 20th Century," Figure 1-15, *Census 2000 Special Reports* (2002), https://www.census.gov/prod/2002pubs/censr-4.pdf; and U.S. Census Bureau, Population and Housing Unit Estimates.

112 Quentin Brummet and Davin Reed, "The Effects of Gentrification on the Well-Being and Opportunity of Original Resident Adults and Children," Federal Reserve Bank of Philadelphia, Working Papers Research Department, WP 19-30, 2019, https://www.philadelphiafed.org/-/media/research-and-data/publications/working-papers/2019/wp19-30.pdf?#.

113 Carl Haub and Toshiko Kaneda, *2011 World Population Data Sheet* (Washington, DC: Population Reference Bureau, 2011).

114 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

115 UN, DESA, *World Population Prospects 2019*, Probabilistic Projections, https://population.un.org/wpp/Download/Probabilistic/Population/.

116 UN, DESA, *World Population Prospects 2019*, Standard Projections, https://population.un.org/wpp/Download/Standard/Interpolated/.

117 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

118 James N. Gribble and Jason Bremner, "Achieving a Demographic Dividend," *Population Bulletin* 67, no. 2 (2013), https://www.prb.org/wp-content/uploads/2013/11/achieving-demographic-dividend.pdf.

119 Ben J. Wattenberg, *Fewer: How the Demography of Depopulation Will Shape Our Future* (Chicago: Ivan R. Dee, 2004); Phillip Longman, *The Empty Cradle: How Falling Birthrates Threaten World Prosperity and What to Do About It* (New York: Basic Books, 2004); and Michael S. Teitelbaum and Jay M. Winter, T*he Fear of Population Decline* (Orlando, FL: Academic Press, 1985).

120 Kaneda, Greenbaum, and Kline, *2020 World Population Data Sheet*.

121 UN, DESA, *World Population Prospects 2019*, Standard Projections.

122 UN, DESA, *World Population Ageing 2019: Highlights* (New York: United Nations, 2019), https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf.

123 U.S. Energy Information Administration, "Frequently Asked Questions (FAQs)," updated June 10, 2020, https://www.eia.gov/tools/faqs/faq.php?id=87&t=1.

124 UN, DESA, *World Population Prospects 2019: Highlights*.

125 UN, DESA, *Family Planning and the 2030 Agenda for Sustainable Development: Data Booklet*, 2019, https://www.un.org/en/development/desa/population/publications/pdf/family/familyPlanning_DataBooklet_2019.pdf.

PRB BOARD OF TRUSTEES

PRB MEMBERSHIP

BECOME A PRB MEMBER

PRB's work is made possible, in part, through the support of our members. As a PRB member, you'll receive all of PRB's signature publications, including the annual *World Population Data Sheet*, at no charge. You'll also be helping us achieve our mission of promoting and supporting evidence-based policies, practices, and decisionmaking to improve the health and well-being of people throughout the world. To join, visit PRB.org.

INDIVIDUAL	**$65**
LIBRARY	**$90**
CORPORATION	**$350**
LIFETIME MEMBERSHIP	**$6,000**

PRB is 501 (c)(3) not-for-profit organization awarded four stars by Charity Navigator.

VISIT WWW.PRB.ORG TO FIND:

FOCUS AREAS.
Explore policy-relevant areas where PRB applies much of its data, research, analysis, and communications expertise.

RESOURCES.
Access videos with leading experts, multimedia presentations to draw stakeholders to critical development conversations, analytical Population Bulletins, the Population Handbook on demography basics, policy training tools, and visual products like interactive infographics.

DATA.
Delve into indicators for the United States and around the world, and view data in map, tabular, or trend graph formats.

WORK WITH PRB.
Explore ways to partner with us, apply to one of our fellowships, and join our membership program. Donate to PRB, and learn about careers with us.

MONTHLY NEWSLETTER.
Sign up to receive email announcements about new web content and PRB-sponsored seminars and briefings.

POPULATION

An Introduction to Demography

PRB
Informing a Smarter World

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? How long will you live?

The answers to these seemingly mundane questions yield data critical to understanding past population trends and forecasting the future. Population growth and decline, along with changes in the composition and distribution of the global population, have a profound impact on many aspects of our lives.

Understanding these changes through demography—the scientific study of human populations—is essential to tackling many of our greatest challenges such as hunger, disease, conflict, and climate change. This guide provides an overview of three fundamental demographic processes—fertility, mortality, and migration—and their effects on population growth, decline, and composition.

PRB published the first edition of this *Population Bulletin* in 1991 as "Population: A Lively Introduction." This latest edition has been retitled and thoroughly revised to provide a greater understanding of why today's population trends matter—not just to researchers and academics but to all of us.

PRB.org 1875 Connecticut Ave., NW, Suite 520 Washington, D.C. 20009 USA 800-877-9881 @PRBdata ISSN 0032-468X | ISBN 978-0-917136-17-7