

DESIGNING AND CONDUCTING HEALTH SURVEYS

A Comprehensive Guide

THIRD EDITION

Lu Ann Aday
Llewellyn J. Cornelius

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Foreword by Steven B. Cohen

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FOREWORD

Steven B. Cohen

Health surveys serve as a critical resource to measure the health status, risk factors, and health behaviors of the population and to assess the level of quality of the health care received. They also permit the identification of disparities in health care associated with access, use, cost, and insurance coverage and serve to identify related patterns and trends over time. The descriptive and analytical findings they generate are key inputs to facilitate the development, implementation, and evaluation of policies and practices addressing health and health care. To ensure their utility and integrity, it is essential that these health surveys are designed according to high-quality, effective, and efficient statistical and methodological practices, and optimal sample designs. It is also important that subsequent applications of estimation strategies to the survey data, as well as analytical techniques and interpretations of resultant research findings, are guided by well-grounded statistical theory.

Over the past two decades, both the first and second editions of *Designing and Conducting Health Surveys* by Lu Ann Aday have served as core references that provide a comprehensive framework to help guide survey planners, health services researchers, and the ultimate users through the major processes that are

The views are those of the author, and no official endorsement by the Department of Health and Human Services or the Agency for Healthcare Research and Quality is intended or should be inferred.

characteristic of well-designed surveys. While the large majority of the guiding principles identified in the earlier editions continue to hold, several recent technological advances have visibly modified the paradigm for the design and conduct of health surveys in the twenty-first century. This most recent revision, which now reflects a collaborative effort between Aday and Llewellyn Cornelius, gives additional attention to advances in computer-assisted data collection efforts and the advent of Web-based surveys. The book also covers recent enhancements in sophisticated statistical software to facilitate appropriate estimation, variance estimation, and imputation techniques, in addition to the application of more appropriate analytical techniques tailored to specific analyses.

Beginning with the need for a clear set of survey objectives that defines the core purpose of a given health survey, attention is given to issues of survey content, questionnaire design, cost considerations, and mode of data collection. The book also features important sample design considerations, with coverage given to topics that include frame development, sample size specifications, precision requirements, and sample selection scheme. Adhering to a total survey error framework, the authors identify the challenges that characterize well-designed health surveys and reinforce the need for informed choices by survey designers and sponsors among the available options at each stage of survey development.

Readers will benefit from the breadth of experience Aday and Cornelius convey in helping guide design decisions that bear on the accuracy, reliability, clarity and relevance, timeliness, and accessibility of survey findings. They provide effective guidelines for minimizing survey errors for each phase of the life cycle of a health survey, which go hand in hand with their informative discussion of the related trade-offs that have an impact on the quality and cost-efficiency of the design. An added feature of this updated edition is the inclusion of new, more current studies based on international, national, and state and local surveys that serve as good vehicles to illustrate both the unique and shared design challenges and to identify effective strategies to solve them.

A well-designed health survey imposes an interdependence of the survey sponsors, the survey designers, the associated statisticians and methodologists, the survey operations, field and management staff, the data processing staff, and the end users, who are primarily the health researchers, policymakers, and the public. This book provides the essential road map to help realize and strengthen these connections. When all the essential health survey contributors work in concert, following the sound practices covered in this book, the overall survey quality and utility that is achieved should be much greater than the sum of the individual successful components. As in the past, this book should continue to serve as a valuable resource to both practitioners and researchers alike, helping to provide a greater respect for the methodological and operational challenges that health

surveys present and the substantive and technical expertise necessary for their effective resolution. Students engaged in health survey research should also substantially benefit from this comprehensive book by gaining an enhanced understanding of the underlying complexities inherent in the design and conduct of health surveys.

July 2005
Rockville, Maryland

Steven B. Cohen
Agency for Healthcare Research and Quality

PREFACE

*D*esigning and Conducting Health Surveys has been a classic guide for many years for institutions and individuals interested in conducting or using health surveys. The first (1989), second (1996), and now the third (2006) editions of the book draw on methodological work on surveys in general and health surveys in particular to illuminate and illustrate the principles and approaches that should be applied in designing high-quality surveys.

The number, complexity, and scope of both privately and governmentally funded health care surveys—on the institutional, local, state, national, and international levels—have increased dramatically in response to the need for information about the sources, magnitude, and impact of health problems, and the roles of programs and providers in addressing these problems. Many hospitals, managed care organizations (MCOs), and other health care businesses are struggling for their share of the consumer market. HIV/AIDS and sociomedical morbidities such as stress-related illness place a substantial strain on the health care system as a whole. The issue of how to provide reasonable access to quality medical care in cost-effective ways with limited resources is a major problem in the United States and other countries. Health surveys have been and will continue to be important sources of information about the impact of these dynamic and complex changes underway in the health care marketplace.

This book is intended to strengthen the preparedness of survey developers in taking on these and related challenges in designing high-quality health surveys.

This third edition draws on the most recent methodological research on survey design in general and the rich storehouse of insights and implications provided by cognitive research on question and questionnaire design in particular. The evolution and application of Internet technologies for gathering survey data are also elaborated. A total survey error framework and survey quality is presented as a useful compass for charting the dangerous waters between the Scylla and Charybdis of systematic and random errors that inevitably accompany the survey design enterprise. In this edition, the specific types of errors that can occur in the design and implementation of surveys and the means that can be used for addressing them are explicitly delineated and discussed within each of the chapters.

In addition, three new studies based on national, international, and state and local surveys—the UNICEF Multiple Indicator Cluster Surveys, California Health Interview Survey, and National Dental Malpractice Survey—are used to illustrate the range of design alternatives available at each stage of developing a survey and what might be a sound basis for choosing among them.

Audience

This book is intended to be a reference for health care marketing personnel, strategic planners, program designers, agency administrators, and health professionals charged with conducting or contracting for health studies. It will also serve as a resource for academics and researchers who are interested in collecting, analyzing, and evaluating health survey data and as a text for teaching students in public health, medical sociology, health administration, health education, medicine, nursing, dentistry, allied health, health program evaluation, social work, and related fields how to design and conduct good surveys.

The issues in designing high-quality surveys parallel those to be considered in evaluating the quality of medical or nursing care. Norms of practice are taught during clinical training, based on research and experience in the profession. The precise relationship of these norms to whether the patient lives, or at least improves, is not always clear or systematically documented. What clinical researchers discover in the laboratory and what works for practitioners on the wards do provide the practical basis for training new professionals in sound medical practice. Doing good surveys is, similarly, a combination of science and practical experience.

Overview of the Contents

Chapter One introduces a framework for identifying and classifying the major topics addressed by health surveys. It lays the groundwork for thinking about what topics could be the focus of a health survey and what related studies to review

before beginning one's own study. This chapter also looks ahead to the topics, technologies, and methodological and ethical challenges that are likely to affect the way health surveys are designed and conducted in the future. An approach to identifying the major types of survey errors that will be elaborated in the chapters that follow is also introduced in Chapter One.

The fundamental starting point for a study is the definition of survey objectives. The process begins with the specification of the health topics to be addressed in the survey. Deciding on the basic research questions to be addressed requires determining when, where, who, and what the focus of the study will be. Chapter Two describes major survey designs for addressing different research questions and presents guidelines for formulating detailed study objectives or hypotheses based on those questions. The research questions and study hypotheses and objectives are usually phrased in general (or conceptual) terms—for example, “Are patients of higher socioeconomic status more likely to engage in preventive self-care practices?” During the survey preparation, these concepts are translated into more directly measurable indicators—for example, “Are patients with more education and higher family incomes more likely to exercise regularly?”

Chapter Three reviews the techniques for developing working definitions of the topics or issues addressed in health surveys. It also provides two important criteria for evaluating just how useful these working definitions are: (1) Do they seem to mean the same thing all the time and to different people? (that is, are they reliable?) and (2) Are they accurate translations of what the investigators originally had in mind? (that is, are they valid?). Techniques are also discussed for reducing the number of variables produced by many different survey questions to a more economical set of indicators through the use of summary typologies, indexes, and scales.

Chapter Four reviews the logic and methods to use in formulating the analysis plan for a survey. Analyzing the data is one of the last steps in the survey process. Having an idea of the analysis plan for the study can, however, help guide decisions made at every subsequent stage of the survey. Survey researchers, like good scouts, should be prepared and know before setting out what they want to accomplish.

Chapter Five explains the advantages and disadvantages of different ways of collecting data in general—and data on health topics in particular. Methods of data collection considered here include face-to-face interviews, telephone interviews, and self-administered questionnaires. These can be either recorded on paper copy questionnaires or input directly into a computer or adapted for e-mail or Web-based surveys. Combinations of these data-gathering approaches can also be used, depending on the funding and technical capabilities at the researcher's disposal.

All of the decisions made to this point, especially those relating to the method of data collection, influence the process of sampling or selecting the people or

organizations to be included in the study. Chapter Six reviews the basic types of sample designs used in surveys and presents examples of each from major health studies. Chapter Seven introduces approaches to estimating the sample size required for a study. It also discusses the problems or errors that can arise in the sampling process and ways to deal with these, both in the course of the study and later, in data analysis using a particular sample design.

The heart of the survey is generally a questionnaire containing questions designed to elicit the information the investigator wants from study participants. Although rules for asking these questions are not always clear-cut, methodological research, particularly the applications of cognitive psychology in designing survey questions, has yielded useful guidelines for composing valid and reliable questions. Chapter Eight provides a general overview, based on the emerging research, of some of the issues to consider in formulating questions in general—regarding both the form of the question itself and the possible response categories to use with it. Similarly, Chapters Nine, Ten, and Eleven present guidelines for developing particular types of questions—objective questions about the respondents' characteristics or behavior, subjective questions about their attitudes toward or knowledge about certain health issues, and questions about their perceived or clinically evaluated health status. Examples of each type of question, drawn from health surveys, are also presented.

Individual questions represent the building blocks of the survey questionnaire itself. The order or context in which questions are placed in the questionnaire and the form and clarity of the questionnaire have been found to influence the quality of data obtained in surveys. The type of data collection method chosen (face-to-face, telephone, self-administered, or computerized or Internet adaptations of these) can also significantly influence the phrasing of individual questions and the form and format of the questionnaire itself. Chapter Twelve presents general rules of thumb to consider in designing questionnaires and the adaptations required for different modes of data collection.

The issue of quality control during data collection is discussed in Chapter Thirteen. The way the survey is actually conducted is shaped by all the prior decisions about study design, as well as the dress rehearsals (pilot studies or pretests) to see how well the questionnaires and procedures are performing, the training and experience of the data collection staff, and the management and monitoring of the data-gathering process.

Coding the data entails assigning numbers to answers so that they can be processed by computers. Before the data can be analyzed, adjustments may have to be made to correct for missing or incomplete data from certain types of respondents on certain questions. The method of data collection (especially if computerized) can directly affect the ways the data are subsequently coded, processed,

and cleaned. (Cleaning refers to the process of identifying and correcting errors.) Chapter Fourteen discusses these preparations.

Chapter Fifteen reviews the major univariate, bivariate, and multivariate methods for analyzing survey data. The methods the researcher uses will depend on the analysis plan chosen for the study (Chapter Four), the research question being addressed, the design of the study, and the measurement of the survey variables to be used in the analysis.

The final step in designing and carrying out a survey is writing up what has been learned in a report to interested audiences. The report may be addressed to the funder, as evidence of fulfillment of grant or contract objectives; to an operating agency's administration or board of directors, as part of their strategic planning process; or to legislative committees, task forces, or staff, as background research on a particular piece of pending legislation. The survey may also be the basis for a thesis, book, or journal article. This final chapter describes what the form and content of a basic research report based on the survey might be and presents a framework for evaluating the overall quality of the study. A summary table highlighting the major types of survey errors that have been reviewed in the previous chapters is introduced to serve as a checklist for identifying what might be particular strengths or limitations of a survey in the context of a total survey errors and survey quality framework.

Major survey examples cited throughout the book and highlighted in the resources at the end of the book include face-to-face, telephone, and mail surveys. Key sources of information on health surveys and an inventory of health survey archives are also provided. Many specific examples of health surveys at the international, national, state, and local levels are presented.

In summary, this book provides an overview of the basic tenets of good health survey design for those who have a role in gathering, analyzing, or interpreting health survey data.

Acknowledgments

We gratefully acknowledge the contributions of a number of people to this book.

We thank the mentors and colleagues who first contributed to our understanding of how to design and conduct high-quality health surveys: Ronald M. Andersen, Odin W. Anderson, and Robert L. Eichhorn.

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field of survey research that supports the design and implementation of high-quality surveys.

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We enjoyed and learned from writing this book. Our hope is that others will learn from and enjoy reading it.

October 2005

Lu Ann Aday
Llewellyn J. Cornelius

THE AUTHORS

Lu Ann Aday is Lorne D. Bain Distinguished Professor in Public Health and Medicine at the University of Texas School of Public Health–Houston. She received her bachelor’s degree in economics (agricultural economics, with high honors) from Texas Tech University and her master’s and doctoral degrees in sociology (with a specialization in health services research) from Purdue University. Aday was formerly associate director for research at the Center for Health Administration Studies of the University of Chicago. Her principal research interests have focused on indicators and correlates of health services utilization and access. She has conducted major national and community surveys and evaluations of national demonstrations and published extensively in this area, including numerous books dealing with conceptual or empirical aspects of research on access to health and health care for vulnerable populations. Her recent books, a number of which have been published in second or third editions, include *Reinventing Public Health: Policies and Practices for a Healthy Nation* (2005); *At Risk in America: The Health and Health Care Needs of Vulnerable Populations in the United States* (2nd ed., 2001); and *Evaluating the Healthcare System: Effectiveness, Efficiency, and Equity* (3rd ed., 2004). Aday’s excellence in teaching and mentoring was acknowledged when she received the University of Texas at Houston Health Science Center Excellence in Scholarship Award, the John P. McGovern Outstanding Teacher Award, the Committee on the Status of Women Distinguished Professional Woman Award, the President’s Award for Mentoring Women, and the statewide Minnie Stevens Piper Foundation Award for Excellence

in Teaching. Dr. Aday's scholarship is recognized nationally through her election to membership in the Institute of Medicine of the National Academy of Sciences and in receiving an honorary doctorate of social sciences, *honoris causa*, from Purdue University.

Llewellyn J. Cornelius is a professor at the University of Maryland School of Social Work. He received his B.A. degree from Syracuse University, majoring in psychology and sociology, and received a master's degree in social science as well as master's and doctoral degrees in social service administration from the University of Chicago. Cornelius has extensive research experience in examining access to medical delivery and the outcome of care for African Americans and Latinos. He has taught a doctoral research practicum where he assisted students in the development, pilot testing, and fielding of surveys. In addition to teaching survey research, he has participated in the design and implementation of a multitude of studies, including the fielding of a statewide survey that examined the cultural competency of mental health providers; the development and implementation of surveys that assessed the use of technology in social work; the design and implementation of a statewide survey on minority physicians' attitudes toward managed care; and the coordination of portions of a data management contract for a federal survey of fifteen thousand households (the 1987 National Medical Expenditure Survey). Cornelius was the recipient of the University of Chicago's 1996 Elizabeth Butler Young Alumni Award for his contributions to health care research on African Americans and Latinos.

DESIGNING AND CONDUCTING HEALTH SURVEYS



CHAPTER ONE

THINKING ABOUT TOPICS FOR HEALTH SURVEYS

Chapter Highlights

1. Surveys systematically collect information on a topic by asking individuals questions to generate statistics on the group or groups that those individuals represent.
2. Health surveys ask questions about a variety of factors that influence, measure, or are affected by people's health.
3. Health survey researchers should review the major international, national, state, and local health surveys relevant to their interests before undertaking their own study.
4. Good survey design is basically a matter of good planning.
5. The total survey error and survey quality framework alerts researchers to ways to identify and mitigate both bias and variable errors in surveys.

This book provides guidance for designing and conducting health surveys. These surveys systematically collect information on a topic of interest (such as state health care reform legislation) by asking individuals questions (about whether they and their family members have insurance coverage) to generate statistics (percentage who are uninsured) for the group or groups those individuals represent (noninstitutionalized residents under sixty-five years of age).

This chapter addresses (1) the topics, techniques, and ethical issues that will characterize the design and conduct of health surveys in the future; (2) the defining features of surveys compared with other data collection methods; and (3) the reasons for studying health surveys. It also provides (4) a framework for classifying the topics addressed in health-related surveys, (5) illustrative examples of health surveys used in this book, and (6) an overview of the total survey design and survey quality approach to designing and conducting health surveys.

Future Health Surveys

Health surveys have been and will continue to be important sources of information for health care policymakers, public health professionals, private providers, insurers, and health care consumers concerned with the planning, implementation, and evaluation of health-related programs and policies. The design and conduct of health surveys in the future will be shaped by changes in the diversity, complexity, and sensitivity of the topics addressed in these studies; the innovative techniques and technologies that are being developed for carrying them out; and the new or intensified ethical dilemmas that are a result of these changes.

Topics

The topics addressed in health surveys have been and will continue to be sensitive and complex. Such sociomedical morbidities as HIV/AIDS, child abuse, sexual dysfunction, drug and alcohol addiction, and family violence, among others, are now encompassed in definitions of public health and medical problems. The issue of access to medical care focuses on vulnerable and hard-to-locate populations differentially experiencing these sociomedical morbidities: gay/lesbian/bisexual/transgendered (GLBT) persons, drug abusers, the homeless, medically fragile children and the elderly, and undocumented migrant and refugee populations. Health care program designers are concerned with the number of people in these vulnerable groups; the particular health problems they experience; the barriers to care they confront; the ways in which their knowledge, attitudes, and behaviors exacerbate the risk of their contracting serious illnesses; and the resources they have to deal with these problems.

These trends in asking tough questions of hard-to-locate respondents in order to gain information for the design of cost-effective public and private health programs to address the needs of these respondents will continue.

Techniques and Technologies

The topics to be addressed in health surveys present new and intensified challenges at each stage of the design and conduct of a study. Corresponding to these developments is the emergence of new technologies for assisting with these tasks.

Rapid growth in the number and diversity of journals and specialized publications dealing with health topics has made the job of identifying and evaluating the major research in any given area more challenging. Computerized text search programs have greatly facilitated access to published research, but knowledge of effective search techniques is required to carry out these searches efficiently. These databases encompass professional journals and related periodical literature, as well as increasingly expanded online access to books, government publications, and unpublished research in progress relevant to the topic of interest. For those health topics for which little information is available because of the newness of the topic or the corollary lag in the dissemination of research results, survey designers need to contact relevant public or private funding agencies and colleagues in the field who are known to have research in progress on the issue.

Training programs are needed to prepare both students and professionals for carrying out these searches and evaluating the credibility of sources that are identified. The credibility of Internet and unpublished research could be evaluated based on the authoritativeness and previous track record of the organization or individual to whom the work is credited (for example, National Center for Health Statistics reports are likely to be a more credible source than an unpublished manuscript posted by a university faculty member with little record of peer-reviewed publications or funding); the other research sources that the research draws on or references; as well as the standards for evaluating the possible sources of errors in research in general and surveys in particular discussed further later in this chapter and highlighted in each of the chapters that follow. (Also, see White, 1994, and Wortman, 1994, for a discussion of procedures and criteria for retrieving and evaluating scientific literature.)

In the interest of learning about health and health-related attitudes, knowledge, and behaviors, survey researchers are attempting to penetrate more deeply into the traditionally best-kept family and personal secrets. The application of principles of cognitive psychology to the design and evaluation of such questions has challenged many of the standardized approaches to asking questions. At a minimum, in the early stages of questionnaire development, survey designers should ask respondents what went through their minds when they were asked sensitive questions about themselves or other members of their family. Moreover, prominent survey methodologists have called for the development of theories of

surveys. These theories would focus on the decisions that could be made at each stage of designing and carrying out a survey to maximize quality and minimize costs (Biemer & Lyberg, 2003; Dillman, 2000, 2002; Groves, 1987, 1989; Groves, Dillman, Eltinge, & Little, 2002; Groves, Singer, & Corning, 2000; Sudman, Bradburn, & Schwarz, 1996).

The technology that has had the largest influence on the techniques used in the design and conduct of health surveys is computerized information processing. These methods can be used to facilitate research on different survey techniques or methodologies (such as using different approaches to sampling respondents, phrasing questions, and training interviewers). The rapid turnaround of information made possible by computerized methods should expedite choices among design alternatives of this kind. More attention needs to be given to evaluating the overall quality of the information obtained using emerging computerized approaches, the impact on the interviewers and respondents of using computers to display the questions and enter respondents' answers, and the costs at each stage of the study. Computerized survey technologies are wonderful innovations. As with any other new invention, however, the most effective and efficient means of producing and using it needs to be explored and tested rather than simply assumed (Jones, 1999).

The topics and technologies evolving for health surveys present both challenges and opportunities in designing the samples for these studies. Health surveys have increasingly focused on rare or hard-to-locate populations. Innovative approaches are required to identify the universe or target population of interest, develop cost-effective methods for drawing the sample, and then find individuals to whom the questionnaire or interview should be administered. Survey designers must be aware of the methods that have been developed to identify and oversample rare populations and be prepared to invest time and resources to come up with the best sample design for their study.

Ethics

Asking people questions in surveys about aspects of their personal or professional lives always involves a consideration of the ethical issues posed by this process. Are the participants fully informed about the study, and do they voluntarily agree to participate? What benefits or harm may they experience if they participate? Will their right to remain anonymous and the confidentiality of the information they provide be maintained when the findings are reported? The evolution of the topics, techniques, and technologies just reviewed promises to heighten, rather than diminish, the importance of these ethical questions in the design and conduct of health surveys (Sudman, 1998).