Trends in Mid-Life Mortality by SES: Overview and subgroup cautions

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Overview:

• Summary of work on trends in US mortality by education and income, including recent focus on mid-life

• Broken down by age, sex, and everything: special considerations for trends in subgroups
U.S. Life Expectancy, 1900–2014

Figure 2. Life expectancy at birth, by Hispanic origin, race, and sex: United States, 2006–2011
EDUCATION DIFFERENTIALS IN MORTALITY BY CAUSE OF DEATH: UNITED STATES, 1960

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Are Educational Differentials in Adult Mortality Increasing in the United States?

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EXHIBIT 1. Life Expectancy at Age 25 by Education
Source: Authors' calculations based on non-Hispanic blacks and whites in the National Longitudinal Mortality Study and Multiple-Cause-of-Death Data.

Life Spans Shrink for Least-Educated Whites in the U.S.

“For generations of Americans, it was a given that children would live longer than their parents. But now there is mounting evidence that this enduring trend has reversed itself for the country’s least-educated whites, an increasingly troubled group whose life expectancy has fallen by four years since 1990.” —September 20, 2012

Differences In Life Expectancy Due To Race And Educational Differences Are Widening, And Many May Not Catch Up.
EXHIBIT 2

Life Expectancy At Birth, By Years Of Education At Age 25 For White Females, 1990–2008

**SOURCE** Authors’ analysis of data from the National Vital Statistics System and the Census Bureau (Notes 24–26 in text).
Mortality Differentials by Income

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.
FIGURE 3-2 Estimated and projected life expectancy at age 50 for males and females born in 1930 and 1960, by income quintile.
SOURCE: Committee generated from Health and Retirement Study data.

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Fig. 1. All-cause mortality, ages 45–54 for US White non-Hispanics (USW), US Hispanics (USH), and six comparison countries: France (FRA), Germany (GER), the United Kingdom (UK), Canada (CAN), Australia (AUS), and Sweden (SWE).
Broken down by age....& race & education

Figure 1.1 All-cause mortality by race and ethnicity, ages 50-54

Case and Deaton (Brookings, 2017)
Cautionary tale: Do these “trends” reflect real deteriorations in health? What is going on with health equity over time?

- Dramatic increases in educational attainment over this period, as well as increases in the dispersion of income

- What do “trends” over time in disparities mean for groups whose composition or underlying distribution is changing?
Lagged Selection Bias (LSB)

1.) a temporal lag between when individuals select into their exposure group and when the outcome manifests

2.) the dynamics of selection into the exposure group were changing over the period spanned by the lag

Can lead to stable differences over time in noncomparable subgroups being mistaken for time trends
Notes for figure 4: We decomposed the population of our simulation example in two different ways—first, by early life socioeconomic status (EL-SES), and then in a separate analysis, by high school completion status. In our example, there are large, stable EL-SES gradients in mortality rates (see figure 2), but high school completion status has no independent relationship with mortality risk. The “decline” in period life expectancy reflected by the downward slope of the blue dotted line, therefore, is entirely an artifact of increasing equity in access to high school over the mid-20th century.
Expanding Access to Education in mid-century

“Among white non-Hispanics ages 45-54, the share of each education group in the population has seen little change since the early 1990s, with those with no more than a high school degree comprising approximately 40 percent, some college (30 percent) and BA or more (30 percent).”

–Case & Deaton (2017, p.6)

<table>
<thead>
<tr>
<th>Birth Cohort</th>
<th>% no more than HS when cohort was aged 25-34</th>
<th>% no more than HS when cohort was aged 45-54</th>
</tr>
</thead>
<tbody>
<tr>
<td>1941-1950</td>
<td>63%</td>
<td>55%</td>
</tr>
<tr>
<td>1961-1970</td>
<td>46%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: Current Population Surveys
Figure 1.11 Drug, alcohol and suicide mortality

White non-Hispanic mortality ages 50-54, by education

- Men, high school degree or less
- Women, high school degree or less
- Men, 4-year college or more
- Women, 4-year college or more
Bound, Geronimus, Waidmann & Rodriguez (Health Affairs, 2015)

- Findings consistent with Olshansky, et al when replicating their methods

- When using education percentiles, find that between 1990 and 2010, white women in the bottom quartile had no appreciable change in survival, while top three quartiles improved. For men, lowest quartile also improved but top three quartiles improved more.

- No evidence of declining survival probabilities for lowest education group, but increasing dispersion between top and bottom by education (while overall dispersion has not increased except for white men).
Figure 4: Survival Curves by educational rank, white men and women, 1990 and 2010
Source: Authors’ tabulations based on National Vital Statistics System multiple cause of death data (“NVSS - Public Use Data File Documentation” 2014) and U.S. Census data (Ruggles et al. 2010). See Appendix Table 2 for values.
Do these approaches address LSB?

Partly— but using percentiles answers a slightly different question.

For example, as the educational distribution gets more compressed, the same quartile need not mean the same thing in terms of selectivity. Because the distribution is truncated from below, bottom quartile in time 2 is still likely to be more negatively selected.

Similarly for income, as distribution widens, different implications for being in bottom quartile

Still would need to explicitly model assumptions about correlation between selection into education and mortality risk
How to think about interpreting trends by SES going forward?

- Just because we CAN calculate trends over time for subgroups whose memberships is changing over time, SHOULD we?

- LSB makes it very challenging to interpret trends in education-specific period and cohort life tables (unless selection into education is very stable over time).

- Larger question of how to best monitor trends in social gradients in health
  - Non-comparability over time?
  - What are we trying to hold constant?
Figure 7: Distribution of Expected Age at Death (age 25+), by sex and race, 1990-2010