The Poor Die Young: What's Killing Them?

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By Christopher Jencks

All over the developed world the poor die younger than the rich, blue-collar workers die younger than white-collar workers, and secondary school graduates die younger than university graduates. Such disparities in life expectancy are far smaller than they were in the nineteenth century. But at least in the United States and Britain they are larger today than they were a generation ago, with those near the top of the hierarchy usually living five to seven years longer than those near the bottom.

There is no consensus about the reasons for such disparities, so discussions tend to follow a predictable political script. Conservatives mostly assume that people with less education and less money die young because they are ignorant, irresponsible, or both. There is no shortage of evidence for such claims. Those with less education and income are more likely to smoke, drink heavily, and be overweight. But while these differences affect longevity, they cannot explain most of the mortality gap between either the rich and the poor or the more and less educated. The less educated and less affluent are also less likely to get regular medical checkups when they are healthy and less likely to follow their doctor's advice when they are sick. No one knows the full effect of these differences, but few experts think the entire mortality gap between rich and poor would disappear if the poor saw doctors more often and paid more attention to medical advice.

Unlike conservatives, liberals tend to blame health disparities on the way market societies are organized. Liberals argue, for example, that one reason the poor and near-poor get less medical care than they need is that their employers are less likely provide health insurance, and they do not earn enough to buy insurance or pay for medical care out of their own pockets. Liberals also argue that those with less education and income lead more stressful lives, and cite evidence that stress can make people more vulnerable to a variety of illnesses, ranging in severity from a common cold to a heart attack. In addition, of course, stress seems to increase the odds that people will smoke, drink, and over-eat. Once again, however, no one has yet made a convincing case that these problems account for the entire mortality gap between either the rich and poor or the more and less educated.

Bruce Link, an epidemiologist at Columbia, has argued that social and economic advantages are what he calls a "fundamental cause" of variation in longevity.[1] By this he means that even when society eliminates one link between socioeconomic advantages and longevity, new links always emerge. As a result, social and economic advantages are correlated with longevity in every society for which we have data, even when the principal causes of death in these societies are very different. Social and economic advantages are also correlated with mortality rates at every age, even though causes of death change dramatically as people move from infancy to childhood to maturity to old age. Link's story does not specify precisely which kinds of social and economic advantages matter most, and sorting this out has proven difficult. For brevity, therefore, I will often refer to disparities between "higher and lower classes,." when I mean disparities between individuals occupying different runs of the educational, occupational, or income ladder. This shorthand is deliberately vague, leaving open the question of which advantages really matter. As we shall see, however, neither income nor education is the whole story.

Although educational and economic advantages are always correlated with longevity, the size of the correlation varies significantly from one place to another, even when we focus exclusively on rich democracies. Thus there is no evidence that affluent societies can completely eliminate class disparities in life expectancy, those with unusually large disparities could almost certainly reduce them if that were a high political priority. Before discussing how this might be done, however, a little history is instructive.

England's dark Satanic mills

In 1844, four years before he co-authored *The Communist Manifesto*, Friedrich Engels wrote a less celebrated book called *The Condition of the Working Class in England*. Engels' critique of industrial capitalism argued that England's new economic system was killing off the very workers on whom it depended. His most telling evidence for class differences in mortality came from a town outside Manchester called Chorlton-

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[1] Bruce Link and Jo Phelan "Social Conditions as Fundamental Causes of Disease," Journal of Health and Social Behavior" (1995) 35: 80-94.

on-Medlock, where a surgeon named P. H. Holland had categorized every street and every house as first class, second class, or third class. In the best houses on the best streets, two percent of the residents died every year. In the worst houses on the worst streets, four percent died.[2]

Holland did not calculate the effect of these differences on life expectancy, but half a dozen other nineteenth century observers did. Like Holland, most of them divided the population into three classes. The top class, whom one writer called "the servant-keeping class," usually included families headed by members of the professions and by "gentlemen" with substantial wealth.   The "middling classes" included families headed by tradesmen and farmers. At the bottom were families headed by factory operatives, laborers, and servants. Local estimates suggested that infants born into the top class typically lived about 45 years. Estimates for the bottom class ranged from 5 years in Preston (a Lancashire mill town) to 24 years in York (a Northern cathedral town).[3] These estimates suggest that life expectancy in the "servant keeping class" exceeded that in "the lower orders" by twenty to forty years.

Engels offered several explanations for such differences. Workers' wages, he said, were so low that their families could not afford a varied diet and often suffered from chronic hunger, making them more vulnerable to disease. He also noted that most workers lived in cold, damp, unventilated, and overcrowded housing, and that sanitary conditions in working-class neighborhoods were abysmal. Finally, manual workers could not afford professional medical care, so they often turned to alcohol, opiates, and quack remedies that lowered their resistance to disease instead of helping them get better.

Engels' ideas about why English workers died in such large numbers have withstood the test of time better than his ideas about the inevitable collapse of capitalism. The role of sanitation in controlling the spread of water-born diseases like typhoid became clear soon after he wrote. The role of crowding and poor ventilation in spreading airborne diseases like influenza, bronchitis, pneumonia, and tuberculosis also became clear once the germ theory of disease was accepted late in the nineteenth century. The

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[2] Friedrich Engels, *The Condition of the Working Class in England, pages to come*.

[3] Aaron Antonovsky, "Social Class, Life Expectancy and Overall Mortality," *Milbank Memorial Fund Quarterly* (April 1967), 45(2):31-73.

connection between poor nutrition and vulnerability to infection is now also universally accepted. The one explanation that a modern epidemiologist might challenge is that English workers died young because they could not afford to seek advice from physicians. Many epidemiologists now believe that the treatments physicians dispensed in the 1840s probably did more harm than good. Nonetheless, Engels may have been right, because the remedies to which the poor turned when they could not afford medical care may have done even more harm than those that physicians offered.

English workers' nutrition, sanitation, housing, and medical care improved dramatically between 1840 and 1940, as did the English statistical system. By the time of its 1931 Census, England's Registrar General was assigning every family to one of five classes, based on the principal breadwinner's current or former occupation.[4] High level professionals, administrators, and their families were in Class I. Lower level professionals, managers, technicians, and their families were in Class II. At the bottom of the ladder, Classes IV and V were composed of semi-skilled and unskilled manual workers plus their families. Because England also required death certificates to indicate the usual occupation of the deceased, the Registrar General's office could compare the number of deaths among, say, fifty year old men in Class I to the total number of 50 year old men in Class I at the time of the Census.

Using these death rates, demographers could project how long the members of each class would live if mortality rates were to remain unchanged in the future. If 1931 mortality rates had persisted, men in Class I would have lived 63 years while men in Class V would have lived 56 years.[5] The longevity gap between men near the top and bottom of the occupational ladder had thus fallen from twenty or more years in the 1840s to about seven years in 1931. Elsie Pamuk, an American demographer, has shown that class differences in English mortality continued to fall between 1931 and 1951, but that the gap widened between 1951 and 1971.[6] This trend continued from 1971 to 2005.[7]

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[4] The Registrar General's reports actually combine data for England and Wales, but for brevity I will refer only to England in he text.

[5] Christopher Tietze, "Life Tables for Social Classes in England," *Milbank Memorial Fund Quarterly* (April 1943) 21:182-87.

[6] Elsie Pamuk, "Social Class Inequality in Mortality from 1921 to 1972 in England and Wales," *Population Studies* (1985) 39:17-31.

Interpreting such tends is complicated by the fact that a man's physical and mental health can affect his occupation as well as the other way around. Because men with physical or mental health problems often have to take a less demanding jobs, the fact that they die young is no surprise, and may not have much to do with their working conditions, wages, or social position. This is especially true for those holding unskilled manual jobs at the bottom of the occupational ladder. The gap between Class I and Class IV (semi-skilled manual workers) may therefore be a better measure of trends in class disparities. In England, the longevity gap between Classes I and IV rose from 4.5 years in 1972-81 to 5.2 years in 1997-2005, whereas the average gap between Classes I and V rose from 6.2 to 7.7 years. Either way, the gap clearly widened.

What could explain this reversal in the earlier trend toward more equal life expectancies? One answer may be that the causes of death changed. By the 1970s advances in medical knowledge, better nutrition, better housing conditions, and better sanitation had almost eliminated deaths from infectious diseases not only in England but in other rich countries. (AIDS, of course, is an important recent exception to this trend.) Among people under the age of forty-five, the big killers are now injuries, murder, and suicide. Among those over forty-five, the big killers are heart disease and cancer. These threats do not diminish as living standards rise; indeed, some of them may increase. And while medical progress has made both heart disease and accidents less lethal, their incidence is still much higher among manual than non-manual workers.

It is tempting to attribute occupational differences in longevity to working conditions and pay gradients, but the famous English study of the subject makes such explanations seem inadequate. The study in question was led by Sir Michael Marmot, a London physician and epidemiologist, and is known as the "Whitehall" study, because it focused on civil servants who often worked on that street. The first Whitehall study began tracking 19,000 middle-aged male civil servants in the late 1960s. Like the civil service, Marmot divided these men into four groups: an "administrative class" who held

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[7] According the Government Actuary's Department in the UK, the mean disparity in life expectancy between classes I and V rose from 6.2 years in 1972-81 to 7.7 years in 1997-2005 (Office of National Statistics. "Trends in Life Expectancy by social class 1972-2005," London, 2007, accessed 4/21/2009 at www.statistics.gov.uk/downloads/theme_population/Life_Expect_Social_class_1972-05/life_expect_social_class.pdf).

policy-making jobs, an "executive" class that included managers and professionals responsible for implementing policy, a clerical class that moved paper, and a residual group that ran elevators, drove cars, and maintained buildings and equipment. All these men had steady work, and all were paid a living wage by British standards. None did work that was unusually dangerous or physically exhausting. All had access to the National Health Service. Nonetheless, only 5 percent of those in the administrative class died before reaching sixty-five, compared to 7 percent of the executive class, 12 percent in the clerical class, and 18 percent of the residual class.[8] Marmot and his collaborators have investigated many explanations for these disparities. Health differences at the time of the initial physical examination did not explain much of the mortality gradient. Smoking, blood pressure, cholesterol, and glucose intolerance explained about a third of the gradient. Marmot thinks stress is a major factor in the differences, but it is not at all obvious that top civil servants live less stressful lives than those who drive them from one appointment to another.

How typical is England?

England is the only place that regularly estimates life expectancy for broad occupational classes, but many rich countries now calculate death rates for men and women who worked in specific occupations before they died. Some of these countries follow the English practice of trying to record the last occupation of everyone who ever worked. Others only record the occupation of men and women who were still working when they died. Because men in unskilled and semi-skilled jobs leave the labor force younger than men in skilled occupations, failure to record occupations for those who are no longer working means that many unskilled workers who died young are omitted when life expectancies are calculated for their occupation. This omission makes the mortality gap between skilled and unskilled workers look smaller than it really is.

During the 1990s a group of Dutch researchers led by Anton Kunst at Erasmus University in the Netherlands developed a method for adjusting occupational death rates

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[8] Michael Marmot and Martin Shipley, "Do Socioeconomic Differences in Mortality Persist after Retirement? 25 Year Follow Up of Civil Servants from the First Whitehall Study," *British Medical Journal* (November 9, 1996) 313:1177-80.

to take account of the bias introduced by omitting men without occupational data.[9] They then estimated the "true" mortality gap between manual and non-manual workers in eleven West European nations, focusing on men between the ages of 45 and 59. The gap was widest in France, where 28 percent of manual workers and 16 percent of non-manual workers died between their 45th and 60th birthdays – a gap of 12 percentage points. In Finland the gap was 10 points. In the other nine countries it was between 5 and 8 points.

The Dutch investigators had expected the wage gap between manual and non-manual workers to affect the mortality gap between such workers, but the relationship turned out to be extremely weak. In the four Scandinavian countries, where wage rates were among the most equal in the world, the mortality gap between manual and non-manual workers aged 45 to 59 averaged 6.7 points. In the other seven West European countries that the Dutch group studied, where wages were more unequal, the mortality gap between manual and non-manual workers averaged 7.1 points.[10] Even in England under Margaret Thatcher the mortality gap between manual and non-manual workers was only 7.5 points.

More recently, another group led by Johan Mackenbach has compared mortality differentials between more and educated residents of England, France, Switzerland, Belgium, and the four Scandinavian countries during the 1990s.[11] Random samples of adults initially aged 30 to 74 were followed for five to ten years, depending on the

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[9] Anton Kunst, Feikje Groenhof, Johan Mackenbach et al. 1998. "Mortality by Occupational Class among Men 30-64 Years in 11 European Countries." *Social Science and Medicine*. 46(11): 1459-76.

[10] While wage inequality does not seem to affect class differences in mortality, family income does seem to be related to disparities in how healthy people feel. Eddy van Doorslayer, a Dutch health economist, has studied the relationship between family income and self-reported health in nine rich democracies. This association is strongest in the United States and Britain and weakest in Scandinavia. Disparities in family income gap are also largest in the United States and Britain and smallest in Scandinavia. See Eddy van Doorslaer, Adam Wagstaff et al. "Income-related Inequalities in Health: Some International Comparisons." *Journal of Health Economics* 16 (1997) 93-112, and Johan Mackenbach et al. "Socioeconomic Inequalities in Health in 22 European Countries." *New England Journal of Medicine* (2008) 358 (23):2468-2481.

[11] Johan Mackenbach et al. "Socioeconomic Inequalities in Health in 22 European Countries." *New England Journal of Medicine* (2008) 358 (23):2468-2481. Although this study does cover 22 countries, only 18 of them had mortality data, only ten were in western Europe, and two of these ten (Italy and Spain) only provided data on a couple of major cities.

country. Just as in the earlier study of disparities between manual and non-manual workers, the gap between the most and least educated men was highest in Finland and France. In France, half the gap was traceable to causes related to alcohol, smoking, and medical conditions that are amenable to medical intervention if properly treated. In Finland these factors explained a third of the gap. Disparities between the most and least educated men were smallest in England and Sweden.

Like many others before them, Mackenbach and his colleagues also found that education had far less effect on mortality among women than among men. This was true in every country they studied. More surprising was the fact that the countries where education had big effects on male and female mortality were not the same. In France, where men had high mortality rates and there were big differences between more and less educated men, women had unusually low mortality rates and the differences between more and less educated women were less than half as large as those among French men. The effects of education on longevity were biggest in Norway and Denmark and smallest in England and Switzerland. Once again, overall economic inequality does not seem to predict the size of these differences.

What about America?

The Mackenbach study did not include the United States, but we have roughly comparable data on the relationship between education and mortality among adults in the United States, England, Hungary, and the four Scandinavian nations during the 1980s. Using these data Samuel Preston and the late Paul Taubman showed that an extra year of education lowered a middle-aged man's chances of dying by roughly 6 percent in all seven countries.[12] However, educational disparities in life expectancy depend on the *absolute* reduction in age-specific mortality associated with additional education, not on the *percentage* reduction. Because the percentage reduction was similar in all seven

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[12] Samuel Preston and Paul Taubman. 1994. "Socioeconomic Differences in Adult Mortality and Health Status." In Linda Martin and Samuel Preston, editors. *The Demography of Aging*. National Academies Press, pp 279-318. Anton Kunst and Johan Mackenbach reached a different conclusion in "The Size of Mortality Differences Associated with Educational Level in Nine Industrialized Countries," *American Journal of Public Health* (June 1994), 84(6):932-37, perhaps because they used categorical measures of educational attainment rather than converting their measures to years.

countries, the absolute reductions were largest in the countries where middle-aged men were most likely to die, namely Finland, Hungary, and the United States. Just as in the Mackenbach study, education always had less effect on deaths among women than among men.

Preston and Taubman's mortality data covered the 1980s. Ellen Meara and her colleagues at Harvard have examined changes since then by comparing death rates among adults with a year or more of college to death rates among those with a high school diploma or less.[13] Life expectancy among those who had not attended college was no higher in 2000 than in 1990, while life expectancy among those who had attended college rose 1.6 years. As a result, the disparity in life expectancy between those who had and had not attended college rose from 5.4 years in 1990 to 7.0 years in 2000.

One possible source of differences between the United States and other rich countries is that Americans are more likely to have African ancestors. From 1960 to 1995 European Americans could expect to outlive African Americans by about seven years, but between 1995 and 2005 the gap fell from 6.9 to 5.1 years. The black-white mortality gap is smaller when we compare blacks to whites with the same amount of education and income, but it does not disappear. Nonetheless, the *increase* in longevity associated with an extra year of education is about the same for blacks as for whites.[14]

How important is the cost of health care?

One popular explanation for high death rates among Americans with low levels of education and income is that they do not have health insurance and cannot afford to pay for medical care out of their own pocket. The fact that educational disparities in the United States are about the same as occupational disparities in England suggests that this cannot be the whole story, since England's National Health Service is essentially free and

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[13] Ellen Meara, Seth Richards, and David Cutler. 2008. "The Gap Gets Bigger: Changes in Mortality and Life Expectancy, by Education, 1981-2000." *Health Affairs* 27(2):350-360. See also Irma Elo and Kirsten Smith, "Trends in Educational Differentials in Mortality in the United States," paper presented at the annual meeting of the Population Association of America, May 2003, available in abbreviated form at http://www.allacademic.com/meta/p_mla_apa_research_citation/1/0/7/5/4/p107547_index.html

[14] Preston and Taubman (1994).

available to all. Nonetheless, it is hard to believe that the high cost of medical care in the United States has no effect whatever on disparities in Americans' life expectancy.

Skeptics sometimes argue that cost cannot be important because the poor see doctors about as often as the affluent.[15] But the poor are also far more likely than the affluent to be sick. The fraction reporting a chronic health condition that limited their activities, for example, was 22 percent in 2006. Among those with incomes twice the poverty line, less than 9 percent reported such a condition.[16] The percentages reporting that their health was "fair" or "poor" were very similar.[17] Thus if medical care were allocated solely on the basis of need, the poor would probably see doctors far more often than the affluent.

The mismatch between physician visits and health problems has many causes, but cost is almost certainly one of them. If we set aside the elderly, almost all of whom have Medicare coverage, 30 percent of those with incomes less than twice the poverty line were uninsured in 2006, compared to 11 percent of those with incomes above this level.[18] The uninsured were also almost ten times as likely as the insured to report that there had been a time in the past year when they needed medical treatment but had not gotten it because they couldn't afford it.[19]

These differences are partly explained by the fact that older and sicker people make more effort to get insurance coverage, but that is not the whole story. In 1971 the RAND Corporation initiated an experiment that randomly assigned nearly 6,000 people to different health insurance plans for five years. All these plans covered medical expenses above an annual limit that varied with income. Until people reached that limit, however, their cost of care varied. In the most generous plan all medical and dental care was free. In the least generous plan patients paid 95 percent of the cost until they reached their annual limit. Patients who got free care consumed about 50 percent more medical

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[15] For doctor visits see *Health, United States, 2002*, Table 72.

[16] *Health, United States, 2008*, p284.

[17] *Health, United States, 2008*, p288.

[18] *Health, United States, 2008*, p439

[19] *Health, United States, 2008*, p329.

services than patients who had to pay 95 percent of the cost. This pattern held for the affluent as well as the poor.

Although people sought more medical care when it was free, health outcomes after five years were surprisingly similar for those who got free care and those who had to pay. The most important exception was blood pressure, which was significantly lower among patients whose care had been free. RAND estimated that if this difference had persisted – a big "if" -- free care would have lengthened patients' lives by about three months. Those who received free care also had better corrected vision and fewer unfilled cavities than those who had to pay. But while outdated glasses and unfilled cavities obviously affect people's well-being, they do not kill many people.

The RAND experiment was too small and too short to determine how free care would affect longevity over the long haul. One way to do that is to compare the United States and England. If we look at infant mortality, class differences look rather similar in the two countries. In 2001, for example, mortality during the first year of life was 0.7 percent for English infants with fathers in skilled non-manual jobs and 0.4 percent for those with fathers in unskilled or semi-skilled manual jobs.[20] In the United States, 0.8 percent of infants born to mothers over twenty died before their first birthday if their mother had not completed high school, while only 0.5 percent died before their first birthday if their mother had completed a year or more of college.[21] But while this comparison shows that half a century of free care has not obliterated class differences in English children's health, it does not show us what would have happened in England if it had not created a National Health Service after World War II.

A somewhat better way to assess the impact of free care is to look at what happens after it is introduced. Between 1979 and 1992, for example, Congress dramatically expanded Medicaid eligibility for pregnant American women and low-income children. Because states pay a large fraction of Medicaid costs, however, different states expanded their coverage at different rates. Janet Currie and Jonathan

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[20] Office for National Statistics, *Mortality Statistics: Childhood, infant and perinatal*. Series DH3, no. 34, Table 20:
http://www.statistics.gov.uk/downloads/theme_health/Dh3_2001/DH3_34.pdf.

[21] *Health United States 2008*, p190.

Gruber, who are economists at Columbia and MIT respectively, have shown that infant mortality and low birth weight declined unusually rapidly when states broadened their coverage of pregnant mothers.[22] Childhood mortality also fell faster when states covered low-income children.[23] These results suggest that free care matters, at least for children, although the impact was quite small.

The introduction or Medicare and Medicaid in 1965 tells a different story about free care for the elderly, however. Amy Finkelstein and Robin McKnight, economists at MIT and the University of Oregon respectively, have shown that the introduction of Medicare had no effect on mortality rates among the elderly between 1965 and 1975, although it did lead to a big reduction in out-of-pocket medical spending, making recipients better off economically.[24] This finding also suggests that increasing the discretionary income of the elderly does not prolong their lives.

David Card and two other California economists have investigated the current impact of Medicaid by looking at what happens when the uninsured sixty-four year olds become eligible for Medicare.[25] Among sixty-four year olds, roughly 12 percent are uninsured. Once Americans turn sixty-five, almost all of them become eligible for Medicare. Poor sixty-five year olds also become eligible for Medicaid, which covers the cost of their prescription drugs and Medicare co-payments. Card and his colleagues found that sixty-five year olds are more likely than sixty-four year olds to report having seen a doctor within the past year and less likely to report having delayed or foregone medical care because of its cost. Most of these changes are especially marked among the two groups least likely to have health insurance at age sixty-four, namely less educated African Americans and Hispanics. But such changes do not reduce the chances of dying.

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[22] Janet Currie and Jonathan Gruber, "Saving Babies: The Efficacy and Cost of Recent Changes in the Medicaid Eligibility of Pregnant Women." *Journal of Political Economy* (December 1996) 104(6):1263-96.

[23] Janet Currie and Jonathan Gruber, "Health Insurance Eligibility, Utilization of Medical Care, and Child Health." *Quarterly Journal of Economics* (May 1996) 111(2):431-66.

[24]Amy Finkelstein and Robin McKnight. 2008. "What Did Medicare Do? The Initial Impact of Medicare on Mortality and Out-of-Pocket Medical Spending." *Journal of Public Economics* 92(7):1644-1668.

[25] David Card, Carlos Doblin, and Nicole Mestas, "The Impact of Nearly Universal Insurance Coverage on Health Care Utilization and Health: Evidence from Medicare." National Bureau of Economic Research, Working Paper 10365, March 2004.

Death rates rise steadily with age, and there is no slowdown in this upward trend when Americans turn sixty-five. The reason seems to be that Americans get treated for most life-threatening conditions even when they are uninsured. Card and his collaborators found that being over sixty-five had no detectable effect on hospital admissions for heart attacks, bronchitis, or pneumonia, all of which are potentially life threatening for the elderly. Nor did the rise in doctor visits after turning sixty-five increase Americans' chances of getting preventive care, giving up smoking, losing weight, or exercising regularly, all of which might have lengthened their lives.

Comparing the United States to Canada reinforces Card and his colleagues' American findings. Canada's version of Medicare covers Canadians of all ages. Death rates prior to age sixty-five are higher among Americans than Canadians, but this mortality gap does not diminish after they turn sixty-five.[26] This is what we would expect based on what happens to Americans after they turn sixty-five. Perhaps the Canadian elderly outlive the American elderly because death rates among the elderly depend partly on whether they got the medical care they needed before they turned sixty-five. Or perhaps Canadians outlive Americans for reasons that have nothing to do with the price of medical care.

Although free care does not seem to make the elderly live longer, it does seem to make them feel better. Card and his collaborators found that becoming eligible for Medicare reduces the normal age-related increase in people's chances of saying that their health is "fair" or "poor." Medicare eligibility also increased the frequency of heart bypass surgery, hip replacements, and knee replacements. These procedures do not make patients live longer, but they usually reduce chronic pain and improve the quality of subsequent life. Since becoming eligible for Medicare also leads to somewhat more doctor visits, it probably leads more patients to ask their doctor about symptoms that worry them. In most cases the doctor probably tells them that these symptoms are just the normal price of growing old, not the first signs of a fatal illness. If we focus only on longevity, such reassuring consultations look like a waste of money. But if you think you might have cancer, being told that you don't can make you feel a lot better.

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[26] Card, Dobkin, and Maestas, op cit.

Free medical care also has another benefit that is even harder to quantify. Many citizens of rich democracies want to feel that they live in a society where we all feel reciprocal obligations to one another. If you have such feelings, you are likely to think that when someone else is in pain because they need a hip replacement or a bypass, we should all do what they can to alleviate their pain, even if pain reduction does not lengthen life.

Do the poor get worse care?

Another popular explanation for economic disparities in life expectancy is that when the poor go to a physician or a hospital they tend to get inferior care. When medical innovation makes it possible to treat a condition, for example, deaths initially decline by a larger percentage among the affluent than among the poor. A Dutch group led by Johan Mackenbach at Erasmus University analyzed deaths in England from 22 medical conditions that had become more amenable to treatment between 1931 and 1981.[27] The percentage reduction in deaths from these conditions was consistently larger among skilled white-collar workers than among unskilled and semi-skilled manual workers. A team led by Jo Phelan, an epidemiologist at Columbia, has found a similar pattern in the United States.[28]

The fact that medical innovation cuts mortality more among skilled than unskilled workers could reflect differences in how physicians and hospitals treat patients from different backgrounds. Alternatively, skilled workers may be more likely to seek treatment, may seek it sooner, may understand their physician's recommendations better, or may follow these recommendations more carefully. Manual workers may also tend to have other medical problems that make successful treatment of the presenting problem more difficult. A reasonable guess is "all of the above." That obviously leaves lots of room for contentious political arguments.

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[27] Johan Mackenbach, Karien Stronks, and Anton Kunst. "The Contribution of Medical Care to Inequalities in Health: Differences Between Socio-Economic Groups in Decline of Mortality From Conditions Amenable to Medical Intervention." *Social Science and Medicine* (1989) 29(3):369-76.

[28] Jo Phelan, Bruce Link, Ana Diez-Roux, Ichiro Kawachi, and Bruce Levin, "'Fundamental Causes' of Social Inequalities in Mortality: A Test of the Theory." *Journal of Health and Social Behavior* (2004) 45:265-285.

As already indicated, what matters for longevity is not the percentage decline in deaths from a given cause but the absolute decline. In England, for example, pneumonia was twice as likely to kill an unskilled or semi-skilled manual worker as a skilled white-collar worker in 1931. So despite the fact that a skilled manual worker's chances of dying from pneumonia fell 80 percent while an unskilled or semi-skilled manual worker's chances fell only 65 percent, the absolute decline was larger for manual workers, because (0.65)x(2) is larger than 0.80. The same pattern held for respiratory tuberculosis and syphilis. Antibiotics played a role in all of these declines.   Thus while the introduction of antibiotics may have led to a larger percentage reduction in mortality from pneumonia, tuberculosis, and syphilis among skilled white collar workers, it probably lengthened the lives of the less skilled manual workers more than the lives of highly skilled white collar workers.

Medical innovations do not always favor the disadvantaged in this way. If we set aside tuberculosis, pneumonia, and syphilis, deaths from the other conditions that became more amenable to treatment were as common among skilled non-manual workers as among relatively unskilled manual workers in England during 1931. Since the baseline death rates were the same and the percentage declines were larger among skilled non-manual workers, the medical innovations that reduced these causes of death lengthened the lives of skilled non-manual workers more than the lives of other groups. The picture is equally mixed between 1961 and 1981. The implication is clear: we cannot count on technical progress to reduce disparities in life expectancy. If we learn how to treat conditions that kill the poor more often than the affluent, the longevity gap may well narrow. But if we learn how to treat conditions that are equally likely to kill all groups, the longevity gap is likely to widen if the treatment requires individual action, because the better educated and more affluent will be more likely to get the treatment.[29]

In most cases, however, these differentials seem to be fairly small, even in the United States. The US government now audits Medicare records to see whether elderly patients are getting the services that medical specialty boards recommend for various problems. Medicare records do not include information on a patient's income or

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[29] Adriana Lleras-Muney and Frank Lichtenberg. "Are the More Educated More Likely to Use New Drugs?" *Annales d'Economie et Statistique* (2006) Vol 79/80.

education, but they do indicate whether the patient is also covered by Medicaid, which is available only to low-income patients. John Hebb and two colleagues at the Centers for Medicare and Medicaid Services have compared both the hospital services and the preventive care received by Medicare patients eligible for Medicaid to the care received by all Medicare patients.[30] Those eligible for Medicaid were less likely to get fourteen of the fifteen treatments that specialty boards recommended, but the average difference was quite small (62 versus 65 percent). The gap was largest for preventive care (flu shots, mammograms, and pneumonia vaccinations), presumably because patients usually have to request these services in order to get them. And even for preventive care the gap between those eligible for Medicaid and the average Medicare patient averaged only 9 percentage points. For quality of hospital care the differences were tiny. These findings suggest that difference in the quality of care are unlikely to play a major role in the longevity gap.

Looking after ourselves

Many patients cannot understand the instructions on prescription labels. A typical American test of such skills begins by explaining that the researcher is trying to find out which instructions people find easiest to understand. The patient is then handed a piece of paper that reads:

> "Take medication on an empty stomach one hour before or two to three hours after a meal unless otherwise directed by your doctor.

Next, the patient is asked:

> "If you eat lunch at 12:00 noon, and you want to take this medicine before lunch, what time should you take it."

In a test that contains four such questions, patients at an inner-city hospital are likely to get two right and two wrong.[31]

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[30] John Hebb, Dawn Fitzgerald, and Weihong Fan. "Healthcare disparities in disadvantaged Medicare beneficiaries: a national project overview." Journal of Health and Human Services Administration, Summer 2003, 26:153-73.

[31] David Baker et al, "Development of a Brief Test to Measure Functional Health Literacy," *Patient Education and Counseling* (Sept 1999) 38(1): 33-42.

Such cognitive limitations have repercussions that go beyond reading prescription labels. Diabetics with low scores on such tests have more vision problems and worse blood counts, even after taking account of differences in age, socioeconomic status, social support, and type of treatment.[32] Medicare patients with low scores are less likely to get flu shots, pneumonia vaccinations, mammograms, and pap smears, even after taking account of differences in formal education, health status, and physician visits.[33]

Such measures of "health literacy" are basically just reading and math tests that use medical examples. As one would expect, adults with more schooling tend to do better on these tests, partly because children who find reading and math easy tend to stay in school longer, partly because staying in school longer improves students' reading and math skills, and partly because staying in school leads to jobs in which workers practice these skills. Separating the effects of education from the effects of early differences in academic skills is obviously a difficult task.

Among AIDS patients getting highly active antiretroviral therapy, those with more schooling are likely to follow the prescribed regimen more closely. As a result, they have better cell counts and are more likely to describe their health as "excellent" or "good." Dana Goldman and James Smith of the RAND Corporation, who studied such patients, found that scores on an abstract reasoning test accounted for most of the differences between more and less educated patients.[34] But they could not tell how much staying in school had raised test scores and how much high initial scores has increased schooling.

One way to distinguish the effects of schooling from the effects of family background and initial ability is to find natural experiments in which changes get more education for reasons that that cannot plausibly be traced to improvements in their family background or test performance in the early years of school. Between 1915 and 1939, for

[32] D. Schillinger et al., "Association of Health Literacy with Diabetic Outcomes," *Journal of the American Medical Association* (July 24-31, 2002) 288(4):475-82.

[33] T.L. Scott, J.A. Gazmararian, M.V. Williams, and D.W. Baker, "Health literacy and preventive health care use among Medicare enrollees in a managed care organization." *Medicare Care* (May 2002) 40(5)395-404.

[34] Dana Goldman and James P. Smith. 2002. "Can Patient Self-Management Help Explain the SES Gradient?" *Proceedings of the National Academy of Sciences* 99(16):10929-34.

example, most American states raised the age at which teenagers were legally allowed to leave school. As one would expect, school leaving laws were not always rigorously enforced, but increases in a state's school-leaving age did increase the educational attainment of adolescents living in that state relative to adolescents in other states. Adriana Lleras-Muney, an economist at UCLA, has also shown that adolescents affected by changes in school leaving laws probably lived longer after they became adults.[35] The data were not precise enough to settle this question, but they suggest that an extra year of schooling could have raised longevity as much as half a year. Some of this gain presumably reflected the fact that those who stayed in school were better at figuring out what they should do to look after themselves.

Janet Currie and Enrico Moretti have also studied changes in American counties that opened new colleges between 1940 and 1996.[36] New colleges are more likely to open in counties where demand for higher education is growing, but the exact year when the college opened is likely to be fairly random. Yet as soon as a new college opened, more local high school graduates began to enter and complete college. Furthermore, when local women in the birth cohorts affected by a college opening had a child, they were more likely to be married and more likely to get prenatal care than women born a year or two earlier.

Despite such evidence, Americans' faith in schooling seems to have eroded in the last third of the twentieth century. The fraction of young people earning regular high school diplomas has leveled off, hovering between 70 and 75 percent. It is true that more dropouts took "high school equivalency" exams, which led to a steady increase in Census Bureau counts of high school graduates. But simply taking and passing an exam is unlikely to make dropouts better at looking after themselves. And while college entrance rates have risen sharply since 1970, and graduation rates have also edged up, the increase in educational attainment has been far slower than it was among those who turned sixteen

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[35] Adriana Lleras-Muney, "The Relationship between Education and Adult Mortality in the United States," *Review of Economic Studies.* (January 2005) 72(1):

[36] Janet Currie and Enrico Moretti. 2003. "Mother's Education and the Intergenerational Transmission of Human Capital: Evidence from College Openings." *Quarterly Journal of Economics* 118(4):1495-1532.

between World War I and the Vietnam War. Furthermore, the gap between the most and least educated young Americans is a little wider today than it was in the 1970s.

While cognitive skills are important for looking after oneself, they are not the whole story. Looking after yourself also requires self-control and a feeling that the future is will last a lot longer than the present. While some people doubtless enjoy exercising or going to the doctor, most of us do these things because we hope they will make us feel better in the future and perhaps even postpone our death by a few years. Those who contemplate giving up cigarettes or cholesterol-laden deserts face a similar tradeoff between a relatively certain short-term reduction in their current well-being and a less certain but more prolonged improvement in their future well-being. The choices people make about such matters seem to vary by education and perhaps also income. This is partly a matter of selection. Climbing the educational and occupational ladder requires impulse control and planning ahead. Whether schooling strengthens such habits is less clear.

Goldman and Smith, for example, studied diabetes treatments. At the outset, better educated patients had been monitoring their blood glucose more closely, taking their insulin more regularly, exercising more, and smoking less. All patients were then randomly assigned to one of two groups. The control group continued to get the standard treatment for diabetes, which relies largely on self-monitoring. The treatment group was monitored more closely, which led to better outcomes. The gains were especially large among patients with less formal education. Goldman and Smith argue that closer monitoring was more valuable to the less educated patients because, as the baseline survey indicated, less educated patients were not as good at monitoring themselves.

Many organizations that treat tuberculosis and AIDS in poor countries have also concluded that what they call "directly observed treatment" is the best way to ensure that individuals without much education take medication in the prescribed way. Instead of sending patients home with medication and instructions on when and how to take it, someone in the village comes to each patient's home, gives them their medication, and watches them take it. Directly observed treatment is more expensive than just handing out pills, especially in rich countries. But if directly observed treatment substantially

increases the faction of patients who take medications in the prescribed way, it could actually prove more cost-effective than the current system.

Parental education and income

When we are too young to look after ourselves, our health depends to a great extent on how well our parents look after us. The effects of poor parental care can last a lifetime. Childhood health predicts adult health independent of parental education and income.[37] Parental education and income also predict children's health. Of the two, parental education appears to be more important. In 1987-88, for example, infant mortality was 0.6 percent among mothers with college degrees compared to 1.3 percent among mothers who had not attended high school – a difference of 0.7 point. The difference between mothers with family incomes in the top third of the distribution and the bottom fifth was only 0.4 points, although the gap might have looked wider if income for earlier years had been available.[38]

Anne Case and Christina Paxson of Princeton and Darren Lubotsky at the University of Illinois have also shown that a mother's education is more important than family income for health throughout childhood. Yet even after taking account of maternal education, children in more affluent families are less likely to suffer from heart problems, digestive disorders, hearing problems, vision problems, and mental retardation. Furthermore, all these disparities increase among older children. The main exception to this pattern is asthma, which follows the standard pattern among young children but becomes more common among affluent children after the age of about eight.[39]

Case and her colleagues show that the association between family income and children's health is about as strong for adopted children as for children living with both of their biological parents, suggesting that genes do not explain much of the income effect. Measures of how carefully parents look after their children, such as using seat

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[37] For example, Debra Blackwell, Mark Hayward, and Eileen Crimmins, "Does Childhood Health Affect Chronic Morbidity in Later Life?" *Social Science and Medicine* (2001) 52:1269-84; .

[38] Gopal Singh and Stella Yu, "Infant Mortality in the United States: Trends, Differentials, and Projections, 1950 through 2010," *American Journal of Public Health* (July 1995) 85(7): 957-64.

[39] Anne Case, Darren Lubotsky, and Christina Paxson. 2002. "Economic Status and Health in Childhood: The Origins of the Gradient." *American Economic Review* (December) 92:1308-34.

belts, having a regular bedtime, and having a regular place for medical care also explain a tiny fraction of the association between family income and children's health.

Getting sick more often may reflect the fact that poorer children grow up in neighborhoods with more environmental hazards or more stress, but the association between income and health is not confined to the inner city poor. Children with health insurance are healthier, but the association between income and health insurance is too weak to account for much of the association between income and health. At least in Canada, moreover, the association between parental income and children's health rises as children get older because poor children have more new health problems, not because they are less likely to recover from old ones.[40] This pattern suggests that differences in the quality of medical care play a fairly minor role in poor children's troubles.

Adult income and health

During the early 1980s 1.2 percent of white working-age men with family incomes in the bottom six percent the distribution died every year. Among men near the middle of the income distribution the annual death rate was only 0.6 percent, and among men near the top it was only 0.4 percent.[41] If no one ever moved up or down the income ladder, those with the highest incomes would live about ten years longer than those with the lowest incomes.[42]

In reality, of course, a family's income may rise or fall over the years. One reason for such changes is that poor health lowers earnings. If you become too sick to work, your income drops and your chances of dying within a few years rise.[43] Even people with health problems who keep working often have more trouble holding down a demanding job and end up with less annual income. In addition, income and longevity

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[40] Janet Currie and Mark Stabile, "Socioeconomic Status and Health: Why is the Relationship Stronger for Older Children?" *American Economic Review* (December 2003) 93(5):1813-23.

[41] Eugene Rogot, Paul Sorlie, Norman Johnson, and Caroline Schmitt, "A Mortality Study of 1.3 Million Persons by Demographic, Social, and Economic Factors: 1979-1985 Followup." National Heart Lung and Blood Institute, NIH Publication 92-3297. Washington, DC: 1992.

[42] Eugene Rogot, Paul Sorlie, and Norman Johnson, and Caroline Schmitt, "Life Expectancy by Employment Status, Income, and Education in the National Longitudinal Mortality Study," *Public Health Reports* (July-August 1992) 107(4):457-61.

[43] For longevity data on working-age adults who are not employed at the time of an initial survey see Rogot, Sorlie, and Johnson (1992).

have common causes, like education, that make the observed association between the income and longevity larger than the true effect. Once again we need natural experiments.

Lotteries are an obvious natural experiment, in which large and small prizes are randomly assigned to people who have bought tickets for the same drawing, but to my knowledge no one has investigated how these prizes affect the physical health of recipients or their families. Jonathan Gardner and Andrew Oswald have, however, investigated the impact of medium-size lottery winnings on winners' mental health.[44] Two years after having won more than £1,000 (mean winnings of about $7,500), winners had were about a quarter of a standard deviation better off on a twelve-item depression scale. During the 1970s the federal government also conducted a "negative income tax" experiment in New Jersey and Pennsylvania in which randomly selected low-income families got monthly payments that raised their income by an average of 18 percent for three years. This extra income had no detectable effect on family members' health, but the experiment was too small, too brief, provided too little money to prove much either way.[45]

The business cycle constitutes a much larger natural experiment, with millions of involuntary participants. At least in the United States, economic downturns not only drive up the poverty rate but reduce real median family income.[46] If lower purchasing power reduced longevity, we would expect death rates to rise slightly during downturns and fall slightly during booms. In the 1970s several studies claimed that that was the case, but those studies turned out to be methodologically flawed. More recently, Christopher Ruhm, an economist at the University of North Carolina in Greensboro, has shown with various collaborators that death rates actually *fall* when unemployment rises. Ruhm's first paper exploited the fact that recessions almost always raise unemployment

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[44] Jonathan Gardner and Andrew Oswald, "Money and Mental Wellbeing: A Longitudinal Study of Medium-Sized Lottery Wins," *Journal of Health Economics* (2007) 26:49–60

[45] David Elesh and Jack Lefcowitz, "The Effects of the New Jersey-Pennsylvania Negative Income Tax Experiment on Health and Health Care Utilization," *Journal of Health and Social Behavior* (December 1977) 18:391-405.

[46] According to US Census Bureau, "Historical Income Tables – Families," Table F-8, accessed 4/25/09 at http://www.census.gov/hhes/www/income/histinc/f08AR.html, median family income measured in 2007 CPI-U-RS dollars fell in nine of the ten recessions between 1947 and 2007. The exception was 1961.

more in some American states than in others. He found that if a state's unemployment rate rose two percentage points more than the national average in a given recession, its mortality fell one point more than the national average.[47] In a subsequent paper Ruhm and Ulf Gerdtham, a Swedish economist, looked at recessions since 1960 in 23 OECD countries. Deaths from flu, pneumonia, car crashes, and liver disease all fell significantly during recessions.[48] When Ruhm tried to explain these startling results, he found that (at least in the United States) heavy smoking, drinking, and obesity all declined during recessions.[49] One would expect declines in heavy smoking to reduce deaths from flu and pneumonia. Likewise, one would expect declines in heavy drinking to reduce car crashes and liver disease.

When I ask health economists about Ruhm's work, they usually say something like, "I don't see anything wrong with it, but I don't believe it." When I first read Ruhm's papers I had the same reaction, but on reflection I think his findings are quite plausible. What changed my mind was the realization that economic downturns have two different effects. First, they reduce employment – usually by two to four percent. No one, including Ruhm, believes that becoming unemployed improves people's health. Even Gerdtham, who co-authored the OECD study with Ruhm, has reported in a separate paper that those who become unemployed in Sweden are more likely to die.[50] Others have found the same association in Britain.[51] None of these studies measure all the personal characteristics that affect an individual's chances of losing a job or finding another one, so we cannot rule out the possibility that some of the characteristics that lead

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[47] Ruhm, Christopher (2000) "Are Recessions Good for Your Health?" *Quarterly Journal of Economics*, 115(2):617-50.

[48] Gertham, Ulf-G and Christopher Ruhm (2002). "Deaths Rise in Good Economic Times," National Bureau of Economic Research, WP 9357.

[49] Ruhm, Christopher, (2003). "Healthy Living in Hard Times," National Bureau of Economic Research, Working Paper 9468.

[50] Ulf-G. Gerdtham and Magnus Johannesson, "A Note on the Effect of Unemployment on Mortality," *Journal of Health Economics* (May 2003) 22(3):505-18.

[51] Klaus Moser, P.O. Goldblatt, A.J. Fox, and D.R. Jones, "Unemployment and Mortality: Comparison of the 1971 and 1981 Longitudinal Study Census Samples," *British Medical Journal* (1987) 294:86-90.

to unemployment also kill people.[52] Nonetheless, there is no research suggesting that becoming unemployed will reduce your chances of dying.

But recessions have a second effect as well: they reduce the income of people whose livelihoods depend partly on providing goods or services to those who have lost their job or fear they might lose it soon. If modest declines in earnings reduce drinking, smoking, and obesity among those who still have work, deaths among those who are still employed should fall. So while an economic downturn almost certainly leads to more deaths among those who lose their job and cannot find another one, it may lead to fewer deaths among the much larger group who still have jobs but have less income.

The reason Ruhm's findings seem implausible to most economists – and to most Americans – is that neither economists nor ordinary citizens normally question the assumption that additional income makes people better off. Since almost everyone says they want to live longer, economists in particular assume that when incomes rise people will spend more on things that lengthen their lives. The poor will fill more of their prescriptions, and those with a bit more money will trade in the car that is dangerously close to collapse. We tend to forget that additional income also allows us to buy more things that shorten our lives, ranging from Big Macs to beer and cocaine. The effect of the business cycle on death rates depends on whether "good" or "bad" spending is more responsive to short-term income changes. Ruhm's results suggest that at least among Americans a downturn cuts "bad" spending more than "good" spending, and a recovery raises bad spending more than good spending.

Ruhm and Gerdtham's finding suggest that this pattern holds in most OECD countries. When people in rich countries are not staring death in the face, they seem to spend more money on stuff that will make them feel better right away than on stuff that some expert says might reduce their chances of dying ten, twenty, or thirty years hence. If that is the case, higher incomes will raise life expectancy only if the stuff that make us feel better in the short run also makes us healthier in the long run.   That is not obvious.

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[52] For Finnish evidence that is consistent with this view see Pekka Martikainen and Tapani Valkonen, "The Effects of Differential Unemployment Rate Increases of Occupational Groups on Changes in Mortality," *American Journal of Public Health,* (December 1998) 88(12):1859-61.

Consider what we eat. A panel of experts appointed by the National Research Council (NRC), an arm of the National Academy of Sciences, recommended in 1989 that Americans get less than 30 percent of their calories from fat and less than 10 percent from saturated fatty acids. The NRC panel also recommended that we consume less than 300 milligrams of cholesterol a day and cut back on protein and salt. At the same time it urged everyone to eat at least five servings of fruit or vegetables and six servings of bread, cereals, or legumes every day. These recommendations did not all rest on rock-solid science, but they did represent the expert consensus of the time, so most doctors and health writers gave the public similar advice. If Americans had been trying to maximize their life expectancy, they would presumably have selected diets that matched the NRC guidelines. And if having more money made it easier to follow these guidelines, affluent families would have followed the guidelines more closely than poor families. That was not case.

In a study of almost 10,000 families in 1989-91, Barry Popkin and his collaborators at the University of North Carolina found that higher-status white families bought more food than lower-status white families, but the quality of the two groups' diet did not differ significantly. Higher status families ate more protein and more salt, both of which were supposed to be bad. Higher status families also ate more fruits and vegetables, which were supposed to be good. The two groups were equally likely to consume too much fat and cholesterol.[53]

Does a higher income lower stress?

Food is unusual in that we are genetically programmed to like many foods that are good for us in moderation but are bad for us when we can eat as much of them as we want. Most other major forms of consumption are relatively harmless, but few help us live longer. Rising incomes lead people to buy bigger houses, which slowed the spread of airborne infections in the nineteenth century but are unlikely to protect us from heart disease, cancer, or accidents today. Some expensive cars are safer than cheap cars, but

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[53] Barry Popkin, Anna Maria Siega-Riz, and Pamela Haines, "A Comparison of Dietary Trends among Racial and Socioeconomic Groups in the United States," *New England Journal of Medicine* (Sept. 5, 1996) 335(10):716-20, corrected on 12/18/1997, 337(25)1846-1848.

some are just glamorous death traps. Even health insurance doesn't seem to lengthen life much.

That said, one form of spending that may lengthen your life is the money you spend to reduce stress. Unlike foregoing ice cream, flagging down a taxi when you are late for an appointment makes you feel better almost immediately. Ordering takeout food when you are too tired to cook, or hiring a baby-sitter when you are desperate for a night out often has the same effect. In these cases short-term gratification may have long-term health benefits. Emulating the European practice of taking a month-long vacation may also reduce stress levels.

But not all forms of stress are bad for us. In *Why Zebras Don't Get Ulcers*, Robert Sapolsky offers the following description of the biological changes that occur when a lion pursues a zebra on the African savanna:[54]

> "For both animals, this crisis requires the immediate mobilization of
> energy into the bloodstream . . . . Digestion is inhibited (including the
> inhibition of salivary secretion, accounting for our dry mouths when we
> are nervous) . . . . Growth, inflammation, and tissue repair are also
> deferred for later. In addition, reproductive technology is inhibited; a
> desperate sprint across the savannah is no time to ovulate. As another
> feature of the stress response, immune function is inhibited."

If running away from a lion or running after a zebra is followed by a period of rest, all this deferred maintenance gets taken care of.   But when stress is more or less continuous, it can apparently do permanent damage, including damage to the immune system.

People who have been under prolonged stress often look as if they have aged prematurely. Many people have also observed that the poor often look older than they are. This difference could be purely cosmetic, but the poor may age faster in some fundamental biological way. How might this work?

In order to deal with normal wear and tear, human cells have to keep dividing. Unfortunately for those who crave immortality, there is an upper limit to the number of times a cell can divide. This limit is apparently linked to the DNA-protein complex at the

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[54] Michael Marmot, *The Status Syndrome,* New York: Times Books, 2004, p112ff.

end of every chromosome, known as a telomere, which get shorter every time a cell divides. When telomeres get too short, a cell can no longer replicate. As more and more cells reach this point, our bodies become less capable of maintaining themselves and we become more prone to disease. Eventually we die.

Elizabeth Blackburn, a molecular biologist at the University of California, is one of the world's leading expert on telomeres. In 2004 Elissa Epel, also at the University of California, published a paper with Blackburn and five other collaborators showing a direct link between prolonged stress and telomere length.[55] Epel studied 58 healthy mothers, 39 of whom had a chronically ill child. As one would expect, mothers with chronically ill children reported more stress. The big news was that the longer the child had been ill, the shorter the mother's telomeres were likely to be, regardless of her chronological age. The difference between the mothers who reported the most and least stress was roughly comparable to the effect of being nine years older.

We do not yet know exactly *how* stress affects telomeres, although Epel, Blackburn, and their collaborators suggested several possibilities. Nor do we yet know whether telomere length varies by education, occupation, or income. Generalizing from one small study to the entire social and economic system would obviously be premature. But Epel and Blackburn's work is likely to spawn a flurry of additional research along the same lines.

While the stress hypothesis makes intuitive sense, it also raised a number of puzzles. People in high level jobs typically report more stress than people in low-level jobs, for example, even though they say they find their jobs more satisfying. Michael Marmot argues, persuasively, that when high level civil servants say their job is stressful, they just mean that they are very busy. Most of them doubtless want a vacation, but few would want a job in which their time was not in demand. This argument suggests that we need to distinguish different kinds of stress. If stress kills, it may not be the kind that people in top jobs experience. Or people in top jobs may experience the kind of stress that kills, but the benefits of ranking high in the social pecking order may more than

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[55] Elissa Epel, Elizabeth Blackburn, *et al.* "Accelerated Telomere Shortening in Response to Life Stress," *Proceedings of the National Academy of Sciences* (December 7, 2004) 101(49): 17312-315.

offset the costs of executive stress. Sorting all this out will take a lot more collaborative work between social scientists, physiologists, biologists, and physicians.

Possible strategies for lowering the mortality gap

The Left and Right have traditionally agreed about almost everything, but one goal they have traditionally shared is faster economic growth. Growth is clearly linked to rising longevity in poor countries. But once countries reach a certain level – something like two-thirds of America's current level seems to be sufficient – the association between longevity and Gross Domestic Product (GDP) seems to disappear.[56] There is no association between GDP and longevity within Western Europe, and the United States, which ranks ahead of all other rich democracies except Luxembourg and Norway on per capita GDP measured at purchasing power parity, is tied with Ireland for the dubious distinction of having the lowest life expectancy of all the rich democracies. Some blame low American life expectancy on the fact that incomes are more unequal here than in other rich democracies, but Finns and Danes die almost as young as Americans, even though their incomes are among the most equal in the world, while Italians and Spaniards outlive Americans by several years, even though their incomes are nearly as unequal as ours. Nor does the level of income inequality in rich democracies correlate with the disparities in life expectancy between their educational or occupational groups.

An alternative approach to reducing mortality gaps is to alter the way medical systems treat impoverished and semi-literate patients. Ensuring that such patients get preventive care, stop smoking, lose weight, go to doctors regularly, or take their medications would require at least three big changes. First, everyone would have to find or be assigned a physician to look after them. Second, we would have to conduct regular audits, comparable to the ones that the government now conducts for Medicare patients, to see whether patients were getting the care they need. Third, physicians and clinics would have to be rewarded for delivering such care successfully. Such changes would create a more paternalistic – or perhaps maternalistic – health care system. Directly observed treatment is one example of such a change, but it is easy to imagine others. No

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[56] Angus Deaton, "Health, Inequality, and Economic Development," *Journal of Economic Literature* (March 2003) 41:113–158

one should suppose, however, that the people most likely to benefit from such policies would all welcome them.

When medical research focuses on diseases that kill disproportionately large numbers of poor people and remedies that are relatively easy to administer, it too can help narrow the mortality gap between rich and poor. Antibiotics are an exemplary case here. But if reducing deaths from cancer, heart disease, and accidents depends on changing people's behavior, the mortality gap between rich and poor is unlikely to narrow and may well widen. Smoking has fallen more among college graduates than high school dropouts over the last three decades.[57] Obesity, on the other hand, has risen more among male college graduates than male high school dropouts.[58]

If we want to reduce death rates among the impoverished and uneducated to the levels found among the highly educated, legislatures we may need to adopt tactics like those that public health officials promoted a century ago. Typhoid was largely eliminated by forcing people to pay higher taxes for public water and sewer systems. Tuberculosis was reduced partly by sending patients to sanitariums so they would not spread the bacillus. Such policies can be politically costly, of course. Prohibition seems to have reduced both alcoholism and domestic abuse, just as its advocates said it would, but it was still a political failure. Banning the sale of tobacco would accomplish far more than Prohibition did, but because everyone remembers that Prohibition was repealed, legislators who advocate a complete ban on tobacco are as scarce as those who advocate a $10 per gallon gasoline tax as the best way to slow global warming.

One other strategy for narrowing the mortality gap is worth mentioning, namely efforts to strengthen people's social ties. A large body of research suggests that people live longer if they are married and if they have frequent contact with friends or relatives. Both marriage and a dense social network become less common as one moves down the socioeconomic ladder. We do not know how much of the correlation between marriage and longevity is causal, but most couples constantly urge one another to stop smoking, see the doctor about that cough, take their pills, and anything else that might keep their

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[57] *Health, United States, 2004,* Table 61.

[58] David Cutler, Edward Glaeser, and Jesse Shapiro, "Why Have Americans Become More Obese?" National Bureau of Economic Research, Working Paper 9446, January 2003, Table 1.

spouse alive until after they themselves die. All this could be pure altruism, but many people probably fear ending up alone even more than they fear death. The protective effect of other social ties is harder to explain, but the association recurs in many contexts and it persists after controlling many of the usual suspects.

Making a marriage work and maintaining social ties take time. Over the past forty years many European societies have made strenuous efforts to reduce the number of hours their citizens work. The United States, in contrast, has constantly encouraged its citizens to work more, even if they are single mothers with very young children. Americans now work more hours than the citizens of any other rich democracy.[59] If you think consuming more stuff is the best route to a good life, America is on the right track. Otherwise, not.

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[59] The Conference Board and Groningen Growth and Development Centre, *Total Economy Database, September 2008*, http://www.conference-board.org/economics/.