

▶ CASE STUDY

ONE BILLION AND COUNTING

GOAL

To learn how to interpret **population pyramids** and to apply that knowledge to understand population projections. You will simulate the effects of future fertility rate assumptions on the shape of pyramids and interactively examine the **hidden momentum** of population growth (i.e., why a long lag occurs between declining fertility and the end of population growth).

LEARNING OUTCOMES

After completing the chapter, you will be able to:

- Relate the shape of population pyramids to a country's birth, death, and growth rates.
- Differentiate population pyramids of countries with rapid, slow, and negative population growth.
- Understand the hidden momentum built into current population pyramids.
- Recognize the hypothetical nature of population projections.

SPECIAL MATERIALS NEEDED

- Computer with high-speed Internet access and a recent release of a Web browser. If using the student Companion Site with the printed book, click on *Tech Support* for system requirements and technical support. (If using the e-book in WileyPlus, click on *Help* for details about the system requirements.)

BACKGROUND

Sometime in 2000, India joined China in the One-Billion Club of demographic giants (Table 5.2). Because of its higher

TABLE 5.2 Ten Most Populous Countries, 2008

Rank	Country	Population in 2008 (millions)
1	China	1,325
2	India	1,149
3	United States	305
4	Indonesia	240
5	Brazil	195
6	Pakistan	173
7	Nigeria	148
8	Bangladesh	147
9	Russia	142
10	Japan	128

Source: 2008 World Population Data Sheet of the Population Reference Bureau.

fertility, India is expected to surpass China within 30 years as the world's largest population. To understand India's current and future population prospects, it is important to know about its demographic history, the status of Indian women, efforts at family planning, connections with the rest of the world through international migration, and the environmental and societal effects of rapid population growth.

As with other developing nations, India's population growth before World War II was slow, owing to high death rates and low life expectancies (Figure 5.8). Epidemics of plague and cholera and famines kept the death rate high and population growth low. Fertility was high to compensate for the loss

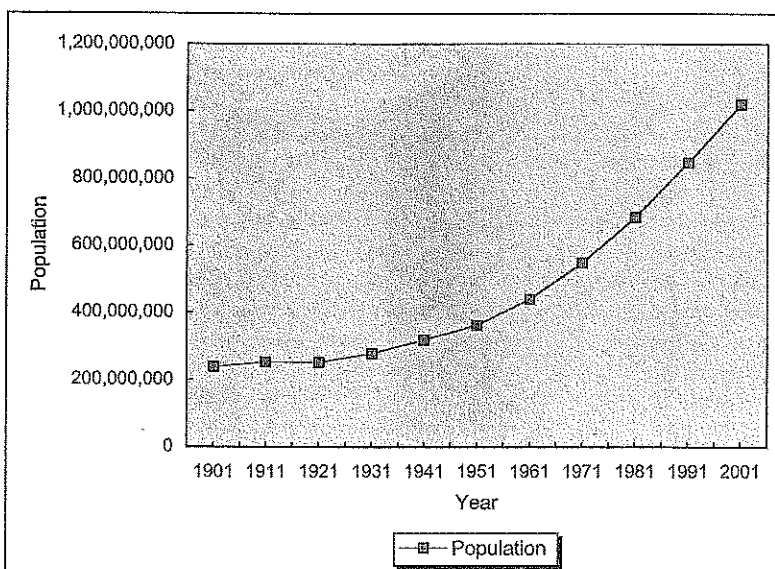


Figure 5.8 India's population, 1901 to 2000.

Source: www.censusindia.net.

▶ CASE STUDY (continued)

of children and to ensure that families would have enough sons to work the land and to take care of them in old age. India was in Stage 1 of the **demographic transition** with high fertility, high mortality, and slow population growth.

The beginnings of modernization after World War II improved health and diet. Life expectancy, which was only 32 years at the time of Indian independence in 1947, rose to 58 years in the 1980s and to 65 years today. The **infant mortality rate**, the number of babies who die before their first birthday (per 1,000 live births), fell from between 200 and 225 in 1947 to 90 during the 1980s and to 57 today. Initiated during the 1970s, the national government's program to provide free immunization to all children reduced the risk of contagious diseases such as tuberculosis, diphtheria, pertussis, tetanus, polio, and measles and was a major factor in reducing childhood death. Still, India's childhood immunization program misses a considerable percentage of children, especially in rural areas. Studies also show that children of illiterate mothers are less likely to be immunized than children of literate mothers, and girls are less likely to be immunized than boys.

As the demographic transition model predicts, the decline in birth rates in India lagged the decline of death rates (Figure 5.5). Norms of high fertility were, and still are, deeply ingrained in traditional Indian culture. Although India is the home of three of the world's 15 largest cities (Mumbai, Calcutta, and Delhi), 72 percent of the population lives in the rural countryside where incomes depend on agriculture, illiteracy is high, and the status of women is low (Figure 5.9). Despite rapid economic

growth, there are still not enough jobs for the recent flood of young people entering the workforce, and a rigid class structure inhibits upward mobility. India is home to 40 percent of the world's poor, and among these lower classes, illiteracy, hopelessness, and dependence on traditional value systems keep birth rates high. India today falls squarely in the third stage of the demographic transition with high but falling birth rates, low death rates, and rapid population growth.

Although fertility in India is high by world standards, it has fallen rapidly since the early 1970s. The **total fertility rate**—the average number of children a woman would have under current age-specific fertility rates—provides the best indication of fertility change over time. From a six-child average in the 1960s, the TFR fell to 3.1 by 2005, the base year for the simulation in Activity 2 (Figure 5.9), and to 2.8 by 2008 (Figure 5.10). This decline is substantial and significant in the context of the country's rural roots and traditional culture, but fertility remains above the replacement standard of two children per woman that prevails in societies that have completed the demographic transition. Pivotal factors in fertility decline have been an increase in the average age at marriage for women, from 16 in 1961 to about 22 today, and higher rates of contraceptive use, from 13 percent in 1970 to 56 percent today.

One of the biggest barriers to further fertility decline is the low status of Indian women. Evidence from the rest of the world shows the strong link between women's status and fertility. Literate, working women define their worth beyond the number of children they produce for the family. In most Indian

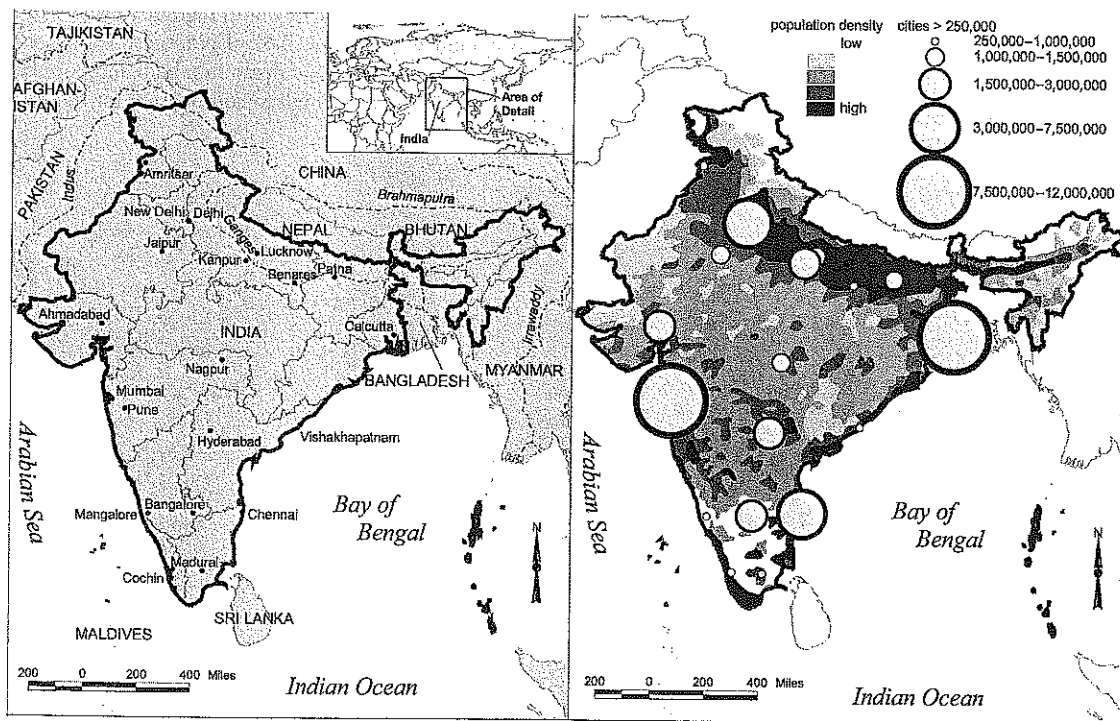


Figure 5.9a (left): India reference map, with major cities shown.

Figure 5.9b (right): India population density and major city population.

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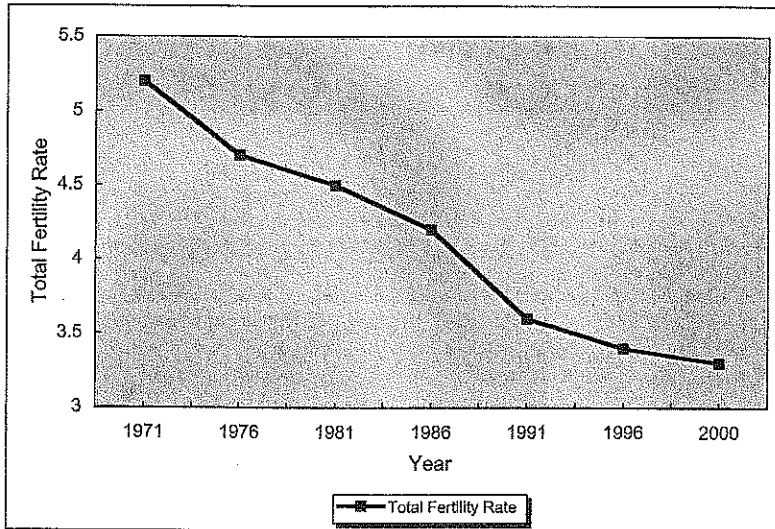


Figure 5.10 Total fertility rates in India, 1971 to 2000.

Source: Vital Rates for India 1971–1996, based on the Sample of Registration System (SRS). New Delhi: Registrar General of India, 1998.

families, males continue to make decisions about finances, work, social relationships, and selection of spouses. Marriage customs rely on arranged marriages, patrilineal inheritance systems, and wives who move in with their husband's family and then have little contact with their family of birth.

Related to the status and position of women in Indian society, a strong cultural preference for sons over daughters continues. This preference promotes neglect of female children, especially in poor families. Neglect can be extreme as in the case of outright infanticide among girl babies or more subtle as in failing to inoculate girls against childhood diseases or not sending them to school. Neglect of females leads to a deficit of women in the Indian population. Most populations contain more women than men because of higher across-the-board mortality among males. Because of the extremely low status of women, India's population has 5 percent more males than females.

Faced with high fertility and unprecedented population growth, India initiated a family-planning program during the 1950s. The program evolved from one focused on increasing the availability of family planning methods to a more all-encompassing view of family planning as integrated with efforts to improve overall health, reduce poverty, protect women's rights, and maintain the environment. Early efforts at family planning stressed methods over motivation and failed because Indian couples were not ready to accept family planning or were concerned about the risks of contraceptive use. In one ill-fated example, 800,000 to 900,000 Indian women were fitted with intrauterine devices (IUDs) in the mid-1960s. Real and perceived IUD-related health risks caused IUD use to plunge, and the method has never again gained widespread popular acceptance.

Frustrated by slow progress toward fertility reduction, many government officials rejected family planning as a means to slow population growth in the mid-1970s. At the 1974 World Population Conference in Bucharest, the Indian delegation

articulated the now-familiar slogan that “development is the best contraceptive.” In their minds, contraceptives are only a means to an end—a vehicle to help people achieve the family size they desire, however large that size may be. Without development and all that it includes—education, rising income, upward mobility, and urbanization—the view was that family planning would be unable to reduce fertility. This view has been moderated subsequently with growing evidence from India and elsewhere that family-planning programs can reduce fertility even without the obvious benefits of development. For instance, in neighboring Bangladesh, a small, mostly rural, country the size of Wisconsin with almost half as many people as the United States, TFR has fallen to 2.7 children per woman as a result of a strong government program of community-based family planning.

In the late 1970s, the Indian government established sterilization clinics around the country and offered financial and material incentives (e.g., money, bags of rice, radios) to those agreeing to the procedure (Figure 5.11). The national government gave local officials sterilization “targets” to achieve, and rumors of forced sterilizations soon swept India. As a result, the Indian people voted President Indira Gandhi out of office, and subsequent democratically elected governments have been careful not to cross the line to the kinds of punitive methods of fertility control practiced in nondemocratic China.

Today's program in India offers a wide range of contraceptives, including permanent sterilization and more reversible methods, such as oral contraceptives and IUDs, that appeal to a wide range of couples; administration is decentralized so programs can be sensitive to local area differences in language, religion, literacy, and economic development; and family planning is linked to women's reproductive health rather than viewed merely as a means of population control.

India has a vast **diaspora** across the world, with people who maintain close contact with families at home and are agents

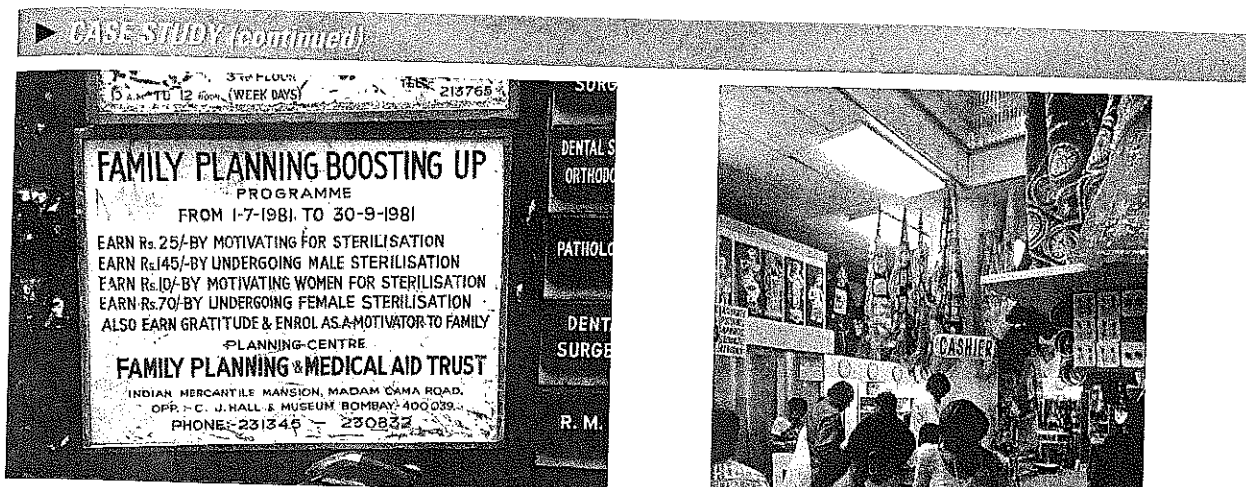


Figure 5.11 A sign outside a medical facility in Mumbai in 1978 entices passersby with money in payment for voluntary sterilization.



Figure 5.12 Women of Indian descent shopping at an Indian market in Durban, South Africa. Mohandas “Mahatma” Gandhi practiced law in South Africa from 1893 to 1914, where he was mistreated by whites for defending Asian immigrants. He developed the strategy of passive resistance there, which he used to lead India to independence from Britain in 1947.

of economic and social change. While India was a colony of Great Britain, many Indians emigrated to countries of the Commonwealth to provide plantation labor and to help build railroads. Large communities grew up in Guyana, Trinidad, Kenya, South Africa, and other British colonies and protectorates (Figure 5.12). More recently, Indians have moved to more-developed countries in search of high-wage jobs. This so-called brain drain draws off some of India’s most ambitious and best educated people, but because emigrants send more than \$3 billion to family at home, migration is a major source of income for the nation. There is considerable debate about whether remittances to family from Indians living abroad are spent on unproductive consumer goods (houses, cars, clothing, etc.) or used for education and to start businesses—investments that reap long-run returns for the Indian economy.

Major destinations for highly educated Indian migrants today are the United States, Great Britain, Canada, and Australia. Until 1990, the Persian Gulf also had drawn many Indian migrants, but they were forced to return home during the Persian Gulf crisis between Iraq and Kuwait. Slowing economies and the reluctance of Middle East governments to allow workers to bring their families or settle eventually reduced this historically and economically significant migration stream.

The social and environmental implications of rapid population growth in India are serious. The challenge of feeding more than 1 billion people puts extreme pressure on environmental resources. Supplies of fresh water are stretched to the limit, and soil exhaustion and erosion become major problems when farmland is overworked. In an effort to develop remaining arable land, farmers expand into marginal areas by cultivating low-lying, hurricane-prone islands in the Ganges delta, building terraces on steep mountainsides prone to landslides, and overgrazing arid lands. Thus far, increased use of fertilizers, pesticides, irrigation, and hybrid seeds (see discussion of the

Green Revolution in Chapter 8) has enabled India to become more or less self-sufficient in food supply, but 20 percent of the population is undernourished, and many poor people cannot afford the food that is available.

India’s growth is outstripping the country’s ability to provide social services and education to its entire population. Tens of millions have left rural India for the major cities, which cannot accommodate the huge influx of migrants. Millions of people are estimated to live in makeshift housing in squatter settlements around Mumbai, Calcutta, and Delhi without adequate sanitation and water supply, electricity, schools, and medical care. All three cities are predicted to grow by more than 33 percent from 2000 to 2015, with Mumbai surpassing 26 million people and possibly becoming the world’s largest city.

It is hardly all doom and gloom, however. In addition to being the world’s largest democracy, India has the largest middle class in the world. Its universities are first rate, its railway system is extensive, and it is industrializing rapidly. From 1990 to 2005, India’s economy grew at an average rate of 6 percent per year—faster than any country in the world except China. Knowledge-based industries, particularly software engineering, are leading India’s economic expansion and attracting foreign investment (Figure 5.13). Yet the rapid population growth puts the brakes on the rate of development by siphoning off capital

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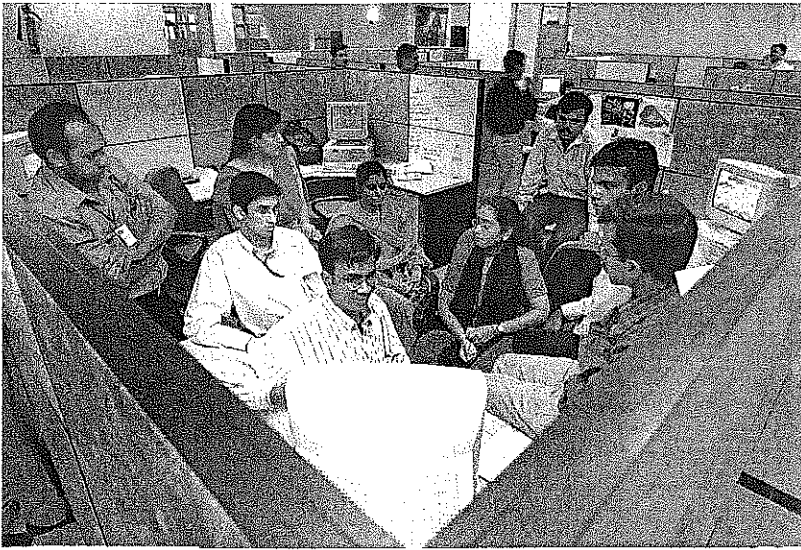


Figure 5.13 India is training ground for one of the world's largest technology work forces. Bangalore, home to the Indian Institute of Technology in South-Central India, is one of India's main high-tech centers.

surpluses that could have been invested in industrial infrastructure and technology but instead must be used for food, clothing, housing, health care, and education for the large cohort of children (Figure 5.14).

You will be asked in this exercise to put this background information to work in interpreting the shape of India's age-sex pyramid and in explaining the consequences of different future population scenarios. Due to the process of **demographic momentum** discussed earlier in this chapter, India is locked into future population growth by virtue of the high fertility in its recent past.



Figure 5.14 Children in Bangalore, India.