

CHAPTER ONE

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EPIDEMIOLOGICAL APPROACHES

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Learning Objectives

At the conclusion of this chapter, the reader will be able to

- describe the differences in considering health at the level of a cell or organ versus an individual or population
- list critical factors that produce health in populations
- discuss limitations of modern methods of epidemiology in understanding health from a population perspective

Introduction

Epidemiology is the study of health and its determinants in specified populations with the often unstated goal of improving health. The root word, “epidemic,” derives its origin from a study of the causes of diseases. The word has been so used for the last 125 years, and epidemiology as a discipline is mainly concerned with illness or disease rather than health and well-being. This chapter traces the historical roots of epidemiology’s evolution, its main concepts, and discusses how the way it is practised limits its potential to improve the health of populations. This chapter considers what health means at various biological and social levels, and the sources of health in populations. It is argued that the gap between rich and poor in a society is the key factor in producing health. Discussion of various natural experiments will help the reader grasp this concept.

Early Epidemiology

The origins of epidemiology and a classic example of its approach comes from John Snow, who studied people who succumbed to cholera in London 150 years ago (Gordis 1996). By plotting the incidence of death on maps he discovered an association between deaths in various districts and the sources of drinking water. He went door to door, counting deaths and asking about those homes’ water sources. He hypothesized that the scourge was spread by contaminated water from evacuations

of infected people. Once these sources were identified, Snow removed the offending pumps' handles even though he did not understand that it was bacteria that spread the disease. Subsequently, deaths declined.

As Snow demonstrated, if we wish to produce health we can do so without understanding all the links between the causes and outcomes of disease. When Snow's study is discussed in standard textbooks, the action he undertook to control the epidemic is rarely mentioned. This lack of concern with improving health once the causes of disease are identified is all too common in the practice of epidemiology today.

Epidemiologists today mostly conduct studies and report results. Action is not usually considered part of the discipline's domain. This reality can be equated with going to the doctor to find out what is wrong with you and then having to find a non-physician to provide treatment. We need a more positive and action-oriented approach to producing health.

Another health official in London at that time, William Farr, the registrar-general in London, recognized that poverty was an important associate of poor health (Farr 2000). Others, before and since, have remarked on this, usually considering that the responsible agents are behaviours and environmental exposures associated with poverty. In this chapter, we scientifically develop the concept that there is something intrinsic about poverty and material deprivation that is unhealthy. This approach is also missing from many standard texts. If studies demonstrate this but there is no action by the field of epidemiology, we may wonder why.

Health as a Concept Differs on the Level Being Considered

The next section considers health from a cellular level, then at an individual human level, and finally at the population level to give a perspective on how health can be produced within a society. Consider a human being and ask of what an individual consists. In biology classes we looked at cells under a microscope and saw small structures with nuclei and chromosomes in which DNA resided. There were also cell walls that contained proteins and energy sources. Cells come in many varieties: heart muscle cells, brain cells, stomach lining cells, blood cells, and so on. As a medical student, I spent considerable time learning the different features of those cells, and how to identify them.

In one sense, you and I are nothing more than a community of different kinds of cells stuck together in various organ systems. These organs include our nervous system, which makes our limbs move when and how we want them to; our digestive system, which extracts and stores nutrients from food; our cardiovascular system, which moves oxygen and energy to various parts of our body, and scavenges waste; our musculoskeletal system, which allows us to maintain our shape and move, and so on. We consist of cells arranged in these various communities, along with water and some other biochemical material.

Suppose we isolate one of these cells, such as a heart muscle cell, and ask what that cell needs to be healthy? Cell biologists would say a cell needs nutrients and

oxygen. Glucose is the key nutrient or energy substance in our blood that powers cells. Oxygen is necessary as well as a few trace elements. The same is true for other cells. If your heart cells do not get enough oxygen or glucose because of a faulty nutrient-delivery system, these cells die and you will have a heart attack. The same is true for any cell in the body. If it is not nourished properly, the cell will not work as it should. Such cells will not be healthy and premature death may occur.

The argument could be made that since human beings are but an assembly of cells that need oxygen and glucose plus some trace elements, then humans need just what their cells need to be healthy. If cells benefit from oxygen and glucose, the more we get, the better. We should consume as much food as possible to get as much glucose as we can, and breathe as much oxygen as we can. Then since each one of our cells will be healthy, so should we.

But stuffing ourselves full of food is folly, as our increasing obesity rates demonstrate. Healthy adults breathing high concentrations of oxygen over long periods get lung disease. And babies given pure oxygen go blind. The logic of doing what is best for our component parts—our cells—and generalizing this prescription to the community of cells that comprise a human being may not be the best advice for us as humans to be healthy.

At the individual level—the community of cells that comprise us—our individual health is improved by following all the do's and don'ts such as eating right, exercising, not smoking, wearing a seat belt, using a condom, and getting a good night's sleep. That is good health advice for an individual human. None of those recommendations make any sense to one of your cells. You cannot ask cells to exercise or to not smoke or to wear a seat belt or to get a good night's sleep and so on. That isn't what cells can choose to do. There are no cellular-relevant versions of individual health advice.

If you follow health advice for individuals, your cells should be healthy as a by-product. If you exercise, eat right, and don't smoke, then your heart muscle cell should be healthier than if you didn't follow those behaviours. If you do what is best for an individual human to produce health, your cells will be healthier than if you don't. Individual health advice is for individual humans, and cellular health advice is for cells and we should keep them separate because humans are a community of cells and the organization of the cells must be considered.

What about others levels of organization—communities, states/provinces, or nations? These locations contain populations of humans. Are we making a logical fallacy by assuming that what is the best advice for the constituents of that population, namely you and I, would be the best health advice for the population? Our health advisers tell us that we should exercise, eat right, not smoke, wear seat belts, use condoms, and our population will be healthy. Are they making the same oversight that I prophesied in going from the health advice for a cell to that of an individual human? Looking at Japan as an example of a population suggests there may be considerable cause for rethinking our health advice to populations of all

rich countries. They smoke the most, yet by almost any definition of health, they lead the world (Marmot 2004). We have all learned how bad smoking is for our health. Smoking is not good for your health, but compared to other factors that affect populations, its effect may be secondary.

There are factors that exist at a population level that produce health that have no individual counterparts, just as the individual health advice had no cellular counterparts. If the population factors are gotten right, then what individuals in that population do or don't do for their own health may not matter as much. They are healthy as a by-product of the way the jurisdiction is organized, just as our cells are healthy if we do what's right for us as individuals. If this is the case, then we can produce the population factors in a particular society and obtain health, or we may decide to organize society in such a way that the population will not be healthy. Citizens in Canada and elsewhere may be unaware of how population level factors impact their health. The task then is to make them aware.

Associations of cells as organs and the factors that produce disease in these organs are the primary concern of most epidemiologists. They study the incidence and prevalence of diseases such as heart disease, lung cancer, and Alzheimer's and attempt to identify the precipitating exposures that lead to these afflictions. This focus leads the discipline to consider risk factors in an individual that produce unhealthy organs. A *risk factor* is a behaviour or other characteristic that is associated with the condition studied. Such a focus may not be more effective than looking at the health of a cell. Certainly when we come to action, removing the pump handle as John Snow did affected a population. These environmental actions may be preferable to trying to get individuals in London to modify their risk factors that affect intestinal (organ) health (cholera), such as boiling their water, or walking to another pump. It is increasingly apparent that we need to look for the pump handle in modern society.

The Cause of the Cause

There is an Indian story—Clifford Geertz, the famous anthropologist, recounts hearing it as a story from India—about an Englishman who, having been told that the world rested on a platform on the back of an elephant, which rested in turn on the back of a turtle, asked what the turtle rested on. Another turtle. And that turtle? “Ah Sahib, after that it is turtles all the way down.”

In any discussion of disease and the causes of disease, we can look at the cause of the cause—that is, we need to go back to the source of the problem. This can be difficult since discussion of disease and its causes is often limited by various societal norms and understandings as to the appropriate way to identify and deal with a problem. There are three questions to ponder. What are the facts? What is the interpretation of the facts? And what are the presuppositions that frame a discussion? What questions are you not supposed to ask? In looking at the health of populations, what are the basic foundations of health? What is the turtle at the bottom of the pile of turtles?

Population Health Epidemiology

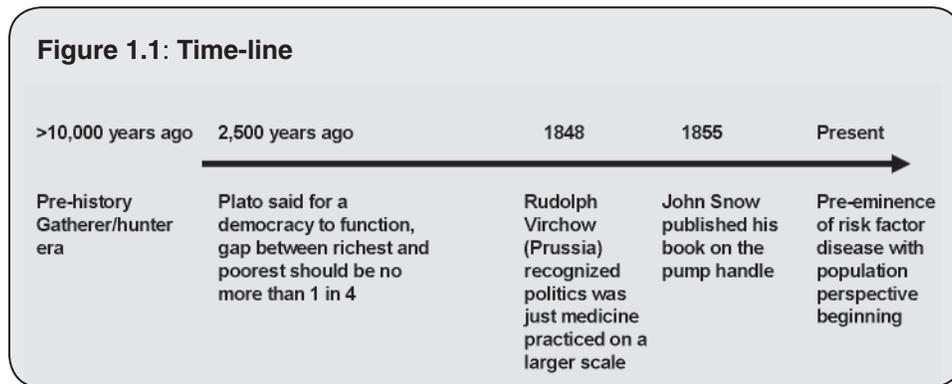
John Snow went door to door in what is called “shoe leather epidemiology” to collect information on water sources and deaths. Such observational data form the backbone of epidemiologic investigations. For a disease-focused approach, one needs to know whether or not someone has the disease, and then obtain a variety of supplemental information to discern what is going on. Suppose one studied lung cancer in a population where everyone smoked. It would be very difficult to discover smoking as a cause of lung cancer if you studied the disease in a population where everyone smoked since you could not compare the incidence of disease between smokers and non-smokers. Smoking as a risk factor for lung cancer would not be apparent. The kinds of questions asked to study health in a population depend on the characteristics of that population and the questions themselves. If you ask the wrong question, or study the wrong population, you get led astray as suggested by our smoking example.

One could ask why “turtles all the way down” are not the focus in epidemiology today. Epidemiologists have graduate training (usually in public health schools) and work in public health departments at various levels. Their employers tend to have a narrow focus, and their projects are short-term and focused on behavioural interventions. These foci may not be the most effective in producing health. Much research is done by private businesses or federal agencies with close ties to private business. The theme is often to create a product, a drug, or an instrument for a procedure, or a communications campaign. The focus is likely to be on individuals or their organs. The outcome is usually something an individual should do. Ask a doctor about a drug. Eat this food. Use this exercise appliance. There are severe limitations with this illness or disease focus (Schwartz et al. 1999).

Another explanation for the kind of work done by epidemiologists relates to the development of powerful computers. This allows analysis of complicated studies of individual diseases. The focus on the individual and the ability to process vast amounts of data keep many researchers stuck in the individual risk factory. At the same time studies demonstrate how difficult it is to change individual behaviours, especially by telling people what they should do. We should not neglect basic treatments of populations comparable to removing the pump handle.

A common approach in modern epidemiology limits the validity of discoveries. A similar problem to studying lung cancer in a society where everyone smokes exists in most contemporary studies of diseases. Unless you look at people who are similar in important respects, you won't find what you are looking for. They must have similar incomes, or education, or wealth, or status in society. In the jargon of epidemiology, you have to control for socio-economic status in a study, or you won't find an effect. Controlling means that you factor out the importance of that variable in the analysis. Then you cannot ask questions about the variable. Hence socio-economic status must be very important in producing health. If it wasn't, then one wouldn't need to control for socio-economic status in studying other factors. How you frame the question profoundly impacts what answer you get.

Defining what a disease is can be very political (Illich 1976). Homosexuality used to be labelled a disease in medical textbooks in the U.S., and it still is in some countries. On the other hand, in Canada formal unions among gays are sanctioned, and it is no longer considered a disease here. Fibromyalgia and chronic fatigue syndrome are conditions that haven't yet appeared on the universally recognized disease stage. A disease focus may provide much useful information, but this schema may not produce health in populations.



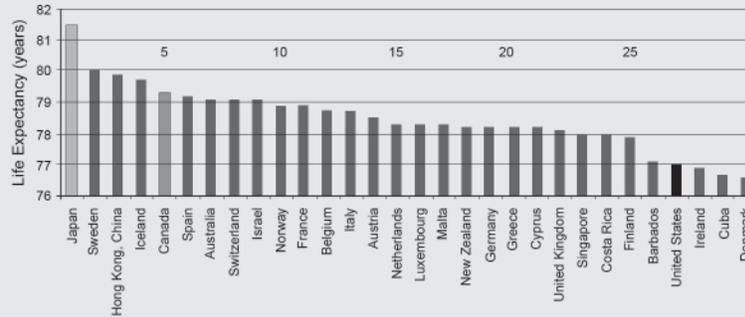
Learning from Health Data on Populations

To understand what produces health in a population we need a definition of health. The World Health Organization states that "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO 1986: 1). A more measurable definition might be asking individuals how healthy they consider themselves. For a population, consider the average length of life (life expectancy), or the infant mortality rate. Out of 1,000 infants born, how many die in their first year of life? These can give us numbers, allowing us to ask what may maximize health.

To determine the life expectancy of a population, one needs to know the death rates for the people and their ages in a given year. One then constructs a table in which a hypothetical population would die at those rates and determine the average length of life. The number of person years lived by the population gives you this number. Life expectancies are computed for all countries recording vital events, births, and deaths. The United Nations' annual *Human Development Report* is a convenient data source (UNDP 2004). The top 30 countries are shown in Figure 1.2. For the data reported in 2004, estimating life expectancy for 2002, the range is from 81.5 years for Japan to 32.7 for Zambia, the least healthy in our list of 177 countries.

The U.S. is undoubtedly the world's richest and most powerful country with half of all billionaires and vast military might, yet it is far from being the healthiest.

Figure 1.2: Health Olympics 2002
UN Human Development Report 2004

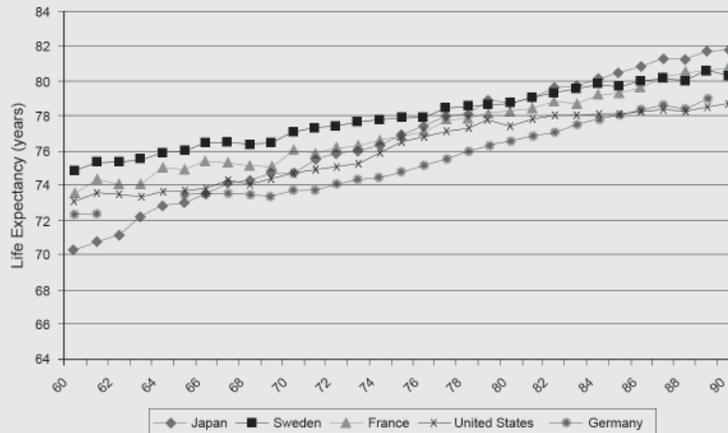


Source: This material was adapted from data in UNDP, *Human Development Report* (New York: Oxford University Press, 2004): Table 1. Note: There is a gap of almost 50 years between the healthiest and least healthy country. This is profound and could be considered a global emergency. We rarely concern ourselves with this gap. We appear comfortable with such vast health disparities.

Canada is right up there, but Japan's lead is considerable. But if the U.S. is only 4.5 years behind Japan, that could appear insignificant. Another perspective is that if the U.S. eliminated heart disease as a cause of death, its number one killer, it still wouldn't be the healthiest country. The health gap is huge! No U.S. doctor could envisage curing heart disease. Fifty-five years ago, best estimates would put the U.S. in the top five, and Japan would be considerably below the 27th ranking enjoyed by the U.S. in 2002, so there has been a profound deterioration in health in the U.S. compared to other countries. Figure 1.3 presents female life expectancy trends for five countries from 1960 to 1990, demonstrating how Japan's health improved faster in comparison to other rich countries, and how the U.S. became last in that cohort.

Imagine how excited John Snow must have been to draw his revealing maps. Our graphs of the "Health Olympics" provide similar insight. The U.S. and Japan have more than changed places. Why? Epidemiologists can collect other data such as measures of health care, air pollution, smoking rates, economic growth, dietary habits, education, etc., to see if there is some association between those data and our measure of health. This is termed looking for confounders or other explanations.

Consider health care. An easy measure is the per-capita expenditure. The U.S. spends half of the world's health care budget, almost U.S. \$6,300 per person, in total as much as every other country combined. The U.S. is not buying health with its

Figure 1.3: Female Life Expectancy Trends, 1960–90

Source: This material was adapted from data in G.J. Schieber, et al., "U.S. Health Expenditure Performance: An International Comparison and Data Update," *Health Care Financing Review* 13(4) (1992): 1–87.

health care money. We naturally assume that health and health care are synonymous, but they are not.

Similar analyses demonstrate that none of the usual factors explain why the U.S. is so unhealthy. We discovered that men in Japan smoke the most of all the countries in Figure 1.2! You could conclude that smoking is what makes Japan so healthy. Another interpretation is that although smoking is not good for your health, other factors are worse and they supercede the bad effects of smoking.

Richard Wilkinson is an economic historian and epidemiologist who has been studying the health of countries for decades, trying to determine the factors related to their health. He demonstrated that the usual factors did not offer satisfactory explanations. By 1986 he had found that the gap between the rich and poor in a country appeared to be correlated with the population's health. This was not something commonly considered, but by 1992, his findings were published in the *British Medical Journal*. Figure 1.4 has life expectancy data for 1981 for 11 countries. You can see how well a country's health lines up with how much income the bottom 70 percent of households earn. This paper helped spawn the study of population health today.

Association does not apply causation. How do we interpret the studies that epidemiologists produce? Guidelines have existed for at least 50 years, and were

Figure 1.4: Income Distribution and Life Expectancy

Source: R.G. Wilkinson, "Income Distribution and Life Expectancy," *British Medical Journal*, 304(6820) (1992): 165–168.

summarized in the U.S. surgeon general's report of 1964 linking smoking and bad health. To consider a finding to be causative, there would have to be many studies on different populations, by different investigators, on different time periods that demonstrated the association. There must be a *dose-response relationship*—that is, more of one should produce more of the other. The chicken-and-egg dilemma needs to be determined. Which direction did the cause go? And finally, there had to be some pathologic mechanism through which the effect could occur.

The ensuing decade and a half has found researchers investigating the health hierarchy hypothesis. At this point, the conclusions are tentative, but extremely suggestive. Most of the research demonstrates many important findings that could lead us to the equivalent of removing the handle on the pump if our goal is to produce health without knowing everything about disease and its causes.

To summarize the findings, relative poverty is bad for your health. That is, for almost any condition, being lower in the socio-economic ladder is bad for you. In other words, poorer people have different body chemistry and physiology than those of greater means. Poverty has an effect that is not just related to personal behaviours engaged in by poorer or richer people. The Institute of Medicine in the U.S., a branch of the National Academy of Sciences that operates under a congressional charter to advise the federal government, issued a report stating: "more egalitarian societies

(i.e., those with a less steep differential between the richest and the poorest) have better average health, because a dollar at the bottom ‘buys’ more health than a dollar at the top.” (Institute of Medicine 2003: 59). This is a well-established rule of thumb common in many Health Canada documents as well (Health Canada 1998).

The gap between the rich and poor in society represents how much the society cares for and shares with its members. The U.S. has the highest child poverty rate among rich countries, despite having half of the world’s billionaires. Canada has a better profile than the U.S., but fares much worse than do many European nations (see chapters 5 and 8 in this volume). A CEO in the U.S. makes 531 times what an average worker does, while the figure is 20 for Canada and 10 for Japan. Back in 1980, when the U.S. was considerably healthier compared to other countries, the pay gap was about 40 to one (Anderson et al. 2000). There is a dose-response relationship. Many studies support the concept that for the most part, you get sick if you are poor, rather than the other way around.

Biological plausibility is present. Mechanisms that produce chronic stress in society have received considerable research attention (Sapolsky 2004). These mechanisms are programmed early in life, and are present by birth. The production of cortisol from the adrenal gland, which is regulated by the hippocampus in the brain, is an important pathway leading to worse health when higher cortisol levels are sustained. We have many individual studies as well as population data that demonstrate this (Kristenson et al. 1998).

In developed nations such as Canada, medical care is not as important in producing health in a population as are these other factors (Jamrozik and Hobbs 2002). For the non-specialist and specialist alike, this is the most difficult concept to grasp. The conclusion of the chapter on medical care and health from the *Oxford Textbook of Public Health* is “The impact of personal medical services on the health and survival of individuals seems readily apparent. With modern investigations and treatments, patients are now regularly saved and make very good recoveries from infections, injuries, and a variety of other conditions that were almost uniformly fatal even a few years ago. Surprisingly it is more difficult to demonstrate conclusively the impact of these medical advances on the health of whole communities” (Jamrozik and Hobbs 2002: 238). A major reason for this difficulty is in part because whenever medical care has been studied, it has been found to be a leading cause of death (Davis 2004). Whereas health care definitely helps some, it harms others, and for populations, whenever it has been studied, there appears to be little or no net benefit. Recognizing this is very difficult for most people. I write this as a practising emergency physician. (See “An Overview of Medical Harm” at the end of this chapter.)

Whenever it has been studied (hospital chart reviews or doctors’ strikes), medical care is a leading cause of death, so even Bunker’s health gains are suspect (see Box 1.1).

Box 1.1: Evaluating the Impact of Health Care on Health

Bunker's (2001) study looked at curative and preventive care in the U.S. during the last century and the effects on life expectancy gain:

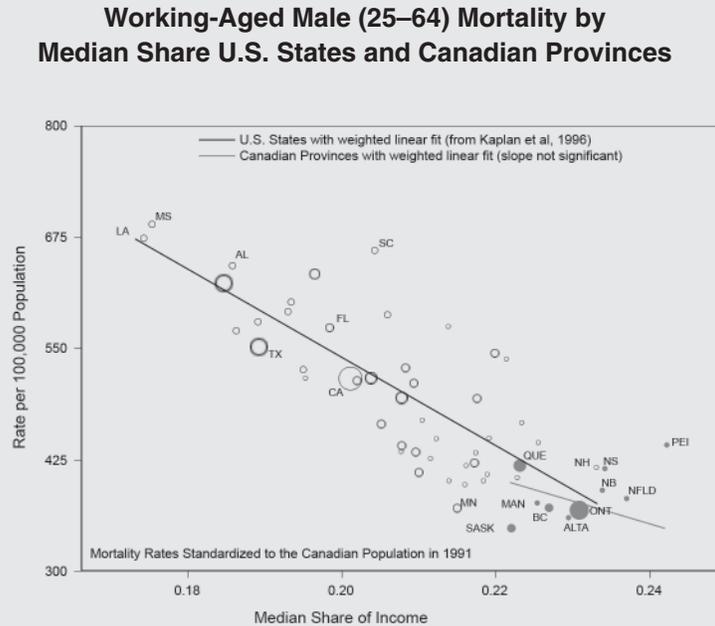
- approximately five years, with 1.5 from preventive care and 3.5 from curative care
- used gain based on results of idealized care from clinical trials of treatments
- did not consider the difference between efficacy (idealized situation of best practice) and effectiveness (as care is delivered in community)

Inequality in Society Is Bad for Your Health

The most commonly used measure of inequality is that of income differences. This is so since these data appear regularly in the census and other sources. Income is a flawed measure—especially among countries—because there are a variety of behind-the-scenes redistribution mechanisms in different countries. Through taxes, transfers, and other payments, Sweden reduces its poverty rate based on income over 80 percent in comparison to about 40 percent for Canada and less than 20 percent for the U.S. Some countries provide health care, education, and other benefits that people in countries like the U.S. and Canada have to purchase directly. There may be a threshold of disparity for income inequality to have an effect. Canada has less income inequality than the U.S. because of various social and economic policies. The relationship between income distribution and health among Canadian provinces is less pronounced than the situation among U.S. states (see Figure 1.5.) On the other hand, in Chile, which has a large gap between the rich and poor, there is a relationship between health and income inequality.

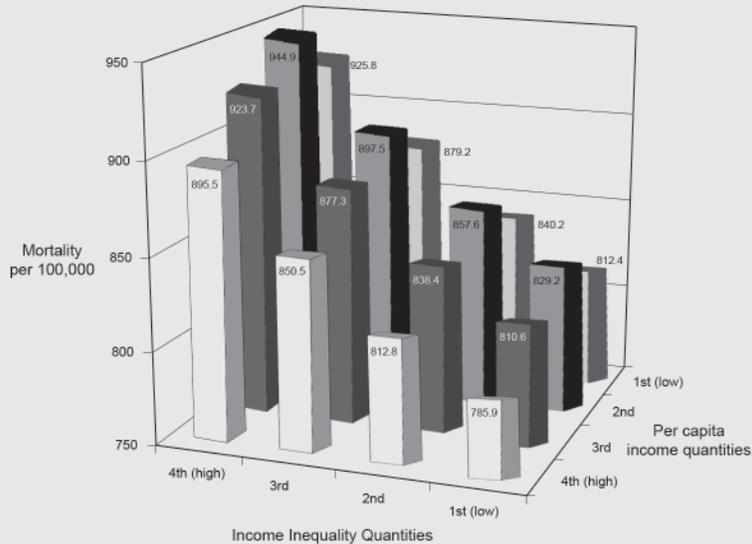
The geographic level at which income distribution is measured affects the health outcome. In a small neighbourhood, most people are similar economically. It would be unlikely that a small income gap in a small area would be related to health. In the U.S. we see the relationship at the city and state level throughout the country, but not at the county level, within a state, for example (Brodish et al. 2000). For the U.S., looking at cities and their health related to income gaps yields striking findings. Figure 1.6 divides the cities into income brackets by quarters or quartiles. Each grouping of cities is then divided into quartiles by income inequality from the highest inequality to the most equal. For poor or rich quartiles, the cities with a small gap between rich and poor have almost the same mortality. The same is true for poor or rich cities with a big gap between rich and poor. The finding hints at the idea that the rich may be at least as affected by the gap between the rich and the poor as the poor are. Epidemiologists speak of the ecological fallacy for population

Figure 1.5: Working-Aged Male Mortality by Proportion of Income Belonging to the Less Well-Off Half of Households, U.S. States (1990) and Canadian Provinces (1991)



Source: N.A. Ross, et al., "Relation between Income Inequality and Mortality in Canada and in the United States: Cross-sectional Assessment Using Census Data and Vital Statistics," *British Medical Journal* 320(7239) (2000): 898–902.

findings that may mislead what happens with individuals. For example, the finding that populations with more poverty have worse health than populations with less poverty implies that poorer people will have poorer health, but this must be demonstrated; it could be the opposite, namely that rich individuals have worse health and where there are more poor, there are also more rich. We have one study on individuals that goes beyond the fallacy limitation that suggests that the rich may be more affected by inequality than the poor. This is the first such study, so we should be cautious in saying it is generally true. If it were verified by other research, it would be a powerful selling point for changing the structure of society so everyone is better off.

Figure 1.6: Mortality, Income Distribution, U.S. Cities

Source: J.W. Lynch, et al., "Income Inequality and Mortality in Metropolitan Areas of the United States," *American Journal of Public Health* 88 (1998): 1074–1080.

Basic Needs

The nature of caring and sharing in a society determines its health. Can we generalize from what we discovered in rich countries? Are egalitarian societies always healthier than those with a big gap between the rich and poor? Let's look at Nepal where I have spent 10 of the last 35 years, much of it in providing and teaching about health care. The health-hierarchy relationship is difficult to study in such a primarily rural agrarian society that does not record births and deaths. Life expectancies are crude estimates. Determining how many infants die in the first year of life is a little easier. How to measure hierarchy is also problematic for such a population, since few people fill out survey forms, and shoe-leather epidemiology will wear out many pairs of shoes in this mostly roadless nation. Nevertheless, in Nepal the highest infant mortality rate is found in districts with the most egalitarian structure. These districts have significant food deficits and everyone is uniformly poor and starving. Having enough food and clean water and shelter takes precedence over economic justice. One finds that for countries with a low gross domestic product (GDP) (a few hundred dollars up to a couple of thousand dollars per person per year), life expectancy estimates increase with

increasing GDP, which can indicate that everyone is getting the basic necessities of life. For such countries, providing food, water, and shelter for everyone take priority. Once countries exceed this threshold, the level of hierarchy or economic justice matters more in producing health.

Box 1.2: Some Methods Used in Epidemiology

- observational ecological studies (e.g., Figure 1.2)
- cohort studies (Figure 1.3)
- cross-sectional study (Figures 1.4, 1.5, 1.6)
- multi-level modelling

Natural Experiments in Population Health Epidemiology

Just as John Snow could observe the decline in deaths from cholera after he removed the pump handle, which boosted his belief in the hypothesis that there was something in the water that caused the disease, so we can be reassured by experiments that change the factors producing population health.

Agriculture

Before the advent of agriculture our health was remarkably good (Cohen 1991). With the domestication of plants and animals, human health declined. In hunter-gatherer societies vigilant sharing was the critical social value. They had few if any possessions and the key resource that was shared with everyone, whether they were related or not, was meat from an occasional big game kill. Given food, shelter, and safety sufficient to sustain health, if everyone is poor, then no one is poorer than anyone else. But with the development of agriculture a food surplus could be produced, and some individuals would proclaim themselves lord or master and coerce others to produce food for the lord, as well as build a castle and protect him. Caring and sharing declined. Poverty appeared. Diets changed and food variety declined (Larsen 1995). Famines began. Living in close proximity to domestic animals resulted in many infectious organisms changing hosts to produce human disease. The nature of human relationships changed as exploitation began. Throughout recorded history until the last century, the health of human populations has been less than that of primitive societies. The recent improvements in health depend on forms of societal redistribution that favoured poorer people along with technological changes that had an impact.

Japan at the End of the Second World War

Japan became the healthiest country in the world because of economic policies resulting from the U.S. occupation of that defeated country after the end of the Second World War (Bezruchka 2003). The “medicine” administered by perhaps

the world's greatest population health doctor, General Douglas MacArthur, had three ingredients. The first was demilitarization. Japan was forbidden to have an army and had to resolve disputes peacefully as written into the constitution that MacArthur wrote. The second ingredient was democratization. Everyone got the vote, and labour unions obtained the right to organize and bargain collectively. A public health clause in the constitution required the government to do all it could to improve health. MacArthur legislated a maximum wage of 65,000 yen per year. The final ingredient was decentralization. The concentration of wealth and power that existed in pre-war Japan was broken up. The 11 large family corporations or *zaibatsu* that controlled most aspects of economic life were dismantled. The most successful land-reform program in history was carried out. Before the war, the land in this rice-farming economy was owned by 37,000 landlords and farmed by millions of tenants. MacArthur purchased the land at a fixed price per hectare and sold it to the tenants at that price, while giving them a 30-year interest-free loan to pay for it. With the dismantling of Japan's hierarchy, the resulting improvement in health was "unequaled in any country in the world in medical history in a comparable period of time" (Willoughby and Chamberlain 1954: 345).

The Former Soviet Union

Japan demonstrates what can happen when hierarchies are dismantled. Countries of the former Soviet Union demonstrate what can happen when huge hierarchies are created overnight (Wilkinson 2005). Russia was a very hierarchical society during the Tsarist period, and lagged about 25 life expectancy years behind the U.S. in 1900. The command economy in Russia dismantled the wealth gap so that by 1960, the two countries had comparable health indicators. Health gains in Russia faltered in the 1970s and 1980s as its people felt deprived of the apparent wealth in the West depicted by outside media. With the dismantling of the former Soviet Union, fabulous wealth was created so that Russia now has the third largest number of billionaires in the world while 10 years ago it had none.

As the gap between rich and poor grew astronomically, health in Russia declined, something that has been unprecedented in the modern world (Marmot 2004). The only other example where health has declined substantially in the last century also occurred in the last decade, in high AIDS-prevalent countries of sub-Saharan Africa. Life expectancy in Russia has dropped about seven years for men and somewhat less for women. The decline has still not abated. The carnage has resulted in between 10 million and 20 million deaths that would not have occurred if health had remained at pre-dissolution levels. The gap between rich and poor in Russia today is greater than Tsarist levels. People in Russia are about as unaware of their health declines as people in the U.S. are unaware of their poor health standing. The health decline in Russia has been absolute, meaning there are more deaths than before. The U.S. has seen a relative health decline, meaning health has not improved as much as in other rich countries.

Box 1.3: What Produces Health in a Population

- Basic needs (food, water, shelter, and security) are met.
- Once those are satisfied, then the nature of caring and sharing in that society, typically measured by distribution of wealth, resources, income, education, political power, status of women, and health care is what is most important.
- More egalitarian societies have better average health.

Conclusions

A positive and action-oriented approach to producing health would be to popularize what is known regarding the poor health status of countries such as the U.S., which have large gaps between the rich and poor relative to other rich countries. These gaps result from lack of an egalitarian policy frame as the cause. If Canadians have no interest in producing health, they can continue to pursue policies that will increase the gap between our rich and poor that move Canada toward the U.S. model. This will further the already growing hierarchy in Canada. Or if they want to live as a healthier population, they can take policy steps that are diametrically opposite to the current ones. In a democracy there is this choice. It should be an informed one.

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Critical Thinking Questions

1. Why is there little interest among epidemiologists and the general population in the broader factors that produce health in a society?
2. What can be done on an individual basis to improve health in a population?
3. Why are the terms “health” and “health care” often considered synonymously?
4. What could be done to improve some of the broader factors that influence health?
5. What public policies in Canada appear to be supporting health and what are those that are threatening health?

Further Readings

Hofrichter, R., ed. (2003). *Health and Social Justice: Politics, Ideology, and Inequity in the Distribution of Disease*. San Francisco: Jossey-Bass.

This collection of articles by many authors looks at the political issues behind the health of societies.

Kawachi, I., and B.P. Kennedy. (2002). *The Health of Nations: Why Inequality Is Harmful to Your Health*. New York: New Press.

A single-author approach to the consumption cancer in the U.S. that is close to the root of most problems.

Kawachi, I., B.P. Kennedy, and R.G. Wilkinson, eds. (1999). *The Society and Population Health Reader*, vol. I: Income Inequality and Health. New York: New Press.

This collection of articles examines the relationship between hierarchy and health. It provides fundamental fodder for understanding the science in order to communicate with others.

Marmot, M. (2004). *The Status Syndrome: How Our Position on the Social Gradient Affects Longevity and Health*. New York: Times Books.

A perspective from the pioneering social epidemiologist in England communicating the results of many studies.

Wilkinson, R. (1996). *Unhealthy Societies: The Afflictions of Inequality*. London: Routledge.

A compilation by the leading thinker presenting the psychosocial nature of health.

_____. (2001). *Mind the Gap: Hierarchies, Health and Human Evolution*. New Haven: Yale University Press.

A small readable extension of the basic premise that the gap is bad for society.

_____. (2005). *The Impact of Inequality: How to Make Sick Societies Healthier*. New York: New Press.

A readable summary of how a just society is healthier.

Medical Care and Health

Bunker, J.P. (2001). "The Role of Medical Care in Contributing to Health Improvements within Societies." *International Journal of Epidemiology* 30(6): 1260–1268.

Davis, P. (2004). "Health Care as a Risk Factor." *Canadian Medical Association Journal* 170(11): 1688–1689.

An Overview of Medical Harm

Frankel, S. (2001). "Commentary: Medical Care and the Wider Influences upon Population Health: A False Dichotomy." *International Journal of Epidemiology* 30(6): 1267–1268.

Considers factors not addressed by Bunker in health care producing health.

Hart, J.T. (2001). "Commentary: Can Health Outputs of Routine Practice Approach Those of Clinical Trials?" *International Journal of Epidemiology* 30(6): 1263–1267.

Reflects on whether idealized trials are found in the community.

Mendelsohn, R.S. (1990). *Confessions of a Medical Heretic*. New York: McGraw-Hill.

A polemical look at what doctors do and don't do.

The following three papers consider that when doctors don't work, we are at least not worse off, and possibly better.

Roemer, M.I. (1979). "LA Study of Physician Malpractice Slowdown: Comment." *American Journal of Public Health* 69(8): 825–826.

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Siegel-Itzkovich, J. (2000). "Doctors' Strike in Israel May Be Good for Health." *British Medical Journal* 320(7249): 1561.

Relevant Web Sites

Centre for Social Justice
www.socialjustice.org

The Centre for Social Justice is an advocacy organization that seeks to strengthen the struggle for social justice. It is committed to working for change in partnership with various social movements and recognizes that effective change requires the active participation of all sectors of our community. The centre's work may change from year to year, but there is an ongoing interest in working strategically to narrow the gap between rich and poor, challenging the corporate domination of Canadian politics, and pressing for policy changes that promote economic and social justice.

Inequality
www.inequality.org

Inequality.org's mission is, first of all, to illuminate the causes and multidimensional consequences of the growing inequality of wealth, income, power, and opportunity in America; and, second, to move this critical national problem onto the front burner of American politics and public discourse.

John Snow
www.ph.ucla.edu/epi/snow.html

A look at the profound influence this man has had on the subject of epidemiology.

Population Health Forum
<http://depts.washington.edu/eqhlth/>

The Population Health Forum, an organization of health activists originally launched at the University of Washington, raises awareness of, promotes dialogue about, and explores how political, economic, and social inequalities interact to reduce the overall health status of our society. It hosts forums, sponsors discussions, develops curriculum, teaches courses, sponsors workshops, and provides speakers to promote knowledge and to advocate for action in service of a healthier society. There is a listserv for updates on population health that you can subscribe to on the site.

UC Atlas of Global Inequality

<http://ucatlas.ucsc.edu/>

The Atlas explores the interaction between global integration (globalization) and inequality. It has generated maps examining some aspects of material inequality, life and death, global connectedness, and economic globalization. It has expanded coverage of health and gender, and added more interactive capacities, enabling users to make comparisons among countries. It has also portrayed aspects of inequality within countries starting with the health consequences of wealth and poverty.

United for a Fair Economy

www.faireconomy.org/

UFE raises awareness that concentrated wealth and power undermine the economy, corrupt democracy, deepen the racial divide, and tear communities apart. It supports and helps build social movements for greater equality.

Glossary

Cohort: A group of people followed over time; usually they are born in a specified short period.

Confounding: A term used when two or more processes that have not been separated in the analysis have an impact on the outcome studied.

Controlling for a factor: This means statistically adjusting in the analysis for a variable (factor) so that there is no impact of this factor on the outcome one is studying.

Life expectancy: The average number of years lived by a population if the age-specific mortality rates in place when the calculation was done continued until everyone had died.

Veterinary Medicine International is a peer-reviewed, Open Access journal that publishes original research articles and review articles in all areas of veterinary research. The journal will consider articles on the biological basis of disease, as well as diagnosis, prevention, treatment, and epidemiology. Epidemiological surveillance in several industrial countries during the last two to three decades indicates that there is even a considerable increase in the prevalence of foodborne illness. In developing countries, infant diarrhoea appears to be the most important health problem related to contaminated food. Epidemiological approach. 10,755 views. Share. Answers to the above questions may provide clues to disease etiology, and help the epidemiologist to guide planning and evaluation. By. Epidemiological approach. 1. GOOD EVENING PRESENTED BY, MRS. B.kalPaNa, M.SC (N) aSSo. PRoFESSoR DEPT oF CoMMUNITY HEaLTH NURSING SREE NaRaYaNa NURSING CoLLEGE NEllORE. 2. Why?