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INEQUALITY IN MORTALITY OVER THE LIFE COURSE: WHY THINGS ARE NOT AS BAD AS YOU THINK

Janet M. Currie

Abstract

Recent research shows increasing inequality in mortality among middle-aged and older adults. But this is only part of the story. Inequality in mortality among young people has fallen dramatically in the U.S. converging to almost Canadian rates. Increases in public health insurance for U.S. children, beginning in the late 80s, are likely to have contributed.

I. INTRODUCTION

Orley Ashenfelter

It is my great pleasure to introduce Janet Currie today. My name is Orley Ashenfelter, President-Elect of the Western Economic Association International (WEAI). I do not believe in long introductions. None of you came here to hear me introduce Janet! So, I think we should probably get right to it.

Janet taught at the University of California Los Angeles, then Columbia, and is now my colleague and department chair at Princeton. She has an extremely diverse background: a fellow at the Econometric Society, but also the National Academy of Medicine, as well as almost everything in between.

She started off as a fine labor economist, and slowly evolved to become the director of the Princeton Center for Health and Wellbeing, and she now is squarely in this area of health economics. She is a Canadian and went to the University of Toronto, who as a very talented undergraduate won a special award, and completed a Master of Arts. Finally, she completed her Ph.D. at Princeton University. So, will you join me, please, and give a warm welcome to Janet Currie?

II. BACKGROUND ON INEQUALITY IN MORTALITY

Janet Currie

Thank you very much, Orley. It is a pleasure to be here. And I am here to do something somewhat uncharacteristic for an economist, and argue that things are not quite as bad as

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(with an introduction by Orley Ashenfelter)

you think. We have all been hearing lots of bad news. And so I have some bad news, too, but I also have some good news to leaven it.

Today I will focus on three main points, and here is a preview. First, it is important to consider inequality trends in children and younger people, not just the middle-aged and older. This gives quite a different perspective on trends in mortality inequality. Second, it is extremely difficult to define subgroups consistently by race and education over time, so we should be somewhat suspicious about pronouncements about how subgroups are doing. Finally, looking at inequality trends suggests that public policy has been effective in reducing mortality inequality, especially in children.

What got me thinking about how differences in mortality relate to income inequality was an article by Olshansky et al. (2012). The *New York Times* headline reporting on this study was, “Life Spans Shrink for Least-Educated Whites in the U.S.” (Tavernise 2012). I found this hard to believe given that mortality rates for children have been falling greatly. And so I really got curious about it.

Paul Krugman (2012) also wrote about “the shocking story in yesterday’s *New York Times* about sharply declining life expectancies for less educated whites,” and he immediately made the connection with inequality in incomes. Rich people do tend to be healthier than poor people, so it is natural to make this connection and then conclude that there has been this huge expansion in income inequality over a long period of time, and so that must lead to growing inequality in health outcomes. That is clearly the conclusion that Krugman was drawing.

The drum beat of bad news on this front has just gone on and on. Another article (Tavernise 2016) has the headline, “Disparity in Life Spans of the Rich and the Poor Is Growing.” This article featured a picture of a child; the implication was that this disparity is true for children as well as for adults, which, up to this point, there was absolutely no evidence about. Another thing that is a little bit gratuitous about this particular article is that the *New York Times* reports, “researchers debate whether expanding access to health care will shrink the gap in life expectancy between the rich and the poor”. The subtext here is that the relationship between inequality in income and inequality in health is so strong that it may not really matter whether policy expands access to health care, because there will still be an increase in inequality in health outcomes if income inequality is growing. I am going to argue that is just not true.

Academic economists have also added to this literature and there are some very well-known people who have written in this area. See for example a book chapter by Cutler and Landrum (2012) and Raj Chetty et al. (2016). There is also a National Academy of Sciences report from a committee chaired by Ron Lee (National Academies of Sciences, Engineering, and Medicine 2015). Case and Deaton (2015) have written about increases in inequality in mortality, most recently in Case and Deaton (2017).

III. THE IMPORTANCE OF AGE AND SUBGROUPS

All of this work focuses on adults, rather than the whole life cycle. Some of it is using data from the Health and Retirement Study (HRS), so they are starting with people 55 and older. Raj Chetty's work is focusing on people who are 45 and older. So, the literature is really silent on what is happening for younger people. For some purposes, like thinking about what is going to happen with Social Security, if you are looking at a near horizon, then looking at people who are 45 or 55 is fine. If you want to look further into the future, then you have to look at the people who are currently young, not the people who are currently middle-aged, and so I am going to talk more about them.

Another thing about this literature is it mostly focuses on subgroups defined by education, race, or location. The newspaper headlines are focused on less educated Whites: a subgroup of less educated and then a subgroup of people who are also White. One of the difficulties that I think tends to get glossed over is that it is actually pretty hard to define those groups in a consistent way over time.

IV. FOLLOWING TRENDS AMONG SUBGROUPS

Olshansky et al. (2012) computed life expectancy at birth for White females by education at age 25 (Figure 1). This requires some assumptions but let us assume that the assumptions are valid. The main point here is that for the group with less than 12 years of education, life expectancy seems to be falling precipitously, whereas for the other groups, it is going up, so therefore, you have increased inequality in life expectancy. What is the problem with that? The problem is that as Figure 2 shows, the population denominator is not staying the same, so you have a huge reduction in the share of White females who have less than 12 years of education.

Focusing on this particular subgroup is somewhat like taking a good news story, that is, that in the United States we now have many fewer high school dropouts in the White female population than we had in the past, and reporting it as a bad news story. Aside from this issue with the change in the group of who is less educated (the denominator), there is also a fundamental problem with defining mortality rates or life expectancy, which is that the numbers come from two different data sets. On the one hand, vital statistics are just counts of number of deaths. To get a rate, you have to divide that by a population estimate, and that normally comes from the census (U.S. Census Bureau 2010). These two data sets have quite different ways of coding race and education, and those have changed over time.

Think about a recent complication with the reporting of race and ethnicity. The census in 2000 started allowing people to choose more than one race. There was a lot of excitement about this. What was going to happen? How many people were going to check more than one box? In the end and on aggregate, at that time not very many people checked more than one box. But this is something that is really different for younger people.

The census also changed the question regarding Hispanic ethnicity in 2008, in a way that greatly increases the number of Hispanics. Consequently, the denominator for that subgroup is changing over time. These changes in the denominator can have a big effect on the

mortality rate that you compute. Figure 3, where 1990 is normalized to be 100, shows the tremendous increase in the number of people who are being identified as Hispanic by 2008.

Figure 4 shows the data on multiple race-reporting in the 2010 Census. For the older people, the 50-plus cohort, a small proportion checked more than one box. Among young people who check the box as African-American, almost 20% check another race. For Whites, the percent who check more than one box is up to 10%. This increase in multiple race children reflects the increasing prevalence of interracial marriage. The latest numbers were that 17% of marriages were now interracial.

Figure 5 provides some idea about what a difference this can make for the denominator in the age 20–24 cohort. Basically, more people in the denominator means the mortality rate is going to be lower. Consider the red lines here that are the death rate based on everybody who checks Black, for example, rather than just the people who only check Black. The results then show a lower rate than if you just take the people who only choose one race. There is another line here, which is an estimate that the National Center for Health Statistics (NCHS) puts out, which seems to be at odds relative to the census-based one, an interesting comparison. Clearly, if education and race are changing, and are different in the census and NCHS surveys, that is a bit of a problem.

V. AN APPROACH FOR COUNTY-LEVEL ANALYSIS

This work has its focus on county as the relevant unit, partly because county data provide a relevant dimension that is consistently reported in the vital statistics and census data over time. However, an issue with counties is that people are mobile. If the most able-bodied people are more likely to leave distressed areas, then the average health in those areas will decline over time even if there was no actual change in any individual's health.

County-by-county comparisons are also being talked about a lot in the popular press. For example, a *New York Times* article (Lowrey 2014) presents a comparison between Fairfax County, Virginia, with “gated communities and bland architecture of military contractors,” and rural McDowell County, West Virginia. While they are relatively close together (about 350 miles apart), economically, they are worlds apart. And life expectancy is going up in the rich county, and going down in the poor one.

Figure 6 shows that Fairfax County, Virginia, which had the increase in life expectancy, also had an increase in population growth of 32%. McDowell County, West Virginia, which experienced a decline in life expectancy, also has seen a decline in population. These differences are big enough to drive the changes in life expectancy that you see just by selectively taking healthy people out of McDowell and putting them into Fairfax. This turns out to be generally true. When you cherry-pick the counties with the biggest declines in life expectancy and the ones with the biggest increases in life expectancy, they are systematically the ones that have the biggest population changes.

Wang et al. (2013) estimated changes in life expectancy at the county level, and they are substantial. New York, New York, looking at Table 1 had the highest increase in life expectancy at 8.37 years. That is just unbelievably large. Some with declines, like Fayette,

Alabama, had an apparent decline in life expectancy of 3.47 years. Plotting these in the same way in Figure 7, here the yellow dots are all the places that had improving life expectancy, and you can see they have increases in population. The places that have declining life expectancy, the red dots, all tend to have declining population as well. (Fairfax and McDowell are shown for comparison.) This example shows how migration can make it difficult to do county comparisons over time.

To ensure that estimates are not affected by the denominator changing for different counties, we first rank the counties from richest to poorest. We then group counties into “bins”, each representing about 5% of the population. We do this separately for 1990, 2000, and 2010, so that in each census year, we are considering mortality in the poorest counties and the richest counties regardless of whether counties changed ranks. Then counties representing the poorest 5% of the population and the counties representing the richest 5% of the population in each census year can be compared. So, we are always comparing the counties that are the poorest to the counties that are the richest. In fact, those do not change as much as you might think, over time. Figure 8 shows poverty rates by county in 1990. The pattern through Appalachia in the South, and in some other places, shows relatively high rates. Then in 2010, in Figure 9 the same places, by and large, also have concentrations of poverty.

We are also going to look at mortality at all ages. It is quite reasonable to start out by looking at mortality at older ages because, after all, that is where most of the deaths are. But in demography and in economic development, infant and child mortality is heavily investigated as an indicator of population health, and the reason is twofold. First, children who are healthier today are going to grow up to be healthier adults, and there is considerable evidence that is the case (Almond, Currie, and Duque Forthcoming). Second, if children are being saved, the marginal infant who is saved might be sicker than the marginal infant who would have survived anyway. But if the whole distribution of health shifts, then the average survivor is still healthier in a population where you have lower mortality.

These are some advantages of analyzing mortality at the county level: The county is consistently recorded in the census and the vital statistics, with a sufficiently large cell size that zero deaths, even for subgroups, by age and race, are not a factor. The problem of the denominator changing is avoided. By focusing on groups of counties accounting for a fixed share of the population, we avoid problems associated with shrinking and growing counties. Many socioeconomic status (SES) indicators are available at county level. The focus here is on poverty rates, but counties can also be ranked by median income, education, and even life expectancy, with similar results (Currie and Schwandt 2016a). Recent work (Currie and Schwandt 2016b), shows that those produce fairly similar rankings, at least for the United States.

Figure 10 shows an example of how counties can be fit into bins. If you try and put them into 1% bins, it is a bit messy. That is what the first plot shows. But if you try and put them into 5% bins, that actually works out pretty well. We split Cook and Los Angeles Counties in two in order to do this, but it works out reasonably well. So, there are 20 bins across the country, each with 5% of the population.

VI. MORTALITY RATES FOR AGE, RACE, AND GENDER BY COUNTY GROUPS

Using our approach of grouping counties we can now show the results for comparisons of mortality rates by age, race, and gender. Figure 11 focuses on 0 to 4-year-olds, infants and young children. The data for 1990 are shown in blue triangles and for 2000 by the black dashed line. There are then two different lines for 2010, green circles and red squares. Why are there two different lines for 2010? This illustrates the difference when multiple-race people are included or excluded. The lower line for 2010 reflects including the multiple-race people, and because it has a bigger denominator, you are going to get a lower rate. On the X axis, all these bins are ranked by poverty percentile. Zero is the richest places and 100 is the poorest places.

All of the lines slope up. That is just showing that mortality is higher in poorer places, and that is what we expect. Among children under 5 years old, there have been big declines in mortality across the county poverty spectrum. The lines tend to fan out, which means that there is a bigger decline in mortality in the poorest places than in the richest places.

What really pops out is the huge decline in mortality for African-American children, and this result is even larger if we include those with multiple race. This result is one thing we really have not heard anything about in all of the popular press and scholarly literature regarding increasing inequality in mortality.

To summarize, there is a strong reduction in mortality across the county-poverty spectrum. There are very large reductions for African-Americans, and those are even larger when multiple-race people are included. The reductions are largest in the poorest counties, which implies decreasing inequality in mortality for children.

If we look at the 5- to 19-year-olds in Figure 12, the multiple-race factor actually does not make such a big difference, so that is a more recent phenomena. There are strong reductions in mortality across the county poverty spectrum. There are very large reductions for males, both White and especially for African-American males. And again, the biggest declines are for people in the poorest places, implying decreasing inequality in mortality.

For the 20- to 49-year-olds (Figure 13) you actually see something a little different. If you look at White females, you see the numbers for 2010 are above the numbers for 1990 at all poverty percentiles. Mortality actually increased slightly for females, though from a low level. That is really an extraordinary and disturbing development, in that we are not used to seeing mortality rates rising for any group, but you do see that here. And this pattern is stronger for the poorest places than for the richest places, implying some increase in inequality in mortality in that group. For African-Americans, especially males, there were large reductions in mortality especially in poorer counties, implying large reductions in mortality inequality. There is little improvement in mortality for White males in rich counties, but some reduction in poor counties, implying reduced inequality in mortality.

The finding of increasing inequality in mortality, especially among White females, and especially in poorer counties, is the one that is been getting a lot of media attention. What I am trying to do is put that in some sort of context by looking at the other groups and what is happening with them. For young and middle-aged adults, mortality did increase for females, but from a low level, and the increases were indeed greater in the poorer counties. There is little improvement in mortality for White males in rich counties, but some reduction in poor counties. African-Americans, especially males, experienced large reductions in mortality.

The oldest group here, age 50-plus, is the age group with the most deaths. Figure 14 is consistent with what other people have reported, in that we see systematic declines in mortality in this age group across all race and gender groups, and across the county poverty spectrum. But among White females the declines are larger in the richer counties, implying increasing inequality in mortality. For other groups, shifts in mortality are similar in rich and poor counties.

You can also do this analysis a little bit more formally, testing the difference in the slopes between 1990 and 2010, if you fit a regression line through the points in the graphs. Tables 2 and 3 summarize what you have already seen. For males, up to age 50, you have decreasing inequality in mortality, then it is generally parallel shifts until old age, whereas for females, you are seeing declines in inequality in mortality up to age 30, then it is flat for a little bit, and then you have increases in inequality in mortality from age 40 on.

These results suggest that looking only at the middle-aged and older cohorts gives you a much more depressing picture than if you look at trends in inequality at the aggregate population level. It also suggests that it is not necessarily the case that increased income inequality will lead to increased health inequality: income inequality increased for all groups, but health inequality increased for the old and decreased for the young. Clearly, there was something going on for the young that went against that trend. And I am going to argue that public policy may, in fact, have been very effective at improving the health of the younger population, as well as effective at buffering the relationship between income and health, so you do not see that increases in income inequality necessarily lead to increases in health inequality, including mortality.

VII. EVALUATING POLICY OVER TIME AND ACROSS STATES IN THE UNITED STATES

What are the policies that might be important? I think one of the major ones is expansions of health insurance for poor pregnant women and for children, and for disabled adults. Other things that might be important are expansions of other support programs, like the earned income tax credit (EITC), food stamps (SNAP), and state-level pre-kindergarten (pre-K) programs. For the older group, I want to flag changes in smoking behavior as potentially important, and I also want to briefly mention reductions in pollution.

The overall amount that the U.S. federal government spends on children has greatly increased over the past 20–30 years. Figure 15 shows the increase in expenditures in some broad categories, between 2002 and 2015. Medicaid is the really big one. For those who do

not follow this, Medicaid covers poor pregnant women and children, disabled people, and old people in nursing homes. In Figure 15 I have tried to display the part of Medicaid that only covers children and pregnant women, and not the old people in nursing homes, and you see a big increase. Part of that is due to increases in the number of children who are covered, which happened after about 1988.

Notes: Only Medicaid for children and nondisabled adults is included. The 2002 numbers are from Currie 2006. The 2015 numbers are from a variety of sources: SNAP data available here: <https://www.fns.usda.gov/pd/overview> (see annual tables); State PreK program spending here: http://www.ecs.org/ec-content/uploads/01252016_Prek-K_Funding_report-4.pdf; Total Medicaid spending was \$545.1 billion in 2015. <https://www.cms.gov/Research-Statistics-Dataand-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NHE-Fact-Sheet.html>; 19% are children, pregnant women, and some non-disabled adults in families with children are also covered, <https://www.cbpp.org/research/health/policy-basics-introduction-to-medicaid>; Plus CHIP, EITC: <http://www.ncsl.org/research/labor-and-employment/earned-income-tax-credits-for-working-families.aspx>.

So, what did we do? Well, we greatly expanded Medicaid coverage for poor women and children. This expansion was phased in across states at varying rates, and also phased in across child age groups. First, pregnant women were covered, then children aged 0–1, then children 1–3, and so on, until by around 2001 all poor children up to age 18 were covered by public health insurance. You can see in Figure 16 that the fraction of children eligible for public health insurance coverage went up from around 15% to over 40%. This has nothing to do with the Affordable Care Act (ACA), by the way. All this was in place before the ACA. But the policy measures that are currently being discussed would roll this back, essentially, so that you would not have quite so many people, women and children, covered by Medicaid.

The result of these policies was that the fraction with any health insurance went up a lot between 1990 and 2010 among children, as seen in Figure 17. At the same time, the fraction with any health insurance was going down for 19- to 64-year-olds. The ACA was all about targeting those people, and trying to get people in that age group covered by health insurance. Of course, the 65 and up are 100% are covered by Medicare.

Variation in coverage across states over time, and across cohorts that were insured, can identify the effects of public insurance. Only children born after September 1, 1983 were eligible for expansions, creating a discontinuity. If you were born on August 31, 1983, you would never be eligible for these insurance expansions. A spate of recent studies look at the covered cohort, who are now young adults, to measure the long-term effects of giving coverage to this cohort of young children (Currie, Decker, and Lin 2008; Wherry, Kenney, and Sommers 2016; Wherry and Meyer 2016; Brown, Kowalski, and Lurie 2015). These studies examine a range of outcomes including mortality, hospitalizations for chronic conditions, whether people are employed, how much education they get, disability, and how much taxes they pay; for all these outcomes, one sees improvements among children who received eligibility for health insurance.

To show one example, Figure 18, from a paper by Wherry et al. (Forthcoming), shows a drop in hospitalizations for chronic illness in Black children born after September 1, 1983. Time zero is September 1, 1983, with people born up to 50 quarters before. Those are the negative numbers. The figure also shows figures for people born up to 50 quarters afterward. Those are the positive numbers. You can see a generally declining trend in hospitalizations, which reflects improvements in medical technology that have lowered hospitalization rates generally. One can also clearly see a sharp discontinuity (a fall) in hospitalizations for indicate that expansions of public health insurance for children could definitely be a big part of this story of improving children outcomes, including reductions in child mortality.

I said I was going to talk about smoking. If you quit smoking in the past, that improves your health in many respects, but it does not bring it back to baseline health as it would have been if you had never smoked; there are still some negative health consequences of ever having smoked. For people 50-plus, Figure 19 shows that a lot of people smoked at some point and then quit. What I want to draw your attention to is that for women 50-plus, there are really different trends by SES. Women who are above the poverty line are, over time, less likely to report that they ever smoked. However women below the poverty line are increasingly more likely to report that they ever smoked over time. These differing trends reflect differential responses to emerging knowledge about the dangers of smoking. This past behavior could have something to do with the health disparities that we see now, where we see increasing mortality among poorer women, relative to wealthier women. The good news part of this story is that if you look at 18- to 40-year-olds, the fraction who ever smoked is substantially lower and also decreasing over time. Again, this reduction in smoking rates did not just happen by accident. There was a really concerted public health effort to get people to stop smoking, and many different policies contributed.

I said I would mention air pollution. Figure 20 shows data from the U.S. Environmental Protection Agency (2017) (EPA) website, for 1989–2012, for the six criteria air pollutants. Criteria pollutants are regulated by the Clean Air Act of 1970 (and later amendments) and required to be tracked. From 1970 to 1989, we saw huge reductions in air pollution. I want to highlight that even if you look at the period from 1989 to 2012, there were still substantial improvements in air pollution.

Why is this relevant to inequality? Well, because poor people are more likely to be exposed to almost any kind of pollutant that you can measure. They are more likely to live near busy roads and more likely to live near factories that are emitting pollutants. So if we reduce pollution that should have a disproportionately positive effect on the most disadvantaged people. Also, children are disproportionately impacted by air pollution, so cleaner air is linked to disproportionate improvements in their health.

VIII. INTERNATIONAL POLICY COMPARISONS

How can we provide further evidence about whether policies affecting children are responsible for the decline in inequality in mortality among the young in the United States? We can compare the United States with another country. Canada is a good comparison because many factors (such as access to technology, smoking, product safety) are similar in

the two countries, but the health policy environment is different. In particular, over the whole period, Canadian children had access to public health insurance, whereas the American children were just gaining access to public health insurance. We can compare trends in mortality inequality in the two countries and see whether it looks like there is something that is happening differentially among children in the United States compared to Canada.

Figure 21 shows the baseline of what mortality looks like by age in the two countries. Since this is partly about Canada, I like to call this the “hockey stick” of mortality. You can see it does look like a hockey stick. Mortality is high for infants and very young children, then it falls precipitously, before showing a sharp rise around age 15; the late teenage years are very dangerous. The dashed lines here are for Canada, and the solid lines are for the United States. You can see the U.S. rates are higher than the Canadian rates at every age, which is kind of stunning. And the male rates are always higher than the female rates, and that is actually true everywhere. So, you can see that the biggest gaps are in the young adult ages.

While it is simple to say that you are going to compare Canada and the United States, the data are not entirely comparable, and we spent a lot of time trying to figure out how to do such a comparison. We are going to look at mortality at what Canadians call the census division level because it is the most comparable to the U.S. county level. We also defined what we call a low income cut off, which is a fixed cut off across all areas of the country. In Canada they do not have an official poverty rate. They have a low income cut off (LICO). And the low income cut off is different in different places, which seems reasonable enough since costs vary widely, but the cut off is much higher in big cities in Canada, which means that big cities, effectively by definition, have a lot of poverty because they have been given a high poverty threshold. If you use the official low income cut off in Canada, the poorest places have the lowest mortality and the lowest high school dropout rates. We use a fixed cut off for every place, which is more like the U.S. poverty line, and this helps us to make comparisons.

If we do exactly the same thing for the United States and Canada, that is rank all the areas by poverty, and then look by age at what the mortality rates look like, Figure 22 is what you see for males. The dashed lines are for Canada, the solid lines are for the United States. The heavier line in each case is for 2011, and the fainter line is for 1991. The figure shows that if we start in 1991, in the richest places the child mortality rates for males look the same in Canada and the United States, but in every other place, they are higher in the United States than those in Canada. By 2010 or 2011, the U.S. rate for male children has almost approached the Canadian rate. There were big declines in child mortality, especially in poor places, in the United States, such that the mortality rate approaches the low Canadian rate. For the other male age groups, you see United States declines in mortality, especially in the poorest places, but they do not approach the lower Canadian levels.

Here are some takeaways for males. In 1990, the death rates in the richest U.S. places were similar to those in Canada. By 2010, the mortality gradients had become flatter for people under 45. And in 2010, the death rates for U.S. children approached those of Canadian children. Among those who are aged 45–65, there was a wide gap between Canadian and U.S. mortality rates, especially in the poorest places. For females, you see the strong

convergence of U.S. rates to Canadian rates among children less than 20. The main difference from results for males is that there is very little improvement in mortality between 1990 and 2010 for women aged 20–39, and virtually none for women aged 40–55. Mortality rates for women 20-plus remain much higher in the United States than in Canada at all area poverty levels. That rather begs the question: what are people dying of?

For children ages 1–19, accidents are the leading cause of death. There are similar declines in the United States and in Canada, for accidents. How does that square with my hypothesis that this has something to do with health insurance? Surely, health insurance cannot have anything to do with accidental deaths. I would argue that it does, because the kind of trauma care that you get matters a great deal. If in the U.S. areas where you have a lot of uninsured people hospitals do not have trauma units, because hospitals that open such a service will not get paid by the uninsured and solvency becomes an issue, then fewer people will survive otherwise survivable accidents.

Accidents remain a leading cause of death for people aged 20–49, but in this age category, accidental deaths fall more quickly in Canada than in the United States. One subcategory of accident that is especially important is accidental drug poisonings. A large increase in deaths in this category reflects the opioid epidemic. For example, among males 20–49, deaths due to accidental drug poisonings increased by 351% in the United States compared to only 58% in Canada. This increase is what my colleagues, Case and Deaton (2017), have been pointing to. Even among older people, 50–64, we see an absolutely astonishing rise in accidental drug poisonings, of over 1,000% for both males and females over the past two decades. The increases are again much smaller increases in Canada. And the only reason why opioid-related mortality is not the headline item for those 50–64 is that in this age category cancer and heart disease become the leading causes of death. In the oldest category, those 65 and over, one sees an increase in deaths due to chronic lower respiratory disease among women in both the United States and Canada, which is consistent with the emphasis I was putting on smoking trends as a possible explanation for trends in mortality among older women.

IX. CONCLUSIONS

Looking at the big picture instead of all of the details, what do these comparisons suggest? The mortality profile for U.S. children approached that of Canadian children when U.S. children gained health insurance. This finding supports the idea that policies aimed at children, in particular health insurance, have been very important in improving child health and young adult outcomes in the United States.

The continuing poor performance of middle-aged and older U.S. adults relative to Canadian adults appears to be largely due to drug overdoses, specifically, the opioid epidemic. There is also an opioid epidemic in Canada, but it is much less severe. In European countries, it really has not hit to the same extent. And why is that? Most people who become addicted start with opioids that were legally prescribed by a doctor. In the United States we have no controls, effectively, on those prescription rates, and so we see this terrible problem with opioids.

Also, both Canadian and U.S. women saw increases in mortality due to chronic lower respiratory disease, which could be due to both past and current smoking.

I think these three observations suggest a potentially strong role for public policy in reducing inequality in mortality. Giving people access to health care via public health insurance, doing something about opioid prescriptions, and anti-smoking campaigns all seem to have the potential to have major impacts on health and health inequalities. And since health in early childhood has long-term effects, this improvement at younger ages is likely to be sustained into the future as these younger cohorts age. Conversely, disparities at older ages may reflect changes that happened long ago, particularly with respect to smoking. Looking forward 40 or 50 years, we may have a substantially healthier population. Conversely, when you see disparities at older ages, it does not necessarily mean that it is about something that is happening right now. Changes in smoking behavior are things that happened a long time ago, and are still having impacts that are being felt.

The bottom line is that even in times of increasing economic inequality, increases in health inequality are optional and depend on public policy.

ABBREVIATIONS

ACA	Affordable Care Act (aka, Obamacare)
AKA	Also Known As
ETC	Earned Income Tax Credit
HRS	Health and Retirement Study data, a longitudinal project sponsored by National Institute on Aging (NIA U01AG009740) and the Social Security Administration (website: http://hrsonline.isr.umich.edu/)
LICO	Low-Income Cut Off
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
pre-K	state-level pre-Kindergarten
SCHIP	Children's Health Insurance Program, through both Medicaid and separate state-level SCHIP programs, funded jointly by states and the federal government
SES	Socioeconomic Status
SNAP	Supplemental Nutrition Assistance Program (food stamps)

References

Almond D, Currie J, Duque V. Childhood Circumstances and Adult Outcomes: Act II. *Journal of Economic Literature*.

- Baker M, Currie J, Schwandt Hannes. Mortality Inequality in Canada and the U.S.: Divergent or Convergent Trends? National Bureau of Economic Research Working Paper No. 23514. 2017
- Brown DW, Kowalski AE, Lurie IZ. Medicaid as an Investment in Children: What is the Long-Term Impact on Tax Receipts? National Bureau of Economic Research Working Paper No. 20835. 2015
- Case A, Deaton A. Rising Morbidity and Mortality in Midlife among White Non-Hispanic Americans in the 21st Century. *Proceedings of the National Academy of Sciences of the United States of America*. 112(49)2015; :15078–83. DOI: 10.1073/pnas.1518393112 [PubMed: 26575631]
- Case A, Deaton A. Mortality and Morbidity in the 21st Century. *Brookings Papers on Economic Activity*. 2017
- Chetty R, Stepner M, Abraham S, Lin S, Scuderi B, Turner N, Bergeron A, Cutler D. The Association between Income and Life Expectancy in the United States, 2001–2014. *Journal of the American Medical Association*. 315(16)2016; :1750–66. DOI: 10.1001/jama.2016.4226 [PubMed: 27063997]
- Currie, J. *The Invisible Safety Net: Protecting the Nation's Poor Children and Families*. Vol. 2006. Princeton, NJ: Princeton University Press; 2006.
- Currie J, Schwandt H. Inequality in Mortality Decreased among the Young while Increasing for Older Adults, 1990–2010. *Science*. 3522016a; :708–12. DOI: 10.1126/science.aaf1437 [PubMed: 27103667]
- Currie J, Schwandt H. Mortality Inequality: The Good News from a County-Level Approach. *National Bureau of Economic Research Working Paper No. 22199*. 2016b
- Currie J, Schwandt H. Mortality Inequality: The Good News from a County-Level Approach. *Journal of Economic Perspectives*. 30(2)2016c; :29–52. [PubMed: 27917023]
- Currie J, Decker S, Lin W. Has Public Health Insurance for Older Children Reduced Disparities in Access to Care and Health Outcomes? *Journal of Health Economics*. 27(6)2008; :1567–81. [PubMed: 18707781]
- Cutler, DM, Landrum, MB. Dimensions of Health in the Elderly Population. In: Wise, DA, editor. *Investigations in the Economics of Aging*. Chicago: The University of Chicago Press; 2012.
- Krugman P. Disdain for Workers. *The New York Times*. Sep 21.2012
- Lowrey A. Income Gap, Meet the Longevity Gap. *The New York Times*. Mar 15.2014
- Committee on the Long-Run Macroeconomic Effects of the Aging U.S. Population-Phase II. Committee on Population, Division of Behavioral and Social Sciences and Education. Board on Mathematical Sciences and Their Applications, Division on Engineering and Physical Sciences. Washington, DC: The National Academies Press; 2015. National Academies of Sciences, Engineering, and Medicine *The Growing Gap in Life Expectancy by Income: Implications for Federal Programs and Policy Responses*.
- Olshansky SJ, Antonucci T, Berkman L, Binstock RH, Boersch-Supan A, Cacioppo JT, Carnes BA, Carstensen LL, Fried LP, Goldman DP, Jackson J, Kohli M, Rother J, Zheng Y, Rowe J. Differences In Life Expectancy Due To Race And Educational Differences Are Widening, And Many May Not Catch Up. *Health Affairs*. 31(8)2012; :1803–13. DOI: 10.1377/hlthaff.2011.0746 [PubMed: 22869659]
- Tavernise S. Life Spans Shrink for Least-Educated Whites in the U.S. *The New York Times*. Sep 20.2012
- Tavernise S. Disparity in Life Spans of the Rich and the Poor Is Growing. *The New York Times*. Feb 12.2016
- U.S. Census Bureau. Population. 2010. Accessed Multiple Dates. <https://www.census.gov/topics/population.html>
- U.S. Environmental Protection Agency. National Air Quality: Status and Trends of Key Air Pollutants. 2017. Accessed Multiple Dates. <https://www.epa.gov/air-trends>
- Wang H, Schumacher A, Levitz C, Mokdad A, Murray C. Left behind: Widening Disparities for Males and Females in the US Country Life Expectancy, 1985–2010. *Population Health Metrics*. 11(8)2013; :1–15. [PubMed: 23360645]
- Wherry LR, Meyer BD. Saving Teens: Using Policy Discontinuity to Estimate the Effects of Medicaid Eligibility. *Journal of Human Resources*. 51(3)2016; :556–88.
- Wherry LR, Kenney GM, Sommers BD. Role Public Health Insurance in Reducing Child Poverty. *Academic Pediatrics*. 16(3, Supplement)2016; :S98–S104. [PubMed: 27044710]

Wherry, L; Miller, S; Kaestner, R; Meyer, B. Childhood Medicaid Coverage and Later Life Health Care Utilization. Review of Economics and Statistics. Forthcoming.

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FIGURE 1.

Life Expectancy At Birth, By Years of Education At Age 25 for White Females, 1990–2008

Source: Olshansky et al. (2012).

FIGURE 2.

Population Share by Education for White Non-Hispanic Females, Age 25–84, 1990–2010

Data Source: U.S. Census Bureau (2010)..

FIGURE 3.

Effect of ACS 2008 Questionnaire Change Size of US Born White Birth Cohorts 1969–1971, by Hispanic Origin 1990 = 100

Data Source: U.S. Census, 1990/2000, 2006–2010 ACS.

FIGURE 4.
Multiple Race Reporting is More Important for Younger People
Data Source: U.S. Census Bureau (2010).

Trends in Death Rates for 20-24 Year Olds by Race, Using Alternative Population Denominators

FIGURE 5.

Trends in Death Rates for 20–24 Year Olds by Race, Using Alternative Population Denominators

Source: Currie and Schwandt (2016b, 2016c).

FIGURE 6.

Population Growth by County 1990–2000

Note: 30 counties with population > 1 million excluded. *Data Source:* Currie and Schwandt (2016b).

FIGURE 7.

County Population Growth and Change in Life Expectancy by County Population

Note: 30 counties with population > 1 million excluded. *Data Source:* Currie and Schwandt (2016b).

FIGURE 8.
FIGURE 8 County Poverty Rates in 1990
Source: Currie and Schwandt (2016a).

FIGURE 9.

County Poverty Rates in 2010

Source: Currie and Schwandt (2016a).

FIGURE 10.
Population Size of Poverty Quantiles
Data Source: Currie and Schwandt (2016b).

3-Year Mortality Rates Across County Groups
Ranked by Poverty Rates, by Race and Gender, Age 0-4.
(Blue triangle=1990, Green Circle=2010, Red Square=2010 with multiple race)

(A) Age 0-4

FIGURE 11.

3-Year Mortality Rates Across County Groups Ranked by Poverty Rates, by Race and Gender, Age 0-4

Source: Currie and Schwandt (2016b, 2016c).

3-Year Mortality Rates Across County Groups
Ranked by Poverty Rates, by Race and Gender, Age 5-19
(Blue triangle=1990, Green Circle=2010, Red Square=2010 with multiple race)

(B) Age 5-19

FIGURE 12.

3-Year Mortality Rates Across County Groups Ranked by Poverty Rates, by Race and Gender, Age 5-19

Source: Currie and Schwandt (2016b, 2016c).

3-Year Mortality Rates Across County Groups
Ranked by Poverty Rates, by Race and Gender, Age 20-49
(Blue triangle=1990, Green Circle=2010, Red Square=2010 with multiple race)

(C) Age 20-49

FIGURE 13.

3-Year Mortality Rates Across County Groups Ranked by Poverty Rates, by Race and Gender, Age 20-49

Source: Currie and Schwandt (2016b, 2016c).

(Blue triangle=1990, Green Circle=2010, Red Square=2010 with multiple race)
(D) Age 50+

FIGURE 14.

3-Year Mortality Rates Across County Groups Ranked by Poverty Rates, by Race and Gender, Age 50+

Source: Currie and Schwandt (2016b, 2016c).

FIGURE 15.

Increases in Government Spending on Children

Data Source: Currie and Schwandt (2016b, 2016c). Assumption: Half of Food Stamp payments go to families with children.

Simulated Medicaid/SCHIP Eligibility by Child Age Group

FIGURE 16.
 Simulated Medicaid/SCHIP Eligibility by Child Age Group
Source: Currie, Decker, and Lin (2008).

FIGURE 17.

Fraction with Any Health Insurance Coverage, U.S. 1990 to 2010

Source: Baker, Currie, and Schwandt (2017).

FIGURE 18.

2009 Hospitalizations for Chronic Illness in Black Children Born Prior to and After September 1, 1983

Source: Wherry et al. (Forthcoming).

FIGURE 19.

The Fraction of Men and Women Who “Ever Smoked” by Age Cohort

Notes: (1) Smoking rates in the overall old and young adult U.S. population, divided by poverty status, are plotted from 1990 to 2010, (2) Lines are fitted based on OLS regressions, and (3)

Data source: NHANES. *Source:* Currie and Schwandt (2016b, 2016c).

FIGURE 20.

Trends in Criteria Air Pollutants, 1989–2012

Data Source: U.S. Environmental Protection Agency (2017).

FIGURE 21.

1-Year Mortality Rates in Canada and the U.S., 2009–2011 (averaged)

Source: Baker, Currie, and Schwandt (2017).

Canada vs. USA Mortality Rates in 1990/91 and 2010-11 by Base Year Fixed-Cut Off LICO/Poverty, Males

FIGURE 22.

Canada vs. USA Mortality Rates in 1990/91 and 2010-11 by Base Year Fixed-Cut Off LICO/Poverty, Males

Source: Baker, Currie, and Schwandt (2017).

TABLE 1
Top 20 and Bottom 20 Counties in Terms of Change in Life Expectancy by Sex, 1985–2010

Top Counties					Bottom Counties				
Rank (Top)	Name	Change in Life Expectancy	Lower	Upper	Rank (Bottom)	Name	Change in Life Expectancy	Lower	Upper
Females									
1	New York, NY	8.37	7.91	8.79	1	Fayette, AL	-3.47	-5.41	-1.71
2	Loudoun, VA	7.77	6.59	8.99	2	Harmon, OK	-3.39	-5.07	-1.60
3	Kings, NY	6.70	6.37	7.03	3	Beckham, OK	-3.39	-5.07	-1.60
4	Bronx, NY	6.39	5.91	6.85	4	Leslie, KY	-3.17	-4.75	-1.59
5	Gunnison, CO	6.28	4.58	7.91	5	Clay, KY	-3.17	-4.75	-1.59
6	Pitkin, CO	6.28	4.58	7.91	6	Seminole, OK	-2.73	-4.35	-1.13
7	Marin, CA	6.27	5.47	7.07	7	Haralson, GA	-2.58	-4.46	-0.89
8	Prince William, VA	6.09	5.02	7.13	8	Murray, OK	-2.58	-4.06	-1.17
9	San Francisco	6.05	5.52	6.61	9	Gavin, OK	-2.58	-4.06	-1.17

Source: Wang et al. (2013).

TABLE 2

Male Mortality Gradients by 5-Year Age Categories

Mortality Rate (per 1,000) in 5% of the Population Living in													
Age Group	Counties with Lowest Poverty Rate					Counties with Highest Poverty Rate					Slope of Fitted Regression Line		
	1990		2010			1990		2010					
	Rate (1)	Standard Error (2)	Rate (3)	Standard Error (4)		Rate (5)	Standard Error (6)	Rate (7)	Standard Error (8)		1990 (9)	2010 (10)	p Value of Difference (11)
<1	9.77	0.34	5.53	0.24		18.28	0.46	9.79	0.29		0.083	0.036	<0.001
1-4	0.80	0.05	0.43	0.03		1.62	0.06	0.84	0.04		0.008	0.003	<0.001
5-9	0.50	0.03	0.26	0.02		1.01	0.04	0.50	0.03		0.004	0.002	<0.001
10-14	0.85	0.04	0.44	0.03		1.72	0.06	0.90	0.04		0.009	0.004	<0.001
15-19	2.65	0.08	1.92	0.06		5.83	0.10	3.10	0.07		0.031	0.010	<0.001
20-24	3.14	0.08	4.09	0.10		7.24	0.12	4.47	0.08		0.034	0.005	<0.001
25-29	3.43	0.08	3.45	0.09		9.00	0.14	5.59	0.10		0.051	0.018	<0.001
30-34	4.09	0.08	3.29	0.08		10.88	0.15	6.58	0.12		0.065	0.027	<0.001
35-39	5.29	0.10	3.62	0.08		13.22	0.18	8.44	0.14		0.080	0.038	<0.001
40-44	6.52	0.11	5.13	0.09		16.64	0.21	11.89	0.16		0.094	0.056	<0.001
45-49	9.80	0.15	8.19	0.11		22.62	0.27	19.14	0.20		0.120	0.095	0.035
50-54	15.88	0.22	12.72	0.14		32.39	0.35	28.71	0.24		0.151	0.141	0.499
55-59	27.63	0.31	19.57	0.19		49.91	0.45	40.74	0.30		0.196	0.187	0.602
60-64	47.54	0.43	28.83	0.26		71.55	0.53	54.33	0.38		0.217	0.224	0.726
65-69	75.56	0.58	45.64	0.38		101.69	0.65	76.22	0.51		0.229	0.268	0.192
70-74	122.06	0.86	75.04	0.59		148.19	0.88	107.30	0.69		0.240	0.296	0.173
75-79	187.42	1.28	126.97	0.86		207.20	1.15	159.64	0.96		0.195	0.320	0.025
80-84	299.77	2.04	218.65	1.24		296.49	1.67	240.84	1.36		0.060	0.242	0.022
>84	497.92	2.81	437.79	1.68		458.15	2.28	422.64	1.82		-0.222	-0.036	0.084

Source: Currie and Schwandt (2016b, 2016c).

TABLE 3

Female Mortality Gradients by 5-Year Age Categories

Mortality Rate (per 1,000) in 5% of the Population Living in										
Age Group	Counties with Lowest Poverty Rate				Counties with Highest Poverty Rate				Slope of Fitted Regression Line	
	1990		2010		1990		2010		1990 (9)	2010 (10)
	Rate (1)	Standard Error (2)	Rate (3)	Standard Error (4)	Rate (5)	Standard Error (6)	Rate (7)	Standard Error (8)		
<1	8.01	0.32	4.86	0.23	15.15	0.42	8.32	0.28	0.071	0.032
1-4	0.60	0.04	0.38	0.03	1.19	0.05	0.73	0.04	0.005	0.003
5-9	0.32	0.03	0.20	0.02	0.70	0.04	0.40	0.03	0.003	0.001
10-14	0.45	0.03	0.27	0.02	0.88	0.04	0.54	0.03	0.003	0.002
15-19	1.11	0.05	0.80	0.04	1.68	0.06	1.05	0.04	0.006	0.002
20-24	1.10	0.05	1.46	0.06	2.17	0.07	1.48	0.05	0.009	0.001
25-29	1.36	0.05	1.39	0.05	2.92	0.08	2.47	0.07	0.014	0.008
30-34	1.66	0.05	1.62	0.06	3.86	0.09	3.44	0.08	0.021	0.017
35-39	2.41	0.07	1.98	0.06	5.49	0.11	5.03	0.10	0.028	0.025
40-44	3.98	0.09	3.11	0.07	7.77	0.14	7.71	0.13	0.034	0.039
45-49	6.09	0.12	5.04	0.08	11.73	0.19	11.66	0.15	0.046	0.059
50-54	10.44	0.18	7.98	0.11	17.49	0.25	16.66	0.18	0.061	0.082
55-59	17.48	0.25	12.04	0.15	25.89	0.30	22.89	0.22	0.077	0.098
60-64	28.77	0.32	18.86	0.20	39.60	0.37	32.95	0.28	0.097	0.124
65-69	46.09	0.42	32.05	0.31	57.33	0.45	48.41	0.38	0.105	0.147
70-74	76.81	0.61	54.43	0.47	83.23	0.58	71.33	0.52	0.080	0.160
75-79	121.92	0.86	94.70	0.66	124.08	0.75	109.58	0.70	0.043	0.183
80-84	202.58	1.26	165.78	0.91	196.34	1.08	177.83	0.96	0.015	0.184
>84	411.51	1.62	386.39	1.14	384.78	1.46	376.08	1.21	-0.134	0.044

Source: Currie and Schwandt (2016b, 2016c).