Chapter 1

Introduction

The purpose of this book is to better understand how to improve the health of individuals, populations and the global community. What are the major threats to health? What are the causes of poor health? What works to improve health? How do we know that it works? What are the barriers to implementation? What are the measures of success? These are some of the key questions that will be addressed in this book. The aim is to provide health practitioners and policy-makers with a broad overview of how to improve health and reduce health inequities, as well as the tools to make more evidence-informed decisions that will have a positive influence on health.

Indeed, countless decisions that affect health are made every day, whether at the level of individual health choices made by patients and the general public, population health policies and programmes made by politicians and public health officials, or global health strategies and recommendations made by an increasing number of players at the international level, including civil servants, non-governmental organisations (NGOs), philanthropists, academics, public–private partnerships and so forth. For instance, a mother takes time off from work to bring her child to the local clinic to be vaccinated. A student buys a fruit for an afternoon snack rather than potato chips. A 28-year-old woman who carries the *BRCA* gene for hereditary breast-ovarian cancer undergoes preventive surgery to remove her breasts and ovaries. A government passes a bill to extend parental leave to one year and to increase funding for early childhood development programmes. The World Health Organization (WHO) recommends increasing universal health coverage and social protection by strengthening primary health care as the foundation for all health systems. In each of the above examples, people were faced with a choice (i.e. to vaccinate or not, to eat a fruit or chips, to have preventive surgery or enhanced screening, to finance social programmes or reduce taxes, to promote vertical programming that focuses on preventing and treating a single disease or a more comprehensive approach based on primary health care), and a decision was made that will either improve or impair health outcomes.

The health status of individuals, populations and the global community is shaped by these decisions. However, despite a growing body of scientific evidence on how to best improve health, decisions often do not incorporate this evidence. At times the reasons for disregarding the scientific evidence are strategic, economic or political. More often, it is due to a lack of awareness and understanding, as well as issues of logistics and timing. Having the right information at the right time in the right format is critical to incorporating evidence into decision-making.

In practice, this is not as straightforward as it seems, and an entire field of knowledge translation has stemmed from trying to address the widening "know–do" gap (i.e. the gap between what we know about how to improve health and what we decide to do to make it happen). There are often important knowledge gaps that make it difficult to find adequate evidence to incorporate into decision-making. And, even when evidence does exist, it is necessary but not sufficient, since other factors including contextual issues and value judgements must also be incorporated and made explicit as part of the decision-making process.

This book therefore attempts to demystify the notion of evidence for health and to create realistic expectations about the role of evidence in decision-making by explaining why evidence is useful, how it is produced, and how it can be better packaged and communicated to help people in making more evidence-informed decisions – from patient choice to global policy.

If the ultimate goal of all health decisions is to improve health outcomes and to reduce health inequities, it is important to know what these terms mean, to know where we want to go, and how to know when we get there. Chapter 2 therefore begins by providing an overview of the concepts of health and health inequities. This is followed by the current thinking on risk factors and determinants of health (i.e. what causes poor health), as well as the continuum of strategies that are used in the field of public health for improving health and reducing health inequities (from treatment and rehabilitation to disease prevention, health promotion and addressing the underlying social determinants of health).

Similarly, to influence health decisions, it is important to better understand what such decision-making entails. Chapter 3 therefore provides an introduction to the many factors that influence decision-making for health at the individual, population and global levels. At the individual level, for instance, decisions are shaped by the sources and quality of information available, personal values, prior experience with the health condition in question, and risk perceptions regarding the various possible outcomes of action or inaction. At the population level there are added layers of complexity, as these decisions must also take into account the multiple implications of proposed policies and programmes for individuals, target groups and the population overall. This includes balancing the needs of competing stakeholder groups, each with their own vested interests, and considering issues of opportunity costs and accountability when using public resources. Finally, at the global level, there are even more layers of complexity since health threats do not respect national borders, multilateral trade agreements and diplomatic considerations become important, and an ever-growing arena of public and private players with their own opinions and interests apply pressure to influence global policy, often bypassing existing fora and structures intended to ensure good global governance. All three levels of decision-making are inextricably linked since global treaties and national policies have an enormous influence on individual-level decisions, while, collectively, individual-level decisions have an important impact on population and global health.

Next, Chapter 4 discusses why evidence is important for informing health decisions and how this evidence is generated. The chapter begins with a brief history outlining the origins of the growing "evidence-based" movement in the health sector, including the initial resistance by physicians followed by the widespread acceptance of using evidence in clinical decision-making, and the extension of the "evidence-based" model to many other health-related disciplines, from nursing and dentistry to public health and health policy. Chapter 4 also describes what counts as evidence and how evidence is produced through a discussion of the different types of research studies that can be used to answer different types of research

questions at each stage in the "research cycle". For instance, at the first stage, qualitative research and descriptive studies, such as cross-sectional surveys, can be used to determine the relative importance and frequency of various health problems (e.g. what do people in the community consider to be the most important health problems? how many people in the community have HIV, depression, heart disease or cancer?). At the next stage, observational studies, including case-control and cohort studies, can be used to better understand the causes of priority health problems (i.e. the risk of developing heart disease is 50% higher for those who smoke, the distribution of smokers in the population is related to gender and socio-economic status, etc.). Randomised controlled trials or other experimental study designs can then be used to test the efficacy of interventions in acting on the various causes to prevent or reduce the burden of disease (e.g. prescribing the nicotine patch can increase smoking cessation rates by 30%). Finally, after large-scale implementation of interventions, quasi-experimental studies such as pre–post studies or natural experiments can be used to evaluate effectiveness in impacting population health (e.g. one year after anti-smoking laws and regulations were passed, the number of smokers was reduced by 40%, and within five years the number of new cases of heart disease was reduced by 10%).

Chapter 5 then discusses the facilitators and barriers to using evidence in decision-making. Facilitators to evidence-informed decisions include finding, critically appraising and synthesising the relevant research literature in a timely way to provide a more accurate appreciation of the wider body of evidence. Indeed, task forces, health technology assessment agencies and international networks are important means of reliably synthesising and disseminating the evidence. As well, it is important to package the main messages using media that are suitable and accessible to the intended audiences – whether decision aids for patients, online evidence portals for busy health practitioners, or policy briefs for politicians – thus encouraging the uptake and use of evidence in day-to-day practice. Nonetheless, the barriers to using evidence in decision-making are many, ranging from knowledge gaps and decision-making in the face of uncertainty, to vested interests undermining the existing evidence base to push forward their own agenda.

Given these barriers, and the sheer complexity involved, a systematic approach can be helpful in identifying and integrating the different types of evidence, contextual considerations and value judgements that are an inherent part of decision-making. While there is no single way of summarising or ordering the various elements involved, Chapter 6 provides an algorithm that lays out many of the key issues that should be considered to facilitate better-informed and more transparent decisions for improving the health of individuals and populations. The main steps of this algorithm include: (1) defining the priority health problems, (2) understanding the underlying causes, (3) listing the options to improve health, (4) assessing whether there is an added benefit that outweighs the harms, (5) determining whether the options are acceptable to those involved, (6) calculating the costs and opportunity costs, (7) determining whether the options are feasible in a given context, (8) exploring the ethical, legal and social issues, (9) identifying what different stakeholders stand to gain or lose, and (10) making a summative assessment of which options improve health most while minimising the harms and ensuring an equitable distribution of benefits and harms. While at the end of the day a judgement must still be made, at the very least, following the algorithm ensures that the key evidence and contextual issues have been considered, and that the various trade-offs and opportunity costs are clearly laid out, so that when it comes time to make value judgements, it is far easier to document the reasons underlying the decisions made.

Chapter 7 concludes the book by discussing the importance of a fair, transparent and participative process for decision-making at all levels. Indeed, the process is part of the product by promoting a shared understanding among all stakeholders of: (1) the evidence, (2) the implications, and (3) the intended outcomes. This shared understanding serves to promote informed choices, as well as reduce conflict and future "undoing" of decisions made, while still permitting decisions to be revisited over time as the knowledge base and/or context evolves. Chapter 7 also addresses the many challenges for making this systematic approach to promoting evidence-informed decision-making work in practice, and for documenting progress both in terms of the process and the outcomes. These include identifying and involving the key stakeholders and decision-makers from the outset, ensuring that the best available evidence has been reliably collected and synthesised, helping people to better understand probabilistic information through the use of pictures and stories rather than statistics, avoiding potential bias when framing the information, and ensuring that the evidence is accessible during the critical window of opportunity so that it can be incorporated into decision-making. A final challenge is documenting the extent to which evidence was used to inform health decisions, but even more importantly, the degree to which this has resulted in improved health outcomes. The book therefore ends with a discussion of ways to evaluate the decision-making process, and particularly the impact that these decisions have on improving health.

Throughout the book I argue that people make choices at various levels that have an impact on health. Therefore, the health status of individuals, populations and the global community is to a large extent determined by the choices that are made – for better or for worse. We therefore have the power to improve health on a large scale by influencing these choices. While there are a number of technical barriers (i.e. not knowing what works, poor quality data, etc.), these problems can generally be overcome through further research and a more nuanced understanding of the issues. However, competing interests and a lack of political will pose the real barriers. Nonetheless, these problems too can be overcome through greater transparency, advocacy and the engagement of civil society to pressure policy-makers into being less complacent about the inequities of our world. These inequities are man-made, and they can also be undone by making better-informed decisions that improve health and reduce health inequities. Geoffrey Rose once said that "the primary determinants of disease are mainly economic and social, and therefore its remedies must also be economic and social. Medicine and politics cannot and should not be kept apart".[1] We live in a world where threats to health are pervasive and far-reaching – from oppressive military regimes and colonial legacies to institutionalised violence and insufficiently regulated economies. Yet we can choose the society we want to live in by influencing the choices that shape our society. This book provides some insight into how to go about creating this much-needed change.

References

1. Rose G. *Rose's Strategy of Preventive Medicine*. Oxford: Oxford University Press, 2008.

Chapter 2

Strategies for improving health

Almost 40 years ago, the *Declaration of Alma-Ata* set forth the aspirational goal of "health for all".[1] While a great deal of progress has been made in recent decades,[2] there remain many important decisions still to be made if we want to come even closer to achieving this goal. However, if the aim of making more evidence-informed decisions is to improve health, it would be helpful to first know what health is. While this appears to be a rather straightforward question, as Socrates found over two millennia ago, many people, when pressed, have difficulty defining even the most fundamental concepts – like knowledge and justice – that are central to their everyday lives. Similarly, health and health inequities are also basic concepts that should be explored further from the outset. What is health? Why should we want to improve health? What are the most effective strategies for improving health? How can we measure whether there have been health improvements? This chapter provides an overview of the concepts of health and health inequities, of the causes of poor health, and of the various strategies to improve health and reduce health inequities.

Health and health inequities

Health is a complex concept that can be examined and defined in many different ways. A widely used definition is inscribed in the 1948 constitution of the World Health Organization (WHO), which considers health to be "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".[3] This definition moves away from a strictly biomedical model of health that focuses only on the disease or disability. Instead, the WHO definition adopts a wider bio-psycho-social model to better integrate the importance of the psychological and social dimensions of health. One might go even further and include a spiritual dimension of health. According to the Canadian Royal Commission on Aboriginal Peoples, many indigenous communities consider health to be "a state of balance and harmony involving body, mind, emotions and spirit. It links each person to family, community and the earth in a circle of dependence and interdependence, described by some in the language of the Medicine Wheel".[4] Health is therefore a holistic and multidimensional concept that must be explored from different angles and perspectives to be fully understood (Fig. 2.1).[5]

Health as the absence of disease and disability

Even the narrow and simple definition of health – i.e. "the absence of disease and disability" – is not as straightforward as it seems. Medical anthropologist Arthur Kleinman ascribes distinct meanings to the terms disease, illness and sickness.[6] Disease entails a physiological dysfunction.

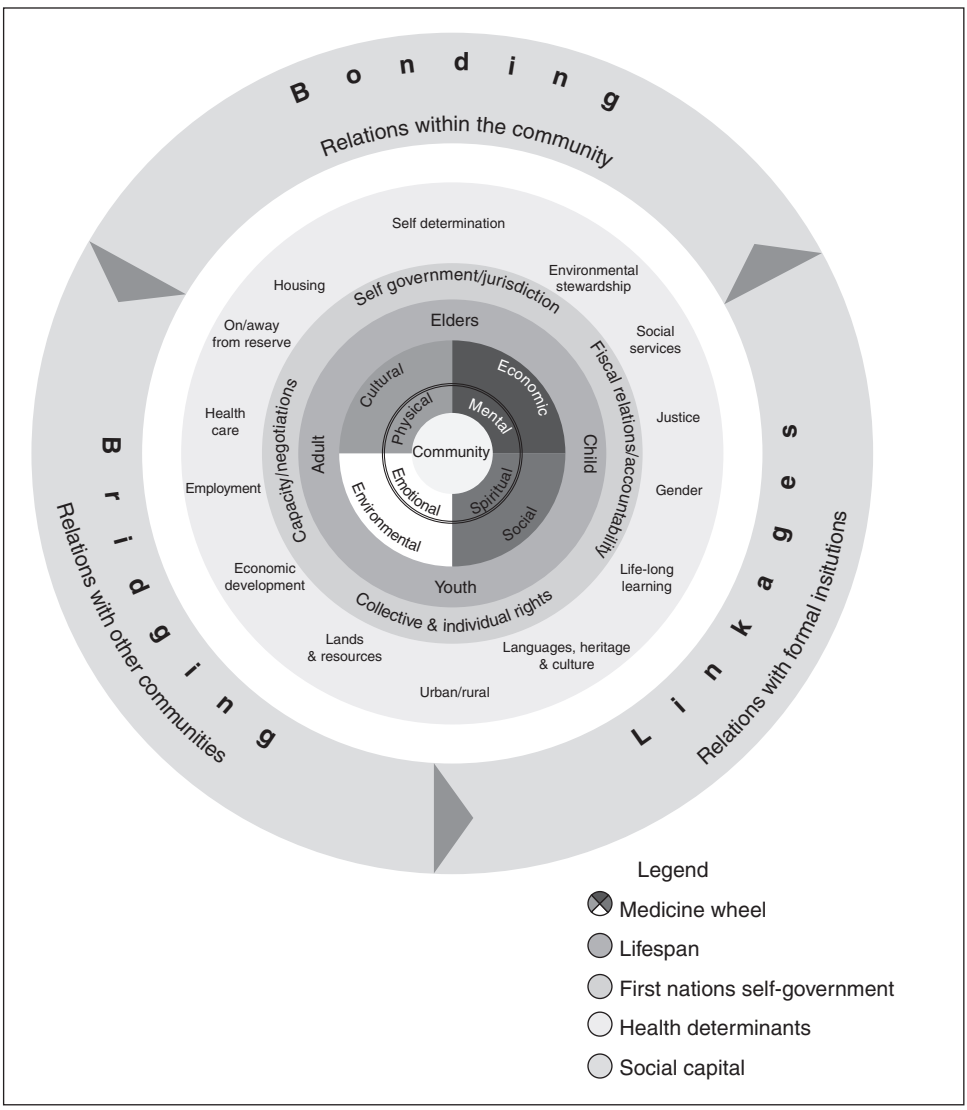

Figure 2.1 Health as a holistic and multidimensional concept.
Reproduced with permission from Reading J, Kmetic A, Gideon V. *First Nations Wholistic Policy and Planning Model: Discussion Paper for the World Health Organization Commission on the Social Determinants of Health*. Ottawa: Assembly of First Nations, 2007.

For example, when a blood clot travels to the brain and causes a blockage of a small blood vessel depriving the brain of oxygen, this results in brain damage, also known as a stroke. People who suffer a stroke often become paralysed on one side of the body or lose the ability to speak. This constitutes a physiological dysfunction. Illness, however, is the subjective perception of this dysfunction. Do these people consider themselves to be unwell? How are they affected by their dysfunction? One individual with only mild tingling in the fingers of one hand may consider themselves to be very ill, whereas another person with complete paralysis on one side of the body may adapt by learning to use a computer with their functioning hand and not feel ill at all.

Finally, sickness is whether or not the person is able to fulfil their social role. In spite of the physiological dysfunction, are they nonetheless able to fulfil their role as a parent, as an employee, as a friend? Thus while the physiological dysfunction occurs at a biological level, the experience of illness is at a psychological level, and how the dysfunction impacts one's life is at a social level (hence the bio-psycho-social model).

A similar hierarchy of terms exists for disabilities as defined by the WHO *International Classification of Impairment, Disability and Handicap*, more recently called the *International Classification of Functioning, Disability and Health*, which distinguishes between impairment at the biological or body function level, disability, which restricts the activity of the individual, and handicap, which is the disadvantage in fulfilling one's social role and fully participating in society.[7] Even if modern medicine is able to repair the impairment and reduce the disability, the degree of handicap very much depends on the extent to which we as a society are able to reintegrate persons with disabilities and adapt the physical and social environment to maximise opportunities for them to contribute in their social role. Therefore, improving health requires more than addressing the problem at the biological level by prescribing a medication or performing a surgery. It is also necessary to address the emotional, social and spiritual dimensions that are invariably associated with the health problem.

Health as the number and quality of years lived

Most people have an intuitive sense of what it means to be unwell and what it means to be healthy. At one extreme, when a person is very unwell, the worst health outcome is death (although some argue that there are certain health states which produce extreme suffering that are even worse than death).[8] It is therefore not surprising that some of the first measures developed to assess the health of populations were derived from death records.

For example, in 1662, John Graunt published one of the first analyses of vital statistics based on records of births and deaths collected by the Church.[9] Using this data he was able to compare death rates of people living in the country versus the city (i.e. London) and also to better understand the causes of death, ranging from "bit by a mad dog" to fever, consumption and old age. Among the most important causes of death at the time (in addition to frequent plagues) were diseases of infancy and childhood. Graunt calculated that about one-third of children died before their fifth birthday, which in today's terminology would be equivalent to a childhood mortality rate of 333 deaths per 1,000 live births. He also developed the first life tables, which illustrated that three-quarters of the population did not live beyond their 26th birthday and only 1% survived to their 77th birthday.

These vital statistics may be somewhat crude measures of health, but they are nonetheless very useful and continue to be important tools for measuring health status to this day. According to recent data, the average life expectancy in Organisation for Economic Co-operation and Development (OECD) countries (representing over 30 member countries that are among the wealthiest in the world) rose from 68.5 years in 1960 to 79.1 years in 2007.[10] Correspondingly, the average infant mortality rate in these countries dropped from 30 deaths per 1,000 live births in 1970 to 5 deaths per 1,000 live births in 2005. However, there are unfortunately still countries, particularly those in poor and politically unstable parts of the world, with vital statistics that are not much better than in the days of John Graunt. According to the *World Health Statistics Report 2010*, while the average life expectancy worldwide is 68 years, the number was much lower in some places (e.g. 42 years in Afghanistan and Zimbabwe, 46 years in Angola and Chad) and much higher in other places (e.g. 83 years in Japan and San

Marino).[11] Therefore, people in some low-income and politically unstable countries live on average 40 years less than people in the richest and most stable countries in the world.

Similarly, while childhood mortality rates have been on the decline over the last two decades in most countries, Afghanistan continues to have a staggeringly high rate of 257 deaths under five years of age per 1,000 live births. Angola, Chad and Somalia also have over 200 deaths per 1,000 live births (i.e. at least 20% of children in these countries die before their fifth birthday). As well, 30 other countries, mostly in Sub-Saharan Africa, have between 100 and 199 deaths per 1,000 live births (i.e. at least 10% of children under five die). This is in stark contrast to countries such as Finland, Greece, Iceland, Japan, Luxembourg, Norway, Singapore, Sweden and Slovenia, where there are only 3 deaths per 1,000 live births (0.3%), demonstrating that almost all childhood deaths are preventable and therefore needless human tragedies.

Health as a state of complete physical, mental and social well-being

While there is already significant complexity in the concept of "the absence of disease and disability", the definition of health as "a state of complete physical, mental and social well-being" is perhaps even more elusive. The term "well-being" is used in different disciplines to mean different things. It is wrapped up with notions of health, happiness, wealth and success. Well-being is also closely related to the concept of quality of life – yet another broad and elusive term. Many different theoretical frameworks and scales exist to better understand and measure health-related quality of life. Health economists, for instance, use methods such as rating scales, time trade-off and standard gamble techniques to assess the quality of life associated with a given health condition.[12] The time trade-off technique, for example, asks a person to imagine a hypothetical scenario where they could choose how many years of life they would be willing to give up to avoid living with a particular health condition for a specified period of time. The person may choose to live until the age of 60 years rather than 80 years (20 years less) to avoid spending 5 years in a persistent vegetative state where they can neither move nor speak and are kept alive using a respirator and a feeding tube. Or they may choose to live until age 77 years rather than 80 years (3 years less) to avoid living 15 years with diabetes, which involves taking multiple medications each day and attending regular medical visits to avoid premature heart attack, stroke, amputation, kidney failure or blindness. Thus the quality of life or utility of being in a persistent vegetative state would be considered much worse than living with diabetes. These utilities are then used to help develop more sophisticated composite measures of health as compared to the more straightforward life expectancy and mortality rates described earlier. For instance, Quality-Adjusted Life Years (QALYs) and Disability-Adjusted Life Years (DALYs) balance the length of life with the quality of life. Thus the goal in improving health is not only to increase the number of years lived, but also to improve the quality of these years. Therefore, in future, one would want the Health-Adjusted Life Expectancy at Birth (HALE) to be a very close approximation of Life Expectancy at Birth (LE) and, thus, most of the years lived would be lived in good health.

Health as a resource for individuals and for society

Although we have only scratched the surface in terms of understanding and measuring health, an important question that often follows is why do we care about health, and, even more importantly, why should others care about improving our health? Particularly as many of the determinants of health are found outside the health sector, as we shall explore further in the next section, it is important to make a strong argument as to why people working to

improve education, to protect the environment or to increase profits for shareholders should care about making decisions that can also maximise health outcomes.

One approach would be to use the humanitarian argument. This approach, which is often successful in soliciting charitable donations for non-governmental organisations (NGOs), calls upon people to take action to prevent or, more often, to intervene and attempt to alleviate, the pain and suffering of others. However, while somewhat effective in certain arenas, the humanitarian argument is not always a powerful tool when there are competing interests involved that can override the desire to be altruistic. Therefore, it is also necessary to use alternative approaches that make a more self-interested argument for health (i.e. what's in it for me?).

For instance, according to the *Ottawa Charter for Health Promotion*, health is "a resource for everyday life, not the objective of living".[13] People do not live with the sole goal of being healthy, but desire to be healthy so that they can pursue other goals in life – such as raising a family, fostering a career, making a difference in the world, making money and enjoying life, leaving a legacy for the future and so forth. At a societal level, health can also contribute to greater economic growth, human development, peace and security.[14] Therefore it can be shown that health has an inherent as well as an instrumental value, both for individuals and also for society.

Perhaps the most persuasive approach is the self-preservation argument. In our globalised world, where there is increased travel across borders, it is apparent that emerging infectious diseases and environmental threats are on the rise and do not respect national boundaries. Without concerted international efforts, there may be grave impacts on all countries. No matter how wealthy or powerful they may be, no country is 100% safe, as epidemics such as SARS and the ongoing threat of avian influenza have demonstrated. These self-interest and self-preservation arguments may ultimately be more convincing than humanitarian arguments, although one would hope that world leaders, and not just philanthropists, care about alleviating human suffering by improving health.

Healthy individuals and healthy populations

When thinking about health, it is also important to consider *whose* health. Often our focus is more personal. Will my child be able to get emergency care in case of an injury? Will my father be able to have surgery to avert another heart attack? However, while this individual perspective is clearly important, it can inadvertently lead to health inequities since some people have greater resources for health than others. As well, focusing on the personal perspective often drives us to consume greater and greater amounts of costly health services and to develop more and more expensive health technologies to treat health problems, rather than focusing on prevention. According to the Naylor Report that was released following the SARS pandemic, public health efforts are chronically underfunded and receive less than 3% of the overall spending on health.[15] Therefore, in addition to the individual perspective, it is also necessary to adopt a population perspective to better understand how to protect and promote health on a large scale.[16]

Populations, however, are rarely homogeneous. They are often composed of different groups with a variety of health needs that are being met, to a greater or lesser extent, by the health and social systems in place. The differences in health status between different groups are commonly referred to as health inequities. Often, these health inequities are a reflection of underlying social inequities that exist between groups. Social inequities are measured in different ways. For instance, one of the most commonly used techniques is the Gini coefficient that measures the distribution of income, ranging from 0 (total equality where every citizen has the same income) to 1 (total inequality where one citizen has 100% of the national income).

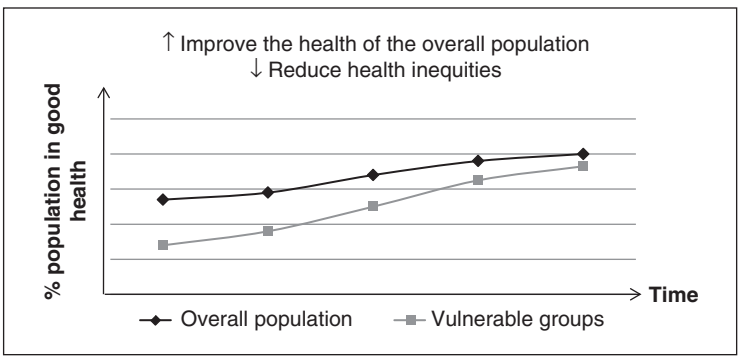

Figure 2.2 The dual goal of population health is to improve health and to reduce health inequities.

Less-equal countries such as Haiti and South Africa have Gini coefficients around 0.60, whereas more-equal countries such as Denmark, Finland, Norway, Sweden and Japan have Gini coefficients closer to 0.20.[17] In contrast, health inequities are generally demonstrated by the gradient in health outcomes from the poorest to the richest quintiles (one-fifth) of the population or by comparing the "gap" in health outcomes between two distinct groups (i.e. Aboriginal versus non-Aboriginal, women versus men, migrant workers versus non-migrant workers, etc.). The goal of population health is therefore twofold: to improve the health of the population overall and to reduce health inequities within and between groups (Fig. 2.2).

For example, in Australia, the average life expectancy of Aboriginal peoples is almost 20 years less than for non-Aboriginal Australians.[18] In Canada, the life expectancy gaps between Aboriginal and non-Aboriginal groups are approximately six to eight years.[19] Similar health gaps are also found in many other countries around the world. The population health goal would therefore be to increase the life expectancy of all citizens while reducing the life-expectancy gap between Aboriginal and non-Aboriginal groups. This example uses life expectancy as the health outcome, but any health outcome may be used here. For instance, the goal could be to reduce the incidence of obesity or cancer or suicide for all members of the population while also reducing the gap between specific vulnerable groups and the population average. Throughout this book, when I refer to improving health, I always have in mind this dual goal of improving the overall health of the population and reducing health inequities.

Risk factors and determinants of health

Being able to improve health outcomes requires first understanding the factors that lead to poor health (i.e. the causes), and then being able to intervene effectively (Fig. 2.3).

For hundreds, if not thousands, of years there have been various theories on what causes poor health, ranging from "bad air" or miasmas to demons and evil spirits. In 1884, the German physician and scientist Robert Koch demonstrated the microbial aetiology of certain diseases using a set of four criteria that are now known as Koch's postulates.[20] By extracting bacteria from diseased organisms, growing the bacteria in culture, inoculating healthy organisms, which then became ill, and then re-extracting the bacteria, Koch was able to show that the microscopic bacteria, which are not visible to the human eye, are the causal agents of certain diseases. Koch was thus the first to provide experimental evidence of the germ theory of disease that revolutionised the prevention and treatment of communicable diseases. However, such