INTRODUCTION

Human beings have been around for a long time, perhaps a million or more years, but for most of that time the imprint of humans on the planet was scarcely noticeable. Humans were hunter-gatherers living a primitive existence marked by high fertility, high mortality, and only very slow population growth. Given the large amount of space required by a hunting-gathering society, it seems unlikely that the earth could support more than several million people living like that, so it comes as no surprise that the world population on the eve of the Agricultural Revolution (sometimes called the Neolithic Agrarian Revolution) about 10,000 years ago (8,000 BCE) is estimated at about 4 million.

POPULATION GROWTH OVER THE PAST TEN THOUSAND YEARS

Since hunting and gathering use resources extensively rather than intensively, it was natural that over tens of thousands of years humans would move into the remote corners of the earth in search of sustenance. Eventually, people in most of those corners began to use the environment more intensively, leading to the more sedentary, agricultural way of life that has characterized most of human society for the past 10,000 years, starting first in what is
now the Middle East, and then in what is now the eastern part of China, and
apparently popping up at roughly the same time in what are now Central
and South America.\(^5\)

The population began to grow more noticeably after the Agricultural
Revolution, although it is hard to detect this trend in Figure 2–1 because
the population was still tiny by comparison to today’s numbers. Between
8000 BCE and 5000 BCE, about 333 people on average were added to
the world’s total population each year, but by 500 BCE, as major civilizations
were being established in China, India, and Greece, the world was adding
100,000 people each year to the total. By the time of Christ (the Roman
Period, 1 CE), there may well have been more than 200 million people on the
planet, with their number increasing by nearly 300,000 each year. There was
some backsliding in the third through fifth centuries AD, when increases

\[\text{Figure 2–1 World Population Size from 8000 BCE to the Present and Projected}
\text{to 2100CE}\]

Data from the following sources: The population data from 8000 through 1900 are the aver-
age of the three different sets of estimates: Evedy C, Jones R. Atlas of World Population History. New
sixbillion/sixbillion.htm. Population figures for 1950 through 2100 are medium variant projec-
tions from the United Nations Population Division. World Population Prospects in World Population
in mortality, probably due to the plague, led to declining population size in the Mediterranean area as the Roman Empire collapsed, and in China as the Han empire collapsed from a combination of flood, famine, and rebellion. Population growth recovered its momentum only to be set back by yet another plague, the Black Death, that arrived in Europe in the middle of the 14th century and did not leave until the middle of the 17th century. After that, during the period from about 1650 to 1850, Europe as a whole experienced population growth as a result of the disappearance of the plague, the introduction of the potato from the Americas (which added calories and improved resistance to death), and evolutionary (although not revolutionary) changes in agricultural practice—probably a response to the receding of the Little Ice Age.

On the eve of the Industrial Revolution (about 1750), the population of the world was approaching 1 billion people and was increasing by more than 2 million every year. This was unprecedented in human history. Figure 2–1 shows rather dramatically that the beginnings of world population growth were associated with the emergence of the Enlightenment in Europe. Indeed, this initial population growth was occurring primarily in Europe and it is quite likely that the Enlightenment, and the scientific and industrial revolutions that took place as part of that huge change in Europe, occurred in part because of this population growth. An early proponent of the idea that population growth could be the trigger of economic development was the Danish economist Ester Boserup. In a set of extremely influential writings, she advanced the idea that, in the long run, a growing population is more likely than either a nongrowing population or a declining population to lead to economic development. The history of Europe shows that the Industrial Revolution and the increase in agricultural production were accompanied almost universally by population growth. Boserup’s argument is based on the thesis that population growth is the motivating force that brings about the clearing of uncultivated land, the draining of swamps, and the development of new crops, fertilizers, and irrigation techniques, all of which are linked to revolutions in agriculture.

Europe of 300 or 400 years ago was reaching the carrying capacity of its agricultural society. Europeans first spread out looking for more room, which led to cultivation of crops outside of Europe for Europeans to use, and then they began to invent more intensive uses of their resources to meet the needs of a growing population. The major resource was energy, which, with the discovery of fossil fuels (first coal, then oil, and more recently natural gas), helped to fire up the modern world.

The early seeds of global population growth were also importantly sown by the Enlightenment, with its emphasis on science, which, among many other things, started the process of bringing death under control. At the
same time, World War II was a global turning point: this seemingly catastrophic world event led to the spread of death control around the globe and triggered widespread population increase (Figure 2-2).

For tens of thousands of years the population of the world grew slowly—and then, within less than 300 years, the number of people mushroomed to more than 7 billion, with the majority of that growth occurring after World War II. There can be little question why the term “population explosion” was coined to describe these historically recent demographic events. The world’s population did not reach 1 billion until after the American Revolution—the United Nations fixes the year at 1804—but since then we have been adding each additional billion people at an accelerating pace. As noted in the Population and Reproductive Health chapter, the 2 billion mark was hit in 1927, just before the Great Depression and 123 years after

![Figure 2–2 Detail of World Population Growth from 1800 to 2100](image-url)

the first billion; 3 billion in 1960 (33 years); 4 billion in 1974 (14 years); 5 billion in 1987 (13 years); 6 billion in 1999 (12 years); and 7 billion in 2011 (12 years). The United Nations Population Division projects that the world population will reach 8 billion by 2025, 9 billion before 2045, and 10 billion by 2085.

It is obviously difficult to say what will happen a half-century or more from now, because even small differences in the number of children born to women or in the death rate can create huge differences in long-range projections. Nevertheless, nearly everyone agrees that global population growth is likely to come to an end sometime late in this century. Furthermore, as discussed later in the chapter, almost all of the population increase between now and the end of this century will occur in the developing nations.

POPULATION GROWTH: RATES VERSUS NUMBERS

There is no question that the rapid rate of growth over the past 200 years has been explosive. The revolutionary consequence of that explosion is that the numbers of people are destined to stay vastly higher than they were 200 years ago, creating huge problems that have to be dealt with. If we look back to the year 1550—250 years before the world population reached 1 billion—we find that the population was about half what it was in 1800; we were clearly in the early stages of the population explosion. But if we look ahead 250 years from that point in 1800, we see there will be nine times as many people in 2050 as there were in 1800. Dealing with this dramatic rise in numbers has driven changes taking place everywhere in the world.

Regardless of the rate of growth (which is the explosive part), the numbers are what we actually cope with. Of course, the combination of rates and numbers means that a big increase in population in a short period of time is more challenging to deal with than a big increase over a longer span of time. The rate of population growth for the world peaked around 1970 and has been declining since then. This ought to be good news, but as we build on an ever larger base of human beings, the lower rates of growth are still producing very large absolute increases in the human population. When you build on a base of more than 7 billion (the current population), the seemingly slow rate of growth of about 1.1% per year for the world still translates into the annual addition of more than 78 million people, whereas “only” 71 million were added annually when the rate of growth peaked in 1970. There were scarcely more than 20 million people being added each year when the world population was last growing at about 1% per year, back in the early 1950s. Put another way, during the next 12 months, approximately 134 million babies will be born in the world, while 56 million people of all
ages will die, resulting in a net addition of about 78 million people. Just in
the two seconds that it took you to read that sentence, 9 babies were born
while 4 people died, so the world’s population increased by 5.

WHY WAS POPULATION GROWTH SO LOW FOR
MOST OF HUMAN HISTORY?

The reason the population grew so slowly during the first 99% of human
history was that death rates were very high, yet very few populations tried to
maximize the number of children born.\textsuperscript{15,16} During the hunting-gathering
phase of human history (hundreds of thousands of years), it is likely that
life expectancy at birth averaged about 20 years.\textsuperscript{16,17} At this level of mortality,
more than half of all children born will die before age 5, and the average
woman who survives through the reproductive years will have to bear nearly
7 children to assure that 2 will survive to adulthood. This is a lot of children,
to be sure, but only about half of what might be thought of as the biological
maximum for a group of humans. Of course, given the high mortality rates,
an average of 7 means that many women will have died giving birth to their
first or second child, balanced at the other end by those women surviving
to have 12 or 13 children.

Research in the 20th century among the last of the hunting-gathering
populations in sub-Saharan Africa suggests that a premodern woman might
have deliberately limited the number of children born by spacing them a few
years apart to make it easier to nurse and carry her youngest child and to
permit her to do her work.\textsuperscript{18} She may have accomplished this by abstinence,
abortion, or possibly even infanticide.\textsuperscript{19,20} Hern’s work among the Shipibo
in the Peruvian Amazon region illustrates the desire of women in premodern
societies to limit fertility, but with almost no success. Indeed, it is likely that
the only truly effective means of family size limitation prior to the modern
era was infanticide, which is “child control” (occurring as it does after a live
birth), but not actually “fertility control.”\textsuperscript{21} The withdrawal method is men-
tioned in the Old Testament, but the standard joke (among demographers,
at least) is that people who use this strategy, like any “natural” fertility con-
trol method, are called “parents.”

It seems logical to think that the Agricultural Revolution increased growth
rates among human populations as a result of people settling down in stable
farming communities, where death rates were lowered. Sedentary life was
assumed to have improved living conditions because of the more reliable
supply of food. The idea would be that birth rates remained high but death
rates declined slightly, with the end result that the population grew. However,
archaeological evidence combined with studies of extant hunter-gatherer
groups suggests another explanation for growth during this period of human history. It is likely that fertility rates rose as new diets improved the ability of women to conceive and bear children. Frisch was among the first to suggest that a certain amount of fat must be stored as energy before menstruation and ovulation can occur on a regular basis. Thus, if a woman’s level of nutrition is not sufficient to permit fat accumulation, she may experience a temporary absence or suppression of menstruation) and/or anovulatory cycles, in which no egg is released. For younger women, the onset of puberty may be delayed until an undernourished girl reaches a certain critical weight.

A related feature of sedentary life is that it became easier to wean children from the breast earlier because of the greater availability of soft foods, which are easily eaten by babies. This would have shortened the birth intervals, and the birth rate could have risen on that account alone, and to a level higher than the death rate, thus promoting population growth. At the same time, the sedentary life and the higher-density living associated with farming probably raised death rates, rather than lowering them, by creating sanitation problems and heightening exposure to communicable diseases, at the same time that the higher birth rate would have put pressure on what were surely limited resources. Nonetheless, growth rates probably went up even in the face of higher mortality as the constraints of hunter-gatherer life were reduced and fertility rates rose to a level slightly higher than the death rate.

It should be kept in mind, of course, that only a small difference between birth and death rates is required to account for the slow growth achieved between 8000 BCE and 1750 CE, when the world was adding an average of only 67,000 people each year to the population. Currently, that many people are being added every 7.5 hours.

WHAT EXPLAINS THE EXPLOSION IN NUMBERS SINCE THE 18TH CENTURY?

The acceleration in population growth after 1750 was due almost entirely to the declines in the death rate that accompanied the scientific revolution that was a significant part of the Enlightenment. First in Europe and North America, and more recently in the rest of the world, death rates have decreased sooner and much more rapidly than have fertility rates. The result has been that many fewer people die than are born each year. In the more-developed countries, declines in mortality at first were due to the effects of economic development and a rising standard of living—people were eating better, wearing warmer clothes, living in better houses, bathing more often, drinking cleaner water, and so on. These improvements in the human condition helped to lower exposure to disease and build up resistance to illness.
Clean water, toilets, bathing facilities, systems of sewerage, and buildings secure from rodents and other disease-carrying animals are all public ingredients for better health. We now accept the importance of washing our hands as common sense, but the important work of Semmelweis in Vienna, Lister in Glasgow, and Pasteur in Paris in validating the germ theory actually took place only in the mid-19th century—just a heartbeat away from us in the overall timeline of human history. Public health is largely a matter of preventing the spread of disease, and these kinds of measures have been critical in the worldwide decline in mortality (see Box 2–1). The medical model of curing disease gets much more attention in the modern world, but its usefulness is predicated on the underlying foundation of good public health. Cutler and Miller point to the particularly important role played by the introduction of clean water technology (chlorination and filtration) in cities of the United States in the late 18th and early 20th centuries, the time period when life expectancy made its single biggest jump in U.S. history. This was, of course, a direct application of the germ theory.

As already noted, declines in death rates first occurred in those regions of the world experiencing economic development in the 19th and early 20th centuries, primarily Europe and North America. Fertility also began to decline in these parts of the world within at least one or two generations after their death rates began its drop. However, since World War II, medical and public health technology has been available to virtually all

---

**Box 2–1  Key Elements in Postponing Death Among Humans**

**19th Century**
- Improved nutrition (occurred first in Western Europe)
- Clean water (Snow in London)
- Sewerage in cities (sanitation studies in Liverpool)
- Small pox vaccinations (Jenner in England)
- Validation of germ theory (Semmelweis in Vienna, Lister in Glasgow, Pasteur in Paris)

**20th Century**
- Health as a social movement
- Antibiotics
- More vaccinations
- Oral rehydration therapy for infants
- Advanced diagnoses, drugs, and other treatments for degenerative diseases to keep older people alive longer
countries of the world regardless of their level of economic development. In the less-developed countries, although the risk of death has been lowered dramatically, birth rates have gone down less quickly, and the result is continuing population growth. For at least 200 years, from 1750 to 1950, the rich countries were the places where population was growing the fastest. Since then, the pattern has reversed and it is now the poorer countries whose populations are growing most quickly.

MIGRATION AND POPULATION CHANGE

As populations have grown disproportionately in different areas of the world, the pressures or desires to migrate have also grown. Migration streams generally flow from areas where there are too few jobs to areas where there is a greater availability of jobs—that is, from poorer to richer economies. Thus, especially since the end of World War II, we have seen migration from Latin America and Asia to the United States; from Asia and Latin America to Canada; from Africa, Latin America, and Asia to Europe; and within Europe from the east to the west.

In earlier decades, a shortage of jobs generally occurred when the population grew dense in a particular region, and people then felt pressured to migrate to some other less populated area. This pattern of migration characterized the expansion of European populations into other parts of the world, especially North America, as European farmers sought land in less densely settled areas. This phenomenon of European expansion is, of course, critically important because as Europeans moved around the world, either as settlers or conquerors, they altered patterns of life, including their own, wherever they went.

European Expansion

Beginning in the 14th century, migration out of Europe started gaining momentum, and this movement virtually revolutionized the entire human population. With their gun-laden sailboats, Europeans began to stake out the less-developed areas of the world in the 15th and 16th centuries, with the English and French settling North America and the Spanish and Portuguese exploiting (more than settling) Central and South America. Migration of Europeans to other parts of the world on a massive scale took hold in the 19th century, when the European nations began to industrialize and swell in numbers due to the decline in mortality. At the same time (and for the same reasons), the invention of steam-powered ships made ocean travel faster and safer, thus facilitating long-distance migration.
Before the great expansion of European people and culture, Europeans represented about 18% of the world’s population, with almost 90% of these people living in Europe itself. By the 1930s, at the peak of European dominance in the world, people of European origin in Europe, North America, and Oceania accounted for 35% of the world’s population. By the beginning of the 21st century, this share had declined to 16%, and it is projected to drop to 13% by the middle of this century. However, even that may be a bit of an exaggeration, since the rate of growth in North American and European countries is increasingly influenced by immigrants and births to immigrants from developing nations.

South to North Migration

Since the 1930s, the outward expansion of Europeans has ceased. Until that time, European populations had been growing more rapidly than the populations in Africa, Asia, and Latin America, but since World War II that trend has been reversed. The less-developed areas now have by far the most rapidly growing populations. It has been said that “population growth used to be a reward for doing well; now it’s a scourge for doing badly.” This change in the pattern of population growth has resulted in a shift in the direction of migration. For the past half-century there has been far more migration from less-developed countries (the “South”) to developed areas (the “North”) than the reverse. Furthermore, since migrants from less-developed areas generally have higher levels of fertility than natives of the developed regions, their migration makes a disproportionate contribution over time to the overall population increase in the developed areas to which they have migrated. As a result, the proportion of the population whose origin is one of the modern world’s less-developed nations tends to be on the rise in nearly every developed country. Within the United States, for example, non-Latino whites (the European-origin population) are no longer the majority in the state of California, and it is likely that Latinos (largely of Mexican ancestry) will represent the majority of Californians by the middle of this century given that the majority of all births in California (as in all southwestern states) are now to Latina mothers.

When Europeans migrated, they generally filled up territory that had very few people, because they tended to move to land used by hunter-gatherers who, as noted earlier, use land extensively rather than intensively. Those seemingly empty lands or frontiers have essentially disappeared today, and as a consequence migration into a country now results in more
noticeable increases in population density. Moreover, just as the migration of Europeans was typically greeted with violence from the indigenous populations upon whose lands they were encroaching, migrants today routinely meet with prejudice, discrimination, and violence in the places to which they have moved, even as their labor is valued by the host community. An important difference is that today’s migrants tend to settle in cities and suburbs, rather than the countryside.

The Urban Revolution

Until very recently in world history, almost everyone lived in basically rural areas. Large cities were few and far between. For example, Rome’s population of 650,000 in 100 CE was probably the largest in the ancient world. It is estimated that as recently as 1800, less than 1% of the world’s population lived in cities of 100,000 or more. Nearly half of all humans now live in cities of that size.

The redistribution of people from rural to urban areas occurred earliest and most markedly in the now developed nations, and this pattern was closely linked to industrialization. In 1800 about 10% of the English population lived in urban areas, primarily London. Two hundred years later, 90% of the British lived in cities. Similar patterns of urbanization have been experienced in other European countries, the United States, Canada, and Japan as they have industrialized. In the less-developed areas of the world, urbanization was initially associated with a commercial response to industrialization in Europe, America, and Japan. In other words, in many areas where industrialization was not occurring, Europeans had established colonies or trade relationships. The principal economic activities in these areas were not industrial but commercial in nature, associated with buying and selling. The wealth acquired by people engaged in these activities naturally attracted attention, and urban centers sprang up all over the world as Europeans sought populations to whom they could sell their goods, often in exchange for raw materials to keep industrialization going.

During the second half of the 20th century, when the world began to urbanize in earnest, the underlying cause was the rapid growth of the rural population. The rural population in every less-developed nation has outstripped the ability of the agricultural economy to absorb it. Paradoxically, to grow enough food for an increasing population, people have been replaced by machines in agriculture—a trend has sent the now jobless rural youth off to the cities in search of work.
DEMOGRAPHIC DIVIDE

Ever since the Enlightenment and its aftermath, the West has been different demographically and economically than the rest of the world. These differences are now narrowing in many respects, but we are still coping with a world in which the haves and the have-nots—that is, developed and developing countries—are divided not only by income and rates of population growth, but also by distinctly different population structures. The legacy of several decades of low fertility and low mortality in the developed countries is an increasingly older population, whereas a much later start to the fertility decline, combined with ever lower mortality, keeps the populations of developing areas (countries “in transition,” as they are sometimes called) with significantly younger population age structures. As these younger people grow up and look around for jobs, the response of the world to their situation will tell the tale of what the future will be.

In the less-developed nations, the population continues to grow quickly, especially in absolute terms. In sub-Saharan Africa, this growth is happening even in the face of the HIV/AIDS pandemic. In contrast, in the more-developed countries, population growth has slowed, stopped, or in some places even started to decline. As we look around the world, we see that the more rapidly growing countries tend to have high proportions of people who are young, poor, prone to disease, and susceptible to political instability. The countries that are growing slowly or not at all tend to have populations that are older, richer, and healthier; in addition, these nations are politically more stable and are calling the shots in the world right now. However, keep in mind that there is almost certainly something to the idea that “demography is destiny”: A country cannot readily escape the demographic changes put into motion by the universally sought-after decline in mortality. Each country has to learn how to read its own demographic situation, and cope as well as it can with the inevitable changes that will take place as it evolves through all phases of the demographic transition. Too many people look to the past and wish they could revive those earlier demographic structures, rather than realizing that the “past” was actually a period of transition that would inevitably lead to a different future.

HOW IS THE POPULATION CURRENTLY DISTRIBUTED IN THE WORLD?

The 20 largest countries in the world currently account for nearly three fourths (71% as of the year 2010) of the world’s population, but only 38% of the world’s land surface. The top 5 countries in terms of total population include...
China, India, the United States, Indonesia, and Brazil (Table 2–1; Figure 2–3). Rounding out the top 10 are Pakistan, Bangladesh, Nigeria, Russia, and Japan. Mexico heads up the next 10, followed by the Philippines, Vietnam, Ethiopia, Germany, Egypt, Turkey, Congo (Kinshasa), Iran, and Thailand. The remaining 29% of the world’s population is spread out among more than 200 other countries that account for the remaining 62% of the earth’s terrain.

China and India (or more technically the Indian subcontinent, including the modern nations of India, Pakistan, and Bangladesh) were already the

<table>
<thead>
<tr>
<th>Country</th>
<th>Population 2010</th>
<th>Land Surface (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1,330,141,295</td>
<td>9,425,846</td>
</tr>
<tr>
<td>India</td>
<td>1,173,108,018</td>
<td>3,178,010</td>
</tr>
<tr>
<td>United States</td>
<td>310,232,863</td>
<td>9,489,567</td>
</tr>
<tr>
<td>Indonesia</td>
<td>242,968,342</td>
<td>1,908,515</td>
</tr>
<tr>
<td>Brazil</td>
<td>201,103,330</td>
<td>8,520,377</td>
</tr>
<tr>
<td>Pakistan</td>
<td>177,276,594</td>
<td>803,188</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>158,065,841</td>
<td>141,217</td>
</tr>
<tr>
<td>Nigeria</td>
<td>152,217,341</td>
<td>910,614</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>139,390,205</td>
<td>16,631,081</td>
</tr>
<tr>
<td>Japan</td>
<td>126,804,433</td>
<td>380,746</td>
</tr>
<tr>
<td>Mexico</td>
<td>112,468,855</td>
<td>1,952,898</td>
</tr>
<tr>
<td>Philippines</td>
<td>99,900,177</td>
<td>308,612</td>
</tr>
<tr>
<td>Vietnam</td>
<td>89,571,130</td>
<td>328,026</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>88,013,491</td>
<td>1,259,921</td>
</tr>
<tr>
<td>Germany</td>
<td>82,282,988</td>
<td>362,301</td>
</tr>
<tr>
<td>Egypt</td>
<td>80,471,869</td>
<td>989,725</td>
</tr>
<tr>
<td>Turkey</td>
<td>77,804,122</td>
<td>778,859</td>
</tr>
<tr>
<td>Congo (Kinshasa)</td>
<td>70,916,439</td>
<td>2,344,649</td>
</tr>
<tr>
<td>Iran</td>
<td>67,037,517</td>
<td>1,625,528</td>
</tr>
<tr>
<td>Thailand</td>
<td>66,404,688</td>
<td>516,378</td>
</tr>
<tr>
<td>Top Twenty</td>
<td>4,846,179,538</td>
<td>61,856,060</td>
</tr>
<tr>
<td>Total as of 2010</td>
<td>6,851,673,664</td>
<td>164,662,261</td>
</tr>
<tr>
<td>Top Twenty as Percentage</td>
<td>71</td>
<td>38</td>
</tr>
</tbody>
</table>

most populous places on earth in the year 1500, with Asia accounting for 53% of the world’s 461 million people in that year. Five centuries later, the population in Asian countries accounts for 61% of all the people on earth, although this share is projected to shrink to 58% by the year 2050, as China’s growth halts while Africa surges ahead.

Sub-Saharan Africa had about as many people as did Europe in 1500. However, contact with Europeans tended to be deadly for Africans (as it was for the native peoples in North and South America) because of disease, violence, and slavery. In the 20th century, sub-Saharan Africa rebounded in population size, to the point that it accounts for 10% of the total world population in 2000. In recent decades, high mortality from HIV/AIDS has slowed the rate of population growth in sub-Saharan Africa, but the United Nations projects that because of the continued above-replacement-level fertility levels in the region, sub-Saharan Africa could account for more than 18% of the world’s population in 2050—even beyond where it had been in percentage terms in the year 1500, and with more than twice as many people as are projected to reside in Europe in 2050.

Before the Great Depression of the 1930s, the populations of Europe and, especially, North America were the most rapidly growing in the world. During the decade of the 1930s, growth rates declined in those two areas until they approximated the rates found in most of the rest of the world. Since the end of World War II, the situation has changed again: Now Europe is on the verge of depopulation, while rapid growth in the less-developed countries of Africa, Asia, and (to lesser extent) Latin America is now responsible for almost all of the world’s population increase.
PATTERNS OF POPULATION GROWTH

The world’s population is currently growing at a rate of 1.1% annually—78 million people per year, as noted earlier, albeit with a lot of variability underlying those global numbers. We expect Europe, as a region, and Japan, as a nation, to have fewer people in 2050 than they have now. Populations in all other areas of the world will continue to grow in size or stop growing, but are not expected to start declining.

Are We Headed for a Population “Implosion”? 

An implosion is something that collapses into itself—the opposite of an explosion. As the rate of population growth has slowed down over the past three decades, there has been talk of a population implosion, implying that “the world is in for some rapid downsizing.” Although the world’s population is in no danger of imploding anytime soon, the same cannot be said for the populations in much of Europe and East Asia. Several countries in these areas are either already declining in population or on the verge of doing so. The populations in Europe and East Asia all have birth rates that are below replacement level and have been that way for some time now, leading to a declining number of people in the younger age cohorts. It appears that the low fertility in countries like Russia is not just a temporary phenomenon. Rather, the evidence suggests that the motivation to have large families has disappeared and has been replaced by a propensity to try to improve the family’s standard of living by limiting the number of children. The situation in Russia is further complicated by the loss of a few years of life expectancy over the past couple of decades, which has further accelerated its population implosion. Although Russia’s decline in population is moderated by consistent immigration from Asia (especially the Central Asian republics that were part of the former Soviet Union), most other Eastern European nations add to low fertility the demographic complication that people are leaving to go elsewhere—primarily to Western Europe, but also to North America.

According to data from the United Nations Population Division, 16 countries in 2010 had fewer people than they did in 2000. All 16 of these countries were in Eastern Europe; they were led by Russia and several former members of the Soviet Union, including Ukraine, Belarus, Georgia, Kazakhstan, the Republic of Moldova, Lithuania, Latvia, and Estonia. It is probably safe to say that the former Soviet Union has imploded.

The more controversial issue has been the aging of the populations in Europe and East Asia as a consequence of the low birth rate. A number of
countries are expected to have at least 20% of their populations be age 65 or older in 2025 while at the same time having less than 20% of their populations be younger than age 15. These include some of the biggest and most dynamic economies in the world, but that status is threatened by the fact that the proportion of the population that is 65 and older is growing rapidly, whereas the younger population is shrinking.

One reaction to this situation is to suggest that it is a good thing for the planet as a whole, if not necessarily for Europeans. Residents of these countries are among the highest per-person consumers of the earth’s resources; if these populations eventually decline in size, their impact on the environment will be lower, thereby lessening the chance of global environmental and economic collapse. Within most of these countries, however, there is a concern about the economic impact of what many people call a “silver tsunami.” Who will earn the money that is to be paid to retirees as pensions? Who will pay for the healthcare and social needs of the elderly? Who will keep the economy going so that the standard of living does not drop even as the expenses associated with population aging increase?

Among the proposed solutions are (1) trying to raise the birth rate, (2) trying to increase labor force participation among older persons, and (3) replacing the “missing” population with immigrants. With respect to the birth rate solution, those countries with the lowest fertility rates turn out to be those in which the least accommodation has been made to permit women to simultaneously have a job and a family. The availability of daycare programs, maternity leave, and family leave, combined with societal pressure for men to help with childrearing and housework, tend to increase the ability of women to participate in the labor force and still have children. Men have obviously always had that ability, but many countries, especially in Southern and Eastern Europe and East Asia, have opened up the labor market to women without making it easy to combine a woman’s participation in the labor force with a family. The result has been birth rates depressed below what they might otherwise be. Researchers have also noted that the effect of a low birth rate would be a little less severe if women simply had children at a younger age, even if they had the same number of offspring as they are currently having. This would shorten the time between generations and would actually increase the growth rate by a slight amount.

The impact of an aging population on a nation’s economy is exacerbated by the preference for retirement at an early age. For most of human history, people simply worked until they were physically no longer able to do so. Retirement has been widely available in the rich countries of the world only for the past half-century or so, but ever since that option was offered, people have been grabbing it—people prefer retirement to work (no surprise!).
Thus, we have witnessed the situation in which even as life expectancy has increased, people have been choosing to retire Earlier. This trend would not be a problem if all of these people had actually saved up enough money to live comfortably during a protracted retirement, but this is largely not the case. For the most part, people have been promised a retirement pension that is based on the transfer of money from people currently in the labor force (through taxation) to people who are retired (the “pay-as-you-go” or PAYGO scheme). As long as the population was growing and the economy was improving, these promises were easy to keep (almost like a Ponzi scheme); when these very same people who now want to collect a pension have not had enough children to supply the needs of the labor force, however, there is a problem. One solution being promoted is to raise the age at retirement, perhaps to as high as 75. Encouraging older people to work longer means that they will continue to pay taxes to fund the pensions of those who are retired. At the same time, these older workers would not be burdening the system with their own pension demands. Vaupel and Loichinger have even suggested that if older people stayed in the work force longer, the number of hours worked by younger people could be reduced somewhat, which might in turn encourage a rise in the birth rate.

The short-term solution to labor shortages in the world has always been to import labor. This pattern explains the history of slavery in the Americas, and then the history of waves of immigrants to the United States from England, Germany, Italy, Mexico, and elsewhere. It also describes the history of England, Germany, France, and several other European countries that needed labor to rebuild their economies after World War II. Between 1945 and the early 1970s, European nations allowed migration from former colonies, and they instituted guest worker programs, in which people contract to work for a few years and then go home again. The rub is that many workers choose not to go home. They stay, build families, and become part of the fabric of their adopted society. If workers came for a while, worked, and then left as they got older and were replaced by younger people, immigration would not be a particularly thorny issue. The Gulf States in the Middle East have managed to accomplish this outcome largely by prohibiting workers from having families with them, and by forcing the deportation of workers who overstay their contracts.

Europeans have rarely been willing to take those extreme measures, so guest workers are likely to stay past the end of their contract to become undocumented immigrants. The reality, then, is that replacement migration in Europe means the immigration of not just workers but also their families. Within a generation or two, the children of these immigrants can become a major force in the demographic makeup of the receiving countries. In the
meantime, many of these immigrants are not in the labor force, so they are not working and paying taxes—thus they are not exactly “replacing” the older population.42

France and the United Kingdom have both taken in significant numbers of permanent immigrants from former colonies and, as a result, neither country is projected to experience a decline in population over the next several decades. But the fact that an estimated 10% of France’s population is now Muslim has created a variety of political and social dilemmas for that country. Studies conducted by the Pew Research Center have shown that immigration is strongly opposed throughout Europe, but paradoxically (and perhaps more positively, in terms of future policies) there is more support for it among the young than among the old.43

Japan, like other Asian countries, has an extremely restrictive immigration policy because of an explicit desire to preserve the country’s ethnic homogeneity. Although Japan does tolerate a small number of immigrants, it is unlikely that the country will soon allow an invasion of workers to prevent its impending population implosion, despite concerns that the declining native population may significantly harm the nation’s economy.44 Japan’s low birth rate is slightly counterbalanced by the extreme longevity of the Japanese—they have the second highest life expectancy in the world (only recently overtaken by Hong Kong)—but that translates into one on four Japanese being age 65 or older—the highest percentage in the world.

WHAT DOES THE FUTURE HOLD DEMOGRAPHICALLY?

Now, and for the foreseeable future, almost all of the growth of the world’s population is originating in less-developed nations. The term “originating” is an apt one because some of that growth then spills into the more-developed countries (especially the United States and Canada) through migration. Even more significantly, almost all of that growth is expected to show up in cities of developing nations.

Figure 2–4 maps the countries of the world based on the projected increase in total population size between 2010 and 2050, according to projections from the United Nations Population Division, with the underlying data shown in Table 2–2. You can see clearly that India is projected to be the single most important source of population increase between now and the middle of the 21st century. It takes the prize for being on a trajectory to add nearly half a billion people to its current population. India’s death rate has been steadily declining at a faster rate than its birth rate has been declining. The average woman in India is
Figure 2-4 Countries According to Population Growth


Table 2-2 Top Twenty Countries of the World in Terms of Projected Population Growth Between 2010 and 2050

<table>
<thead>
<tr>
<th>Country</th>
<th>Projected Population Increase, 2010–2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>483,445,614</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>190,269,646</td>
</tr>
<tr>
<td>United States</td>
<td>128,777,390</td>
</tr>
<tr>
<td>Congo (Kinshasa)</td>
<td>118,394,410</td>
</tr>
<tr>
<td>Nigeria</td>
<td>112,045,064</td>
</tr>
<tr>
<td>Pakistan</td>
<td>99,152,164</td>
</tr>
<tr>
<td>Uganda</td>
<td>94,608,832</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>75,521,438</td>
</tr>
<tr>
<td>Philippines</td>
<td>72,064,010</td>
</tr>
<tr>
<td>Indonesia</td>
<td>70,052,505</td>
</tr>
<tr>
<td>Brazil</td>
<td>59,589,163</td>
</tr>
<tr>
<td>Egypt</td>
<td>57,400,653</td>
</tr>
<tr>
<td>Sudan</td>
<td>46,247,579</td>
</tr>
<tr>
<td>Niger</td>
<td>39,426,178</td>
</tr>
<tr>
<td>Mexico</td>
<td>35,438,795</td>
</tr>
<tr>
<td>Madagascar</td>
<td>35,231,983</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>31,187,698</td>
</tr>
</tbody>
</table>

(Continued)
having 2.5 children—far fewer than just a few decades ago, but now most of those children are surviving to adulthood. Given that World Bank data show that more than two out of every three residents of India currently live on less than $2 per day, you can appreciate the struggle that will be part of India’s future. It will share that struggle with its subcontinental neighbors of Pakistan and Bangladesh, whose own populations will collectively grow by about 175 million people through 2050. The southeast Asian nations of Indonesia and the Philippines are both expected to add tens of millions more people to the world population. Sub-Saharan Africa is projected to contribute another half billion people in just four countries alone, led by Ethiopia, Congo (Kinshasa), Nigeria, and Uganda. The countries in western Asia—regionally between sub-Saharan Africa and South Asia—are also projected to grow by tens of millions of people.

The United States is in the top 10 list of countries in terms of expected growth between now and 2050, with its total population growing from 310 million in 2010 to almost 400 million by 2050. In 2009, the U.S. Census Bureau made projections assuming zero net international migration; it resulted in a very different scenario characterized by an increase to only 322 million by 2050, if there were no more immigrants after 2010. Thus, if the U.S. population really does approach 400 million by 2050, that growth will have been fueled almost entirely by immigrants and their children. On these grounds alone, it is understandable that immigration is both a hot topic and an issue that cannot easily be resolved. Brazil and Mexico are expected to be other high-demographic-growth areas in the Americas, even when taking into account the outmigration from those countries to the United States and elsewhere.

Conspicuously absent from future growth is China. This country experienced a huge increase in its population (750 million people) after the end of World War II, but it is expected to soon reach its goal of halting population growth. Finally, if we consider rates of growth instead of sheer population

<table>
<thead>
<tr>
<th>Country</th>
<th>Projected Population Increase, 2010–2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iraq</td>
<td>26,644,724</td>
</tr>
<tr>
<td>Kenya</td>
<td>25,129,298</td>
</tr>
<tr>
<td>Tanzania</td>
<td>24,950,417</td>
</tr>
<tr>
<td>Total for Top 20</td>
<td>1,825,577,561</td>
</tr>
<tr>
<td>Percentage of World Increase</td>
<td>76.7</td>
</tr>
</tbody>
</table>

size, sub-Saharan Africa, the Middle East, and Western Asia jump out as the places that are anticipated to be growing most quickly in the world—places where local communities will certainly be under the greatest pressure to cope with their burgeoning populations. And, of course, it is inconceivable that rapid growth in these places will not forcefully impact the richer, slower (or non-) growing nations as well.

CONCLUSION

For most of human history, the world population grew very slowly (indeed, sometimes not at all, and sometimes it even declined) as a result of universally high death rates. To maintain themselves, humans created a variety of social institutions to ensure the continuation of the group, including early and universal marriage for girls, and pressure on women to conceive and bear children. These pronatalist views are reified in the texts of all major religions of the world. In the face of historically high death rates, the average woman had to bear 5 to 7 live children just to have 2 who would survive to adulthood. Since getting pregnant is one of the most life-threatening things a young woman can do, especially anytime prior to the past few decades, you can appreciate why some strong motivation might be required to repeatedly bear children.

That situation changed with the Enlightenment and the scientific revolution, which formed a core part of thinking about the world that emerged in Europe and North America scarcely more than 200 years ago. Our new ability to control disease and postpone death to ever older ages was the most transformative thing that ever happened to humans. It helped to change every major aspect of human existence, leading eventually to lower fertility and the resulting freedom of women to be more than reproductive machines, while creating massive changes in the size and age structure of populations, and leading to migration and especially urbanization, which is associated with new ways of organizing everyday life around these new demographic realities.

Although we are on a trajectory to eventually level off in terms of global population size, we still have a long way to go, given our current expectations about future population growth. Between now and the end of the 21st century, the world population is likely to grow by an additional 3 billion people. At the beginning of the 22nd century, the world’s population will be 10 times greater than it was just 300 years earlier. Furthermore, the majority of people will live in cities of developing countries, rather than in the countryside. The future will indeed be a foreign country.
**Discussion Questions**

1. Why did the human population grow so slowly over most of its history?
2. Which is more important: the rate of growth or the increasing numbers of people? Explain your answer.
3. Is population implosion a positive development? Compare its effects to those of population explosion.
4. Discuss the importance of urbanization for the future of world population.
5. What is the “demographic divide” and why is it significant?

**References**

Chapter 2: History and Future of World Population