

like malaria contribute to the poor health status of these populations.

See also: Bertillon, Jacques; *Disease, Burden of; Disease, Concepts and Classification of; Epidemiological Transition*; Farr, William; *Mortality, Age Patterns of; Mortality Decline*.

BIBLIOGRAPHY

- Bourgeois-Pichat, Jean. 1952. "Essai sur la mortalité biologique de l'homme." *Population* 7(3): 381–394.
- Holland, W. W., dir. 1993. *European Community Atlas of Avoidable Death*, 2nd edition, volume 2. Oxford, Eng.: Oxford University Press.
- edermann, Sully. 1955. "La répartition des décès de cause indéterminée." *Revue de l'Institut international de statistique* 23(1): 3.
- Meslé, France. 1996. "Les causes médicales de décès." In *Démographie: analyse et synthèse. Causes et conséquences des évolutions démographiques*. Paris: CEPEID/DSD.
- . 1999. "Classifying Causes of Death According to an Aetiological Axis." *Population Studies* 53(1): 97–105.
- . 1996. "Reconstructing Long-Term Series of Causes of Death." *Historical Methods* 29(2): 72–87.
- Meslé, France, and Jacques Vallin. 1984. "The Problem of Studying Mortality Patterns By Cause over a Long Period of Time: An Example from France, 1925 to 1978." In *Methodologies for Collection and Analysis of Mortality Data*, ed. Jacques Vallin, John Pollard, and Larry Heligman. Liège: IUSSP, Ordina Éditions.
- Omran, Abdel R. 1971. "The Epidemiologic Transition: A Theory of the Epidemiology of Population Change." *Milbank Memorial Fund Quarterly* 49(4): 509–538.
- World Health Organization. 1992. *International Statistical Classification of Diseases and Related Health Problems*, 10th revision, volume 1. Geneva: World Health Organization.
- Wolleswinkel-van den Bosch, Judith. 1998. *The Epidemiological Transition in the Netherlands*. Rotterdam: Erasmus University.

INTERNET RESOURCES.

- Vallin, Jacques and France Meslé. 1998. "Les causes de décès en France depuis 1925." *Institut national d'études démographiques*. <<http://matisse.ined.fr/~tania/causfra/data/>>.
- World Health Organization. 2001. <<http://www.who.int/whosis/>>.

FRANCE MESLÉ

CENSUS

A population census, which usually is just called a census, is a count of the population of a country on a fixed date. National governments conduct censuses to determine population sizes, growth rates, and characteristics (such as sex, age, marital status, and ethnic background) for the country as a whole and for particular regions or localities. Generally governments collect this information by sending a questionnaire in the mail or dispatching an interviewer to every household or residential address in the country. The questionnaire asks the head of the household or a responsible adult living in the household (the respondent) to list all the people who live at the address on a particular date and answer a series of questions about each of them. Over a period of months or years the government census office aggregates and tabulates the answers and reports the results to the public.

Censuses are very expensive and elaborate administrative operations and thus are conducted relatively infrequently, generally at five- or ten-year intervals. Between censuses governments estimate the size and characteristics of the population by extrapolating past trends or drawing on other data sources. Periodic sample surveys are one such source. In the United States, the Current Population Survey of around 50,000 households is conducted monthly. The Census Bureau is planning a new rolling sample survey called the American Community Survey to provide the same level of local area detail available in a decennial census by cumulating and averaging sample estimates over a five-year period.

History

Censuses have been conducted since ancient times. Early censuses were conducted sporadically and generally were used to measure the tax or military capacity of an area. Examples include Roman and Chinese censuses, the Domesday Book, occasional city surveys such as the Florentine *Catasto*, and records of medieval manors. Unlike modern censuses, they tended to count only adult men, men liable for military service, or tithables (people liable to pay taxes) along with landholdings. The results were used for administrative purposes and were not extensively tabulated or regarded as public records. Nevertheless, historical demographers have derived estimates of total populations from them.

Census taking in the modern sense requires the conception of a uniform, countable unit of analysis. Hence, census taking had to await the development of the state and the emergence of the concept of the commensurate household. The latter occurred in the medieval European west: In the ancient world rich households with large slave labor forces could not be considered “commensurate” with the hovels of the poor. In modern censuses the household or family serves as the unit of analysis or the locus for counting the members within it.

The modern periodic census of all persons is an invention of the early modern period in Europe. One of its purposes was to monitor the progress of overseas colonies. Thus, repeated counts were taken of the colonial American population in the seventeenth and eighteenth centuries, starting in the 1620s in Virginia. In Canada, French efforts to count the population began in 1665–1666 in what is now Quebec, and censuses were conducted at irregular intervals after Canada became a British colony in 1763. Sweden began to conduct censuses in the mid-eighteenth century by tallying the records in its vital registration. England and Wales instituted a regular census on a ten-year cycle in 1801. By the early nineteenth century census taking had begun to be a regular function of government in Western Europe and North America, and in the twentieth century it spread throughout the world.

Functions and Techniques

Censuses serve a variety of purposes in different countries. At a minimum a census provides a measure of the size of the population of a country, which can be compared with the population in the past and

the populations of other countries and used to make estimates of the likely population in the future. Governments use census information in almost all aspects of public policy, such as determining how many children an educational system must serve, determining where to put new roads, and providing the denominators of other measures (e.g., per capita income, crime rates, and birth rates and death rates). Private businesses use census data for market analysis in deciding where to locate new businesses or where to advertise particular products. Government agencies and private researchers use the census to provide the “sampling frame” for other types of survey research.

In the United States the census is taken during the tenth year of each decade. The resulting population count provides the data for reapportioning seats among the states in the House of Representatives and the Electoral College and for redrawing district boundaries for seats in the House, in state legislatures, and in local legislative districts. In Canada and many European countries a full census is taken during the first year of every decade. Canada also takes an abridged census during the sixth year of the decade. Canadian population data are used to apportion seats among the provinces in the House of Commons and to draw electoral districts.

Most countries create a permanent national statistical agency to take the census, such as the United States Bureau of the Census or Statistics Canada. This agency usually undertakes a public review process to determine the questions that will be asked. Most censuses ask for basic demographic information such as the age, sex, educational background, occupation, and marital status of an individual. Race, ethnic or national origin, and religious affiliation are important questions in some countries. Other questions often include a person’s place of birth, relationship to the household head, individual or family income, type of house, citizenship, movement in the last five years, and language spoken at home. Questions that are routine in one nation may be controversial in another. In the United States questions on religious affiliation are not asked in the census because they are seen as an infringement of the First Amendment right to freedom of religion. Other nations, such as India, do collect this kind of information. Questions on the number of children born to a woman were quite controversial in China in the early twenty-first century because of their connection with the government’s one-child policy. A

question on income was considered controversial in the United States in 1940, when it was first asked; it is no longer considered problematic.

Questions also change in response to public debate about the state of society. For example, Americans wanted to know which households had radios in 1930 and introduced questions on housing quality in 1940. Canada asks census questions on unpaid work done in the home.

Census taking can be divided into several phases. In the first phase the census agency divides the country into geographic divisions, makes maps and address lists, and prepares instructions for the local census takers. To conduct the count, large numbers of temporary workers may be hired or other government employees, such as schoolteachers, may be called on. The census agency prepares, prints, and mails the questionnaires to households or has them delivered by enumerators.

In the second phase a responsible adult or household head in every household, family, or equivalent entity is asked to fill out the form or respond to the enumerator and supply the required information about each member of the household. (In the current U.S. practice a brief set of questions on a "short form" is asked of all people, usually including name, age, sex, race and ethnicity, and relationship to the household head. A sample of households is asked to complete a more complicated "long" form, which can have many detailed questions on work status, income, housing, educational background, citizenship, and recent moves.)

In the third phase the census agency enters the data into a computer and tabulates the responses for the nation, states or provinces, and cities, towns, and other local jurisdictions. The agency also cross-tabulates the answers, for example, reporting not only the number of people in a local area but the number of people in five-year age cohorts, for each sex, and for local areas. The agency publishes only the tabulated results of the count and keeps the individual responses confidential. In the United States the individual census forms are stored in the National Archives and eventually opened to the public. People then may use them to research the history of their families or construct genealogies.

The choice of census technique for a particular country is the result of its social and political traditions and technological capacities. The U.S. Census

is highly automated and is conducted primarily by mail. Canada sends enumerators to deliver the census form to each household, to be completed and returned by the household head. Other nations use more labor-intensive techniques for collecting and tabulating the data, sometimes requiring people to stay home to await the census taker on census day.

The U.S. Census

The U.S. Census was mandated in the 1787 Constitution. This census was the first count in the world designed to provide population figures for apportioning the seats in the national legislature. Direct taxes levied on the states were also to be apportioned on the basis of population. At that time almost 20 percent of the American population consisted of enslaved African Americans. The framers debated whether slaves were "persons" or "property" and thus whether states should receive representation for their slave populations. The framers developed what came to be called the Three-Fifths Compromise, which discounted the size of the slave population as the equivalent of 60 percent of the free population when determining the apportionment of the House. (The abolition of slavery also abolished the compromise, but the tradition of counting the different racial groups in the population continued.)

In the first census, taken in 1790, assistant U.S. marshals were instructed to travel the country and ask six questions at each household: the name of the family head and for each household the number of free white males age 16 and over; the number of free white males under 16, the number of white females, the number of other free people (the free colored), and the number of slaves. The marshals recorded and totaled the figures for the local jurisdiction and sent them to the U.S. marshal for the state, who totaled the figures for the state and sent them to the President. The census counted 3.9 million people.

In later years the census became more elaborate, with more questions asked and more data published. In 1850 Congress mandated a census schedule (form) with a line of questions for each person, including name. A temporary Census Office, as it was then called, was set up in Washington to compile the responses and publish the results. By 1880, when the American population topped 50 million, the census was still compiled by hand, using a primitive tally system. In 1890 the Census Office introduced machine tabulation of the responses, and each person's

answers were converted to codes punched into Hollerith cards, a precursor to the IBM punch card. The cards then were run through counting machines. This was the beginning of modern data processing and led to further innovations in tabulating large amounts of data. In the 1940s the Census Bureau commissioned the construction of the first nondefense computer, UNIVAC, to tabulate the 1950 census. In the late 1950s the Census Bureau developed an electronic scanning system called FOSDIC (Film Optical Scanning Device for Input to Computers) to transfer the answers on the census form to a computer.

In 1940 the United States began to collect some census information from a sample of the population and thereafter slowly shifted the detailed questions on the census to the long form sent to only about 15 to 25 percent of households. In 1970 the census became primarily a mail enumeration as the Census Bureau developed automated address files for the country. In the year 2000 over 90 percent of the roughly 110 million residential addresses in the United States received the census form by mail. If the Census Bureau does not receive a response, it sends an enumerator to determine whether the address is correct and to get the information from the household at the address.

Availability of Census Data

Until the 1980s statistical agencies published census results in large volumes of numeric tables, sometimes hundreds of those volumes. Since that time census results have become available electronically on disc, magnetic tape, and CD-ROM or the Internet. Retrospective print compilations of census data are available in libraries, and some have begun to be converted to an electronic format and posted on the World Wide Web. For example, basic population tabulations from American censuses from 1790 to 1960 are available from data compiled by the Interuniversity Consortium for Political and Social Research (ICPSR).

Availability of the original census forms varies by country. With the exception of the forms from the 1890 census, the original schedules for the U.S. censuses survive. If a country's forms are available, historical public use samples of population censuses may exist in electronic form. These samples have been compiled online, including the Integrated Public Use Microdata Series (IPUMS) for American data

and planned international compilations that can be viewed on the Internet.

Issues

Censuses can become embroiled in political or social controversy simply by reporting information relevant to ongoing issues in a society. Complaints about the census generally involve concerns about the accuracy of the count, the propriety of particular questions, and the uses to which the data are put.

Censuses require public understanding, support, and cooperation to be successful. Concerns about government interference in private life can prevent people from cooperating with what is an essentially voluntary counting process. People may be wary of giving information to a government agency or may regard particular census questions as invasions of privacy.

When public trust is lacking, people may fail to cooperate. Individuals in illegal housing units, those who are resident in the country illegally, and those who do not wish to reveal their economic or social situation to a government agency are reluctant to respond to a census. In a more serious challenge, some people claim that censuses should not be conducted at all on the grounds that the results will not be held in confidence. In the Netherlands the legacy of the Nazi era, during which census records were used to identify Jews for deportation, was one of the major justifications for ending census taking in 1971.

Some political challenges to the census claim that the census does not count the population well enough. All censuses contain errors of various kinds. People and addresses are missed, and people may misunderstand or fail to answer some questions. Census officials have developed elaborate procedures to catch and correct errors as the data are collected and to impute missing answers from the answers to other questions. Nevertheless, some errors inevitably remain.

Various methods are used to measure the accuracy of censuses. Census results may be compared with population information from other sources, such as the records of births, deaths, and marriages in vital statistics. Commonly, a second, sample count (a postenumeration survey, or PES) is collected shortly after the complete census. Its results are matched against those of the census, allowing estimates to be made of the number of those missed and those who have been counted twice or are in the

wrong geographic location. Some nations, such as Canada and Australia, adjust their census results for omissions and other errors.

In the United States, city dwellers, the poor, and minorities tend to be undercounted in the census relative to the rest of the population. Officials representing such undercounted jurisdictions claim that these jurisdictions have suffered loss of political representation and government funding as a result of incorrect data. Litigation seeking to compel adjustment of census results has been unsuccessful in the United States. The question of adjustment has also emerged as a political controversy in Congress: Republicans generally have opposed adjusting for the undercount, and Democrats have supported it. In 2001 the U.S. Census Bureau certified the unadjusted results of the 2000 census as the official results on the grounds that it could not guarantee that the adjusted census results were more accurate than the unadjusted count.

See also: *Databases, Demographic; Data Collection, Ethical Issues in; Demographic Surveys, History and Methodology of; Demography, History of; Population Registers.*

BIBLIOGRAPHY

- Anderson, Margo. 1988. *The American Census: A Social History*. New Haven, CT: Yale University Press.
- Anderson, Margo, and Stephen E. Fienberg. 2001. *Who Counts? The Politics of Census Taking in Contemporary America*. New York: Russell Sage Foundation.
- Cassedy, James. 1969. *Demography in Early America: The Beginnings of the Statistical Mind*. Cambridge, MA: Harvard University Press.
- Choldin, Harvey. 1994. *Looking for the Last Percent: The Controversy over Census Undercounts*. New Brunswick, NJ: Rutgers University Press.
- Curtis, Bruce. 2001. *The Politics of Population: State Formation, Statistics, and the Census of Canada, 1840–1875*. Toronto: University of Toronto Press.
- Eckler, A. Ross. 1972. *The Bureau of the Census*. New York: Praeger.
- Glass, David. 1973. *Numbering the People*. Farnborough: Saxon House.
- Herlihy, David. 1985. *Medieval Households*. Cambridge, MA: Harvard University Press.
- Seltzer, William. 1998. "Population Statistics, the Holocaust, and the Nuremberg Trials." *Population and Development Review* 24: 511–552.
- Wells, Robert. 1975. *The Population of the British Colonies in America before 1776: A Survey of Census Data*. Princeton, NJ: Princeton University Press.
- Worton, David A. 1997. *The Dominion Bureau of Statistics: A History of Canada's Central Statistics Office and Its Antecedents: 1841–1972*. Kingston, Ontario: McGill-Queens University Press.

INTERNET RESOURCES.

- Integrated Public Use Microdata Series (IPUMS). 2002. <<http://www.ipums.org>>.
- Interuniversity Consortium for Political and Social Research (ICPSR). 2002. <<http://www.icpsr.umich.edu>>.
- Statistics Canada. 2002. <<http://www.statcan.ca>>.
- U.S. Department of Commerce, U.S. Census Bureau. 2002. <<http://www.census.gov>>.
- U. S. Historical Census Data Browser. 2002. <<http://fisher.lib.virginia.edu/census/>>.

MARGO ANDERSON

CENTRAL PLACE THEORY

Central place theory is a conceptual statement about the relative locations, numbers, and economic functions of the different-sized urban places in a region. Within a framework of several assumptions concerning the character of the region (for example, that it is a uniform physical plain, evenly settled and over which movement is possible in all directions) and the rational economic behavior of both the region's farm population as consumers and of the producers of goods and services in the urban centers, the theory allows for predictions to be made about the hierarchical ordering of the urban places and the spatial patterning of their market areas within the region. The most widely reported of these results is the