FOUR

Health in the Modern World

SINCE WORLD WAR II, people in poor countries have begun to see the health benefits that people in rich countries have long enjoyed. The germ theory of disease had made possible a great reduction in the burden of infectious disease, but the science and science-based policies took more than a century to spread from their origins to the rest of the globe. If this had been the whole story, the late adopters would have eventually caught up with the pioneers, and the history of global health would have been the story of the gradual elimination of the inequalities in international health that first appeared in the eighteenth century. But there were further escapes to be made, even in the pioneer countries, and the length of life continued to increase, even in the countries that had led the way and even after deaths of infants and children had become rare. Now it was the turn of the middle-aged and the elderly.

This chapter tells the story of how those further escapes came about, and what the future might hold for longevity in the rich world. It is also about the implications for health of a highly interconnected world in which it makes less and less sense to talk about the rich world and the poor world. With faster and cheaper transportation and communication, health innovations in one country have almost instantaneous implications for health in the rest of the world; the germ theory may have taken a century to spread, but modern discoveries travel much more rapidly. New diseases, like new treatments, also ride the global highways. In this age of globalization, international inequalities in longevity have been shrinking. However, longevity is not the only aspect of health that is important, and it is much less clear that international *health* inequalities are getting smaller; they certainly should not be thought of as relics ready to go quietly into the dustbin of history. Health is not only about living and dying, but about how healthy people are while they are alive. One measure of "living" health, which provides both an antidote and a complement to life expectancy, is human height—a sensitive indicator of the burden of undernutrition and disease, especially among children. We will see that most—but not all—of the people of the world are growing taller. Yet progress is slow; at current rates, it will take two hundred years for Indian men to grow as tall as Englishmen are now. And that is not the worst news; it will take nearly five hundred years for Indian women to catch up with English women.

The Elderly Can Escape Too: Life and Death in the Rich World

Even in the rich countries, the health improvements that came from the germ theory were far from complete by 1945; the infant mortality rate in Scotland in that year was as high as it is in India today. Yet, after World War II, increases in longevity in the pioneer countries came increasingly to depend on reductions in mortality among the middle-aged and elderly, and less on reductions in mortality among infants and children. Today, the leading causes of death are no longer

tuberculosis, diarrhea, and respiratory infections, but heart disease, stroke, and cancer. Yet life expectancy is still increasing (albeit more slowly than it did before 1950), driven upwards not by cleaner water and more complete vaccinations but by medical advances and changes in behavior.

By 1950, the rich countries of the world had done most of the work of escaping from childhood infectious disease, and by 2000, the job was essentially complete. As I write, in 2013, around 95 percent of all newborns in rich countries can expect to reach their fiftieth birthday. In consequence, further increases in longevity now depend on what happens to the middle-aged and elderly. Here too there has been much progress in the past fifty years.

Figure 1 shows what happened to life expectancy at age 50 in fourteen of the world's rich countries. Life expectancy at 50 is defined as the number of years that someone on his or her fiftieth birthday can

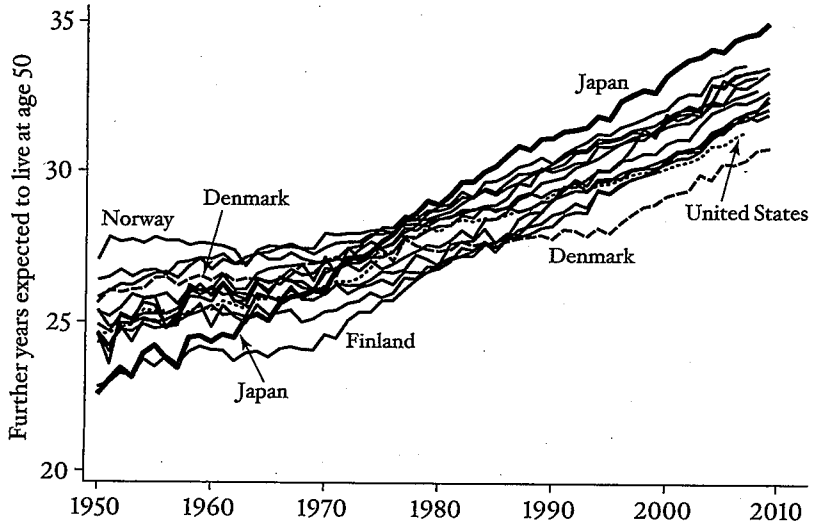

FIGURE 1 Life expectancy at 50 in wealthy countries (men and women together).

expect to live, so if life expectancy at 50 is 25 years, the 50-year-old can expect to live to age 75; as with life expectancy at birth, the calculation assumes that mortality rates will remain constant. The figure shows the average for men and women; as always women do better, but here I simply want to show the rate of progress for everyone, rather than looking at differences between the sexes. Even in 1950, the 50-year-olds in all of these fourteen countries could expect to live at least a couple of years beyond the biblical threescore and ten; this was true even in Japan, which was then the worst-performing country in the group. There was substantial inequality across countries in 1950, from 27.0 years in Norway to 22.8 in Finland and 22.6 in Japan. In the 1950s and 1960s, progress was different in different countries, but after 1970, the rate of increase in longevity speeded up. It was also much more closely synchronized across countries. Whatever was making people live longer seemed to be working in much the same way everywhere. Between 1970 and 1990, life expectancy at 50 in these countries rose by nearly three years. Progress continued after 1990, but now there were more differences across countries; some, like Japan, did extraordinarily well, while others, like the United States and Denmark, lagged behind.

The main message of the figure is that the middle-aged and elderly everywhere saw big reductions in mortality rates after 1950. As we saw in Chapter 2, nothing like this happened prior to 1950, when the improvements were mostly among children, with less of a gain in life expectancy at higher ages. The second message is that some countries have done better than others. Japan, which was last in 1950, is now first. Denmark, which was among the early leaders, is now last, and the United States, which started out in the middle of the pack, is now second from the bottom.

What made this happen? One reason transcends the specifics of diseases and their treatment. People do not want to die, and they

will devote great resources—both their own and those of their governments—to trying to escape death. When large fractions of children die before they become adults, doing something about child mortality is the first priority for parents and for society as a whole. But as people live longer, the "next" disease becomes the most important one, and the "next" disease typically means the next major killer that afflicts people at an older age than did the "last" one. Having slain the first monster in the labyrinth, the next priority is the monster that lurks behind it, whose presence becomes much more important once we have figured out how to dispose of the first one.

With child mortality and infectious disease largely behind us in the 1960s and 1970s, the next monsters were the chronic diseases that killed people in middle age: heart disease, stroke, and cancer. *Chronic* in this context applies to diseases that last for a while—conventionally more than three months—and is the opposite of *acute,* referring to diseases that threaten to carry you off quickly, as happens with many infectious diseases. (Perhaps more accurate would be the descriptors *noncommunicable* and *infectious.*)

As we shall see, there has been progress against all three of the major chronic diseases, particularly heart disease and stroke, which both fall into the category of cardiovascular disease. At least some of this progress came from people being prepared to spend large sums of money, partly on treatment, but more importantly on the research and development that unraveled the basic mechanisms of the diseases and thus allowed the design of better treatments. As cancer and cardiovascular disease recede in importance—as we can reasonably hope they will—new urgency will be focused on disorders such as Alzheimer's disease, a condition that was much less of a priority in 1950, let alone 1850, because so few people lived long enough to suffer from it. Just as in the nineteenth century, new diseases demand new cures and offer new opportunities to discover them. Today, as death

itself ages, the challenging diseases are those that afflict older and older people.

Cigarette smoking is one key to understanding recent mortality trends in high-income countries.[1] The patterns are not the same everywhere, but the spread of smoking in the first half of the century happened everywhere, with subsequent declines in many, if not all, countries. At first, women were much less likely to smoke than men, so that women became smokers later and, in countries where smoking is now declining, have been slower to quit than men. Smoking brings benefits to people in straightforward enjoyment, and it was a cheap and sociable pleasure for poor and rich alike. For many poor people, it was an easily available and affordable activity that provided a temporary escape from busy and often difficult lives. But it also brought disease and death. Lung cancer is most strongly associated with cigarette smoking because very few people who die of lung cancer did not smoke, although not everyone who smokes gets lung cancer. Deaths from lung cancer typically lag behind smoking trends by about thirty years, so that the mortality from smoking continues long after the behavior has changed. But cigarettes likely kill more people through cardiovascular disease than lung cancer, and there are other unpleasant consequences, such as respiratory diseases. The most important among these is chronic obstructive pulmonary disease, which includes both bronchitis and emphysema; the disease makes it difficult to breathe and is a major cause of death.

In the United States, the publication in 1964 of the surgeon general's *Report on the Health Consequences of Smoking* (for men!) is often seen as the hinge moment for behavioral change; many older Americans will say that they smoked until the report came out, but then either quit, or at least resolved to do so, immediately thereafter. There was no better example than that of the surgeon general himself, Dr. Luther Terry. In an attempt to minimize public attention, the press

conference for the release of the report was scheduled for a Saturday morning in Washington, D.C., and as he traveled to the conference in his limousine, Dr. Terry was smoking. To his intense irritation—"that is none of their business"—an aide warned him that the first question would be whether or not he himself was a smoker. Indeed it was, and Terry replied with an unhesitating "No." "For how long?" was the follow-up. The answer: "Twenty minutes." Millions of Americans followed the surgeon general's example in the years that followed. Sales of cigarettes peaked in the early 1960s at around eleven per day for each adult, when about 40 percent of the population smoked, each consuming more than a pack a day.

That the surgeon general's report by itself changed everything can reasonably be doubted. There had been many earlier reports on the health consequences of smoking —indeed, my mother was ordered by her doctor in Edinburgh in 1945 to quit smoking during her pregnancy, which may be why I am writing this book—and even in the United States, the 1964 peak was largely coincidental. Smoking among men had been declining well before 1964, and women's smoking had been rising for some time; it was only the sum of the two that peaked in 1964.

Knowledge about the harmful effects of smoking is now widespread, at least in rich countries, so one might think that smoking should have declined everywhere. Yet there remain significant differences across countries and between men and women. Incomes and the local cost of cigarettes vary from one country to another, and different countries have different attitudes about health warnings and restrictions on smoking in public places. None of those factors does much to explain the differences between men and women. In some countries, it was socially disreputable for women to smoke—in Scotland in the 1950s women who smoked on the street were regarded (at least by my mother) as little more than prostitutes—and the right

to smoke became associated with movements for equal rights for women. In the United States, as in Britain, Ireland, and Australia, women's smoking caught up with or even exceeded that of men, although today the prevalence of smoking is falling in both sexes. In Japan, the rate of smoking among men has been extraordinarily high (close to 80 percent in the 1950s), though it is declining now; very few Japanese women have ever smoked. In continental Europe, smoking is also generally declining, but there are many exceptions, especially among women. As someone once joked, the surgeon general's report was not translated into "foreign" languages.[2]

There is a parallel between the spread of smoking and the spread of the germ theory of disease less than a century before. Cigarettes are, or were, part and parcel of the way people lived, and they are, or were, an important source of pleasure. The knowledge that cigarettes are harmful makes people less likely to smoke, but there are offsetting considerations—not to mention a habit that is difficult to break. Knowledge of the germ theory needed to be embodied in day-to-day housekeeping and hygiene, and it too involved habits and ways of living that were difficult and sometimes costly to change. In both cases, gender roles were important. Women were primarily responsible for the housekeeping and childrearing tasks that were important for implementing measures against the spread of germs, and in many families, women became the household "germ police."[3] In the case of cigarettes, smoking was linked first to the oppression and later to the liberation of women. It is also important to keep in mind that cigarettes are *not* analogous to cholera bacteria or the smallpox virus, in spite of the current demonization of tobacco and the frequent use of the terms *plague* or *epidemic* to describe smoking. Certainly smoking is harmful to health, but it also brings benefits, something no one ever claimed for the bubonic plague or, for that matter, for breast cancer. It is not a mark of insanity if a person decides that the pleasures of

smoking more than compensate for the health consequences. Many localities in the United States are currently raising substantial sums of money from the predominantly poorer people who choose to smoke; these funds are largely used to offset property taxes for better-off people. It is far from clear that any overriding public health interest justifies this taxing of the poor to benefit the rich.

The rise and fall of cigarette smoking is echoed in the rise and fall of deaths from lung cancer in Figure 2.[4] The graphs show the mortality rate for people aged 50–69 from lung cancer since 1950 for Australia, Canada, New Zealand, the United States, and the countries of northwestern Europe. The United States is shown as the heavy line in both graphs. In the graph for men, we see an explosion of mortality, peaking around 1990, about two to three decades after the peak in smoking, and then falling back. On the right, because women took up smoking much later, the fall is confined to only a few countries, and the graph looks like the open jaws of a crocodile.

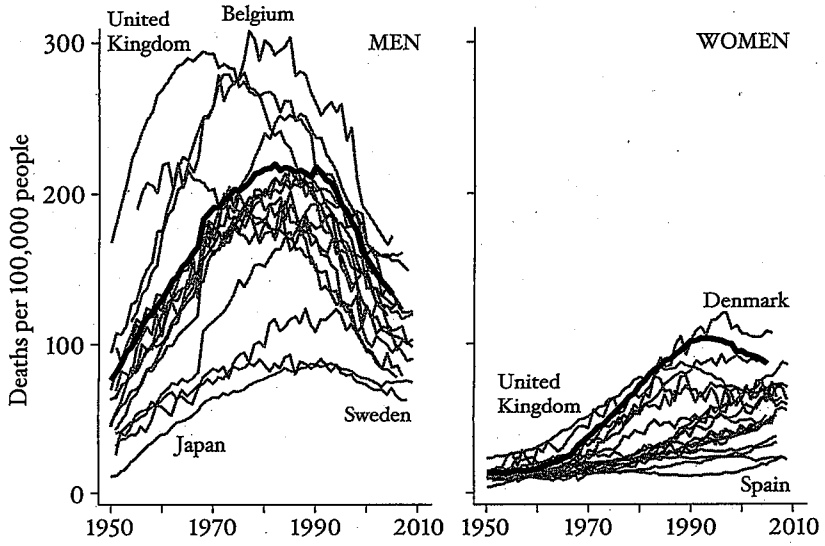

FIGURE 2 Mortality from lung cancer (heavy line is United States).

Among women, the explosion in smoking is still going on, although for a few countries, including the United States, lung cancer mortality has begun to fall. Women never smoked as much as men, so their mortality rates are lower, in line with their smoking rates in earlier years, with the countries in which women smoked experiencing higher death rates. Note finally that, although lung cancer is an important cause of death, only a small fraction of the 40 percent who used to smoke actually died (or will die) of lung cancer; the average annual mortality rate in the United States in the worst years was just over 200 per 100,000 people, or a fifth of 1 percent.

Although smokers are ten to twenty times more likely to die of lung cancer than nonsmokers, the vast majority of smokers do not die of the disease; the Memorial Sloan-Kettering Cancer Center has an online calculator that estimates the risks.[5] For example, a 50-year-old man who has smoked a pack a day for thirty years has a 1 percent chance of developing lung cancer if he quits now and a 2 percent chance if he does not. Before anyone takes too much comfort from this information, it should be remembered that lung cancer is neither the only nor the most prevalent risk from smoking.

Cigarette smoking is the main reason that women's life expectancy has been rising less rapidly than men's in recent years, not only in the United States but also in a number of other countries where women started smoking early, including Britain, Denmark, and the Netherlands. American women are paying quite a price for the tobacco companies' successful attempt in the 1960s and 1970s to link women's liberation to cigarette smoking. American smoking prevalence is the single biggest reason why life expectancy at 50 has been growing less rapidly in the United States than in a number of other rich countries, such as France and Japan. Recent calculations estimate that without smoking, life expectancy at 50 in the United States would be 2.5 years longer than it is.[6]

Even more important than the decline in lung cancer has been the decline in deaths from cardiovascular disease, a term that covers diseases of the heart and veins, including stroke, atherosclerosis (the accumulation of plaque that blocks arteries), coronary artery disease, heart attack, congestive heart failure, and angina. The reduction in smoking among men has helped relieve this burden too, but there have also been important advances in effective medical treatment, something that has not so far been true for lung cancer.

Figure 3 shows mortality from cardiovascular disease since 1950 for middle-aged to older men between the ages of 55 and 65. In the left panel, I show only the United States and Britain; in the right panel, I show mortality in the same rich countries included in Figure 2. These numbers are *huge*—about *five times* the mortality rate for lung cancer. In the 1950s, between 1 and 1.5 percent of these middle-aged and older men could expect to die in any given year. Cardiovascular disease was then, and remains today, the leading cause of death in

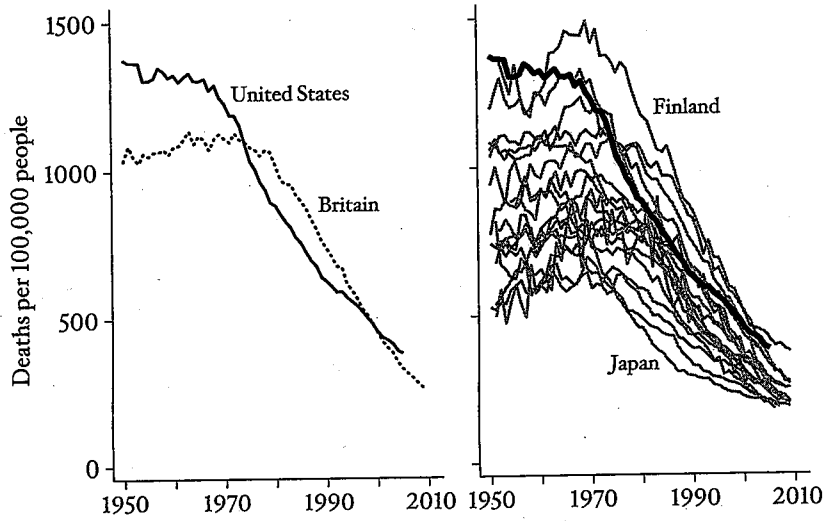

FIGURE 3 Mortality from cardiovascular disease (heavy line in right-hand panel is United States).

high-income countries. In the 1950s and 1960s, mortality from cardiovascular disease was higher in the United States than in Britain, rising slowly in Britain and falling slowly in the United States. Among other rich countries, the United States had the highest risk, and there was considerable variation across countries, with Iceland and the Netherlands at the bottom of the graph. Until about 1970, each country went its own way, with no obvious coordination across countries. Whatever the cause of cardiovascular disease, it was—like smoking, which is indeed one of its causes—different in each country.

Everything changed after 1970. With the United States leading the way, mortality from cardiovascular disease started to fall—later in some countries than in others; Britain, for example, was seven or eight years behind—and there was an internationally synchronized collapse of mortality from cardiovascular disease. Even Finland—once the home of mortality from cardiovascular disease, with annual mortality of 1.5 percent in 1970—rapidly fell into line, so that in the first years of the twenty-first century not only has the mortality rate fallen by a half to two-thirds, but there has also been a convergence of rates across different countries. Nearly all of the diversity of experience in the 1950s has vanished.

What happened? Quitting smoking was part of the explanation, but as we have already seen, behavior varies from country to country even now, and behavioral change is unlikely to be so fast and so coordinated across countries. It is not as if there were some international health authority—and the World Health Organization is hardly a likely candidate—that ordered all its member countries to change at the same time. A much better candidate is a medical innovation, especially one that is both cheap and effective, so that it can quickly move from one country to the next.

One key innovation in managing cardiovascular disease was the discovery that diuretics—cheap pills, sometimes called "water pills" because they increase the frequency of urination—are effective anti-

hypertensives, meaning that they reduce high blood pressure, one of the major risk factors for heart disease. According to the Mayo Clinic, "Diuretics . . . help rid your body of salt (sodium) and water. They work by making your kidneys put more sodium into your urine. The sodium, in turn, takes water with it from your blood. That decreases the amount of fluid flowing through your blood vessels, which reduces pressure on the walls of your arteries."[7] An important randomized controlled trial from the U.S. Veterans Administration was published in 1970,[8] and thereafter practice changed quickly in the United States.

One of the characteristics of the U.S. health-care system is that innovations tend to be introduced very quickly—not only the good ones like antihypertensives, but also many that are of dubious value. Britain, with its cash-constrained and centrally run National Health Service, tends to be much slower and more cautious about introducing medical innovations—today it has a National Institute of Clinical Excellence, with the splendid acronym NICE, to test new products and new procedures and make recommendations—so even the cheap and effective diuretics took a while to be adopted. The right-hand side of Figure 3 shows that the same happened elsewhere; the United States led the way, and other countries followed after a time that varied with local institutions and health-care systems.

Diuretics were the first antihypertensives and they were followed by a series of others—with names like ACE inhibitors, calcium channel blockers, beta-blockers, and angiotensin antagonists—so that physicians now have a large cast of characters from which to select the one that best suits a specific patient. Cholesterol-reducing drugs—statins—have also contributed to the mortality reduction, by one account by as much as drugs that reduce blood pressure.[9] These preventive measures are designed to reduce the chance that people get sick in the first place, but there have also been innovations in treatment. One important—and also very cheap—treatment is to make sure that people who are brought to a hospital after a heart attack are immediately given aspirin. There are other, higher-tech innovations for treating heart disease—bypass surgery and the like—which are decidedly *not* cheap, and which may also have contributed to the decline in mortality. One clinical trial showed that on average there were mortality reductions for middle-aged people who took a "baby" aspirin every day, but it has subsequently become clear that while such a treatment saves some, it kills (a smaller number of) others—a good example of what is often a sharp conflict between the average and the individual. Even so, the innovations in treatment and prevention have collectively saved millions of lives, greatly reducing mortality from the leading cause of death; leaving millions of middle-aged men who would otherwise have died to continue working, earning, and loving; and making it more likely that they will get to meet and know their grandchildren.

What about women? As is the case for lung cancer, the mortality rates from cardiovascular disease are *much* lower for women, generally half of those for men. But those rates too have been decreasing, by around a half depending on the country, and with a similar degree of international coordination, so that international variations in women's mortality rates from cardiovascular disease today are much lower than was the case in the 1950s. Although they had lower risks to begin with, women have shared with men the benefits of declining risks of dying from heart disease. For women, as for men, cardiovascular disease is the leading cause of death. While breast cancer is (rightly) seen as an important and specific threat to women, fewer women die of breast cancer than die of heart disease.

The innovations that have helped prevent and treat cardiovascular disease are unusual because they did *not* generate cross-country inequality among the relatively rich countries—rather the reverse.

Rates of mortality from heart disease are much more similar across countries now than they were half a century ago, so the important innovations that drove the decline did not generate the international inequality in health outcomes that was brought about by the germ theory of disease a century ago. Perhaps because the important innovations were cheap and easily imitated, countries could quickly bring them into their health services. But cheapness does not seem to have helped guarantee complete diffusion *within* countries, and progress against cardiovascular disease has likely caused some widening of health inequalities across income and education groups. The part of the treatment that depends on the individual—in this case regular visits to a physician to have blood pressure taken and cholesterol measured—were adopted more quickly by the more educated, the better off, and those who were already healthier.[10]

Cancer is the second major killer after heart disease. After lung cancer, the most important forms of the disease are breast cancer (almost entirely among women), prostate cancer (entirely among men), and colorectal cancer (which affects both men and women). At least until the 1990s, there was little progress in treating these cancers, and mortality rates did not fall. In spite of a multi-billion-dollar war on cancer in the United States, people went on dying at about the same rates, and the most authoritative reviews concluded that the war was being lost, or at least not won.[11] Throughout this book, I have emphasized that the discovery of new knowledge and the invention of new ways of saving lives are responsive to the need for them. But demand does not *always* create supply, nor do billions of dollars or the declaration of war on a disease necessarily cure that disease—as evidenced by the failure to find a cure for cancer.

Yet, once again, there is evidence that, at last, progress is being made, and that mortality rates for all three kinds of cancer have begun to fall.[12] This decline may have been going on for some time, but,

perhaps paradoxically, it might have been disguised by falling rates of mortality from cardiovascular disease. If we get better at dealing with the first monster in the labyrinth, the monster behind it claims more victims, and it will kill more even if it is not as deadly as it once was. People who were saved from heart disease became available to be afflicted by cancer, and if some of the risk factors (perhaps obesity) overlap, then successes in preventing cardiovascular disease should raise mortality from cancer. That this did *not* happen, that the dog did not bark in the night, might then be counted as evidence of progress against cancer. But recent reductions in cancer mortality provide more direct evidence of success. Screening for all three diseases—with mammograms, PSA tests, and colonoscopies—is often given some of the credit, though its role, especially that of mammograms and PSA tests, cannot be very large. For example, with the rise in mammography, there was an enormous increase in early-stage diagnoses, but no sign of the corresponding decline in late-stage diagnoses that should have been the consequence; over the past thirty years breast cancer screening has detected cancer in more than a million women who would never have experienced any symptoms.[13] Improvements in treatment have likely been more important, such as the use of tamoxifen for breast cancer. In his biography of cancer, *The Emperor of All Maladies,* oncologist and historian Siddhartha Mukherjee argues that, after generations of what was essentially trial and error in surgical and chemical treatment, a better scientific understanding of the origins of individual cancers is slowly emerging and is beginning to pay off in new and more effective treatments.[14]

In contrast to many of the most effective new treatments for cardiovascular disease, the new chemical and surgical treatments for cancer are often very expensive, and that expense will limit the speed with which they are transmitted to other countries. Screening itself is not very expensive, but it can cause great subsequent psychic and

monetary expense. A prime example is the situation in which screening detects not a disease itself but a risk factor for a disease, such as high blood pressure, high cholesterol, or even a genetic predisposition. Treating those in whom such risk factors are detected—with antihypertensives, statins, or in extreme cases with prophylactic surgery, such as breast removal for women with a genetic risk of breast cancer—will save the lives of a few of those treated, while treating a much larger number of healthy people who would never develop the disease.[15] When screening is effective, it can also introduce inequalities if the more educated and the better informed adopt it first. Even so, there is hope that screening will become more effective over time, that overscreening will be better controlled, and that drugs and procedures will become cheaper as they are more widely prescribed. If so, there is a good hope that cancer will follow cardiovascular disease as one of the success stories of science and medicine. One more bar of the prison of poor health will have been removed, giving people more capabilities to lead better lives for more years.

Many other factors affect mortality rates, though these are typically less clear or more controversial than the ones that I have discussed. One is our old friend, more and better food. Better nutrition is more plausible as a factor driving down mortality rates in the nineteenth century, when hunger was more common than it is today; today we tend to worry about people eating too much, not too little. Even so, it is possible that one of the reasons that mortality rates are falling among the elderly today is improvements in their nutrition seventy years ago, when they were being conceived, born, and nurtured as children. Finland, which had the highest mortality from cardiovascular disease in the 1970s, was one of the poorest countries in the world around the time of World War I, when the 55-year-olds of the 1970s were born.

Another piece of evidence that supports the food argument is a remarkable finding by the demographers Gabriele Doblhammer and James Vaupel.[16] They calculated that in the Northern Hemisphere life expectancy at 50 is half a year higher for people born in October than for people born in April. The pattern is reversed in the Southern Hemisphere, except for those born in the North and who later emigrated to the South; they too show the Northern pattern. One plausible reason for their finding is that, even in now-rich countries, green leafy vegetables, chicken, and eggs used to be readily and cheaply available only in the spring, which meant that nutrition in the womb was better for unborn children whose due date was in the autumn. As might be expected, this effect has become smaller over time, as seasonal differences in food supply have become less pronounced.

Declining mortality is a great boon—we all want to live longer—but it is not the only kind of health improvement. We also want to live better and healthier lives, so we should not focus only on mortality and ignore *morbidity*. People who are physically or mentally disabled, or who suffer from chronic pain or depression, have fewer capabilities to do the things that make life worth living. There have been important improvements here too. One is the development—essentially through trial and error—of joint replacement, particularly hip replacement, which is now a routine procedure that relieves what would otherwise be a lifetime of pain and immobility.[17] Hip replacement is one of those "magic" surgeries that turns a difficult, painful, and limited life into one in which original function is almost completely restored. Similarly, modern cataract surgery restores or even improves vision. Such procedures restore a whole range of capabilities that would otherwise be lost. Pain medication is much better than it was; ibuprofen (available since 1984) provides relief in situations where aspirin does not, and health professionals now understand much bet-

ter how to allow patients to control their own pain medication in more serious situations. New drugs for the treatment of depression have improved many people's lives. Access to health professionals is important even when they can do nothing, because they can at least reassure people who are concerned about their own or their loved ones' health; and even if they cannot, they can help resolve the uncertainty that is a source of distress on its own.

Physician care and treatment cost money—from either individuals, their insurers, or the state. The United States spends a uniquely high amount on health care—currently about 18 percent of national income—but it is not unique in facing challenges in paying for ever more expensive and, in many cases, *effective* new techniques. In some cases, in order to save money, states place restrictions on access. In one famous story, the British National Health Service in the 1970s severely limited the availability of kidney dialysis, restricting it to those who were deemed young enough to benefit and excluding those in their 50s, who were described as "a bit crumbly" and not worth the cost.[18] In some periods, Britain has also had long waiting lists for hip and knee replacements. In such cases, inadequate provision of health care raises morbidity and mortality rates, and access to kidney dialysis and joint replacement is currently much less restricted in Britain. Yet Britain has not abandoned its attempts to control the introduction of new drugs and procedures. I have already referred to its NICE, which tests medical innovations and issues detailed reports on how well they work and whether they offer value for money. Such an institution is strongly opposed by the pharmaceutical industry and by device manufacturers. At least one pharmaceutical company threatened to withdraw from Britain after an early adverse decision, but Tony Blair, then the British prime minister, held his ground.[19]

There is disagreement among both economists and doctors on how much health care is too much or on the necessity for some form of

rationing. Some point to the enormous successes of medicine; they argue that if we put reasonable values on morbidity and mortality reductions—which doctors hate to do, and which is an imprecise and controversial art at best—we need more health care, not less, even in the United States. Spending twice as much money and getting twice as much mortality and morbidity reduction, they argue, would still be a good deal. Some of these calculations make the mistake of crediting *all* mortality reductions to health care—ignoring, for example, the large effects of reductions in cigarette smoking—but even with a more reasonable attribution, a case can be made for spending more, not less. As we get richer, this argument goes, what better way to spend our money than on achieving better and longer lives? And if health care costs more in the United States than in Europe, that is in part because health care is more luxurious in the United States—more private or semiprivate rooms in hospitals, shorter waits for diagnostic tests and screening—which makes sense, given that Americans are on the whole richer than Europeans and can afford such things.

The opposing argument concedes that health care has delivered great benefits but focuses on the waste in the system, which affects the level of expenditure, and on the lack of a NICE-like approval process, which allows new procedures to be introduced whether or not they are beneficial and accelerates the rate of growth of spending. One of the star witnesses in making the case that many health expenditures are unnecessary is the Dartmouth Atlas, which documents spending by Medicare, the program that covers health care for the elderly in the United States. The atlas is a map of the United States that shows extraordinary variation in health-care expenditures from place to place, a variation that is linked neither to medical needs nor to better outcomes. Indeed, there is a *negative* correlation between expenditures and the quality of outcomes.[20] The most plausible interpretation is that some doctors and hospitals are much more aggres-

sive than others in ordering tests and treatments and that those additional expenditures produce little or no benefit and in some cases may actually harm patients. If this is true, health-care expenditures could be greatly reduced without harming health.

Given that health care is of high quality and helps maintain and improve health, it is an important instrument of wellbeing. But health care is expensive, so there is a potential trade-off between greater health care spending and other aspects of wellbeing. If Americans spent twice as much on health care, they would have to reduce expenditures on everything else by a quarter. Or if we could follow the Dartmouth recommendations in reducing expensive, low-value programs, and cut health-care expenditure by, say, half, we could have an increase of almost 10 percent in everything else. These sorts of trade-offs happen all the time in daily life, and we do not usually worry too much about whether people are, for example, spending too much on books or electronic gadgets so that they have too little left to spend on summer vacations. So why is health care different?

The problem is that people are not actually *choosing* how much to spend on health care in the way that they choose how much to spend on books or on vacations. Indeed people may not even be aware of what they are paying for health care, or what they are giving up to get it. In the United States, most health care for the elderly is paid for by the government through Medicare, and most (59 percent) of the non-elderly have coverage through their employers. Many of these think that their employers are *paying* for their health care at no cost to themselves. Yet most studies have shown that it is not employers that ultimately pay, for example through lower profits, but employees, through lower wages.[21] As a result, typical earnings, and the family incomes that depend on them, have grown more slowly than would have been the case if health-care costs had not grown so rapidly. But people do not see it that way, and do not think to blame rising health-

care costs for the slow growth in their incomes. As a result, they fail to see the cost of health care as the problem that it really is.

Similar problems arise when the government provides health care, as in Europe, or in Medicare, which pays for health care for the elderly in the United States. When people press for the government to provide additional health-care benefits—coverage for prescription drug benefits, for example—they tend not to think about what has to be given up in exchange. The doyen of American health economists, Victor Fuchs, gives the example of an elderly woman for whom Medicare will provide expensive surgery at no cost to herself, even surgery that might not be urgent or necessarily effective, but whose pension check is not enough to allow her to buy a plane ticket to attend her granddaughter's wedding or to visit a new grandchild.[22] These trade-offs have to be made through the political process by some sort of democratic debate, but that is a difficult, contentious, and often ill-informed process. It is also a process that, at least in some countries, is deeply influenced by the providers of health-care services, who have an interest in over-provision—an interest that becomes stronger and better financed the more that is spent.

Income and health are two of the most important components of wellbeing, and the two with which this book is mainly concerned. We cannot think about them one at a time, or allow doctors and patients to lobby for health improvements and economists to lobby for economic growth, each group ignoring the other. When health care is as expensive and as effective as it is today, trade-offs need to be made; in Fuchs's words, we must take a holistic view of wellbeing. Some process needs to be put into place to allow us to take that view collectively, almost inevitably involving an institution like Britain's NICE, as well as a greater and more widespread public understanding of the threats to other aspects of wellbeing that come from the unlimited growth of health-care costs.

What about the future? Can we expect life expectancy to continue its rise in the high-income countries? The negative view, often associated with the demographer and sociologist Jay Olshansky, starts from the observation that it is getting harder and harder to increase life expectancy. This is something we have already seen; saving children's lives has a dramatic effect on life expectancy, because they have so many years to live, but once nearly all of the children have been saved, saving the elderly makes less of a difference, at least to life expectancy. Figure 1 in Chapter 2 shows the distinct slowdown in the rate of increase in American life expectancy after 1950, and the argument is that we can expect a similar slowdown in the future, even if innovations continue, because the lives saved will be of ever-older people. Even if cancer were eliminated in the United States, life expectancy would increase by only four or five years. The pessimists also note that the rise in obesity in most rich countries may raise mortality rates in the future. Perhaps, but there has been little evidence of it so far. This may be because, with better treatments for cardiovascular disease—including drugs to control cholesterol and hypertension—the risks of obesity are lower now than when they were first studied.[23]

On the other side, the demographers Jim Oeppen and James Vaupel published in 2002 a remarkable diagram that calculated the world's highest life expectancy for women in each year from 1840, and showed that this measure—which can be thought of as the maximum possible life expectancy in each year—has risen at a constant rate for 160 years.[24] For every four years of calendar time, the world's highest life expectancy increased by a year. Oeppen and Vaupel see no reason why this long-established rate of progress should not continue. Their diagram also marks the many previous estimates of the maximum possible life expectancy, each of which was swept away by actual events; many previous sages have forecast that the gains to life span will slow or stop, and they have all been wrong. Further supporting the optimistic argument in favor of a continued rise in life expectancy is the fact that people do not want to die any earlier than they must; that as they get materially richer they have more income to spend trying to avoid that outcome and will likely be prepared to devote a larger and larger share of their incomes to staying alive; and there is no reason to suppose that they will not succeed in the future as they have in the past.

I find the optimistic argument the more compelling: ever since people rebelled against authority in the Enlightenment, and set about using the force of reason to make their lives better, they have found a way to do so, and there is little doubt that they will continue to win victories against the forces of death. That said, it is too optimistic to think that life expectancy in the future will grow at the same rate as it did in the past; falling rates of infant and child mortality make life expectancy grow rapidly, and that source of growth is largely gone, at least in the rich countries. During the 160 years when top life expectancy grew by a year every four years, a substantial contribution came from saving the lives of children, and that will not continue. Once again, there is good reason *not* to focus on life expectancy as the measure of success. Eliminating cancer and other diseases of the elderly would eliminate great suffering and improve millions of lives. That it would have a modest effect on life expectancy is largely beside the point.

Health in an Age of Globalization

I have looked at rich countries (in this chapter) and poor countries (in Chapter 3) as if they were separate worlds. Now it is time to look at them together, and to think about how the two groups affect one another. The past half-century has seen an unparalleled integration of

the world—a process often referred to as globalization. This is certainly not the first instance of globalization in history, although the current episode is one of the most far reaching. Transport is faster and cheaper than ever before, and information moves faster still. Globalization has affected health in many ways: directly through the spread of disease, information, and treatment, and indirectly through economic forces, particularly increased trade and higher economic growth.

There have been many periods of globalization in history—sometimes through war, conquest, and imperialist expansion, sometimes through new trade routes, bringing new products and new riches. Disease usually came along for the ride, with consequences that reshaped the world. The historian Ian Morris has described how increased trade around the second century CE merged previously separate disease pools that, since the beginning of agriculture, had evolved in the West, South Asia, and East Asia, "as if they were on different planets." Catastrophic plagues broke out in China and in the eastern outposts of the Roman Empire.[25] The Columbian exchange after 1492 is an even better-known example.[26] Many historical epidemics started from new trade routes or new conquests. The plague of Athens in 430 BCE was attributed to trade, and bubonic plague was brought to Europe in 1347 by rats aboard trading ships. The cholera epidemic of the nineteenth century is thought to have come from Asia thanks to the activities of the British in India, and its subsequent spread through Europe and North America was speeded by the new railways. An infected person could be in another city before he or she knew of the infection, and cholera spread along the railway lines; today, someone can move from one hemisphere to another in the time it used to take to go from one city to another.

Yet globalization also opens its routes to the enemies of disease. We have already seen how the germ theory of disease—a set of ideas and practices developed in the North—spread rapidly to the rest of

the world after 1945. Knowledge about drugs to control high blood pressure spread rapidly across the world after 1970, producing the synchronized declines in mortality plotted in Figure 3. That cigarette smoking caused cancer did not have to be rediscovered country by country. While the origins of HIV/AIDS are in dispute, there is no dispute about its rapid spread from one continent to another. The scientific response—the discovery of the virus, the deduction of its means of transmission, and the development of chemotherapy that is transforming the disease from a fatal to a chronic condition—was extraordinarily rapid by historical standards, although hardly rapid enough for the millions who died as they waited. Today's understanding of the disease, although still incomplete, has underpinned the response—not just in the rich world—and in the worst affected African countries rates of new infection have fallen in the past few years, and life expectancy is beginning to rise again.

Successes against cardiovascular disease and cancer are spreading, not just from one rich country to another, but throughout the world. As mortality from infectious disease has fallen, noncommunicable diseases are becoming more important as the children who did not die become adults and live long enough to encounter them. Except in Africa, noncommunicable disease is now the leading cause of death everywhere in the world, and cheap and effective preventative drugs like antihypertensives should spread just as vaccines did in the past. Here, once again, the constraint is likely to be the capacity of some governments to organize and regulate a physician-based system of health care. Advances that are more expensive, such as some cancer treatments or joint replacement, are also spreading, but they are typically available only to the well heeled or well connected in a limited number of poor countries.

The contributions of rich-country to poor-country health have not always been benign. Health researchers, unlike economists, often

think of globalization as a negative force. There is deep concern about cigarette smoking, and the activities of the tobacco companies whose products, no longer welcome in much of the rich world, are finding a safe haven in poorer countries whose governments, once again, may not have the capacity for or an interest in regulation. The patent system that makes drugs temporarily very expensive has been vociferously challenged, though it is not clear whether patents are the real problem. Again, local capacity for delivery is an issue and, in any case, nearly all of the drugs that the WHO lists as "essential medicines" are off patent; even so, the list might be longer if more drugs were cheaper. Small poor countries often find themselves at a disadvantage when negotiating bilateral trade deals with large rich countries. The latter are much better supplied with lawyers and lobbyists, including pharmaceutical lobbyists, whose interest is not to protect poor-country health. First-world medicine has certainly sharpened local health inequalities in poor countries. In cities like Delhi, Johannesburg, Mexico City, and São Paulo, first-world state-of-the-art medical facilities treat the wealthy and powerful, sometimes within sight of people whose health environment is not much better than that of seventeenth-century Europe.

What has happened to global health and global health inequalities since 1950? In Figure 1 of Chapter 3, we saw that regional inequalities in life expectancy have narrowed, so that the regions with the lowest life expectancy have drawn closer to the regions with the highest life expectancy. Now I look at countries, not regions, as units. Figure 4 shows how life expectancy is changing in the typical country, how the worst and best countries are doing, and whether inequality in life expectancy is getting larger or smaller. The graph looks like a series of organ pipes, though it as actually known as a "box-and-whisker" plot. The vertical axis shows life expectancy, and the pipes (or boxes) show

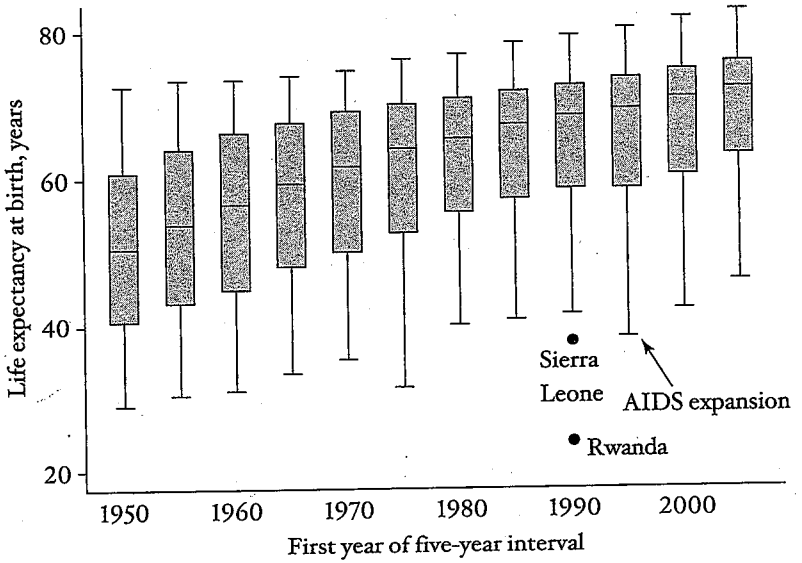

FIGURE 4 Life expectancy and its dispersion around the world.

where countries' life expectancies line up; the first message from the graph is that the pipes are rising from bottom left (1950–54) to top right (2005–09) as longevity increases around the world. Each shaded box contains half of all countries, and the line across the middle marks the middle country in terms of life expectancy. These horizontal lines are rising over time—life expectancy in the middle country is going up—albeit at a rate that is somewhat slower now than fifty years ago. Once again, the reason is that we have moved from the large increases in life expectancy that come from saving children to the smaller and more hard-won gains that come from saving the elderly. The top and bottom "whiskers," shown as lines coming out of the pipe with bars on the end, are designed to capture all countries except those that are really extreme in their longevity. The figure shows only two countries that are extreme in this way, both of which were in the

midst of civil wars between 1990 and 1995: Rwanda and Sierra Leone. A total of 192 countries are plotted for each period, and some of the estimates are speculative, especially in the earlier years.

The figure shows the pipes getting smaller over time, so that countries are moving toward the middle of the crowd. The dispersion of life expectancy across countries is narrowing, and this measure of the international distribution of health is becoming less unequal. The explosion of international health inequality that began 250 years ago is beginning to be reversed. The narrowing has not been entirely even, and we can see the widening in 1995–2000 that comes from AIDS deaths in Africa, after which the narrowing resumes. The bars in the middle of the boxes are getting progressively closer to the tops of the pipes, and to the top whisker, which tells us that the gap between life expectancy in the middle country and the top countries —like Japan—has also been narrowing over time. There is now only a 10.5-year gap between the middle—more precisely the median—(72.2 years) and the top (Japan at 82.7 years). Yet this narrowing is leaving a longer tail of countries behind it. Even ignoring the horrors in Rwanda and Sierra Leone in the early 1990s, the gap from middle to bottom has grown from 22 to 26 years.

Once again we must ask ourselves whether life expectancy is a good measure for thinking about health inequalities across countries. This chapter has shown that the gains have come from saving children in poor countries and from saving the middle-aged and elderly in rich countries. When we use gains in life expectancy to compare across rich and poor, we give greater weight to the poor countries, because saving a child has a much larger effect on life expectancy than saving a 60-year-old. And indeed, this is the main reason why inequality in life expectancy has declined. Yet it is not obvious that saving a child is indeed better than saving an older adult, a judgment that is built in to this measure of inequality. This point can be argued

either way. Some would argue for saving the child—because, even if he or she does not yet have much stake in the world, so many future years are gained—and others for saving the adult—because he or she has a larger stake, albeit with fewer years left. But there is nothing that says that using life expectancy to look at inequalities solves this conundrum in just the right way, and weighing lives differently could make the reduction in inequality larger or smaller, or might even reverse it.

The reductions in global inequalities in life expectancy do not automatically mean that the world is a better place, because life expectancy does not capture all the aspects of health—or even of mortality—that we care about. Certainly, we live in a world in which child mortality is falling in poor countries, and middle-aged and elderly mortality is falling in rich countries. Whether those trends make the world a more equal place is a debatable issue that depends on how much we care about each kind of mortality decline.

The philosophical arguments do not stop there. The reductions in infant and child mortality have been followed by reductions in the number of children that people choose to have. In Africa in 1950, each woman could expect to give birth to 6.6 children; by 2000, that number had fallen to 5.1, and the UN estimates that it is 4.4 today. In Asia as well as in Latin America and the Caribbean, the decline has been even larger, from 6 children to just over 2. Fertility did not fall immediately after mortality rates fell, which is why there was an explosion in population. Yet in time, as parents came to believe that not so many children would die, they stopped having so many babies, though they may have had as many or more who survived to adulthood. One way of thinking about this change is that babies, who would have been born and quickly died, are now not being born at all. Who are the beneficiaries of this change? Again, it depends on how we choose to weigh lives, a question that has engaged philosophers for

a long time. Yet it is clear that *mothers* benefit a lot; they do not have to be pregnant as often to have the same number of children who survive, and they—and their husbands—are spared the agony of having their children die. Lightening this burden on women not only removes a source of pain, it also frees them to lead fuller lives in other dimensions, becoming more educated, working outside of the home, and playing a fuller role in society.

Changing Bodies

There is much to cheer about in global health since 1950. But I want to conclude with a somewhat less cheery set of observations that focus not on the Great Escape from death—which has been impressive in most places, and perhaps even equalizing—but on the less impressive and less equal progress in the Great Escape from malnutrition. One good way to look at malnutrition is to see what has happened to human height.

Height, in and of itself, is not a measure of wellbeing. Other things equal, there is no reason to suppose that someone who is over six feet tall is any happier, richer, or healthier than someone who is six inches shorter. Nor is height a part of wellbeing in the way that income and health are parts of wellbeing. Yet when a *population* is short, it indicates that its members were nutritionally deprived in childhood or in adolescence, either because they did not get enough to eat, or because they lived in an unhealthy environment where disease, even if it did not kill them, left them permanently stunted. While height depends on genes for each individual, so that taller parents have taller children, it is now believed that this is not true for (sufficiently large) populations, and that variations in average height among populations are good indicators of variations in the degree of deprivation. In the past, we thought that genetic differences were the main source of differences in heights across populations. But as conditions improved, and one "short" country after another has grown taller, sometimes quite quickly, these views have been discarded.[27]

We are now beginning to understand that deprivation in childhood can have serious and long-lasting consequences. Shorter people earn less than taller people, not only in agricultural societies, where strength and physique are useful in the labor market, but also among professionals in rich countries such as Britain and the United States. One reason is that cognitive function develops along with the rest of the body, so that shorter people, *on average,* are not as smart as taller people—a statement that tends to call forth howls of outrage. Two of my Princeton colleagues who investigated this question[28] were denounced, bombarded with hate-filled emails, and subjected to demands by alumni that the university dismiss them. So let me try to explain carefully.

In an ideal environment where everyone gets enough to eat and where no one ever gets sick, some people will be short and some tall, according to their genetic makeup, but there will be *no systematic difference* in cognitive function according to height. In the actual sublunary world, some people will be deprived in childhood, and those people will be overrepresented among the short, which is why short people, on average, have poorer cognitive function. This may be simply a matter of insufficient calories, or of fighting off one too many childhood diseases, an important drain on calories. The deprivation can also be more specific; for example, children's brains need fat to develop properly, and there are millions of people in the world whose diets contain *too little* fat, in contrast to the more familiar millions whose diets contain too much.

Nutritional deprivation wears off as populations become richer and get enough to eat, and as childhood disease is banished through sanitary improvements, pest control, and vaccines. Even so, the effects

of nutritional deprivation on heights may take many years to wear off, if only because tiny mothers cannot have large children. The rate of height increase in a population is subject to this biological limit, so that it may take many generations for populations to grow to their full potential, even after the nutritional and disease constraints have been removed; biology limits growth to avoid problems that would result from fast catch-up.[29] But over time we would expect to see the people of the world getting taller. It turns out that some have and some have not.

Europeans have become *much* taller. The economists Timothy Hatton and Bernice Bray have assembled data on men's heights from various sources for eleven European countries going back into the late 1850s or early 1860s.[30] Unfortunately there are very few historical data on the heights of *women,* because the information on men's heights typically comes from measurement during recruitment for armies. For those born in the middle of the nineteenth century, the height of the average European adult man was 166.7 centimeters (cm), or 5 feet 5.5 inches. For those born a little over a hundred years later, in the five years from 1976 to 1980, the average was 178.6 cm, or 5 feet 10.5 inches. In the country that grew the least—France—the rate of growth was 0.8 cm for each decade; in the fastest-growing—the Netherlands—the rate of growth was 1.35 cm for each decade. Men in most of the other countries grew taller by something close to 1 cm for every decade. Hatton has tracked these improvements back to their underlying causes and, in line with the arguments of this chapter, finds that the reduction in infant mortality—an indication of an improved disease environment—was the most important factor, with growth in income in second place.[31] As Europe made its escape from too little food, and the "cloacal infernos"[32] created by the Industrial Revolution, people's bodies began to grow toward the heights that had always been possible but were previously unachievable.

For most of the world today, there is only fragmentary historical information, but we do have good information on the heights of women from many of the Demographic and Health Surveys discussed in Chapter 2. (The most recent of these surveys measured men too.) Each survey gives us historical information because it measures people aged 15 to 49. Because people's heights do not change once they reach their adult height (or at least not until they start shrinking after age 50), each survey gives us the average adult heights of people born over a period of twenty or more years. So not only do these surveys give us the average heights of female adults in the country at the time of the survey, but by comparing older and younger women we can also see how fast heights are growing. In countries that are doing well, the older women will be a centimeter or two shorter than the younger women.

Figure 5 shows women's heights around the world. Each of the points in the figure is for a "birth cohort" of women for a country; it is the average height in centimeters of all the women born in a particular year, say 1960. That average is plotted against average national income in that country in the women's year of birth, and once again I have used a log scale for income. At the top right of the picture, for example, we see European women getting taller as their national incomes rose; women born earlier are at the bottom left of the European group, and women born later are at the top right. The United States is shown as a spur on the right; Americans have been growing taller but not as quickly as Europeans. In the middle and to the left of the diagram we see the women of poor and middle-income countries. The dark circles are for Africa and appear mostly to the left, because African countries were poor when these women were born, just as they are poor today. (The rich Africans on the right of the diagram live in Gabon, whose oil exports give it a high per capita income, although most of its inhabitants remain poor.) Nestled among the

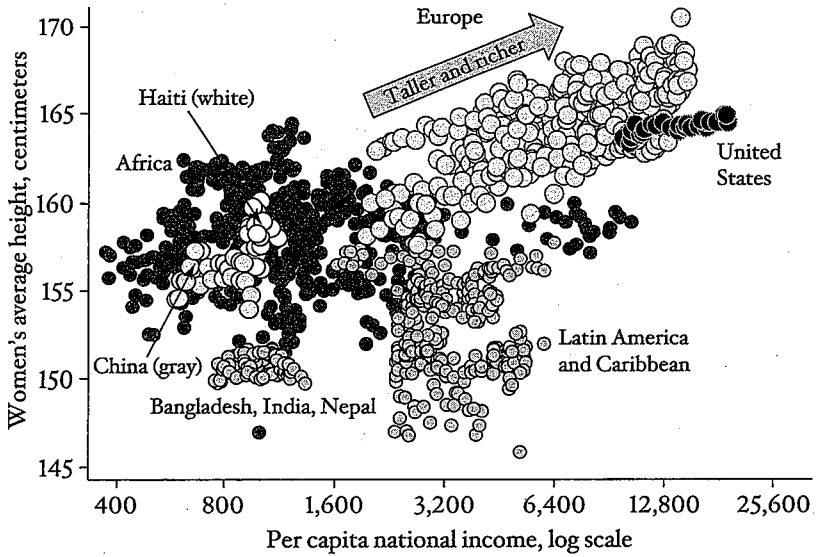

FIGURE 5 Women's heights around the world.

Africans are Haitians (white circles), most of whom are of African descent, and whose heights and incomes give them much in common with Africans in Africa. China (in gray) is also on the left, and Bangladesh, India, and Nepal are on the bottom at the left. Remember that we are looking at incomes in the years in which these now-adult women were born, typically 1980 or earlier, so that China and India show up as much poorer than they are today. Latin American and Caribbean women, who live in middle-income countries, appear in the lower middle part of the figure.

Perhaps the most startling feature of the diagram is the enormous inequality of average heights around the world. For women born in 1980, the average adult Dane was 171 cm, the average Guatemalan was 148 cm, the average Peruvian or Nepali 150 cm, and the average Indian, Bangladeshi, or Bolivian 151 cm. If the shortest populations in the world were to grow at the European rate of 1 cm every decade, it

would take 230 years for the Guatemalan women to be as tall as Danish women are today. Today, a Danish woman visiting a Guatemalan village would tower 9 inches above her hosts, a modern Gulliver in a modern Lilliput.

Looking from bottom left to top right, people in better-off countries are taller than people in poorer countries, which is what we might expect if higher incomes come with better sanitation, lower rates of childhood disease, and more to eat. But things are not quite so simple. Imagine the figure redrawn with Europe and the United States blanked out. For the rest of the world, the relationship between height and income goes the wrong way, with the *taller* people living in the *poorer* countries. A lot of this has to do with Africa. There is a lot of variability across African populations—think of Dinka basketball players from southern Sudan or the bushmen of the Kalahari—but on average African women are tall, not relative to Europeans but relative to South Asians and many Latin Americans. This negative relationship between heights and incomes is not about to go away any time soon, because Indian children born today are *still* very short, in spite of the rapid growth of the Indian economy in recent decades.

Why Africans are so tall is not well understood. One reason is that, in much of the continent, food is neither so scarce, nor so heavily vegetarian, as in much of South Asia, particularly India. Obviously, this is not true in some places—the Kalahari Desert, for example—but in most African countries, people eat a varied diet that includes meat and animal fats. There is also great variability in Africa, depending on local food availability and local disease environments. At the same time, mortality rates among children are extremely high, and if the shorter children are weaker and more likely to die, the survivors will be relatively tall. For this to produce a tall population, mortality has to be very high, high enough to sweep away a large enough fraction of short children and to overcome the stunting effect of living through

a dangerous disease environment in childhood. Sanitation may be another factor; in places where people defecate in the open, and where population density is high, child growth is stunted by chronic exposure to fecal germs. Africa, with its much lower population density, does better than India.[33]

The fact that residents of many African nations are taller than those of India, or of several countries in Latin America, should help us resist the superficially attractive idea that population average heights can be used as some overall measure of wellbeing or of the standard of living. Mortality and income are two of the most important influences on adult height, and they are also crucial for wellbeing. But there is no guarantee that the way that disease and poverty affect height is the same as the way that they affect wellbeing. And as the map of Africa attests, many local factors—such as variations in diet—affect height, and these local factors may or may not affect wellbeing. Recall too that it can take many generations for populations to grow taller, because the mothers have to grow before the children, the grandmothers before the mothers, and so on. It is not just today's nutrition and today's diseases that determine today's height; history matters too. All of this means that average height is not a sensible measure of wellbeing.

The fact that South Asians are so short is perhaps the most informative part of the whole picture. Because we do not have historical data on European women, we do not know how far we have to go back to get to modern Indian heights. However, the latest Indian data include men, and it turns out that the average height of Indian men born in 1960 was 164 cm: 2–3 cm shorter than the European average in 1860, similar to European heights in the eighteenth century, and only 5 cm taller than the lowest figures in the literature, 159 cm from contemporary bushmen and from Norway in 1761.[34] In Sikkim and

Meghalaya, states in northeastern India, the average heights of men born in 1960 are actually less than 159 cm.

It is possible that the deprivation in childhood of Indians born around midcentury was as severe as that of any large group in history, all the way back to the Neolithic revolution and the hunter-gatherers that preceded them. Life expectancy in India in 1931 was 27, also reflecting extreme deprivation. Indians, even in the twentieth century, lived in a Malthusian nightmare. As in Malthus, death and deprivation kept the population in check, but even for the survivors, the conditions of life were terrible. Not only was there insufficient food to maintain good health, but its makeup also lacked important nutrients. Most people ate a monotonous diet of a single cereal, supplemented by a few vegetables, lacking iron and adequate fat. In order to survive at all, even with a life expectancy in the 20s, the whole population had to be short, just as were the populations of England in the seventeenth and eighteenth centuries. The Malthusian imperative trades off more people for shorter people.

India is today escaping from this nightmare, but it still has a long way to go. Indian children are still among the skinniest and shortest on the planet, but they are taller and plumper than were their parents or grandparents, and the signs of gross hunger, such as marasmus, are now rarely seen in nutritional surveys. Indians too are now growing taller, decade by decade, though not as quickly as happened in Europe, or indeed as is now happening in China, where people are growing at about (the now familiar figure of) a centimeter every decade. Yet the Indian escape is only half as fast—about *half* a centimeter a decade—and that figure is for *men;* Indian women are growing too, but at a much slower rate, so that it takes them sixty years to grow a centimeter.[35]

We do not know why Indian women are doing so much worse than Indian men; the reason is surely linked to general patterns of favoring

sons in north India, though exactly how this works is not known. In south India, in Kerala and Tamil Nadu, which have no tradition of bias against girls, both men and women are growing taller at the standard centimeter-a-decade rate, but in the north, women are growing more slowly than men, who are themselves growing less fast than their counterparts in the south. An irony of this sort of discrimination against women is that it rebounds against the men, because men, just like women, have unduly small and undernourished women as mothers, compromising their own prospects for physical and cognitive development.

In Africa, although people are taller on average, women in some places are actually getting *shorter*.[36] Although, as we have seen, it is not always true that better-off people are taller, there is a strong correlation around the world between getting richer and getting taller. This is most obviously true in Europe, and the growth has been sufficiently prolonged for it to be visible in Figure 5, but it is also true in modern China, India, and elsewhere. So the most likely reason that African women are shorter than their mothers is falling real incomes in Africa in the 1980s and early 1990s.

The world's peoples are not just living longer or getting richer; their bodies are getting taller and stronger, with many good consequences, including even possibly an increase in cognitive ability. But as with mortality and money, the distribution of benefits has been unequal. At current rates, it will take centuries for the Bolivians, Guatemalans, Peruvians, or South Asians to become as tall even as Europeans are today. So while many have made their escape, millions more are left behind, resulting in a world of difference in which inequality is apparent even in people's bodies.

PART II MONEY