

Social divides and health divides in America

Sandro Galea, MD, DrPH

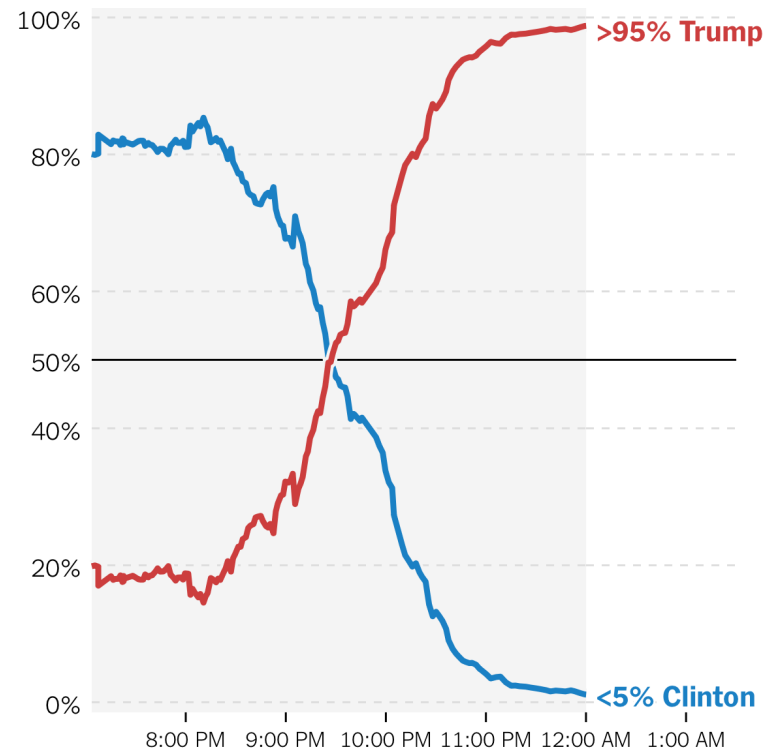
Boston University School of Public Health



1. Something extraordinary this way came

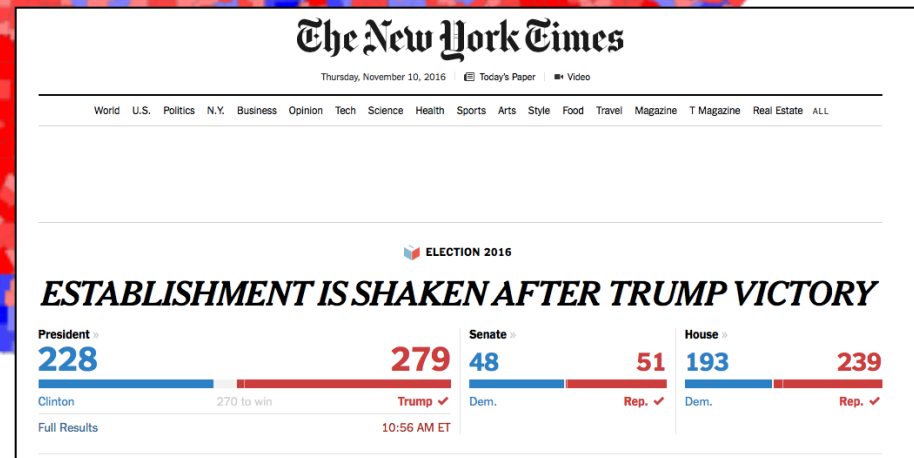
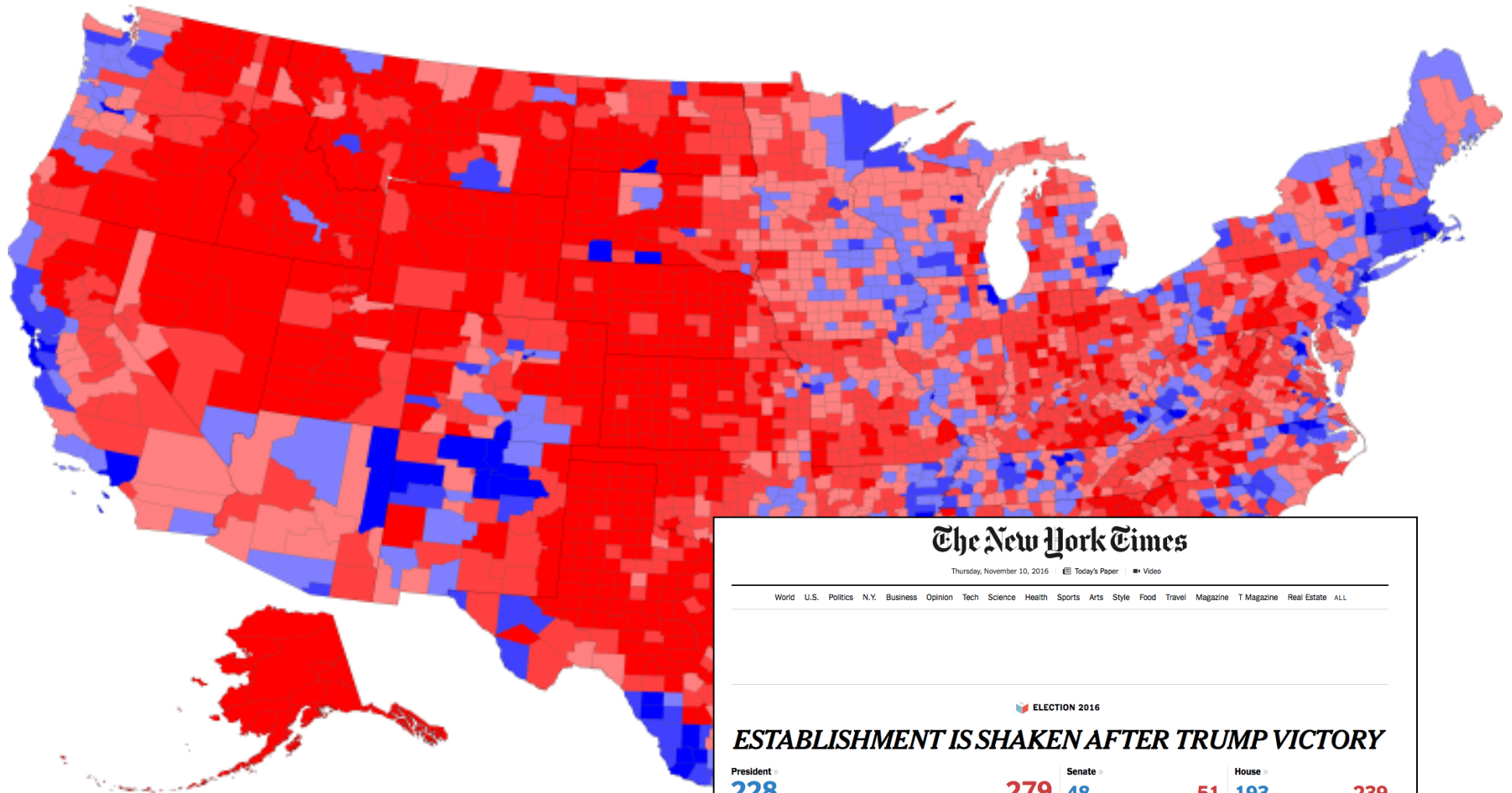
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Chance of Winning Presidency



Total Electoral Votes

The estimates below include an estimate of uncertainty. We expect the uncertainty around these estimates to narrow, especially after races are called.



Star-Telegram

President Trump



President-elect Donald Trump speaks early on Wednesday during his election night rally in New York. He said it is now time for Americans to become a united people.

Supreme Court may shift to the right for decades to come

BY MICHAEL DOTY
Star-Telegram Washington Bureau

WASHINGTON — President-elect Donald Trump now has a chance to recast the Supreme Court, steering it to the more youthful right for years to come.

A short-handed, eight-member court that currently has three justices age 78 or older will be replenished by one or more conservative nominees likely to be in their 50s, or even younger.

But Senate Democrats, embittered over the GOP's deep-freeze treatment of Judge Merrick Garland, can still fight a rear-guard action. One result may be vicious fights that, given the stakes, could even go, in the Senate's parlance, nuclear.

"The justices that I am going to appoint will be 'the justices that I am going to appoint to be conservative bent. They debate.' They will have a conservative bent. They will be protecting the Second Amendment."

Two of the oldest current justices, Stephen Breyer and Ruth Bader Ginsburg, are Democratic appointees and generally reliable liberal votes. A third member of the court, 80-year-old Justice Anthony Kennedy, is a Republican appointee who has swung left on some key cases.

Replacing any of these three would significantly tilt the court rightward. Kennedy, for instance, joined the court's liberals in June in a decision, denounced at the time by the Trump supporters who oppose women's right to an

SEE SUPREME COURT, 4A

GOP voters keep Texas solidly red on Election Day

BY ANNA M. TINSLEY
atinsley@star-telegram.com

As Donald Trump prepares for his move into the White House next year, Texans can rest assured that they helped put him there.

And in doing so, they kept the state solidly red. While some thought Texas might at least turn purple this election year, election results show a sea of red counties in the presidential election with the occasional blue blip in areas such as Dallas, Austin, Houston, El Paso and the Rio Grande Valley.

Texas Democrats note that Democrat Hillary Clinton picked up more than 3.8 million votes here, accomplishing "the closest presidential margin in two decades."

Still, the former reality TV star and New York businessman won the vote of more than 4.6 million Texans — primarily white men and women in nearly all age groups who earn \$50,000 or more a year, election records and exit polls show.

"Change was on the voters' minds," said Brandon Rottinghaus, a political science professor at the University of Houston. "Most Texans wanted a candidate

SEE TEXAS VOTERS, 7A

Texas popular vote results



Source: AP Election Research

Republicans say victory gives them mandate to govern

BY JULIE PACE
The Associated Press

WASHINGTON — Emboldened Republicans claimed a mandate Wednesday for President-elect Donald Trump after his astonishing election triumph, and an emotional Hillary Clinton told crestfallen supporters that the GOP victor deserves a "chance to lead."

Barack Obama pledged a smooth transition of power. "We are now all rooting for his success in uniting and leading the country," the president said of the president-elect, the man who spent years questioning Obama's birthplace and challenging the legitimacy of his presidency. Obama, who had declared Trump unfit for the presidency, invited him to the White House on Thursday.

Trump was uncharacteristically quiet in the aftermath of his triumph and made no public appearances Wednesday beyond his pre-dawn celebration speech, in which he called for unifying Americans.

"Now it's time for America to bind the wounds of division," he told cheering supporters at a Manhattan hotel. "To all Republicans and Democrats and inde-

SEE MANDATE, 6A

MORE INSIDE

- Latino Muslims in DFW wary of repercussions after Trump win 3A
- Protest following Trump's victory turns destructive in California; other demonstrations around the nation are mostly peaceful 3A
- GOP tours in Congress figure prominently in Trump's plans 5A

Texas Rangers request fan input on new stadium

BY ROBERT CADWALLADER
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ARLINGTON — A day after a resounding election victory for their new \$1 billion baseball stadium, the

ideas on food, technology and anything else that would help create the "ultimate fan experience."

Backers of the proposition to allow public funding for up to half of the project were still bubbling the morning after a

community debate over the retractable-roofed, climate-controlled stadium.

The ballot initiative lost in just five of the city's 137 voting precincts. A whopping 62.7 percent of the 186,000 registered voters cast ballots, most of them cast early.

"It feels as good as it did last night," Rangers spokesman John Blake said.

The Rangers' new website asks for help creating "an atmosphere that is welcoming to fans and intimidating to oppo-

nents." It seeks ways to "improve your travel and parking experience" and asks fans to tell the favorite part of their experience at Globe Life Park, as well as desirable features at other ballparks they have visited.

Fans can also rate the importance of equipping the stadium with state-of-the-art technology, access to group hospitality areas, architectural style, pregame meeting space and other features.

"I love that," Mayor Jeff Williams said. "I think it shows you

the character of the Rangers ownership to be seeking fan input."

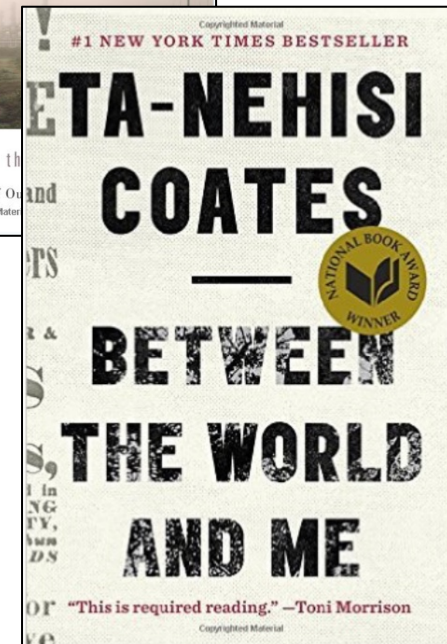
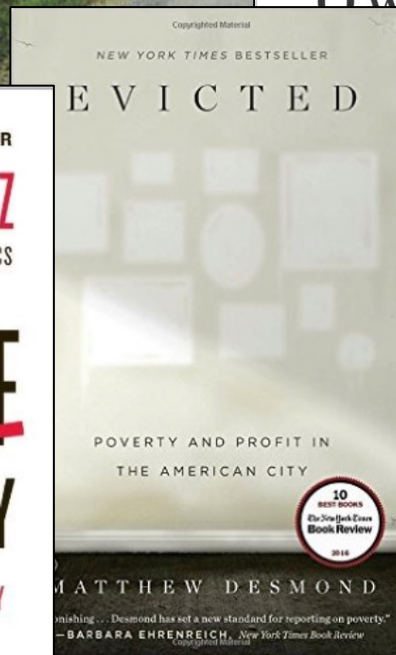
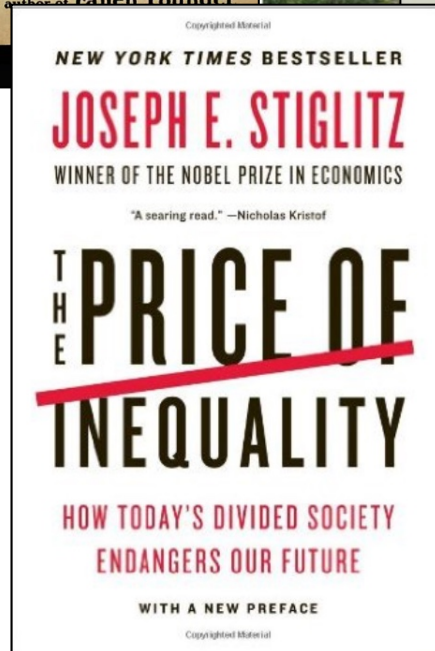
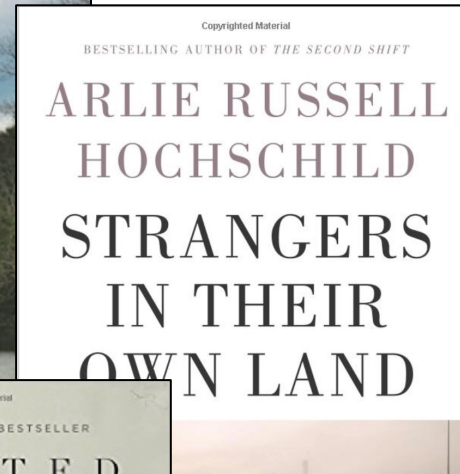
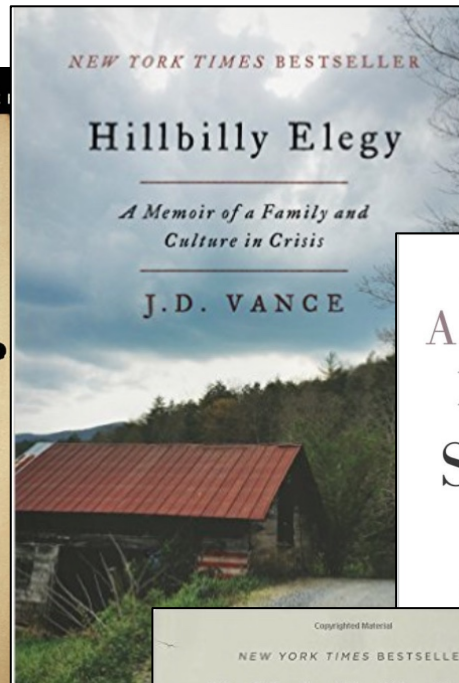
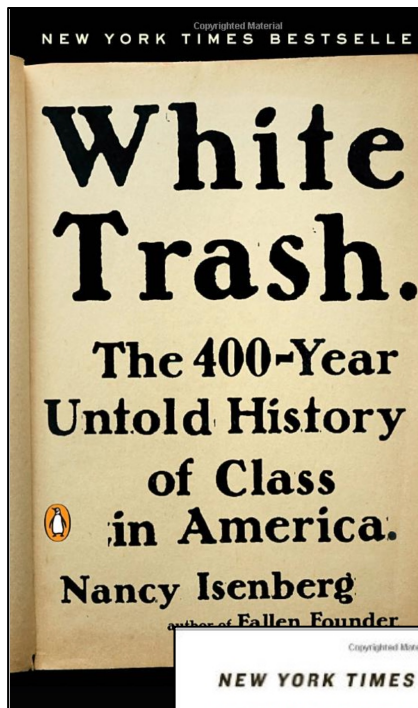
Blake said designing the stadium is "the first process, and that's where we feel this input is vital." The Rangers are close to choosing an architect for the project, he said. Construction is expected to begin next summer, with the new stadium opening in time for the 2020 baseball season.

"There was a bidding process,

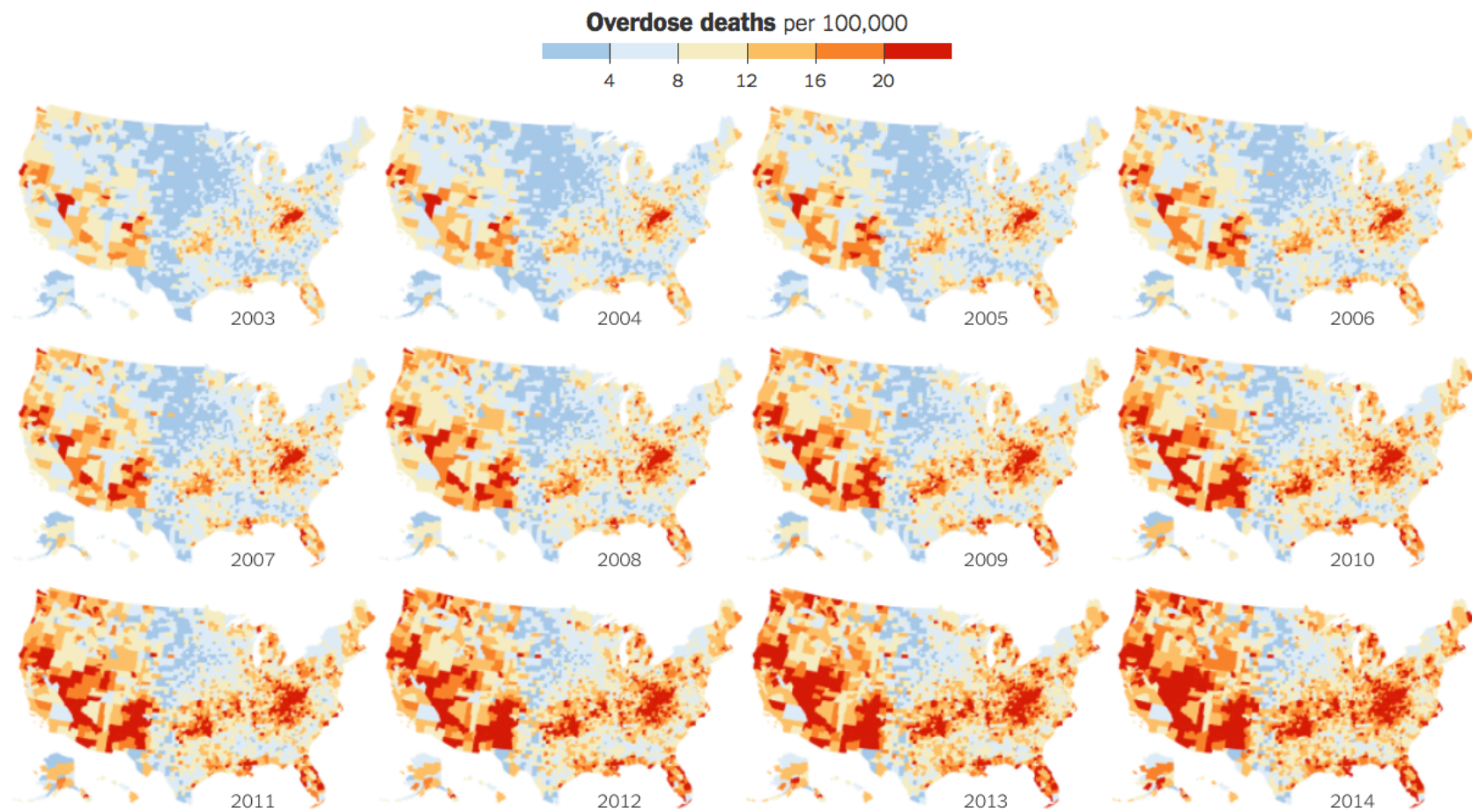
SEE STADIUM, 5A



A resounding echo of underlying divides



And underlying health?

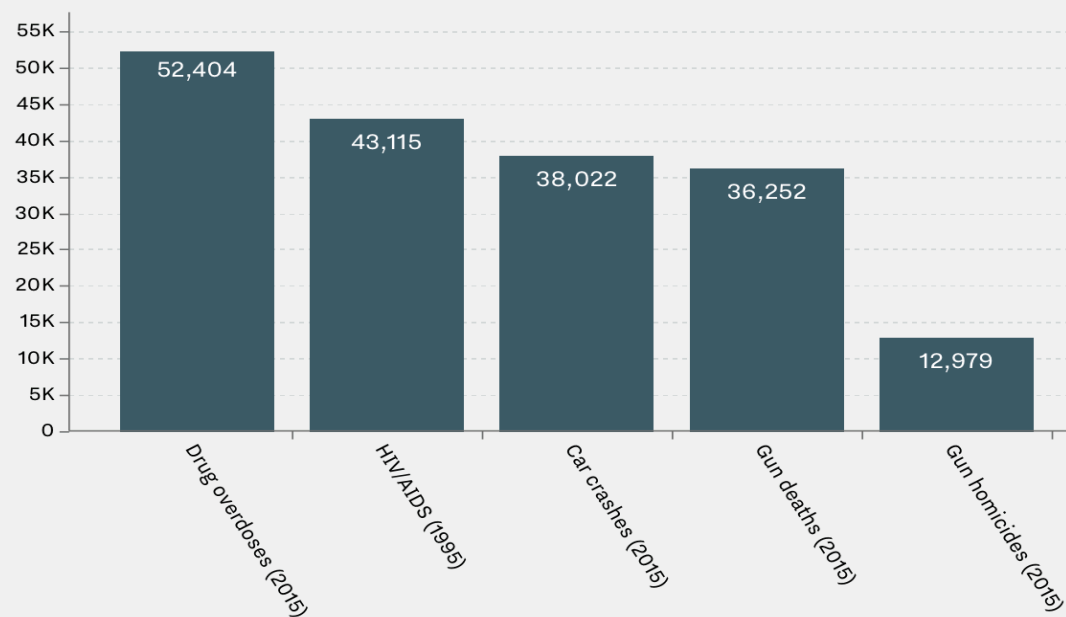


Park H & Block M. How the epidemic of drug overdose deaths ripples across America. *The New York Times* January 19, 2016.
<http://www.nytimes.com/interactive/2016/01/07/us/drug-overdose-deaths-in-the-us.html>.

Drug overdoses killed more people in 2015 than HIV/AIDS at its 1995 peak



Total deaths in America by cause and year



Source: [Centers for Disease Control and Prevention](#)

Vox

Lopez G, Frostenson S. How the opioid epidemic became America's worst drug crisis ever, in 15 maps and charts. Vox. March 23, 2017. <http://www.vox.com/science-and-health/2017/3/23/14987892/opioid-heroin-epidemic-charts> Accessed March 26, 2017.

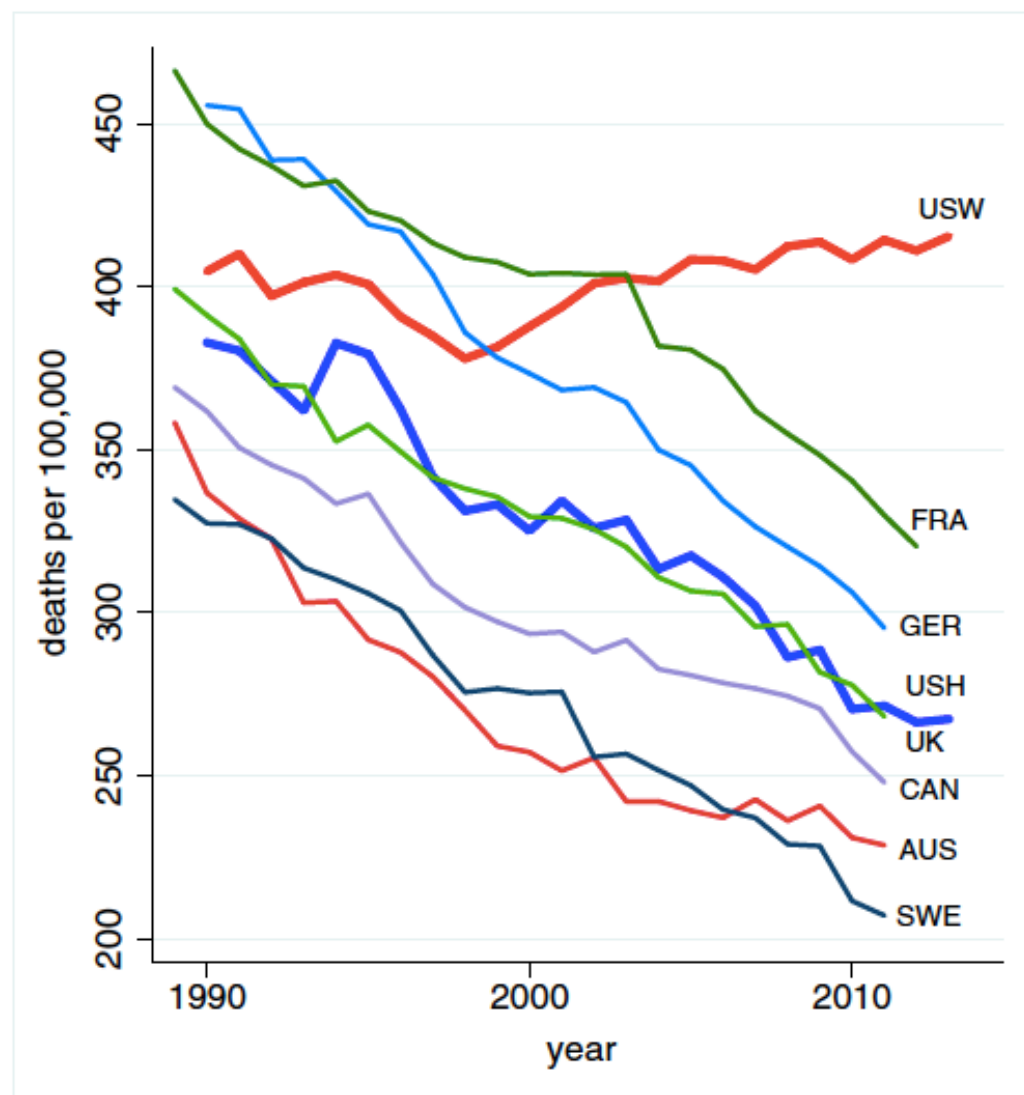
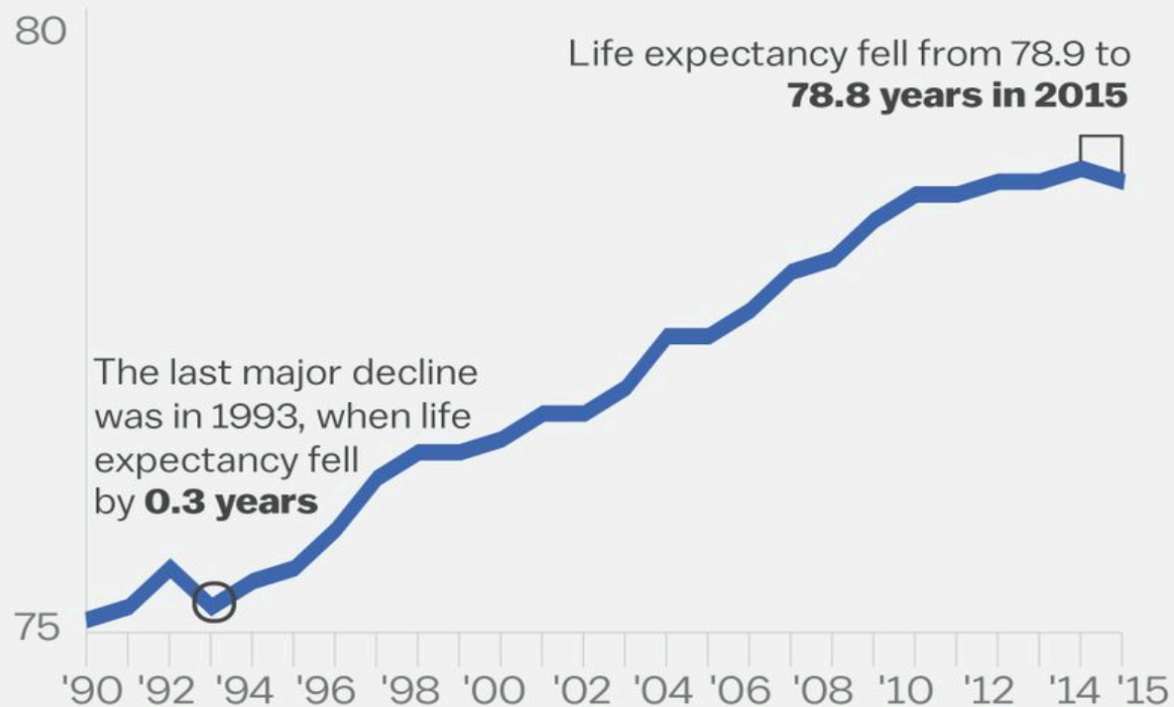


Fig. 1. All-cause mortality, ages 45–54 for US White non-Hispanics (USW), US Hispanics (USH), and six comparison countries: France (FRA), Germany (GER), the United Kingdom (UK), Canada (CAN), Australia (AUS), and Sweden (SWE).

Life expectancy has improved in the US, but a 2015 dip shows that might be changing



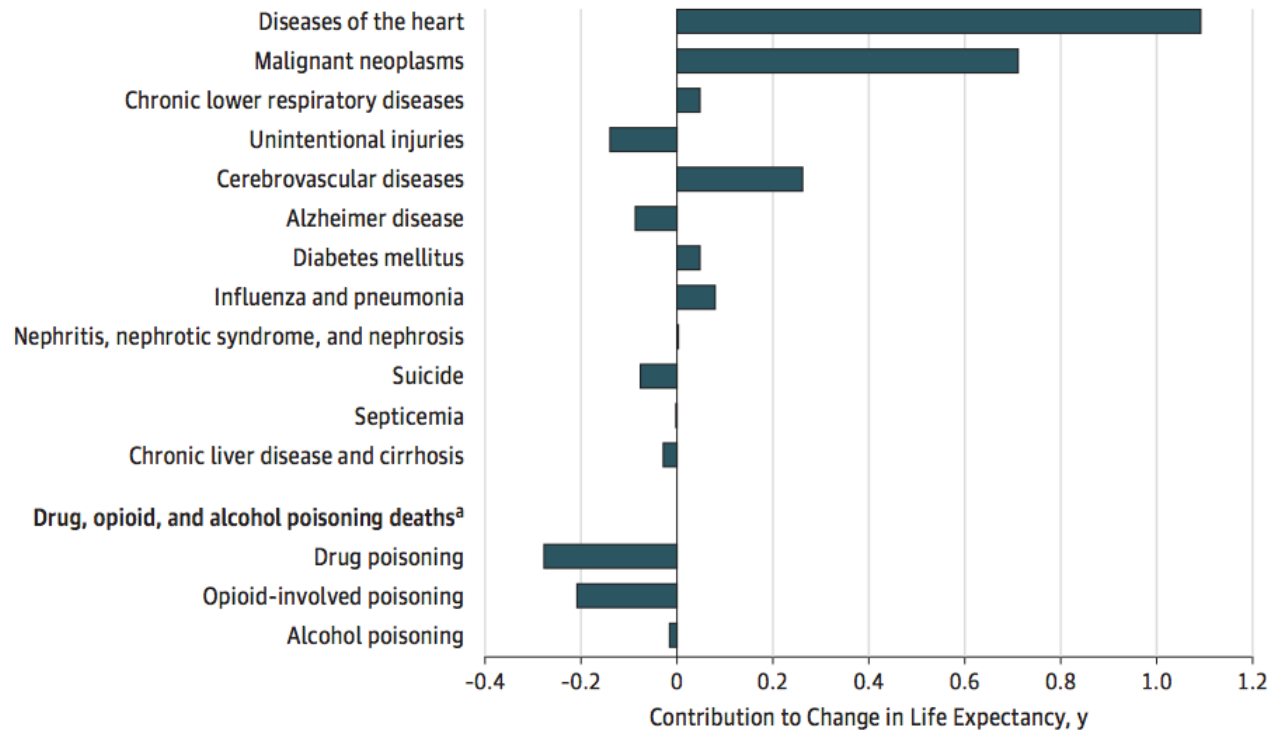
Source: National Vital Statistics System

Credit: Sarah Frostenson

Vox

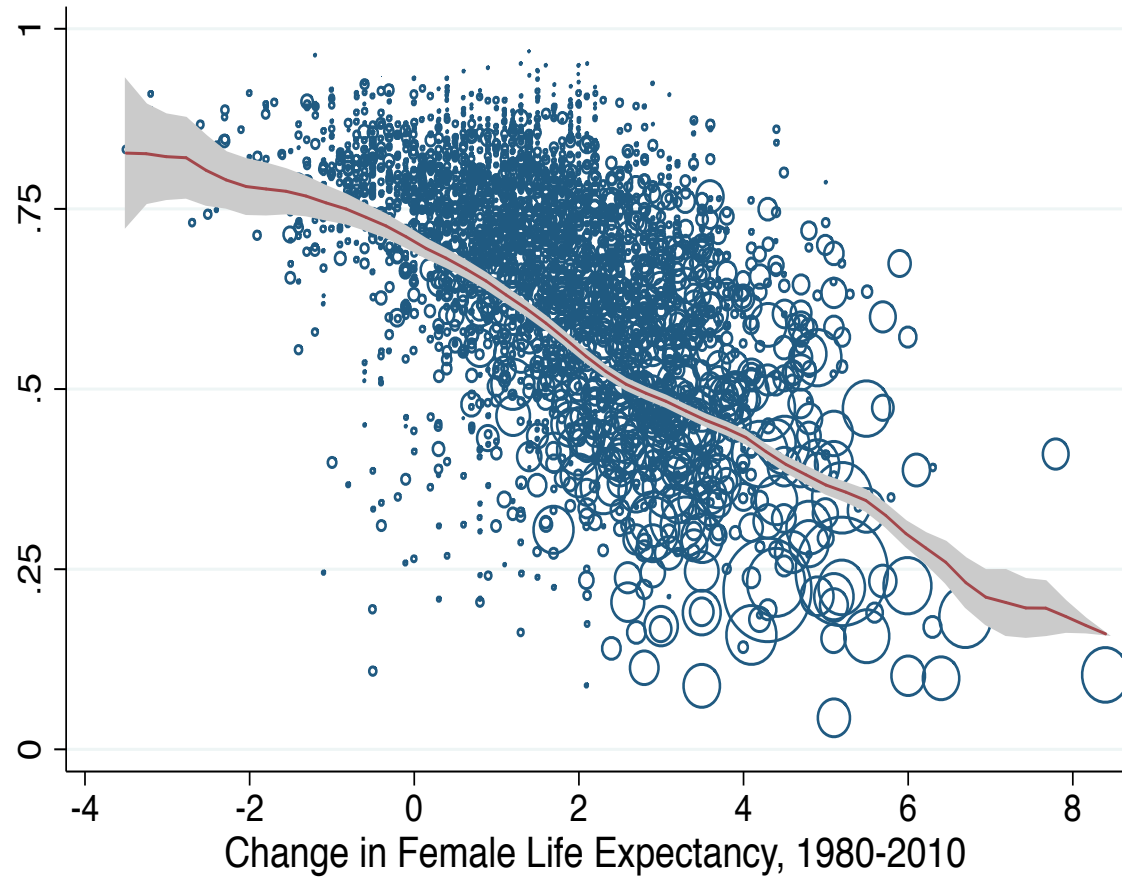
Figure. Contributions of Selected Causes of Death to the Change in Life Expectancy in the United States, 2000-2015

12 Leading causes of death (ranked highest to lowest according to No. of deaths in year 2015)



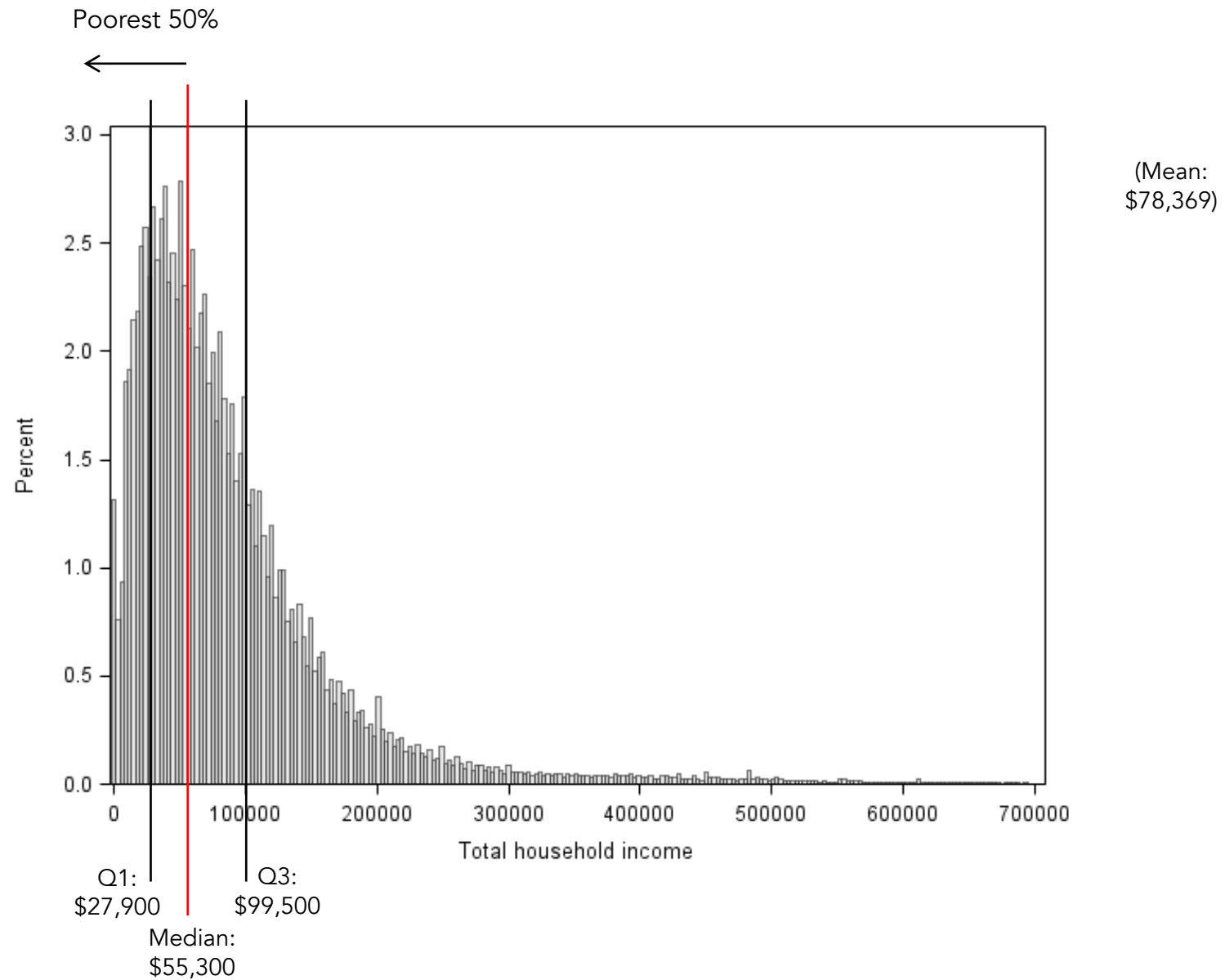
^a In ranked cause-of-death classification, drug, opioid, and alcohol poisoning are not considered to be unique cause-of-death categories. Instead, poisoning deaths are classified as either accidental poisonings (which contribute to unintentional injuries), suicides, or homicides (ranked 16th in leading causes of death). Contributions from drug, opioid, and alcohol poisoning deaths overlap with both unintentional injury deaths and suicides and cannot be summed with these leading ranked causes of death.

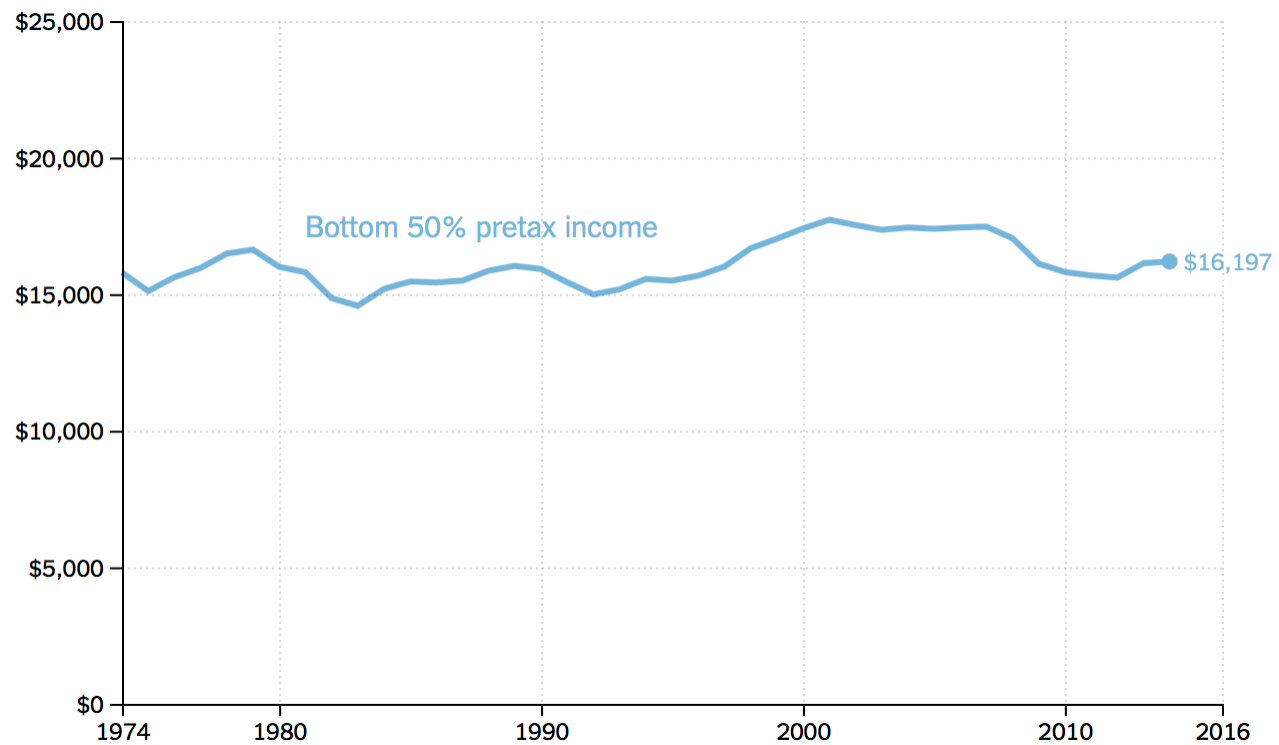
County Vote Share for Donald Trump



2. On social divides on multiple axes

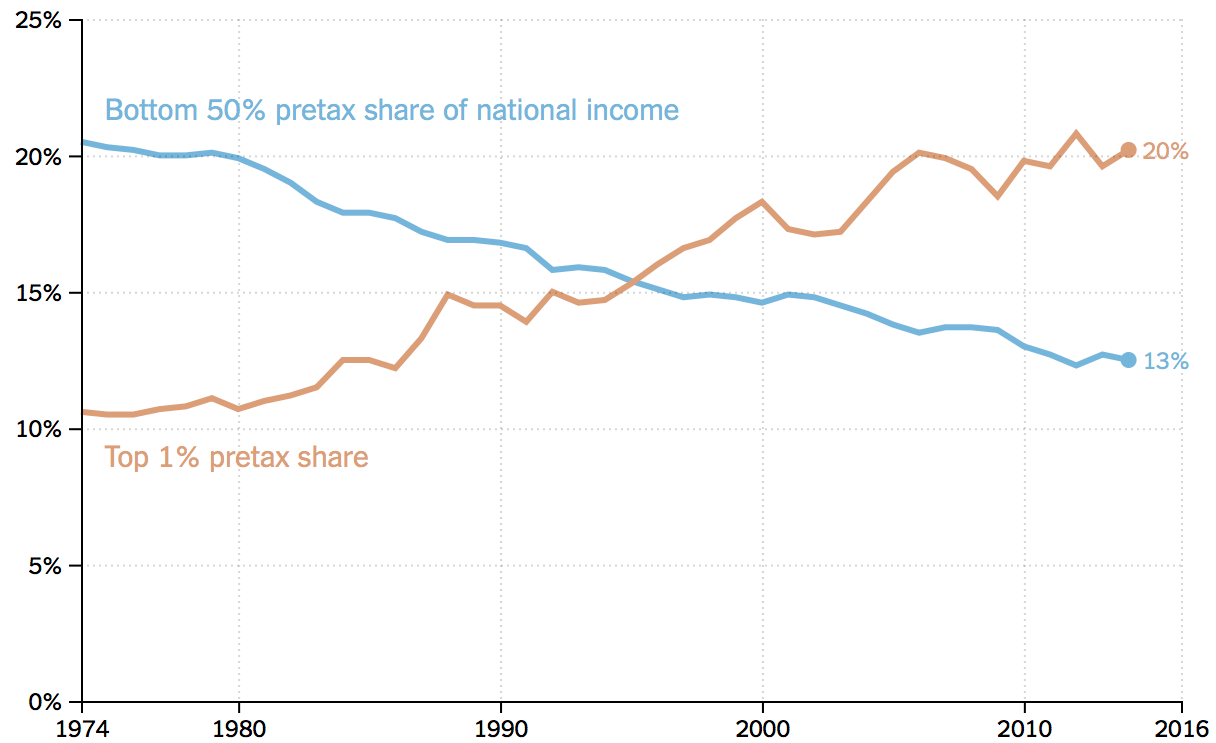
Household income, 2015





Ashkenas J. Nine New Findings About Inequality in the United States. *The New York Times*. December 16, 2016.

<http://www.nytimes.com/interactive/2016/12/16/business/economy/nine-new-findings-about-income-inequality-piketty.html> Accessed December 23, 2016.



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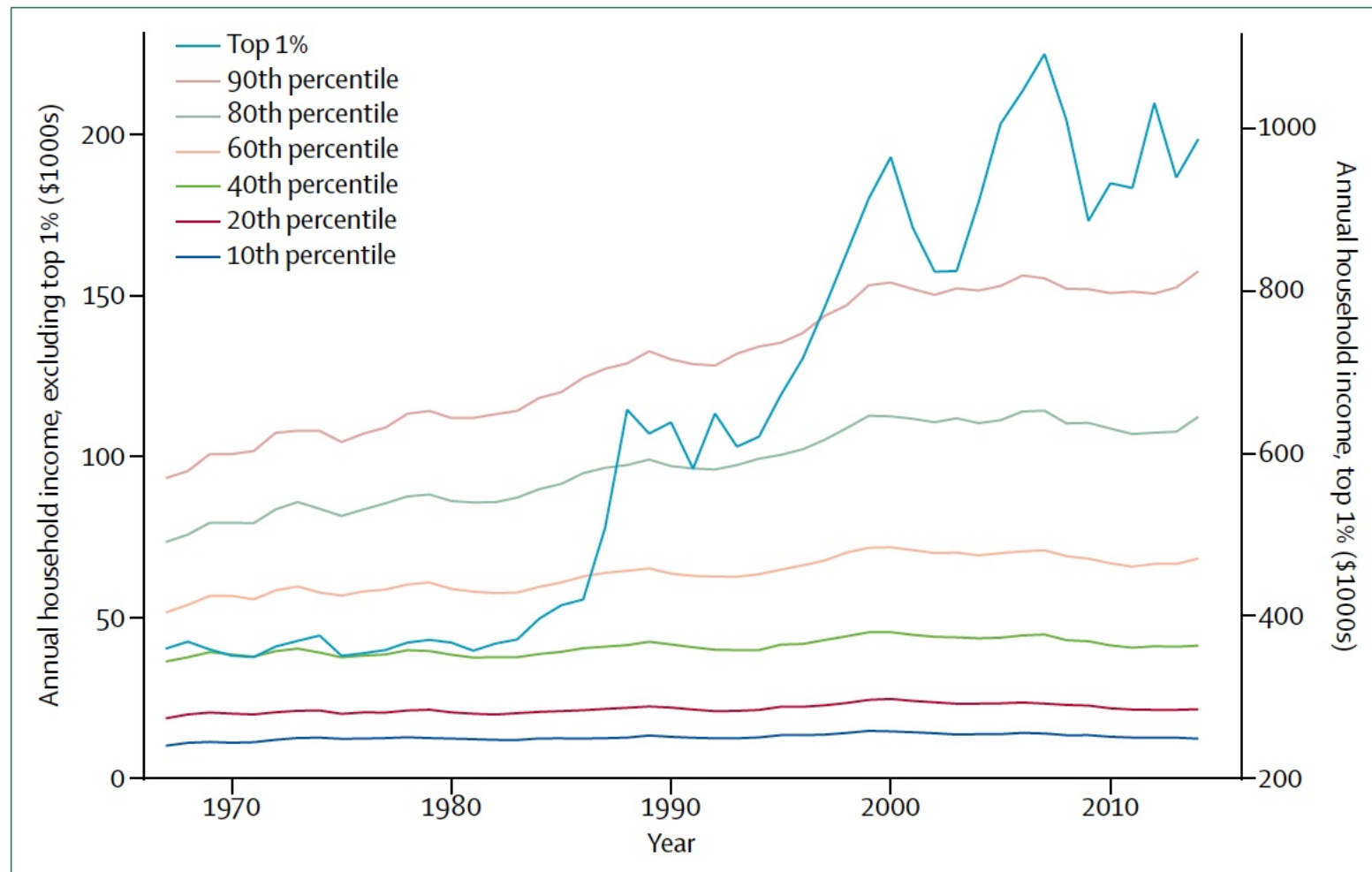


Figure 1: Inflation-adjusted annual household income at selected percentiles, 1967–2014

All series show percentiles of the distribution except for top 1%, which shows the mean of the top 1%. All income series except for the top 1% are plotted against the left vertical axis, displaying incomes from \$0 to \$200 000. The top 1% is plotted against the right vertical axis, displaying incomes from \$200 000 to \$1 000 000. Data are from the US Census Bureau Current Population Survey, 1968–2015 Annual Social and Economic Supplements and World Wealth and Income Database. Income is expressed in 2014 US\$.

MAY 11, 2015

TIME



AMERICA, ~~1968~~ 2015

WHAT HAS CHANGED.
WHAT HASN'T.

BY DAVID VON DREHLE

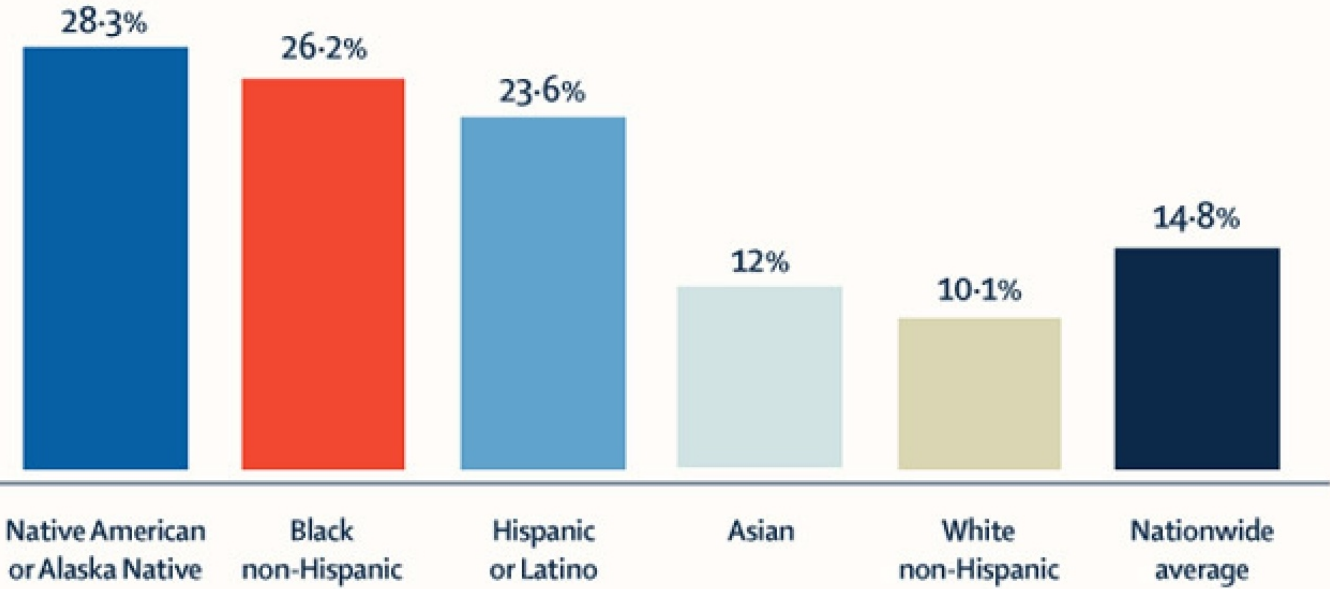
time.com



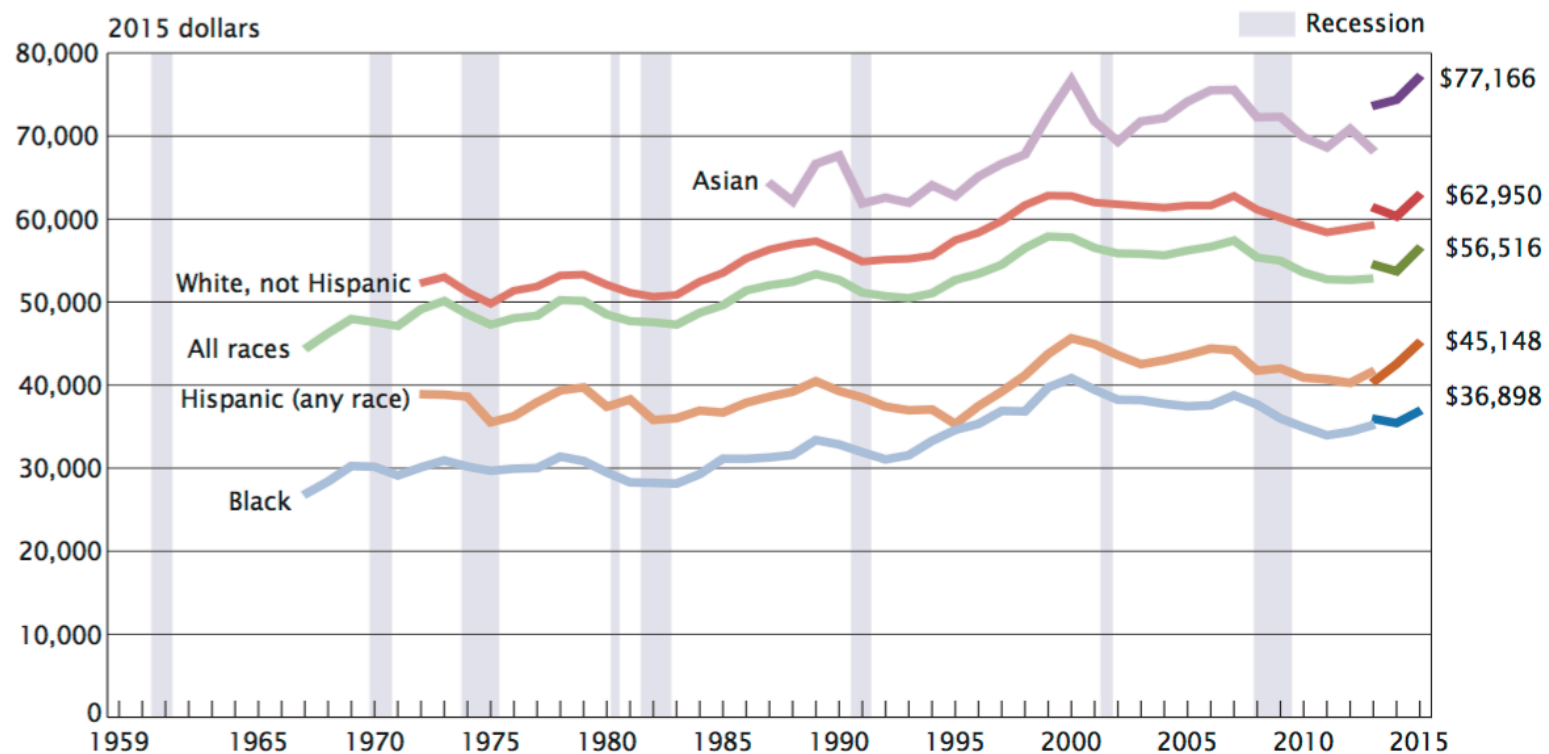
People of colour face discrimination at many levels of life

POVERTY
People of colour are far more likely to live in poverty (2014)

HEALTH



Black and Hispanic Americans have consistently had the lowest median household income of all racial/ethnic groups for the past several decades



Hourly wages of black workers as a percent of white hourly wages, at the 10th, 50th, and 95th wage percentiles, 1979–2013

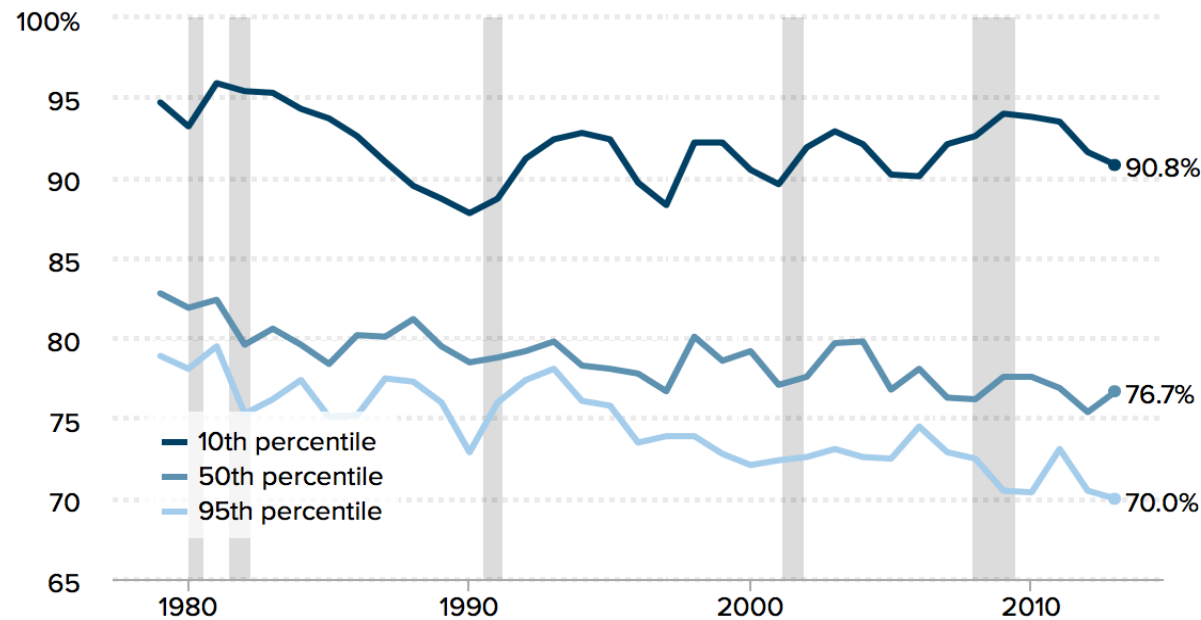


Chart Data

Note: The xth-percentile wage is the wage at which x% of wage earners earn less and (100-x)% earn more. Shaded areas denote recessions. Race/ethnicity categories are mutually exclusive (i.e., white non-Hispanic, black non-Hispanic, and Hispanic any race).

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Wage gap* between the 50th and the 10th wage percentiles,** by gender, 1979–2013

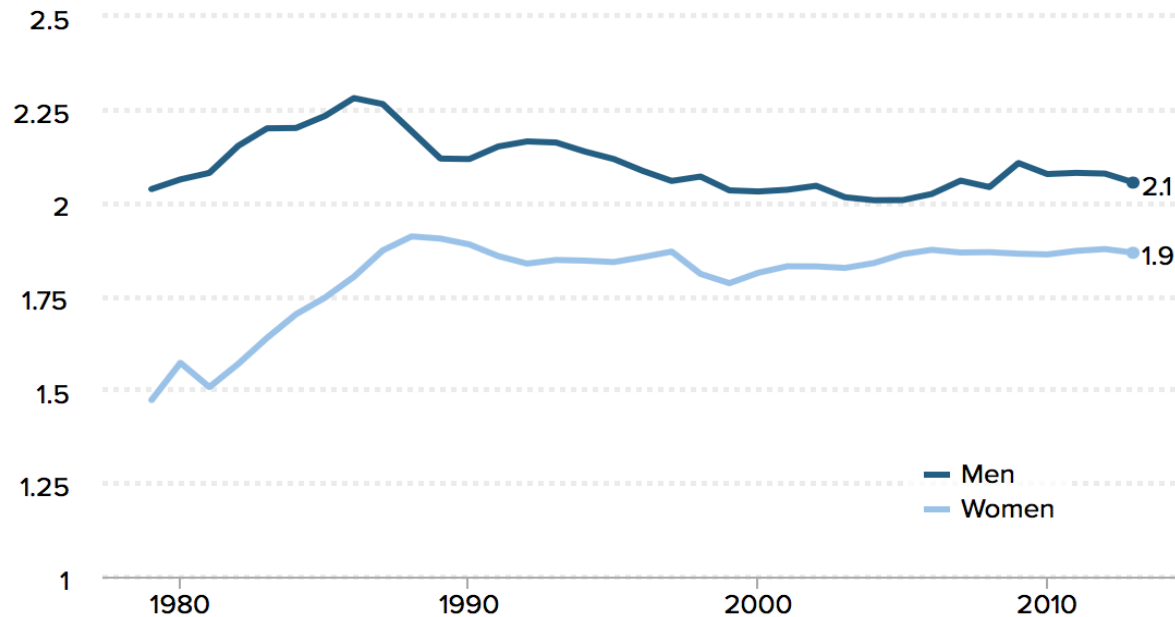


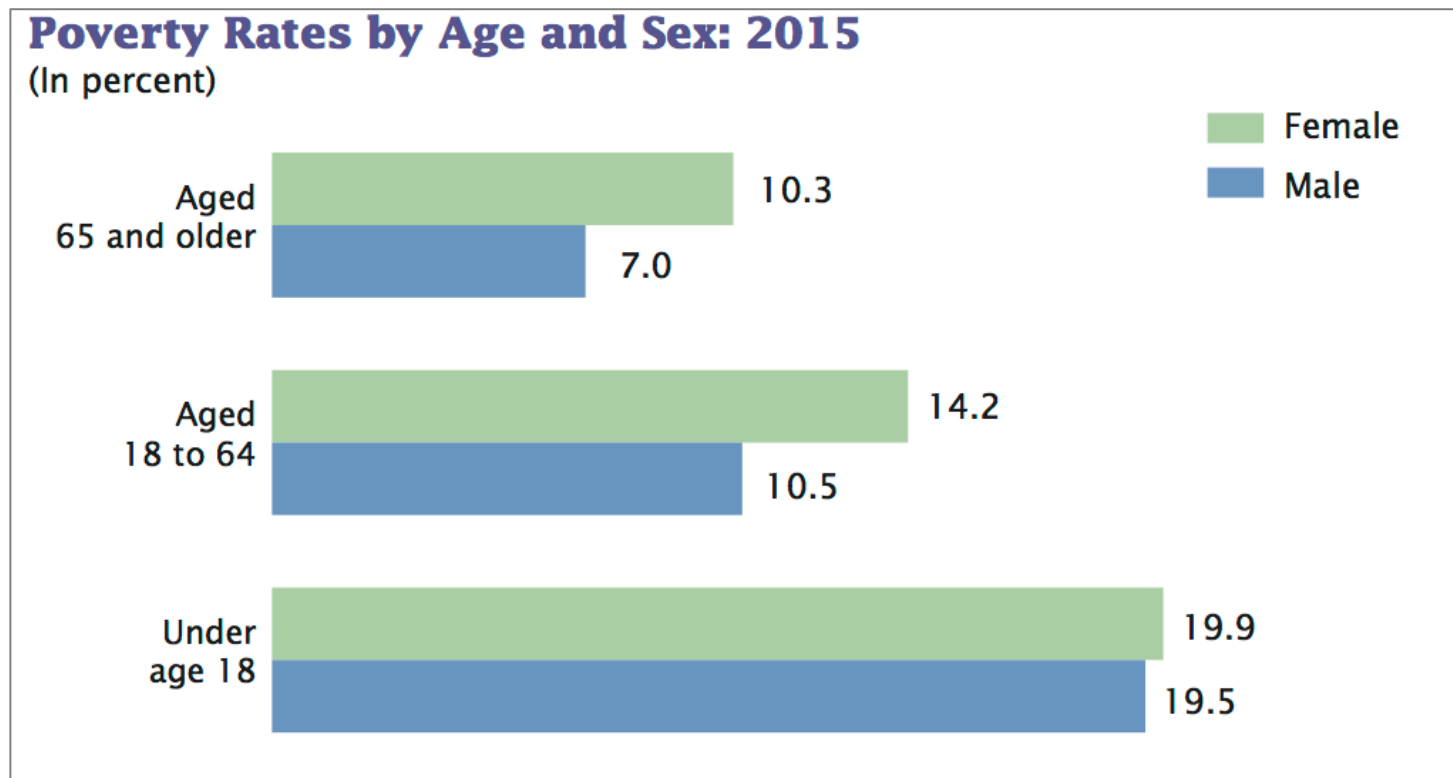
Chart Data

* Ratio of workers' wages at the higher earnings percentile to workers' wages at the lower percentile

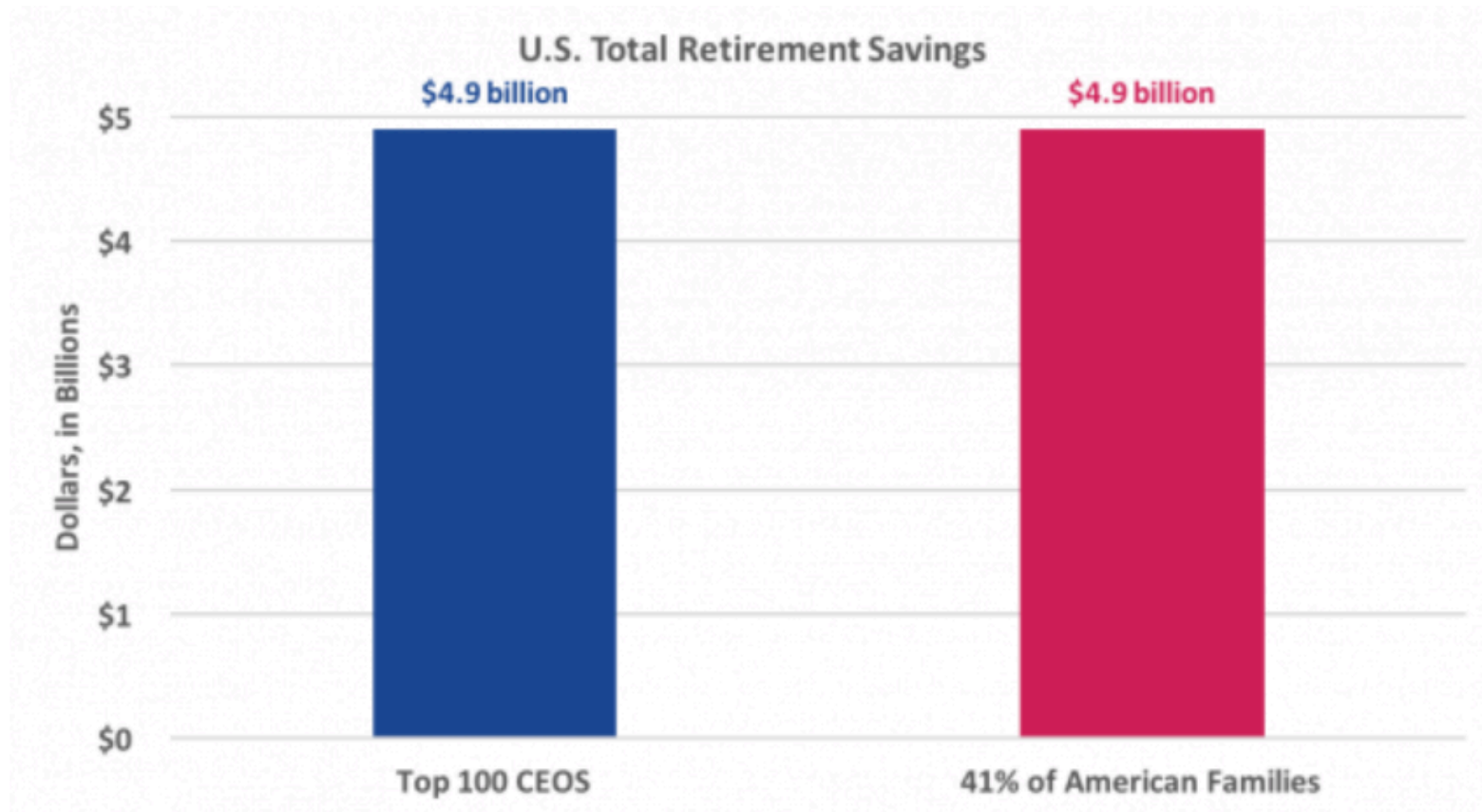
** The xth-percentile wage is the wage at which x% of wage earners earn less and (100-x)% earn more.

Source: Authors' analysis of Current Population Survey Outgoing Rotation Group microdata

Women are more likely to live in poverty than men, in all age groups



The distribution of wealth in the U.S. is highly concentrated at the top



The distribution of wealth in the U.S. is highly concentrated at the top

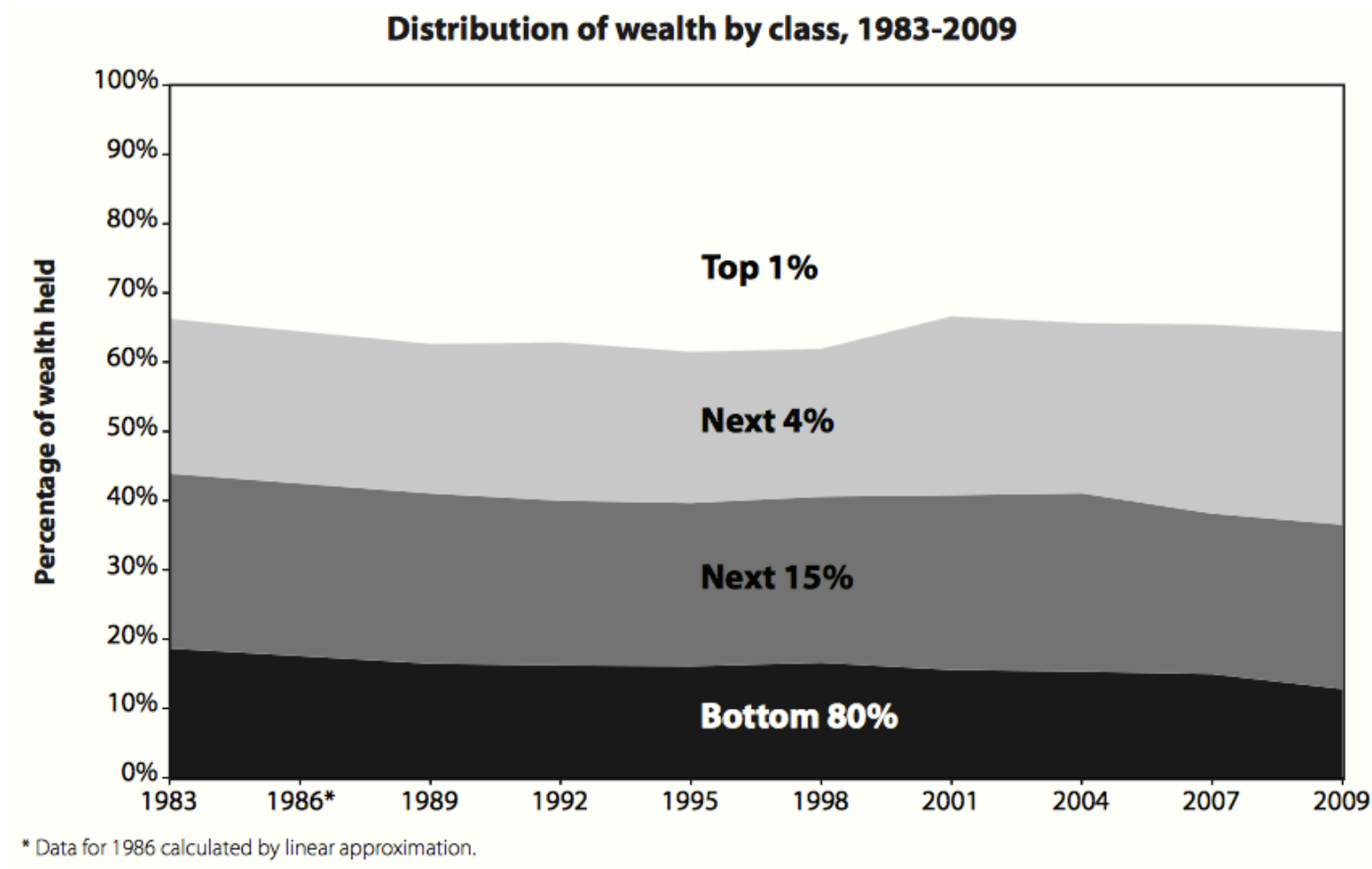
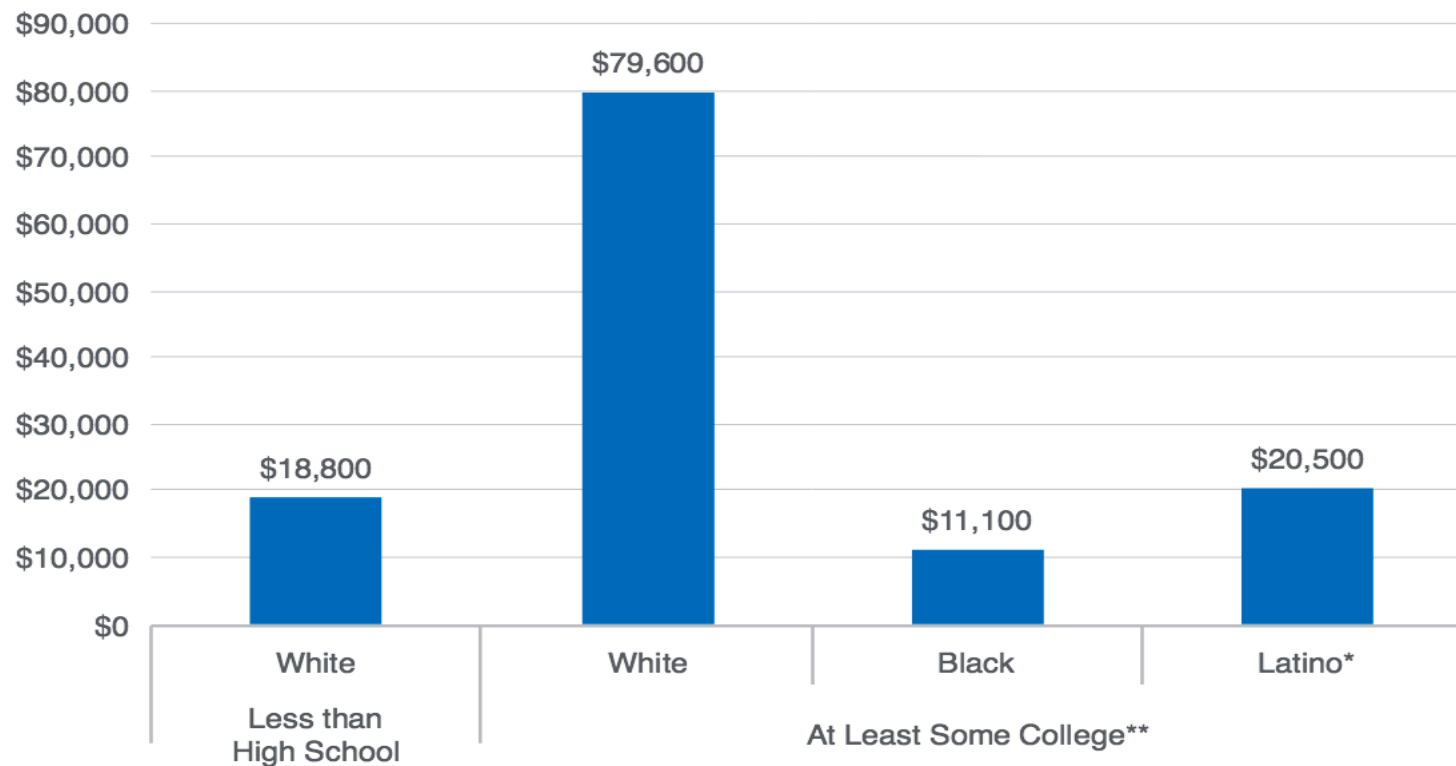


Figure 1. Median Wealth by Educational Attainment for Working Households under Age 55

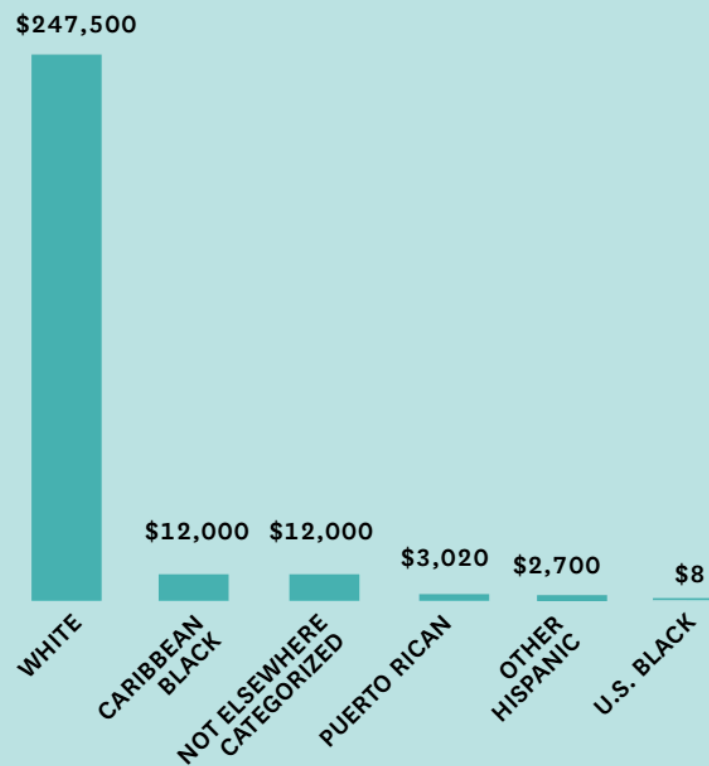


Source: Authors' calculations of the Survey of Consumer Finances, 2013

* Latino refers to anyone who identified as Hispanic or Latino on the Survey of Consumer Finances and may be of any race.

** This group includes households who attended college but attained no degree as well as those with associate's or bachelor's degrees. Households with graduate and professional degrees are not included.

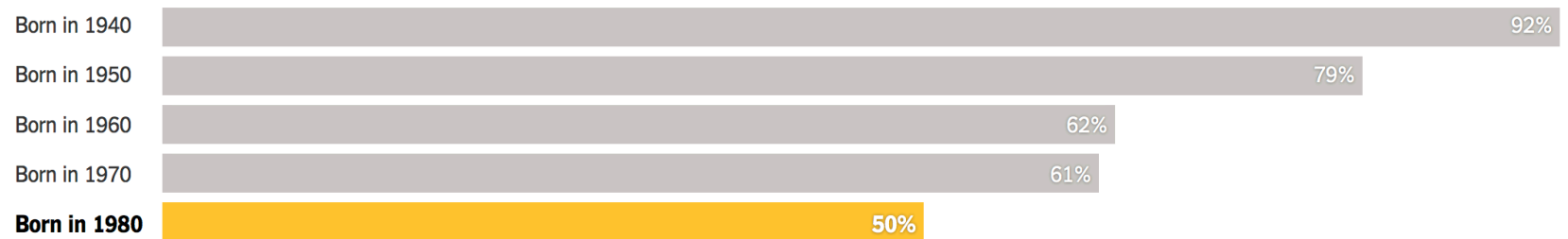
There is a stark wealth gap
between whites and people
of color.



Figures are for
Greater Boston.
Analysis did not
look at all races.

3. On perpetuating these social divides

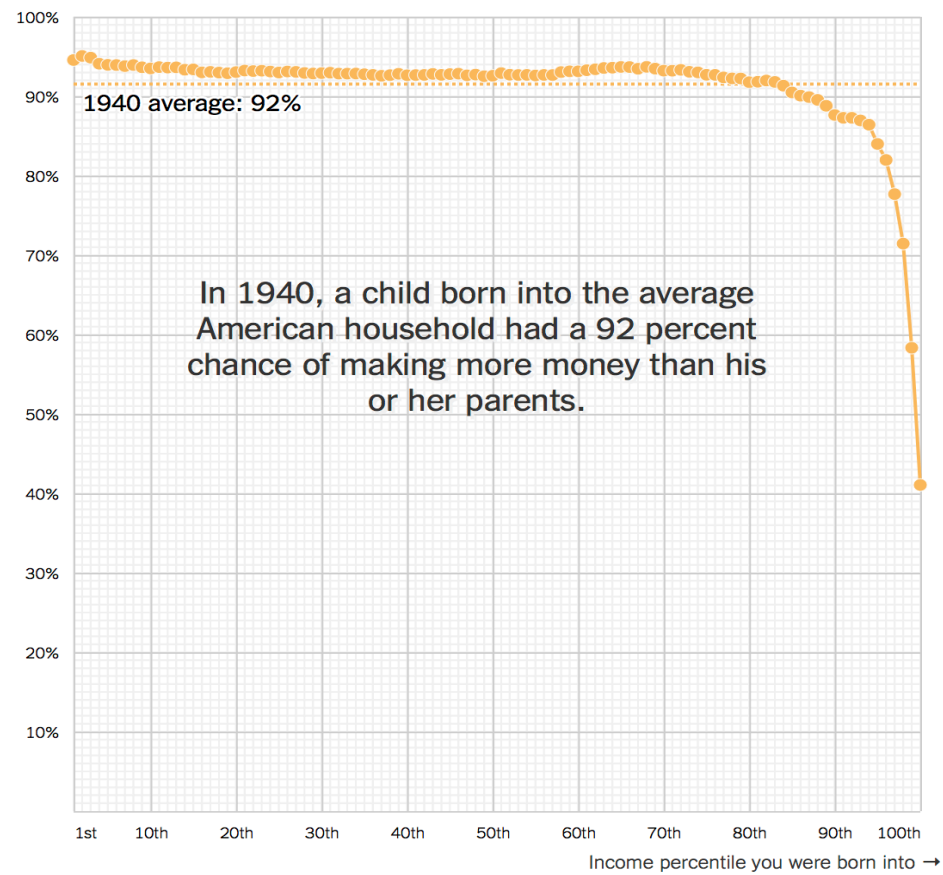
Chance of making more money than your parents if you were ...



Leonhardt D. The American Dream, Quantified at Last. *The New York Times*. December 8, 2016.

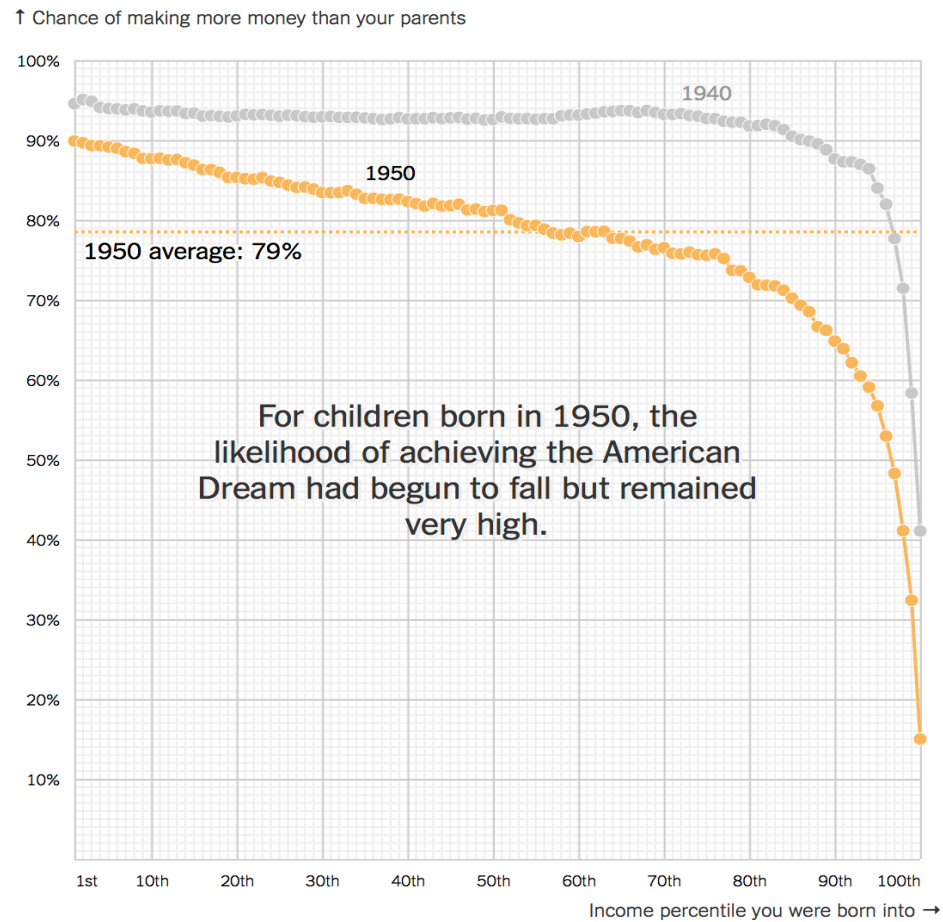
http://www.nytimes.com/2016/12/08/opinion/the-american-dream-quantified-at-last.html?em_pos=small&emc=edit_up_20161212&nl=upshot&nl_art=3&nlid=60881523&ref=headline&te=1&r=1 Accessed December 12, 2016.

↑ Chance of making more money than your parents



Leonhardt D. The American Dream, Quantified at Last. *The New York Times*. December 8, 2016.

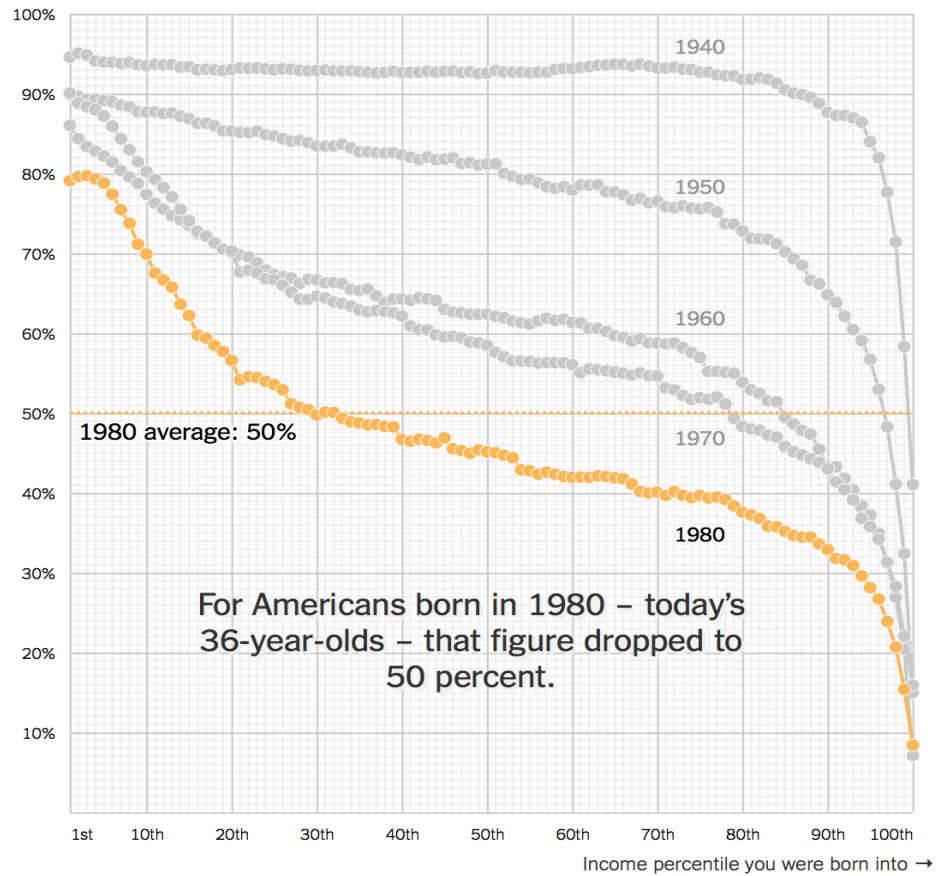
<http://www.nytimes.com/2016/12/08/opinion/the-american-dream-quantified-at-last.html?em_pos=small&emc=edit_up_20161212&nl=upshot&nl_art=3&nlid=60881523&ref=headline&te=1&r=1> Accessed December 12, 2016.



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[last.html?em_pos=small&emc=edit_up_20161212&nl=upshot&nl_art=3&nlid=60881523&ref=headline&te=1&r=1](http://www.nytimes.com/2016/12/08/opinion/the-american-dream-quantified-at-last.html?em_pos=small&emc=edit_up_20161212&nl=upshot&nl_art=3&nlid=60881523&ref=headline&te=1&r=1)> Accessed December 12, 2016.

Probability that sons of fathers in the bottom 20 percent of the earnings distribution end up in the bottom or top 40 percent as adults, by country

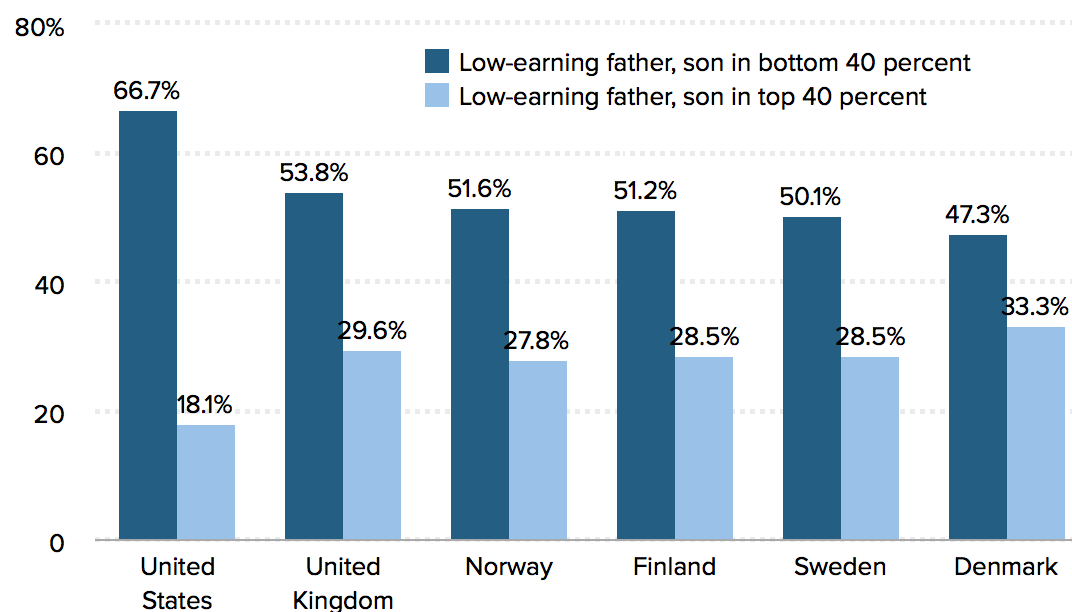


Chart Data

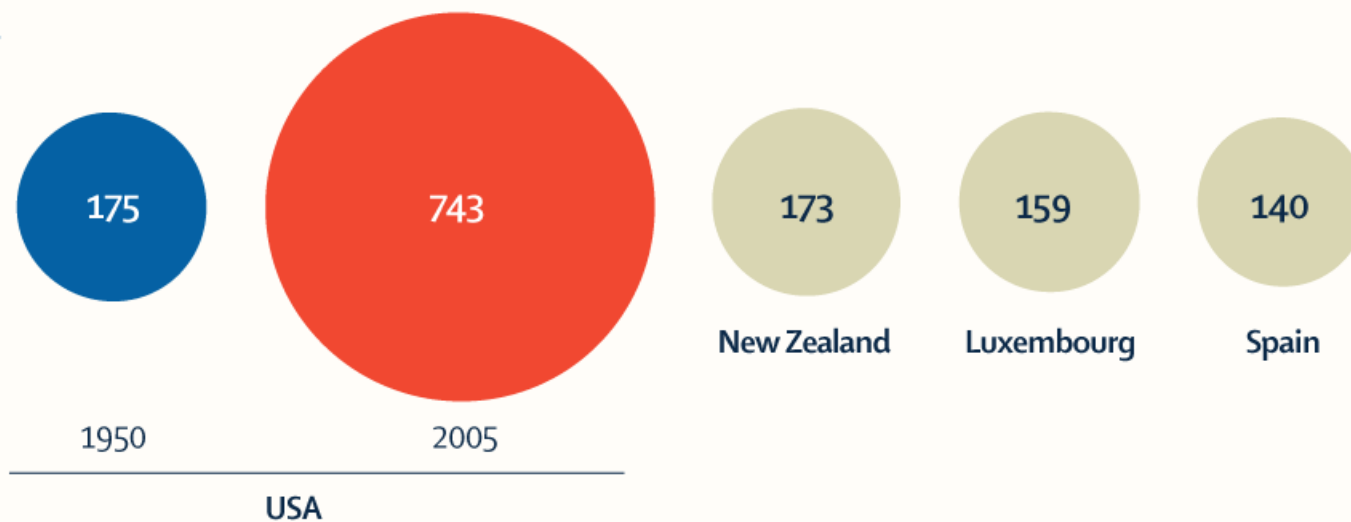
Source: Authors' analysis of Jantti et al. (2006)

Lower-income individuals have difficulty voting and traveling due to lack of ID's and passports

HOUSEHOLD INCOME*	PERCENTAGE OF POPULATION	CONFIRMED ID	NO CONFIRMED ID
Below 25,000	14%	88%	12%
25,000 to 29,999	4%	92%	8%
30,000 to 34,999	4%	90%	10%
35,000 to 39,999	4%	94%	6%
40,000 to 49,999	5%	91%	9%
50,000 to 59,999	5%	94%	6%
60,000 to 74,999	8%	94%	6%
75,000 to 84,999	4%	94%	6%
85,000 to 99,999	4%	95%	5%
100,000 to 124,999	6%	96%	4%
125,000 to 149,999	3%	96%	4%
Over 150,000	4%	98%	2%
Inapplicable	35%	94%	6%
Total	100%	93%	7%

The US is a world leader in incarceration

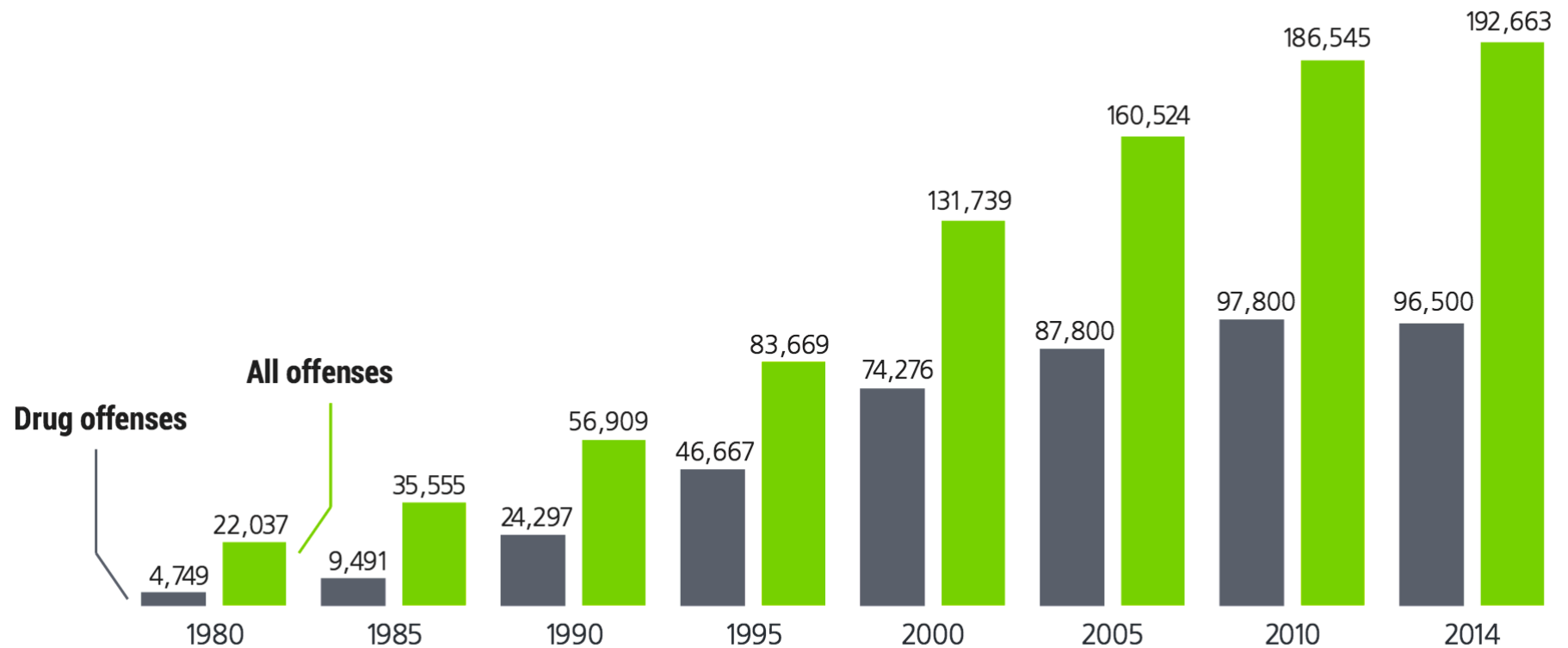
Incarceration rates
per 100 000
residents



THE LANCET

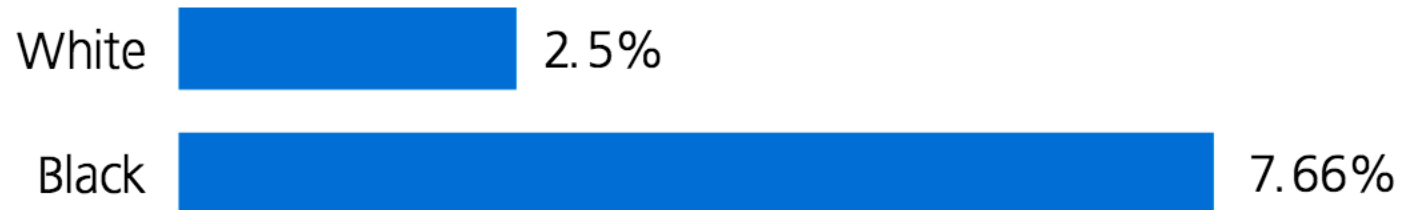
Read the Series: www.thelancet.com/us-health

Number of People in Federal Prisons for Drug Offenses, 1980-2014

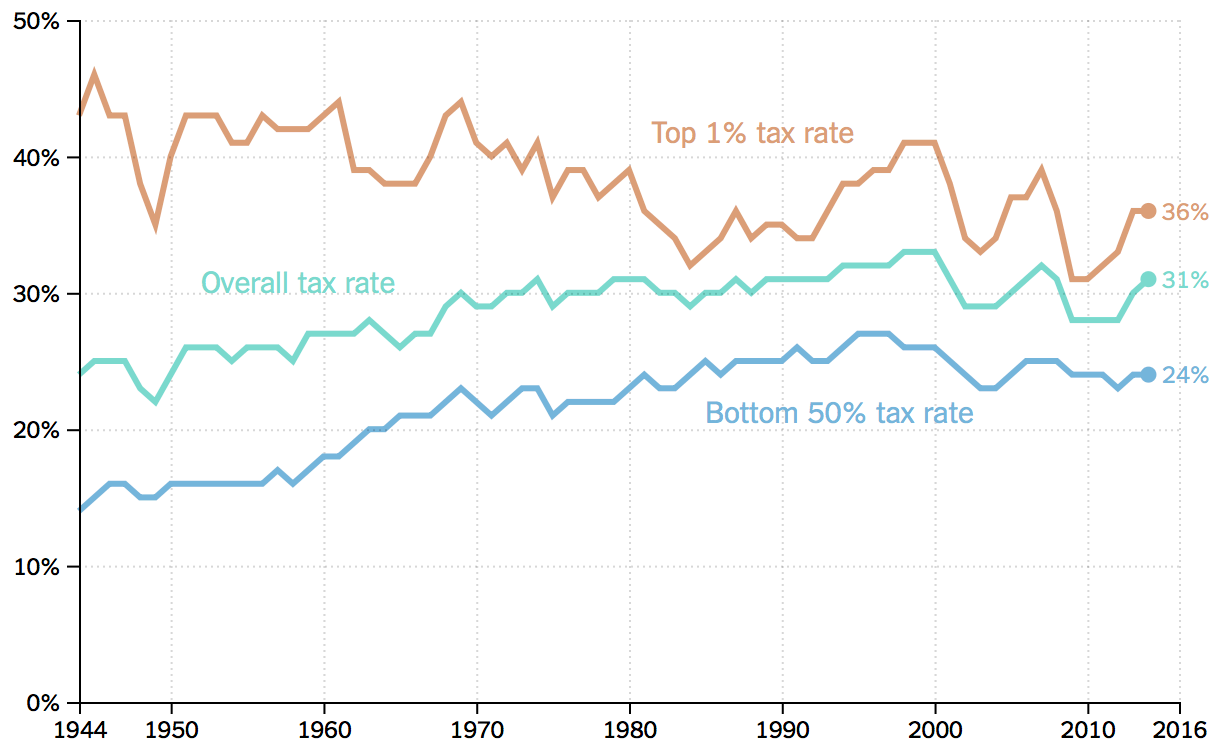


Sources: *Sourcebook of Criminal Justice Statistics Online*; Carson, E.A. (2015). *Prisoners in 2014*. Washington, DC: Bureau of Justice Statistics.

Rate of Disenfranchisement, by Race, 2010



Source: Uggen, C., Shannon, S., & Manza, J. (2012). *State-Level Estimates of Felon Disenfranchisement in the United States, 2010*. Washington, DC: The Sentencing Project.



Ashkenas J. Nine New Findings About Inequality in the United States. *The New York Times*. December 16, 2016.

<http://www.nytimes.com/interactive/2016/12/16/business/economy/nine-new-findings-about-income-inequality-piketty.html> Accessed December 23, 2016.

Poorest 50% almost half as likely to own their home

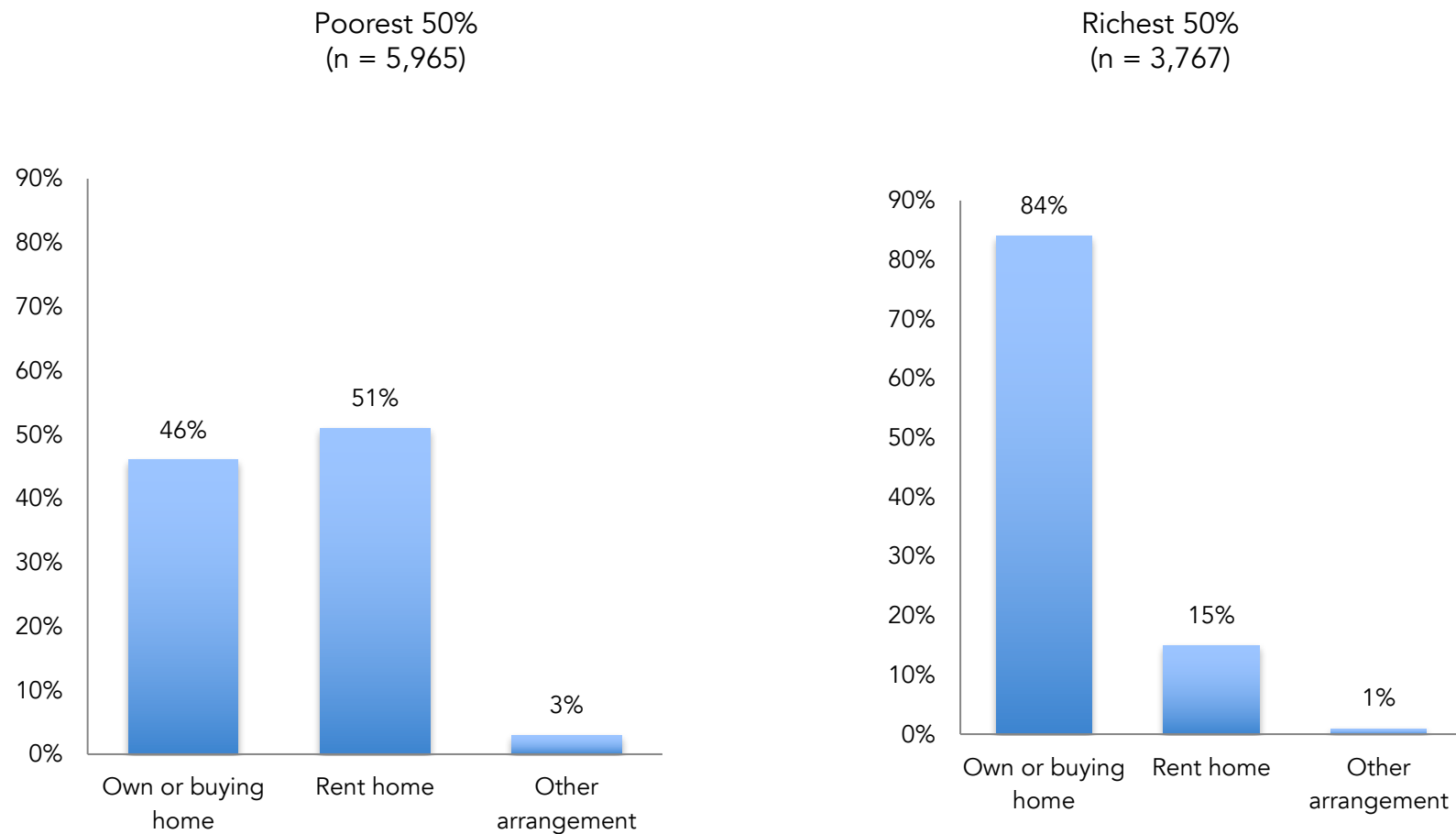
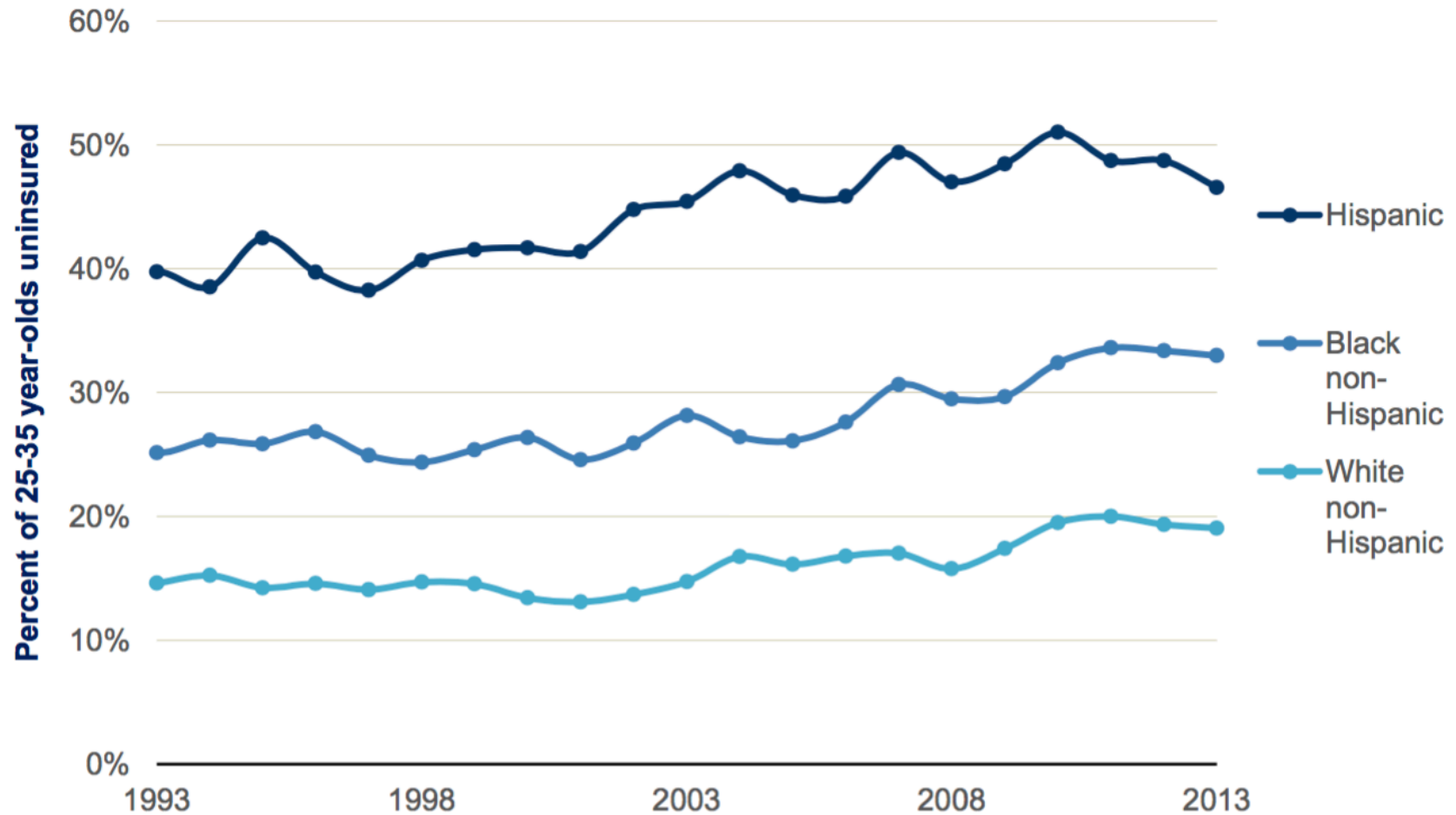
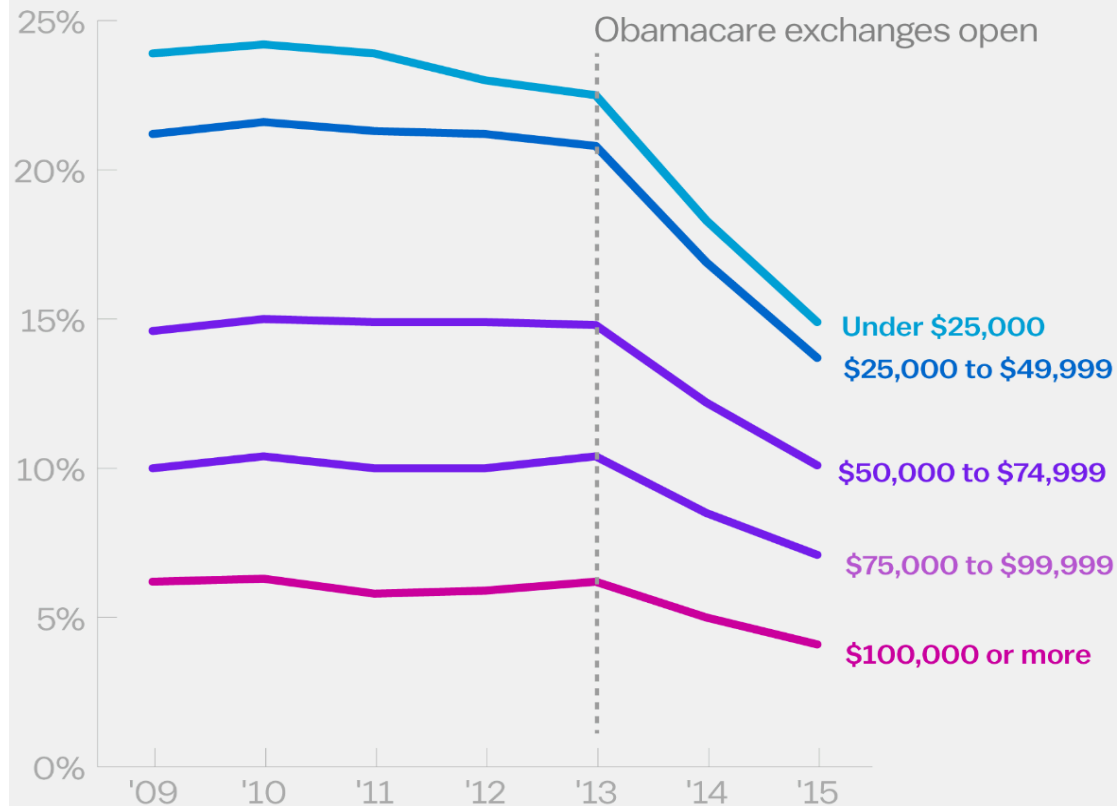


Figure 10. Health insurance coverage: Race gaps



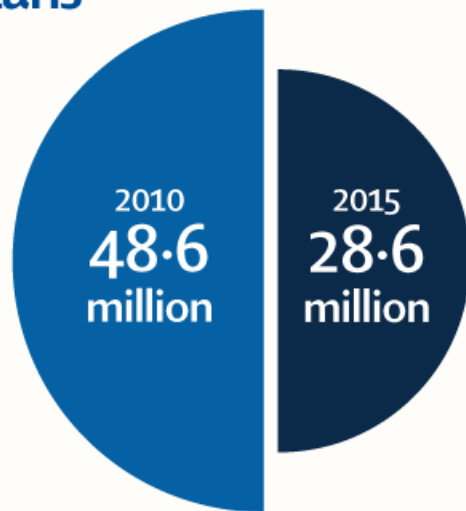
Source: Author's tabulations of IPUMS CPS; University of Minnesota

Percentage of uninsured people, by household income



Data from the US Census Bureau's American Community Survey, one-year estimates

Number of uninsured Americans



Those with serious illness commonly face FINANCIAL HARDSHIP

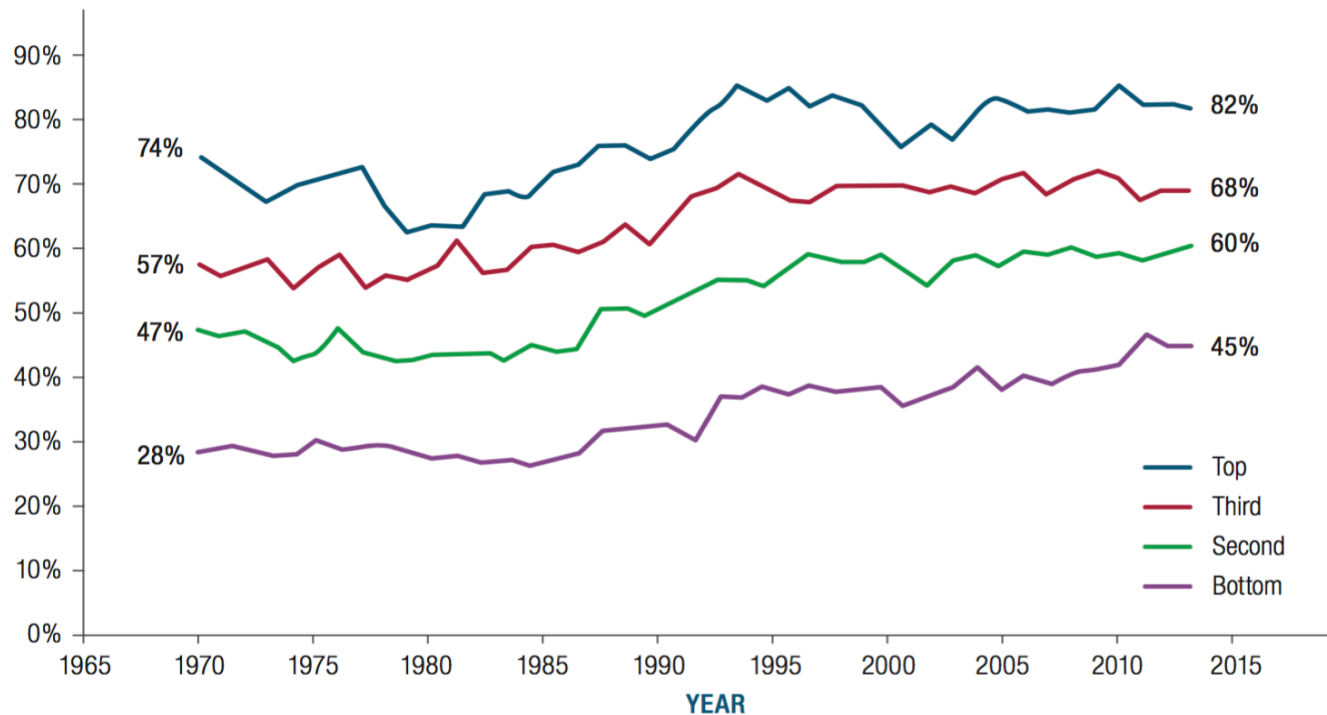


1 in 10 families with problems paying medical bills has declared bankruptcy

THE LANCET

Read the Series: www.thelancet.com/us-health

Equity Indicator 1a: Cohort College Continuation Rate (CCCR) by family income quartile for dependent 18 to 24 year olds: 1970 to 2012



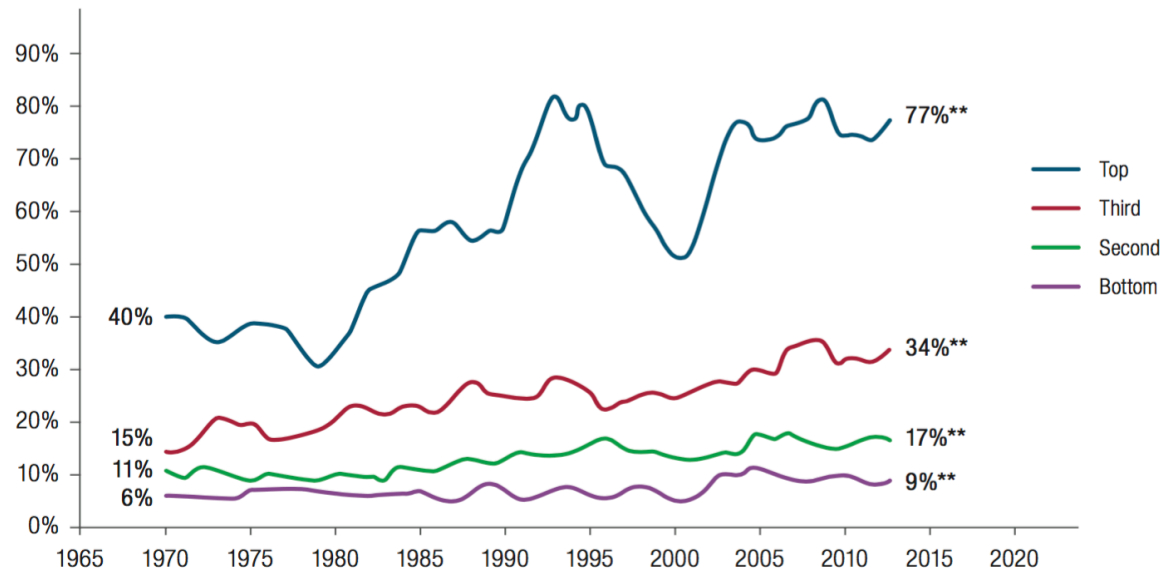
How Are We Doing? High Inequity Despite Small Narrowing of Gap

37 percentage-point gap between top and bottom quartiles in 2012, compared with 46 percentage-point gap in 1970

Note: Cohort College Continuation rate (CCCR) is tabulated based on the total number in the cohort year and includes those that have not completed high school in the denominator of the tabulation.

Source: U.S. Census Bureau; School Enrollment Data, Compiled by Tom Mortenson, graph by Pell Institute, July 2014

Equity Indicator 5a: Bachelor's degree attainment by age 24 for dependent family members by family income quartile: 1970-2013



How Are We Doing? High Inequality and Widening Gap

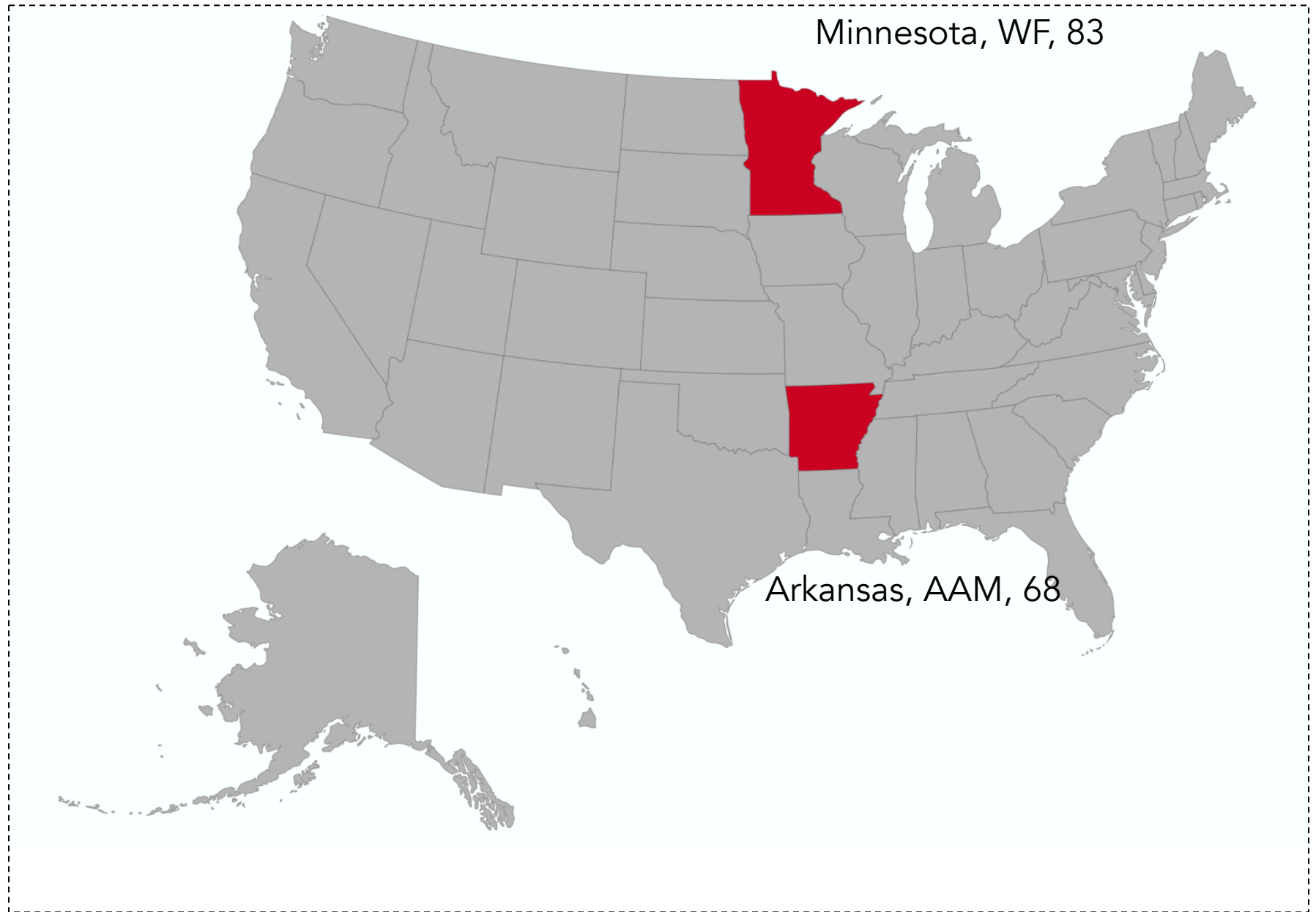
In 2013 those from high-income families were 8 times more likely to obtain a bachelors' degree by age 24 than those from low-income families. In 1970 individuals from high-income families were 6 times more likely to obtain a bachelor's degree than those from low-income families.

Note: **These data represent dependent students only and cannot be assumed to represent the percent of the entire population of individuals who have obtained a bachelor's degree by the family income quartiles. Data for the top quartile for dependent students are especially likely to overestimate degree attainment relative to entire population of individuals from the top family quartile.

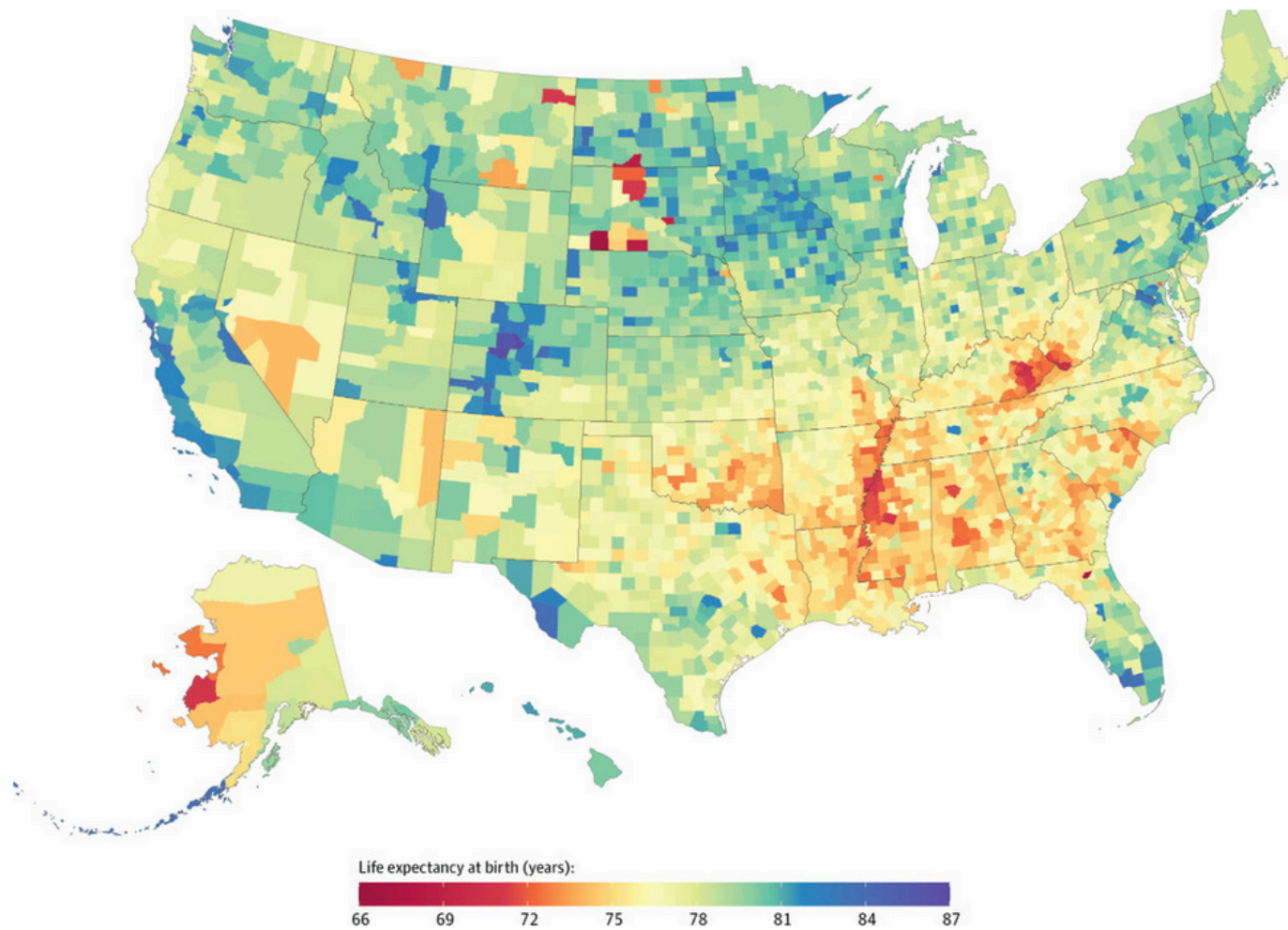
Source: U.S. Census Bureau, Current Population Survey, October Education Supplement. Data from 1970 to 1986 consider unmarried 18 to 24 year olds and data from 1987 to 2013 are based on dependent 18 to 24 year olds. We used data in Table 14 in Census Bureau P20 report on School Enrollment. After 2006, the Census Bureau no longer published Table 14. We received unpublished data. Mortenson, Thomas, 2014, "Unequal Family Income and Unequal Higher Education Opportunity, 1970 to 2013", Postsecondary Educational Opportunity, no. 267, Pell Institute for the Study of Opportunity in Higher Education, Washington DC, September. <http://www.postsecondary.org/>

4. On health divides

[illegible]



There is a 20-year gap between counties with the lowest and highest life expectancies

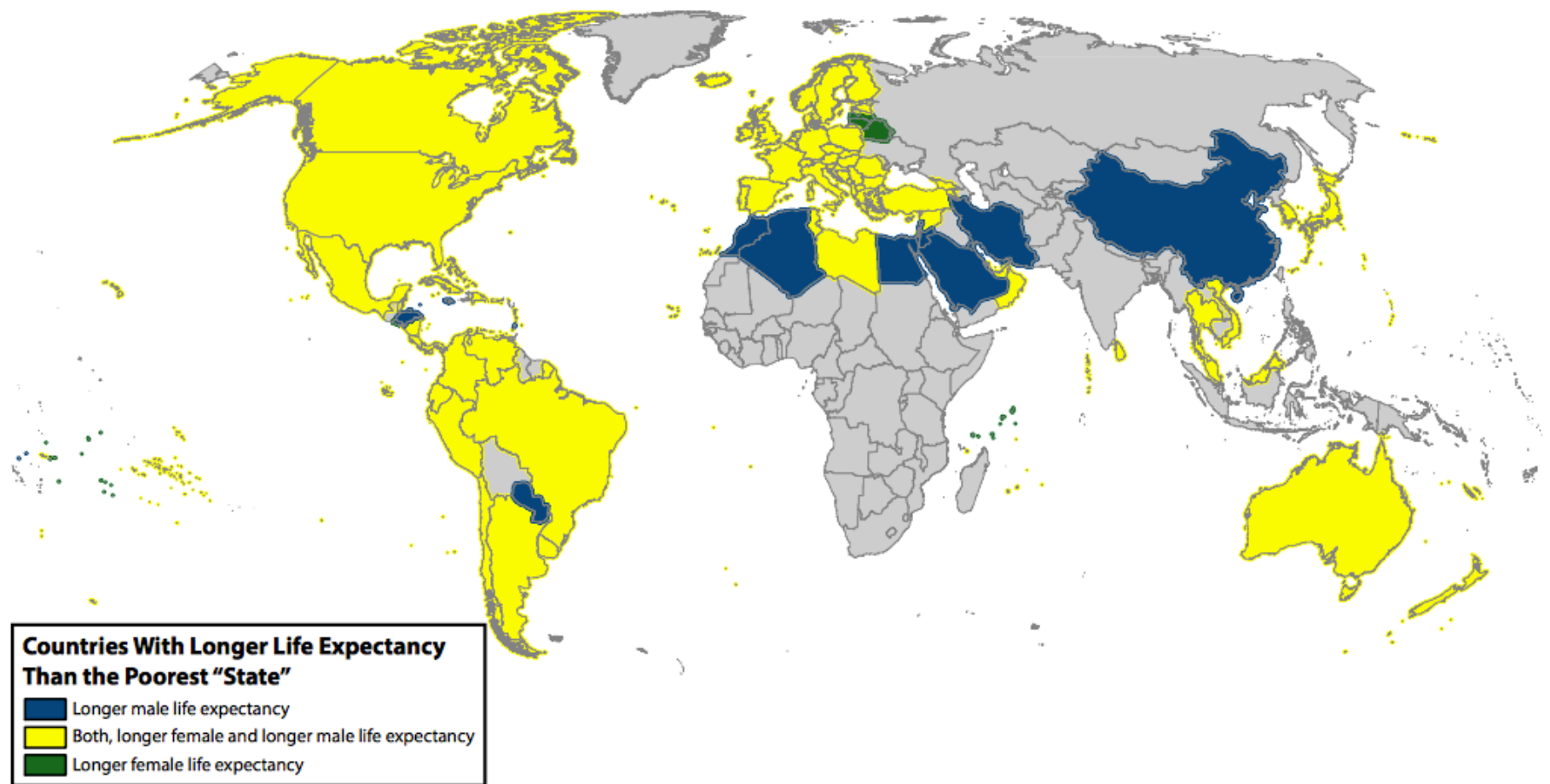


JAMA

Belluz J, Frostenson S. These maps show how Americans are dying younger. It's not just the opioid epidemic. Vox. May 9, 2017.

<https://www.vox.com/2016/12/13/13926618/mortality-trends-america-causes-death-by-county> Accessed May 14, 2017.

More than half of the countries in the world have longer life expectancies than the poorest “state” in the U.S.



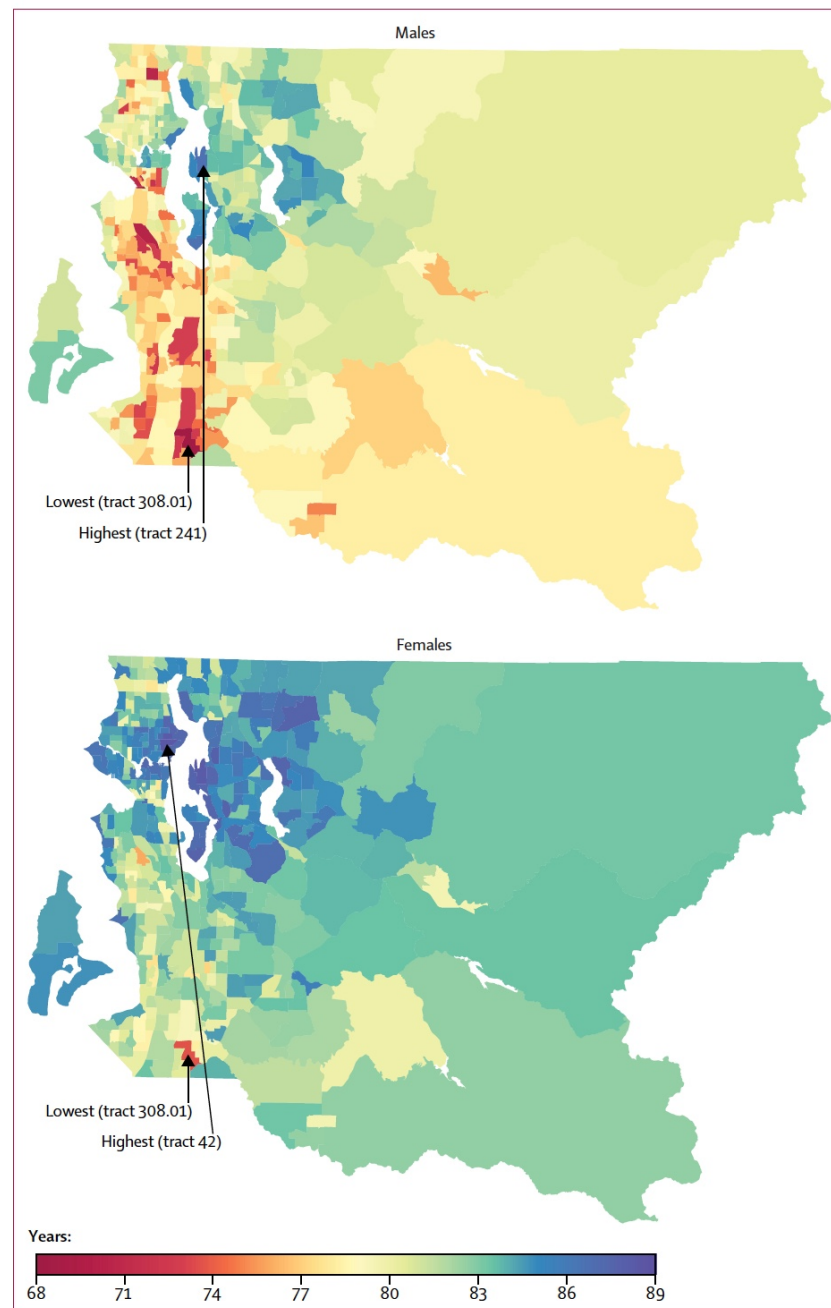
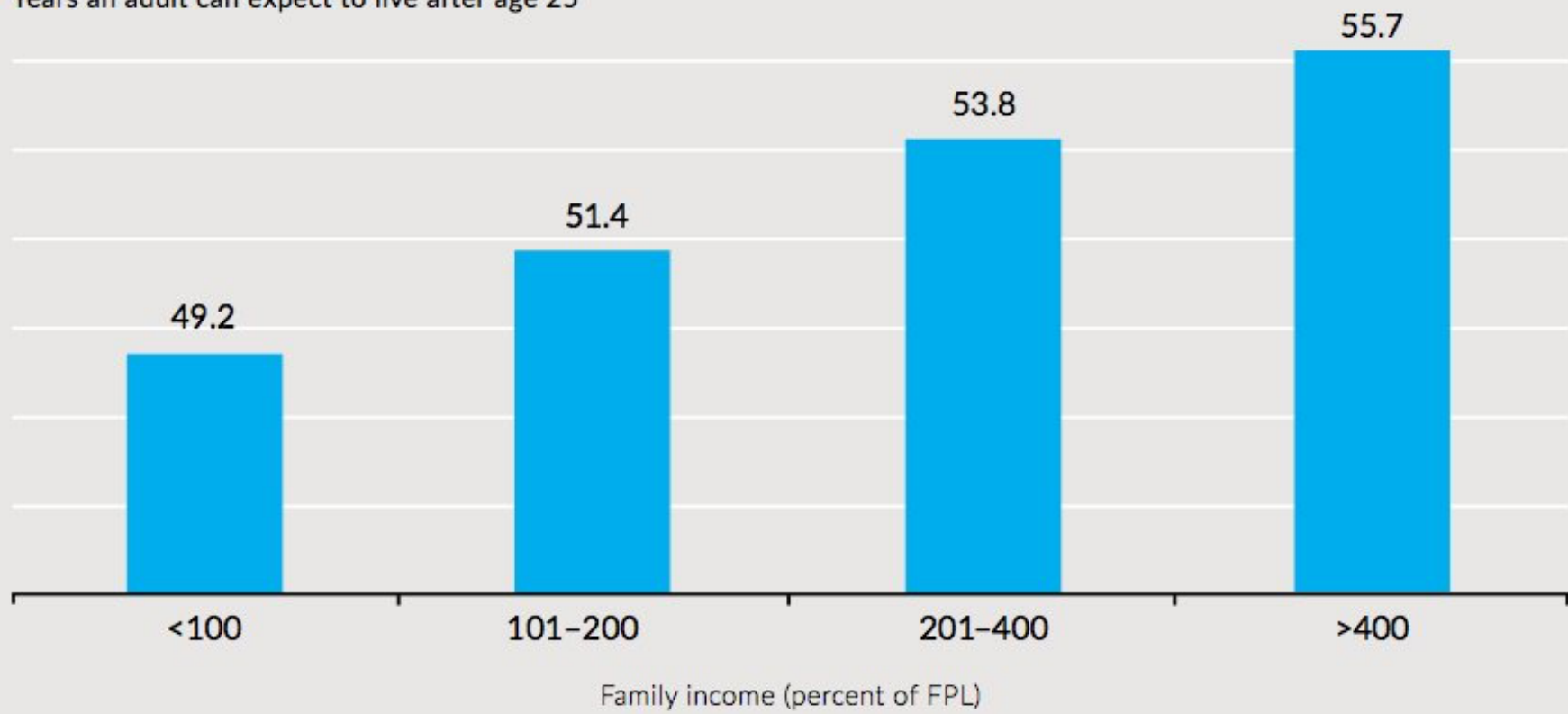


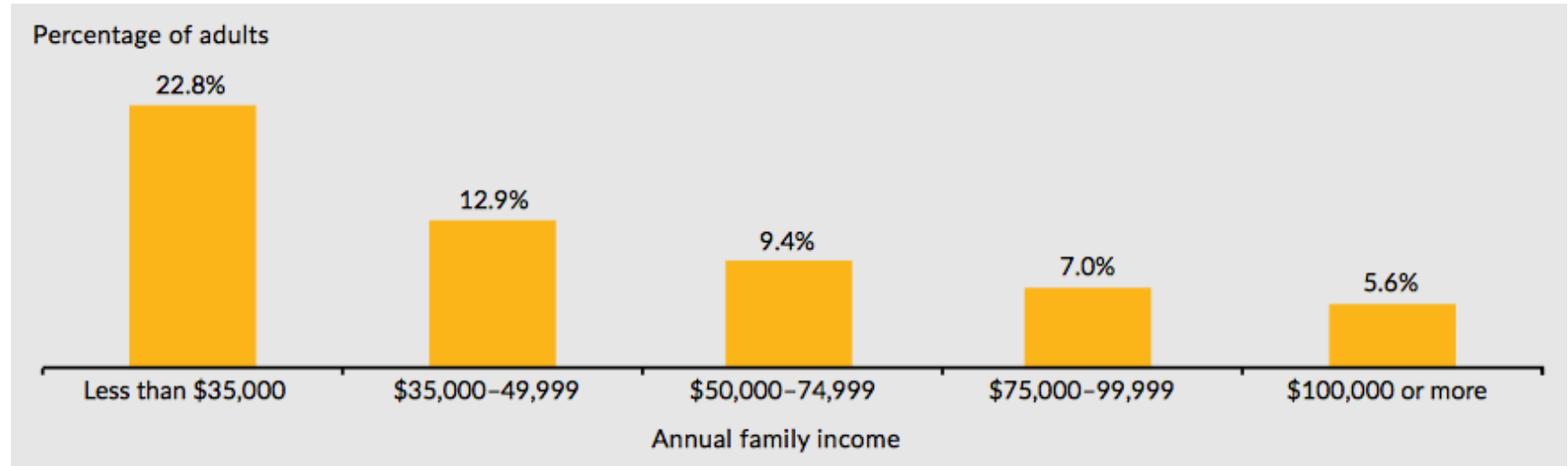
Figure 1: Life expectancy at birth by census tract in King County, WA, 2014

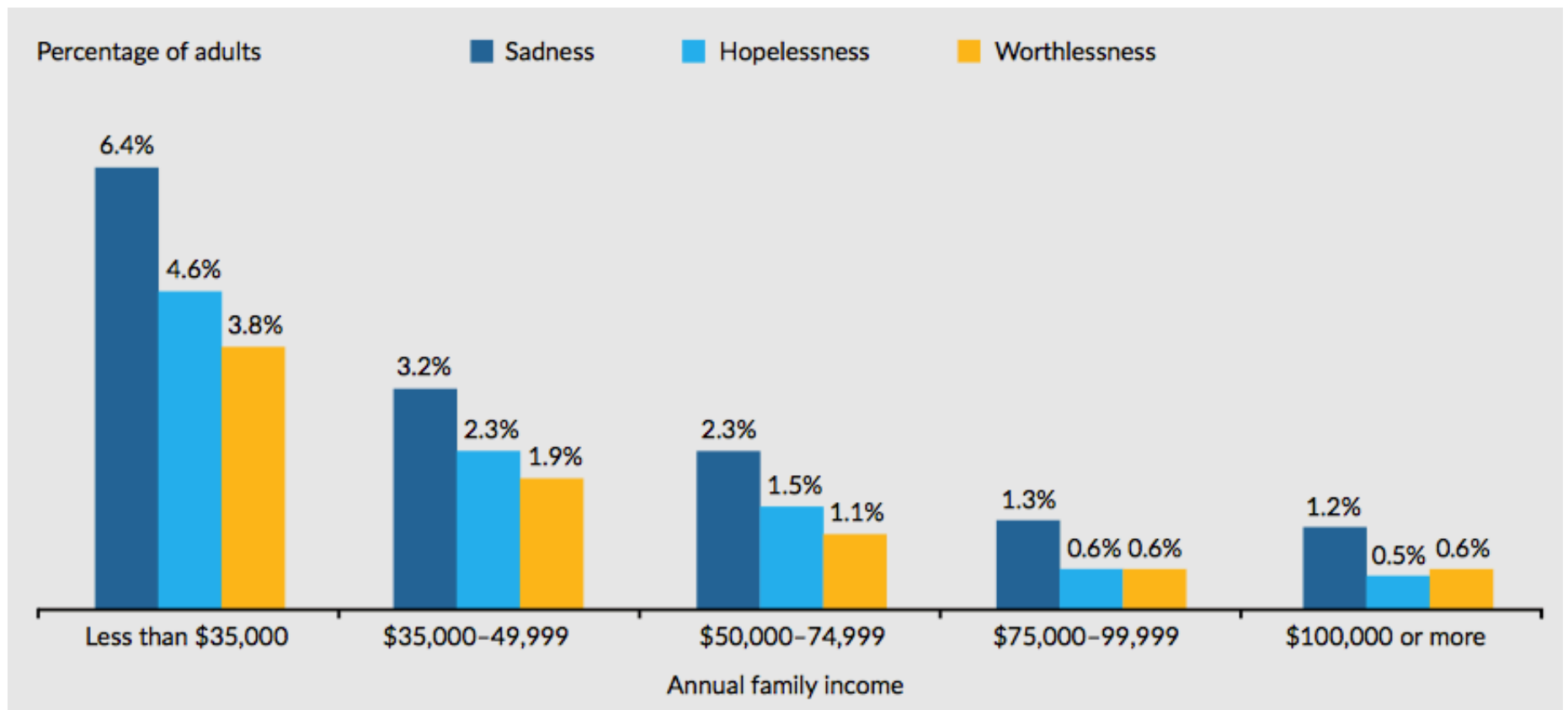
Dwyer-Lindgren L et al. Variation in life expectancy and mortality by cause among neighbourhoods in King County, WA, USA, 1990–2014: a census tract-level analysis for the Global Burden of Disease Study 2015. *Lancet Public Health*. 2017;

Years an adult can expect to live after age 25



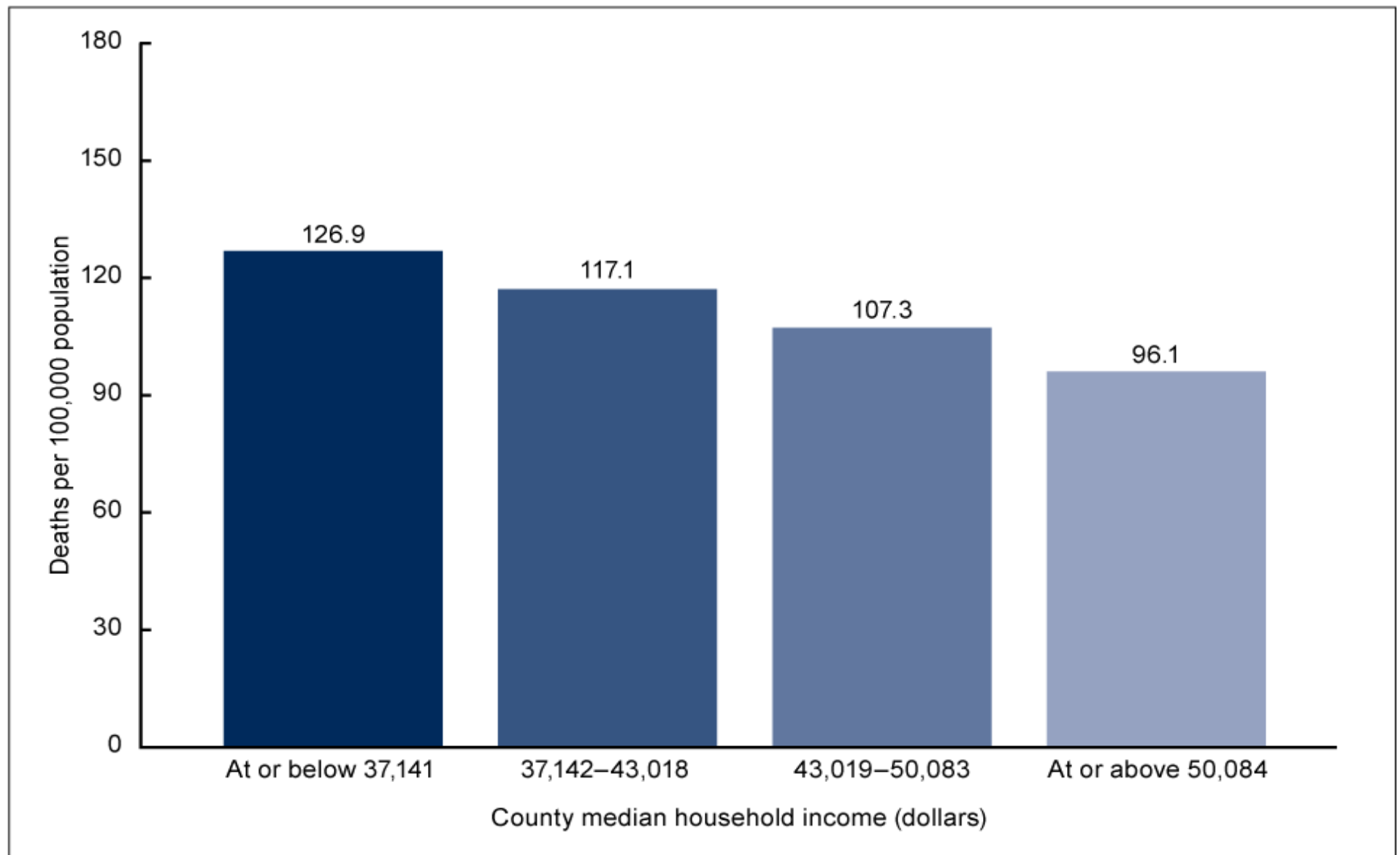
Poor self-rated health





Woolf SH et al. How are Income and Wealth Linked to Health and Longevity? Urban Institute, Center of Society and Health, April 2015.
<<http://www.urban.org/sites/default/files/alfresco/publication-pdfs/2000178-How-are-Income-and-Wealth-Linked-to-Health-and-Longevity.pdf>>

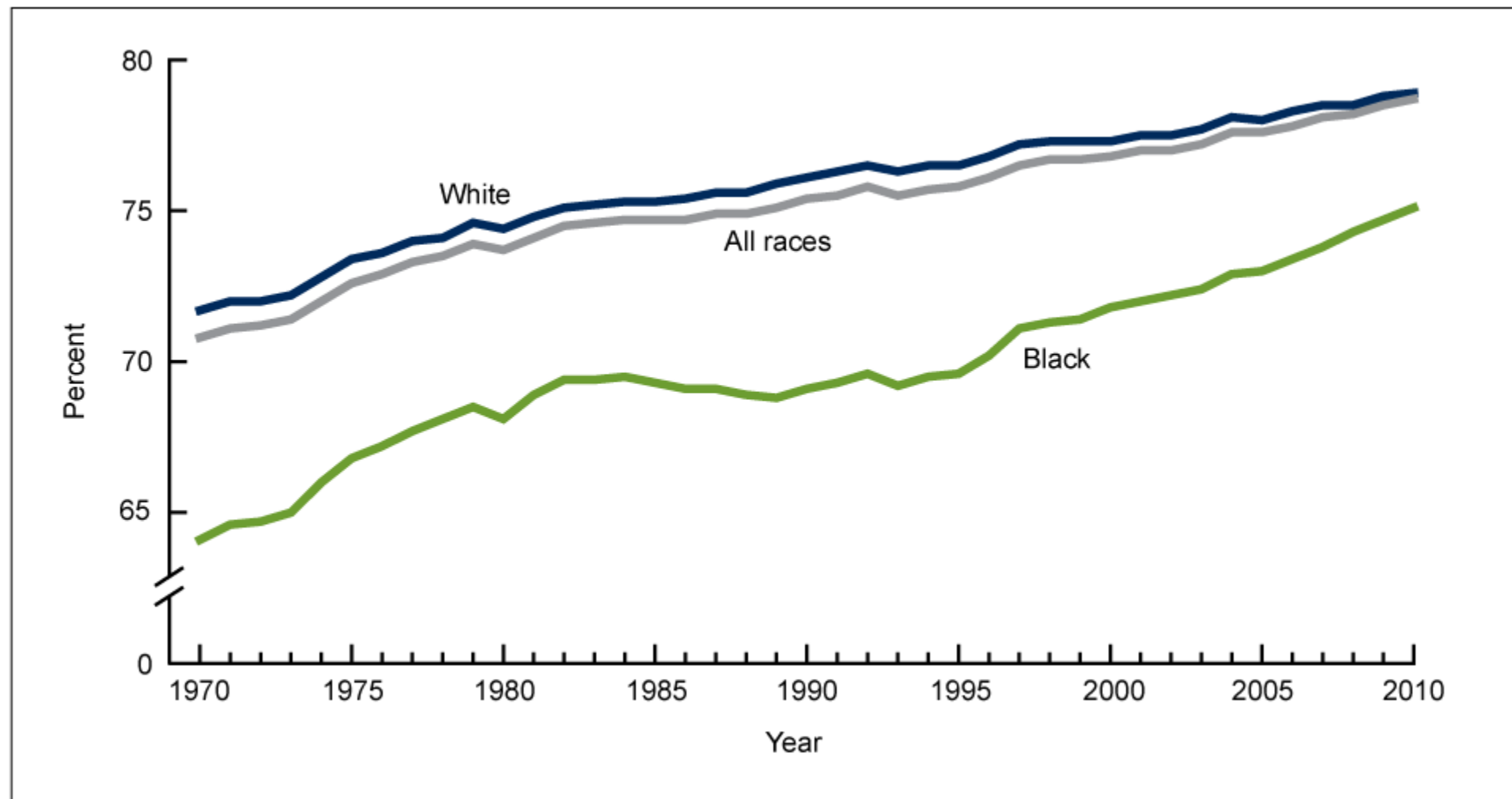
Figure 3. Age-adjusted stroke death rates among persons aged 45 and over, by county median household income quartile: average annual, 2010–2013



NOTES: Income categories are quartiles of county median household income. There is a significant linear trend across the categories ($p < 0.05$).
SOURCES: CDC/NCHS, Compressed Mortality File, 1999–2013 (reference 9) and 2012 U.S. Census Bureau Small Area Income and Poverty Estimates (reference 12).

Differences in Stroke Mortality Among Adults Aged 65 and Over: United States, 2010–2013. <<http://www.cdc.gov/nchs/data/databriefs/db207.htm>> Accessed March 18, 2016

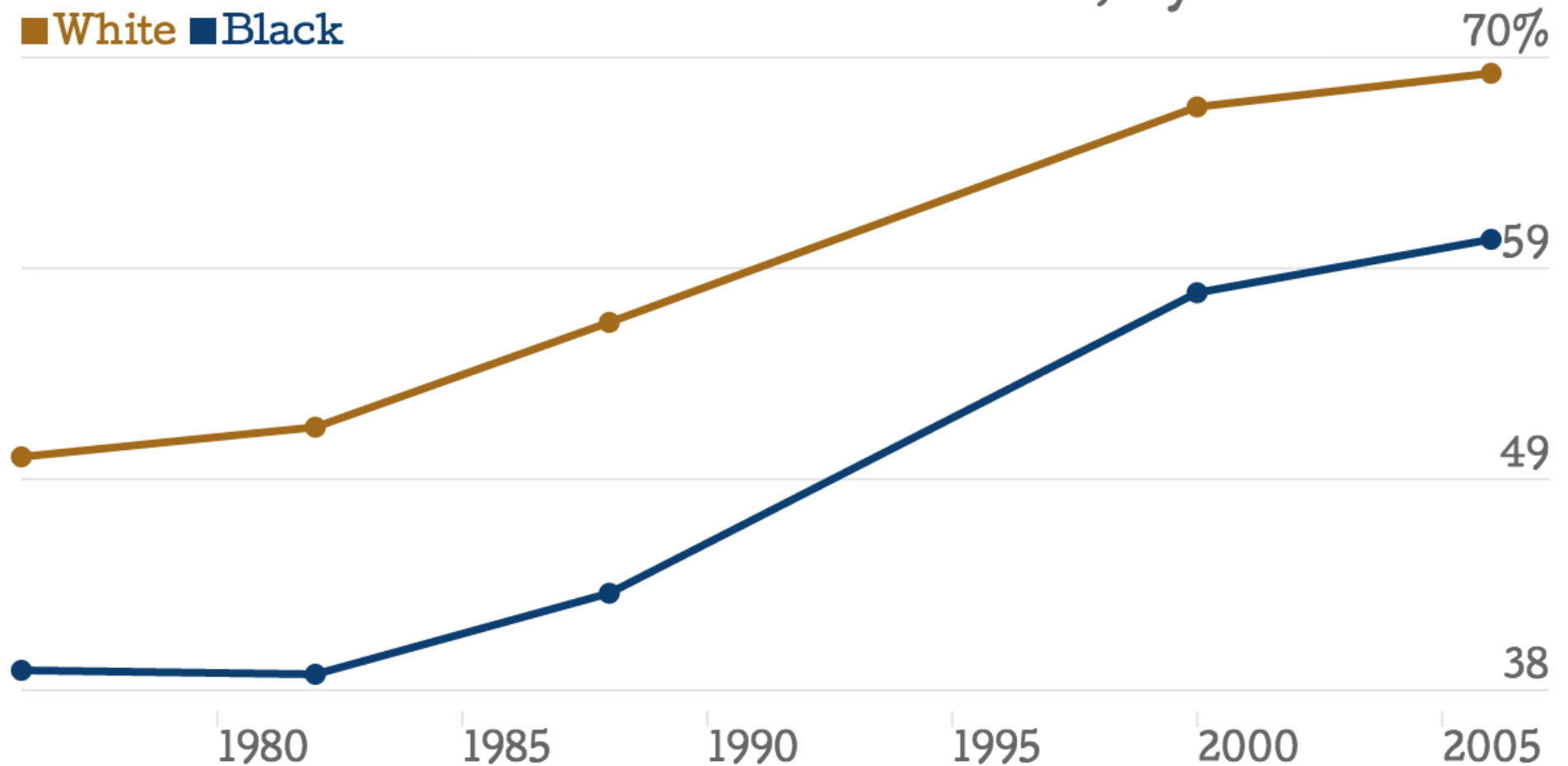
Figure 1. Life expectancy, by race: United States, 1970–2010



SOURCE: CDC/NCHS, National Vital Statistics System, Mortality.

Cancer Patients Alive After 5 Years, by Race

■ White ■ Black



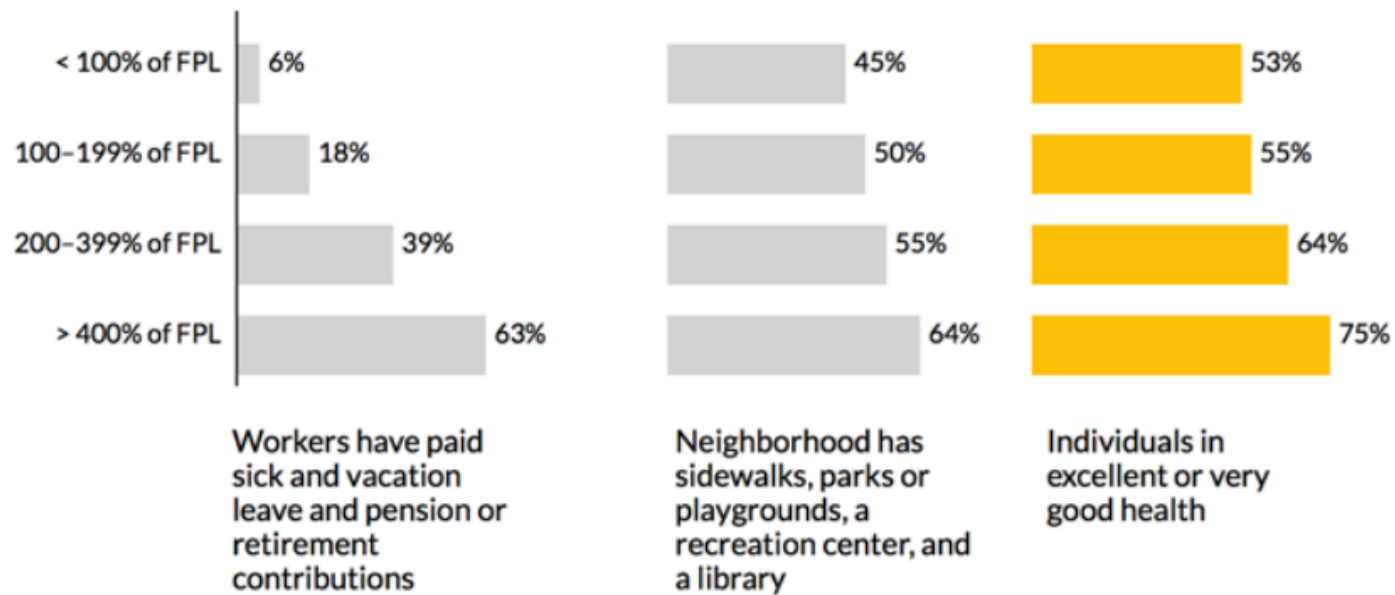
USNews

Lindsey Cook for USN&WR; Source: CDC

U.S. News & World Report, "Why Black Americans Die Younger."

<<http://www.usnews.com/news/blogs/data-mine/2015/01/05/black-americans-have-fewer-years-to-live-heres-why>> Accessed March 18, 2016

How income drives health

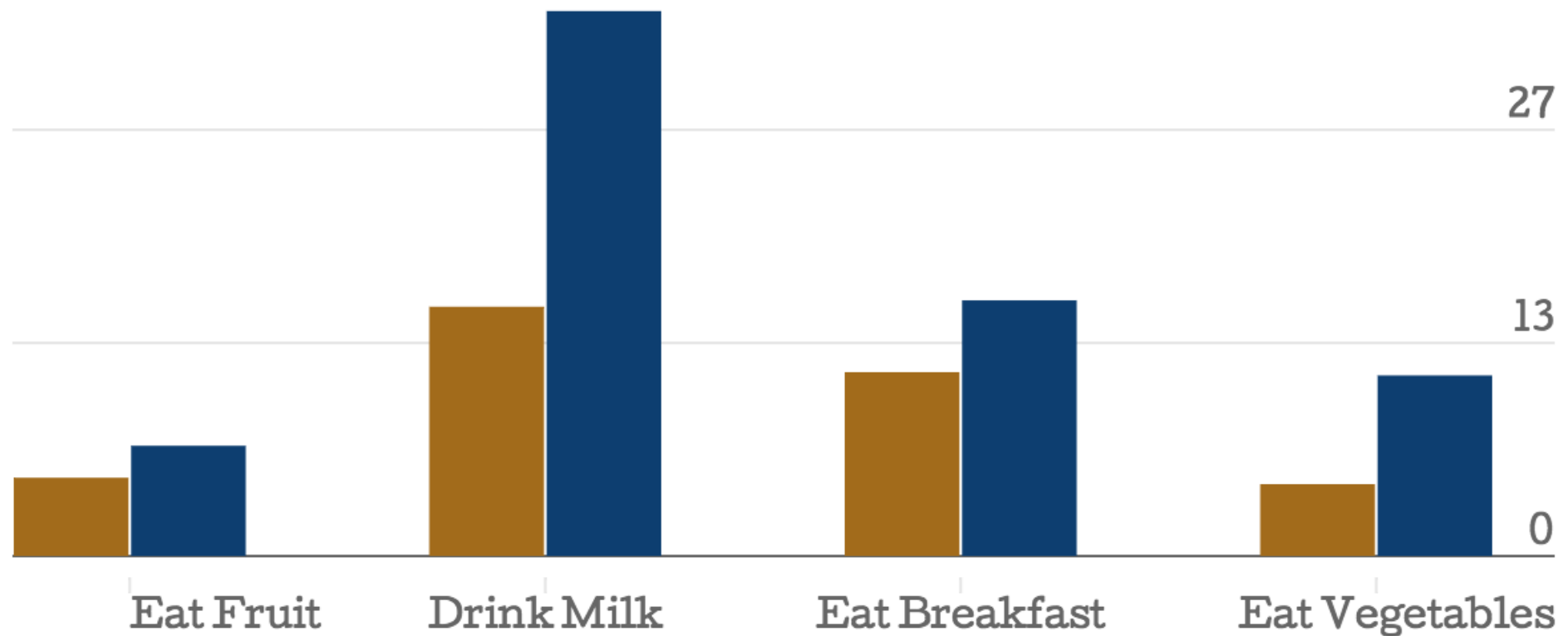


FPL = Federal poverty level

High Schoolers Did Not ... in Last 7 Days (2013)

■ White ■ Black

40%



USNews

Lindsey Cook for USN&WR; Source: CDC

U.S. News & World Report, "Why Black Americans Die Younger."

<<http://www.usnews.com/news/blogs/data-mine/2015/01/05/black-americans-have-fewer-years-to-live-heres-why>> Accessed March 18, 2016

5. Do social divides kill?



https://en.wikipedia.org/wiki/Blind_Willie_Johnson

National Center for Health Statistics

FastStats Homepage

Diseases and Conditions +

Infectious/Immune +

Family Life +

Health Care and Insurance +

Disability and Risk Factors +

Injuries +

Life Stages and Populations -

Age Groups +

Births +

Deaths -

Deaths and Mortality

Leading Causes of Death

Life Expectancy

Race and Ethnicity +

[CDC](#) > [NCHS Home](#) > [FastStats Homepage](#) > [Life Stages and Populations](#) > [Deaths](#) > [Leading Causes of Death](#)

Leading Causes of Death



Number of deaths for leading causes of death

- Heart disease: 633,842
 - Cancer: 595,930
 - Chronic lower respiratory diseases: 155,041
 - Accidents (unintentional injuries): 146,571
 - Stroke (cerebrovascular diseases): 140,323
 - Alzheimer's disease: 110,561
 - Diabetes: 79,535
 - Influenza and pneumonia: 57,062
 - Nephritis, nephrotic syndrome, and nephrosis: 49,959
 - Intentional self-harm (suicide): 44,193

Source: [Health United States, 2016 Table 19](#) [PDF- 11.1 MB] (Data are for 2015)

Related FastStats

- [Deaths and mortality](#)

Actual Causes of Death in the United States in 1990 and 2000

Actual Cause	No. (%) in 1990	No. (%) in 2000
Tobacco	400 000 (19)	435 000 (18.1)
Poor diet and physical inactivity	300 000 (14)	365 000 (15.2)*
Alcohol consumption	100 000 (5)	85 000 (3.5)
Microbial agents	90 000 (4)	75 000 (3.1)
Toxic agents	60 000 (3)	55 000 (2.3)
Motor vehicles	25 000 (1)	43 000 (1.8)
Firearms	35 000 (2)	29 000 (1.2)
Sexual behavior	30 000 (1)	20 000 (0.8)
Illicit drug use	20 000 (<1)	17 000 (0.7)
Total	1 060 000 (50)	1 159 000 (48.2)

McGinnis and Foege. Actual Causes of Death in the United States. JAMA. 1993; 270: 2207-2212.; Mokdad et al. Actual Causes of Death in the United States, 2000. JAMA. 2004; 291: 1238-1245. * Corrected estimate: Mokdad et al. JAMA. 2005; 293: 293-294.

Deaths attributable to social factors

Social Factor	No. (%) in 2000
Individual-level factors	
Low education	193 626 (8.3)
Poverty	102 672 (4.4)
Low social support	179 937 (7.7)
Area-level factors	
Area-level poverty	39 553 (1.7)
Income inequality	145 388 (6.2)
Racial segregation	153 796 (6.6)

Comparing deaths from social factors to other causes

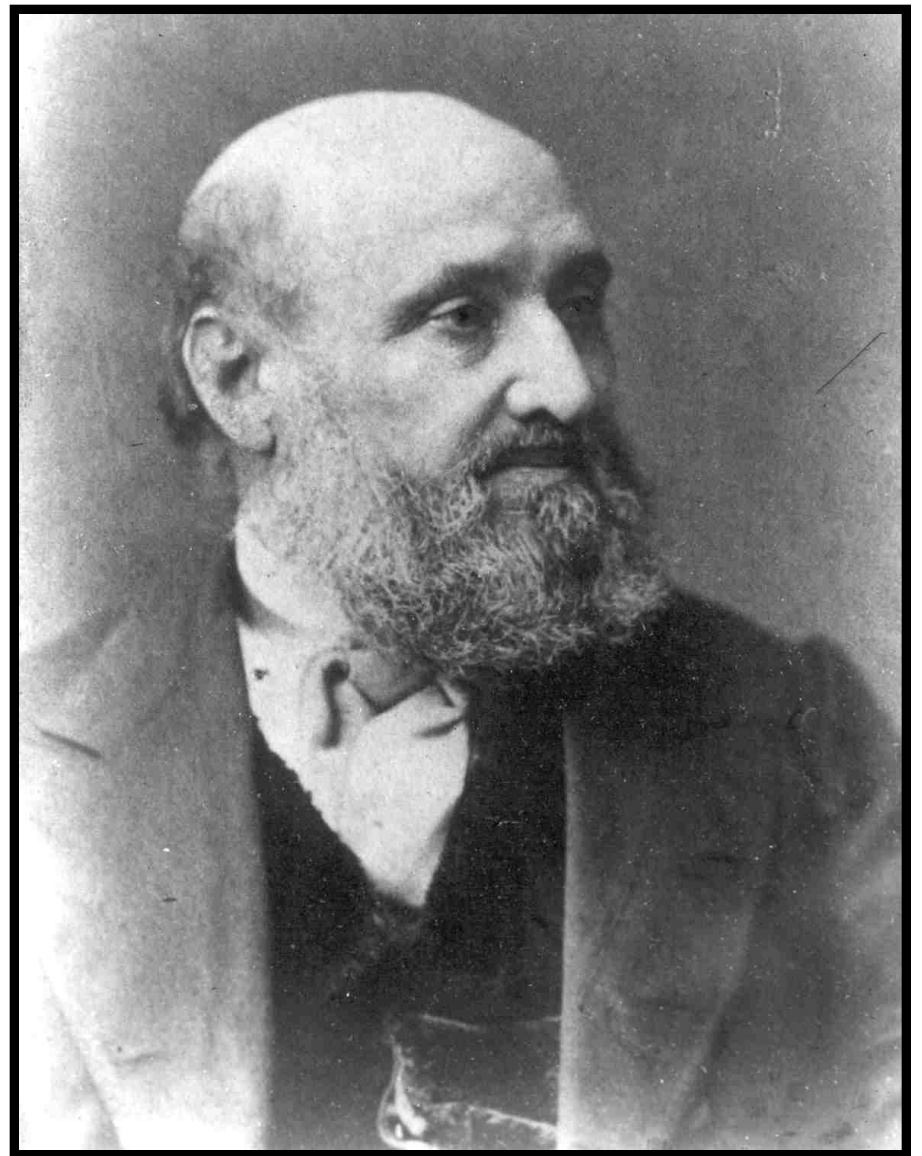
Social Factor	No. (%)	Cause of Death	No. (%)
Low education	193 626 (8.3)	Acute MI	192 898 (8.0)
Low social support	179 937 (7.7)	Stroke	167 661 (7.0)
Racial segregation	153 796 (6.6)	Lung cancer	155 521 (6.5)
Income inequality	145 388 (6.2)	Chronic lower resp. dis.	122 009 (5.1)
Poverty	102 672 (4.4)	Unintentional injuries	97 900 (4.1)
Area-level poverty	39 553 (1.7)	Renal failure	36 471 (1.5)

Minino et al. Deaths: Final data for 2000. Natl Vital Stat Rep. 2002; 50: 1-120.

Galea S, Tracy M, Hoggatt KJ, DiMaggio C, Karpati A. Estimated deaths attributable to social factors in the United States. American Journal of Public Health. 2011;101(8):1456-65. PMID: 21680937.



VS



Hamlin C. Could you starve to death in England in 1839? The Chadwick-Farr controversy and the loss of the "social" in public health. *American Journal of Public Health* 1995; 85:856-66

6. Are social divides killing us *more*?

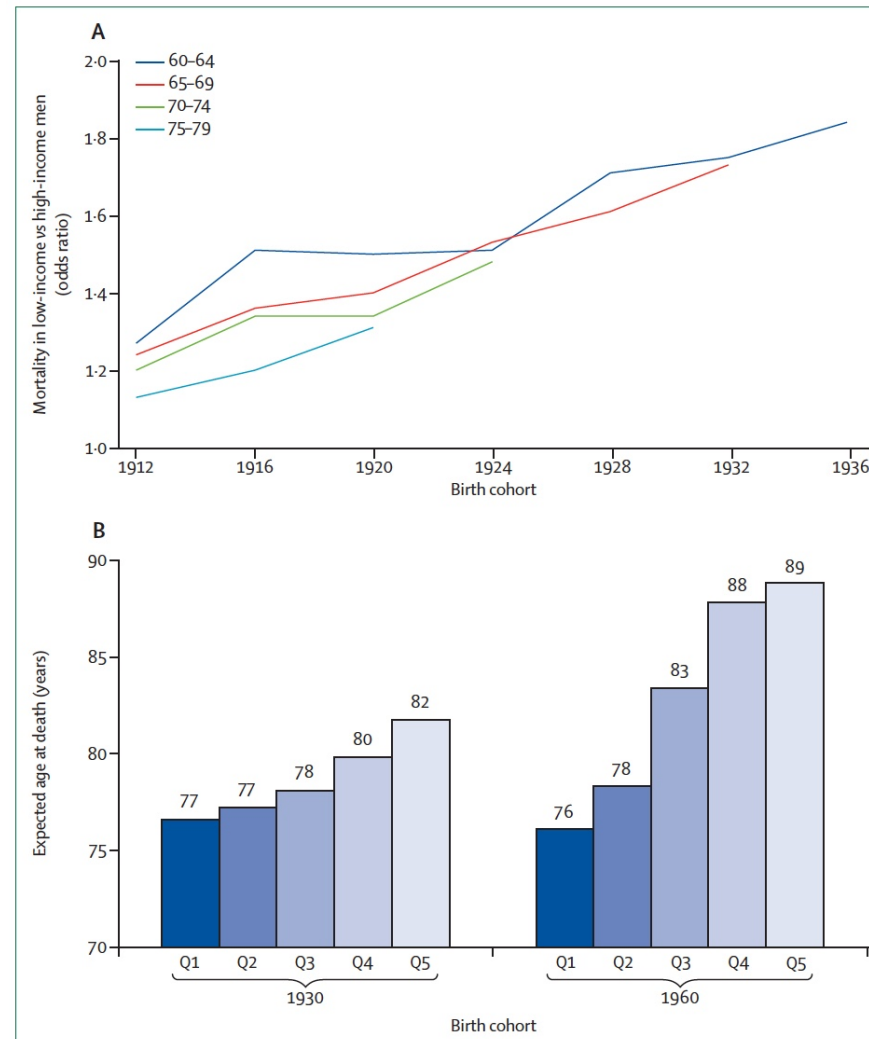


Figure 5: Widening income-related inequalities in survival across birth cohorts

(A) Excess mortality (odds ratio) associated with lifetime income in the lower (vs upper) 50% of the income distribution is shown at different ages for men born in 1912–38. Birth cohorts were grouped into 3-year intervals; the start of the interval is labelled on the horizontal axis. The association between income and mortality increased across birth cohorts for all observed age groups. Data are from Waldron (2007).⁷ (B) The projected life expectancy at age 50 is shown for 1930 and 1960 birth cohorts, by income quintile—Q1 (poorest) to Q5 (richest). Life expectancy is displayed as expected age at death, conditional on reaching age 50. Estimates for 1930 cohort are based on observed and projected age-specific mortality rates; estimates for 1960 cohort are based entirely on projections. Underlying data for these projections come from the Health and Retirement Study. Projections presented are for men; similar divergence in life expectancy by income was projected for female birth cohorts. Cohort life expectancy for the bottom two quintiles of the 1930 birth cohort was 76.6 years (Q1) and 77.2 years (Q2). Data are from the National Academies of Sciences, Engineering, and Medicine study.⁷

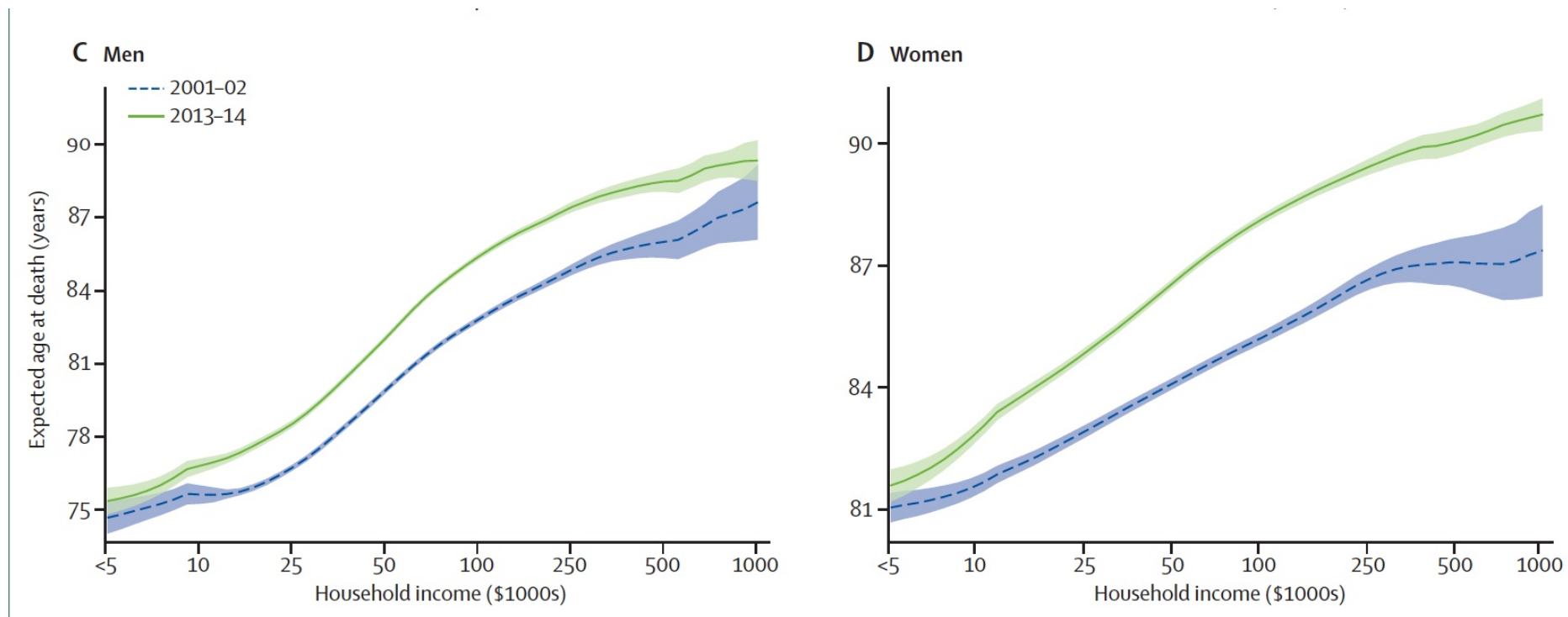


Figure 4: Decomposition of trends: changes in life expectancy across the income distribution, 2001-14

Graphs show (A) percentage change in household income from 2001 to 2014, by income percentile, for men (similar trends were observed for women); (B) the average annual change in life expectancy by household income category over the period 2001-14 (whereas figure 3 shows changes by income percentile); and the income-life expectancy gradient in 2001-02 and 2013-14 for men (C) and women (D), shown as a kernel-weighted moving average. Household income is expressed in 2012 US\$, based on US tax records, and is presented on a log scale. In (B), income categories were defined in 0.5 log-point bins: 8.5, 9.0, 9.5, ..., 14.0; male datapoints are offset for visualisation purposes. Differential changes in life expectancy by income percentile were the result of both (A) falling incomes among the poor and (B-D) a steeper gradient between income and life expectancy. Data are from Chetty et al.⁶

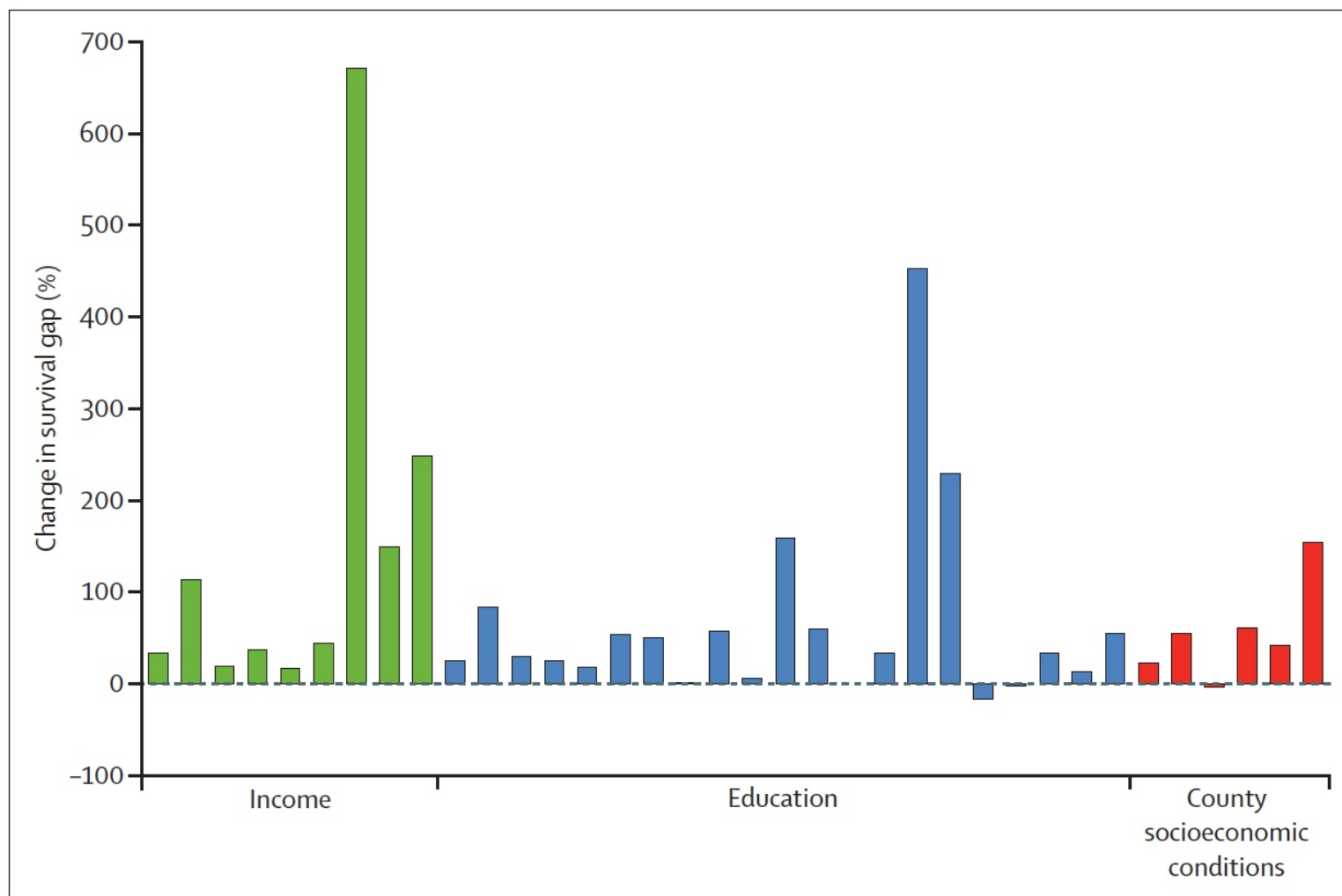
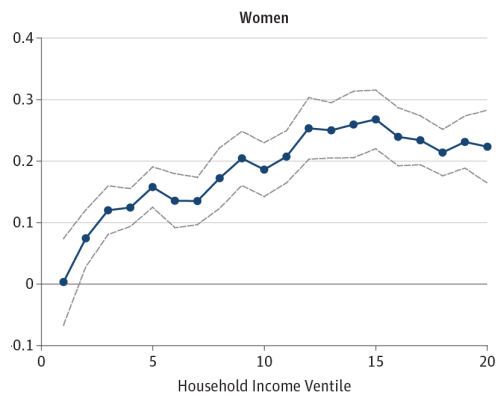


Figure 2: Percent changes in survival gaps, 1980–2014

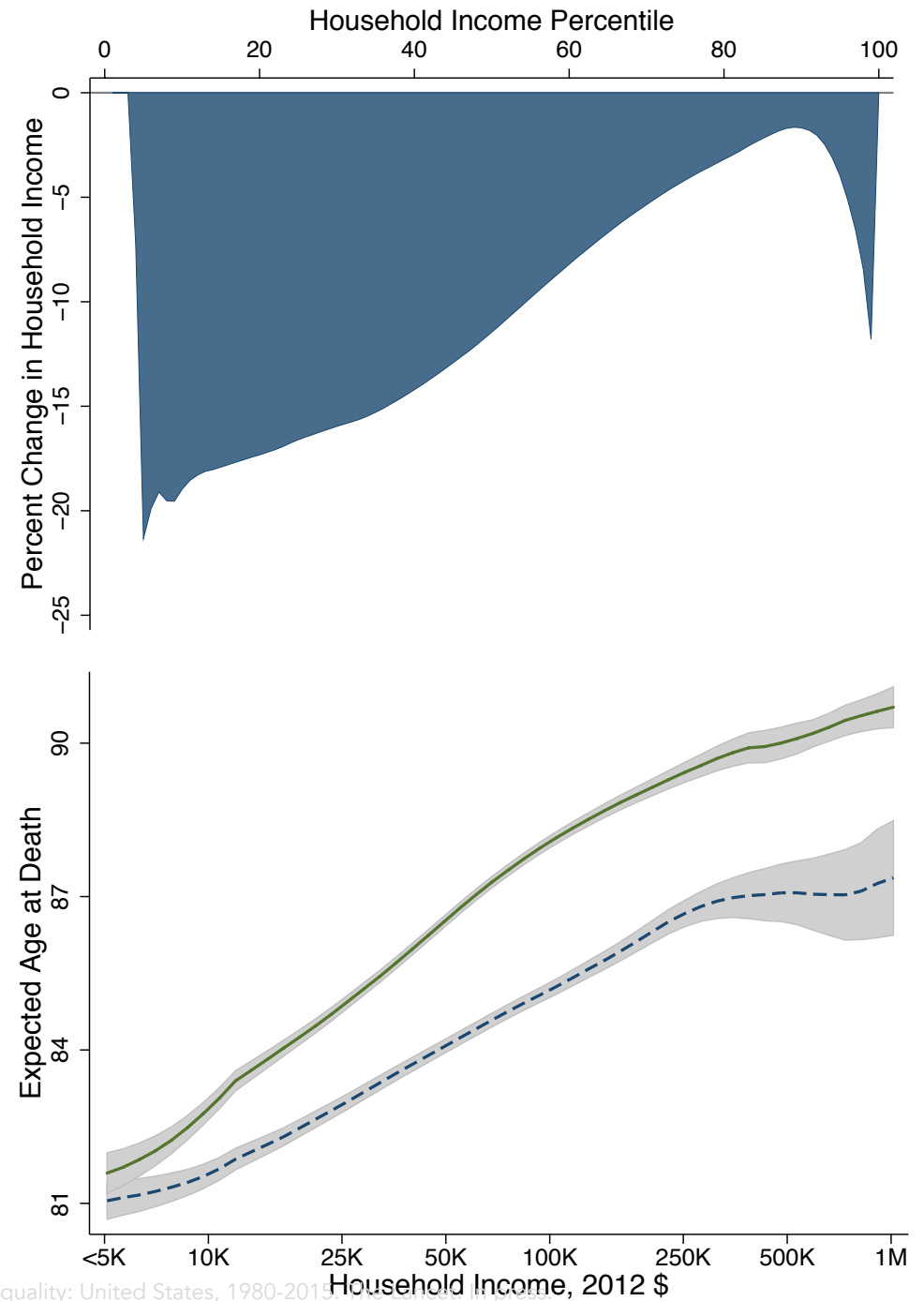
Chart shows percent changes in income, education, and county socioeconomic condition-related survival gaps reported in the literature reviewed. Each bar represents a row in the table. The vast majority of studies reported widening survival gaps.

Incomes have fallen for the poor and middle class

From 2001 to 2014



The income-health gradient has become steeper

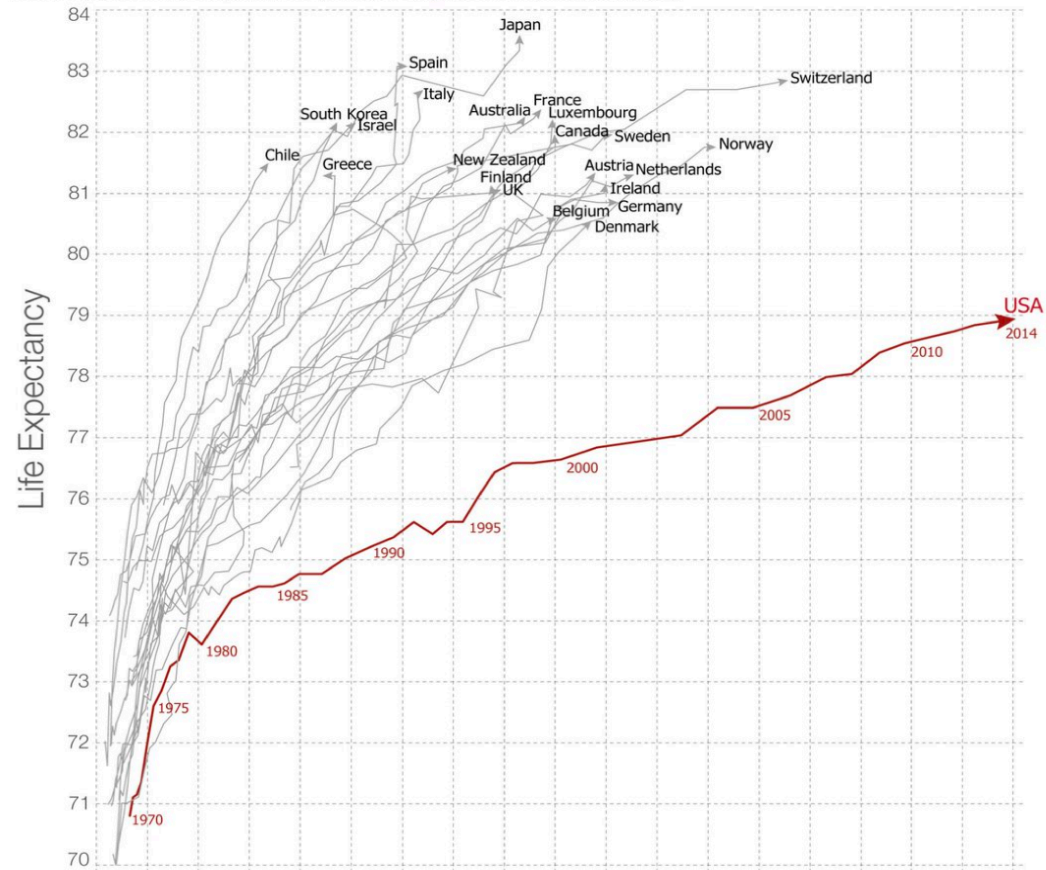


7. Not a solution

Life expectancy vs. health expenditure over time (1970-2014)

Our World
in Data

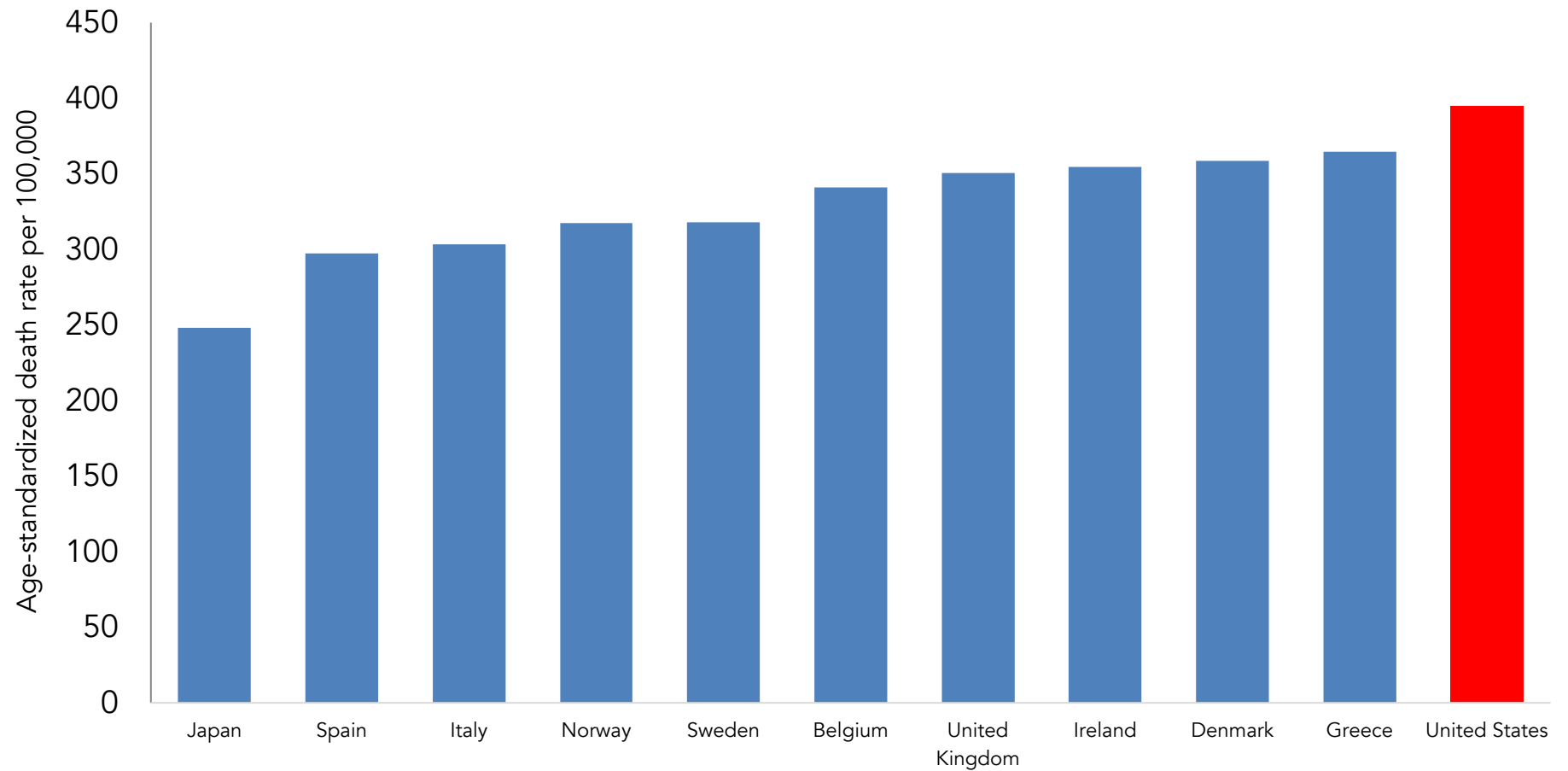
Health spending measures the consumption of health care goods and services, including personal health care (curative care, rehabilitative care, long-term care, ancillary services and medical goods) and collective services (prevention and public health services as well as health administration), but excluding spending on investments. Shown is total health expenditure (financed by public and private sources).



Our World in Data. "The link between health spending and life expectancy: The US is an outlier."

<<https://ourworldindata.org/the-link-between-life-expectancy-and-health-spending-us-focus>> Accessed September 7, 2016

Non-communicable diseases mortality rate in selected countries, 2015



Total NCD mortality (age-standardized): Data by country. Global Health Observatory data repository, World Health Organization 2016.

<http://apps.who.int/gho/data/view.main.1390?lang=en> Accessed October 2, 2017.

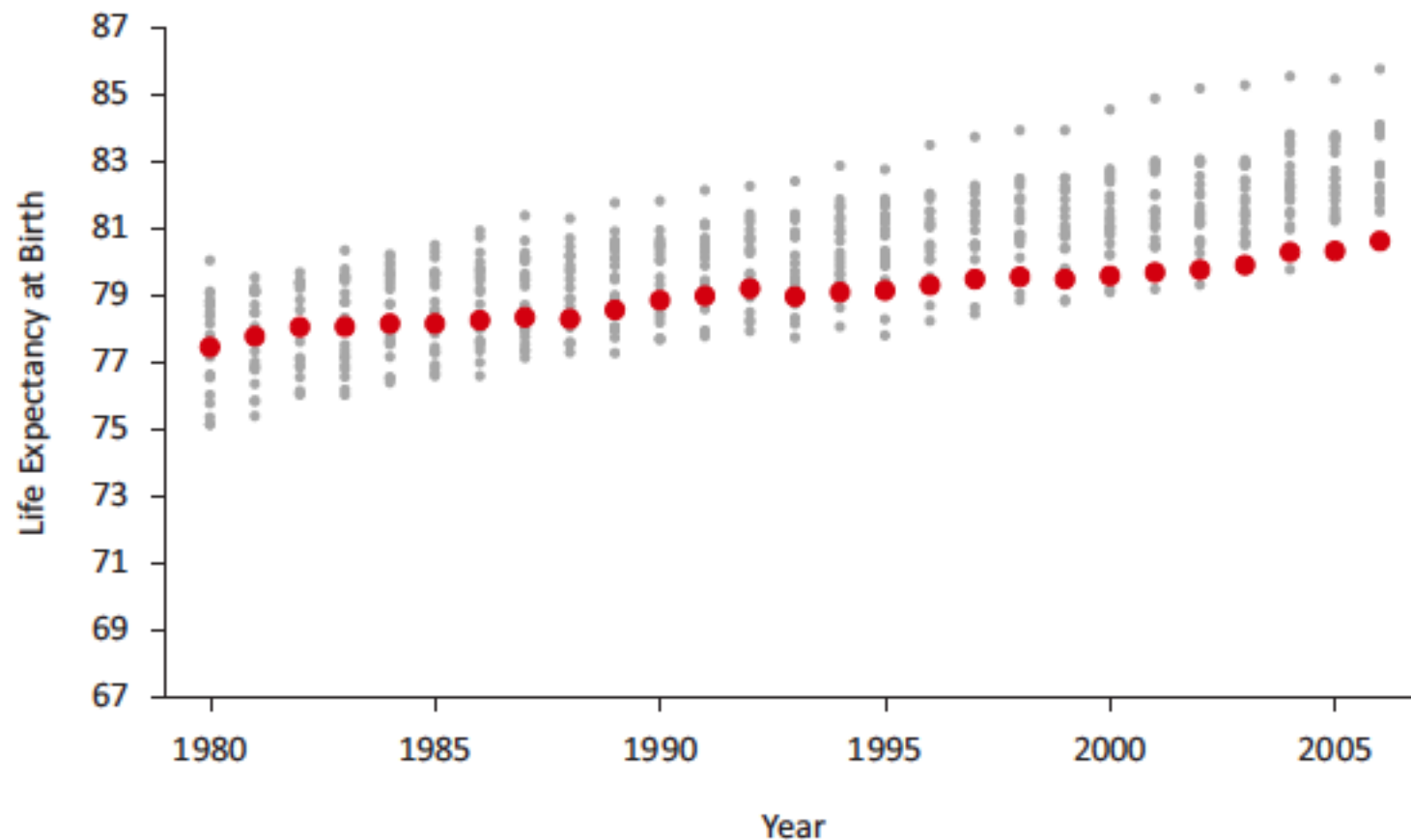
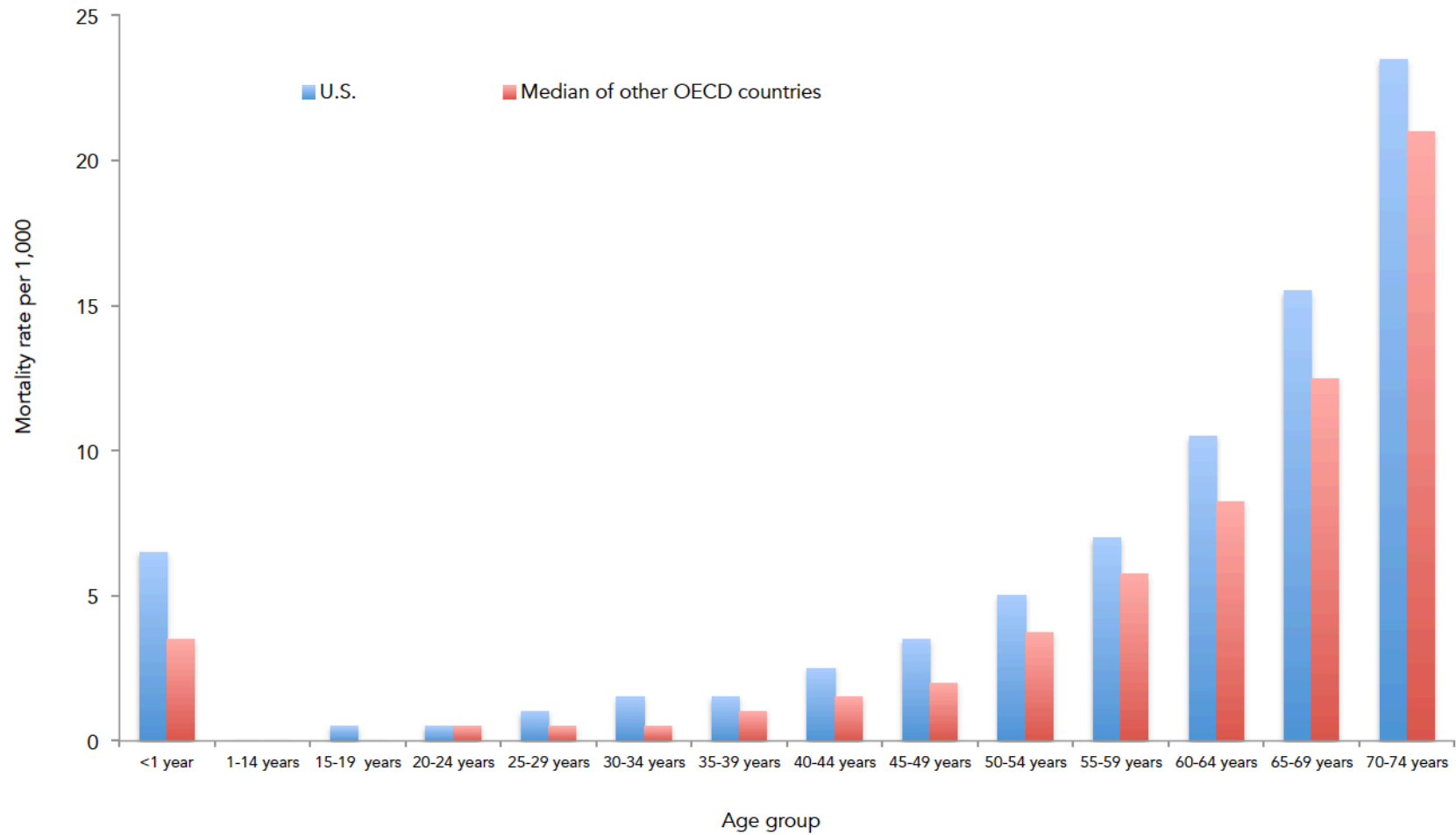


FIGURE 1-6 U.S. female life expectancy at birth relative to 21 other high-income countries, 1980-2006.

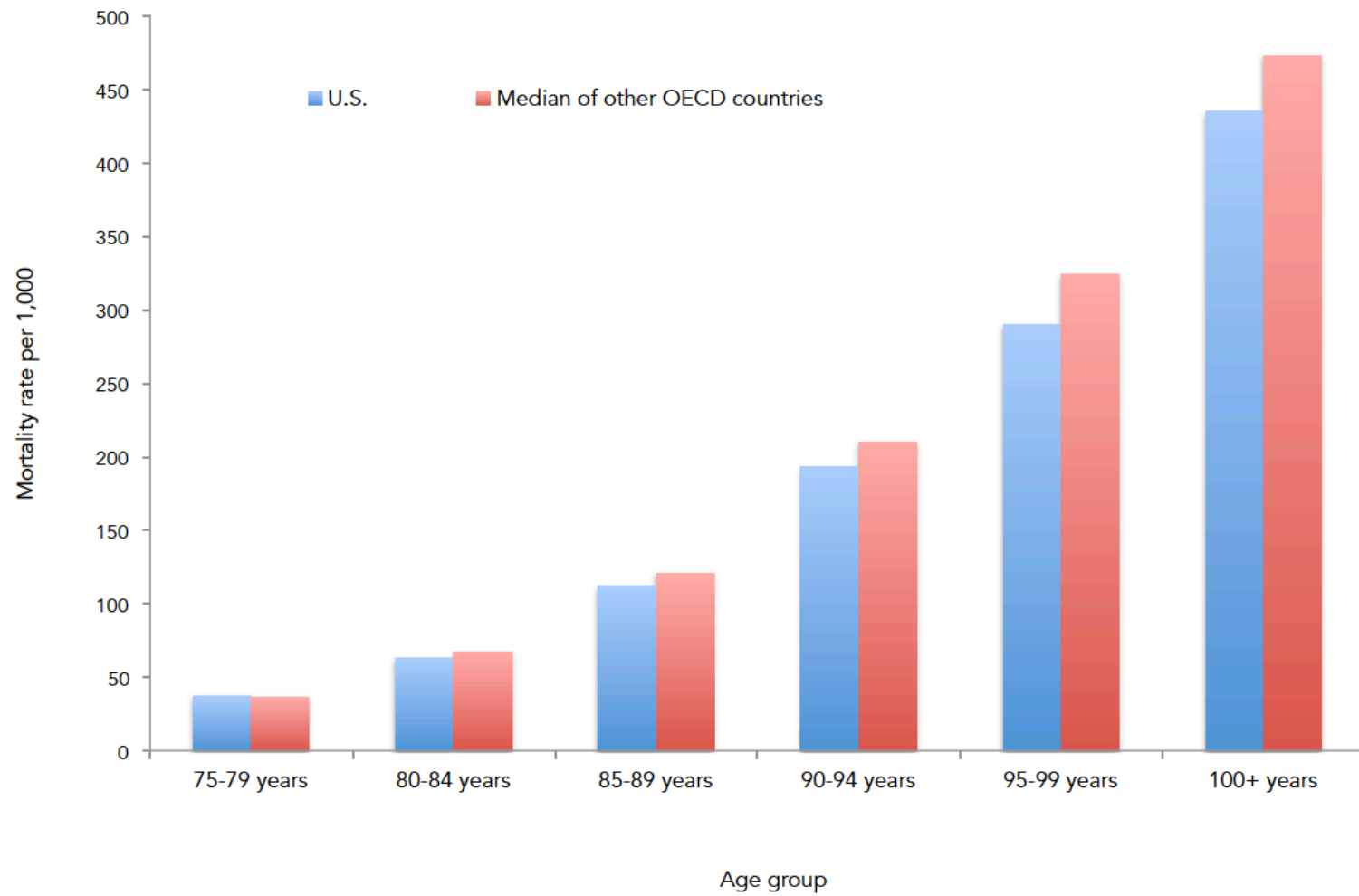
NOTES: Red circles depict newborn life expectancy in the United States. Grey circles depict life expectancy values for Australia, Austria, Belgium, Canada, Denmark, Finland, France, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and West Germany.

SOURCE: National Research Council (2011, Figure 1-4).

U.S. vs. median mortality rates, age 0-75



U.S. vs. median mortality rates, age 75+



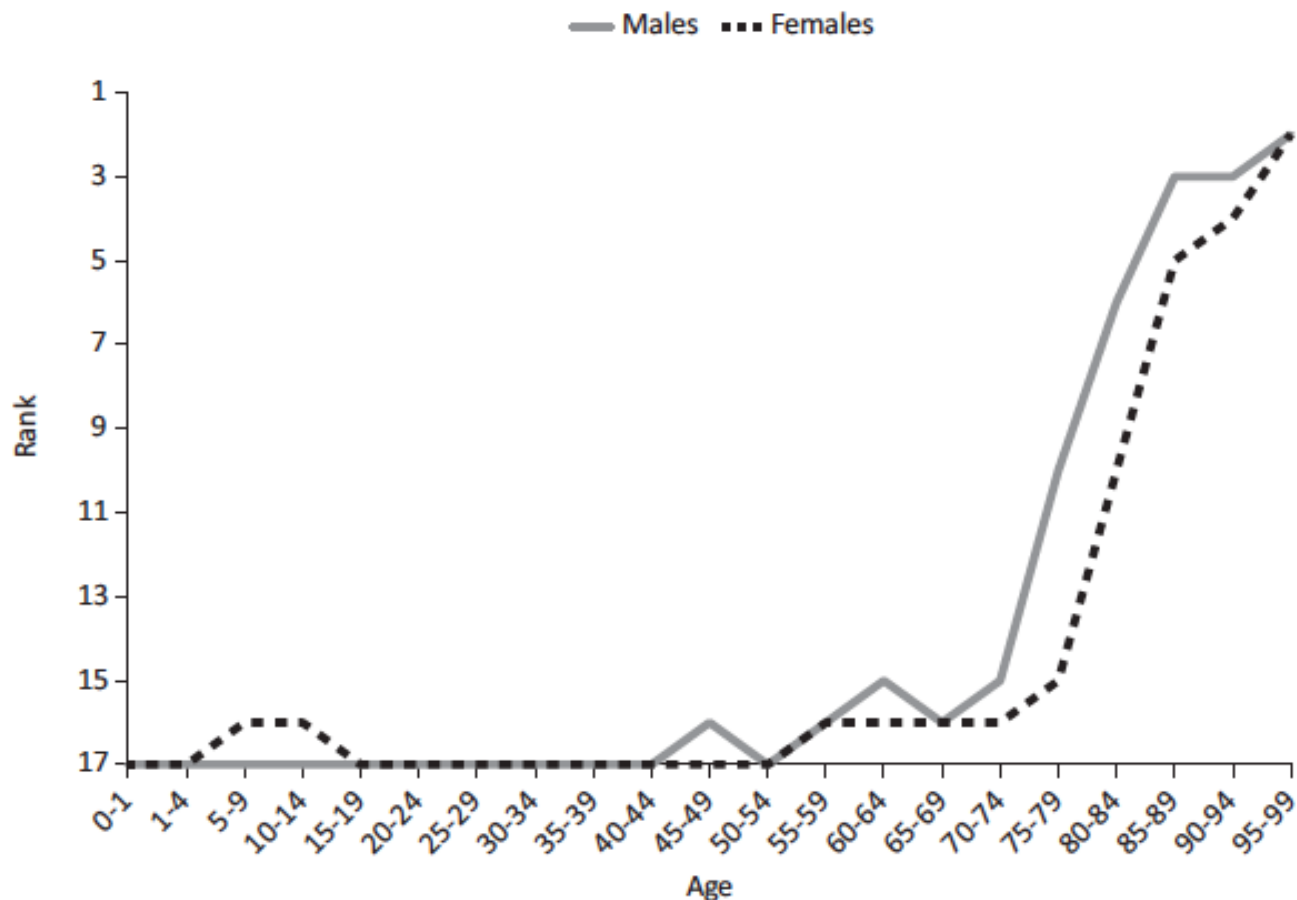
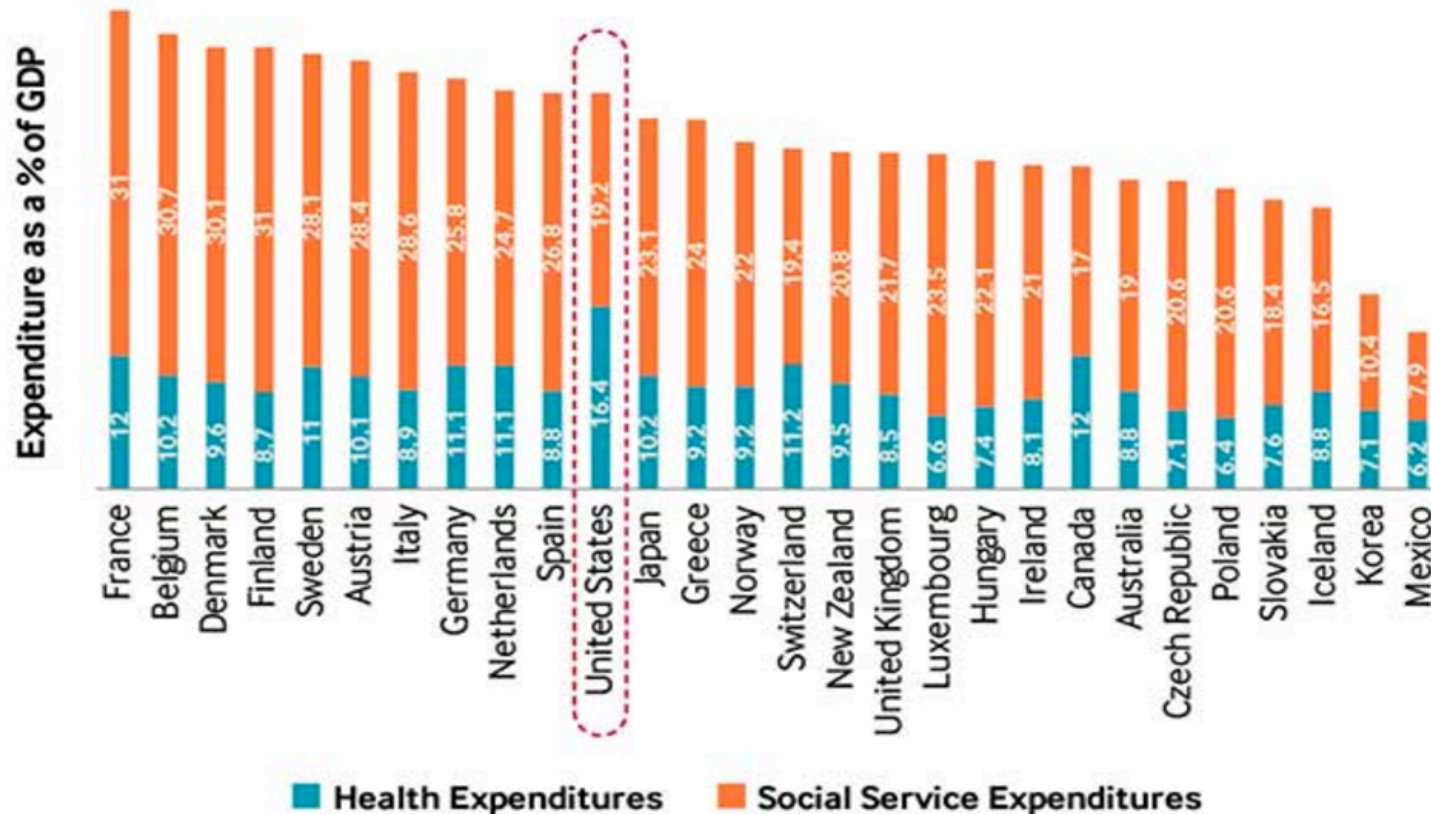


FIGURE 1-9 Ranking of U.S. mortality rates, by age group, among 17 peer countries, 2006-2008.

NOTES: The top rank is number 1, indicating the lowest death rate, and the bottom rank is number 17, indicating the highest death rate. Rankings are based on all-cause mortality rates for 2006-2008. Data for this figure were drawn from (1) the Human Mortality Database, 2011, University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany), available at <http://www.mortality.org> or <http://www.humanmortality.de> (data downloaded July 18, 2011) and (2) Arias, Elizabeth, 2011, United States Life Tables, 2007. *National Vital Statistics Reports*, 59(9), Hyattsville, MD: National Center for Health Statistics.

SOURCE: Adapted from Ho and Preston (2011, Figure 1).

Health Care Compensates for a Lack of Social Services Spending in US



Source: Bradley E, et al. Health and social services expenditures: associations with health outcomes. *BMJ Quality & Safety*. 2011 March 29.

Updated using OECD Health Data 2014; OECD Social Expenditure Dataset 2014.

In Boston, the prevalence of diabetes is also clustered in the same areas where poverty is most prevalent

If you get off at Arlington:
3%

If you get off at Fenway:
2%

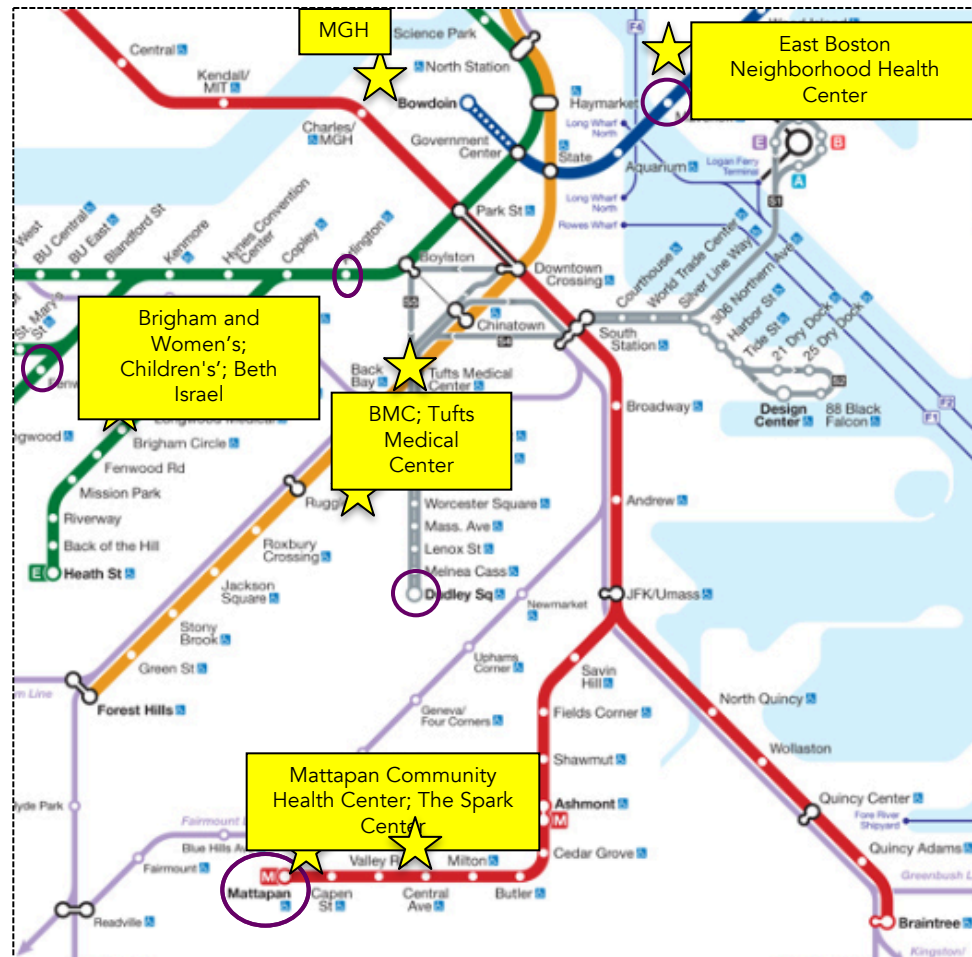


If you get off at Maverick:
11%

If you get off at Dudley Square:
11%

If you get off at Mattapan:
10%

Despite geographic proximity to health services



Prevalence of poverty across Boston

If you get off
at Arlington:
4%

If you get off
at Fenway:
14%

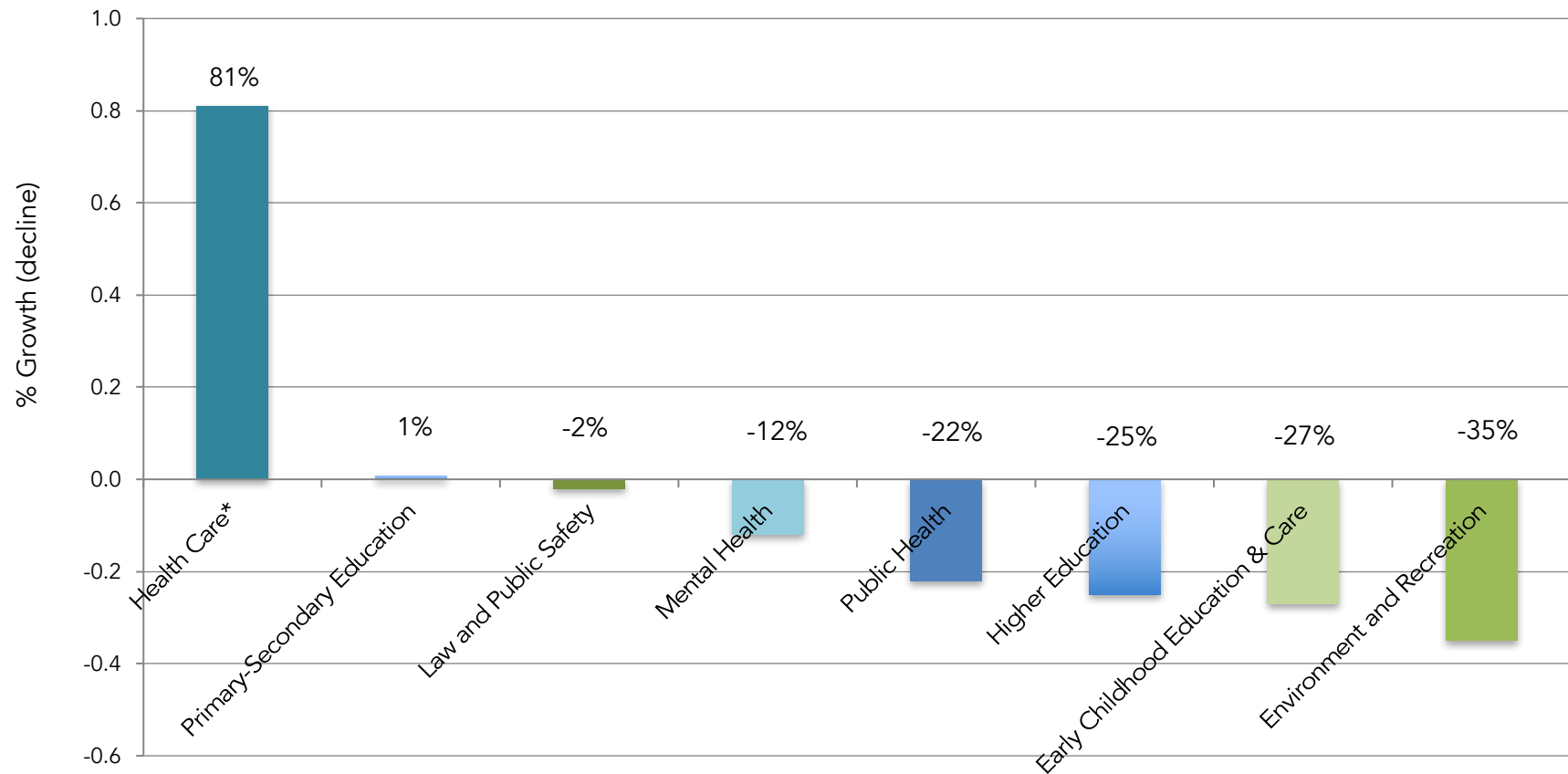


If you get off
at Maverick:
12%

If you get off
at Dudley
Square: 32%

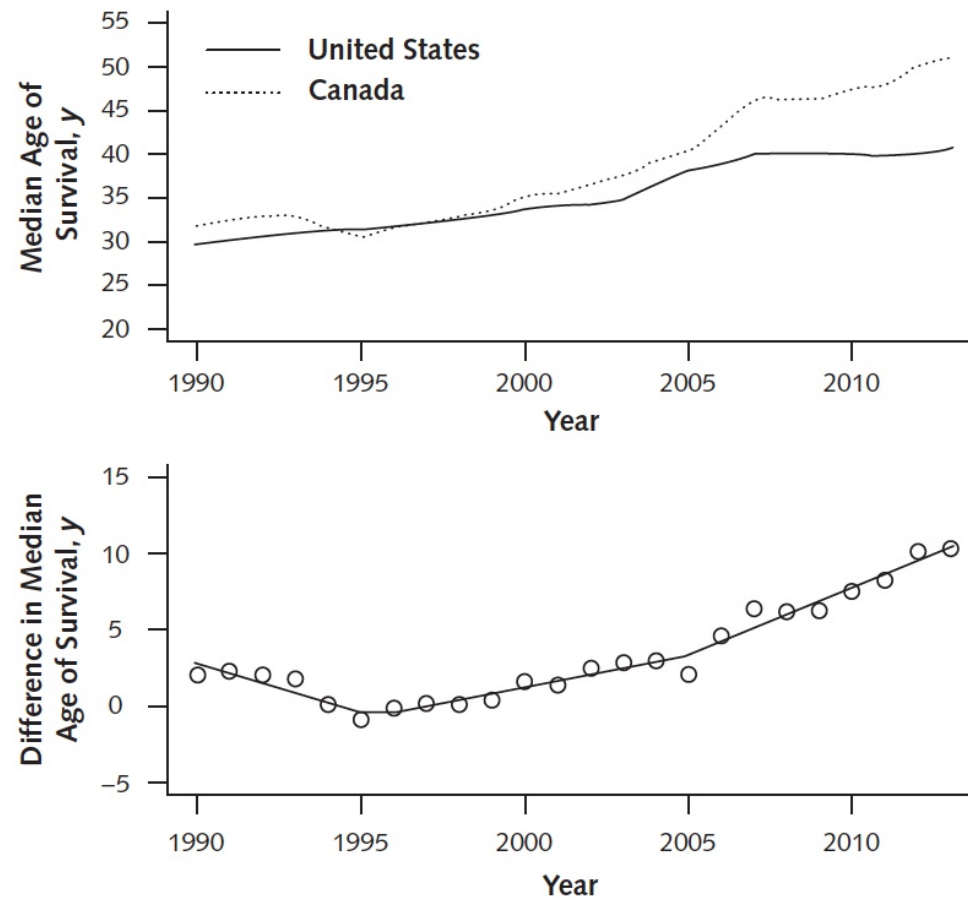
If you get off at
Mattapan: 16%

Change in Massachusetts State Government spending: 2001-14



* Health care expenditure is Group Insurance Commission spending plus MassHealth (Medicaid)

Figure 1. Median age of survival over time.



Top. Median survival age obtained by using a 5-year rolling window, Canada versus the United States, 1990-2013. **Bottom.** Difference in median age of survival between Canada and the United States, 1990-2013. Circles represent the point estimates for the difference.

8. Solutions




In a city of a million residents, 40 percent expansion of transit developments has annual health benefit of \$216 million

<https://www.cdc.gov/policy/hst/hi5/publictransportation/index.html>

<http://www.apta.com/resources/reports-and-publications>

Transportation and Health Benefits. 2010, Victoria Transport Policy

Institute

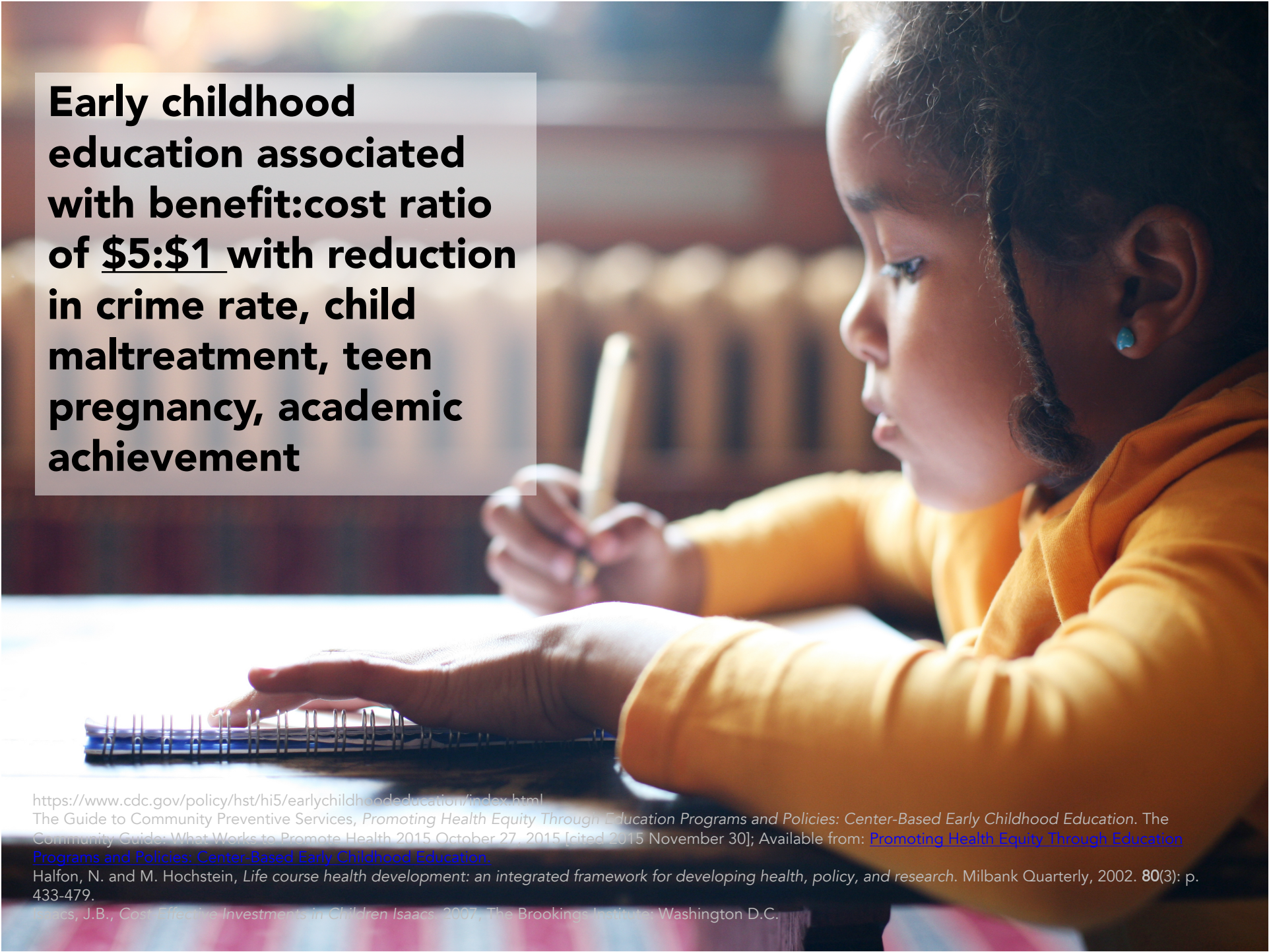


Financial support for habitable homes: After rehabilitating housing 62% of adults have excellent health vs 33% before

<https://www.cdc.gov/policy/hst/hi5/homeimprovement/index.html> ; Breyse J et al. Health Outcomes and Green Renovation of Affordable Housing. [Public Health Rep.](#) 2011; 126(Suppl 1): 64–75. doi: [10.1177/003335491112605110](https://doi.org/10.1177/003335491112605110)
https://www.flickr.com/photos/nodding_pig/15588502703/sizes/l

**Multi-component worksite
obesity prevention: 5%
weight loss results in \$90
average per person saving**

<https://www.cdc.gov/policy/hst/hi5/worksites/index.html> Finkelstein, E.A., et al., The cost of obesity in the workplace, *Journal of Occupational and Environmental Medicine*, 2010, 52(10): p. 971-976.
Trogdon, J., et al., A return-on-investment simulation model of workplace obesity interventions, *Journal of Occupational and Environmental Medicine*, 2009, 51(7): p. 751-758.



Early childhood education associated with benefit:cost ratio of \$5:\$1 with reduction in crime rate, child maltreatment, teen pregnancy, academic achievement

<https://www.cdc.gov/policy/hst/hi5/earlychildhoodeducation/index.html>

The Guide to Community Preventive Services, *Promoting Health Equity Through Education Programs and Policies: Center-Based Early Childhood Education*. The Community Guide: What Works to Promote Health 2015 October 27, 2015 [cited 2015 November 30]; Available from: [Promoting Health Equity Through Education Programs and Policies: Center-Based Early Childhood Education](#).

Halfon, N. and M. Hochstein, *Life course health development: an integrated framework for developing health, policy, and research*. Milbank Quarterly, 2002. 80(3): p. 433-479.

Isaacs, J.B., *Cost Effective Investments in Children* Isaacs, 2007, The Brookings Institute: Washington D.C.

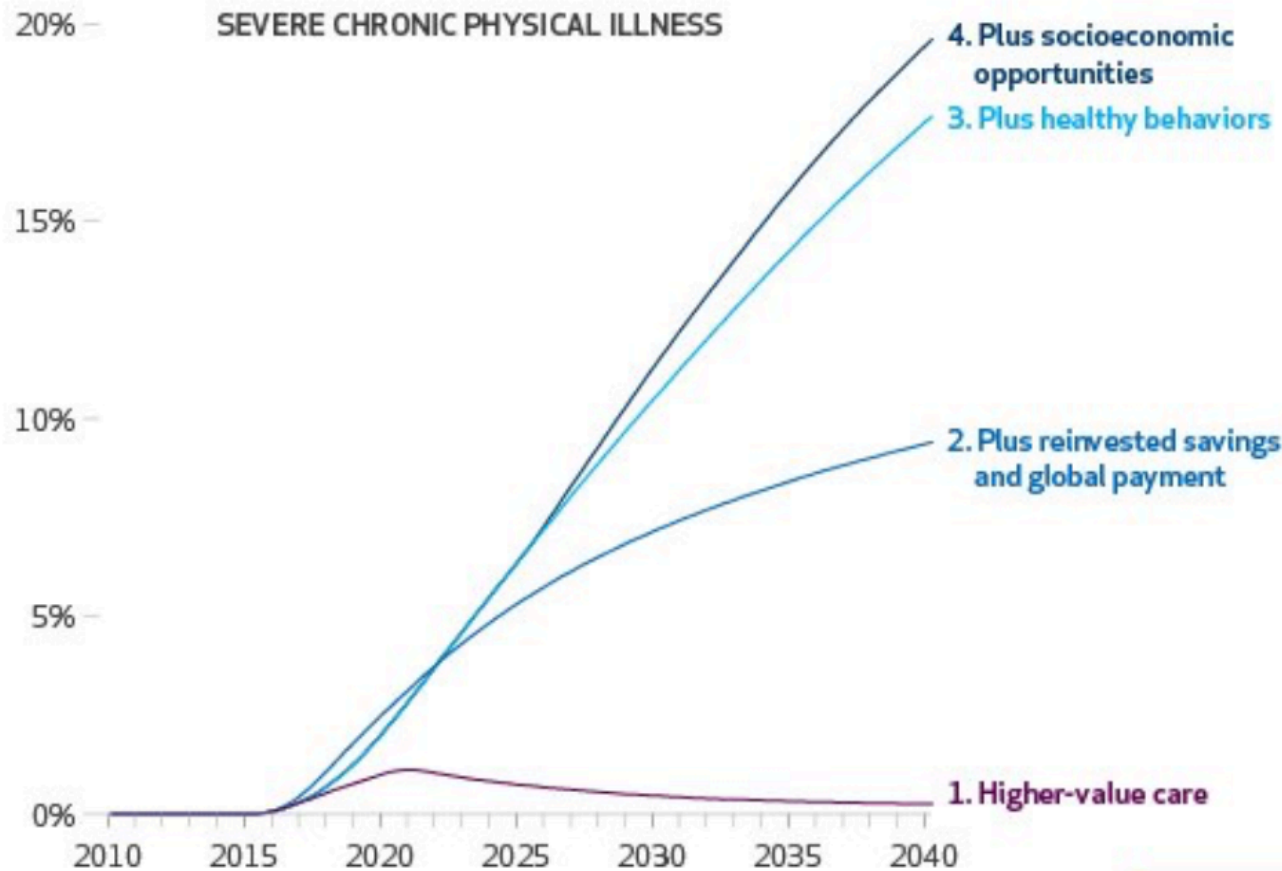
A photograph of a woman with dark hair pulled back, looking directly at the camera with a serious expression. She is holding a young child with dark, curly hair who is looking slightly to the side. They are positioned in front of a weathered wooden wall. The lighting is soft and natural.

Each time the Earned Income Tax Credit increases by 10 percent, infant mortality drops by 23.2 per 100,000

<https://www.cdc.gov/policy/hst/hi5/taxcredits/index.html>

Arno, P.S., et al., *Bringing health and social policy together: The case of the earned income tax credit*. Journal of public health policy, 2009. 30(2): p. 198-207.

Combined intervention improvements in **severe chronic physical illness** in the population, expressed as percentage decreases relative to baseline

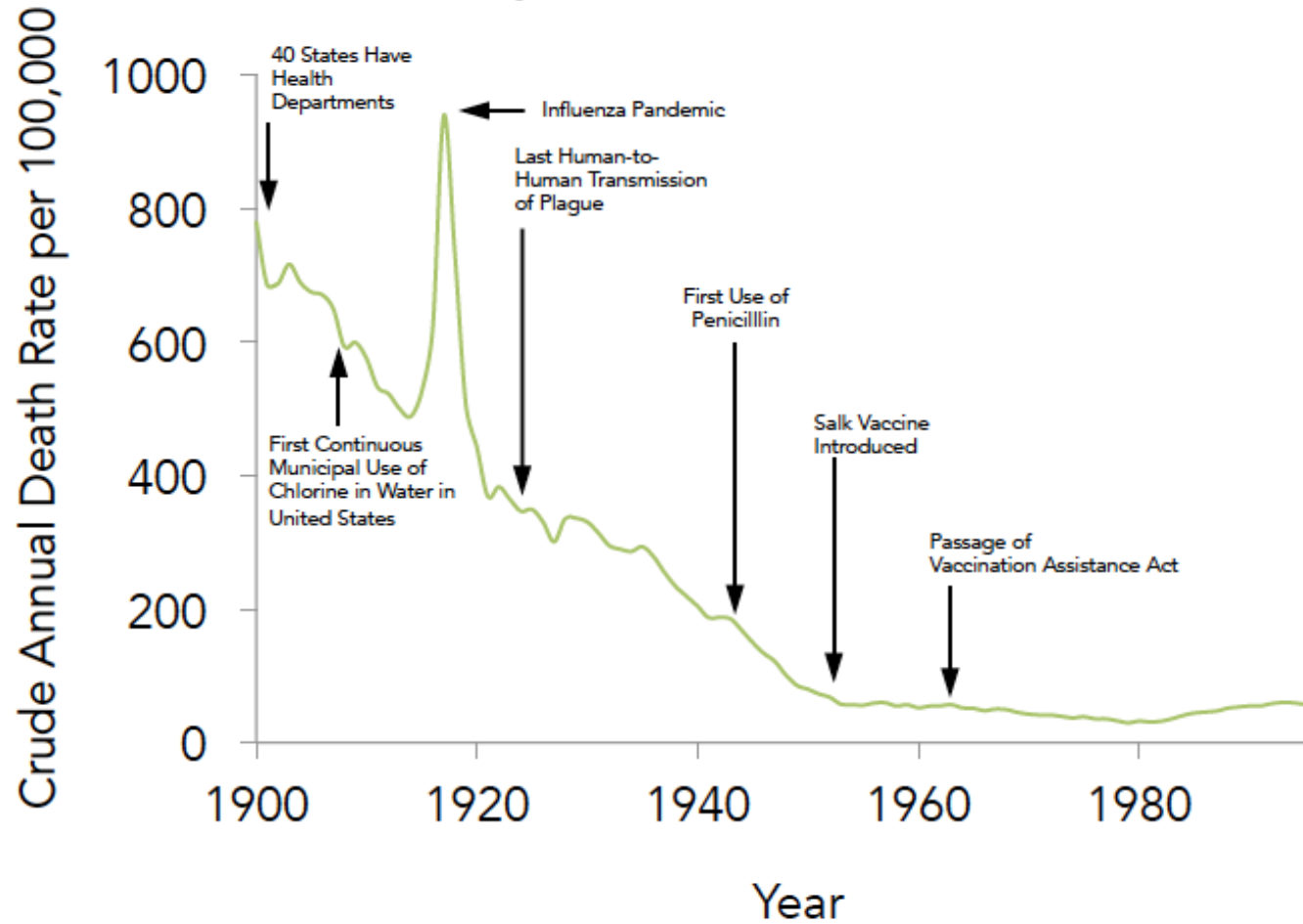


Jack Homer et al. Health Aff 2016;35:1435–1443

©2016 by Project HOPE - The People-to-People Health Foundation, Inc.

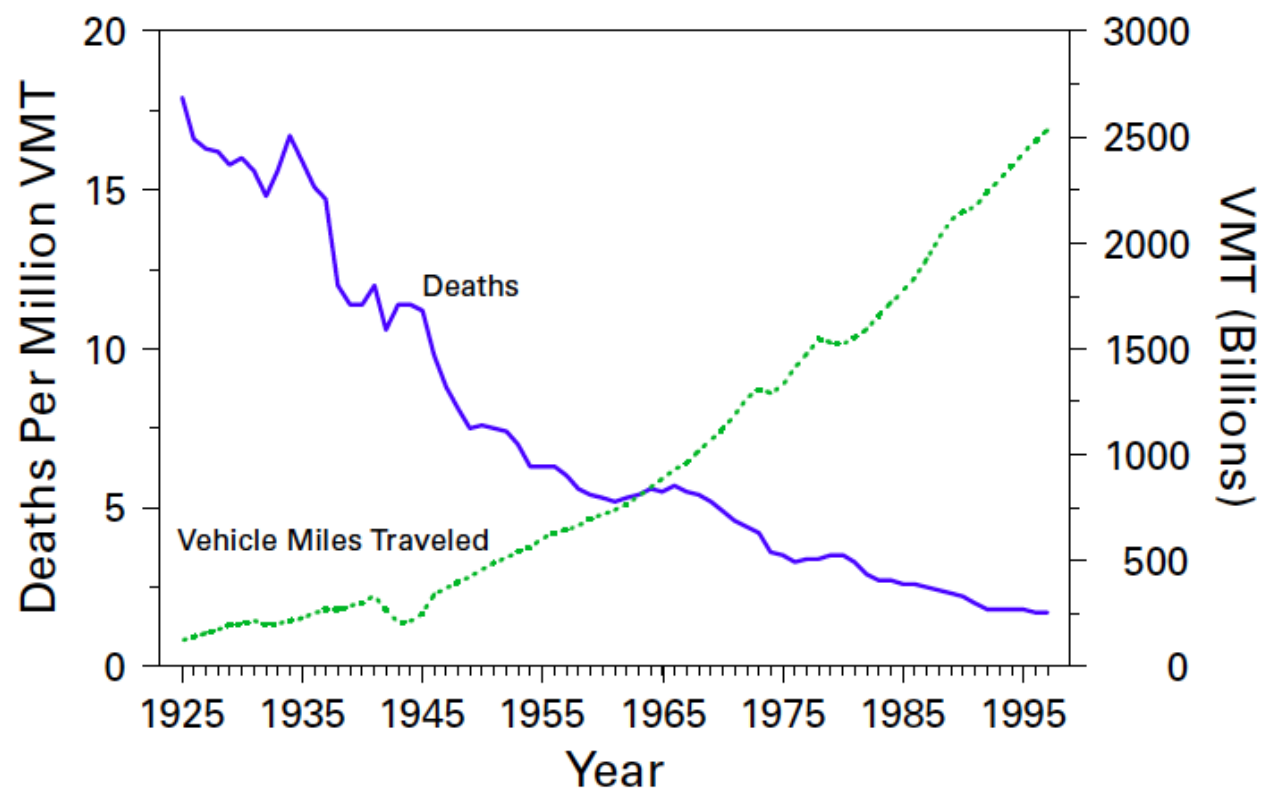
HealthAffairs

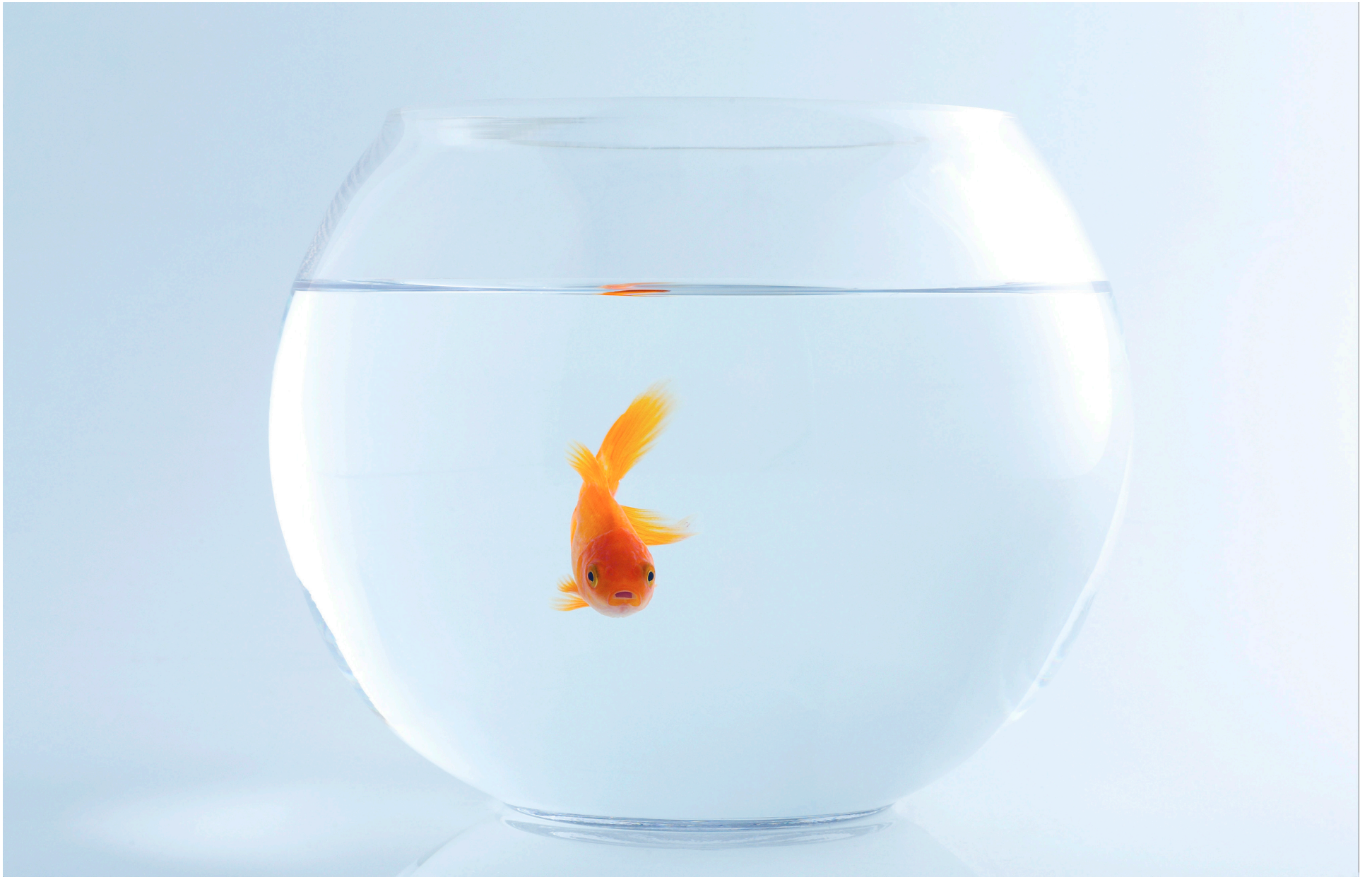
Infectious Disease Mortality in the United States: 20th Century



9. The art of the (im)possible

FIGURE 1. Motor-vehicle-related deaths per million vehicle miles traveled (VMT) and annual VMT, by year — United States, 1925–1997





An aerial photograph of a dense urban landscape, likely New York City, showing a vast number of skyscrapers and buildings. A thick layer of white smoke or fog rises from the city, partially obscuring the lower parts of the buildings and creating a dramatic, hazy atmosphere. The sky is a pale blue-grey.

Healthier

Fifty

Thoughts

on the

Foundations

of

Population

Health

Sandro

Galea

twitter/@sandrogalea

sgalea@bu.edu