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The Changing Landscape of American Life Expectancy

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Introduction

Life expectancy—the average remaining years an individual of a particular age can be expected to live—is perhaps the most valuable indicator of social progress. In the past 100 years Americans have enjoyed an overall gain of about 25 years in life expectancy at birth. Many of us take for granted the continuous improvement in life expectancy that much of the industrialized world has experienced over the past several centuries. These gains are the result of deliberate individual and social efforts that must be reinforced through continued private and public investments.

Some recently documented trends in U.S. life expectancy are encouraging. Life expectancy at birth continues to increase, and mortality has generally declined; for some populations mortality has fallen dramatically in recent years. Mortality for blacks, and particularly for black men, has been decreasing in recent decades, with the mortality rate for black men age 45–54 falling by about a third from 1999 to 2014. Mortality among children overall has fallen, and at the same time the inequality in children's mortality by income level has declined.

Despite our progress, some improvements have yet to reach more-vulnerable populations. Low-income workers have experienced stagnating or even falling life expectancy over the past 30 years and mortality rates have increased for middle-aged whites by about 10 percent over 1999–2014.

These trends demand that we continue to focus our attention on investing in the health and well-being of all Americans. In acknowledging disparities in life expectancy trends, we should also evaluate the fairness and effectiveness of our existing policies, including investments in social insurance programs. Because it reflects the state of economic growth and the extent to which the entire population participates in that growth, life expectancy relates directly to core concerns of The Hamilton Project. In this framing paper we consider a number of policies that are relevant to life expectancy trends and suggest reforms aimed at extending life expectancy gains.

Large Gains in Life Expectancy

During the 20th century most of the industrialized world, including the United States, saw some of the greatest gains in life expectancy ever recorded. This was a colossal achievement of medical science, public health, and economic progress. Figure 1 plots life expectancy at birth for American men and women from 1900 to 2010, with selected events shown on the graph.[1] At the turn of the 20th century, life expectancy at birth was only 46 years for men and 48 years for women. By midcentury, life expectancy was around 66 years for men and 71 years for women. In the most recent years, life expectancy has increased to 76 years for men and 81 years for women.

Much of the improvement over the past century came in the form of reduced infant mortality, which fell by more than 90 percent (Centers for Disease Control and Prevention [CDC] 1999). But increases in life expectancy at older ages were also dramatic: 15-year-olds in 1900 could expect to live 46.8 more years, whereas their counterparts in 2000 could expect to live 62.6 more years, an increase of almost 16 years. At the older end of the age distribution, 60-year-olds in 1900 and 2000 could expect to live 14.8 years and 21.6 more years, respectively.

WHAT PRODUCED THE GAINS?

The dramatic gains in life expectancy over time can be explained by a combination of technology improvements (e.g., more-effective medical treatments and safer cars) and social factors (e.g., increasing real incomes, antipoverty programs, and the reduction in cigarette smoking).

One way to chronicle the progress in technology is by causes of death, which the CDC analyzes. In 1900 a plurality of deaths was caused by infections. Pneumonia, influenza, tuberculosis, gastrointestinal infections, and diphtheria claimed 34 percent of all those who died in that year (CDC n.d.b; Jones, Podolsky, and Greene 2012). By contrast, the only infections on this list that caused an appreciable number of deaths in 2010 were pneumonia and influenza, and those diseases accounted for only 2 percent of deaths (Hoyert 2012). As the burden of infectious disease recedes, death more frequently occurs in old age and is most commonly associated with heart disease and cancer—these two causes alone accounted for nearly half of deaths in 2010 (Jones, Podolsky, and Greene 2012). Today, microbial resistance to antibiotics is becoming more of a concern, a development we discuss in the next section.

The reduction in the prevalence of infection-related deaths is a story of technological innovation, chiefly concerning antibiotics and vaccines. Antibiotics reduced the incidence of many bacterial infections (Nichols 2004) and, importantly, made it possible to conduct more-ambitious surgeries (e.g., excision of cancerous tissue) by preventing postsurgical infections. For viral infections like smallpox, measles, and polio, vaccines provided a relatively inexpensive and powerful solution (UNICEF 1996).

BOX 1.

What Is Life Expectancy?

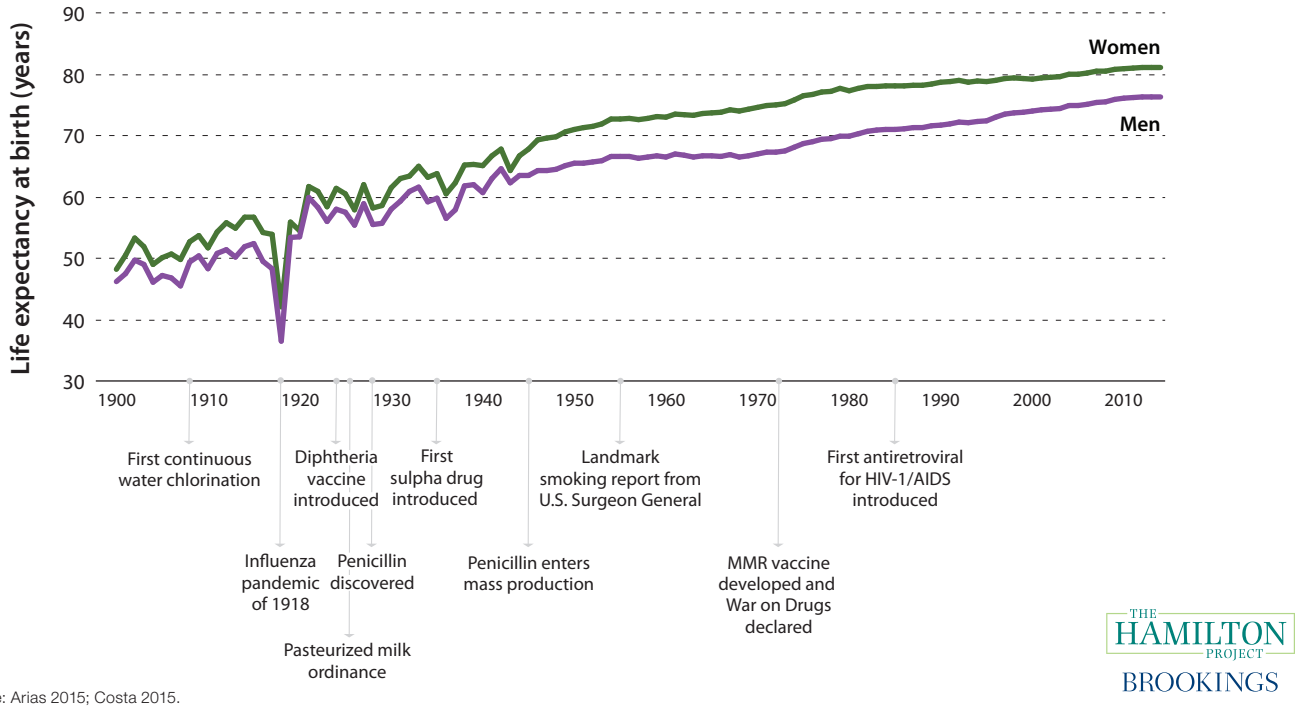
Life expectancy is an estimate of the average remaining number of years that a person will live given their current age. In some instances, as explained in the figure source notes, we show the current age plus the expected remaining years (i.e., the expected age at death) rather than expected years remaining. Note that life expectancy is distinct from the mortality rate, which shows the number of recorded deaths in a given period. The two measures will move in opposite directions after an event that affects longevity; life expectancy will increase and mortality will decrease when smoking becomes less common, for instance.

There are two ways of estimating life expectancy: cohort life tables and period life tables. Cohort life tables present the expected mortality experience of a particular birth cohort, such as the one born in 1930, while period life tables present what would happen to a hypothetical cohort if it experienced the mortality conditions of a given calendar year throughout its existence (Arias 2015). Period life tables are used to construct the estimates of life expectancy that are most commonly reported.

Finally, it is important to recognize that both life expectancy and mortality are always calculated on a forward-looking basis, assuming that the individual has lived to a particular age. Life expectancy at birth is an estimate of the average years remaining for a newborn, while life expectancy at age 75 is an estimate of the average years remaining for a 75-year-old. Suppose that life expectancy at birth is 80 years, while life expectancy at age 75 is 15 years. These estimates are entirely consistent with one another: someone who lives to 75 has already been fortunate in living that long, and has a substantially better chance of making it to (say) 90 than the same person had at birth, when it was still uncertain whether the person would die at an early age.

FIGURE 1.

U.S. Life Expectancy, 1900–2014



Source: Arias 2015; Costa 2015.

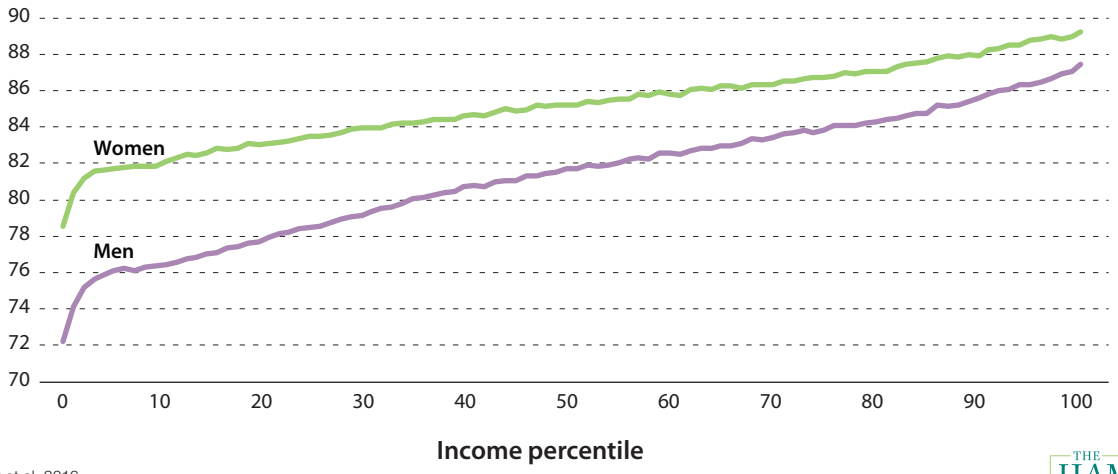
In addition, a host of public health actions improved health and limited infectious disease: clean water, sanitation, and behavioral changes all played important roles. For example, Cutler and Miller (2005) estimate that nearly half of the total mortality reduction for major U.S. cities from 1900 to 1936 can be attributed to the introduction of water filtration and chlorination. Ferrie and Troesken (2005) find similar results for the city of Chicago and the introduction of pure water. Campaigns to improve individuals' hygiene practices (e.g., hand and food washing) may also have had an effect (Ewbank and Preston 1990). More recently, public health campaigns aimed at reducing smoking and encouraging seatbelt use have reduced mortality rates (Hornik 2002; Hu, Sung, and Keeler 1995).

It is unsurprising that life expectancy gains continue to accrue to ever-younger cohorts: these individuals have benefited from technological and economic progress for more of their lives. Better nutrition, higher-quality education, reduced violence, and medical innovations, among other improvements, increase well-being and reduce the risk of death at every age. These improvements accumulate over time, both mechanically (because young people benefit from a wider range of improvements than do older people) and physiologically (as young people age, they become healthier old people than their counterparts in previous cohorts were). In recent decades, healthy life expectancy has increased, in large part due to improving medical treatment (Chernew et al. 2016).

Medical innovations were not the only source of gains in life expectancy. Improvements in nutrition that came alongside rising real incomes, and that were aided by antipoverty programs such as the Food Stamp Program allowed many people to fight off diseases that would otherwise have resulted in death (Fogel 1994; Hoynes, Schanzenbach, and Almond 2016). In figure 1 the most visible shock to life expectancy is associated with the 1918 influenza pandemic, known as the Spanish flu. One possible explanation for the lack of recurrences of disease with such visible mortality effects is the improved nutrition of the population at large, given that malnutrition is an important factor in the risk of dying from influenza (Katona and Katona-Apte 2008).

FIGURE 2.

Expected Age at Death for 40-Year-Olds, by Household Income Percentile



Source: Chetty et al. 2016.

Note: Sample pools individuals who turn 40 during the period 2001–14.

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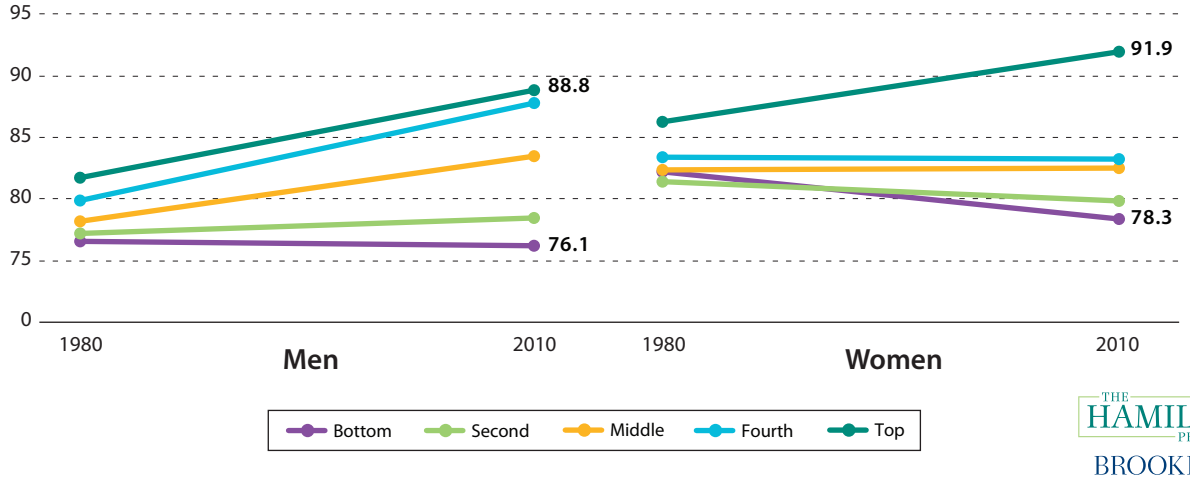
INCOME IS A STRONG PREDICTOR OF LIFE EXPECTANCY

People with higher incomes have longer life expectancies than do people who have lower incomes. Figure 2, drawn from Chetty et al. (2016), plots expected age at death for 40-year-olds with differing levels of income. Among both men and women, persons with higher incomes have longer remaining life expectancies than those with lower incomes. For example, 40-year-old men with incomes in the bottom 1 percent have an expected age at death of 72 years, while those with incomes in the top 1 percent have an expected age at death of 87 years—15 years longer. Women live longer at every income level than men. While the life expectancy gains associated with additional income are smaller for women than for men, women with household incomes in the top 1 percent are nonetheless expected to live a decade longer than women with household incomes in the bottom 1 percent.

The life-expectancy advantage for those with higher incomes has increased over time. As shown in figure 3, high-income individuals have seen strong gains in life expectancy over the past several decades, while those with lower incomes have had flat or declining life expectancies.[2]

FIGURE 3.

Expected Age at Death for Men and Women, by Income, 1980 and 2010



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Source: National Academy of Sciences 2015.

Note: Expected age at death is conditional on reaching age 50 (i.e., an age of 88.8 represents a life expectancy of 38.8 years at age 50). Income is measured as lifetime average nonzero earnings reported to Social Security between ages 41 and 50.

BOX 2.

Geographic Variation in Life Expectancy

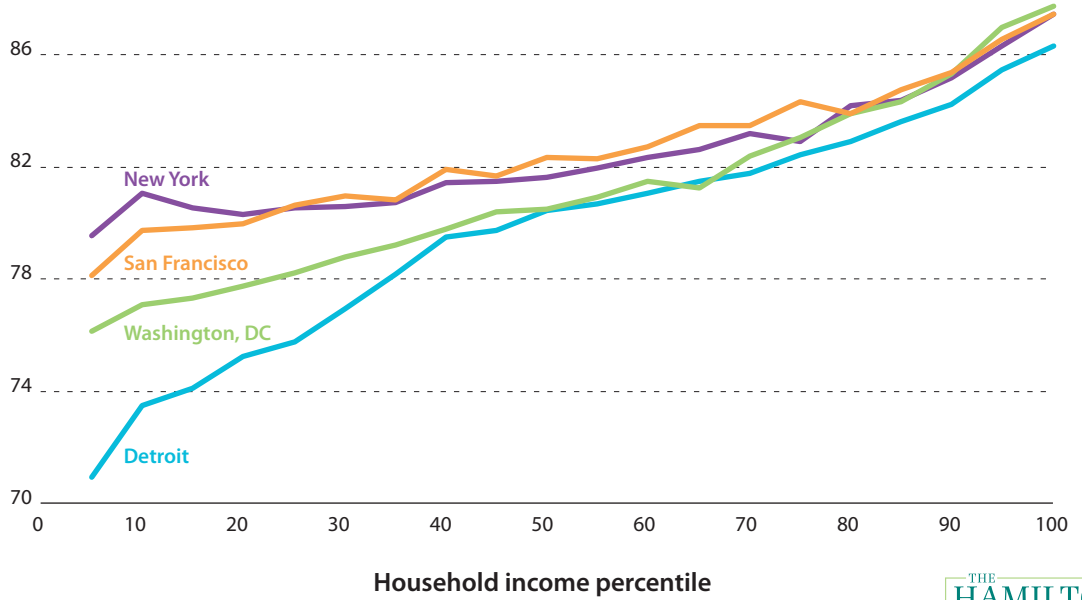
Recent research has shown that life expectancy varies widely across geographic locations, with especially large differences among Americans at the bottom of the income distribution (Chetty et al. 2016). For example, the life expectancy of a man reporting income in the bottom quartile was five years shorter in a so-called commuting zone (a particular definition of geographic area) with the lowest longevity compared with that of a man reporting income in the bottom quartile in an area with the highest longevity. Chetty et al. examined geographic factors that might be expected to affect the life expectancy of those with the lowest incomes: access to medical care, environmental factors, income inequality, and labor market conditions. These factors were surprisingly uncorrelated with differences in life expectancy across areas, with the exception of smoking rates, which were correlated with geographic differences in life expectancy among those with incomes in the bottom quartile. In terms of geographic factors, Chetty et al. concluded, "Low-income individuals tend to live longest (and have more healthful behaviors) in cities with highly educated populations, high incomes, and high levels of government expenditures, such as New York, New York, and San Francisco, California" (Chetty et al., E15).

Box figure 1 uses Chetty et al.'s (2016) data to show the expected age at death for men, by household income percentile, for four geographic areas that contain major cities. Notably, those with low incomes in New York City fare much better than their counterparts in Detroit, while life expectancy for those at the top of the income distribution exhibits much less variation across locations.

This research suggests that there remains much we do not know about determinants of life expectancy for low-income men and women. Further research will help illuminate the local factors that affect life expectancy, as well as the place-based strategies that could help struggling populations.

BOX FIGURE 1.

Expected Age at Death among Men by Household Income Percentile in Selected Commuting Zones



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Source: Chetty et al. 2016.

Note: Sample pools men who turn 40 during the period 2001–14. Cities in the figure refer to commuting zones that include adjacent counties as defined by commuting patterns, in addition to urban cores. (Commuting zones are similar to metropolitan statistical areas, but may cover rural areas as well.)

A DIVERGENCE IN LIFE EXPECTANCY

Many drivers of improved mortality—for example, more-effective medical treatments, safer cars, and smoking cessation—are first adopted by higher-income people, and later by the broader population. In fact, variation in the use of technology and behavioral changes helps explain some of the divergence in life expectancy across income groups and age cohorts.

The most quantitatively significant improvements in life expectancy have generally been experienced by people throughout the income distribution. Inexpensive medical innovations like vaccines and mass-produced antibiotics, as well as public goods like clean water and sanitation, were eventually extended broadly. Other factors that affect life expectancy, such as smoking behavior, have yet to change for the entire population. Figures 4A and 4B use data from the National Survey on Drug Use and Health to show several important patterns in smoking from 2000 through 2013.[3] First, among men, older cohorts had much higher rates of smoking than did younger cohorts. Second, the decline in smoking among the older cohorts occurred first among higher-income individuals before extending to those with lower incomes. In other words, high-income Americans reduced their smoking behavior more quickly than did low-income Americans. Perhaps surprisingly, lower-income women past age 50 actually increased their rate of smoking. Third, younger people at all income levels have been reducing their smoking from 2000 to 2013. Because of the time lag between smoking and its effect on mortality, it takes decades for declines in smoking among young adults to become apparent in reduced mortality rates. The fact that higher-income groups quit smoking earlier likely explains some of the divergence in life expectancy by income. In the future, however, we should expect to see broader impacts of smoking cessation on mortality.

As has been widely reported, Case and Deaton (2015) document that the decline in mortality rates among middle-aged whites has unexpectedly stalled. As shown in figure 5B, at the same time that there was an increase in mortality rates among middle-aged white non-Hispanics, there were sharp declines in mortality rates among middle-aged blacks—from 800 to fewer than 600 deaths per 100,000. Middle-aged Hispanics also experienced steady declines in mortality from 1999 to 2014. The increase in mortality among whites appears to have been driven largely by increases in mortality for those with little education, and appears to be associated with changing rates of drug and alcohol abuse as well as mental illness and suicide (Case and Deaton 2015). As shown in figure 5A, although lung cancer deaths fell and diabetes deaths rose only slightly, deaths from suicide, alcohol, and drug-use rose sharply. In 2014 the rate of suicide among white Americans age 45–54 actually surpassed the rate of mortality from lung cancer, reflecting both worsening suicide rates and falling smoking rates.

Suicide mortality is related to means—fatal suicide attempts are highly correlated with having access to a firearm (Miller, Azrael, and Barber 2012). The majority of deaths from suicides—and homicides—are from firearms (Grinshteyn and Hemenway

BOX 3.

What Is a Public Good?

Most goods and services—and most activities that people engage in—are a matter of concern only for the people engaged in the transaction. That is, virtually all the costs and benefits associated with the transaction are experienced by the buyer and seller themselves. For instance, when an electrician fixes some wiring in a house, the consumer and the professional experience the costs and benefits: the payment, the utility from having a working light fixture, the opportunity cost of the time spent fixing the wiring, and so on.

By contrast, there are goods and services that create significant costs or benefits for third parties: individuals who are not at all involved in the transaction. A classic example of a public good is vaccination. When one person is vaccinated, that person becomes much less likely to catch and pass on the disease to others. This constitutes a positive spillover—also known as an externality—of the transaction to third parties. Note that a public good can also have the reverse structure. If a transaction produces a negative spillover for a third party, then minimizing the number of such transactions is a public good. The classic example here is industrial pollution: producing energy from fossil fuels has costs and benefits to the consumer and energy producer, but it also has negative spillovers in the form of public and environmental health risks related to particulate matter and carbon emissions.

With both types of public good, economists typically expect that the market will settle on the "wrong" quantity of transactions, viewed from a social perspective. Because they do not experience all the costs of air pollution, industries will pollute too much; similarly, too few people will pay the cost of vaccination, given that they do not receive all the social benefits conferred by vaccination. Public goods therefore offer an opportunity for government interventions to improve on a private market outcome, usually by imposing a tax or offering a subsidy that allows market participants to take account of the spillovers to third parties.

FIGURE 4A.

Men Who Have Ever Smoked by Age and Income

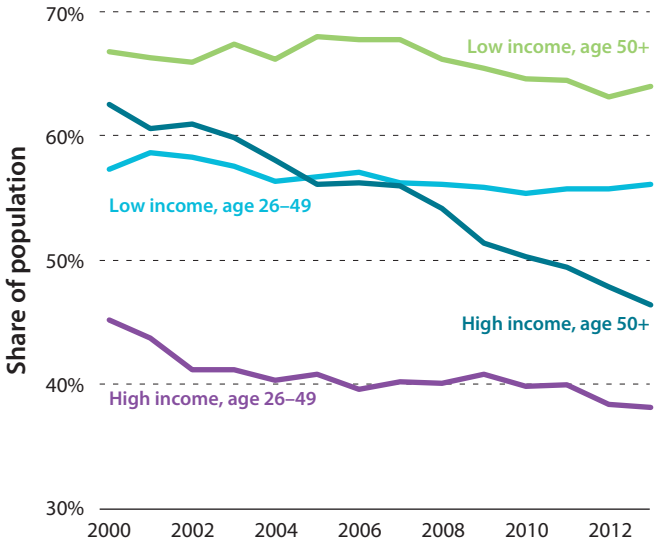
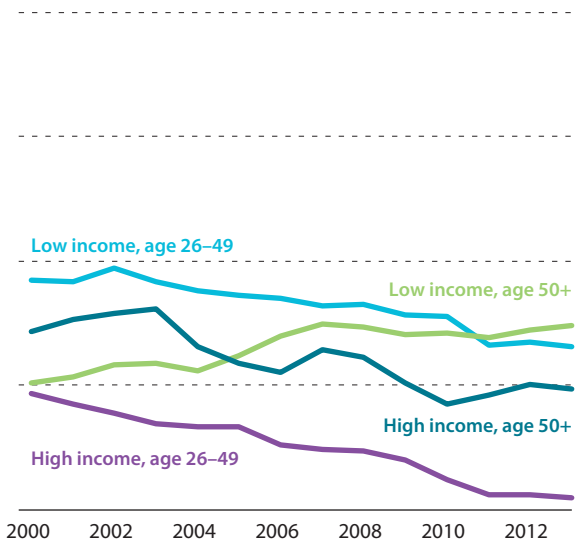


FIGURE 4B.

Women Who Have Ever Smoked by Age and Income



Source: National Survey on Drug Use and Health 1999–2014.

Note: Smoking is defined as having ever smoked at least 100 cigarettes. Income bins are terciles of family income for the entire sample, and the sample is restricted to individuals age 26 and older.

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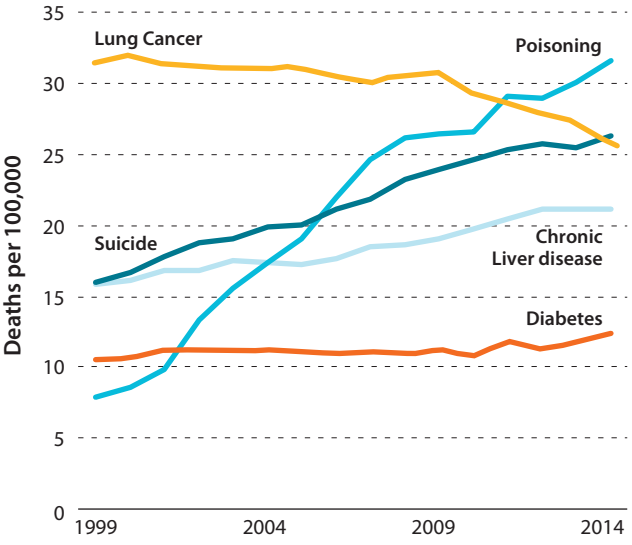
FIGURE 5A.

Mortality by Cause, White Non-Hispanics Age 45–54

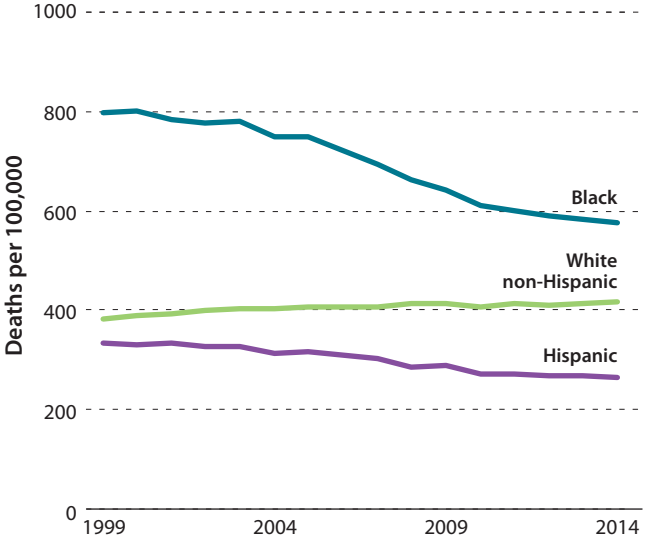


Source: CDC 1999–2014.

Note: Figure is adapted from Case and Deaton (2015) figure 2. Chronic liver diseases include alcoholic liver diseases and cirrhosis. Poisonings include drug and alcohol poisoning, both accidental and with undetermined intent.

FIGURE 5B.

Mortality, Age 45–54



Source: Centers for Disease Control and Prevention 1999–2014.

Note: Mortality data are for all-cause mortality. Figure is adapted from Case and Deaton (2015) figure 1.

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2016). Research has found that firearm ownership and suicide rates are robustly correlated (Hemenway 2014) even after accounting for rates of antidepressant prescriptions (Opoliner et al. 2014). Firearms are lethal in other scenarios: more than 100 children are accidentally killed with a firearm every year in the United States, most of them by other children (Hemenway and Solnick 2015). Means restriction policies—a variety of measures that include things like erecting suicide-prevention barriers on bridges and restricting access to firearms—are effective in reducing rates of preventable death (Mann et al. 2005; Yip et al. 2012).

Given that Americans with low incomes have seen stagnating or declining life expectancy, it is worth investigating how the link between income and substance use has changed over time. In figures 6A and 6B we again use data from the National Survey on Drug Use and Health, this time to examine recent changes in the rate of drug and alcohol abuse by income group. Interestingly, heavy drinking has become more common at all income levels; by contrast, use of illegal drugs, excluding marijuana, has become more common for those with low incomes, while high-income men have experienced smaller increases.

The recent trends have caused many to speculate about a possible link between labor market changes and the factors that have depressed life expectancy for lower-income people. The stagnation in real wages at lower percentiles, and increasing real wages at upper percentiles (Bivens et al. 2014) would seem to correspond to the observed divergence in life expectancy. Concurrent with this increasing wage inequality is an increasing pessimism about future economic conditions (Uslaner 2012). Perhaps the bleak economic outlook, real or perceived, for low-income and lesser-educated workers has led to problems—related to mental health, alcohol abuse, and drug abuse—that depress longevity.

The trends in life expectancy do not entirely align with this hypothesis, however. Life expectancy for those with high incomes diverged from life expectancy for those with lower incomes in both the male and female populations over the past 35 years, yet the labor market fortunes of men and women have evolved differently over that period. While men—aside from men with at least a college degree—have suffered stagnant or declining incomes, women have been more likely to experience labor market gains. Household income was roughly constant for low-income women from 1980 to 2010 while household income dropped considerably for low-income men (Current Population Survey March Supplement and THP calculations). If labor market stagnation was an important driver of deteriorating life expectancy among those with low incomes, we might expect to see men suffering more than women. Instead, as we see in

FIGURE 6A.

Illegal Drug Use and Heavy Drinking among Men Age 26–49, by Income

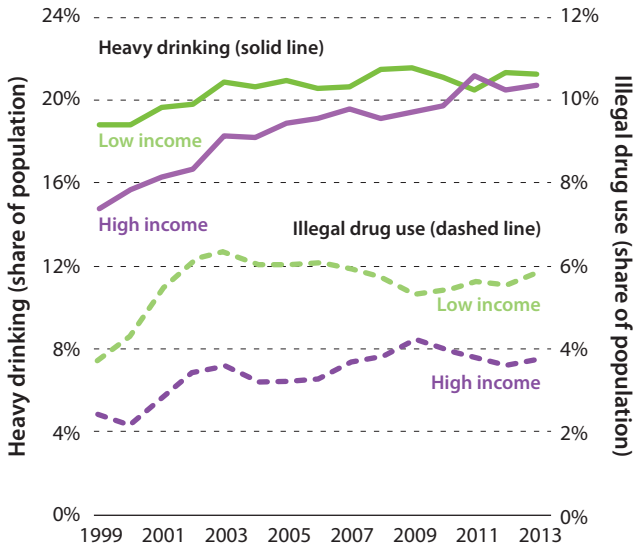
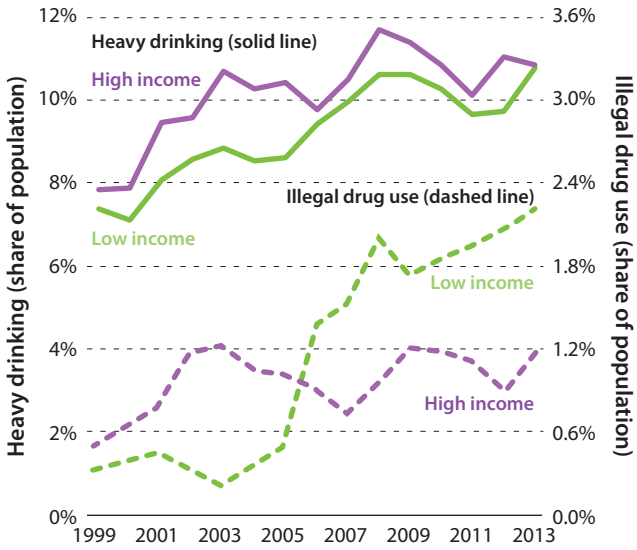


FIGURE 6B.

Illegal Drug Use and Heavy Drinking among Men Age 50 and Older, by Income



Source: National Survey of Drug Use and Health 1998–2014.

Note: Illegal drug use refers to the use of hallucinogens, cocaine, or inhalants on three or more days in the past year, the use of heroin in the past year, or the use of prescription drugs—sedatives, tranquilizers, stimulants, or analgesics (i.e., pain killers)—on three or more days for nonmedical reasons in the past year. By definition, this excludes any use of marijuana. Heavy drinking is defined as drinking five or more drinks on the same occasion on three or more days in the past 30 days. Income bins are inflation-adjusted terciles of family income for the entire sample. The sample is restricted to individuals age 26 and older.

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figure 3, life expectancy for the bottom quintile of women falls considerably more than the bottom quintile of men.

Moreover, the labor market stagnation narrative is difficult to square with other aspects of mortality trends in recent decades. Currie and Schwandt (2016) find that mortality rates for black Americans have fallen dramatically, and that mortality inequality among children has also fallen, all while income inequality has been increasing. Appendix figure 1 reproduces some of Currie and Schwandt's findings, showing that increasing inequality in mortality and life expectancy is restricted to the population age 50 and above. The authors argue that investments in health care for pregnant women and children, changing smoking behavior, and other factors may be important for understanding divergences in mortality and life expectancy.

In understanding the economic determinants of mortality, it is helpful to distinguish three types of mortality effects: (1) the effect of poverty amelioration, (2) the effect of income stagnation, and (3) the effect of increasing income inequality.

First, there is considerable evidence that poverty amelioration (at both the family and community levels) causally improves health and, by implication, life expectancy. For instance, nutrition assistance (Hoynes, Schanzenbach, and Almond 2016), the Earned Income Tax Credit (Hoynes, Miller, and Simon 2015), and relocation to lower-poverty neighborhoods (Chetty, Hendren, and Katz 2016) all have been shown to improve health. Other policies aimed at poverty reduction—the minimum wage, for example—may have similar impacts.

The mortality effect of recent U.S. income stagnation for many workers is much less clear. While it is certain that high-income workers live longer than low-income workers, it is not obvious that recent changes in income for those above the poverty level are having an effect on mortality. Finally, researchers have generally concluded that mortality is not importantly affected by increasing income inequality (Deaton 2003), though again, poverty itself is quite important.

Protecting Life Expectancy Gains for Everyone

The policies that can help ensure future life expectancy gains fall into two categories: (1) those that expand participation in technological advances contributing to longer life spans, and (2) those that address social factors relevant to life expectancy. Often these factors go hand in hand. For example, one enduring problem in medicine—mentioned by Hippocrates around 400 BC (Hugtenburg et al. 2013)—is that medication cannot help the patient who does not take it (Ho et al. 2006; Bailey et al. 2010). Differential rates of medical adherence (e.g., by race) may be related to disparities in mortality (Wu et al. 2010). Evolving technologies, such as automatic text messages to patients to remind them to take their medications (Granger and Bosworth 2011), provide an avenue for further progress.

IMPROVING PARTICIPATION IN TECHNOLOGICAL ADVANCES

Investments in clean water infrastructure contributed importantly to life expectancy improvements before and during the 20th century. Opportunities exist to consolidate and extend these improvements. The recent crisis in Flint, Michigan—centering on toxic levels of lead in the drinking water—underscored the importance of this infrastructure and the continuing problems with delivering clean water to households (Simon and Sidner 2016). Research has explored the sometimes subtle yet damaging effects of lead exposure for children, as well as the role that public policy has played in both creating and resolving this problem (Troesken 2006).

As with clean water infrastructure, the benefits of antibiotics and vaccines are now largely taken for granted. However, with falling rates of vaccination in some locations (Lee, Rosenthal, and Scheffler 2013) and increasing rates of drug-resistant bacteria (Andersson 2003)—including the first colistin-resistant bacteria in the United States (McGann et al. 2016)—protecting the modern victory over infectious disease has become a higher priority.[4] Recently, the White House introduced an initiative that aims to accelerate the production of new antibiotics while also establishing international cooperation in the monitoring of and response to antibiotic resistance (White House 2015a). Drug resistance will likely always become a problem for any given antibiotic, so a combination of economic and technological reforms is best for protecting the (historically unprecedented) very low rates of death from infectious disease.

Retaining the benefits of vaccination is largely a matter of maintaining high rates of community vaccination. Antibiotic resistance is a more difficult problem. Many observers fear that the pipeline of new antibiotics has dried up and multiple drug-resistant bacteria have emerged, their development accelerated by antibiotic overuse (White House 2015a). Users of antibiotics currently have little incentive to minimize their use of the drugs, because the users do not take into account the damage to antibiotic effectiveness caused by overuse. The continued usefulness of antibiotics is something from which we all benefit, but no single individual has much impact on the development of drug-resistant bacteria. As a result, antibiotics are widely used on livestock to hold down infection rates and promote growth, which is likely contributing to resistance (CDC n.d.a), as is overuse of broad-spectrum antibiotics in hospitals (Kaier 2012). One analysis of a particular set of antibiotics widely used in hospitals suggests that each use produces a negative spillover of between $110 and $160[5] through those antibiotics' encouragement of drug-resistant strains of infections like those caused by Methicillin-

resistant Staphylococcus aureus (MRSA). Basic economic theory suggests that the government should make antibiotic use more costly, thereby reducing these negative spillovers.

As both the vaccine and antibiotic examples illustrate, there is continued need for public investment in basic science and medical research. Policies that support basic and applied research, such as sequencing the human genome (Human Genome Project; National Human Genome Research Institute 2015), curing cancer (National Cancer Moonshot Initiative; National Cancer Institute n.d.), and investing in precision medicine (Precision Medicine Initiative; White House 2015b) are vital to protecting life expectancy gains and producing future improvements in life expectancy. These research initiatives require the collection of a wide variety of data about individuals, including family histories, behavioral health information, and genetic information (Chaussabel and Pulendran 2015). For example, the Precision Medicine Initiative will leverage new data and tools to prevent, diagnose, treat, and cure disease through data collection, measurement, and analytics at the population and individual levels (Collins and Varmus 2015). Furthermore, policies that promote health information technology and electronic health records, like the Health Information Technology for Economic and Clinical Health Act (HITECH; American Recovery and Reinvestment Act of 2009, 112–64), contribute to better-organized and more-useful data. The collection, analysis, and use of so-called big data—detailed information about the behavior of an extremely high number of individuals—may have an important role in fighting diseases over the coming years.

From 2008 to 2013 there was an almost 20 percent increase in the use of some aspect of personal health records (Ford, Hesse, and Huerta 2016). Personal health records have been found to increase use of preventive services among patients with both mental and general health conditions (Druss et al. 2014). With continued investments in data creation, architecture, analytics, and sharing, the future of medicine will be increasingly linked to the way society collects and puts such information to good use.

REDUCING CONSUMPTION OF HEALTH-HARMING SUBSTANCES

There is a medical consensus that health and life expectancy are negatively affected by excessive use of a number of products—including alcohol, tobacco, sugar-sweetened beverages, and illegal or prescription drugs. One important tool for limiting these harms is taxation, which raises the product's price and thereby discourages consumption. There are downsides to this approach: non-harmful uses of taxed substances are discouraged along with harmful uses, and, because of current patterns of use, the burden of the taxes may be borne disproportionately by the poor.

BOX 4.

Implications for Social Security

It is clear that changes in life expectancy have not been identical across the population. While the divergences discussed throughout this paper are a cause for concern in their own right, in this box we consider the relationship between trends in life expectancy and the implications for Social Security's design.

Partly due to Social Security, the second half of the 20th century saw a rapid decline in poverty among the elderly (Smolensky, Danziger, and Gottschalk 1988) as well as more rapid declines in mortality relative to younger age groups (Arno et al. 2011). Despite its universality, Social Security has always been a progressive program, meaning that the replacement rate—the share of monthly career earnings that Social Security benefits cover—for lower-income workers is higher than it is for higher-income workers.

Life expectancy divergence by income acts to reduce the progressivity of Social Security. Bosworth, Burtless, and Zhang (2016) demonstrate that higher-income workers tend to retire later—thereby receiving increased monthly benefits—and collect Social Security benefits for longer due to advantages in life expectancy. A recent National Academy of Sciences report also documents this tendency, showing that the increasing income-linked gap in life expectancy has made the Social Security program less progressive over time (National Academy of Sciences 2015, chap. 3). Rising life expectancy among those with high incomes means that Social Security must pay out monthly benefits to high-income individuals for longer periods of time.

Furthermore, the National Academy of Sciences report (2015) found that certain proposed measures to improve the finances of the program (e.g., raising the minimum retirement age) disproportionately harm low-income recipients who already collect retirement benefits over a shorter period of time due to lower life expectancy. The report explains that any policy forcing people to claim Social Security benefits later than they otherwise would has the effect of lowering total benefits for workers with shorter life expectancies.

Alcohol is much more commonly used and abused than other substances. By our calculations using National Survey on Drug Use and Health data, frequent binge drinking is four times more common than frequent illegal drug use. As Case and Deaton (2015) have documented, alcohol is associated with significant mortality—and significant increases in mortality—over at least the past 15 years. But alcohol is a legal and relatively uncontrolled substance that presents a somewhat different public health problem than other substances. Distinguishing uses that are and are not socially harmful is difficult for a variety of drugs; in the case of alcohol, the preponderance of non-problem users makes the difficulty especially pronounced.

Excise taxes on tobacco have already been extensively utilized, with mixed but likely beneficial results for smoking behavior (DeCicca et al. 2008; Nonnemaker and Farrelly 2011), albeit at a cost of added tax burden for low-income households (Farrelly et al. 2012) and substantial tax avoidance (DeCicca et al. 2013). Proposals for the taxation of sugar-sweetened beverages would likely involve a similar calculus: although diabetes and obesity-related illnesses might be reduced as a result, much of the burden of the tax would fall on the poor (Brownell and Frieden 2009). The benefits of a sugary beverage tax would depend on the consumer response; although it might reduce the consumption of sugar-sweetened beverages, a sugary beverage tax could result in an increase in consumption of other harmful foods, potentially negating the tax's healthful effects.

From 1999 to 2014 more than 160,000 people died from overdoses related to opioid medications (CDC 2016c) and almost half of Americans know someone who has been addicted to opioids (Kaiser Family Foundation 2016). Critically, illegal substances cannot be discouraged by taxation and so a variety of actions have been taken to limit the overprescription of legal opioids, both to improve patient care and to prevent diversion into secondary markets. The White House released a prescription drug abuse prevention plan in 2011 (White House 2011) and both houses of Congress have approved opioid-related legislation in the 114th session. In March 2016 the CDC issued new guidelines for prescribing opioids that state directly that any non-opioid therapy is the preferred treatment for chronic pain (CDC 2016a). The president of the American Medical Association has called on physicians to limit both new prescriptions of opioids and prescription dose and duration (Stack 2016). As we will discuss in detail, prescription drug monitoring programs (PDMPs) that allow for doctors to get better information on the prescription drug use of their patients are a critical part of this effort. Recently, opioid prescriptions do seem to be falling (Goodnough and Tavernise 2016).

EXPANDING INSURANCE COVERAGE AND BENEFITS TO TREAT BEHAVIORAL HEALTH PROBLEMS

Drug dependence is a chronic medical illness that requires treatment. It is widely documented that substance use disorder treatment is effective (McLellan et al. 2000) in terms of reducing substance abuse (Gelberg et al. 2015; Hser et al. 2006), drug-induced mortality (Evans et al. 2015; Swenson 2015), and crime (Prendergast et al. 2002; Wen, Hockenberry, and Cummings 2014). The Patient Protection and Affordable Care Act of 2010 (ACA) dramatically changed the landscape for insurance coverage of mental health and substance use disorders. The ACA marked not only an expansion of insurance coverage, but also a change in the benefits that insurers must provide, particularly regarding behavioral health.

Lack of needed treatment is partly due to a lack of health insurance: in 2012 almost 60 percent of those admitted for substance abuse treatment did not have health insurance (Woodward 2016). Since the passage of the ACA, nationwide rates of uninsurance decreased dramatically: the number of people between the age of 18 and 64 who lack health insurance has dropped by about 15 million (CDC 2016b). The data indicate that insurance coverage has increased for those with mental health and substance use disorders, including those who reported serious psychological distress (SPD). Though the total number of adults with reported SPD was 20 percent larger in 2015 than in 2012, there were fewer adults reporting an SPD who were uninsured in 2015 (Cohen and Zammitti 2016). Providing insurance coverage and benefits to those who suffer from behavioral health problems could help stem the the mortality rate increases described in Case and Deaton (2015).

One ACA lever for expanding both insurance and treatment is the Medicaid State Plan Amendment, which allowed for Medicaid expansion to all those with incomes below 138 percent of the federal poverty level. These newly eligible adults are disproportionately likely to suffer from a substance use disorder (Boozang, Bachrach, and Detty 2014). Although the Supreme Court ruled that states could reject the Medicaid expansion provisions of ACA (National Federation of Independent Business v. Sebelius, 2012), 31 states and the District of Columbia expanded Medicaid eligibility under the Amendment. Recent research also suggests that Medicaid enrollment has risen in states that have not expanded coverage, because previously eligible households were diverted toward Medicaid enrollment when using the health insurance exchanges (Frean, Gruber, and Sommers 2016).

Another ACA lever that holds particular promise for populations affected by mental health problems and substance use disorders is the dependent coverage provision that allowed young adults to remain on their family's health insurance plan until their 26th birthday. In extending dependent coverage,

the ACA produced a simple solution for providing health insurance to the age group with the highest rates of illegal drug use, alcoholism, and suicidal thoughts—18- to 25-year-olds (Hedden et al. 2015; Lipari and Piscopo 2015). Carefully designed studies of the effect of the dependent coverage provision on behavioral health have found increases in mental health treatment and visits paid through private insurance (Antwi, Moriya, and Simon 2014; Saloner and Cook 2014) and lower rates of emergency room visits (Golberstein et al. 2015).

USING NEW DATA COLLECTION TO REDUCE MORTALITY

One factor driving the divergence in life expectancy by income may be the rise in substance abuse—particularly that associated with opioid pain medications. However, it would be a mistake to simply make it more difficult for everyone to access pain medication. Some patients, including many cancer patients, have a legitimate need for opioid pain relief, and restricting their access unduly would cause suffering. Fortunately, there are more-nuanced approaches to this problem that can reduce substance abuse while maintaining legitimate patient access to pain relief.

Comprehensive data collection, in the form of prescription drug monitoring, is one such approach. As of 2015, 49 states have operational databases that track the prescription and dispensation of certain prescription drugs to patients (PDMPs). There is tremendous variation across states in which controlled substances are monitored, who can be an authorized recipient of PDMP data, and whether prescribers and dispensers are required to register with or use a PDMP (National Alliance for Model State Drug Laws 2015). PDMPs have more comprehensive data on the prescription history of an individual than that reported to an insurer for a claim, because PDMPs also include prescriptions for out-of-network providers and prescriptions from which no claim is made, such as those paid for in cash. PDMPs can make use of a variety of mechanisms that insurers have to identify patients who might be seeking multiple doctors to write prescriptions or who have prescriptions for medically unnecessary quantities of controlled substances.

The extent to which PDMPs can be used by insurers to identify individuals who might have a substance use disorder is a matter of state law. Only 32 states allow Medicaid and only two states—South Dakota and Michigan—allow private insurers to be an authorized recipient of PDMP data. Applying similar procedures to PDMPs as to claims could result in intervention that is more widespread.

One way that Medicaid uses claim data and PDMP data to stem drug abuse is through Patient Review and Restriction programs, commonly referred to as "lock-in" programs (CDC 2012). Originally conceived as a tool for waste and fraud management, these programs can also be used to identify Medicaid recipients who might be abusing prescription drugs. For those patients who appear to be doctor-shopping or receiving prescriptions for medically unnecessary narcotics, Medicaid can require that prescriptions be obtained from a single provider and/or pharmacy, making it more difficult for the patient to abuse the medications. The most recently available evaluation of Medicaid PDMP use comes from the state of Washington (PDMP Center of Excellence 2013), a state where 45 percent of people who died from prescription opioid overdoses in 2004 through 2007 were enrolled in Medicaid (Coolen, Sabel, and Paulozzi 2009). The state has used PDMP data not only to monitor Medicaid recipients, but also to identify rogue pharmacies and prescribers. Action based on data analysis resulted in early intervention for individuals, a reduction in diversion of prescription medication into open markets, and cost savings. Expending additional resources to collect and analyze these data would help to detect suspect billing, bad actors, and patients in need of intervention.

IMPROVING SOCIAL CONTRIBUTORS TO LONGEVITY

There is much to suggest that longevity would be extended if underlying social conditions that contribute to health were also improved. For example, there is evidence that increased educational attainment is causally related to longer life expectancy (Bosworth, Burtless, and Zhang 2016; Buckles et al. 2015; Lleras-Muney 2005). Furthermore, there is important evidence that some experiences in the labor market can influence life expectancy. Sullivan and von Wachter (2009) find that job displacement increases mortality, and that the largest impacts occur to those who experience the largest earnings losses. These findings, combined with the difficult labor market experiences of low-skilled workers in recent years, suggest that policies that increase educational attainment or otherwise enhance labor market opportunities have the potential to improve life expectancy.

In addition, there appears to be an important role for safety net programs to improve health that may directly or indirectly affect mortality. Research on Medicaid expansions to children has documented reductions in mortality among infants and teenagers and improvements in education and labor market outcomes (Brown, Kowalski, and Lurie 2015; Currie and Gruber 1996; Meyer and Wherry 2015). There is also evidence that investments in early life have later-life impacts on health. For example, childhood Medicaid coverage has been shown to reduce hospitalizations in later life, and access in early life to the Food Stamp Program improves health and labor market outcomes in middle age (Hoynes, Schanzenbach, and Almond 2016; Wherry et al. 2015). This line of research suggests that a robust safety net and early investments in the health and economic security of children may play an important role down the line. Policies such as modest increases to Food Stamp benefits would be expected to help as well by reducing food insecurity and enabling families to purchase healthier foods (Anderson and Butcher 2016; Ziliak 2016).

Conclusion

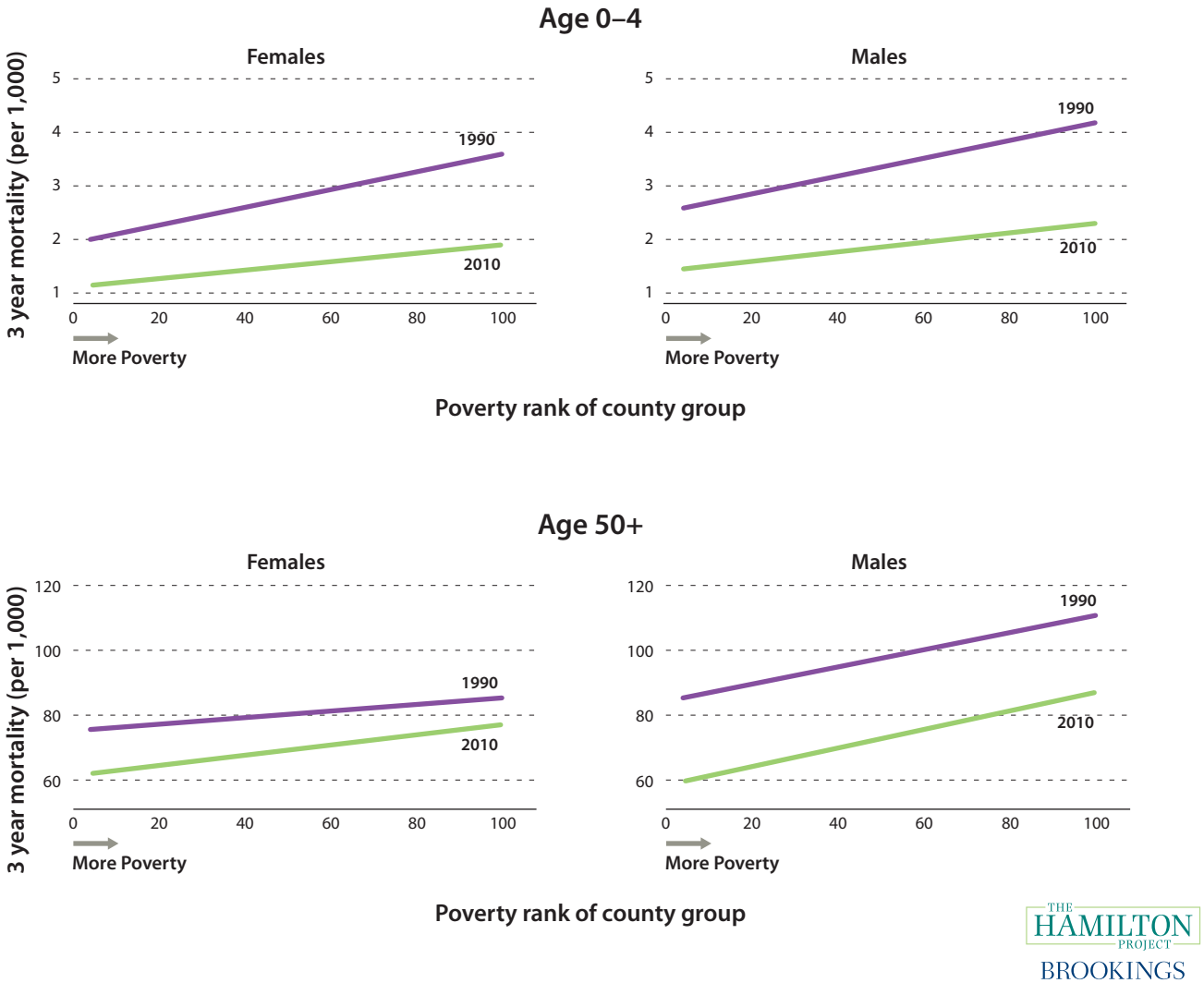
Over the long run, population life expectancy has increased dramatically. This has resulted from a confluence of advances: the provision of clean water and sanitation, antibiotics, vaccines, better nutrition, and many other factors. Many of these improvements require continuing investments or policy reforms to retain their benefits.

Yet, in recent decades, improvement in life expectancy has occurred quite differently across various groups. While young people and non-whites continue to see both improvements in mortality and reductions in income-linked disparities, some older populations—and especially low-income whites—have seen stagnation or even rising death rates. This deterioration appears to be associated with troubling increases in suicides, alcohol abuse, and overuse of legal and illegal drugs.

Just as continued social investment is necessary for the maintenance of some of the long-run improvements in life expectancy, putting all Americans back on a path of increasing life expectancy may require policy reforms, some of which are already being implemented. Increased access to health care—including mental health care—for low-income households and increased utilization of PDMPs are two such policy reforms.

APPENDIX FIGURE 1.

Three-Year Mortality Rates across Groups of Counties Ranked by Their Poverty Rate, 1990 and 2010



Source: Currie and Schwandt 2016.

Note: Figure is adapted from figure 3 in Currie and Schwandt (2016). Mortality rates are age-adjusted.

Technical Appendix

FIGURE 1. U.S. LIFE EXPECTANCY, 1900–2014

Source: Arias 2015; Costa 2015.

Note: Life expectancy data for 1900–2011 are collected from Arias (2015) and life expectancy data are matched and continued through 2014 with CDC (2015). Dates for the events noted on the timeline were collected through a basic Web search and Costa (2015).

FIGURE 2. EXPECTED AGE AT DEATH FOR 40-YEAR-OLDS, BY HOUSEHOLD INCOME PERCENTILE

Source: Chetty et al. 2016.

Note: Sample pools men and women who turn 40 during the period 2001–14.

The data from the figure are taken from Chetty et al. (2016) and are publicly available. Unlike figure 2 in Chetty et al. (2016), reported estimates are not adjusted for race and ethnicity. Chetty et al. (2016) gathered the micro data from Social Security Administration death records and deidentified tax records made available by the U.S. Department of the Treasury.

FIGURE 3. EXPECTED AGE AT DEATH FOR MEN AND WOMEN, BY INCOME, 1980 AND 2010

Source: National Academy of Sciences 2015.

Note: Expected age at death is conditional on reaching age 50 (i.e., an age of 88.8 represents a life expectancy of 38.8 years at age 50). Income is measured as lifetime average nonzero earnings reported to Social Security between ages 41 and 50.

FIGURE 4A. SMOKING AMONG MEN BY AGE AND INCOME

FIGURE 4B. SMOKING AMONG WOMEN BY AGE AND INCOME

Source: National Survey on Drug Use and Health 1999–2014.

Note: Smoking is defined as having ever smoked at least 100 cigarettes. Income bins are terciles of family income for the entire sample, and the sample is restricted to individuals aged 26 and older.

Low income is defined as less than $40,000 in household income, and high income is defined as greater than $83,500. (Note that in the figure the middle tercile is not shown.) Since the income variable for 1998 differs from that used for 1999–2014 (it contains many more income categories), observations from 1998 were excluded when generating the cutoffs for the income terciles. Family income is adjusted for inflation using the CPI-U-RS to 2014 dollars. Values reported in the table are smoothed using a three-year moving average (beginning in 1998 and ending in 2014). Observations for income includes imputed values.

FIGURE 5A. MORTALITY BY CAUSE, WHITE NON-HISPANICS AGE 45–54

Source: CDC 1999–2014.

Note: Data are collected through CDC Wonder. Figure is adapted from Case and Deaton (2015, figure 2). Chronic liver diseases include alcoholic liver diseases and cirrhosis. Poisonings include drug and alcohol poisoning, both accidental and with undetermined intent.

FIGURE 5B. MORTALITY, AGES 45–54

Source: CDC 1999–2014.

Note: Data are collected through CDC Wonder. Mortality data are for all-cause mortality. Figure is adapted from Case and Deaton (2015, figure 1).

FIGURE 6A. ILLEGAL DRUG USE AND HEAVY DRINKING AMONG MEN AGE 26–49, BY INCOME

FIGURE 6B. ILLEGAL DRUG USE AND HEAVY DRINKING AMONG MEN AGE 50 AND OLDER, BY INCOME

Source: National Survey of Drug Use and Health 1998–2014.

Note: Illegal drug use refers to the use of either hallucinogens, cocaine, or inhalants on three or more days in the past year, the use of heroin in the past year, or the use of prescription drugs—sedatives, tranquilizers, stimulants, or analgesics (i.e., pain killers)—on three or more days for nonmedical reasons in the past year. By definition, this excludes any use of marijuana. Heavy drinking is defined as drinking five or more drinks on the same occasion on three or more days in the past 30 days. Income bins are inflation-adjusted terciles of family income for the entire sample. The sample is restricted to individuals age 26 and older.

Low income is defined as less than $40,000 in household income, and high income is defined as greater than $83,500. (Note that in the figure the middle tercile is not shown.) Since the income variable for 1998 differs from that used for 1999–

2014 (it contains many more income categories), observations from 1998 were excluded when generating the cutoffs for the income terciles. Family income is adjusted for inflation using the CPI-U-RS to 2014 dollars. Values reported in the table are smoothed using a three-year moving average (beginning in 1998 and ending in 2014). Observations for income includes imputed values.

BOX FIGURE 1. EXPECTED AGE AT DEATH AMONG MEN BY HOUSEHOLD INCOME PERCENTILE IN SELECTED COMMUTING ZONES

Source: Chetty et al. 2016.

Note: Sample pools men who turn 40 during the period 2001–14. Cities in the figure refer to commuting zones that include adjacent counties as defined by commuting patterns, in addition to urban cores. (Commuting zones are similar to metropolitan statistical areas, but may cover rural areas as well.)

The data from the figure are taken from Chetty et al. (2016) and are publicly available. Chetty et al. (2016) gathered the micro data from Social Security Administration death records and de-identified tax records made available by the U.S. Department of the Treasury.

APPENDIX FIGURE 1. THREE-YEAR MORTALITY RATES ACROSS GROUPS OF COUNTIES RANKED BY THEIR POVERTY RATE, 1990 AND 2010

Source: Currie and Schwandt 2016.

Note: Figure is adapted from figure 3 in Currie and Schwandt (2016). Mortality rates are age-adjusted.

Endnotes

1. Costa (2015) provides a comprehensive review of this progress and its determinants from 1750 to 2015.
2. Note that the data for women are somewhat less reliable than for men (Bosworth and Burke 2014), which may help explain the surprisingly large gap between life expectancies for the top two quintiles of women.
3. This analysis follows a similar analysis in Currie and Schwandt (2016).
4. Colistin is one of a number of last-resort antibiotics.
5. Values were originally reported in euros and adjusted to American dollars using June 2016 exchange rates.

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