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DEMOGRAPHY

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This chapter defines, circumscribes, and reviews the field of demography, providing insight into the breadth of issues covered by this interdisciplinary specialization. Attention is first directed to the discipline of demography, its definition, and conceptual and methodological character,¹ while later sections focus specifically on the various resources of demography. In addition to describing the resources and issues encompassed by the field, the chapter also identifies what the authors believe to be three research areas requiring future attention. Finally, unlike many of the sociological specializations discussed in this *Handbook*, demography has not always been viewed primarily as a subfield of sociology. This issue is also explored in this chapter.

WHAT IS DEMOGRAPHY?

When professors introduce demography and its subject matter in their graduate and undergraduate courses, many find useful what Bogue (1969) has proposed as the three basic demographic questions: (1) How large (or small) is

the population? (2) How is the population composed in terms of the demographic characteristics of age and sex, and two additional characteristics closely aligned to demography, namely, race and marital status? and (3) How is the population distributed spatially? Answers to these questions are typically formulated in terms of the effects of the three demographic processes of fertility, mortality, and migration/mobility. A consideration of these materials leads to defining demography generally as *the scientific study of the size, composition, and spatial distribution of human populations, and the changes that occur in these phenomena through the processes of fertility, mortality, and migration* (Poston 2000).

The subject matter of demography is often divided into formal or mathematical demography and social demography or population studies (Hauser and Duncan 1959a). Formal demography may be distinguished from social demography by the substantive foci of the independent and dependent variables. Both approaches endeavor to model dependent variables that are demographic in nature; that is, they are concerned with one of the demographic processes of fertility, mortality, or migration or one of the demographic characteristics of age and sex. However, the

independent variables of formal demography are also demographic, whereas those of social demography are nondemographic.

To illustrate, a formal demographer might examine among populations the influence of age composition on the birth rate or, alternately, the influence of the birth rate on age composition. Another illustration of a formal demographic exercise would be an analysis among cities of the effects of the sex composition of in-migrants on city death rates. In contrast, a social demographer might study the influence of a sociological independent variable, such as social class, on the death rate; or the effects of a social psychological variable, such as attitudes about motherhood, on desired and intended fertility; or the effects of a geographic variable, such as annual rainfall, on population density; or the influence of an economic variable, such as economic or livelihood opportunities, on the migration rate (Kammeyer and Ginn 1986). Social demography is necessarily broader in scope and orientation than formal demography. As Preston (1993) has written, it includes “research of any disciplinary stripe on the causes and consequences of population change” (p. 593).

Schofield and Coleman (1986) have brought these two approaches together, as follows:

The subject matter of demography may be imagined as being arranged within a sphere with a hard mathematical core and a softer socio-economic and biological rind. The core represents the specific technical property of demography; the mathematical theory which deals with statics and dynamics of population; vital rates in relation to the age structure, dynamics, growth and their perturbations, and all the techniques of measurement, analysis and substitution that follow. . . . But this hard core of demography does not touch the surface of the real world directly, except through measurement and reconstruction. It does so only when the population is made specific. An outer structure of theory and fact is then necessary to explain and predict that population's response, through the specific agencies of independent biological, social and economic causes and consequences of population trends. In this outer region of demography, the numerical techniques and ideas of demography act as an interdisciplinary common currency. Demography, which deals with the hardest (biological) facts in social science, enables material from one subject to be used in conjunction with material drawn from another. This permits the risks of the fundamental human events of birth and death to be analyzed interchangeably by ideas which may draw on sociology, geography, history, biology and other subjects. (P. 5)

Demographers, however, do not always agree about the boundaries and restrictions of their field. Caldwell (1996) states the problem succinctly as follows:

What demography is and what demographers should be confined to doing remains a difficult area in terms not only of the scope of professional interests, but also of the coverage aimed at in the syllabuses for students and in what is acceptable for journals in the field. (P. 305)

In the United States, most graduate training programs in demography are located in departments of sociology, although this is not the case in many other countries. Some U.S. demographers thus argue that demography is best treated as a subdiscipline or specialization of sociology owing to this organizational relationship (Moore 1959:833). The late Kingsley Davis (1948), who served at different times as president of both the Population Association of America and the American Sociological Association, wrote in 1948 in his classic sociology textbook, *Human Society*, that “the science of population, sometimes called demography, represents a fundamental approach to the understanding of human society” (p. 551). The relationship between sociology and demography is hence a fundamental one: “Society is both a necessary and sufficient cause of population trends” (pp. 553–54).

Others subscribe to a broader purview of the discipline, particularly social demography, claiming that demography is not a specialization of sociology, or of any discipline, but a discipline in its own right. Consider the definition of demography in today's most popular demography textbook, *Population: An Introduction to Concepts and Issues*, by John Weeks (2005), now in its ninth edition: “Demography is concerned with virtually everything that influences, or can be influenced by population size, distribution, processes, structures, or characteristics” (p. 5). It is no wonder that J. M. Stycos (1987) observed that “as a field with its own body of interrelated concepts, techniques, journals and professional associations, demography is clearly a discipline” (p. 616). J. C. Caldwell (1996) also reached this conclusion, but more for methodological reasons:

Demography will remain a distinct discipline because of its approach: its demand that conclusions be in keeping with observable and testable data in the real world, that these data be used as shrewdly as possible to elicit their real meanings, and that the study should be representative of sizable or significant and definable populations. (P. 333)

Earlier in this chapter, demography was defined as the scientific study of the size, composition, and spatial distribution of human populations and the changes that occur in these phenomena through the processes of fertility, mortality, and migration. How this activity, the study of population, is carried out and the results it produces depend on a set of disciplinary resources (Micklin and Poston 2005). These resources are important for the operation of most, if not all, of the topics discussed in this *Handbook*.²

Demographic theories and models are statements of the evident or hypothesized course, causes, and/or consequences of demographic phenomena at varying levels of aggregation (Coale and Trussell 1996; Coleman and Schofield 1986; Hauser and Duncan 1959b). *Demographic methods* comprise a body of procedures and techniques for collecting, evaluating, adjusting, estimating, and analyzing demographic data, while *demographic materials* consist of the sources of raw data such as censuses, vital registration

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systems, population registers, and sample surveys (Hauser and Duncan 1959a; also see Siegel and Swanson 2004). The *infrastructure of demography* consists of the professional organizations, modes of disseminating ideas and research findings, and institutional sources of research support that influence the kinds of work done under the banner of the discipline and how the results are portrayed and received. Finally, *demographic praxis* refers to the use of demographic data and research findings by governments, businesses, and other organizations for predicting, planning, monitoring, and evaluating a wide range of demographic and nondemographic conditions, events, and trends (Siegel 2002). Each of these resources is discussed in detail in the next section.³ This will serve as a further introduction to the subject matter of demography and how demographic research is carried out.

THE RESOURCES OF DEMOGRAPHY

Demographic Theories and Models

In the last 50 years or so, a variety of views have been presented about the nature and status of demographic theory. In 1952, demographer Rupert Vance lamented the “poverty” of theory in demography. A decade later Robert Gutman (1960) wrote “in defense” of population theory, contending that “demography . . . continues to offer illuminating theoretical statements which organize knowledge, lead to the acquisition of new knowledge, and help in the solution of population problems” (p. 333). Hauser and Duncan (1959b) identified several important population theories, including those derived from Malthus, optimum population theory, demographic transition theory, and psychosocial theories of fertility. But they concluded by stating that “demographers in general may have much to gain from additional allocation of energy to deliberate efforts directed toward theory-construction in conjunction with the conduct of empirical research” (p. 104).

Recent assessments of the discipline of demography are less ambivalent about the adequacy of population theories. Writing in 1979, Charles Nam argued,

The issues of demographic journals today are replete with theoretically based articles, in stark contrast to those of the past. We no longer fall behind our fellow disciplines in theoretical development, and a merging of lower-order propositions into a theoretical whole is now as conceivable in demography as in any of the social sciences. (Pp. 490–91)

Yet a decade and a half later Eileen Crimmins (1993) stated that “although our theoretical approaches are considerably more complex now than in the past, demography still has highly developed theories in only a few areas. Fertility behavior is the exception” (p. 587). Other population scientists point to demographic transition theory as the theoretical staple of the discipline (Caldwell 1997; Kirk 1996; Lee 2003).

Although a variety of new or reformulated population theories have been proposed in recent decades, their clarification and evaluation remain a challenge for the field. On the other hand, demography has such an abundance of both formal theory and discursive theory that its theoretical accomplishments rival those of any of the other social sciences. Regarding formal theory, one need only consider, for instance, the richness and precision of stable population theory. Regarding discursive theory, few social sciences may claim as much theory as one finds in, say, the study of fertility. Prominent theories to explain fertility behavior include demographic transition theory, wealth flows theory, human ecological theory, political economic theory, feminist theory, proximate determinants theory, biosocial theory, relative income theory, and diffusion theory (see Caldwell 1997; Hirschman 1994). Any view among nondemographers that demography is void of theory was incorrect in the past and is incorrect today.

Demographic Methods

There is agreement among demographers about the significant advances that have occurred in the past 50 years in methods of data collection and analysis. In their systematic review of this topic, Hauser and Duncan (1959a) covered standard census procedures, vital registration systems, the sample survey, rudimentary data processing, and several types of administrative record systems. They also discussed techniques for evaluating, adjusting, estimating, and analyzing demographic data.

In the past half-century, improvements have been forthcoming in each of the techniques, partly through the application of advances in electronic information systems. National census taking is increasingly based on statistical sampling theory and techniques, resulting in more efficient and accurate data collection.

In recent decades, the uncertain quality and availability of demographic data have led to the development of a variety of techniques for evaluating, adjusting, estimating, and projecting population parameters (Ahlburg and Lutz 1998; Ahlburg, Lutz, and Vaupel 1998; Brass 1996; Coale and Demeny 1968; Keyfitz 1975, 1981; Siegel and Swanson 2004). Although the results of many of these exercises, particularly population forecasts, are notoriously inaccurate, their use continues.

Demographic Materials

This set of basic disciplinary resources may be divided into *primary data sources* and *data compendia*, for example, data banks. The most comprehensive and generalizable primary data source is the national population census. National census coverage has improved considerably since the end of World War II, largely through assistance provided to developing countries by the United Nations and a few other organizations. Among 94 developing countries with a population in the mid-1990s of at least

1 million, only 49 conducted a national population census in the decade of the 1950s, by the 1990s, that figure had risen to 71 countries (Cleland 1996). The content, completeness, and accuracy of information collected through censuses vary widely from one country to the next. Overall, the situation has surely improved worldwide.

Another important source of demographic information is the civil registration system, which typically collects information on demographic events such as births, deaths, and changes of civil status as they occur. Although not 100 percent accurate and complete, vital registration in the more developed nations is far better than in the poor nations. Cleland (1996) contends that although civil registration systems in developing countries are “seriously defective, it would not be correct that the data are of little value to demographers” (p. 435). Techniques have been developed for data adjustment and analysis, yielding a rough notion of trends and differentials in vital events.

Beginning in the 1970s, coordinated cross-national surveys emerged as an important source of demographic information. Between 1974 and 1986, sample surveys of reproductive behavior and related social and psychological indicators were conducted in 62 countries, representing 40 percent of the world’s population, under the auspices of the World Fertility Survey (Cleland and Hobcroft 1985; Cleland and Scott 1987). This effort was succeeded by another coordinated international program of research, the Demographic and Health Surveys, with 170 sample surveys carried out in 69 developing countries between 1986 and 2003. The obvious advantage of these surveys was the opportunity for comparative analysis and generalization of findings beyond a single population.

Less ambitious demographic surveys, typically focusing on a single country or community, have been a part of the demographer’s repertoire for decades. Early studies of fertility include the Indianapolis study (Kiser 1953; Kiser and Whelpton 1953), the Princeton study (Westoff, Potter, and Sagi 1963; Westoff et al. 1961), and surveys of family and reproductive behavior carried out in Puerto Rico (Hill, Stycos, and Back 1959; Stycos 1955). The number of demographic surveys has grown steadily over the years. Examples in the United States include the monthly Current Population Survey, the weekly health interview survey, and the various rounds of the National Survey of Family Growth (NSFG) carried out by the National Center for Health Statistics, the most recent being Cycle 6 conducted in 2002. Another important source of demographic information is the Adolescent Health Survey, which was started in the early 1990s by the Carolina Population Center at the University of North Carolina.

In short, in the past five decades, there has been an enormous increase in the availability of primary demographic data. The various sources differ in terms of data quality, but the trend has been toward better coverage and reduced error in census enumeration and collection of survey data. Moreover, the development of techniques to

estimate missing values or reduce measurement error has increased the utility of these sources of demographic information.

Another welcome addition to the disciplinary resources of demography is the growing availability of repositories for demographic data. Some of these collections are longstanding and others are of more recent vintage (for discussion, see Micklin and Poston 2005).

Overall, the volume of demographic and population-related information resources has grown dramatically, particularly over the last two decades. The research-oriented demographer has a virtually unlimited access to multiple data banks and statistical yearbooks, many of them via the Internet (see below). Used judiciously, this rapidly increasing set of resources provides a means of examining linkages between population conditions and trends and a wide range of societal phenomena.

The Infrastructure of Demography

The development of any scientific discipline depends to an increasing extent on its organizational infrastructure, which includes several components. In the case of demography, these are four: (1) professional and affiliated organizations; (2) professional journals that serve as outlets for the results of demographic research; (3) Internet sites that facilitate communication among demographers, access to research ideas and reports, and retrieval of demographic data; and (4) the application of knowledge produced to resolve societal problems. Each of these infrastructure components is now discussed.

With respect to the first component, professional organizations, the oldest professional association of population scientists is the International Union for the Scientific Study of Population (IUSSP). The Union was founded officially in Paris in 1928 and in 1947 was reorganized as an association of 147 individual members representing 32 countries. By 2005, the IUSSP had grown to nearly 2,000 members, approximately one-third from developing nations. The IUSSP publishes a set of monographs covering diverse topics related to population; many are the result of scientific meetings sponsored by the IUSSP. The full meetings of the IUSSP are held every four years.

Shortly after the launch of the IUSSP, the Population Association of America (PAA) was organized in 1931 with 38 original members. By 1955, membership numbered 430, and as of the date of its 68th annual meeting in 2005, the organization had approximately 3,000 members. Annual meetings of the PAA are devoted to presentation and discussion of research reports and theoretical papers, some of which are published in the PAA’s official quarterly journal, *Demography*.

In 1983, the European Association for Population Studies (EAPS) was founded. EAPS organizes conferences, seminars, and workshops; disseminates population-related information; and publishes the *European Journal of Population*.

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The Southern Demographic Association (SDA) is a scientific and educational society of demographers that was first organized in 1971 as the Southern Regional Demographic Group. The SDA has approximately 200 members and publishes a journal, *Population Research and Policy Review*.

These professional associations certainly do not exhaust those that exist worldwide. Their descriptions here are intended to illustrate the variety of activities undertaken by such organizations and to suggest that while not as large as many scientific disciplines, demography is a viable and flourishing profession.

In addition to the above-mentioned professional associations, there are many affiliated organizations that are more or less loosely linked with professional demographic organizations and with the discipline as a whole. They contribute to the activities of demographers via several functions, including (1) the funding of demographic research, (2) the public advocacy of important demographic and population-related issues and/or policy concerns, (3) the dissemination of demographic data and research findings, (4) the provision of population education, and (5) the delivery of services to address population problems and improve population health (see Micklin and Poston 2005 for more discussion).

Another component of infrastructure is demographic periodicals. In the 1950s, demographers had few specialized outlets for their work. Most demographic research was published in journals of sociology and economics. The only demographic journals available were the Italian journal *Genus* (1934), the *Population Index* (1935) (which was devoted primarily to bibliographic references), the Population Reference Bureau's *Population Bulletin* (1945), the British journal *Population Studies* (1947), and the Indian journal *Population Review* (1957). There was a slow but steady increase in the 1960s in periodicals devoted to demography. *Studies in Family Planning*, published by the Population Council, made its appearance in 1963. A year later, the first issue of the official journal of the PAA, *Demography*, appeared along with the initial publication of the *International Migration Review*. In 1969, the Alan Guttmacher Institute issued the first volume of *Family Planning Perspectives* and followed it in 1975 with the *International Family Planning Digest* (which would later be called *International Family Planning Perspectives*). The Population Council's creation of the *Population and Development Review* in 1975 was a major addition to demography's journal repertoire. Later debuts of demographic journals included *Population and Environment* (1978), *Population Research and Policy Review* (1981), the *European Journal of Population* (1985), *Journal of Population Economics* (1987), the English edition of the French journal *Population* (1989), *Demographic Research* (1999), and *Applied Population and Policy* (2004). Demographers today have many more opportunities to publish results of their research in discipline-friendly periodicals.

Another infrastructure component is Internet sites that facilitate communication among demographers, access to research ideas and reports, and retrieval of demographic data. Considering the case of demography, one cannot help but be impressed with changes in the infrastructure of the discipline resulting from Internet access (see Gryn 1997). However, given the rate of change of Web site addresses and the addition of new sites, it would be futile here to devote a great deal of space to site references. However, several useful sites will be mentioned that have a likelihood of stability.

The United Nations operates a Population Information Network (POPIN) at <http://www.un.org/popin/>. POPIN includes a list of relevant publications from the UN and affiliated organizations as well as a list of journals and newsletters with population content. The Population Reference Bureau operates a site (POPNET) (<http://www.popnet.org/>) that includes links to a wealth of organizational sources (international, nongovernmental, university centers, associations, directories, "listservs," and databases). The Office of Population Research of Princeton University provides access to its *Population Index* site (<http://popindex.princeton.edu/index.html>) with regular coverage of 400 journals. Finally, the Committee for International Cooperation in National Research in Demography (CICRED) offers access to a wide range of information.

Demographic Praxis

Here the concern is with the applications of demographic knowledge. In recent decades there have been considerable advances in this particular resource of demography. Applied demography is a thriving enterprise, providing employment for a sizeable number of demographers (Micklin 1992; Siegel 2002). Three specific examples of applied demographic activity will be mentioned.

First, demographers serve as advisors, witnesses, and technicians on matters of political apportionment and redistricting. Over time, populations become redistributed within political jurisdictions. Periodically, the decision is made to reassess the correspondence between population distribution and voting districts. In such cases, demographic expertise is invaluable.

Second, the increased size and rate of population growth as well as population density have been linked to environmental deterioration, particularly in less developed nations (Shi 2003; United Nations 2001; York, Rosa, and Dietz 2003). Demographers are frequently called to participate in multidisciplinary teams given the responsibility of developing a plan to halt the environmental damage.

Third, demographers are often asked to provide various types of population forecasts in conjunction with community development programs. Large-scale expansion of transportation facilities and construction of residential structures are likely to change patterns of population

growth, distribution, and perhaps composition. Officials need research data to estimate the extent of disruption that will occur.

RESEARCH CHALLENGES

There are three areas of demographic research that the authors of this chapter deem to be particularly relevant and important for research in future years.⁴ These are areas that to date have received insufficient attention by demographers and, moreover, are areas many consider to be preeminent in terms of their actual or potential contribution to the state of demographic knowledge. They are (1) male fertility, (2) biosocial models of demography, and (3) sexual orientation. This is a short and selective listing. But these are areas that have impressed the authors of this chapter as important, relevant, and challenging. It is not known whether other demographers will agree with the selection.

Male Fertility

Why are males not included in the study of fertility? In discussions in both the scholarly and popular literatures, the methods and numbers pertaining to fertility rates almost always apply only to females but are referred to as fertility rates and fertility numbers, not as female fertility rates and female fertility numbers. In the development and testing of fertility theories in the demographic and social science literatures, the explanations are implicitly based on females but are referred to as fertility theories, not as female fertility theories.

But as everyone knows, biology requires that females and males must both intimately be involved in the production of children. Fertility is not a process that involves only women. So, why have males been ignored in conventional demographic studies of fertility? The answer is not because female and male fertility rates are the same. Although some might believe they should be, in fact they are not, and this is shown below.

It is not at all an understatement that until the past few years virtually all conventional demographic research on fertility has been devoted to analyses of women. Until recently, meetings of the PAA and the IUSSP seldom included sessions on the male side of fertility. Indeed, it has only been since the late 1990s that articles and book chapters on male fertility have started to appear in the demographic literature. In 1998, the journal *Demography* published a special issue on the topic of male reproduction. In 2000, a major paper appeared in the journal *Population and Development Review* (Greene and Biddlecom 2000) that evaluated current research and suggested directions for future research on male reproductive roles. And also in 2000, a monograph was published on *Fertility and the Male Life-Cycle in the Era of Fertility Decline* (Bledsoe, Lerner, and Guyer 2000) based in large part on the papers presented at a 1995 conference of the IUSSP.

POPLINE was consulted a few years ago for a review of the literature on the topic of fertility. The POPLINE search reported more than 75,000 fertility studies conducted between 1950 and 2000. Of these, only 381 dealt with fertility and reproduction behaviors involving males, two-thirds of which were biological and medical in orientation, focusing on such issues as spermatogenesis (e.g., Aitken et al. 1986) and medical and biological aspects of fertility regulation (Singh and Ratnam 1991). The other one-third mainly comprises papers investigating family planning policies (e.g., Adamchak and Adebayo 1987) and fertility regulation (Mbizvo and Adamchak 1992), male attitudes toward fertility and family planning (Micklin 1969), and economic considerations and cultural factors that shape male fertility (Muvandi 1995). Most of the fertility analyses uncovered in the POPLINE search that included males (often along with females) were published in the 1990s.

So, why has conventional demographic research in fertility concentrated largely, if not exclusively, on women? Seven specific reasons may be proposed to justify excluding males from fertility studies (Poston et al. 2005:871–72). First, Greene and Biddlecom (2000) write that the (1) “most important barrier to the inclusion of men in demographic research was normative and reflected the socialization of influential demographers and the research course they set” (p. 83). Men were regarded principally as breadwinners, and “as typically uninvolved in fertility except to impregnate women and to stand in the way of their contraceptive use” (p. 83). This is a gender-related perspective and focuses significantly on the social construction of the male gender role. The reasoning is biological, not sociological. This is hardly a satisfactory justification for ignoring males in fertility studies.

Keyfitz (1977) notes (although does not necessarily endorse) four more reasons. Two of them are that (2) data on parental age at the birth of a child are more frequently collected on registration certificates for the mothers than for the fathers; and (3) when such data are obtained for mothers and fathers, there are a greater number of instances of unreported age data for fathers, and this is especially the situation for births occurring outside marriage.

While it is true that demographic surveys have tended to focus more on women than on men, this situation has improved significantly in recent years. Also, birth registration certificates, particularly in the developed world, now typically include data on both parents. Certificates for births occurring outside marriage, however, occasionally still do omit data on fathers. Finally, Coleman (2000:43) notes that as of 1995, 15 countries in the industrialized world have published, at one or more times in recent years, data and/or rates on male fertility in their demographic yearbooks or related publications.

The next two reasons mentioned by Keyfitz (1977) are (4) the fecundity, and hence, the childbearing years of women occur in a more sharply defined and narrower range (15–49) than they do for men (15–79); and (5) “both

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the spacing and number of children are less subject to variation among women; a woman can have children only at intervals of 1 or 2 years, whereas a man can have hundreds" (p. 114). The fourth point is true theoretically, and indeed "in polygamous populations a man's fertility can remain high well into his fifties and sixties; . . . [however], in controlled fertility societies, it peaks . . . with a mode in the mid-twenties" (Coleman 2000:41). This is due in part to low fertility norms in Western societies, as well as to a small average age difference of about two to three years between men and women in first marriages. Regarding the fifth point, Guyer (2000) observes that although biologically a man has the potential for siring dozens more children than a woman, this large difference in number of children ever born only occurs in a few societies and "amongst a tiny minority of the population" (p. 64).

Another reason is that (6) female fertility rates are thought to be more fundamental because they are more physiological; that is, they are more bound by biological limitations, and hence are more influenced by the proximate determinants than are male rates. Indeed, several of the proximate determinants are virtually "man-free" (Coleman 2000:31) and thus less tractable. Also "mothers remember events such as miscarriages and deaths in early childhood more clearly than fathers do, and there is no ambiguity as to whether a child is theirs or not" (Greene and Biddlecom 2000:85). The fact that births are more tractable to mothers than to fathers cannot be ignored. But this fact makes it all the more necessary to include males in fertility studies, if for the only reason that by including males, one would then be able to estimate the degree of false paternity in a population, a subject about which little is known. Moreover, Greene and Biddlecom (2000) observe that "since demographers do not limit themselves to counting but also attempt to explain and predict fertility behavior, this methodological justification is patently weak" (p. 85).

The last reason proposed to justify the exclusion of men in studies of fertility is (7) the incompatibility of male and female fertility rates. Unless the population is closed and has a stable age distribution, the rates will likely be different. The differential rates are due to a host of causes that are well known to demographers, some of which are that more males are born than females, males have higher age-specific death rates than females, males marry at older ages than females, males remarry more quickly than females, and emigration and immigration both are often sex selective. These and other factors act together to produce male and female fertility rates that are not the same.

The United Nations (2002) has assembled a natality database that includes age-specific fertility rates (ASFRs) for males and females for various years in the 1990s. Poston, Baumle, and Micklin (2005) have calculated male and female total fertility rates (TFRs) for 19 countries for 1994. They report that most countries have male TFRs that are actually larger than their female TFRs. For instance, Tunisia and Panama show male TFRs that are 623 and 674 births, respectively, larger than their female TFRs. Among

those few countries with larger female TFRs than male TFRs, Australia and the United States show the greatest differences, with female TFRs that are 915 and 201 births, respectively, larger than their male TFRs. Only a few countries, namely, Singapore, Canada, and Denmark, have male and female TFRs that are near equal (see Poston et al. 2005:873 for a similar analysis of the counties of Taiwan).

The fact that male and female fertility rates are not the same makes it all the more important and necessary to analyze male fertility along with female fertility. The factors causing the differentials vary over time in their magnitude and effects on the male and female fertility rates. In some cases, they may well be sex specific and will not be realized or understood empirically unless both male and female rates are investigated.

Biosocial Models of Demography

Biosocial models of demography combine biological variables (e.g., hormonal levels and genetic factors) with social variables to predict demographic outcomes, in particular, those outcomes or processes that are biological in nature, that is, fertility and mortality. Aside from demographic studies of the proximate determinants of fertility, the incorporation of biological variables into explanatory models of demographic processes is not an activity to which demographers have devoted even a modest amount of attention. It is likely that there are proportionally more sociologists than demographers developing and testing biosocial models of human behavior. For whatever reasons, demographers have avoided such developments.

Casterline (1995) is one of a handful of demographers who recognize the importance of incorporating biological thinking into our theories of demography. He observes that demographers "can no longer run away from biosocial models . . . It requires either extraordinary blindness or exceptional stubbornness to fail to recognize that fertility and mortality . . . are determined in part by biological variables" (p. 359).

Casterline (1995) argues that after 1994, the "passive avoidance of biosocial models [among demographers] is no longer an option . . . [owing to Udry's presidential address in 1994 to the Population Association of America] challenging demographers to take biosocial models seriously" (p. 360). In his address, Udry (1994) reported research showing that "one-fourth of the variance in women's 'gendered' behavior" is accounted for by a model comprising "prenatal and adult androgen measures and their interaction" (p. 520). This research (Udry, Morris, and Kovenock 1995) concludes that "gendered behavior is not entirely socially constructed, but partly built on a biological foundation" (p. 367).

Udry is a demographer who, over the years, has developed and tested biosocial models of demographic outcomes. He has published several papers introducing "biosocial models of adolescent sexuality that combine traditional sociological models with models derived from a

biological theory of hormone effects" (1988:709; see also Udry, Talbert, and Morris 1986). Weller (1995) notes that just because Udry claims that a "behavior has biological foundations [does not mean he believes] it does not also have social foundations" (p. 281).

Here is a hypothetical equation, proposed by Casterline (1995:360):

$$D_i = hB_i + sS_i + c(B_i * S_i) + e_i$$

where D is some demographic outcome, B is a vector of biological variables, S is a vector of social variables, h and s are vectors of parameters to be estimated indicating the effects of the biological and social variables, e is a disturbance, and the subscript i refers to individuals.

In the first place, much of demography assumes the parameter h not to be significantly different from zero. But Casterline (1995) counters that the

denial of the existence of parameter h . . . [is] now amply refuted by empirical scientific evidence . . . Scientists . . . must acknowledge that a substantial and solid body of evidence supports the proposition that individual variation in many behaviors is biologically driven . . . The challenge for scientists is to determine the magnitude of parameter h . (P. 361)

In Casterline's equation, the biological and social variables may be considered as additive and as interacting. The $B_i * S_i$ interaction would posit that the "effect of biological variables is conditioned by the level of social variables" (Casterline 1995: 361), a point made also by Udry (1994; see also Udry 1995).

Casterline (1995) and Udry (1994, 1996) both admit that biosocial models will have no role in certain demographic studies. Casterline (1995) observes that "a large fraction of the central research questions in social demography concerns secular change and or macro/societal variation, and hence it is not clear that much attention need be given [in such analyses] to biological variables" (p. 368). The role of biosocial models in demography thus depends greatly on the demographic outcome being investigated. Given the results of Udry and several others regarding the empirical importance of biological variables as predictors of certain types of demographic outcomes, it is concluded that demographers can no longer afford to ignore the potential of biological predictors of them.

Sexual Orientation

Policymakers are increasingly focusing attention on issues concerning the gay and lesbian community. This recent surge in interest may be attributed partly to judicial decisions seen as victories for homosexuals, including the Supreme Court's decision striking down Texas's law against same-sex sodomy, and the Massachusetts Supreme Court's ruling that the state constitution requires the state to give same-sex couples marriage rights equal to those of

opposite-sex couples (*Goodridge et al. v. Department of Public Health* 2003; *Lawrence et al. v. Texas* 2003). In coming years, policymakers are likely to look to demographers and other social scientists to provide information on the homosexual community to aid them in constructing arguments for or against certain policies. Presently, however, there has been little demographic work done in the area of sexual orientation; many questions are just beginning to be explored, and some remain virtually untouched.

The demography of sexual orientation is underdeveloped due in large part to a lack of representative data sets with samples of sufficient size to answer many of the questions that researchers would like to ask about the homosexual community. Many of the larger surveys conducted of the homosexual population were surveys of convenience, such as those drawn from readership of magazines or newspapers (see the discussion of Black et al. 2000). U.S. researchers seeking representative samples of the gay and lesbian population must rely on the General Social Survey (GSS), the National Health and Social Life Survey (NHSLs), the NSFG—Cycle 6, and the census to explore research questions. Studies conducted using the GSS, the NHSLs, or the NSFG are limited due to the small number of individuals captured in these surveys who either identify as homosexual or who report having engaged in sexual activity with a same-sex partner. In the NHSLs, for instance, the sample consists of 3,432 American men and women but includes only 12 women and 27 men who identify as homosexual. And it includes only 32 women and 45 men who either identify as homosexual and/or had exclusively same-sex sex partners in the past year. The numbers in the NSFG are almost twice as large. However, sample sizes such as these are far too small to conduct many analyses of the homosexual population of interest to demographers, such as their distributions across cities, states, or occupations.

Beginning in 1990, however, the U.S. Census Bureau introduced a change on the long-form questionnaire that resulted in the creation of a large data set of same-sex individuals. The bureau offered respondents the option of identifying individuals living in the household as unmarried partners, after studies indicated the increasing number of opposite-sex and same-sex individuals living in marriage-like relationships in the United States (Baumle, Compton, and Poston, forthcoming; Black et al. 2000). The unmarried-partner category permits unmarried heterosexual and homosexual couples to identify themselves as a couple.

In the 2000 U.S. Census, 1,188,782 individuals identified themselves as being in same-sex unmarried partner households on the census, 605,052 males and 586,730 females (Simmons and O'Connell 2003). The addition of this category to the census has opened the door for social scientists to explore a number of issues relating to homosexuals that were previously out of reach due to the paucity of data.

Census data on same-sex partners are limited, however, in that only individuals who choose to identify as unmarried partners on the census questionnaire are

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captured. Thus, individuals who prefer not to self-identify are not counted. Furthermore, the census question allows data to be collected only for same-sex partners living in the same household, leaving homosexuals who are single unaccounted for. Nonetheless, the advantages of the census data over other data sources renders the census an attractive source for research on homosexuals, and studies attempting to quantify the extent of possible bias have concluded that the problem is not so severe as to warrant abstaining from using census data.

Surprisingly, however, little research has been conducted in this area to date, despite the availability of census data for both 1990 and 2000. And the work that has been done has been dominated by economists rather than demographers. There are a number of important areas of research in the area of sexual orientation, however, in which demographers and other social scientists can and should play an important role in the coming years.

One of the primary concerns of policymakers in both formulating policy goals and determining their impacts will center on the places in which gays and lesbians are located within the country. Data from the 1990 and 2000 U.S. Censuses indicate that there are concentrations of gays and lesbians in virtually all the metropolitan areas of the country. However, with but a few exceptions (Baumle et al., forthcoming; Black et al. 2000, 2002; Gates and Ost 2004; Walther and Poston 2004), there has been little effort among social scientists at indexing these concentrations among the metropolitan areas of the United States and examining the extent to which the indexes are associated with the social, ecological, and political characteristics of the areas. Preliminary research using 2000 data indicate that in most metropolitan areas, the levels of concentrations of partnered lesbians are higher than those of partnered gays. San Francisco is an outlier with many more partnered gays per 1,000 never-married males than partnered lesbians per 1,000 never-married females. Most metropolitan areas show the opposite. Limited research also indicates that ecological characteristics of metropolitan areas reflecting amenities of interest to both homosexuals and heterosexuals are more associated with the levels of homosexual prevalence than are characteristics pertaining to factors important only for homosexuals (Baumle et al., forthcoming; Black et al. 2002). Even less quantitative research has been undertaken regarding the differential concentration of partnered gays and lesbians in the nonmetropolitan and rural areas of the United States (Baumle et al., forthcoming).

Another area of homosexual demography in which there is a major research void is residential segregation. Demographers have paid virtually no attention to patterns of residential segregation of homosexuals from married and unmarried heterosexuals (for an exception, see Baumle et al., forthcoming). Preliminary research indicates that levels of segregation of homosexuals (gays and lesbians treated separately) from unmarried and married heterosexuals are sizable, that lesbians are less segregated from heterosexuals than are gays, and that gays and

lesbians are segregated from each other. Extensive demographic research on racial residential segregation of black and Hispanic minorities from the white majority indicates that the segregation is largely involuntary. Early research on the segregation of homosexuals from heterosexuals suggests that the segregation is both involuntary and voluntary, but considerable work remains to be done that would sort out these differences and estimate statistical models to explain them.

For decades, U.S. politicians have been proposing the adoption of a federal law prohibiting discrimination in employment on the basis of sexual orientation. Policymakers might turn to social science research to answer important questions in assessing whether such a law is necessary: Do homosexuals earn less than heterosexuals? Are homosexuals segregated into different occupations than heterosexuals? The majority of studies examining homosexuality and work have focused on the relationship between sexual orientation and income. Once controls are introduced for individual characteristics, most research finds that gay men earn less than heterosexual men (Badgett 1995; Baumle et al., forthcoming; Black et al. 2003; Klawitter and Flatt 1998). Findings about the earnings of lesbians are mixed (Badgett 1995; Baumle et al., forthcoming; Klawitter and Flatt 1998). Research is ongoing concerning income differences between homosexuals and heterosexuals, but there is no clear consensus as to the cause of the income differences if they do exist.

Badgett (1995) finds that occupational differences account for some of the income differences between homosexuals and heterosexuals. Occupational segregation, therefore, is another area in which future research needs to be conducted in assessing whether inequalities exist in the workplace between homosexuals and heterosexuals. Baumle et al. (forthcoming) have explored the manner in which homosexuals and heterosexuals are segregated in professional occupations. They find that partnered homosexuals are overrepresented in the professions as a whole and appear to be concentrated within fields that are focused on creativity, psychology/counseling, and law/social work. Partnered homosexuals are underrepresented primarily in the engineering and teaching professions. Additional research needs to be conducted to determine the cause of such occupational segregation, as well as to examine segregation in occupations outside the professions.

Finally, the debate concerning the legal right of homosexual couples to marriage is one that is virtually global (Merin 2002). There are few places in which homosexuals have been granted marriage rights equal to those of heterosexuals, and family rights vary widely both within and between countries. To provide guidance to legislators in formulating marriage and family laws, demographers must develop a literature about the family practices of homosexuals. What is the average length of a homosexual relationship? How prevalent is childrearing among lesbian and gay couples? Do lesbian and gay couples predominantly adopt or raise their own children? These questions,

and others, are important to address if demographers and policymakers are to understand the manner in which laws and social policies are to be constructed to address the needs of the homosexual population.

In the above and last section of this chapter, three broad areas of demographic research have been proposed requiring major conceptual and methodological advances. They represent challenges to demographers. They require demographers to not undertake fertility analyses that are based only on females, to not estimate demographic models that are based only on social variables, and to not restrict their investigations, implicitly or explicitly, to heterosexuals. According to Horton (1999), an important characteristic of “critical demography,” as opposed to “conventional demography,” is the posing of “questions that challenge the prevailing social order” (p. 365). In some ways, demographic research in the areas outlined above may well challenge existing demographic paradigms.

Also, the issues and topics presented here comprise a short and very selective list. There are certainly many other areas of research requiring the future attention of demographers.

CONCLUSION

Over the past 50 years, the field of demography has changed substantially (see Hauser and Duncan 1959c; Poston and Micklin 2005). First, the theoretical base of the field has expanded considerably in terms of the subject matter incorporated and its links to other disciplines. Demographic theories now encompass phenomena other than the standard variables reflected in the demographic equation (population size, composition, and distribution, and fertility, mortality, and migration). This is because demographic research has shown that fuller explanation of population conditions, trends, and events requires that theories and models incorporate nondemographic variables and that the effects of demographic conditions and trends extend to nearly all dimensions of human societies and their natural environments. As the substantive concerns of demographers have grown, so has their reliance on concepts, theories, and methods developed in other disciplines such as economics, political science, social psychology, and cultural anthropology. In short, the scope of the field of demography—the “demographer’s ken”—has widened considerably.

A second way in which demography has changed over the past half-century is the enormous expansion in the availability of demographic materials, including both primary and secondary data sources. The frequency, coverage, and accuracy of basic demographic data collection systems, for example, census and vital registration procedures, have increased worldwide, although there is still sizeable variation among countries and regions. Such improvements increase the likelihood that routine demographic activities such as population counts, estimates, and

projections will become more accurate and, therefore, more useful for social, political, and economic planning.

Perhaps the most significant changes in the field of demography are seen in its infrastructure. Examples include a growing number of professional organizations, the expanded number and variety of outlets for distributing research findings, an enormous variety of Internet sites that provide demographic information or discussions of topics of demographic interest, and the continuing spread of efforts to use demographic information to inform and influence local, regional, national, and international practices and policies.

Throughout this chapter, we have suggested that the scope of demographic theories and research now extends throughout the social and behavioral sciences. Readers should not interpret these comments to mean that demography and population studies are any less significant for the discipline of sociology than they were decades earlier. Indeed, several features of the sociological perspective all but guarantee that demography will remain an integral component of sociological theory and research. First, a sizeable number of sociologists continue to show a primary interest in the standard demographic variables of population size, composition, and distribution and the processes that influence changes in these variables—that is, fertility, mortality, migration, and social mobility. The continued strong interest and enrollment in the Sociology of Population section in the American Sociological Association is indirect testimony to this contention. Second, much of sociology is concerned with human groups and aggregates, including such varied forms as peer and kinship groups, formal organizations, residential communities, and nation-states. Even those sociologists who focus their attention on individual conduct or personal characteristics tend more often than not to interpret these individual variables in terms of features of the group or collective context in which they are embedded. Questions about contextual effects are often raised in demographic terms, for example, various indicators of group size, composition, and/or distribution. Third, the discipline of sociology grew out of a problem-oriented concern with the quality of life in human societies, and this concern is still a vibrant force. Demographers, many of them sociologists, have continued this concern, raising questions about the effects of population size and growth on the sustainability of social and economic development, particularly in the poorer societies and regions of the world, and on medium- to long-term effects on natural resource supplies and environmental quality.

The examples presented above are intended only to whet the reader’s appetite to think more about the integral connections between sociology and demography. There is much conceptual, theoretical, and empirical territory to be explored. One conclusion, however, is clear: The study of population is a key component of twenty-first-century sociology.