Introduction

The media these days are rediscovering population dynamics and the subject of demography. The first real heyday for demography was probably in the 1960s and 1970s with the "discovery" of the global population problem. In recent decades, demographic behavior and demographic characteristics have received increased attention in the popular media. As a result, the term *demographics* has seeped into our vocabulary. For us authors of this text, this is an encouraging sign. Forty years ago when we first began studying and teaching demography, the subject was nowhere near as recognized and discussed as it is today. Now, the importance of population change, whether in size, composition, or distribution, has become increasingly relevant in policymaking at the local, state, national, and international levels. There is an increasing awareness not only of population growth and decline but also of compositional change in age, sex, and racial identity.

Care must be taken, however, to evaluate the works of journalists and others who use demographic data and comment about their dynamics. It is very easy to make errors when reporting on and interpreting population behavior. Hopefully, readers of our book will become attuned to these types of errors that seem to appear every so often in the popular media.

Population and Society: An Introduction to Demography is intended for undergraduate students, as well as graduate students, taking their first course in demography. It is sociologically oriented, although economics, political science, geography, history, and the other social sciences are also used to inform some of the materials we cover and discuss. While the emphasis is on demography, we recognize that at the individual level, population change is related to private decisions, especially in relation to fertility but also to migration and even to mortality. We thus consider in some detail, early in the book, the role of individuals in population decision making. At the level of countries, and even the world, changes in population size have an important effect on environmental and related challenges facing all of the world's inhabitants. We often wonder why the media, when

discussing an issue such as global warming, tend sometimes to minimize the role of population and population growth. The final chapter of our book focuses on the broad implications of population growth and change.

A significant and very necessary component of demography is its techniques. The study of demography involves much more than theories, concepts, and data. Demography, more so than any of the other social sciences, has a body of methods and approaches uniquely suited for the analysis of its concepts and events. In our book, we present some of the basic techniques that are needed to better understand demographic behavior. But the methodological discussions in the chapters per se are introductory. Students interested in pursuing the techniques in more detail will need to take a course or two dealing with demographic methods and/or consult any of a number of excellent texts focusing on demographic methods (e.g., Hinde, 1998; Pollard, Yusuf, and Pollard, 1990; Preston, Heuveline, and Guillot, 2001; Rowland, 2003; Siegel and Swanson, 2004; Smith, 1992).

We believe that students of demography should be conversant with the basic sources of demographic data. Thus, on the Cambridge University Press Web page that is maintained for our book, we have placed detailed instructions on how to locate population data through the Internet and other sources. We are hopeful that in addition to learning about the relevance and importance of demography and its concepts, theories, and methods, students will also gain some knowledge about the richness of data available from a wide variety of governmental sources. This knowledge should come in handy in many future endeavors.

In sum, we have tried to provide students and others interested in this exciting and relevant field with as much information as possible in a readable manner mostly absent of professional jargon.

1 "We Are All Population Actors": An Introduction to Demography

INTRODUCTION

This book introduces you to the study of **demography**. What is demography? It is the systematic and scientific study of human populations. The word *demography* comes from the Greek words δημοσ (*demos*) for **population** and γραφια (*graphia*) for "description" or "writing," thus the phrase, "writings about populations." The term *demography* is believed to have first been used in 1855 by the Belgian statistician Achille Guillard in his book *Elements of Human Statistics or Comparative Demography* (Borrie, 1973: 75; Rowland, 2003: 16). There is fair agreement among demographers (Hauser and Duncan,1959; McFalls,2003; Micklin and Poston, 2005; Pressat, 1985; Rowland, 2003) about the objectives and definition of demography.

Demography is the social science that studies 1) the size, composition, and distribution of the human population of a given area at a specific point in time; 2) changes in population size and composition; 3) the **components** of these changes (**fertility**, **mortality**, and migration); 4) the factors that affect these components; and 5) the consequences of changes in population size, composition, and distribution, or in the components themselves. Demography may be defined as the scientific study of the size, composition, and distribution of human populations and their changes resulting from fertility, mortality, and migration. Demography is concerned with how large (or small) populations are; how populations are composed according to age, sex, race, marital status, and other characteristics; and how populations are distributed in physical space (e.g., how urban and rural they are) (Bogue, 1969). Demography is also interested in the changes over time in the size, composition, and distribution of human populations, and how these result from the processes of fertility, mortality, and migration. The chapters of this book discuss these topics in more depth and provide you with a more detailed introduction to demography.

In this first chapter, we begin with the following point: Every one of you, whether you are aware of it or not, has already contributed, and will continue to contribute throughout your lives, to the subject matter of demography. We next elaborate on the definition of demography introduced earlier. We then consider the so-called demographic equation. Because two of the most important variables used by demographers are age and sex, we give examples of the relevance of age and sex to demography and to society. We then discuss the issue of population distribution and review briefly some of the major sources of demographic data. Finally, we conclude this first chapter by discussing the phrase "Demography is destiny."

WE ARE ALL POPULATION ACTORS

We are all population actors. This is a major theme of our book. Think about it: Your parents performed a demographic act when you were conceived. You, in turn, perform similar demographic acts when you decide to have, or not to have, children. Sometime during your lifetime you will move – once or perhaps numerous times. These, too, are demographic acts. Finally, you will die.

Now, you may think that your dying is not the same kind of demographic act as the decision making of your parents when you were conceived because you yourself do not really decide how long you will live and when you will die. But we do indeed have a lot to say about how old we will be when we die. That is, we have many options that may, or may not, extend our lives. These include such behaviors as stopping or never beginning smoking, limiting alcohol intake, eating a healthful diet, and exercising. Other behaviors that will extend our lives are more apparent; obtaining a college degree, for instance, will add, on average, one year to our lives, and a graduate degree will add two more. And the list goes on and on. So, there it is: "We are all population actors" even though we hardly ever realize it.

Demography is the study of many of the most important events in our lives, and we are very much involved in these events. Ask yourself: What are the only two times in your life when you will have an almost 100 percent chance of being identified by name and listed in your local newspaper? When you are born and when you die. These are two of the events that demographers study. Other extremely important events in the lives of many of us include getting married and, also for some of us, getting divorced. These are two more behaviors studied by demographers. Another really important event that almost everyone will do at least once, if not many times, is to move from one residence to another. Demographers also study residential changes. So, it is not at all an overstatement to say that demographers study when we are born and when we die, as well as many

of the really important events in our lives that occur in between. Or as the eminent demographer Samuel Preston (1987: 620–621) once stated, "The study of population offers something for everyone: the daily dramas of sex and death, politics and war; the interlacings of individuals in all their . . . (groups); and the confrontations of nature and civilization." In the next chapter, we begin elaborating on these and related points.

DEFINITION OF DEMOGRAPHY

We defined demography in the second paragraph of this chapter. Let us return to its consideration. Demography, that is, the scientific study of human populations, is the study of three basic processes: fertility, migration, and mortality. These are referred to as the **demographic processes**. In one sense, that is really all there is to demography. When populations change in size, composition, or distribution, the changes depend solely on one or more of the three demographic processes. Hence, the examination of the three demographic processes comprises a major portion of our text.

THE DEMOGRAPHIC EQUATION

It should be clear that the size of a population can change only through the processes of fertility, mortality, and migration. There are only two ways of entering a population – being born or moving into it. There are also two, and only two, ways of leaving a population – dying or moving out of it. One of the fundamental facts about population change, thus, is that populations only change because of a limited, countable number of events. For example, consider the population size of a country. Suppose that this country at time t contains P_t persons, and that one year later it contains P_{t+1} persons. We may write this as the following equation:

$$P_{t+1} = P_t + B_{t\ to\ t+1} - D_{t\ to\ t+1} + I_{t\ to\ t+1} - E_{t\ to\ t+1} \qquad (1.1)$$

where $B_{t\ to\ t+1}$ and $D_{t\ to\ t+1}$ are, respectively, the number of births and deaths occurring in the population between times t and $t+1$; and $I_{t\ to\ t+1}$ and $E_{t\ to\ t+1}$ are, respectively, the number of immigrants (or in-migrants) to and emigrants (or out-migrants) from the population between times t and $t+1$.

Equation (1.1) is known as the *basic demographic equation*, or sometimes as the demographic balancing or accounting equation. It states that an area's population size can change because of only three types of events: births, deaths, and migrations. These three events are known as the components of demographic change and also as the three demographic processes.

The quantity $(B_{t\ to\ t+1} - D_{t\ to\ t+1})$ refers to the difference between the number of births and the number of deaths occurring during the time

period and is known as **natural increase**; if $B_{t\ to\ t+1} < D_{t\ to\ t+1}$, then the number of deaths exceeds the number of births during the interval ***t to t + 1***, meaning negative natural increase, or natural decrease. The quantity $(I_{t\ to\ t+1} - E_{t\ to\ t+1})$ refers to the difference between the number of immigrants and the number of emigrants occurring during the time period and is known as net international migration (or, in the case of **in-migration** minus **out-migration**, net internal migration). If $I_{t\ to\ t+1} < E_{t\ to\ t+1}$, then more persons leave (emigrate from) the area than enter (immigrate into) the area, and the quantity is known as negative net international migration. Finally, if the quantity $I_{t\ to\ t+1} > E_{t\ to\ t+1}$, then we have positive net international migration.

In the United States, we almost always have positive net international migration because it is the situation in the United States and in most developed countries that $I_{t\ to\ t+1} > E_{t\ to\ t+1}$. The United States is, thus, a receiving country when it comes to international migration. In most developing countries, there is almost always negative net international migration because $I_{t\ to\ t+1} < E_{t\ to\ t+1}$. Countries such as Mexico and China, for instance, have negative net international migration. They are sending countries when it comes to international migration.

Within countries, however, there is significant variation in the demographic equation. Large older cities often have net out-migration. If the extent of natural increase does not surpass the level of out-migration, then the city loses population. Washington, D.C., is an example of such a demographic pattern. Between 2000 and 2005, its population fell by 20,539 inhabitants. Yet it had positive natural increase (42,502 births minus 30,109 deaths). However, although 20,618 persons moved into the District of Columbia, 53,550 left. Thus, the net out-migration of 32,932 more than offset the natural increase of 12,393.

Some places have natural decrease because the population that is elderly is very large proportionally. Flagler County, Florida (located between St. Augustine and Daytona Beach) is one of the fastest-growing counties in the United States. During the five-year period of 2000 to 2005, the county grew by 26,506 persons. But, there were 3,628 deaths and only 2,652 births; thus, the county had 976 more deaths than births. To account for that loss, net migration amounted to 27,482. Why the high number of deaths? The in-migration predominantly comprised of retirees, resulting in an elderly population. There are many of these so-called retirement counties in Arizona, California, Florida, North Carolina, and Texas.

Some counties have negative levels of both natural increase and net migration. Between 2000 and 2005 in Barnes County, North Dakota, for example, there were 578 births and 736 deaths, and there were 528 more people moving out of the county than moving in. The county's high number

of deaths reflects an old population. However, in Flagler County, Florida, the population growth was due to the in-migration of elderly. In Barnes County, North Dakota, the population loss was due to the exodus of young people, thereby leaving a large proportion of elderly.

From these examples, we can see that all three of the demographic processes play important roles in determining not only the size but also the composition of any region. Changes in the variables themselves are the result of our behavior as population actors. This is the heart of demography: understanding how the many factors that cause changes in demographic behavior and that are the consequences of this behavior are all interrelated.

AGE AND SEX

Changes in any one of the demographic processes yield equally important information about how populations are composed, that is, their structure. The most important characteristics that tell us about population structure are age and sex. These two characteristics are so important to the study of demography and the demographic processes that they are referred to as the **demographic characteristics**.

Let us consider how closely age and sex are tied in with the three demographic processes. With regard to fertility, that is, the actual production of children, more males are born than females, usually around 105 males for every 100 females. **Fecundity**, that is, the ability to produce children, varies by sex; specifically, the childbearing years of females are, for the most part, between the ages of 15 and 49, and for males they are generally between the ages of 15 and 79 (Poston, 2005).

Regarding mortality, that is, the frequency with which death occurs in a population, females have lower death rates than males at every age of life. Death rates are high in the first year of life and then drop to very low levels. In modern populations, they do not again reach the level of the first year of life for another five to six decades. Also, cause-specific mortality is often age related. For instance, causes of "mortality such as infanticide, parricide and suicide are . . . age (and sex) related" (Goldscheider 1971: 227). Two renowned demographers, Jacob Siegel and Henry Shryock, have written that "in view of the very close relation between age and the risk of death, age may be considered the most important demographic variable in the analysis of mortality" (Shryock, Siegel, and Associates, 1976: 224; McGehee, 2004).

Migration also differs by age and sex. Traditionally, males and females have not migrated to the same places in equal numbers. Long-distance migration has tended to favor males, and short-distance migration, females; this has been especially the case in developing countries. However, with

increases in the degree of gender equity in societies, the migration of females tends to approximate that of males. In fact, almost half of the international migrants worldwide are now women, and more than half of the legal immigrants to the United States are women (Population Reference Bureau, 2007b: 9). Migration is also age selective, with the largest numbers of migrants found among young adults (Tobler, 1995).

Age and sex are not the only important compositional variables in demography. Other variables are also related to the three demographic processes. Knowing something about marital status, for example, is important when studying fertility. Race is strongly associated with socioeconomic status. Blacks, whites, Asians, and Hispanics all have somewhat different lifestyles, and these are related to the basic demographic processes. Education is an especially important variable to consider. In general, the higher the education attained, the lower the fertility and the lower the mortality.

These are just hints of the many compositional variables that demographers consider. The number is large, giving demographers a wide field to study. They are interested in anything that is related to demographic behavior.

Finally, compositional variables are both the cause and effect of population changes. In turn, demographic changes can affect the compositional variables. We have much more to say about this later in our book.

AGE COMPOSITION: AN EXAMPLE

Let us now consider an example that illustrates well the central importance in demography of **age composition**. This is an example that is mentioned and discussed later again in the pages of our book. It is the famous **baby boom**, which began in the United States and in some other Western countries around 1947 and lasted until about 1964. Rather suddenly, right after the end of World War II, the young adults of that period decided to have more children than those in previous generations. This resulted in a "bulge" in the age composition – a bulge, as we shall see, that resulted in numerous challenges for every institution in the U.S. society. The bulge is easy to find in Figure 1.1. In 1950, it is evident in the 5-year-and-under age group; in 2000, the bulge appears in the 35–44-year age groups. In future decades, the baby boom bulge will be visible higher and higher up in the country's pyramid. Joseph A. McFalls, Bernard Gallagher, and Brian Jones (1986) have noted, figuratively, that we can think of the people born during the baby boom period as a group or **cohort** that passes through the population from the youngest ages to the oldest ages as a pig that has been swallowed by a python.

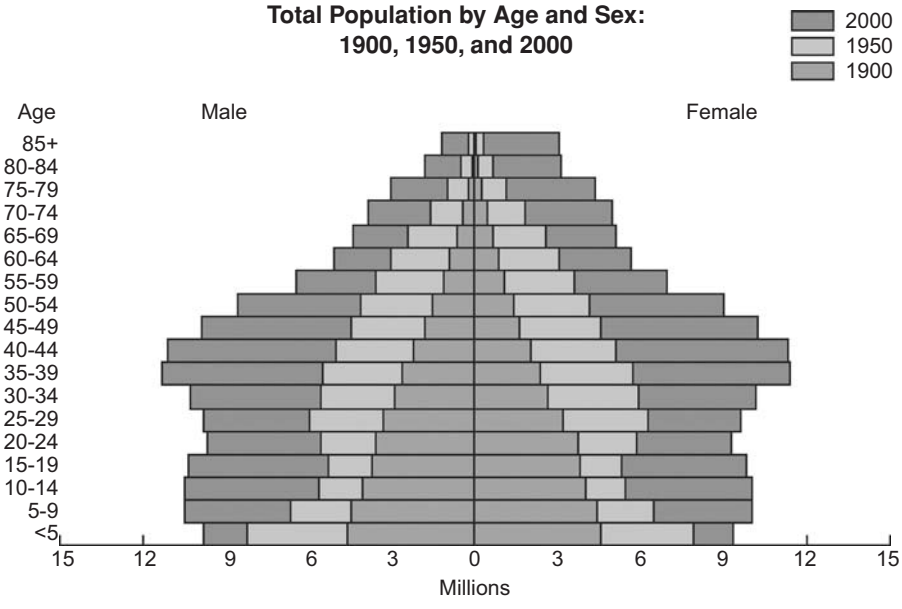

Figure 1.1. Age Composition: 1900, 1950, and 2000. *Source*: U.S. Census Bureau, decennial census of population, 1900, 1950, and 2000.

Those people born from the mid-1940s to the mid-1960s are known as baby boom babies because there were so many of them in comparison to the numbers of babies born before and after them. The baby boomers have experienced problems throughout their lives. Their attendance at elementary and secondary school and at college was marked by overcrowded classrooms and a shortage of teachers. When they entered the labor market, many of them discovered there were not enough jobs to go around. Housing for many members of this generation has been scarce. The older members, now reaching retirement age, are finding that their demands on the U.S. Social Security system are producing strains and will continue to produce strains between the financial demands of their large cohort and the smaller number of younger workers who must finance the system. These are examples of some of the problems that are likely to occur when one age group is considerably larger than groups before or after it (Carlson, 2008).

In contrast, the babies born after the baby boomers, say, those born in the 1970s, have had a much easier time during their lives. In the 1970s, there were 33 million babies born in the United States, a figure 10 million fewer than the number born in the ten years between 1955 and 1964, the latter part of the period when most of the baby boom babies were born. The babies born in the 1970s and in later decades, but especially those born in the 1970s, may be referred to as the **baby bust** cohort. They followed the enormously large group of baby boomers and have been in a much more

favored position on their march through life. Education facilities have been more than adequate, and many more jobs have been available for them than for the baby boomers who preceded them. But the baby bust babies will have a major responsibility financing the retirement of the baby boomers.

Clearly, being a member of the baby boom or bust generation can have a significant impact on one's chances of success in life. We are not necessarily suggesting demographic determinism. Indeed, individuals can and do succeed on their own. But it goes without saying that being born as a member of a large or a small cohort does in fact alter one's odds for later success in life (Carlson, 2008). We have discussed here the importance of age and age composition in demography and also some of the ways in which the size of one's age cohort can influence many aspects of one's life and livelihood. Let us turn now to a consideration of sex and **sex composition**.

SEX COMPOSITION: AN EXAMPLE

We noted earlier that most societies in the world have **sex ratios** at birth (SRBs) of around 105, that is, 105 boys born for every 100 girls. This so-called biologically normal level of about 105 is probably an evolutionary adaptation to the fact that females have higher survival probabilities than males. Since at every year of life males have higher age-specific death rates than females, around 105 or so males are required at birth per every 100 females for there to be approximately equal numbers of males and females when the groups reach the marriageable ages (although there are often slightly more males than females at the beginning of the marriageable ages).

Later in the book, we discuss in more detail the sex ratio at birth. But we note here that since the mid-1980s and into the 1990s, several countries, for example, China, South Korea, Taiwan, India, and a few others, have been having sex ratios at birth (i.e., the number of male births per 100 female births) that are much higher than the biological average of around 105 (Hudson and Den Boer, 2002,2004; Jha et al.,2006; Poston and Glover,2005; Poston and Morrison,2005; Poston et al., 1997). Indeed, in 2005, China had an SRB of 118; this means that in 2005 in China, there were 118 baby boys born for every 100 baby girls.

We have estimated that there are already in China more than 31 million Chinese boys who, when they reach their mid-twenties and are looking for brides, will not be able to find Chinese girls to marry (Poston and Zhang, 2009). The Chinese government, as a consequence, could well turn to a more authoritarian form of government so as to be better able to control these millions of excess bachelors. Sociological research has shown that when large numbers of men do not marry, they are often more prone to crime than if they were married (Mazur and Michalek,1998; Sampson and