

# CHAPTER ONE

## Origins and Development of Health Survey Methods

**Timothy P. Johnson**

*Survey Research Laboratory, College of Urban Planning and Public Affairs,  
University of Illinois at Chicago, Illinois, USA*

### 1.1 Introduction

---

The health survey methodologies considered in this handbook have been under continuous development for the past 150 years. The story of their emergence has been one of tools and ideas borrowed from many disciplines, such as demography, economics, medicine, nursing, psychology, public health, social work, sociology, and statistics, to address the concerns of social reformers, health care providers, community advocates, business interests, government planners, policy makers, and academic modelers. Indeed, the statistics derived from health surveys have served multiple purposes and multiple audiences. This chapter provides a brief overview of their origins and development.

### 1.2 Precursors of Modern Health Surveys

---

The first recognizable health surveys are no doubt lost to history. It is known, however, that public health problems associated with early industrialization and

rapid urbanization during the nineteenth century motivated some of the earliest empirical inquiries that exhibited characteristics not greatly unlike what is now considered modern health survey research (Ackerknecht 1948, Elesh 1972, Rosen 1955). The efforts of Kay (1832) and Booth (1889–1902) to examine poverty conditions in the British cities of Manchester and London, respectively, were in fact early applications of survey methodology to address health-related problems. Booth's *Life and Labour of the People of London*, in particular, was noted for the development of poverty maps, which provided graphical representations of the geographic distribution of poverty indicators across London (Pfautz 1967). Similar efforts were conducted by Villermé (1840), who investigated health conditions among factory workers in France in his volume *Survey of the Physical and Moral Condition of Workers Employed in Cotton, Wool and Silk Factories*, and Johann Peter Frank, who conducted crude surveys of health and social conditions in several Italian provinces in 1786 (Frank 1941). The focus of these early studies on relationships among health, environment, and socioeconomic status became a recurrent and often dominant theme over subsequent decades as health survey tools continued to be developed and refined (cf. Ciocco et al. 1954, Krieger 2011, Sydenstricker 1933a).

Later poverty studies by Rowntree (1910) in York and Bowley and Burnett-Hurst (1915) in Reading and several other English cities each made independent methodological contributions. Rowntree may have been the first to employ a staff of survey interviewers to collect data. Possibly the earliest reported use of systematic random sampling was during the survey conducted in Reading by Bowley, who also included a detailed assessment of the accuracy of his findings that considered each of the sources of error now commonly recognized as part of the total survey error model. Following in the British tradition, poverty surveys, each linking adverse health events with the onset of poverty, were conducted in the U.S. cities of Buffalo in 1887 (Warner 1930), New York City in 1905 (Frankel 1906–1907), and Baltimore in 1916–1917 (Ciocco and Perrott 1957). In none of these efforts, however, were health conditions the central focus of the research but rather one of many factors crudely measured because of their perceived association with poverty and economic status.

Other nineteenth century research focused on urban sanitary conditions and their relationship to population health. One of the earliest such efforts that relied in part on empirical observations was Chadwick's (1842) *Report on the Sanitary Condition of the Labouring Population of Great Britain*, which led to new public health legislation (Rosen 1958). Sanitary research similar to Chadwick's was also undertaken by public health practitioners in the United States concerned with emerging epidemics in rapidly expanding American cities (Bulmer et al. 1991, Peterson 1983, Rosenberg 1962). Most notable were the sanitary surveys conducted in Boston by Shattuck (1850) and in New York by Griscom (1845) and subsequently in numerous other cities. Several such surveys were sponsored by the Russell Sage Foundation, which also supported other early health-related surveys in dozens of communities in the United States and Canada (Department of Surveys and Exhibits 1915). One of the more well-known and comprehensive of these was conducted in Springfield, Illinois,

in 1910 (Palmer 1912, Schneider 1915). Sanitary surveys also were conducted by the U.S. Public Health Service, which was reorganized and renamed (formerly known as the *Public Health and Marine Hospital Service*) in 1912 and charged with conducting field research into human disease and public sanitation (Furman and Williams 1973). Between 1914 and 1916, a series of these surveys were conducted by the Public Health Service in rural areas across the nation (Lumsden 1918). The methodologies employed in conducting sanitary surveys were varied, involving numerous approaches to evaluating community conditions. As such, there was at best only partial overlap with what we now consider to be modern health survey research.<sup>1</sup> Although crude approximations by today's standards and widely criticized at the time (Elmer 1914, Schneider 1917), these efforts nonetheless demonstrated the value and importance of systematic observation for the study of health, environment, and related social conditions and contributed to dramatic improvements in public health in the United States and many other nations.

Similar to sanitary surveys in their diversity of methods and focus on action research—but more broadly framed—were the studies conducted as part of the social survey movement in the early years of the twentieth century (Burgess 1916). Covering topics such as housing, adult and child labor, immigration, economics, and criminal justice, in addition to health, these studies perhaps were most accurately described as “social inventories” of communities (Harrison 1912). As with the early sanitary surveys, a variety of practical methods in addition to, or in some cases instead of, household interviews were employed.<sup>2</sup> Perhaps the most well known of these was the Pittsburgh Social Survey, conducted from 1907–1908 (Greenwald and Anderson 1996). Several other important social surveys focused their investigations on specific racial or ethnic groups, including Blacks in Philadelphia (DuBois 1899) and the Polish in Buffalo (Kellogg 1912). Eaton and Harrison (1930) cataloged the vast numbers of social surveys conducted in the first several decades of the last century. Although more broad in their coverage, health remained an important topic in these social surveys; in fact, many of them employed questionnaires to collect health information from respondents. The Pittsburgh social survey, for example, reported on the costs of illness in terms of lost wages, medical bills, medications, hospitalization, and so on (Kellogg 1912), and a survey conducted of residences in the Chicago Stockyards District in 1909–1910 reported information regarding family medical expenditures (Kennedy 1914).

Possibly the first studies specifically designed to collect national health data in the United States were the decennial Censuses of 1880 and 1890, which collected household information regarding persons who were currently “sick or temporarily disabled,” “blind,” “deaf and dumb,” “idiotic,” “insane,” and “maimed, crippled [sic], bedridden, or otherwise disabled” (Department of the Interior, Census Office 1888, 1895).<sup>3</sup> Late in the nineteenth century, the U.S. Bureau

<sup>1</sup>The methodology of sanitary surveys is detailed in Horwood (1921).

<sup>2</sup>The methodology of early social surveys is detailed in Aronovici (1916) and Elmer (1920).

<sup>3</sup>Similar sickness and disability data also was collected as part of census activities in Ireland and Australia during the latter half of the nineteenth century (Collins 1951).

of Labor also collected illness data as part of economic canvassing surveys conducted in urban slum areas of four large cities: Baltimore, Chicago, New York, and Philadelphia. This *Special Investigation of the Slums of Great Cities* concluded that rates of sickness were unexpectedly low, given the “wretched conditions” in which these populations lived (Osborn 1895). The Chicago part of the field work for this study was conducted by the noted social activist Florence Kelley under the auspices of Jane Addams’ Hull House. Conducting analyses of the Chicago data independently of the Bureau of Labor’s official report, Kelley and colleagues developed detailed social and economic maps for slum sections of Chicago similar to Booth’s earlier work in London (Holbrook 1895) and consistent with the soon-to-be-popular social survey movement discussed earlier.

### 1.3 The First Modern Health Surveys

Early in the twentieth century, increases in life expectancy and associated declines in mortality rates also began to render traditional vital statistics less useful for evaluating population health, leading to increased interest in developing methods for assessing population morbidity (National Center for Health Statistics 1981). Research studies for the first time focused on health topics. An early pioneer in this effort was Edward Sydenstricker of the U.S. Public Health Service, who applied survey research methodology to numerous health-related problems (Kasius 1974). An economist by training, Sydenstricker first employed the survey method to collect health information on a periodic basis from employees of cotton mills in seven South Carolina villages (Sydenstricker et al. 1918) and subsequently as part of the Hagerstown Morbidity Survey, which was conducted in Hagerstown, Maryland, in 1923 (Sydenstricker 1926). He also employed surveys as part of his investigations of the population health effects of several notable early twentieth-century events, including the 1918 flu pandemic (Frost and Sydenstricker 1919, Sydenstricker 1931) and the Great Depression (Sydenstricker 1933b). Sydenstricker’s health surveys tended to be geographically limited in scope, typically restricted to data collection in a relatively small number of towns and/or cities located mostly along the eastern coast of the United States.

A series of health surveys were also conducted between 1915 and 1917 by the Metropolitan Life Insurance Company, which used its field agents to systematically collect illness information for large numbers of its policy holders in several locations, including Rochester, New York; North Carolina; Boston; Kansas City; the Chelsea neighborhood of New York City; and cities in Pennsylvania and Western Virginia (Stecker et al. 1919). A “sickness census” conducted in Framingham, Massachusetts, in 1917 copied the Metropolitan approach (Armstrong 1917). Further, the Metropolitan Life Insurance Company collaborated with the U.S. Public Health Service on a study designed to track the incidence of minor respiratory diseases via mail surveys sent to convenience samples of university students, university faculties, military medical officers, and families on a biweekly

basis over an 18-month period in 1923–1924 (Townsend 1924, Townsend and Sydenstricker 1927).

Other early health surveys included morbidity studies of the “chronic sick” in New York City in 1928 (Jarrett 1933) and of cancer and other chronic diseases in Massachusetts from 1929–1931 (Bigelow and Lombard 1933); the illness surveys completed in Cattaraugus County, New York in 1929–1932 and Syracuse in 1930–1931 (Collins et al. 1955); and the chronic disease survey in the Eastern Health District of Baltimore, fielded from 1938–1943, that addressed the fundamental statistical challenges of differentiating prevalent from incident cases within a population (Downes 1950, Downes and Collins 1940). In 1943, a 20-year follow-up survey of original respondents from Sydenstricker’s Morbidity Survey in Hagerstown, Maryland, was also completed (Lawrence 1948).

## 1.4 The Emergence of National Health Surveys

The first nationwide health survey of the general public conducted in the United States was not government supported. Rather, the *ad hoc* Committee on the Cost of Medical Care Studies, a group of physicians, public officials, and other interested parties, conducted such an effort as the culmination of a series of empirical studies designed to better inform the development of health policy. The national survey of the *Incidence of Illness and the Receipt of Medical Care Among Representative Family Groups* (Falk et al. 1933), was conducted from 1928–1931, during which more than 8000 families in 17 states were interviewed at multiple time points to collect information regarding health conditions and health care expenditures. Similar to Sydenstricker’s work in Hagerstown and elsewhere, attempts to confirm respondent self-reports with treating physicians were undertaken.

Shortly thereafter, the U.S. Public Health Service, with support from the Works Project Administration (WPA) and employing staff on public relief, conducted the National Health Survey (Perrott et al. 1939, Weisz 2011), a massive effort that demonstrated the feasibility of collecting national survey data ( $n = 83$  urban and 15 rural areas) from large samples of households ( $n = 703,092$ ) within relatively brief time periods (i.e., the winter of 1935–1936). Findings from the National Health Survey became the primary source of data regarding the health status and health service use of the American public for the next two decades.

The earliest national survey that employed rigorous probability sampling methods in the United States was conducted in 1939 and primarily designed to estimate unemployment statistics (Frankel and Stock 1942). Shortly thereafter, the first national health survey data collected using probability methods took place when the Census Bureau’s *Monthly Report on the Labor Force* was employed to construct nationwide estimates of health-related disabilities in 1943 (Sanders and Federman 1943). Similar estimates were produced by the renamed *Current Population Survey* in 1949 (Woolsey 1950).

## 1.5 Post-WWII Advances

As core survey methodologies continued to develop after World War II (Susser 1985), the use of these tools to meet demands for more reliable population health statistics, deemed necessary for resource allocation and policy assessment, expanded as well. A bibliography of health survey research, prepared by the Public Health Service in the early 1960s, attests to the scope and variety of health surveys having been conducted by then in the United States (U.S. Public Health Service 1962a). Some of the more notable health surveys conducted in the early post-war years include the Arsenal Health District morbidity survey in Pittsburgh in 1951 (Horvitz 1952), the chronic disease surveys in rural Hunterdon County, New Jersey, from 1952–1955 (Trussell and Elinson 1959) and in Baltimore from 1953–1955 (Commission on Chronic Illness 1957), and the 1954–1955 California Morbidity Survey (Breslow and Mooney 1956). A two-community longitudinal survey that focused on acute respiratory illnesses, rather than chronic disease, was also conducted during 1946–1949 in New York State (Downes 1950). During this period, the first community mental health surveys also were conducted in rural Nova Scotia in 1952 (Leighton et al. 1963) and New York City in 1954 (Srole et al. 1962), along with the first studies demonstrating the usefulness of surveys for the collection of information regarding sensitive topics such as sexual behavior (Kinsey et al. 1948, 1953).

In addition to interviewing the general public directly regarding their health conditions and experiences, surveys became increasingly useful for collection of information from various health care providers. Physician surveys, designed to understand practice patterns and other professional behaviors, quickly became common (Ciocco and Altman 1943, Klein 1944, Palmer 1912, Sinai and Mills 1931). The first prospective evidence documenting a link between smoking and lung cancer was in fact a large survey of physicians conducted in England in the early 1950s (Doll and Hill 1954). Surveys of hospitals and other health care facilities (Carpenter 1930; Emerson 1937, Emerson et al. 1930, Jarrett 1933, Peebles 1930), and public health organizations (Schneider 1916) also became commonplace. One of the most comprehensive surveys of health care establishments and facilities was conducted in the province of Ontario, Canada, in 1948 (Mackinnon 1952). Included were all hospitals, mental treatment facilities, nursing homes, dental facilities, public health services, health-related educational facilities, voluntary organizations, organizations supporting disabled persons, and medical services provided in industrial settings. Investigations into the services being provided to patient populations and their assessments of those services also became more common (Ciocco et al. 1950).

Survey methods additionally became an important element of cohort and case–control studies (Kleinbaum et al. 1982, Schlesselman 1982, Scott 2006). Early cohort studies include the still-ongoing Framingham Study, initiated in the late 1940s and designed to examine the natural progression of atherosclerotic disease (Dawber 1980, Oppenheimer 2005). The lifestyle interviews included as part of Framingham’s data collection efforts continue to yield valuable findings today (Christakis and Fowler 2008, Rosenquist et al. 2010). Other early examples

include the Tecumseh (Michigan) Community Health Study, initiated in 1957 and also designed to investigate heart disease (Napier 1962) and the Alameda County Survey in California, first fielded on a large scale in 1965 (Breslow 1965). Kalton and Piesse (2007) provide an overview of population-based case–control studies that have relied on survey methods to identify and recruit control subjects. Surveys also quickly became useful tools for evaluating health education and other intervention programs (Lombard et al. 1944).

A watershed moment in the development of health survey methods took place when President Dwight Eisenhower signed legislation in 1956 creating the ongoing U.S. National Health Survey, designed to “produce statistics on disease, injury, impairment, disability, and related topics on a uniform basis for the nation as a whole” (U.S. Public Health Service 1958: 1). What is today known as the annual National Health Interview Survey (NHIS) was first fielded the following year, and the currently named National Health and Nutrition Examination Survey (NHANES) became operational in 1959 (U.S. Public Health Service 1962b). Perhaps aware of the various sources of error documented in earlier health surveys (cf. Gray 1955, Kiser 1934), the House of Representatives included language in the National Health Survey Act mandating methodological research be conducted as part of the National Health Survey in order to continually improve its operations (Haywood 1981). Thus encouraged, methodological research was both immediate (cf. Cartwright 1963, Nisselson and Woolsey 1959, Simmons and Bryant 1962, Sanders 1962) and sustained over the ensuing decades (cf. Blumberg and Luke 2013, Cannell et al. 1977, Jabine 1987). This handbook will make reference to much of this research.

## 1.6 Current Developments

Today, the National Center for Health Statistics, the Agency for Healthcare Research and Quality, and numerous other federal agencies in the United States sponsor a large number of ongoing national survey systems designed to monitor trends in health conditions and behaviors (Madans and Cohen 2005). Many of these are also referenced in subsequent handbook chapters. These surveys continue to develop and experiment with new innovations designed to improve and enhance the information provided. Examples include some of the first assessments of the use of telephones to collect health data (Thornberry 1987), the development of cognitive questionnaire pretesting (Fienberg et al. 1985), and the introduction of computer-assisted survey technologies (Turner et al. 1996). The National Center for Health Statistics also was an early supporter of the development of specialized computer software for variance estimation in complex sample surveys (LaVange and Shah 1988).

Nongovernmental health surveys have also expanded considerably. Suchman (1967) provides an extensive review of survey research applied to public health and medicine during the 1950s and early 1960s by a wide variety of researchers for a wide variety of purposes. Noteworthy for their impact were the nationwide health care utilization surveys conducted by the National Opinion Research

Center over several decades (Anderson and Feldman 1956, Anderson et al. 1963, Anderson and Anderson 1967, Anderson et al. 1975). Today, many academic, business, professional and philanthropic organizations support surveys concerned with population health, population policy, health care utilization, and related topics. The Commonwealth Fund, the Henry J. Kaiser Family Foundation, the Milbank Memorial Fund, and the Robert Wood Johnson Foundation, for example, each actively support broad research programs that focus on health policy issues in the United States and abroad.

Many state and local governments in the United States also now conduct or sponsor surveys to monitor local health conditions. With support from the Centers for Disease Control and Prevention, all 50 U.S. states and several U.S. territories have collected telephone survey data annually regarding health-related risk behaviors as part of the Behavioral Risk Factor Surveillance System (BRFSS) since the early 1980s (Remington et al. 1988). Another ongoing effort is the California Health Interview Survey (2009), first fielded in 2001 and conducted biennially since that time. Other states conduct comprehensive health surveys as well (cf. Nieto et al. 2010), and numerous municipalities have similar efforts. New York City, for example, undertakes a variety of health-related surveys on a regular or periodic basis, including the New York City Community Health Survey and the New York City Health and Nutrition Examination Survey (cf. Norton et al. 2012).

Health surveys in other countries have been equally impressive, with a variety of large national studies of health conditions, behaviors, and risk factors currently operational. Great Britain's first such effort, the Survey of Sickness, began data collection during World War II to examine the effects of wartime stress and pressures on the civilian population (Logan and Brooke 1957). Since 1991, the Health Survey for England has been conducted annually (Mindell et al. 2012). Approximately three dozen other nations now also conduct general and specialized health surveys on a regular basis (National Center for Health Statistics 2005).

Internationally coordinated health survey efforts are also becoming common. One of the earliest such efforts was the World Fertility Survey (WFS), managed and funded by the US Agency for International Development (USAID) with support from several other nations (Lightbourne et al. 1982). The WFS charted declines in childbearing rates across 62 nations between 1974 and 1984. USAID also supported Contraceptive Prevalence Surveys in 37 nations between 1977 and 1985, as well as the current Demographic and Health Surveys program, which has worked with more than 90 nations to conduct population-based health surveys that focus on a variety of health behaviors and outcomes (Corsi et al. 2012). Numerous international health survey programs also are supported by the World Health Organization and the United Nations. Some of the more notable of these are the World Health Survey, conducted from 2002–2004 (Üstün et al. 2003), and the World Mental Health Surveys (Kessler and Üstün 2008). The multinational surveys conducted in support of the International Tobacco Control Policy Evaluation Project are supported by numerous national and international organizations (Fong et al. 2006).

Established health surveys continue to evolve as reflections of the societies they serve. The U.S. NHIS, for example, has shifted its content emphasis, its unit of analysis, and conceptual health framework in response to shifting national priorities over its half-century of operation (Powell-Griner and Madans 2007). Ironically, many of the early surveys, including some of those conducted by the U.S. Public Health Service (Sydenstricker 1926), systematically excluded African-American and other minority population groups. They did so for a variety of reasons, including “to avoid the question of racial differences in employment, income, and sickness” (Perrott and Collins 1935: 597) and because “it was considered that the procedure adopted could not procure satisfactory information from Negro families” (Falk et al. 1933: 5). These practices, some undertaken by employees of the U.S. Public Health Service, are in retrospect a great irony given the current National Institutes of Health emphasis on racial and ethnic health disparities.

In the mid-1970s, a series of professional conferences concerned specifically with health survey research methodology were initiated in the United States, with support from a variety of public and private research organizations (Rice and Rosenthal 1977). To date, 10 such conferences have been held on a periodic basis to review and consider evolving research needs and confront new methodological challenges. An online link to the full set of proceedings from these conferences is provided at the end of this chapter. Several texts concerned specifically with health survey research methodology (Abramson and Abramson 1999, Aday and Cornelius 2006, Cartwright 1983, Cox and Cohen 1985, Witts 1959), measurement (Bowling 2001, McDowell 2006, Streiner and Norman 2008), and analysis (Anderson et al. 1979, Korn and Graubard 1999) have also been published in recent decades. This handbook is intended as a contribution to this body of knowledge, one that focuses on methodological issues that are largely unique to health survey methodology, as well as special considerations when employing common survey methodologies to the study of health-related topics.

---

## REFERENCES

- Abramson JH, Abramson ZH. *Survey Methods in Community Medicine*. 5th ed. Edinburgh, England: Churchill Livingstone; 1999.
- Ackerknecht EH. Hygiene in France: 1815-1848. *Bull Hist Med* 1948;22:117–155.
- Aday LA, Cornelius LJ. *Designing & Conducting Health Surveys: A Comprehensive Guide*. 3rd ed. San Francisco: Jossey-Bass; 2006.
- Anderson OW, Collette P, Feldman JJ. *Changes in Family Medical Care Expenditures and Voluntary Health Insurance: A Five-Year Resurvey*. Cambridge, MA: Harvard University Press; 1963.
- Anderson OW, Feldman JJ. *Family Medical Costs and Voluntary Health Insurance: A Nationwide Survey*. New York: McGraw-Hill; 1956.
- Anderson RM. National health surveys and the behavioral model of health services use. *Med Care* 2008;46:647–653.

- Anderson R, Anderson OW. *A Decade of Health Services: Social Survey Trends in Use and Expenditure*. Chicago: University of Chicago Press; 1967.
- Anderson R, Kasper J, Frankel MR. *Total Survey Error: Applications to Improve Health Surveys*. San Francisco: Jossey-Bass; 1979.
- Anderson R, Lion J, Anderson OW. *Two Decades of Health Services: Social Survey Trends in Use and Expenditure*. New York: Ballinger; 1975.
- Armstrong DB. *Medical Sickness Census: Framingham Monograph 2*. Framingham, MA: Framingham Community Health and Tuberculosis Demonstration of the National Tuberculosis Association; 1917.
- Aronovici C. *The Social Survey*. Philadelphia: The Harper Press; 1916.
- Bigelow GH, Lombard HL. *Cancer and Other Chronic Diseases in Massachusetts*. New York: Houghton Mifflin; 1933.
- Blumberg SJ, Luke JV. 2013. Wireless substitution: early release of estimates from the National Health Interview Survey, July–December 2012. National Center for Health Statistics. Available at <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201306.pdf>. Accessed on August 2013.
- Booth C. *Labour and Life of the People of London*. London: Macmillan; 1889–1902.
- Bowley AL, Burnett-Hurst AR. *Livelihood and Poverty*. London: G. Bell and Sons; 1915.
- Bowling A. *Measuring Disease: A Review of Disease-Specific Quality of Life Measurement Scales*. 2nd ed. Buckingham: Open University Press; 2001.
- Breslow L. Alameda and Contra Costa Counties, California. *Milbank Mem Fund Q* 1965;43(2, Part 2: Comparability in International Epidemiology):317–325.
- Breslow L, Mooney HW. The California morbidity survey: a progress report. *Calif Med* 1956;84:95–97.
- Bulmer M, Bales K, Sklar KK. The social survey in historical perspective. In: Bulmer M, Bales K, Sklar KK, editors. *The Social Survey in Historical Perspective 1880–1940*. Cambridge: Cambridge University Press; 1991. p 1–48.
- Burgess EW. The social survey: a field for constructive service by departments of sociology. *Am J Sociol* 1916;21:492–500.
- California Health Interview Survey. 2009. CHIS 2007 methodology series: report 2 – data collection methods. Los Angeles, CA: UCLA Center for Health Policy Research. Available at [http://healthpolicy.ucla.edu/chis/design/Documents/CHIS2007\\_method2.pdf](http://healthpolicy.ucla.edu/chis/design/Documents/CHIS2007_method2.pdf). Accessed on September 2013.
- Cannell CF, Marquis KH, Laurent A. A summary of studies of interviewing methodology. *Vital and health statistics: series 2, data evaluation and methods research*, no. 69. DHEW Publication No. (HRA) 77-1343. National Center for Health Statistics. Washington, DC: U.S. Government Printing Office; 1977.
- Carpenter N. *Hospital Service for Patients of Moderate Means: A Study of Certain American Hospitals*. Washington, DC: Committee on the Cost of Medical Care; 1930.
- Cartwright A. Memory errors in a morbidity survey. *Milbank Mem Fund Q* 1963;41:5–24.
- Cartwright A. *Health Surveys in Practice and in Potential: A Critical Review of their Scope and Methods*. London: King's Fund Publishing Office; 1983.
- Chadwick E. Report on the sanitary condition of the labouring population of Great Britain. London: W. Clowes and Sons; 1842.

- Christakis NA, Fowler J. The collective dynamics of smoking in a large social network. *N Engl J Med* 2008;358:2249–2258.
- Ciocco A, Altman I. The patient load of physicians in private practice: a comparative statistical analysis of three areas. *Public Health Rep* 1943;58:1329–1351.
- Ciocco A, Perrott D. Statistics on sickness as a cause of poverty: an historical review of U.S. and English data. *Hist Med Allied Sci* 1957;12:42–60.
- Ciocco A, Densen PM, Thompson DJ. On the association between health and social problems in the population. II. The influence of medical care problems. *Milbank Mem Fund Q* 1954;32:247–261.
- Ciocco A, Hunt GH, Altman I. Statistics on clinical services to new patients in medical groups. *Public Health Rep* 1950;65:99–115.
- Collins SD, Trantham KS, Klehmann JL. Sickness experience in selected areas of the United States. *Public Health Monograph No. 25*, DHS Publication No. 390. Washington, DC: U.S. Government Printing Office; 1955.
- Collins SD. Sickness surveys. pp. 511–535. In H. Emerson, editor. *Administrative medicine*. Edinburgh: Thomas Nelson and Sons; 1951.
- Commission on Chronic Illness. *Chronic Illness in the United States, Volume IV: Chronic Illness in a Large City, The Baltimore Study*. Cambridge, Massachusetts: Harvard University Press; 1957.
- Corsi DJ, Neuman M, Finlay JE, Subramanian SV. Demographic and health surveys: a profile. *Int J Epidemiol* 2012;41:1602–13.
- Cox BG, Cohen SB. *Methodological Issues for Health Care Surveys*. New York: Marcel Dekker; 1985.
- Dawber TR. *The Framingham Study: The Epidemiology of Atherosclerotic Disease*. London: Harvard University Press; 1980.
- Department of the Interior, Census Office. Report on the defective, dependent, and delinquent classes of the population of the United States, as returned at the tenth census (June 1, 1880), by Frederick Howard Wines, special agent. Washington, DC: Government Printing Office; 1888.
- Department of the Interior, Census Office. Report on the insane, feeble-minded, deaf and dumb, and blind in the United States at the eleventh census: 1890. Washington, DC: Government Printing Office; 1895.
- Department of Surveys and Exhibits. *The Social Survey: A Bibliography*. New York: Russell Sage Foundation; 1915.
- Doll R, Hill AB. The mortality of doctors in relation to their smoking habits: a preliminary report. *Br Med J* 1954;1(4877):1451–1455.
- Downes J. Control of acute respiratory illness by ultra-violet lights. *Am J Public Health* 1950;40:1512–1520.
- Downes J. Method of statistical analysis of chronic disease in a longitudinal study of illness. *Milbank Mem Fund Q* 1951;29:404–422.
- Downes J, Collins SD. A study of illness among families in the Eastern Health District of Baltimore. *Milbank Mem Fund Q* 1940;18:5–26.
- DuBois WEB. *The Philadelphia Negro: A Social Study*. Philadelphia: University of Pennsylvania; 1899.
- Eaton A, Harrison SM. *A Bibliography of Social Surveys: Reports of Fact-Finding Studies Made as a Basis for Social Action; Arranged by Subjects and Localities*. New York: Russell Sage Foundation; 1930.

- Elesh D. The Manchester Statistical Society: a case study of discontinuity in the history of empirical social research. In: Oberschall A, editor. *The Establishment of Empirical Sociology: Studies in Continuity, Discontinuity, and Institutionalization*. New York: Harper & Row; 1972. p 31–72.
- Elmer MC. *Social Surveys of Urban Communities*. Menasha, WI: George Banat Publishing Co.; 1914.
- Elmer MC. *Technique of Social Surveys* Revised Edition. Minneapolis: University Printing Co.; 1920.
- Emerson H. *The Hospital Survey for New York* Volume I. New York: United Hospital Fund; 1937.
- Emerson H, Pincus S, Phillips AC. *Philadelphia Hospital and Health Survey, 1929*. Philadelphia: Philadelphia Hospital and Health Survey Committee; 1930.
- Falk IS, Klem MC, Sinai N. *The Incidence of Illness and the Receipt and Costs of Medical Care among Representative Families: Experiences in Twelve Consecutive Months During 1928–1931*. Chicago: University of Chicago Press; 1933.
- Fienberg SE, Loftus EF, Tanur JM. Cognitive aspects of health survey methodology: an overview. *Milbank Mem Fund Q* 1985;63:547–564.
- Fong GT, Cummings KM, Borland R, Hastings G, Hyland A, Giovino GA, Hammond D, Thompson ME. The conceptual framework of the International Tobacco Control (ITC) Policy Evaluation Project. *Tob Control* 2006;3(Suppl):iii3–11.
- Frank JP. The people's misery: mother of diseases, an address, delivered in 1790 by Johann Peter Frank, translated from the Latin, with an Introduction by Henry E. Sigerist *Bull Hist Med* 1941;9:81–100.
- Frankel LK. The relation between standards of living and standards of compensation. *Char Comm* 1906–1907;17:304–314.
- Frankel LK, Stock JS. On the sample survey of unemployment. *J Am Stat Assoc* 1942;37:77–80.
- Frost WH, Sydenstricker E. Influenza in Maryland: preliminary statistics of certain localities. *Public Health Rep* 1919;34:491–504.
- Furman B, Williams RC. *A Profile of the U.S. Public Health Service: 1798–1948*. Bethesda, MD: National Institutes of Health; 1973.
- Greenwald MW, Anderson M. *Pittsburgh Surveyed: Social Science and Social Reform in the Early Twentieth Century*. Pittsburgh: University of Pittsburgh Press; 1996.
- Griscom JC. *The Sanitary Condition of the Laboring Population of New York with Suggestions for Its Improvement*. New York: Harper & Brothers; 1845.
- Gray PG. The memory factor in social surveys. *J Am Stat Assoc* 1955;50:344–363.
- Harrison SM. A social survey of a typical American city. *Proc Acad Polit Sci City N Y* 1912;2:18–31.
- Haywood A. The National Health Survey—in the beginning. *Public Health Rep* 1981;96:195–199.
- Holbrook AS. *Hull-House Maps and Papers: A Presentation of Nationalities and Wages in a Congested District of Chicago Together with Comments and Essays on Problems Growing Out of the Social Conditions by Residents of Hull-House, A Social Settlement*. New York: Thomas Y. Crowell & Co.; 1895.
- Horvitz DG. Sampling and field procedures of the Pittsburgh Morbidity Survey. *Public Health Rep* 1952;67:1003–102.

- Horwood MP. *Public Health Surveys: What They Are, How to Make Them, How to Use Them*. New York: John Wiley & Sons; 1921.
- Jabine TB. Reporting chronic conditions in the National Health Interview Survey: a review of findings from evaluation studies and methodological test. Vital and Health Statistics. Series 2, No. 105. DHHS Pub. No. (PHS) 87-1379. Public Health Service. Washington, DC: U.S. Government Printing Office; 1987.
- Jarrett MC. *Chronic Illness in New York City, Volume 1: The Problems of Chronic Illness*. New York: Columbia University Press; 1933.
- Kalton G, Piesse A. Survey research methods in evaluation and case-control studies. *Stat Med* 2007;26:1675–1687.
- Kasius RV. *The Challenge of Facts: Selected Public Health Papers of Edgar Sydenstricker*. New York: Prodist; 1974.
- Kay JP. *The Moral and Physical Condition of the Working Classes Employed in the Cotton Manufacture in Manchester*. London: Ridgway; 1832.
- Kellogg PU. The spread of the survey idea. *Proc Acad Polit Sci City N Y* 1912;2:1–12.
- Kennedy JC. *A Study of Chicago's Stockyards Community. III. Wages and Family Budgets in the Chicago Stockyard's District*. Chicago: University of Chicago Press; 1914.
- Kessler RC, Üstün TB. *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders*. New York: Cambridge University Press; 2008.
- Kinsey AC, Pomeroy WB, Martin CE. *Sexual Behavior in the Human Male*. Philadelphia: Saunders; 1948.
- Kinsey AC, Pomeroy WB, Martin CE, Gebhard PH. *Sexual Behavior in the Human Female*. Philadelphia: Saunders; 1953.
- Kiser CV. Pitfalls in sampling for population study. *J Am Stat Assoc* 1934;29:250–256.
- Klein H. Civilian dentistry in wartime. *J Am Dent Assoc* 1944;31:648–661.
- Kleinbaum DG, Kupper LL, Morgenstern H. *Epidemiologic Research: Principles and Quantitative Methods*. New York: Van Nostrand Reinhold; 1982.
- Korn EL, Graubard BI. *Analysis of Health Surveys*. New York: Wiley; 1999.
- Krieger N. *Epidemiology and the People's Health: Theory and Context*. New York: Oxford University Press; 2011.
- LaVange LK, Shah BB. A comprehensive software package for survey data analysis. In: *Proceedings of the Bureau of the Census Fourth Annual Research Conference*. Washington, DC: US Department of Commerce; 1988. p 327–336.
- Lawrence PS. An estimate of the incidence of chronic disease. *Public Health Rep* 1948;63:69–82.
- Leighton DC, Harding JS, Macklin DB, Hughes CC, Leighton AH. Psychiatric findings of the Stirling County Study. *Am J Psych* 1963;119:1021–1026.
- Lightbourne R, Singh S, Green CP. The World Fertility Survey: charting global childbearing. *Popul Bull* 1982;37:1–55.
- Logan WPD, Brooke EM. The survey of sickness 1943 to 1952. General Register Office Studies in Medical and Population Subjects No. 12. London: HMSO; 1957.
- Lombard HL, Tully MR, Potter EA. Evaluation of the cancer educational program in Massachusetts. *Hum Biol* 1944;16:115–125.
- Lumsden LL. Rural sanitation: a report on special studies made in 15 Counties in 1914, 1915, and 1916. *Public Health Bulletin No. 94*. Washington, DC: Government Printing Office; 1918.

- McDowell I. *Measuring Health: A Guide to Rating Scales and Questionnaires*. 3rd ed. Oxford: Oxford University Press; 2006.
- Mackinnon P. Report of the Ontario Health Survey Committee, volumes I, II, and III. Toronto: Ontario Ministry of Health; 1952.
- Madans JH, Cohen SB. Health surveys: a resource to inform health policy and practice. In: Friedman DJ, Hunter EL, Parrish RG, editors. *Health Statistics: Shaping Policy and Practice to Improve the Population's Health*. Oxford: Oxford University Press; 2005. p 119–128.
- Mindell J, Biddulph JP, Hirani V, Stamatakis E, Craig R, Nunn S, Shelton N. Cohort profile: the health survey for England. *Int J Epidemiol* 2012;41:1585–1593.
- Napier JA. Field methods and response rates in the Tecumseh Community Health Survey. *Am J Public Health* 1962;52:207–216.
- National Center for Health Statistics. 1981. Improving the health and nutrition examination survey: an evaluation by a panel of the National Academy of Public Administration. Washington, DC: U.S. Government Printing Office. Available at <http://www.cdc.gov/nchs/data/nhanes/nhanesii/improve.pdf>. Accessed on 23-June 2013.
- National Center for Health Statistics. 2005. International health data reference guide: 2003. DHHS Publication No. (PHS) 2005–1007. Hyattsville, MD: NCHS. Available at <http://www.cdc.gov/nchs/data/misc/ihdr2003.pdf>. Accessed on 23-June 2013.
- Nieto FJ, Peppard PE, Engelman CD, McElroy JA, Galvao LW, Friedman EM, Bersch AJ, Malecki KC. The survey of the Health of Wisconsin (SHOW), a novel infrastructure for population health research: rationale and methods. *BMC Public Health* 2010;10:785.
- Nisselson H, Woolsey TD. Some problems of the household interview design for the National Health Survey. *J Am Stat Assoc* 1959;54:69–87.
- Norton JM, Sanderson M, Gupta L, Holder-Hayes E, Immerwahr S, Konty K, Olson C, Eisenhower D. 2012. Methodology updates to the New York City Community Health Survey. New York City Department of Health and Mental Hygiene: Epi Research Report, September 2012; 1–12. Available at <http://www.nyc.gov/html/doh/downloads/pdf/epi/epiresearch-chsmethods.pdf>. Accessed on March 2013.
- Oppenheimer GM. Becoming the Framingham study 1947-1950. *Am J Public Health* 2005;95:602–610.
- Osborn C. The slums of great cities. *Roy Econ Soc* 1895;5:474–476.
- Palmer GT. A sanitary and health survey. *Proc Acad Polit Sci City N Y* 1912;2:32–50.
- Peebles A. *A Survey of the Medical Facilities of Shelby County, Indiana: 1929*. Washington, D.C.: Committee on the Cost of Medical Care; 1930.
- Perrott GSJ, Collins SD. Relation of sickness to income and income change in 10 surveyed communities. *Public Health Rep* 1935;50:595–622.
- Perrott GSJ, Tibbitts C, Britten RH. The National Health Survey: scope and method of the nation-wide canvass of sickness in relation to its social and economic setting. *Public Health Rep* 1939;54:1663–1687.
- Peterson JA. The impact of sanitary reform upon American urban planning, 1840-1890. In: Krueckeberg DA, editor. *Introduction to Planning History in the United States*. New Brunswick, NJ: Rutgers University Press; 1983. p 13–39.

- Pfautz HW. *Charles Booth On the City: Physical Pattern and Social Structure*. Chicago: University of Chicago Press; 1967.
- Powell-Griner E, Madans J. History of the National Health Interview survey. *Proc Am Stat Assoc Section on Health Policy Statistics* 2007;1519–1522.
- Remington PL, Smith MY, Williamson DF, Anda RF, Gentry EM, Hogelin GC. Design, characteristics, and usefulness of state-based behavioral risk factor surveillance: 1981–87. *Public Health Rep* 1988;103:366–375.
- Rice DP, Rosenthal G. *Advances in health survey research methods: Proceedings of a National Invitational Conference*. DHEW Publication No. (HRA) 77-3154. Washington, DC: U.S. Government Printing Office; 1977.
- Rosen G. Problems in the application of statistical analysis to questions of health: 1700–1880. *Bull Hist Med* 1955;30:27–45.
- Rosen G. *A History of Public Health*. Baltimore: The Johns Hopkins University Press; 1958.
- Rosenberg CE. *The Cholera Years: The United States in 1832, 1849 and 1866*. Chicago: University of Chicago Press; 1962.
- Rosenquist JN, Fowler JH, Murabito J, Christakis NA. The spread of alcohol consumption behavior in a large social network. *Ann Intern Med* 2010;152:426–433.
- Rowntree BS. *Poverty: A Study of Town Life*. London: Macmillan; 1910.
- Sanders BS. Have morbidity surveys been oversold? *Am J Public Health* 1962;52:1648–1659.
- Sanders BS, Federman D. The prevalence of disability recorded through four monthly sample surveys. *Soc Secur Bull* 1943;6(8):5.
- Schlesselman JJ. *Case-Control Studies: Design, Conduct, Analysis*. New York: Oxford University Press; 1982.
- Schneider F. *Public Health in Springfield, Illinois*. New York: Russell Sage Foundation; 1915.
- Schneider F. A survey of the activities of municipal health departments in the United States. *Am J Public Health* 1916;6:1–17.
- Schneider F. Some shortcomings of socio-sanitary investigations. *Am J Public Health* 1917;7:3–13.
- Scott A. Population-based case control studies. *Survey Methodol* 2006;32:123–132.
- Shattuck L. *Report of a General Plan for the Promotion of Public and Personal Health, Devised, Prepared, and Recommended by the Commissioners Appointed under a Resolve of the Legislature of the State*. Boston: Dutton & Wentworth; 1850.
- Simmons WR, Bryant EE. An evaluation of hospitalization data from the Health Interview Survey. *Am J Public Health* 1962;52:1638–1647.
- Sinai N, Mills AB. *A Study of Physicians and Dentists in Detroit: 1929*. Washington, DC: Committee on the Cost of Medical Care; 1931.
- Srole L, Langer TS, Michael ST, Kirkpatrick P, Opier M, Rennie TAC. *Mental Health in the Metropolis: The Midtown Manhattan Study*. New York: McGraw-Hill; 1962.
- Stecker ML, Frankel LK, Dublin LI. *Some Recent Morbidity Data: A Summary of Seven Community Sickness Surveys Made Among Policyholders of the Metropolitan Life Insurance Company, 1915 to 1917*. New York: Metropolitan Life Insurance Company; 1919.
- Streiner DL, Norman GR. *Health Measurement Scales: A Practical Guide to their Development and Use*. 4th ed. Oxford: Oxford University Press; 2008.

- Suchman EA. The survey method applied to public health and medicine. In: Glock CY, editor. *Survey Research in the Social Sciences*. New York: Russell Sage Foundation; 1967. p 423–519.
- Susser M. Epidemiology in the United States after World War II: the evolution of a technique. *Epidemiol Rev* 1985;7:147–177.
- Sydenstricker E. A study of illness in a general population group, Hagerstown morbidity studies, No. 1: the method of study and general results. *Public Health Rep* 1926;41:2069–2088.
- Sydenstricker E. The incidence of influenza among persons of different economic status during the epidemic of 1918. *Public Health Rep* 1931;46:154–170.
- Sydenstricker E. *Health and Environment*. New York: McGraw-Hill; 1933a.
- Sydenstricker E. Sickness and the economic depression. *Public Health Rep* 1933b;48:1251–1264.
- Sydenstricker G, Wheeler GA, Goldberger J. Disabling sickness among the population of seven cotton mill villages of South Carolina in relation to family income. *Public Health Rep* 1918;33:2038–2051.
- Thornberry OT. An experimental comparison of telephone and personal health interview surveys. DHHS Publication No. (PHS) 87-1380. Hyattsville, MD: National Center for Health Statistics; 1987.
- Townsend JG. Epidemiological study of the minor respiratory diseases by the public health service. *Public Health Rep* 1924;43:2669–2680.
- Townsend JG, Sydenstricker E. Epidemiological study of minor respiratory diseases. *Public Health Rep* 1927;42:99–122.
- Trussell RE, Elinson J. *Chronic Illness in the United States, Volume III: Chronic Illness in a Rural Area, The Hunterdon Study*. Cambridge, Massachusetts: Harvard University Press; 1959.
- Turner CF, Ku L, Sonenstein FL, Pleck JH. Impact of audio-CASI on bias in reporting male-male sexual contacts. In: Warnecke R, editor. *Health Survey Research Methods Conference Proceedings* DHHS Publication No. (PHS) 96-1013. Hyattsville, MD: National Center for Health Statistics; 1996. p 171–176.
- U.S. Public Health Service. Origin and program of the U.S. National Health Survey. Public Health Service Publication No. 584-A1. Washington, DC: U.S. Government Printing Office; 1958.
- U.S. Public Health Service. Plan and initial program of the health examination survey. Public Health Service Publication No. 584-A4. Washington, DC: U.S. Government Printing Office; 1962a.
- U.S. Public Health Service. Health studies of human populations: a selected bibliography. Public Health Bibliography Series No. 38. Washington, DC: U.S. Government Printing Office; 1962b.
- Üstün TB, Mechbal A, Murray CJL. The world health surveys. In: Murray CJL, Evans DB, editors. *Health Systems Performance Assessment: Debates, Methods and Empiricism*. Geneva: World Health Organisation; 2003. p 762–796.
- Villermé LR. *Tableau de l'état Physique et Moral Dans Ouvriers Employés dans les Manufactures de Coton, de Laine et de Soie*. Paris: Renouard; 1840.
- Warner AG. *American Charities and Social Work*. Fourth ed. New York: Thomas Y. Crowell Co.; 1930.

- Weisz G. Epidemiology and health care reform: the National Health Survey of 1935–1936. *Am J Public Health* 2011;101:438–447.
- Witts LJ. *Medical Surveys and Clinical Trials: Some Methods and Applications of Group Research in Medicine*. London: Oxford University Press; 1959.
- Woolsey TD. Estimates of disabling illness prevalence in the United States: based on the February 1949 Current Population Survey. *Public Health Rep* 1950;65:163–184.

---

## ONLINE RESOURCES

Proceedings from the first ten conferences on Health Survey Research Methods, dating back to 1975, are available at: [www.srl.uic.edu/links/proceedings.html](http://www.srl.uic.edu/links/proceedings.html).

