

APPENDIX

Looking Closer at Health Research Methods: Surveys, Statistics, and Stories

If you are interested in learning more about the lifelong pursuit of health and wellness and are planning to conduct a study, you will need to be prepared to deal with several critical methodological challenges. Conducting research involves a number of important decisions. For example, you will have to decide: what is the central research question you plan to investigate; what type of study is best able to provide the information you need to answer the research question; what data sources should you use; who should be included in your study; how will you recruit study participants; how should the data be collected and managed; how should the data be analyzed; and, finally, how will you interpret the findings. All studies require a **research design** or a strategy for carrying out research and addressing methodological issues.

The purpose of this appendix is to provide additional information about some of the research strategies discussed in the text and to highlight the major methodological issues that are involved in both population health surveys and personal health diaries. Throughout this discussion, examples will be drawn from Chapter 3 to illustrate the types of methodological challenges facing health researchers.

Choosing a Research Design

One thing that is very important to realize about research methods is that there is no single, right research methodology for studying all aspects of health and wellness. All research designs have certain advantages and disadvantages, and it is the task of the investigator to select the most appropriate one. Discussions of research methodology typically start by distinguishing between two basic strategies used in social research—quantitative and qualitative approaches. It is important to recognize at the outset that these two approaches are not mutually exclusive. In fact, there is compelling evidence that the process of pursuing health and wellness is far too complex to be adequately assessed by any one research method.

Quantitative and Qualitative Methods: Why Both Are Necessary

Quantitative methods rely on objective indicators to assess the biophysical and behavioural aspects of health and illness and to examine relationships between variables (such as smoking and

health status). This type of empirical health information is typically collected by conducting surveys of a large representative random sample of a defined target population (as well as through experimental procedures). Quantitative health research is based on the belief that social observations are essentially comparable to physical phenomena. Chapter 3 provides examples of the type of standardized questions used to collect quantitative information about observable bodily changes known as signs (e.g., morbidity data on the prevalence and incidence of disease) and the behavioural practices that affect health (e.g., level of physical activity and dietary practices). The aim of the quantitative approach is to produce generalizable results regarding the health of the population.

Qualitative methods rely on subjective indicators to assess the psychosocial aspects of health and illness using self-reported information collected by having study participants keep a health diary, provide illness narrative accounts, or answer open-ended questions during in-depth interviews. Qualitative studies typically collect data from a relatively small purposive sample about their lived experiences. Chapter 3 provides examples of the ways people perceive, evaluate, and respond to the qualitative aspects of health and illness, such as the type of symptoms they experience (e.g., the sensation of pain). The aim of the qualitative approach is to further our understanding of complex health issues, such as how people give meaning to their daily lives (including their perceived level of wellness) and make sense of sickness when it occurs. The essence of qualitative research is that it is naturalistic—studying people in real life situations rather than artificially isolating them from their everyday social context for the purposes of a health survey.

To further illustrate this distinction, length of life (i.e., a quantitative count of the number of years lived) is different from quality of life (i.e., a qualitative account of level of life satisfaction). Similarly, you can learn about the self-rated health of Canadians by conducting a quantitative survey, but if you want to gain greater insight into what people mean when they report that they are in good health or that they are satisfied with their lives, you will need to do a qualitative study. Both types of research method are vital sources of information and are necessary to gain a complete picture of the health of the population. Furthermore, it is important to recognize that some aspects of health and illness defy quantification (such as feelings of nausea, dizziness, or fatigue). Therefore, it makes sense to combine the two research strategies and to concentrate on constructs such as health expectancy (versus life expectancy), which (as described in Chapter 3) is a more comprehensive measure of population health that includes both quantity (length) of life and quality of life and focuses research attention on the number of years lived in good health. In other words, this construct combines quantitative and qualitative health information.

Mixed-Methods Research: Time for a More Comprehensive Approach

The text emphasizes the need to adopt a **mixed-methods research** approach for gaining a more complete understanding of the complex issues involved in the lifelong pursuit of health and wellness. Many structural and personal determinants intersect over the life course to contribute to health outcomes. Consequently, there is a need for a research design (such as a mixed-methods approach) that incorporates both quantitative and qualitative health information and supports multi-level analyses of the data. Using more than one type of methodology in a single study to answer a research question and to verify that different methods result in the same finding is referred to as **triangulation**. This approach is based on the belief that while quantitative and qualitative research methods are both necessary and useful, neither one (alone) is sufficient. Adopting a

mixed-methods research approach enables us to move beyond the outdated debate about whether quantitative and qualitative research designs are somehow incompatible and forces us to recognize that while there are differences, these research strategies also share some similarities (i.e., both methodologies collect and analyze data and construct explanations based on their data). A mixed-methods approach acknowledges the social nature of the research enterprise and opens the door to using multiple research methods for investigating health and wellness by combining different forms of data collection and analysis in one study. In fact, it has been argued that one of the key advantages of a mixed-methods research design is its methodological pluralism.

The Advantages and Disadvantages of Alternative Research Methods

As stated previously, all research methods have advantages and disadvantages. To summarize the strengths of these alternative research strategies, quantitative methods can be used for testing hypotheses that are constructed before the data are collected and for confirming existing theories about health and illness behaviour. This approach is useful for studying large numbers of people and provides quantitative, numerical data that can be analyzed using statistical software. The research findings of quantitative studies can be generalized to the wider population. By comparison, qualitative methods are useful for the in-depth study of a limited number of cases and for exploring complex social phenomena. This approach can provide rich, detailed information about people's underlying assumptions about health and illness, the social context in which health, illness, and sick role behaviours take place, and the meaning that they attribute to life events (such as sickness and wellness). Finally, a mixed-methods approach combines the research strengths of quantitative and qualitative studies by including both numbers and narratives. For example, narrative accounts can add meaning to numbers, while numbers can be used to provide context for personal accounts. This approach has a greater potential to answer a broad range of research questions, because it does not restrict the study to a single methodological strategy. In addition, it is important to note that the adoption of a mixed-methods research design is consistent with the ongoing development and refinement of an intersectional analytic conceptual framework (such as the causal model presented in Chapter 8) to guide future research on the lifelong pursuit of health and wellness.

Turning to the weaknesses of these three research strategies, quantitative studies typically rely on standardized questions that may not reflect participants' understanding of the phenomenon being investigated (such as the nature of the pain experience). As a result, important information may be missed. Furthermore, the lack of contextual information in health surveys limits the interpretation of findings. The findings of qualitative studies may be unique to a relatively small number of participants and therefore not readily generalizable to other groups or social settings. In addition, data collection and analysis can be very time-consuming when using research strategies such as health diaries or illness narrative accounts. While qualitative studies can elicit a wealth of personal information, it takes time to transcribe interviews and perform analysis. Establishing the validity of the study's findings may also be problematic. **Validity** refers to the extent to which a concept, measurement, or conclusion is well-founded and that the methodology used accurately measures the idea or construct it claims to measure. Quantitative studies often involve replication, and therefore, if standardized questions are used, findings can be compared across different populations to assess their validity. In qualitative studies, the information is analyzed by the investigator, and then a summary of the findings is presented to study participants to determine whether the interpretation is valid and accurately reflects the intended meaning of their responses.

Finally, while a mixed-methods approach can offset the weaknesses of studies that rely exclusively on quantitative or qualitative methods by using both in one research project, it is dependent on the skills and ability of individual researchers (or research teams) to be able to carry out both concurrently. This means learning appropriate ways to combine multiple methodological strategies, to mix quantitative and qualitative data analysis, and to interpret possible contradictory findings. In some studies, this may mean quantitative researchers adding some in-depth interview questions to their standardized survey measures or qualitative researchers adding a quantitative component to their illness narrative accounts. In these cases, either a quantitative or qualitative approach still generally dominates the research design. Consequently, it is not yet clear what constitutes the right mixture of methodological components for a mixed-methods research design. There is obviously more work to be done to improve the design and conduct of mixed-methods research, but some have argued that health research may be the field of study most capable of bridging the traditional quantitative–qualitative divide!

Ultimately, it is the research question to be answered or the major objective of the study that should influence the type of methodology (or combination of methodologies) selected in each study. In other words, research methods should follow research questions in a way that offers the best chance of discovering meaningful answers. Furthermore, the choice of research method ideally should also be guided by the theoretical paradigm used to frame the research question(s) to be answered. For example, as described in Chapter 2, the structural functionalist paradigm is associated with methods such as survey research and statistical analysis to collect and analyze quantitative data about the effects of social structures on behaviour (i.e., the way illness behaviour is shaped by social locations such as socioeconomic status and ethnicity). In contrast, the symbolic interactionist paradigm relies on qualitative research methods such as case studies and personal accounts of health and illness experiences to examine each individual’s definition of the situation and the subjective meaning of wellness and sickness. To some extent, a mixed-methods approach is reflected by the feminist paradigm’s reliance on a variety of research strategies for studying the relationship between gender inequality and health at both the broad societal and the individual level. In summary, there are a variety of factors that need to be considered in choosing a research design for your study.

Identifying the Best Sources of Information

A number of methodological issues are common to all health research designs. For example, whether you are planning to conduct a quantitative study or a qualitative study or adopt a mixed-methods approach, you will need to decide what type of information is required to answer the research question you are investigating.

Different Data Sources: Primary and Secondary Research

What types of data sources should you use in your study? There are actually many different sources of information that reflect the health of the population and could be used, including census and vital statistics (such as birth and death rates), administrative data (such as the use of hospital and medical services), survey data (regarding personal practices such as smoking and physical exercise), and narrative accounts (such as health diaries and life stories). These sources of health information provide both primary and secondary data.

Primary research refers to the collection of original information for a specific purpose (whether it is for a study or for official organizational record-keeping). Primary data are collected by various methods, including directly contacting individual respondents through face-to-face interviews, telephone surveys, or self-administered questionnaires or asking them to keep health diaries and document their self-rated health and routine lifestyle behavioural practices. Thus, primary research can focus on both quantitative and qualitative issues. By collecting original primary data, the researcher can exercise considerable control over the study design, including the selection of participants, the collection of information, and the time frame for carrying out the research. Ultimately, all research, whether primary or secondary, depends on the collection of primary data.

Secondary research refers to accessing information that was originally collected for a different purpose and using the data to address other questions. For example, information can be extracted from official statistics and administrative health databases such as the census, Statistics Canada, and the Canadian Institute for Health Information (e.g., mortality and morbidity data, health-services use, including physician visits, days in hospital, and number of medications used) and then subjected to further analysis to answer specific research questions. While any primary data that is archived and made available for reanalysis can be used as secondary data (i.e., allowing subsequent researchers to ask new questions of the data that were not originally addressed), in health research most secondary analysis makes use of quantitative information.

In other words, social scientists studying the health of the population are faced with a choice: whether to collect their own data or to find an existing data source that they can analyze further to try and answer their research questions. There are a number of advantages to collecting primary data. For example, as just mentioned, researchers have greater control over the study design, including the operationalization of key theoretical constructs, sampling, and data collection strategies. **Operationalization** refers to the stage in the research process when concepts (theoretical constructs) such as social class are defined empirically and transformed into variables or attributes that can be measured (e.g., level of income or number of years of school completed). While primary research increases the likelihood that the study will gather all of the information required for analysis, collecting this type of data is very time-consuming and expensive. By comparison, secondary research facilitates access to more data than most investigators would be able to collect on their own and enables them to concentrate their efforts on analyzing rather than collecting data. A benefit of using secondary data is that much of the background work has already been completed (e.g., sampling and data collection). However, although conducting secondary research may take less time and be less expensive, researchers often encounter a variety of problems because the data were originally collected for a different purpose and the measures used in the study may not be ideally suited for answering the research questions now under consideration. Finally, with secondary research there may be issues related to data ownership and access.

Sampling Strategies: Probability and Non-probability Samples

If you are going to collect primary data, you will need to make a number of further decisions about who should be included in your study. For example, you will need to determine: What types of participants are best suited for answering the research questions posed in your study? What is the best way to recruit study participants? How large a sample will you need? What types of sample inclusion/exclusion criteria should be applied? There are, in fact, a number of different

types of samples that you could use in your study, including random samples and stratified samples, as well as convenience samples and quota samples. In each case, a sample is essentially a subset of the population being studied, and the type of sampling strategy selected depends on the nature of the study. The various sampling strategies are generally categorized as probability and non-probability sampling methods.

Probability sampling refers to the selection of study participants from an identified population with specific characteristics based on the principle of randomization or chance. In other words, since it is virtually impossible to study the entire population that you may be interested in (e.g., university students, older Canadian women), this sampling strategy ensures that each member of the population has an equal chance of being included in your sample. This of course means that you need to have access to an up-to-date list of all members of the population (e.g., a voter's list). Since study participants are randomly selected from the population of interest and the probability of inclusion in the sample can be calculated, it is possible to reliably estimate the sampling error and to make statistical inferences about the population. The goal of this sampling strategy is to ensure that the study is based on a representative sample of the overall population.

The most common probability sampling strategies include simple random sampling, stratified sampling, and multi-stage sampling. In simple **random sampling**, each member of a population has an equal chance of being included in the study. **Stratified sampling** is a variation of random sampling that enables the researcher to study specific subgroups in more detail. In stratified random sampling, the population is divided into mutually exclusive subgroups or strata (based on selected characteristics such as sex, age, or income), and then random samples are drawn from each stratum. This approach is used in studies that intend to compare subgroups in the population, such as the health status of women and men, or mid- and late-life adults, or those with high and low family incomes. A population can be stratified by any variables that are available for all those included in the sampling frame used for the study. **Multi-stage sampling** requires at least two stages for selecting the sample. In the first stage, a large number of individuals or groups is identified and selected, and then in the second stage study participants are selected (using probability sampling methods) for the final sample. A common multi-stage sampling strategy involves using a geographical area to select the initial regions in the first stage (e.g., a province or a city) and then selecting a systematic sample of households within each region in the second stage to identify the study participants.

Probability sampling is most closely associated with quantitative research such as population health surveys. *The National Population Health Survey* (NPHS) can be used to illustrate probability or random sampling. The target population for the NPHS was household residents in all Canadian provinces. While the survey did try to include long-term residents of health-care institutions and northern regions of the country, a number of groups were excluded from the sample. For example, those living on Indian reserves, on Canadian Forces bases, and in some remote areas in Quebec and Ontario were excluded from the study. As well, since participants were restricted to household members 12 years of age or older, young children were also excluded from the NPHS.

To try to offset these exclusions, separate surveys of Aboriginal people and children have been conducted to provide a more complete picture of the health of Canadians—the *Aboriginal Peoples Survey* (APS) and the *National Longitudinal Survey of Children and Youth* (NLSCY). The APS is a national survey of First Nations people living off reserves, Métis, and Inuit aged six years and over (although once again those living on Indian reserves were excluded from the study). The NLSCY is a long-term study of Canadian children that follows their development and well-being from birth to early adulthood. The survey excludes children living on Indian reserves, full-time

members of the Canadian Armed Forces, and those living in institutions and in some remote regions of the country. Consequently, certain groups of Canadians are continuously left out of national population health surveys!

The NPHS used a stratified two-stage sample design (as previously described). Each province was first divided into three types of areas (major urban centres, urban towns, and rural areas) to try to ensure that the sample size was proportional to the distribution of the population. The second stage involved randomly selecting households in each of these areas, as well as one resident within each household to be a longitudinal panel respondent. Unfortunately, the federal government terminated this study a number of years ago.

A Canadian population health survey that is currently underway, the *Canadian Longitudinal Study of Aging* (CLSA), consists of a national, stratified random sample of 50,000 Canadian women and men between the ages of 45 and 85 years at the time the study was initiated in 2010. Study participants who were 45 years of age at baseline were included so that the CLSA could prospectively capture the impact of their life experiences on their health and well-being in later life. By April 2013, approximately half of the participants had been recruited for the study, and by May 2015 the initial goal of a total of 50,000 participants was reached. Study participants were selected from Statistic Canada's *Canadian Community Health Survey* (CCHS) and from provincial health registration databases, as well as by random digit dialing. This longitudinal study includes two sub-samples: the first (approximately 20,000 participants) are being followed by telephone interviews only and were randomly selected within age/sex strata in the population of each province; the second (approximately 30,000 participants) are being followed by in-depth interviews and on-site data collection and were randomly selected within age/sex strata for people living in or close to 11 Canadian cities. The data collection sites range across the country from Victoria, British Columbia, to St John's, Newfoundland.

Individuals who were unable to respond in either French or English and/or were cognitively impaired at the time of recruitment were excluded from the CLSA. In addition, because the sample was partially drawn from the CCHS, once again this research excluded members of the Canadian Armed Forces as well as those living on Aboriginal reserves, in northern communities, and in long-term-care institutions. Despite the national focus of these studies, the size of the sample, and the length of the data collection period, it should be apparent that it is simply not possible to include the total population in one research project. As well, they all exclude certain groups within Canadian society (even though the studies are entitled the *Canadian Community Health Survey* and the *Canadian Longitudinal Study of Aging*). These health surveys illustrate some of the challenges involved in choosing a research design and sampling strategies that ensure the sample of people actually studied will in fact be representative of the overall Canadian population.

The probability sampling methods used in quantitative studies such as population health surveys are generally not feasible when conducting qualitative research. However, choosing a sample for a health diary study is also a very important step in the research process (since, as already noted, it is not really possible to study the whole population). Contrary to the type of probability sampling used in quantitative studies that focus on trying to ensure that the sample represents the larger population, qualitative research typically focuses on smaller groups of people and makes use of non-probability sampling to select study participants.

Non-probability sampling (or purposive sampling) attempts to identify and recruit a sample of people that is theoretically meaningful and has shared characteristics that are relevant to the research question being investigated (e.g., chronic pain sufferers). In this sampling strategy, the probability of being selected can't be accurately determined. Because the sample selection

process in this case is non-random, it is difficult to estimate sampling error and to extrapolate the study findings from the sample to the population of interest. Non-probability sampling does not allow the researcher to have any control over the representativeness of the sample.

The most common non-probability or naturalistic sampling strategies include convenience sampling, quota sampling, and snowball sampling. **Convenience sampling** is also sometimes referred to as haphazard or accidental sampling, since study participants are basically selected because they are easily accessible. In other words, a convenience sampling strategy is simply one in which the researcher selects people from a group that is available to participate in the study. Perhaps the best example is the frequency with which social science research findings are based on data collected from samples of undergraduate university students enrolled in courses such as psychology and sociology. The underlying assumption is that the population of undergraduate university students is sufficiently homogeneous (or similar) for any of these students to be selected for a study sample.

Quota sampling is another common type of non-probability sampling and involves selecting study participants with pre-selected characteristics until a specific number is reached for the subgroups being investigated. This is basically a means of satisfying sample size objectives for certain groups included in the study. For example, if you are interested in comparing the sense of coherence among female and male undergraduate students and there are 100 students in the class (70 per cent female, 30 per cent male) from which you hope to draw a sample of 10 students, then your goal would be to interview seven female students and three male students (if the quota is based on population proportions). Quota sampling is similar in some respects to stratified sampling (discussed earlier) but does not involve a random selection process. In fact, in quota sampling, if potential study participants refuse to be part of the research, they are replaced by other individuals who meet the inclusion criteria.

Finally, **snowball sampling** (or chain sampling) involves finding a number of initial study participants (through various means such as social media or posted flyers in clinical settings) and then using these individuals to identify and recruit other people they know who share the selected sample characteristics (e.g., chronic pain sufferers). In other words, once people become involved in the study, they are asked to invite others who meet the sample inclusion criteria to contact the researcher if they are interested in participating. This sampling strategy is used in studies when the population of interest is not readily accessible (such as research exploring the health of socially isolated older adults).

As discussed in Chapter 3, health diaries have been used to gather detailed information about the types of self-care practices people use to deal with everyday health concerns. These studies typically make use of non-probability sampling such as convenience samples or snowball samples (although there are a few exceptions). Participants in health diary studies frequently include university students, employees of specific organizations, members of self-help groups (e.g., cancer support groups), families using formal health-care services, and older adults living with common illness conditions (e.g., arthritis). The sample size used in health diary studies is generally less than 100 respondents and sometimes even as low as 20 to 30 respondents. In a few cases, several hundred respondents have been asked to keep a daily health record. Regardless of the sampling strategy used, however, all studies have to deal with matters such as finding ways to maximize response rates and minimize attrition in an effort to avoid potential sample bias. These factors, along with the representativeness of the sample, all have an impact on the researchers' ability to generalize the findings of their studies to the broader population.

Data Collection and Management: Cross-Sectional and Longitudinal Studies

The next critical methodological question is: how should the information be collected? Health researchers make use of a number of different data collection strategies to gather information about both personal and population health. Research designs are also categorized as either cross-sectional or longitudinal. **Cross-sectional** refers to studies that collect information at one point in time (like a snapshot), while **longitudinal** refers to studies that collect information on an ongoing basis over a period of time (like a video or a film). Cross-sectional or prevalence studies provide a great deal of information about the health status and health lifestyle practices of people at a specific point in time (e.g., the date of the interview). As illustrated by the discussion in Chapter 3, a number of cross-sectional population health surveys have been conducted in Canada since the early 1950s. These health surveys collect data on a number of different aspects of health and illness from a large representative sample of respondents. This type of study design has a number of limitations. Perhaps most important, since the element of time is not measured, the temporal sequence of the social determinants that shape population health is unclear. For example, we know that low income is associated with poor health, but we don't know which came first. It is quite possible that poor health may have led to a loss of employment and eventually to lower socioeconomic status. As a result, it is not really possible to clarify cause-and-effect relationships using cross-sectional data.

Cross-Sectional Health Surveys

The NPHS (as described in Chapter 3) started to collect population health data in 1994 and was originally intended to be conducted every second year. The study was designed to gather both cross-sectional information about the health of Canadians and longitudinal data to improve our understanding of changes in health status and health behaviour over time. After the completion of the first three cycles of the NPHS, the CCHS was introduced in 2000 to focus on the longitudinal component and to collect standardized health information from the original panel of respondents during subsequent cycles. The NPHS continued to collect cross-sectional information about various aspects of health from different samples of Canadians (until the study was cancelled by the government). We learned from this experience that it is extremely difficult for one study (even if it is being done by Statistics Canada) to conduct population health surveys that collect both cross-sectional and longitudinal data. For example, available resources had to be divided between analyzing the data that had already been collected to begin interpreting the findings, drawing a new representative sample, deciding on the survey content, and collecting new cross-sectional data every two years. At the same time, the researchers had to link the data sets to facilitate longitudinal analysis of the same respondents over time, maintain contact with panel respondents to minimize attrition, and carry out follow-up interviews.

Studies such as the NPHS produce a great deal of cross-sectional quantitative health information about a large number of people at one point in time. For example, we know that the majority of Canadians report that they are in good health the day they are surveyed (i.e., on a particular date). We also know that the percentage of Canadians reporting that they are in good health remains constant at about 60 per cent over time (between surveys). Since this is cross-sectional information that was collected from different respondents at each wave of data collection, we

don't know the extent to which individual self-rated health remains the same or changes over time. This requires a longitudinal study design and repeated measurement of the same variables for a group of respondents over time.

Longitudinal Health Surveys

Longitudinal studies follow the same people for a specified period of time to document the temporal order of events that take place throughout their lifetime, identify patterns of change through repeated measurement, and try to uncover both short- and long-term causal relationships. Longitudinal research includes both cohort and panel studies. **Cohort studies** sample a defined group of people who share a common characteristic or experienced a life event such as birth during a specific time period (e.g., the period after the end of the Second World War). This cohort is typically referred to as “baby boomers,” since they were born between 1946 and 1965. This birth cohort is currently receiving a great deal of attention, including in the field of population health research. **Panel studies** are similar in the sense that they also follow a group of people over time, but in this case they do not necessarily have a shared life event. Panel studies can be based on a number of different sampling strategies. Both longitudinal cohort and panel studies collect cross-sectional data from the same group of people at specified intervals over a defined period.

The CLSA is the most ambitious longitudinal study of health and well-being across the life course attempted to date in Canada. This prospective cohort study is also unique in a number of respects. Perhaps most noteworthy is the fact that the research design used in this ongoing national study reflects the importance of adopting a life course perspective for investigating the lifelong pursuit of health and wellness. Furthermore, it explicitly acknowledges the fact that social, psychological, and biological factors intersect with each other and have a cumulative effect over our lifetime that may only become evident in our health status in later life. The plan is to follow study participants for at least 20 years and to collect primary data on health and the aging process every three years. That time interval was chosen because it is short enough to allow the monitoring of important ongoing changes and the mapping of health trajectories while giving the researcher enough time to manage the practical demands of a growing database between the repeated waves of data collection. The longitudinal design of the study and the scope of the research have the potential to provide important new insights into the ways in which health trajectories change over time. The ultimate objective of the CLSA is to expand our understanding of the complex ways in which multiple determinants shape our health as we age.

Longitudinal studies generally rely on primary quantitative data such as the type of health information collected in population health surveys (like the CLSA). It is important to note that secondary analysis of health data collected for administrative purposes (such as provincial health services programs) can also be used in longitudinal studies. Gaining access to existing health databases that compile information over a period of time has certain advantages over trying to locate earlier respondents for interviews in subsequent waves of data collection in primary research projects. For example, longitudinal research using administrative data may result in better follow-up rates (i.e., fewer problems with non-responses over time). The challenge, however, is finding administrative data sets that contain health information that is relevant for addressing research questions and permit researchers to follow health-care practices over time (e.g., linked data sets covering physician visits and hospitalization admissions). Gaining access to these data for research purposes may also be problematic given current health information privacy legislation.

While it is difficult to find examples of longitudinal studies that make use of qualitative data, it has been argued that qualitative studies are well suited for examining health across space and over time. A qualitative approach facilitates the study of health and wellness not only across multiple sites (such as home, work, and during leisure time) but also over time (e.g., the ongoing development of health beliefs and illness explanations). This is vitally important, since as demonstrated throughout the text, the intersecting factors that contribute to the pursuit of health and wellness continue across the life course and potentially over generations. Longitudinal population health surveys may be able to capture important health information about the same people at different times in their lives (providing a series of cross-sectional snapshots), but qualitative research such as health diary studies and ethnographies (which focus on documenting the learned and shared values, beliefs, and behaviour of a group of people who interact over time) can provide a more dynamic picture of the ongoing social processes involved in the lifelong pursuit of health and wellness.

Health Diary Studies

As pointed out in Chapter 3, although health diaries have been used for many years as a prospective method of collecting information about the ways people manage the illnesses they experience in their daily lives and the steps they take to maintain their health, this approach to measurement is underutilized. Health diaries give people a chance to describe in their own words what health and illness mean to them and to provide a daily record of their health, illness, and sick role behaviours. This type of study is well suited for gaining insight into the ongoing process of self-health management and the self-care practices used to deal with everyday health issues (including preventive and reactive self-care health practices). For example, health diary studies highlight the importance of the social context within which people interpret the meaning of their daily symptoms and decide on a course of action (including self-treated conditions). In other words, the diary method has the potential to capture valuable information about the hidden or taken-for-granted aspects of our daily lives and changing health status that is not typically collected in population health survey interviews. Health diaries or health calendars have been used in a number of different ways. For example, they have been used in methodological studies to compare reporting levels in prospective and retrospective research designs. They have also been used as a memory aid to improve the recall of health events in studies that include follow-up interviews. Finally, they have been used to collect primary data about health and illness.

Health diaries vary considerably in complexity and form, but the most common type is the daily journal. Respondents usually have a face-to-face interview about their health before beginning to keep a daily record of health events. Health diary studies provide general guidelines for participants regarding the type of life events to be recorded. Since health and illness experiences are documented on a daily basis, recall error is less of a concern than in retrospective interviews. Respondents have been asked to keep daily health records for periods ranging from one week to several weeks or in some cases several months. In a couple of early studies, people were actually asked to keep a health diary for a full year (or more)! The most frequent time period is three to four weeks. Sometimes researchers contact participants during the period they are keeping a diary to monitor their progress and encourage them to keep completing their daily health records. In some studies, researchers also conduct follow-up interviews after the diary has been picked up.

Attrition Rates

Retaining study participants and minimizing attrition rates over time are challenges faced by researchers carrying out both longitudinal health surveys and health diary studies. It has been argued that the increase in longitudinal research should be accompanied by a corresponding increase in attention paid to potential problems associated with attrition (i.e., the loss of study participants over time). For example, researchers need to monitor their studies to determine whether there are significant differences between those who continue to participate in longitudinal research projects and those who are no longer in the study. While the initial sample may have been carefully selected and representative of the general population, over time those who continue to participate in subsequent waves of data collection may be quite different from the original sample of respondents. For example, if the study loses selected groups such as older adults, males, or people with higher levels of education who may be more mobile, this in turn may introduce sample bias and reduce the generalizability of findings! In other words, attrition rates may adversely affect the benefits of random sampling (described earlier) and ultimately the research results. Longitudinal studies, such as the CLSA with its proposed 20-year period of data collection, use a short questionnaire annually to maintain contact and to try to minimize the number of study participants lost over time. Despite these efforts, the researchers have to anticipate that a number of participants may die, move, or eventually drop out of the study. Consequently, the research design needs to include methods for dealing with survivor effects (i.e., data analytic techniques to ensure that long-term survivors do not introduce sample bias into the study and lead to inaccurate conclusions).

Data Management

Data management poses many challenges for both cross-sectional and longitudinal health studies. For example, the research design must ensure that the confidentiality of study participants is maintained (i.e., their identity is safeguarded) and that the privacy of their personal information is protected in both population health surveys and health diary studies. Quantitative population health surveys have to devote a great deal of time and attention to managing very large data sets (e.g., cleaning and editing the data and preparing it for statistical analysis). In addition, various data reduction techniques are used to code responses, construct scales, and calculate aggregate scores for measures such as the Health Utilities Index and the sense of coherence scale (described in Chapter 3). This often involves dealing with missing data. To illustrate, when calculating an overall score for the items in the sense of coherence scale, researchers may find that participants have not provided answers to all of the questions. If there is too much missing data, it may not be possible to calculate a scale score for those participants. Alternatively, a value may be assigned for the missing item based on the mean of the individuals' responses to all of the other items in the scale.

By comparison, although health diary studies obviously differ in scope (e.g., they typically collect data from a smaller sample of respondents), some of their methodological challenges are similar (e.g., dealing with missing data). As with other longitudinal research designs involving repeated measures, it is also important to decide on the appropriate length of time for respondents to keep a daily health diary. While there is obvious value in collecting longitudinal data, there are also reasons to limit the duration of health diary studies. For example, while the initial compliance rate may be high, because the type of detailed data collection involved in keeping a

daily health record demands more time and effort on the part of respondents (than a single interview), there is a consistent decline in reporting rates with the passage of time. Finally, researchers conducting these types of qualitative studies have to contend with the extremely demanding task of processing the detailed information contained in health diaries and transcribing lengthy illness narrative accounts to be able to analyze the data and interpret the findings.

Data Analytic Techniques: Moving from Description to Explanation

Once the data have been collected, you will need to decide on the best way to analyze the information and interpret the findings. The general purpose of both quantitative and qualitative research is to gain new descriptive information about the health of the population, to explore relationships between social determinants and health, and ultimately to identify causal links between intersecting structural and personal factors and health outcomes. Chapter 3 outlines the difference between health inputs or causes, such as living conditions and lifestyle practices (that are typically treated as independent variables in health research), and health outcomes or effects (dependent variables such as self-rated health). To establish **causality** or a cause-and-effect relationship between variables, three conditions must be satisfied.

- *First, there has to be a significant association between the variables (e.g., level of physical activity and health).* There is ample research evidence from both cross-sectional and longitudinal studies documenting the fact that lifestyle behavioural practices (such as physical activity, smoking, and drinking) are significantly associated with health status.
- *Second, it is necessary to clarify antecedence (i.e., to determine which factor occurred first), since the supposed causal factor (the independent variable) obviously has to come before the measured effect (the dependent variable).* In other words, the direction of the relationship has to be identified. For example, while level of physical activity as an adult has an effect on health in later life, certain health conditions experienced in childhood may limit participation in physical activities as an adult. Cross-sectional studies attempt to gather this type of information by asking retrospective questions about the past (but are limited due to problems with recall and validating responses). Longitudinal studies and prospective designs (that follow up respondents for a period of time) are better suited to documenting that the causal factor did indeed occur before the health outcome being measured.
- *Third, to establish causality, the study must also be able to control intervening variables (other factors that may confound the relationship between the cause and effect).* This is a problem for all social science research, including health studies, because our lives are extremely complex and many things happen at the same time in the social world. Consequently, studies sometimes attempt to control the impact of intervening variables during the statistical analysis of the data.

Quantitative research designs have traditionally been associated with a **deductive approach** to data analysis. In other words, the assumption is that the research question was derived from an established theoretical framework and that the research process moves from the conceptual level to the empirical level, including statistical analysis of the data collected to test the hypotheses guiding the study and to formulate an explanation. Research on the hypothesized relationship

between income inequality and health reflects this approach. In contrast, qualitative methods are associated with an **inductive approach** to data analysis. In this case the research process starts by having people give first-hand accounts of their lived experiences (e.g., an illness narrative account such as the one provided in Chapter 9 in which Anna described the impact that fibromyalgia had on her self-identity and everyday life). The research process then moves from the information presented by study participants, to the identification of emerging themes, to the formulation of hypotheses, and possibly to the development of grounded theory. In other words, explanations are generated inductively from the data.

Mixed-methods research is guided by a logic of inquiry that combines both deduction (i.e., testing hypotheses and confirming theories) and induction (i.e., exploring and discovering patterns and generating hypotheses) for the purpose of identifying the best possible explanation for study results. Since the mixed-methods approach incorporates multiple strategies for answering research questions and does not constrain researchers' choices, it also permits a complementary approach to data analysis.

Types of Data

In order to use specific statistical techniques, a number of underlying assumptions must be met (e.g., there is a normal distribution of responses to the measures used in the study). In addition, there is a required level of measurement. For example, studies typically make use of health status indicators that elicit different types of data, including nominal, ordinal, interval, and ratio data. **Nominal data** refers to categorical information that differentiates between subjective classifications such as describing your health as good versus bad. These dichotomous categories are mutually exclusive but are not ordered. **Ordinal data** can be sorted and allow for rank ordering of responses, such as self-rated health on a five-point scale as excellent, very good, good, fair, or poor. Numbers may be assigned to these responses (e.g., 5, 4, 3, 2, 1), and while these values reflect an order, they do not represent a meaningful degree of difference between the responses. For example, a score of 5 (excellent) is interpreted as indicating better health than a score of 3 (good), but the exact meaning of this difference is still not clear. **Interval data** allows for the degree of difference between responses to be calculated, such as scores on the sense of coherence scale (Chapter 3) or the Life Event Inventory (Chapter 9). One other level of measurement produces **ratio data**, which is similar to interval data but also has a zero value—for example, the number of cigarettes smoked daily or the number of hours of physical exercise per week. This level of measurement is not often available for the type of health determinants examined in social science research.

Quantitative Data Analysis

Cross-sectional studies provide the type of quantitative data that is used for conducting statistical analysis. In some cases, it may be relatively simple **bivariate analysis** (or correlational analysis) to examine the relationship between two variables, such smoking and health status or exercise and health status. In other cases, statistical techniques such as **multivariate analysis** may be used to simultaneously examine the relationships between multiple variables. Multivariate analysis (such as multiple regression) is used to determine the extent to which specific outcomes (e.g., self-rated health) can be accounted for by a number of different determinants such as age, gender, and socioeconomic status, as well as level of social support. While this type of data analysis can reveal the

strength and statistical significance of the association between these variables, it does not contribute a great deal to our understanding of the causal relationships between social determinants and health. An extension of regression analysis known as path analysis is sometimes used to estimate the magnitude and significance of hypothesized causal connections between variables in the conceptual model (and the results are presented in a path diagram). There are a number of widely used software programs for the statistical analysis of large quantitative data sets (e.g., IBM SPSS Statistics, originally known as the Statistical Package for the Social Sciences).

Qualitative Data Analysis

To increase the explanatory power of health research, we really need both quantitative and qualitative longitudinal data. There are a number of different approaches to qualitative data analysis, including thematic analysis, narrative analysis, discourse analysis, and the constant comparative method. Briefly, **thematic analysis** is a process by which patterns (or themes) related to the research question are identified in the data. **Narrative analysis** is an analytical technique that focuses on texts, journals, and letters, as well as stories about life experiences as a means of learning about the ways that people create meaning in their lives. By comparison, **discourse analysis** examines how meaning is shaped by language and explores the ways in which words, images, and ideas reveal critical information about sense of self and social relationships (e.g., pain vocabulary). Finally, the constant comparative method is an iterative process in which data collection and analysis occur concurrently. By examining, comparing, and categorizing the data on an ongoing basis, researchers can be flexible in collecting new data (and potentially developing grounded theories). Increasingly today, researchers are now making use of computer-assisted qualitative data analysis software (e.g., NVivo).

Longitudinal Data Analysis: Emerging Issues

As longitudinal studies become more popular, there is a growing need to improve the available techniques for statistical analysis (particularly for population health surveys such as the CLSA, which is generating a wealth of quantitative longitudinal data about health and aging). Statistical analysis of complex longitudinal panel data can be very challenging, and there are still a number of unresolved issues (e.g., related to handling missing data, dropouts, and measurement errors). While new statistical methods are required to address these problems, researchers are making use of existing techniques for the analysis of longitudinal data, such as event history analysis and repeated measures analysis. For example, the CLSA is using **event history analysis**, which focuses on socially significant life events. From an aging perspective, this might include graduating from university, getting married, or, at a later stage in life, retiring or becoming a widow. In the health context, it refers to life events such as major illness episodes, undergoing surgery, or being hospitalized. An event history is essentially a longitudinal record of the timing of the occurrence of these types of life events. In addition to gathering longitudinal information about the timing of these events, it is also important to collect and analyze data regarding time-varying covariates (such as age and income).

Since examining change over a period of time is the object of longitudinal research, this means collecting and analyzing repeated measurements. Consequently, the ultimate goals of health research should be to identify the multiple intersecting distal and proximal causal factors that have a cumulative impact on our health trajectories and to trace the pathways through which

structural and personal factors determine the pursuit of health and wellness over the life course. A mixed-methods research design combining complex longitudinal quantitative and qualitative health data and incorporating a life course perspective on health, along with a multi-level analysis of the data, offers researchers the greatest promise for eventually being able to move from description to a more complete explanation of the ways in which key social determinants shape population health.

Gaining a Greater Understanding of the Social Determinants of Population Health: The Need for Further Improvements in Health Research Methods

If future research is going to make a significant contribution to advancing our current understanding of the impact of social determinants on population health across the life course, we need:

- more theoretically informed research focused on the lifelong pursuit of health and wellness;
- continuing development and refinement of an intersectional conceptual framework to guide future research, including multi-level analysis;
- to focus greater research attention on assessing the intersecting effects of multiple health determinants over time;
- to adopt a more comprehensive mixed-methods research design that combines both quantitative and qualitative aspects of personal and population health;
- improved research methods for measuring changes in health across the life course if we are to discover the “fundamental causes” of wellness as well as of sickness;
- better statistical tools for analyzing longitudinal data on health and wellness; and
- to ensure that the accumulated body of research knowledge enables us to provide causal explanations for healthy life trajectories.

The use of a mixed-methods research design to study health and wellness is increasing in popularity, and recent Canadian health studies have demonstrated the value of adopting this type of approach. If we encourage people to tell personal stories about their health and illness and combine that with information elicited by standardized measures in health surveys, we can gain a more complete picture of the health of the population. There is reason to be optimistic that mixed-methods research will continue to improve as more researchers adopt this approach. Despite the obstacles highlighted earlier, greater effort is currently being devoted to carrying out longitudinal studies of health and aging (such as the *Canadian Longitudinal Study of Aging*). The research design used in the ongoing CLSA recognizes that aging is a dynamic process and that it is necessary to explore the impact of social, psychological, and physical determinants as they intersect over time if we hope to understand how they collectively shape our health trajectory as we transition from mid- to later-life. That noted, however, there is still room for methodological improvements and a need to refine the frameworks used to design and conduct mixed-methods research in our efforts to more fully explain the mystery of good health!

Glossary

- bivariate analysis** A form of statistical analysis that involves testing the empirical relationship between two variables.
- causality (or causation)** The cause-and-effect relationship between variables. The causal factor in the relationship (the independent variable) is understood to be responsible to some extent for the measured effect (the dependent variable).
- cohort studies** Studies focused on a defined group of people such as “baby boomers” who share a common characteristic or experienced a life event such as birth during a specific time period (e.g., the period after the end of the Second World War).
- convenience sampling** A non-probability sampling strategy in which study participants are basically selected because they are easily accessible and available to participate in the study.
- cross-sectional research** Studies that collect information at one point in time (like a snapshot or photograph).
- deductive approach** An approach in which the research process moves from the theoretical level to the empirical level, including statistical analysis of the data collected for testing the hypotheses guiding the study and deriving an explanation (i.e., a “top-down” approach).
- discourse analysis** An analytic technique that examines how meaning is shaped by language and explores the ways in which words, images, and ideas reveal critical information about sense of self and social relationships.
- event history analysis** An analytical technique that focuses on an examination of a longitudinal record of the timing of socially significant life events.
- inductive approach** An approach in which the research process moves from the information presented by study participants and specific observations, to the identification of emerging themes, to the formulation of hypotheses, and possibly to the development of grounded theory (i.e., a “bottom-up” approach).
- interval data** Data that allow for the degree of difference between responses to be calculated, such as scores on the sense of coherence scale.
- longitudinal studies** Studies that collect information on an ongoing basis over a period of time (like a video or film).
- mixed-methods research** A methodological approach that combines both quantitative and qualitative information to assess health and illness.
- multi-stage sampling** A probability sampling strategy that requires at least two stages for selecting the sample. A large number of individuals or groups is identified and selected in the first stage, and then study participants are selected in the second stage for the final sample.
- multivariate analysis** A form of statistical analysis that involves testing the empirical relationships between multiple variables simultaneously.
- narrative analysis** An analytical technique that focuses on texts, journals, and letters, as well as stories about life experiences, as a means of learning about the ways that people create meaning in their lives.
- nominal data** Categorical data that differentiates between subjective classifications such as describing your health as good versus bad.
- non-probability sampling** The non-random selection of study participants who have shared characteristics that are relevant to the research question being investigated.
- operationalization** The process of transforming theoretical constructs or concepts into variables or attributes that can be measured.
- ordinal data** Data that can be sorted and allow for rank ordering of responses, such as self-rated health on a five-point scale as excellent, very good, good, fair, or poor.
- panel studies** Studies similar to cohort studies in the sense that they also follow a group of people over time, but in this case they do not necessarily have a shared life event (such as their date of birth).
- primary research** The collection of original information for a specific purpose (whether it is for a study or for official organizational record-keeping).
- probability sampling** The selection of study participants from an identified population with specific characteristics based on the principle of randomization or chance.
- quantitative methods** A methodological approach that relies on objective indicators to assess the biophysical and behavioural aspects of health and illness.
- qualitative methods** A methodological approach that relies on subjective indicators to assess the psychosocial aspects of health and illness.
- quota sampling** A non-probability sampling strategy that involves selecting study participants

with predetermined characteristics until a specific number is reached for the subgroups being investigated.

random sampling A probability sampling strategy in which each member of a population has an equal chance of being included in the study.

ratio data Data that allow for the degree of difference between responses to be calculated and also has a zero value such as the number of cigarettes smoked daily or the number of hours of exercise per week.

research design A strategy for carrying out research and addressing methodological issues.

secondary research Accessing information that was originally collected for a different purpose and using the data to address other questions.

snowball sampling A non-probability sampling strategy that involves finding a number of initial study participants (through various means such as newspaper advertisements and posted flyers in

clinical settings) and then using these individuals to identify and recruit other people they know who share the selected sample characteristics.

stratified sampling A probability sampling strategy in which the population is divided into mutually exclusive subgroups or strata (based on selected characteristics such as sex, age, or income) and then random samples are drawn from each stratum.

thematic analysis An analytic technique that focuses on identifying patterns (or themes) in qualitative data that are related to the research question.

triangulation The use of more than one type of methodology in a single study to answer a research question.

validity The extent to which a concept, measurement, or conclusion is well founded and that the methodology used accurately measures the idea or construct it claims to measure.