Epilogue: Needed Research in Demography

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What is the future of the research enterprise in demography? What are the demographic questions and topics requiring attention in the years ahead?

This chapter has three parts. The first sets the stage for the second and third. It consists of a review of Hauser and Duncan's *The Study of Population* and the research priorities articulated by their chapter authors in 1959. Most of the needed research articulated by the chapter authors of *The Study of Population* has been addressed in the 45-year period between its publication and the publication of the present *Handbook*. The second section summarizes the research priorities proposed by many of the authors of this *Handbook*. The last section sets forth and discusses a few research challenges that we deem to be particularly relevant and important for demographic research in future years.

RESEARCH PRIORITIES OF *THE STUDY OF POPULATION*

In *The Study of Population*, editors Philip M. Hauser and Otis Dudley Duncan wrote the first chapter, which set out the book's overview and conclusions. They also wrote Part I, "Demography as a Science," which consists of four chapters dealing with the nature of demography, its data and methods, demography as a body of knowledge, and demography as a profession. In these five chapters they do not address directly the

research priorities of demography, but they do make several observations about the research requirements and needs of demography. In their discussions of the knowledge base of demography and the need for theory development, they note that it is not possible to deal conclusively with matters raised about the major foci of the field. To resolve these issues "would be to anticipate accurately the future course of the discipline" (Hauser and Duncan 1959: 16). They continue that although "nothing in demography, any more than in any other science, is ever 'finished,' " it would be good for demography to cast its theories "at least partly in historical terms" (1959: 16). This remains an important objective.

Regarding data requirements, they note the rather obvious need of all countries and territories and their geographical subdivisions for good censuses and registration systems, the two pillars claimed by Walter F. Willcox, the "dean of American demography in his day," that support the "arch" of demography (1959: 53). These data need to be made available both backward and forward in time (1959: 53–54). They also report on needed developments in data processing and delivery. Some of the discussions in the Prologue to this *Handbook* note that many of these data requirements have been addressed rather satisfactorily since 1959.

In an early section outlining the issues they had asked chapter authors to address, Hauser and Duncan state that chapter authors writing about the status of demography in a particular country or geographical area could consider "aspects of demography that should be emphasized or developed further in future research," as well as "the most pressing subjects on which research should be done in the near future" (1959: 24–25). The chapter authors writing about elements of demography were asked to consider the "next steps" in research as well as any obstacles that might hinder these research advances (1959: 25). Some of the chapter authors chose to address these issues, others did not.

In his brief discussion of the development of demography in France, Sauvy writes that demographers need to do a better job in their studies of penetrating the "social complex" of the demographic processes of fertility, mortality, and migration. These "must be studied more and more by relating them to social factors" (Sauvy 1959: 186). And since "these social factors cannot always be comprehended by the too rigid and costly classic statistics (censuses and vital statistics), local inquiries [that is surveys] must be multiplied" (Sauvy 1959: 186). If anything, demography has been characterized since 1959 by a proliferation of fertility and health surveys, both international and country-specific. Moreover, the several chapters in this *Handbook* on population and the social sciences show that demographers in the past 45 years have indeed followed Sauvy's advice.

Grebenik's chapter on the development of demography in Great Britain concludes with the observation that future research is needed that "lies on the borders of demography proper and sociology, social psychology, and allied disciplines" (Grebenik 1959: 201). Once again, many of the chapters in this *Handbook*, particularly those dealing with population and the social sciences, point to significant advances in this regard since 1959.

After reviewing the current status of demography in Germany, Schubnell writes more than two pages on future prospects. He outlines many issues that must be addressed by social scientists in Germany, including the "social equalization of family burdens," the "sociopolitical and labor market effects of rearmament," the "course of the trade cycle," and the "special problems of the process of aging" (Schubnell 1959: 212). Although demography needs to make substantial contributions in all these arenas, he notes that among the most pressing problems that need to be addressed by German

demographers are "the structure of families and households," "population mobility and its connection with sifting and selection processes," the "sociopolitically requisite equalization of family burdens," and the "need for the replacement and provision for the population in the various areas of the economy" (Schubnell 1959: 213). Many of these issues are covered in several of this *Handbook's* chapters. One that requires continued research pertains to issues and implications of below-replacement fertility. See in particular the discussions in Morgan and Hagewen's chapter in this *Handbook*.

In their chapters on demography in Brazil and in India, both Mortara (1959) and Chandrasekaran (1959) point to the fact that future research in their countries depends significantly on "adequate demographic data," especially in the case of Brazil, "an efficient organization for the registration of births, deaths, and marriages" (Mortara 1959: 245). The censuses in both countries, the authors write, have become efficient and timely. Even today, many countries have better censuses than they do registration systems. This problem, mentioned in 1959, remains.

In Taeuber's chapter on demographic research in the Pacific area, she correctly writes that in the late 1950s "the greatest of the research fields in the Pacific, and the least cultivated, is that of China and the Chinese" (Taeuber 1959: 274). She observes in some detail the paucity of demographic knowledge and data about China and the Chinese. In 1959, indeed, little was known in and outside China about the country's demography. While today there are still many important demographic research questions that need to be addressed about China, the knowledge base and data on the demography of China have increased tremendously since 1959. Many of these developments are mentioned in several chapters in this *Handbook*. Other treatments are those of Banister (1987), Poston and Yaukey (1992), and Peng and Guo (2000).

In Bogue's chapter on population distribution, he observes that demographers are devoting considerable effort addressing the question of "*how* fluctuations in fertility occur" (Bogue 1959b: 398). He suggests that a major research requirement involves also addressing the question of why, sociologically and socioeconomically, fertility changes occur. "An intensive distributional analysis of interarea variation in fertility and of interarea change in differences in fertility should throw considerable light on this subject" (Bogue 1959b: 398). There has been development in this regard since the publication of Bogue's chapter. See the discussions in Chapter 20, "Ecological Demography," in this *Handbook*.

In his chapter on fertility, Ryder focuses on many areas in which research is needed. He characterizes as insufficient the state of knowledge in the late 1950s pertaining to "quantitative materials concerning the parameters of procreation and their statistical relationship with demographic and socioeconomic variables" (Ryder 1959: 434). Research, he writes, is also needed "in the area of the immediate causes of fertility variation: fecundity, copulation, and contraception. Improvements in the diagnosis of sterility would be of considerable assistance" (Ryder 1959: 434). Discussions in chapter 8, "Fertility," and chapter 24, "Fertility Planning," in this *Handbook*, among others, report some of the advances since the 1950s in social demographic analyses of fertility and investigations of the proximate determinants of fertility.

Dorn (1959) proposes several areas of needed research in his chapter on mortality. Aside from data improvements and methodological advances, he also mentions the need for certain kinds of analytical studies. Referring specifically to the United States, he calls for detailed investigations of urban-rural differences in mortality, studies of metropolitan and nonmetropolitan mortality, mortality analyses focusing on occupation and

socioeconomic groups, fetal mortality, the sex differential in mortality, and old age mortality. These topics have received considerable attention since the late 1950s as evidenced in chapter 9, "Infant Mortality," and chapter 10, "Adult Mortality," in this *Handbook* (see also Rogers, Hummer, and Nam 2000).

Bogue's chapter on internal migration ends with the recommendation that demographers "stop oversimplifying the migration situation and underestimating its variability from place to place and over time" (Bogue 1959a: 505). He holds that the following lines of research are needed: demographers must exploit the "existing data relating to migration streams and selective migration." They must estimate multivariate models of migration because "migration, perhaps more than most topics in demography, demands research designs that take into account several variables simultaneously" (Bogue 1959a: 506). And comparative and international studies of internal migration are needed. There have been significant advances along these lines since the 1950s, as may be evidenced by discussions in chapter 11, "Internal Migration," and chapter 20, "Ecological Demography," in this *Handbook*.

In the chapter by Thomas on international migration, the author holds that future research "will be much improved if the most glaring deficiencies of the primary data are eliminated in the developed countries and if the lessons of the past are borne in mind where new records are introduced in underdeveloped countries" (Thomas 1959: 534). Thomas then presents a list of some 30 specific topics that "are aspects of the migration process in the era of unrestricted movement which would well repay intensive analysis" (Thomas 1959: 537). They will not be repeated here, but it is of interest to note that since the publication of Thomas's chapter, many, if not most, of these topics have been satisfactorily addressed by international migration researchers. See the discussions of some of these topics in chapter 12, "International Migration," in this *Handbook* and in the *Handbook of International Migration* edited by Hirschman, Kasinitz, and Dewind (1999).

Glick's chapter on family statistics raises a number of issues that need to be addressed for this area of demography to prosper in the coming years. He first calls for more detailed data on the current status and changing characteristics of family composition. He identifies specific kinds of questions that could be added to the decennial census and to other government surveys. It turns out that many of them have found their way onto survey and census instruments in past decades. Glick also calls for advances in punch card technology so that person characteristics could be cross-classified with characteristics of the family (Glick 1959: 599). The kinds of cross-tabulations wished for by Glick in 1959 are now easily obtained, given the computer technology developed since the 1950s and electronically available government and private surveys and public use samples from the censuses of the U.S. and many other countries.

One of the most important questions for future research raised by Jaffe in his chapter on the workforce is the following: "Will women who take full-time jobs outside the home have smaller completed families than if they had not taken such jobs? Or does it work in reverse? . . . Or are both variables (size of completed family and working-force behavior of the woman) the resultants of other socioeconomic factors?" (Jaffe 1959: 615). This question has generated a great deal of research activity since the 1970s, some of which is discussed in chapters 3, 7, and 8 in this *Handbook*.

The Study of Population contains two chapters dealing with ecology, namely, Frank's (1959) chapter on general ecology, and Duncan's (1959) on human ecology. Both are concerned with the extent to which ecology may provide a framework or

perspective for demographic analysis. This is likely the most important contribution of ecology to demography. Indeed Frank notes that "if ecology has anything to offer the demographer, it must be looked for along theoretical lines" (Frank 1959: 672). And Duncan writes that "the ecological framework provides one means of ordering demographic data intelligibly" (Duncan 1959: 710). The major theoretical statement of human ecology was written more than 50 years ago by Amos Hawley in his *Human Ecology: A Theory of Community Structure* (1950). His ideas have led to an abundance of empirical analyses. Many of those focusing on demographic processes are discussed and referenced in chapter 20, "Ecological Demography," in this *Handbook*. Many of those dealing with organizations and corporations are discussed in chapter 15, "Organizational and Corporate Demography." But these are mainly empirical manifestations and extensions of Hawley's (1950) theory of human ecology. Theoretical advances in this field since 1950 have been limited.

In Ackerman's chapter on geography and demography, he mentions several areas requiring research attention. He focuses particular attention on the need to study "the technological element in settlement influences and sustenance patterns as they affect population characteristics" (Ackerman 1959: 724). This has been a major concern of human ecologists since the publication of Hawley's (1950) *Human Ecology*, Duncan's (1959) chapter in *The Study of Population*, and other conceptual and theoretical treatments by Duncan (1961, 1964), Gibbs and Martin (1959), and Schnore (1958, 1961). See the discussions of much of this work in chapter 20, "Ecological Demography," in this *Handbook*, as well as in publications of Namboodiri (1988, 1994), Micklin (1973), Poston, Frisbie, and Micklin (1984), Micklin and Poston (1998), Micklin and Sly (1998), and Poston and Frisbie (1998), among others.

In the chapter on economics and demography, Spengler lays out several areas where future research is needed. Since "population problems deal with the behavior of groups and subgroups of individuals through time . . . it appears to be essential, if dynamic process analysis is resorted to, that social-psychological considerations be taken into account as well as those of an essentially economic or demographic order" (Spengler 1959: 816). Among the other areas where future research is needed, Spengler calls for more extensive multivariate analyses and the use of time lags in dynamic models. He also suggests the need to inquire into the nature and causes of the apparent appeal made by Marxian views on population to public spokesmen and policymakers. And he recommends longitudinal analyses of the impact of acquisition of consumption on age-specific fertility, as well as the interrelations of the trade-cycle and age-specific fertility. Many of the areas outlined by Spengler in 1959 have been addressed in the past 45 years. See discussions in Chapter 18, "Economic Demography," in this *Handbook* and in Rosenzweig and Stark's (1997) *Handbook of Population and Family Economics*.

In Moore's chapter on sociology and demography, he does not refer explicitly to "future research areas" or "next steps," as did many other authors of chapters in *The Study of Population*. But he does mention a few areas deserving more attention. For instance, he states "that it is probably safe to say that the relation of fertility to the social and psychological aspects of mobility is the most promising lead to part of the 'intervening links' between 'structural' characteristics and fertility behavior" (Moore 1959: 848). He also notes the need to treat mortality and migration as dependent variables and not to focus only on biological and economic explanations. The sociological context must play a role in these models. Several chapters in this *Handbook*, especially Chapter 14, "Sociological Demography," provide considerable evidence of the many accomplishments of

social demography in the past 45 years. Some of these were mentioned by Moore in 1959, but many were not.

This section has summarized many of the discussions of future research needs that were articulated by contributors to *The Study of Population*. As noted earlier, most of these research areas have been addressed by demographers in the 45-year period since the publication of Hauser and Duncan's inventory. This Epilogue now turns to summaries of the areas of future research set forth by many of the authors of chapters in this *Handbook*.

RESEARCH PRIORITIES OF THE *HANDBOOK OF POPULATION*

Age and Sex

In his chapter on age and sex in this *Handbook*, Poston identifies two major areas in which future age and sex research should focus. He first highlights the possible implications of the unbalanced sex ratios at birth in China, South Korea, Taiwan, and India. In contrast to normal sex ratios at birth (SRBs) of approximately 105, the SRBs in these four countries fell close to 120 in the year 2000. The unbalanced sex ratios have been attributed primarily to a preference for sons in a time when declining fertility and family planning policies limit an individual's opportunities to have a son. Researchers have theorized that individuals in these countries have turned to measures to ensure that they have at least one son, most likely employing sex-selective abortion.

The decline of female births in China, South Korea, and Taiwan could result in a number of long-term problems. When reaching marriage age, many men will find themselves unable to find a wife due to the shortage of women (Poston and Glover 2005). Likely outcomes of this "bride shortage" include employing unmarried young men in public works projects or war, importing new brides from other countries, and the establishment of "bachelor ghettos."

Poston also contends that future research should be directed at the process of demographic aging (see Poston and Duan 2000; Poston 2002). Many countries in Asia and Latin America have experienced significant declines in fertility which will ultimately increase the elderly populations in the years to come. The huge increase in the older population will likely impact the ability of the younger population to support the older population, both economically and emotionally. Further, the role of the government in providing support to the older population will have to be reassessed as the older population increases and the number of younger individuals available to provide support decrease.

Thus, policymakers will need to develop possible methods of caring for the older population, and demographers could play a vital role in this process. Future research in this area could provide guidance to countries on methods to increase support for the older population, including increasing international migration for demographic replacement or raising the retirement age.

Population Distribution and Suburbanization

Guest and Brown's chapter in this *Handbook* notes that suburbanization has influenced significantly the way populations are distributed in the U.S. and throughout the world.

They suggest that the continued outward movement of populations will be one of the most significant demographic trends of the 21st century, dependent in part on transportation developments, which increase the ability of individuals to traverse long distances in shorter time frames. In addition, they note that future suburbanization will also depend on improvements in electronic communication, which will decrease the necessity for daily interactions between individuals, thereby permitting persons to work from their homes.

Due to the likelihood of this continuing trend, Guest and Brown suggest that researchers should focus future research on developing more sophisticated models that have the capacity to explain suburbanization across metropolitan areas and countries. Contextual characteristics could influence the rate of suburbanization, including changing physical boundaries, community amenities, ethnic composition, immigration, and employment patterns. It is these areas that should be the focus of future studies in population distribution and suburbanization.

Marriage and Family

Explanatory models of marriage and the family are evolving in postindustrial societies. There are many issues pertaining to marriage and the family requiring future research. Waite observes in her chapter in this *Handbook* that the notion of what constitutes a family and a marriage is changing with increased cohabitation and the rising recognition of the partnerships of homosexual couples. These developments challenge accepted definitions of what constitutes a family, i.e., must the family be based on a blood relationship or a legal bond? If the response is in the affirmative, cohabiting couples, both heterosexual and homosexual, cannot constitute a family. Many would claim otherwise, especially if children are involved.

In recent years, some U.S. states, and some other countries, have recognized legal rights for homosexuals in the areas of marriage and family. These changes in the legal definition of marriage could affect the social, political, and economic lives of homosexual individuals owing to the rights and benefits carried by marriage (emotional, physical, and economic). This area will likely be a focus of new work in the years ahead.

In addition to changing definitions of marriage and family connected with cohabitation and homosexuality, Waite notes that future research should focus on racial disparities in family patterns. Black men and women have not experienced the same patterns in age at marriage as whites, resulting in blacks having lower ages at marriage than whites (Fitch and Ruggles 2000). In addition, whites marry at approximately twice the rate of blacks (Waite 1995), with the rates of black women predicted to decline and those of white women to remain high (Goldstein and Kenney 2001). In addition to marital differences, the birth rate of unmarried women is three times higher for blacks than for whites (Martin et al. 2002). Future research should be directed toward explaining these differences between marriage and family patterns of blacks and whites.

Demography of Gender

Since the publication of Hauser and Duncan's *The Study of Population* in 1959, research on the demography of gender has increased almost exponentially. Riley notes in her chapter in this *Handbook* that the amount of research incorporating gender indicates

that demographers are accepting the significant influence of gender on social and demographic processes.

Although demographers have increasingly incorporated gender into their studies, Riley notes that theoretical and methodological weaknesses in demography result in a failure to truly capture the complex effects of gender. She suggests that the field might benefit from incorporating theoretical and methodological perspectives on gender from other disciplines. By incorporating gender perspectives from feminist studies, for instance, demographers might be able to develop new approaches to the understanding of gender's role in population studies.

Demography of Aging

Drawing on a study conducted by the National Research Council (2001), Uhlenberg notes in his chapter that there are five primary areas in which future research on aging is likely to develop. First, Uhlenberg encourages multidisciplinary research on aging that explores connections among the social sciences; in this manner, policy recommendations would incorporate a more complete picture of the aging process. Second, he emphasizes the importance of collecting longitudinal data. Only longitudinal data are adequate for drawing causal conclusions about aging. Uhlenberg's third proposed area of research involves conducting comparative analyses of aging across countries in order to expand the knowledge base about cross-country similarities and variance in the aging process.

Fourth, computer technology allows the development of databases and the implementation of advanced statistical methods leading to more sophisticated analyses of aging. Data from administrative records may be linked with survey information to increase available information, geographical information can be added to analyses, and multilevel analyses can be undertaken. Finally, Uhlenberg suggests that one of the major theoretical challenges facing demographers in the coming years is to better understand the manner in which societies will change and adapt as their populations grow increasingly older.

Demography of Race and Ethnicity

Much like demographic studies of gender, race and ethnicity have mainly been incorporated into demographic analyses as important, if not essential, controls. Nonetheless, Saenz and Morales argue in their chapter that further development of the demography of race and ethnicity is necessary in the coming years. Just as Riley posits that gender demography could benefit from incorporating outside theories and methodology, Saenz and Morales suggest that demographers should broaden their understanding of the meaning of race and ethnicity. They contend that in the future, demographers should be cognizant of theories of race and ethnicity in sociology and related disciplines in order to gain insight into the manner in which race and ethnicity can be successfully incorporated into demographic research. By understanding the history and context of racial and ethnic groups and related stratification, demographers will be better able to comprehend the manner in which these groups affect and are affected by demographic processes.

Morales and Saenz also identify some specific areas where studies of the demography of race and ethnicity should be focused. Due to the ability of individuals to

identify multiple racial identities on the 2000 U.S. census, demographers will now be able to incorporate more fine-tuned distinctions of race and ethnicity into their analyses. Research on multiracial persons could center on the effect of multiracial identity on social and economic circumstances, marriage patterns, racial and ethnic identification of the children of multiracial individuals, and the incorporation of multiracial persons into population projections. Saenz and Morales also suggest that future research should distinguish between immigrant populations based on country of origin, rather than treating Latino and Asian groups as a whole, since group traits and experiences vary by country of origin. Further, researchers should delineate between native-born and foreign-born members of groups because research has indicated that native-born minorities often possess characteristics and degrees of success that differ from those of foreign-born members.

Finally, Saenz and Morales contend that the effects of race and ethnicity on stratification and inequality must be considered in conjunction with other traits that play a role in inequality, such as nativity, gender, class, sexuality, and the color of one's skin. They note that there are few studies which have attempted to incorporate all of these characteristics and argue that future research should attempt to create models which integrate these aspects of inequality.

Labor Force

Labor force demography continues to play an important role in demographic research because the size, structure, and changes of the labor force have a significant effect on the population processes, particularly fertility and migration. In her chapter in this *Handbook*, Sullivan notes that early retirement in developed countries, coupled with declining mortality rates, has resulted in workers in developed countries spending many more years of their lives out of the labor force. In order to provide for the care of these individuals, Sullivan suggests that demographers in the coming years will continue to explore the demographic patterns of retirement in an attempt to provide estimates of future retiring populations. The lack of a mandatory retirement age makes the process of predicting retirement age a challenging one and, as a result, will render the insight of demographers in this area increasingly valuable.

In addition to retirement age, Sullivan suggests that the manner in which young individuals become attached to the labor force will be an area of research focus in the coming years. Research has indicated that the way youths are involved in the labor force during their early years affects future labor force participation, income, completion of college, and criminal activity (Carr, Wright, and Brody 1996; Crutchfield and Pitchford 1997). Further, youth labor force attachment varies between the sexes and among racial and ethnic groups (Deseran and Keithly 1994). Sullivan predicts that this area will continue to be of interest to demographers in the future, as factors influencing youth labor force attachment are likely to differ for future generations.

Finally, Sullivan contends that a continuing issue of import in the area of labor force demography will concern the composition of the labor force following the completion of the demographic transition and the movement from agriculture to industry to service economies. The aging of the labor force, movement toward professional and/or knowledge-based occupations, and the impact of future technological improvements could all play a role in altering the labor force in the coming years.

Fertility

In their chapter in this *Handbook*, Morgan and Hagewen note that fertility is an advanced field of demographic study, boasting uniform methods of measurement and analysis, common interpretations and organizations of data, and some consensus regarding the explanations for a variety of observed events and trends. Despite this development, fertility, like the other demographic processes, is constantly altering and will be an important area of research in both developing and developed countries.

Although common patterns have been observed in many countries in the transition from high to low fertility, there is no guarantee that the same determinants will play a role in the fertility declines for countries undergoing the transition now or in the future. Morgan and Hagewen remark that new phenomena could dramatically alter the transition process, rendering past theories of fertility decline inadequate for explaining current or future declines. Already, countries experiencing recent fertility transitions have exhibited signs of being affected by the infusion of ideas and technology from developed countries, which in turn has resulted in more rapid fertility declines (Bongaarts and Bulatao 2000: 76–77; Bongaarts and Watkins 1996). Thus, future declines are likely to be affected not only by the experiences of countries that have already completed the transition but by perhaps unforeseen political, economic, or social phenomena.

In addition to future research concerning the causes of fertility decline, Morgan and Hagewen note that the world is entering a stage in which fertility in many countries has not only declined but has reached below-replacement levels. In the coming years, these countries will likely be the focus of extensive fertility research, as demographers and policymakers explore how low fertility will decline and whether governments could or should offer effective incentives to raise fertility levels.

Technological developments are also likely to play a role in future fertility developments and, thus, future research. Morgan and Hegewen write that technological developments could result in the ability to safely postpone childbirth, as well as to genetically engineer children. Such developments could affect fertility decisions and their implications, as well as their likely use.

Infant Mortality

In his chapter, Frisbie predicts that future research in the area of infant mortality will continue to explore the relationship between deviations from birth outcome survival optimums and their effects on infant mortality. He suggests that gaining insights about these interrelationships could assist in gaining a better understanding of the variation in perinatal health.

Further, Frisbie contends that the disparity between black and white infant mortality continues to be a pressing issue for research. In particular, he suggests that nationally representative studies need to be conducted exploring the linkages between the decline of the black survival advantage at short gestations and low birth rates connected in part to the manner in which pulmonary surfactant therapy differentially affects neonates with RDS.

Lack of adequate data, however, restricts studies in many areas of infant mortality. Frisbie suggests that the area of infant mortality could benefit from an increase in

contextual research, but observes that there is a need for data sets designed specifically for multilevel analysis. In addition, he notes that utilizing random effects models would permit the determination of whether individual-level effects vary by area.

Finally, Frisbie emphasizes that demographers studying infant mortality must collaborate with social epidemiologists and medical researchers to assess the biological factors, as well as the social factors, that act upon infant mortality.

Adult Mortality

Just as in the area of infant mortality, research on adult mortality will benefit from multidisciplinary work that incorporates information from epidemiology, medicine, and biology, as well as from sociology, demography, economics, geography, and history. In their chapter in this *Handbook*, Rogers, Hummer, and Krueger suggest that future research on adult mortality is likely to focus on factors limiting further gains in longevity. In particular, the rise in obesity impacts mortality by increasing the occurrence of diabetes, heart disease, and some types of cancer. In addition, despite warnings regarding the risk of cigarette smoking, a large number of individuals begin smoking every year, and one quarter of the adult population in the U.S. continues to smoke. Rogers and his colleagues note that these trends warrant further study, as they could offset the positive effect on longevity of increased education and public health efforts; further, these trends disproportionately impact racial and ethnic minorities.

The authors suggest that future research on adult mortality should also explore the impact of social and contextual factors on mortality; some research has explored the impact of the marriage and family structure on mortality (Lillard and Waite 1995; Rogers 1995), but future research could examine mortality patterns within households, neighborhoods, and regions.

Internal Migration

In their chapter, White and Lindstrom identify future developments needed in the areas of data, methods, and theory to advance research in internal migration. They observe that the increase in available data, most notably in microdata surveys, has played an important role in developing research in demography as a whole. They predict that data collection will remain a priority in the coming years in order to provide resources for researchers interested in developing behavioral modeling. In particular, they note that longitudinal or event-history information is particularly important for future research on internal migration, as life histories regarding mobility are needed to explore migration in depth.

White and Lindstrom also note that geographic information systems (GIS) technology will likely play a large role in future research on migration. GIS technology permits researchers to no longer be bound by geographical units contained in government data sets, such as states, cities, or tracts. Instead, the researcher can organize information into units that are defined by other characteristics, such as households or employment sites. The technical complexity of GIS, as well as the manner in which notions of space will be redefined, will likely result in future challenges to researchers of migration.

White and Lindstrom further suggest some new directions for research in the area of internal migration. The impact of migration on the labor force, as well as the effect of

migration on the provision of government resources, will likely remain areas of focus in the years to come. In addition, White and Lindstrom predict that future improvements in data quality will aid research on the relationship between migration and other demographic factors, including family structure. Further, the development of longitudinal data could aid in studies of migrant adaptation, such as the manner in which migrants adapt to moves between rural and urban settings. Contextual models will also likely play a role in future internal migration studies, incorporating the manner in which characteristics of the place of origin, as well as the destination influence migration behaviors.

Finally, White and Lindstrom suggest that future research is likely to integrate theories in various areas of migration research. For instance, studies of internal migration might be merged with those of local mobility and international migration. In addition, the study of migration of developing countries might be integrated with those of developed countries. Many of the studies in these areas have taken different theoretical paths, but White and Lindstrom suggest they could benefit from incorporating theories from related literature.

International Migration

In the conclusion of their chapter in this *Handbook*, Brown and Bean identify a number of areas for future research in international migration. Low fertility and the rise in longevity have resulted in the aging of populations in many developed countries. One possible solution to the challenges posed by aging populations would be for advanced countries to increase the number of working-aged immigrants. An influx of working-aged immigrants could stall the economic costs associated with an older population. In many countries with aging populations, however, unemployment remains high. As a result, an influx of working-aged immigrants could impact unemployment and other market outcomes, and these costs would need to be balanced with the possible benefits associated with increasing immigration.

Brown and Bean also suggest that future research on international migration will likely concern the manner in which immigrants will be incorporated into countries of destination, as well as the way in which the destination countries will react to ethnically diverse immigrants. Immigrants from less developed countries might not possess the educational background to incorporate themselves into the economies of their destination countries. Definitive findings on the manner in which immigrants are incorporated into destination countries cannot be discerned for some time. Thus Brown and Bean emphasize that theoretical models of incorporation will be necessary in the coming years to guide research and policy. An associated concern is the manner in which the ethnic diversity resulting from immigration will impact destination countries. Such diversity could increase social tension and perhaps prevent the incorporation of immigrants. On the other hand, increasing ethnic diversity may serve to increase ethnic tolerance.

Demography of Social Stratification

Sakamoto and Powers suggest that research in the demography of social stratification should move away from the intensive descriptive analysis that has dominated the area in

the past, and focus more on the development of analytical models. They suggest incorporating both exogenous and endogenous variables from demography and stratification to create broader models of social stratification.

In addition to expanding the variables incorporated in social stratification models, Sakamoto and Powers also suggest that future research should focus on understanding commonalities in mobility and inequality between nations. In so doing, researchers are able to determine whether there are any similarities that are perhaps repeatedly present in social stratification, despite varying contexts, thereby expanding upon the theoretical understanding of social stratification.

Social Demography

Hirschman and Tolnay highlight a number of elements of social demography that have characterized, and will likely continue to characterize, the field. Social demography pays particular attention to the role of cohorts in effecting social change. The interpretation of cohort effects is inhibited, however, by the difficulty in separating cohort effects from those of age and period. Nonetheless, Hirschman and Tolnay note that the cohort continues to play an important role in social demography and will doubtless influence future studies in the area.

In addition to the cohort perspective, Hirschman and Tolnay write that studies in social demography have been characterized by the logic of decomposition. Many of the demographic processes are composed of a number of related components; decomposition permits the demographer to focus on each of these components in order to arrive at a better understanding of social phenomena. Social demography will likely continue to use the logic of decomposition to gain further insights into the parts that make up demographic phenomena.

Hirschman and Tolnay also observe that social demography is characterized by its interdisciplinary approach. By incorporating theories, data, and methods from multiple disciplines, social demographers are better able to take unique approaches to their studies. Hirschman and Tolnay posit that future research in social demography will benefit from this interdisciplinary approach as research issues become more complex.

Organizational and Corporate Demography

Carroll and Khessina summarize in their chapter the future of organizational and corporate demography within theory fragments, across theory fragments, and within conceptual frameworks. Although they indicate that future research is likely to occur with respect to all of the theory fragments, Carroll and Khessina note that the density dependence fragment might pose fertile ground for future research because of the challenges in incorporating an explanation of late-stage population declines and resurgences. Further, they suggest that future research should incorporate a more global perspective, comparing findings cross-nationally in an attempt to explain variations in the timing and levels of density-dependent population evolution.

Carroll and Khessina also suggest that future research could occur across theory fragments. In particular, they suggest that corporate demography could benefit from

additional research on the cumulativity in model specifications. Further, they suggest that empirical integration should be a focus in the area, as should the attempt to unify theories in the discipline.

Finally, Carroll and Khessina note that new work in organizational and corporate demography could continue the practice of unifying some of the themes of this area with other demographic research. For instance, connecting corporate demography with that of workforce demography, or corporate demography and internal organizational demography, would be especially appropriate. They posit that new research in the area of organizational and corporate demography will continue this trend.

Urban and Spatial Demography

In his chapter, Fossett explores the tension between traditional perspectives on urban and spatial distribution (urban economics, human ecology, and urban geography) and new perspectives (critical, political, postmodern, and sociocultural). Although some argue that the new perspectives should supplant the traditional perspectives in future research, Fossett argues that traditional demographic perspectives are a necessary part of studies of urban and spatial distribution. He notes that the new perspectives contend that culture plays an important role in spatial distribution, but argues that these perspectives do not effectively generalize in order to explain spatial distribution in any overarching way. Although there has not been a large movement to combine traditional and new perspectives, Fossett suggests that future research might benefit most from an attempt to synthesize these two fields in order to develop a more comprehensive picture of urban and spatial patterns.

Anthropological Demography

Only within the past 20 or so years has anthropological demography been formally recognized as a specialty within either anthropology or demography. As noted by Kertzer in his chapter in this *Handbook*, the two fields have been both methodologically and theoretically at odds. Anthropologists have viewed the quantitative, positivist approach of demographers with some skepticism, and demographers have questioned the utility of the deconstructionist, ethnographic approach of anthropologists. Despite the disparity, historically anthropologists have explored many demographic topics, such as fertility, mortality, and migration. The renewed focus of anthropology on demographic topics has resulted in large part from an acknowledgment that demographic studies could benefit from anthropological theory and methods.

As a result, Kertzer predicts that future research in the area of anthropological demography will likely unite demographic studies with anthropological theories concerning culture and symbolism, providing new insights into demographic processes by recognizing the importance of culture. Further, the incorporation of anthropological survey and ethnographic techniques are likely to expand and richen future demographic research.

Economic Demography

Mason predicts that future research in economic demography will be guided by technological advancements and access to information, as well as by a variety of population changes that have occurred or are expected to occur in the coming years. He observes that technological improvements in the ability to store, share, and analyze data have advanced the field by enabling economic demographers to propose and work with increasingly complex models, including complicated microsimulation models and macrosimulation models. Further, the ability to easily and cheaply analyze and share large amounts of data has enabled economic demographers to explore new issues and to collaborate on a global level. Mason writes that as a result of these technological advancements, future research can involve large international collaborative efforts which will provide new insights into the manner in which cultural, historical, social, and economic differences impact economic demography.

Coupled with the impact of technological advancements, Mason argues that future research in economic demography will likely focus on the influence of the aging of populations. First, he contends that the rapid aging of populations in developing countries will likely result in difficulties in obtaining economic security for the elderly. To obtain economic security, developing countries must first establish stable economic and political institutions so that reliance on public pension programs, as well as private savings, becomes a less risky and uncertain prospect. Further, Mason suggests that as population aging becomes a global phenomenon, its impact will be widely felt. For example, the aging of western workers has been moderated by turning toward other nations for production. The impact of global aging, therefore, is likely to be a fertile ground for research for economic demographers as this trend expands.

Finally, Mason suggests that economic demographers are likely to explore the relationship between regional population differences and globalization. The proportion of the world's population located in the more developed regions (i.e., Europe, North America, Australia, New Zealand, and Japan) is shrinking, and, perhaps most notably, its share of the working-age population will shrink, while that of the less developed regions will grow. The impact of such shifts on globalization in the coming years will likely be of interest to economic demographers.

Historical Demography

Assessing "the future" of historical demography poses some limitations since, as van de Walle observes, future research is limited by the existing data, much of which has already been discovered and explored. Historical demography will nonetheless be aided by advancing statistical methodologies and by developing interdisciplinary ties with historical demography and mainstream demography, permitting methods and findings of past studies to influence future ones, and vice versa.

Although van de Walle notes that it is difficult to predict what future discoveries will be made in historical demography, he does suggest some possible directions for future research. He first contends that research will expand into different countries, and extensions of demographic variables back in time will likely be attempted in order to formulate notions of the historical composition of these populations. In addition, he

suggests that future research will include the recent trends in historical demography of incorporating comparative approaches and of focusing on substantive issues, rather than the more monographic studies of the past.

Political Demography

Teitelbaum observes in his chapter that future work in political demography will likely focus on four issues: population size, age structure, population composition, and the interactions between immigration and fertility. Population size has been traditionally equated with power. Accordingly, many countries have advocated the notion of increased population size in their pursuit of political power. Although evidence supporting a correlation between size and power is mixed, with fertility declines this issue is likely to be the subject of future research.

Research in political demography is also likely to focus on the political repercussions of population age. With the increased aging of populations that accompanies fertility and mortality declines, some contend that countries with older populations will lose political vigor, as well as military and economic strength. Countries with younger populations, in turn, are viewed as the source of more political turmoil. The manner in which population aging affects the political atmosphere of nations will thus likely be a focus of political demographers.

Teitelbaum also posits that population composition in terms of ethnic, socioeconomic, and geographical groups will likely be the subject of future research, as variations in these groups are thought to impact the distribution of political power. Population composition is intricately connected with immigration and fertility. Thus, Teitelbaum argues that future research in political demography will focus on the impact of immigration and declining fertility on population composition and, in turn, political power.

Fertility Planning

Despite significant advances in fertility planning, Potter and Mundigo observe that a number of areas remain ripe for improvement. The quality of contraceptive services and the use of such services remain stratified in many parts of the world, with the most disadvantaged less likely to use contraceptives, to receive quality services, or to have a variety of contraceptive choices. In addition, unwanted teenage pregnancy remains an issue of concern in many countries where adolescents lack access and/or information to fertility planning services.

In addition to these two widely publicized issues upon which future research should be focused, Potter and Mundigo contend that demographers should also focus on two other reproductive issues where the outcomes are perhaps less clear cut. Below-replacement-level fertility is occurring in European countries and in many East and Southeast Asian countries; there is no consensus, however, as to the cause of this phenomenon or whether it is a threat to the welfare of these countries. Potter and Mundigo thus see below-replacement-level fertility as an important area for future fertility planning research. Second, Potter and Mundigo recommend that future research focus on the dilemma confronting sub-Saharan Africa brought about by rapid

population growth due to high fertility and large increases in mortality resulting from the HIV/AIDS epidemic. They suggest that the role of family planning programs in affecting reproductive patterns and treating and preventing HIV/AIDS should be a significant focus of fertility planning research in the coming years.

Small-Area and Business Demography

Smith and Morrison argue that the future of small area and business demography will be directed by a few recent developments in these fields. They first note that the increase of small-area data in the form of administrative records and sample surveys has played a large role in developing the field of small-area demography, as analyses in this field were previously limited by the available data. In addition, businesses have maintained data registries for customers that have created new data sources for studies in business demography. In particular, databases containing customer characteristics have permitted businesses to target consumers. Smith and Morrison note, however, that consumer privacy concerns might result in restrictions on the collection and sharing of such data in the future.

In addition to data developments, increased computer power has permitted the collection, storing, matching, and analysis of data that was once impossible or too costly for most researchers. The development of geographical information systems (GIS) has also aided in the collection and analysis of spatially referenced data, which Smith and Morrison contend is the most significant development in small-area and business demography.

Finally, Smith and Morrison note that business demography does not always focus on small areas; rather, global markets have resulted in new consumer markets all over the world, of which little is known about consumer behavior. Thus, business demographers will likely develop research on these new consumers in the coming years.

Health Demography

Kawachi and Subramanian suggest future areas of research in health demography. They note that future research will continue to develop linkages between the areas of demography and epidemiology. Techniques and measures that were once exclusively used by epidemiologists are now being incorporated into the research of demographers, including collecting biological specimens in longitudinal research and engaging in specific diagnoses of diseases in population surveys (Goldman 2001).

Epidemiologists, in turn, have increasingly looked to population-based samples, rather than clinical samples, and have incorporated social determinants of disease into their studies. Kawachi and Subramanian suggest that cross-disciplinary research will be increasingly important over the coming years, with the AIDS pandemic, population aging, and the increasing disparities between rich and poor countries.

Kawachi and Subramanian further suggest that health demographers will work toward improving methods of measuring, monitoring, and forecasting mortality and morbidity, perhaps focusing particularly on developing the measurement of morbidity and the health transition. In addition, they contend that health demographers will continue to attempt to refine models assessing the determinants of health, including incorporating contextual influences and a time dimension, i.e., health over the life course.

Demography of Population Health

In their chapter in this *Handbook*, Hayward and Warner observe that it is not a simple task to predict the manner in which disease will burden a population in future years because the epidemiological transition is ongoing. The transition is influenced by worldwide population aging, scientific and technological advancements in fighting disease, and advances in educational attainment and health knowledge. These forces will influence not only the epidemiological transition, but also the course of future research in population health, leading to both substantive and methodological advances in the field.

Population Policy

May notes in his chapter that the current demographic diversity of the world will play an important role in the future of population policy. Fertility ranges from very high to below replacement; populations are both young and, increasingly, aging; immigration is welcome in some countries and opposed in others; and countries fall at varying stages of the demographic transition, while the notion of the transition itself is challenged by forces such as the HIV/AIDS epidemic. Population policy will be an important factor in future decades, as the world confronts variation in demographic patterns and attitudes.

To emphasize the impact of diverse demographic patterns on population policy, May highlights the varying policies required by countries with different levels of fertility. In areas with high fertility, he suggests that population policies might need to focus primarily on family planning services. When fertility rates are between five children per woman and the replacement level, May contends that public health and social development interventions should complement the fertility transition. In many industrialized countries, where fertility has fallen below replacement levels, May suggests that a high priority will need to be placed on fertility, emphasizing migration policies in order to offset the aging effect of fertility and mortality declines.

In this way, May demonstrates the continuing importance of population policies, contending that population policy will be most effective with public consensus, a focus on dynamic concepts like equity, a participatory framework, and the incorporation of new data and research.

THREE ADDITIONAL AREAS REQUIRING ATTENTION

After reviewing and reporting the recommended directions for future research suggested by many of the *Handbook* chapter authors, we will now discuss the three areas we deem particularly relevant and important for demographic research in future years. These are areas that to date have received insufficient attention by demographers and, moreover, are areas considered to be preeminent in terms of their actual or potential contribution to the state of demographic knowledge: (1) male fertility; (2) biosocial models of demography; and (3) sexual orientation. This is a short, selective, and perhaps idiosyncratic listing. But these are areas that have impressed us as important, relevant, and challenging. It is not known whether other demographers will agree with the selection. Most probably will not.

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 dictates that females and males must both intimately be involved in the production of children. Fertility is not a process that only involves women. So, why are males ignored in conventional demographic studies of fertility? The answer is not because female and male fertility rates are the same. Although common sense suggests they should be, in fact they are not, and this is shown below.

Until the past few years virtually all conventional demographic research on fertility has been devoted to analyses of women. Until recently, meetings of the Population Association of America (PAA) and the International Union for the Scientific Study of Population (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. 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 recently consulted for a review of the literature on the topic of fertility. The POPLINE search reported over 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 was mainly comprised of 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, 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 last decade.

So why has conventional demographic research in fertility concentrated largely if not exclusively on women? Seven specific reasons have been proposed to justify excluding males from fertility studies (Poston and Chang 2005). First, Greene and Biddlecom (2000: 83) write that the "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." 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" (Greene and Biddlecom 2000: 83). This is a gender-related reason and focuses significantly on the social construction of the

male gender role. This is not a biological reason but a sociological one. This is hardly a satisfactory reason for ignoring males in fertility studies.

Keyfitz (1977) notes (although does not necessarily endorse) four more reasons. Two of them are (1) 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 (2) when such data are obtained for mothers and fathers, there are more instances of unreported age data for fathers, especially 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 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 are (3) the fecundity, and hence, the childbearing years of women occur in a more sharply defined and narrower range (15 to 49) than they do for men (15 to 79); and (4) "both 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" (1977: 114). The third 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 fourth 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" (2000: 64).

A fifth reason is that 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 traceable. 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 traceable to mothers than to fathers cannot be ignored. But this fact makes it all the more necessary to include males in fertility studies, if only because 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: 85) 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."

A seventh reason proposed to justify the exclusion of men in studies of fertility is 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

Table 1. Male and Female Total Fertility Rates: 1994

Country	Male TFR	Female TFR
Australia	1809	2724
Bulgaria	1306	1060
Canada	1567	1539
Denmark	1724	1770
Estonia	1258	1175
Hong Kong SAR	1252	1198
Hungary	1599	1476
Israel	3048	2815
Macao SAR	1655	1390
Mauritius	2243	2034
Panama	2899	2225
Poland	1722	1670
Puerto Rico	2248	1754
Romania	1433	1193
Singapore	1732	1764
Spain	1221	1171
Trinidad & Tobago	1951	1662
Tunisia	3391	2768
United States	1829	2030

females, males marry at older ages than females, males remarry more quickly than females, and emigration and immigration both are usually 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. Table 1 reports male and female total fertility rates for 1994 calculated for the 19 countries with male and female data. Figure 1 graphs these male and female TFRs. Most countries have male TFRs that are larger than their female TFRs. 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 U.S. 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 nearly equal (see Poston and Chang [2005] 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

This section is a review and commentary on what may be referred to as biosocial models of demography, i.e., the development of demographic models of human behavior that combine biological variables (for instance, hormonal levels and genetic factors, among other variables) with social variables to predict demographic outcomes, in particular,

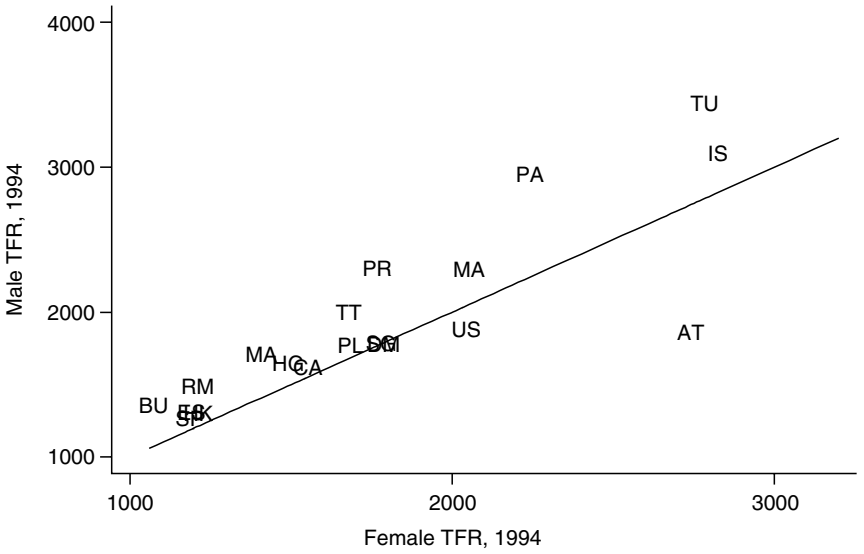

FIGURE 1. Male and female total fertility rates, 1994.

those outcomes or processes that are biological, viz., fertility and mortality. In chapter 21, BioDemography, Carey and Vaupel term this a subfield of what they call biomedical demography.

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, one of a handful of demographers who recognize the importance of incorporating biological thinking into our theories of demography, 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" (1995: 359).

It is Casterline's belief that after 1994, the "passive avoidance of biosocial models [among demographers] is no longer an option ... [owing to Richard Udry's presidential address in 1994 to the Population Association of America] challenging demographers to take biosocial models seriously" (1995: 360). In his address, Udry reported research showing that "one-fourth of the variance in women's 'gendered' behavior" is accounted for by a model comprised of "prenatal and adult androgen measures and their interaction" (Udry 1994: 570). This research (Udry, Morris, and Kovenock 1995: 367) concludes that "gendered behavior is not entirely socially constructed, but partly built on a biological foundation."

A recent review of the demographic literature found very few examples of empirical research incorporating biological and social variables in models of demographic processes. Carey and Vaupel's chapter in this *Handbook* supports this observation.

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" (1995: 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. Casterline (1995: 361) states 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."

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 possibly have no role in many demographic studies. Casterline (1995: 368) 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." 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 the Texas 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 (*Lawrence et al. v. Texas* 2003; *Goodridge et al. v. Department of Public Health* 2003). In the 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. At the present time, however, little demographic work has been 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 remains underdeveloped due in large part to a lack of representative datasets 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]). Thus, U.S. researchers seeking representative samples of the gay and lesbian population have turned predominantly to the General Social Survey (GSS), the National Health and Social Life Survey (NHSLS), and the census to explore research questions. Studies conducted using either the GSS or the NHSLS 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. 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 dataset 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 (Black et al. 2000). The unmarried partner category permits unmarried heterosexual and homosexual couples to identify themselves as a couple. In the 2000 Census, 1,188,782 individuals identified themselves as being in same-sex unmarried partner households on the census, 605,052 being male and 586,730 being female (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.[1]

Surprisingly, however, little research has been conducted in this area to date, despite the availability of the 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 (Black et al. 2000, 2002; Walther and Poston 2004; Poston, Gu, and Walther 2003; Gates and Ost 2004), there has been little

[1] Findings based on census data are limited, however, in that only individuals who choose to identify as unmarried partners on the census are captured; thus, individuals who prefer not to self-identify are not counted. Further, the census question allows data to be collected only on partnered homosexuals living in the same household, leaving homosexuals who are single unaccounted for. Nonetheless, the advantages of the census data over other data sources render 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.

effort among social scientists at indexing these concentrations among the metropolitan areas of the U.S. 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 (Black et al. 2002; Poston, Gu, and Walther 2003). Even less quantitative research has been undertaken regarding the differential concentration of partnered gays and lesbians in the nonmetropolitan and rural areas of the U.S. (Poston and Gu 2004).

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 (Compton and Poston 2004). 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 may be both involuntary and voluntary, but considerable work remains sorting out these differences and estimating 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; Klawitter and Flatt 1998; Black et al. 2003). Findings about the earnings of lesbians are mixed, with some studies indicating lesbians earn less than heterosexual women, and others finding little or no difference (Badgett 1995; 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 (2004) has explored the manner in which homosexuals and heterosexuals are segregated in professional occupations. She finds 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 of 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. In order 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 policy makers 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 Epilogue, three broad areas of demographic research have been proposed requiring major conceptual and methodological advances. They represent challenges to demographers in that strictly speaking they are not mainstream. They require demographers to not undertake fertility analyses that are only based on females, to not estimate demographic models that are only based on social variables, and to not restrict their investigations, implicitly or explicitly, to heterosexuals. According to Horton (1999: 365), an important characteristic of "critical demography," as opposed to "conventional demography," is the posing of "questions that challenge the prevailing social order." In some ways demographic research in the areas outlined above may well challenge existing demographic paradigms.

Finally, the areas and topics presented here comprise a short and very selective list. There are certainly other areas of research requiring the future attention of demographers. Many of them have been discussed in the chapters of this *Handbook* and summarized in an earlier section of this Epilogue.

It was noted earlier in this Epilogue that most of the needed research areas identified in 1959 by the authors of chapters in *The Study of Population* have indeed been addressed in the intervening 45 years. It will be of interest to see several decades from now whether the authors of chapters in this *Handbook* have been as prescient.

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