The Decline in US Life Expectancy: Are Deaths of Despair Responsible?

Vermont Center on Behavior and Health Conference

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No disclosures to report

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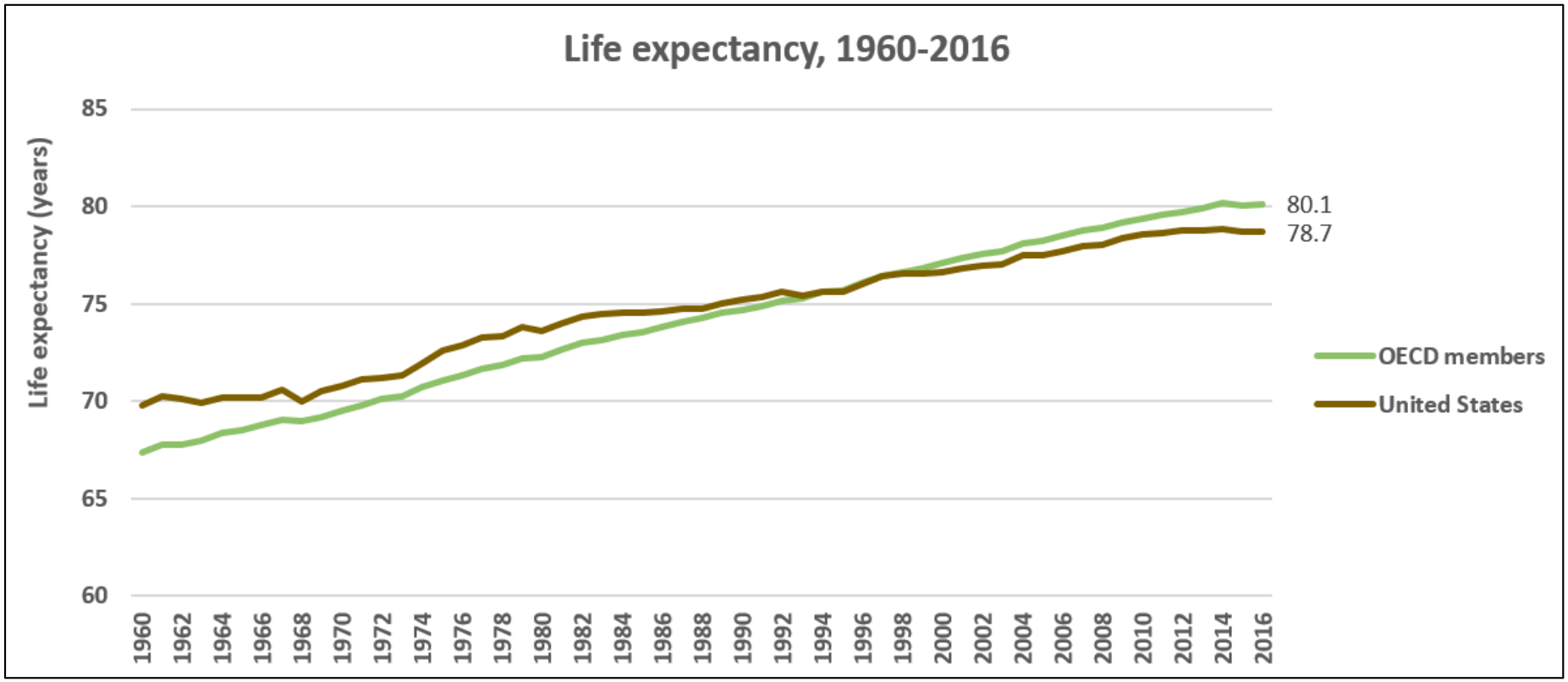
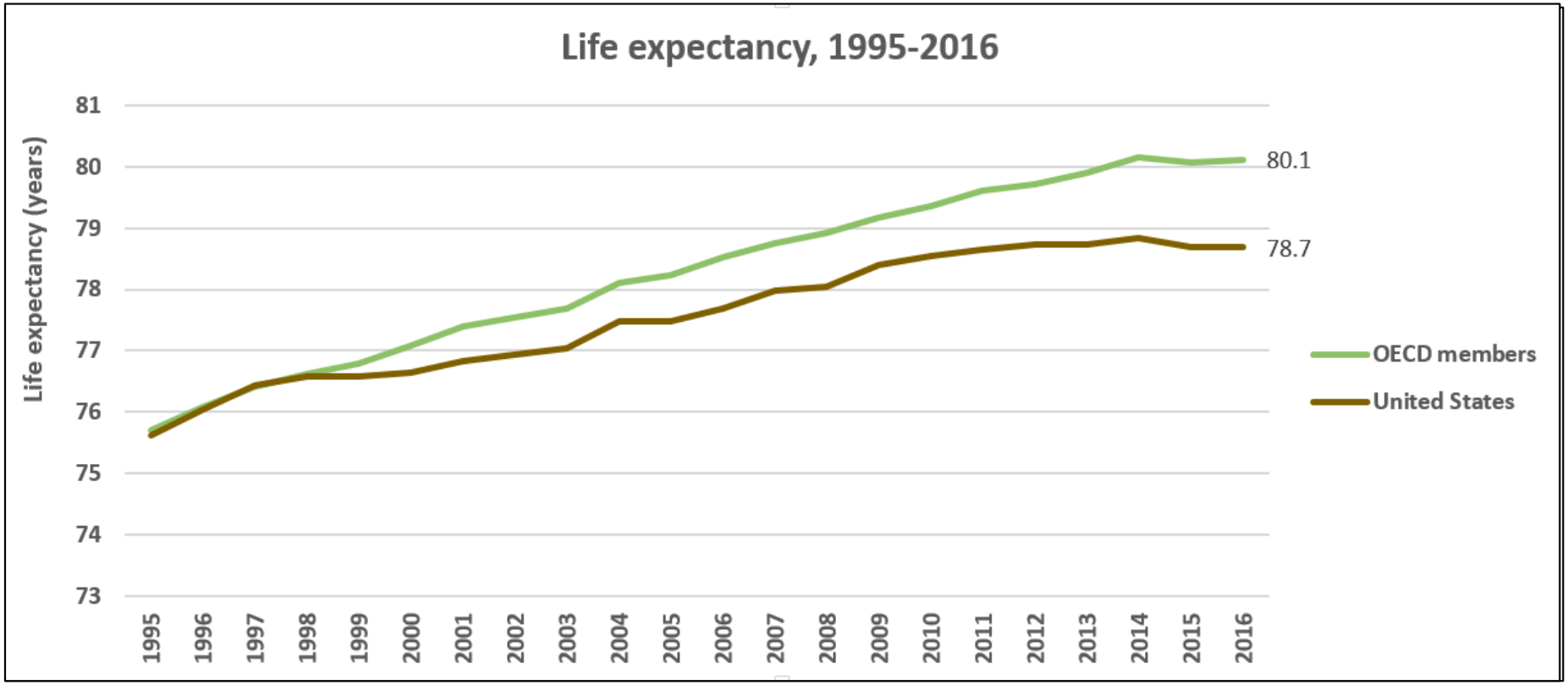
The decline in US health



Source: The World Bank. https://data.worldbank.org/indicator/sp.dyn.le00.in

The decline in US health



Source: The World Bank. https://data.worldbank.org/indicator/sp.dyn.le00.in

U.S. life expectancy increased from 78.6 years to 78.7 years between 2017 and 2018

BuzzFeed News

US Life Expectancy Has Finally Stopped Declining

Life expectancy in the US increased by about a month to 78.7 years in 2018, federal health officials reported on Thursday. The increase ...

1 week ago

CNN International

US life expectancy climbs for the first time in 4 years as drug overdose and cancer deaths decline

Life expectancy in the United States in 2018 was 78.7 years -- an increase of 0.1 year compared with life expectancy of 78.6 years in 2017, the ...

In-Depth · 6 days ago

U.S. News & World Report

U.S. Life Expectancy Rises for First Time in 4 Years

Life expectancy in the United States increased in 2018 for the first time in four years, newly released federal data shows, marking a positive shift ...

1 week ago

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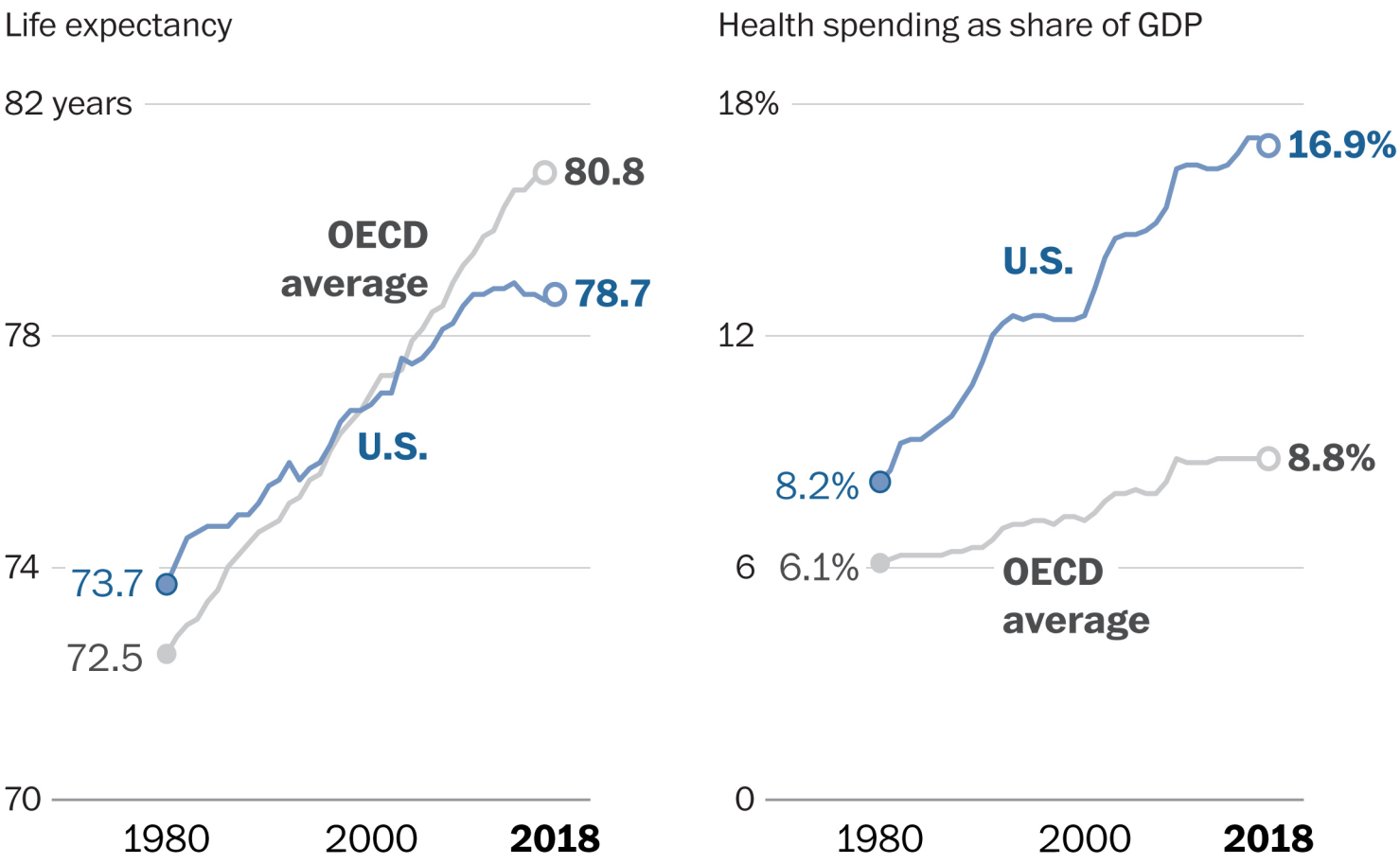
The Washington Post



*OECD average life expectancy through 2017

Source: OECD.Stat, National Center for Health Statistics HARRY STEVENS/THE WASHINGTON POST

Washington Post, January 30, 2020

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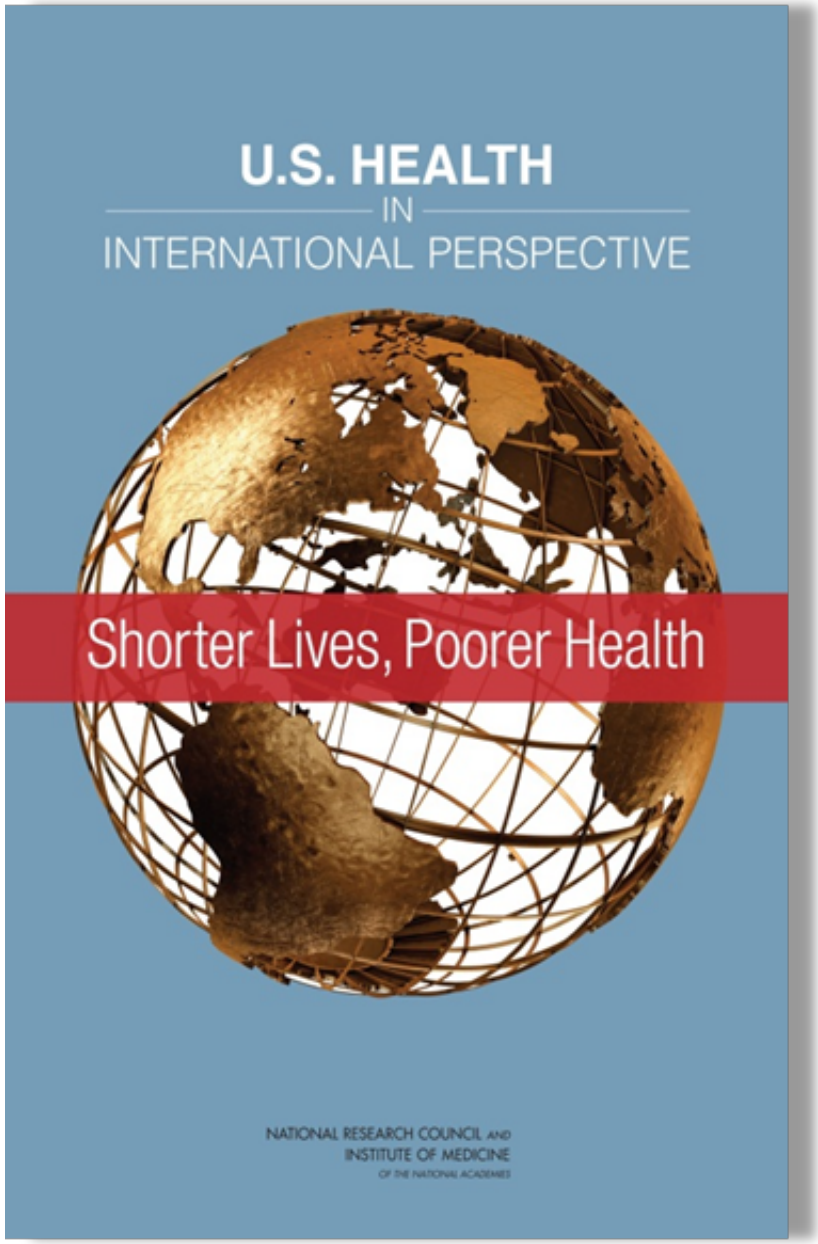

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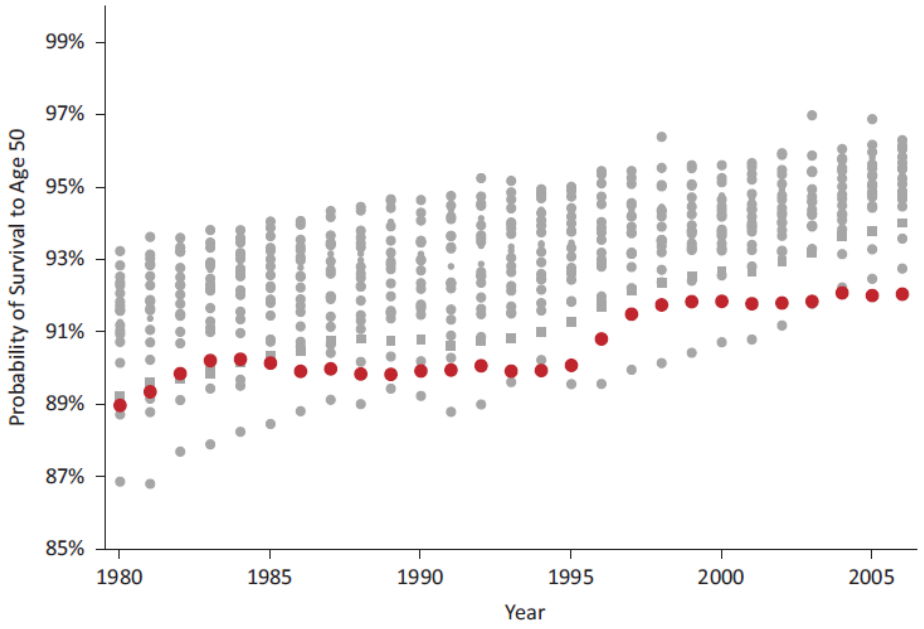
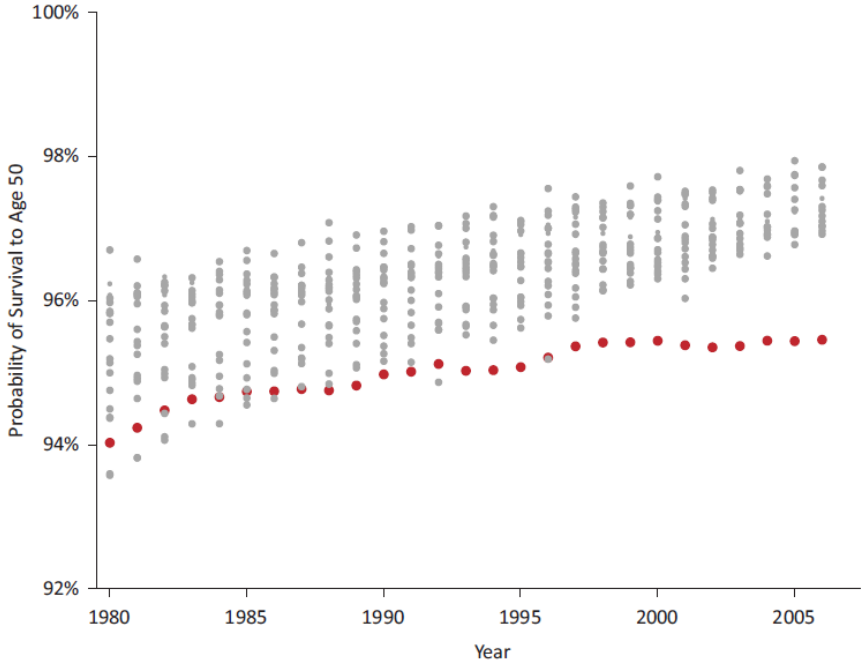
Cause of death	Mortality rate (per 100,000)			
	United States	US Rank	Peer countries (N= 16)	
			Unweighted mean	Range
US death rates above average for peer countries				
Circulatory system	131.8	16	99.5	70.9-139.0
Ischemic heart diseases	57.9	15	37.0	17.1-66.6
Hypertensive diseases	13.5	14	7.6	1.2-16.9
External causes	62.1	17	27.6	18.5-39.3
Accidental poisoning (e.g., drug overdoses)	17.5	17	2.7	0.2-7.2
Suicide	12.5	16	9.2	4.7-14.5
Homicide	6.4	17	0.7	0.2-1.3
Respiratory system	42.6	16	29.4	13.6-51.2
Nervous system	29.0	16	18.3	7.1-49.2
Endocrine, nutritional, and metabolic	21.5	17	11.5	4.9-19.3
Diabetes	14.3	17	8.2	3.2-14.2
Digestive system	19.9	14	15.7	11.2-22.3
Mental and behavioral disorders	17.9	10	15.9	2.3-26.8
Infectious and parasitic diseases	12.9	17	6.5	1.9-10.0
Genitourinary system	11.1	17	6.0	1.7-9.1
Congenital malformations	3.7	15	2.8	2.1-4.0
Musculoskeletal diseases	2.4	10	2.2	1.4-2.9
Blood and immune mechanism	2.0	17	1.3	0.7-1.9
Skin and subcutaneous tissue	0.8	14	0.6	0.2-1.3
Pregnancy and childbirth	0.8	17	0.1	0.0-0.2
US death rates at or below average for peer countries				
Cancer	109.8	5	114.8	100.7-133.1
Cerebrovascular diseases	21.4	9	22.2	15.0-38.1
Symptoms, signs, and abnormal findings	6.7	4	14.4	4.2-31.2
Eye and adnexa	0.0	15	0.0	0.0-0.1
Ear and mastoid	0.0	14	0.0	0.0-0.1

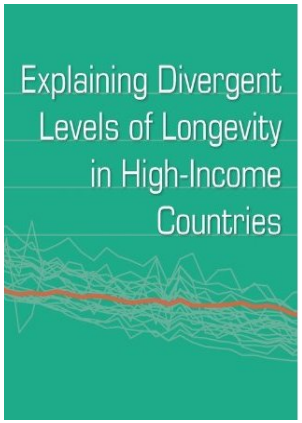
Probability of survival to age 50 in 21 high-income countries, 1980-2006

Males



Females





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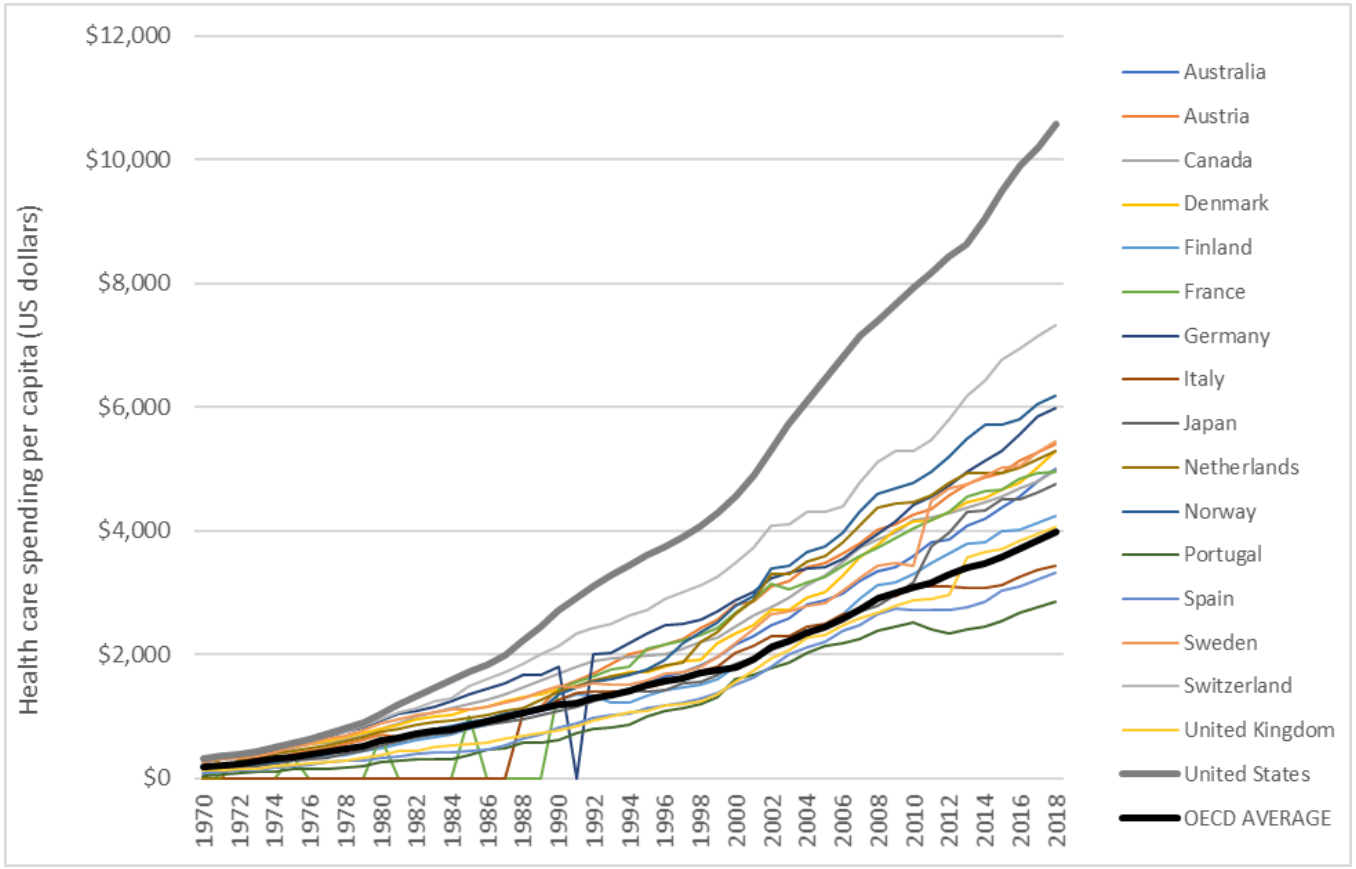
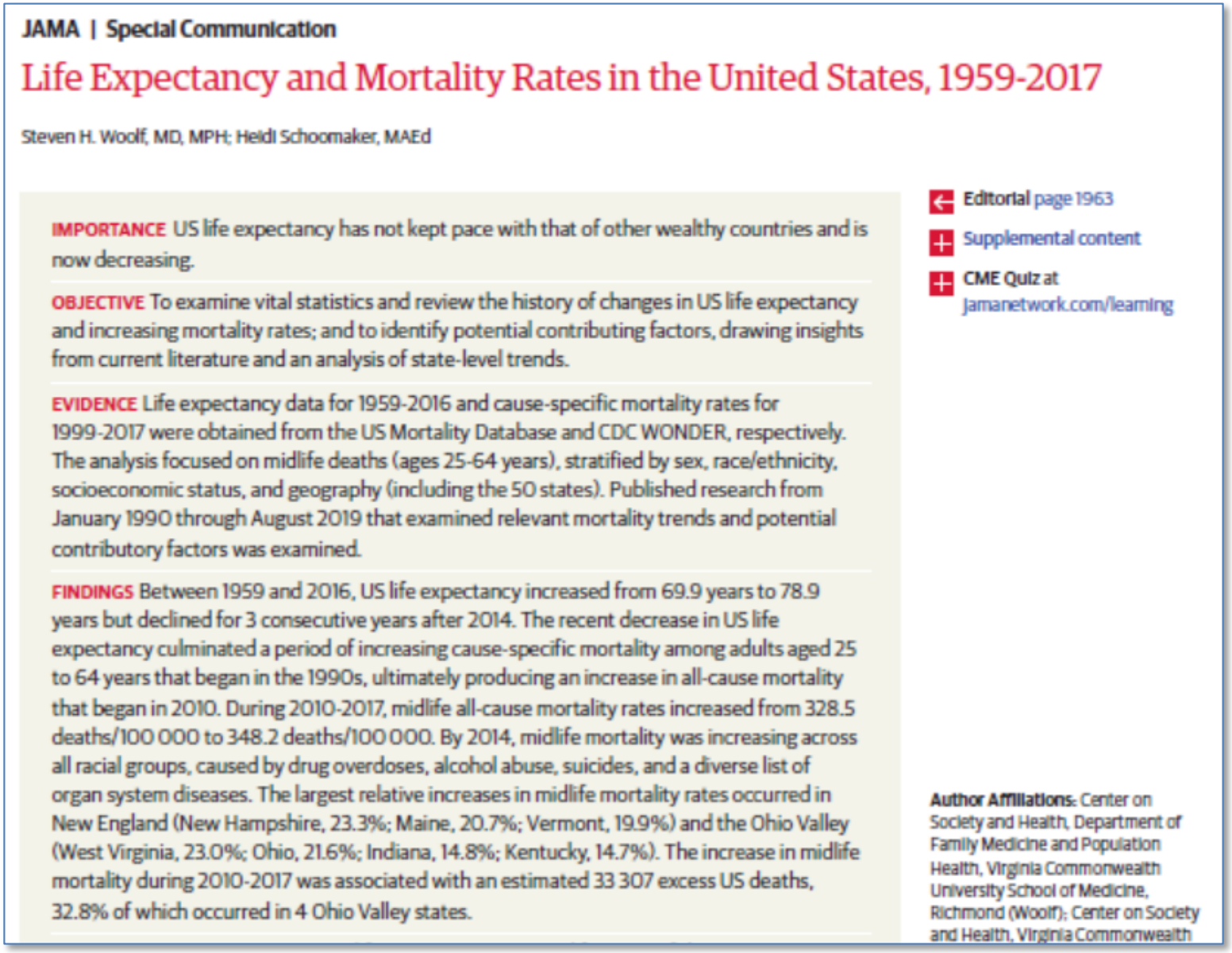
Health care spending (per capita) among 17 peer countries and OECD, 1970-2018



Source: OECD Health Statistics 2019. Frequently requested data (updated 7-2-19). Accessed 7-29-19 at http://www.oecd.org/els/health-systems/health-data.htm



JAMA | Special Communication

Life Expectancy and Mortality Rates in the United States, 1959-2017

Steven H. Woolf, MD, MPH; Heidi Schoomaker, MAEd

IMPORTANCE US life expectancy has not kept pace with that of other wealthy countries and is now decreasing.

OBJECTIVE To examine vital statistics and review the history of changes in US life expectancy and increasing mortality rates; and to identify potential contributing factors, drawing insights from current literature and an analysis of state-level trends.

EVIDENCE Life expectancy data for 1959-2016 and cause-specific mortality rates for 1999-2017 were obtained from the US Mortality Database and CDC WONDER, respectively. The analysis focused on midlife deaths (ages 25-64 years), stratified by sex, race/ethnicity, socioeconomic status, and geography (including the 50 states). Published research from January 1990 through August 2019 that examined relevant mortality trends and potential contributory factors was examined.

FINDINGS Between 1959 and 2016, US life expectancy increased from 69.9 years to 78.9 years but declined for 3 consecutive years after 2014. The recent decrease in US life expectancy culminated a period of increasing cause-specific mortality among adults aged 25 to 64 years that began in the 1990s, ultimately producing an increase in all-cause mortality that began in 2010. During 2010-2017, midlife all-cause mortality rates increased from 328.5 deaths/100 000 to 348.2 deaths/100 000. By 2014, midlife mortality was increasing across all racial groups, caused by drug overdoses, alcohol abuse, suicides, and a diverse list of organ system diseases. The largest relative increases in midlife mortality rates occurred in New England (New Hampshire, 23.3%; Maine, 20.7%; Vermont, 19.9%) and the Ohio Valley (West Virginia, 23.0%; Ohio, 21.6%; Indiana, 14.8%; Kentucky, 14.7%). The increase in midlife mortality during 2010-2017 was associated with an estimated 33 307 excess US deaths, 32.8% of which occurred in 4 Ohio Valley states.

Editorial page 1963

Supplemental content

CME Quiz at Jamanetwork.com/learning

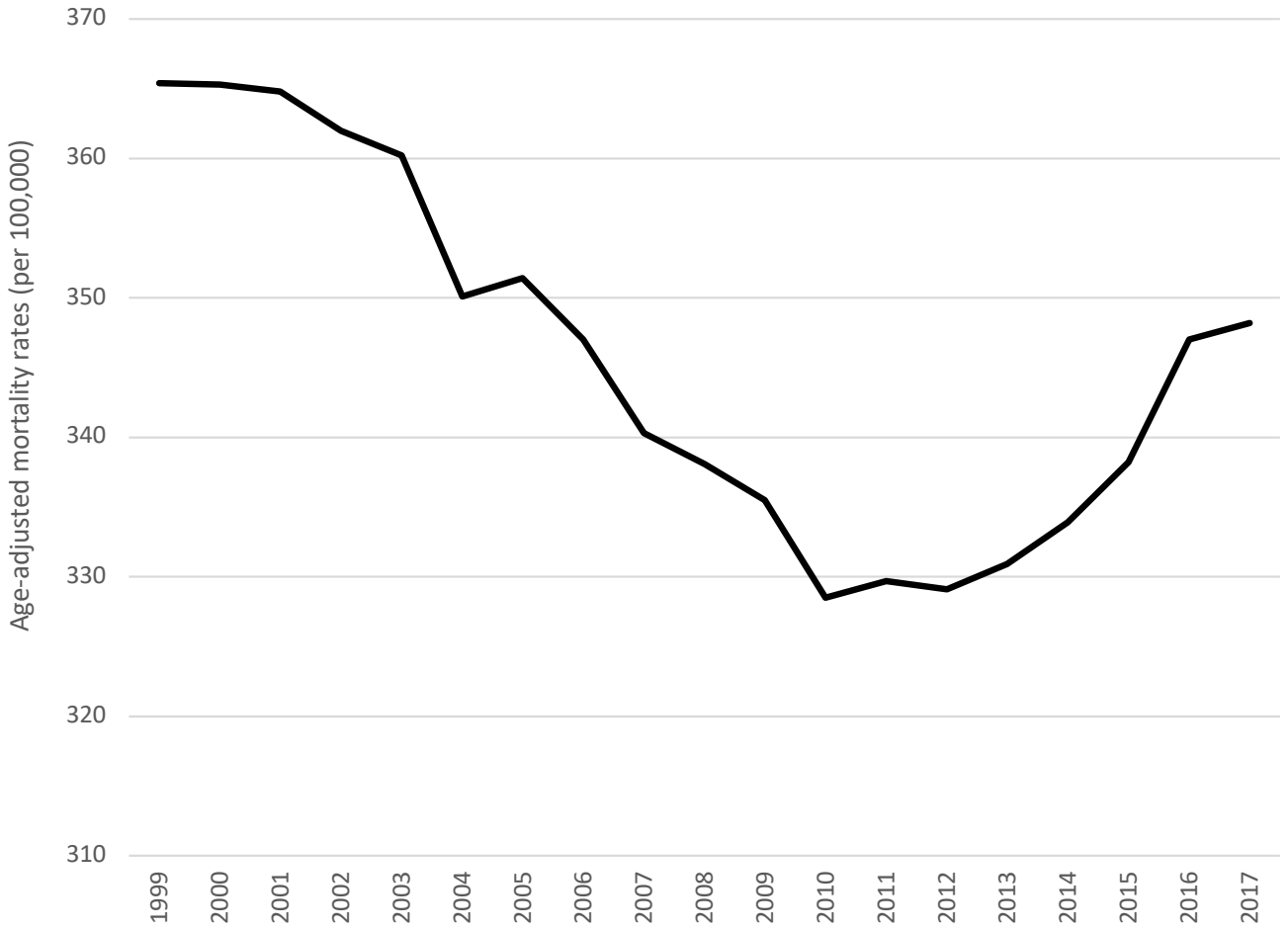
Author Affiliations: Center on Society and Health, Department of Family Medicine and Population Health, Virginia Commonwealth University School of Medicine, Richmond (Woolf); Center on Society and Health, Virginia Commonwealth

Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

Methods

- Data sources
  - Life expectancy: US Mortality Database, 1959-2016
  - Mortality: CDC WONDER, 1999-2017
    - Detailed analysis of cause-specific mortality rates
- Life expectancy and mortality data stratified by sex, across five racial/ethnic groups, and by geography (nine census divisions and 50 states)
- Changes in life expectancy and mortality assessed for statistical significance by NCI Joinpoint Regression Program
- Excess deaths calculated for 2010-2017: deaths attributable to year-to-year changes in mortality

Midlife mortality (ages 25-64 years), United States, 1999-2017



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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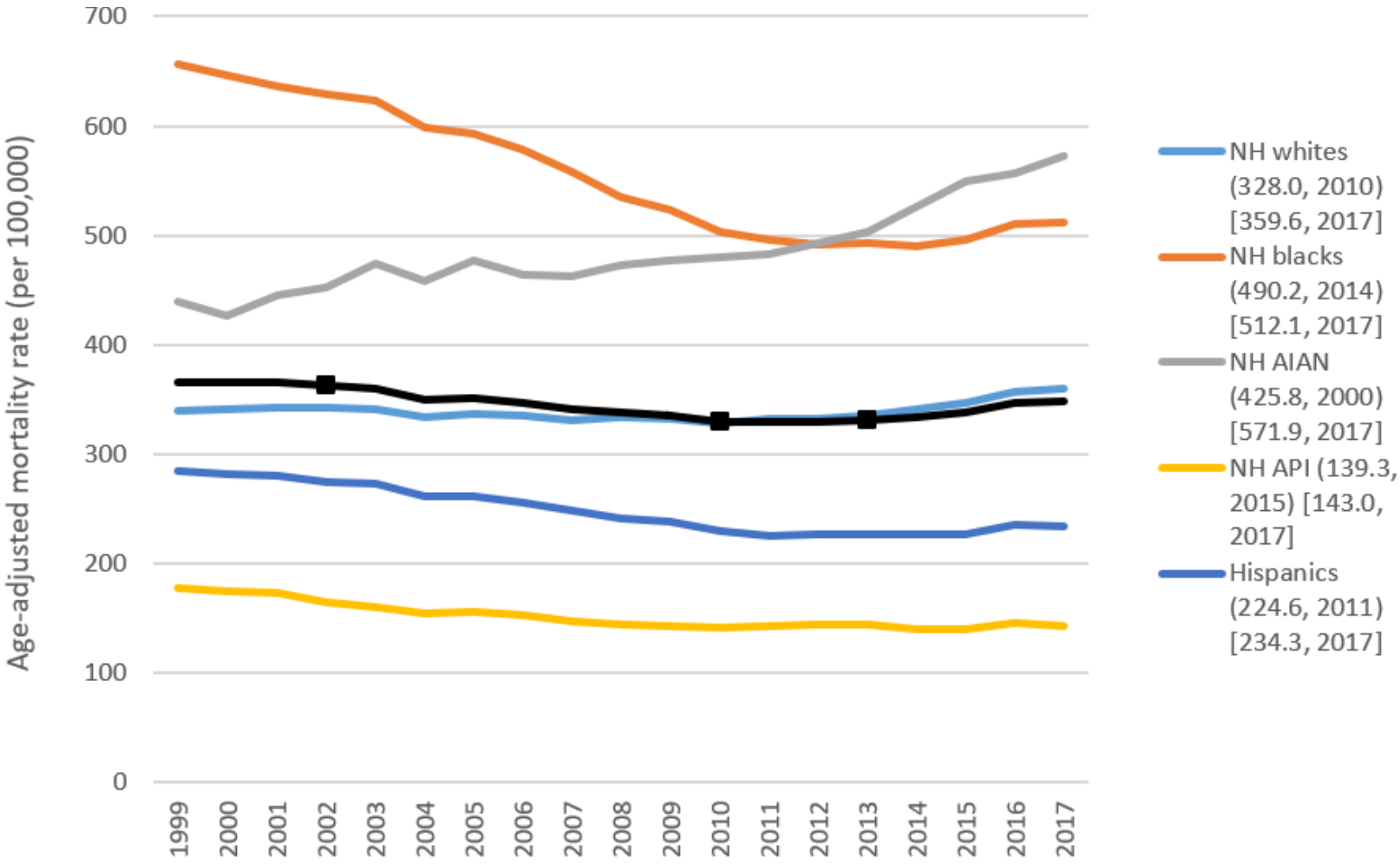
All-cause mortality rates, US adults ages 25-64 years, by race-ethnicity, 1999-2017



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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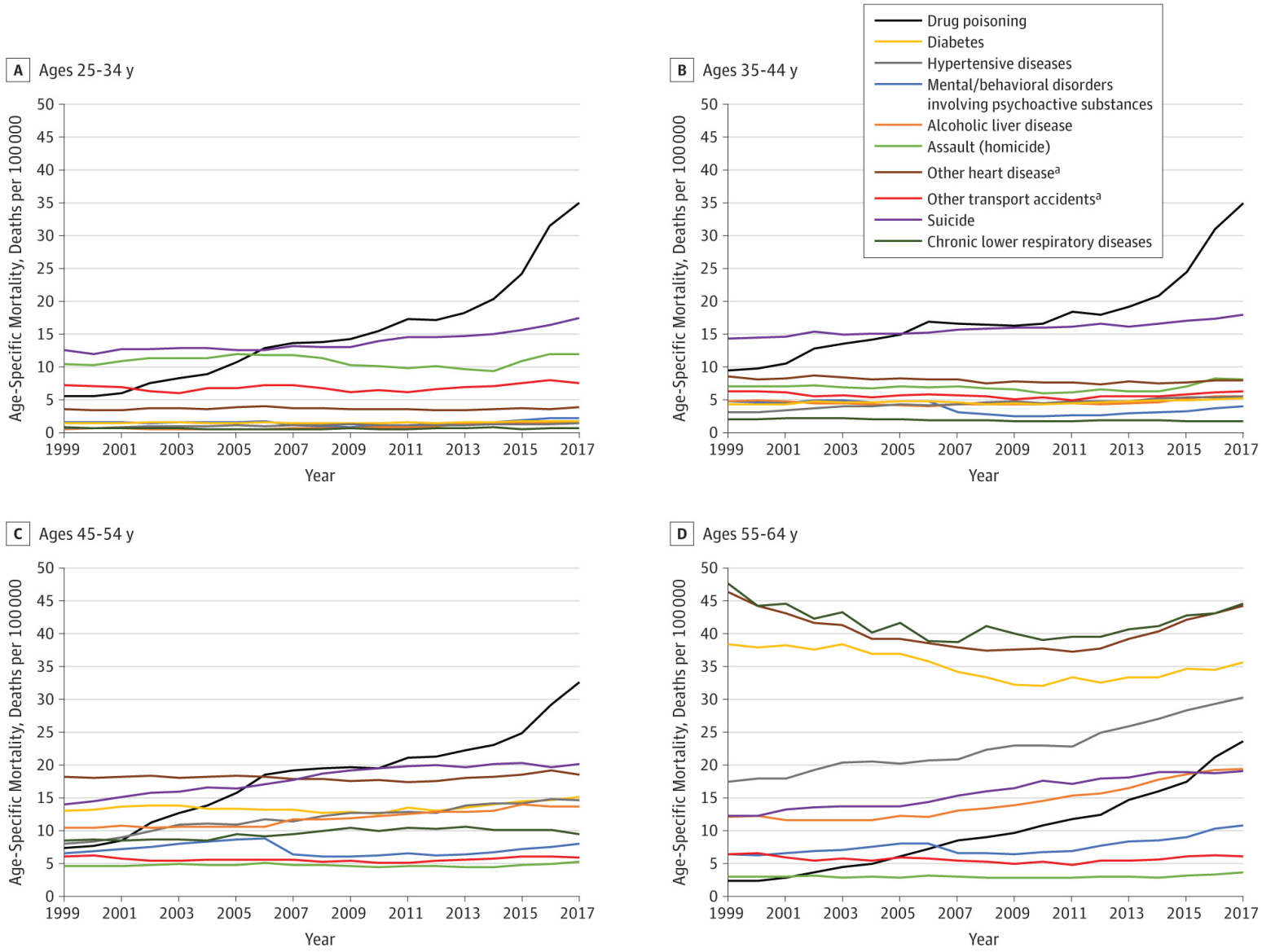
Specific causes of increasing midlife mortality, by age group



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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Changes in age-specific mortality, 1999-2017

CAUSE OF DEATH (IDC-10 CODES[2])	CHANGE MEASURES	CHANGE IN MORTALITY BETWEEN 1999 AND 2017, BY AGE (YRS)											CHANGE IN MORTALITY BETWEEN 2010 AND 2017, BY AGE (YRS)										
		<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	<1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Endocrine/nutritional/metabolic diseases *(E00-E88)*	Absolute increase (per 100,000)	-2.2	-0.1	0.0	0.0	1.0	2.2	5.0	3.8	-10.7	-22.6	-48.6	-0.1	0.0	0.0	0.1	0.5	1.5	3.9	6.8	10.5	11.8	32.1
	Relative increase (%)	*-31.7*	*-14.8*	*-8.0*	*-3.2*	*38.0*	*34.1*	*29.0*	*8.1*	*-9.7*	*-9.9*	*-9.2*	*-1.5*	*3.1*	*-0.1*	*8.7*	*16.6*	*20.3*	*21.6*	*15.6*	*11.8*	*6.0*	*7.1*
Diabetes mellitus *(E10-E14)*	Absolute increase (per 100,000)	UR	UR	0.0	0.2	0.4	0.9	2.2	-2.8	-19.9	-37.2	-54.8	UR	UR	0.0	0.2	0.3	0.8	2.7	3.5	4.3	-3.3	-23.1
	Relative increase (%)	*UR*	*UR*	*5.6*	*48.1*	*25.3*	*20.3*	*16.8*	*-7.2*	*-21.7*	*-20.9*	*-17.3*	*UR*	*UR*	*30.6*	*51.6*	*23.0*	*19.0*	*21.3*	*10.9*	*6.3*	*-2.3*	*-8.1*
Obesity and other hyperalimentation *(E65-E68)*	Absolute increase (per 100,000)	UR	UR	UR	0.0	0.5	1.1	1.8	2.9	3.5	3.1	2.2	UR	UR	UR	0.0	0.1	0.4	0.7	0.8	1.3	1.4	1.3
	Relative increase (%)	*UR*	*UR*	*UR*	*9.7*	*105.4*	*106.4*	*106.4*	*136.7*	*149.7*	*144.9*	*156.9*	*UR*	*UR*	*UR*	*-7.6*	*17.4*	*24.8*	*24.6*	*20.0*	*28.6*	*37.5*	*54.2*
Metabolic disorders *(E70-E88)*	Absolute increase (per 100,000)	-1.6	-0.1	-0.1	-0.2	0.1	0.2	0.9	3.0	4.8	11.0	-2.7	-0.2	0.1	0.0	-0.1	0.0	0.2	0.5	1.9	3.2	8.0	12.6
	Relative increase (%)	*-29.0*	*-12.3*	*-18.2*	*-29.8*	*19.6*	*26.4*	*52.5*	*64.4*	*39.5*	*33.1*	*-2.1*	*-5.3*	*10.0*	*-10.1*	*-14.7*	*3.1*	*19.3*	*19.9*	*31.6*	*23.1*	*22.1*	*11.0*
Mental and behavioral disorders *(F01-F99)*	Absolute increase (per 100,000)	UR	UR	UR	-0.1	0.7	-0.8	1.7	6.7	17.7	118.2	772.6	UR	UR	UR	0.1	1.2	1.4	1.7	3.9	1.7	-27.5	-78.0
	Relative increase (%)	*UR*	*UR*	*UR*	*-9.8*	*39.0*	*-15.1*	*23.3*	*84.0*	*110.7*	*145.3*	*149.9*	*UR*	*UR*	*UR*	*25.4*	*82.4*	*47.2*	*23.7*	*35.3*	*5.3*	*-12.1*	*-5.7*
Organic mental disorders (e.g., vascular dementia) *(F01-F09)*	Absolute increase (per 100,000)	UR	UR	UR	UR	UR	UR	0.2	2.0	15.4	120.6	783.9	UR	UR	UR	UR	UR	UR	-0.1	-0.4	-1.3	-28.0	-76.2
	Relative increase (%)	*UR*	*UR*	*UR*	*UR*	*UR*	*UR*	*127.5*	*190.9*	*169.2*	*169.2*	*159.3*	*UR*	*UR*	*UR*	*UR*	*UR*	*UR*	*-29.0*	*-12.8*	*-5.2*	*-12.7*	*-5.6*
Mental/behavioral disorders due to psychoactive substance use *(F10-F19)*	Absolute increase (per 100,000)	UR	UR	UR	-0.1	0.7	-0.7	1.4	4.4	2.1	-0.6	-0.2	UR	UR	UR	0.1	1.2	1.4	1.9	4.1	2.6	0.8	0.2
	Relative increase (%)	*UR*	*UR*	*UR*	*-13.7*	*46.9*	*-15.1*	*21.5*	*68.4*	*38.2*	*-11.7*	*-5.7*	*UR*	*UR*	*UR*	*45.2*	*100.1*	*56.4*	*30.3*	*61.1*	*54.2*	*21.1*	*7.1*
Diseases of the nervous system *(G00-G98)*	Absolute increase (per 100,000)	-5.2	-1.0	-0.2	0.0	0.9	0.8	2.1	8.6	25.2	172.2	931.4	-2.4	-0.2	0.1	0.0	0.5	0.4	0.8	4.6	16.7	88.7	480.7
	Relative increase (%)	*-44.9*	*-44.2*	*-12.4*	*0.3*	*45.5*	*19.9*	*25.0*	*48.3*	*44.1*	*73.5*	*117.8*	*-26.9*	*-16.0*	*6.7*	*-2.0*	*18.7*	*9.9*	*8.7*	*20.7*	*25.5*	*27.9*	*38.7*
Inflammatory diseases and systemic atrophies *(G00-G14)*	Absolute increase (per 100,000)	-3.8	-0.4	-0.1	-0.1	0.1	-0.1	0.2	1.0	-1.2	-0.6	-0.8	-1.6	-0.2	0.0	0.0	0.1	-0.1	-0.1	0.2	-1.3	-1.7	-1.2
	Relative increase (%)	*-62.8*	*-64.0*	*-31.7*	*-32.2*	*17.7*	*-6.5*	*7.6*	*20.5*	*-10.7*	*-4.1*	*-7.0*	*-42.0*	*-44.6*	*-3.6*	*-21.8*	*27.4*	*-11.1*	*-3.0*	*3.1*	*-11.3*	*-10.4*	*-10.1*
Other degenerative diseases (e.g., Alzheimer's) *(G30-G31)*	Absolute increase (per 100,000)	-0.8	UR	0.0	UR	UR	0.0	0.1	2.2	14.3	129.1	833.8	-1.2	UR	UR	UR	UR	0.0	0.0	1.7	9.9	65.8	425.4
	Relative increase (%)	*-7.0*	*UR*	*-5.3*	*UR*	*UR*	*16.4*	*35.9*	*87.8*	*76.7*	*97.8*	*137.1*	*-10.1*	*UR*	*UR*	*UR*	*UR*	*6.0*	*0.2*	*57.7*	*43.0*	*33.7*	*41.8*
Episodic/paroxysmal disorders (e.g., epilepsy) *(G40-G47)*	Absolute increase (per 100,000)	UR	0.0	0.1	0.2	0.2	0.1	0.4	0.9	0.9	2.0	1.1	UR	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.4	1.3	2.5
	Relative increase (%)	*UR*	*22.9*	*75.5*	*64.9*	*34.9*	*21.3*	*57.4*	*102.8*	*61.1*	*84.3*	*15.6*	*UR*	*15.8*	*69.2*	*40.8*	*29.4*	*29.1*	*24.9*	*25.3*	*23.4*	*41.7*	*48.1*
Cerebral palsy and other paralytic syndromes *(G80-G83)*	Absolute increase (per 100,000)	UR	-0.3	0.0	0.2	0.3	0.2	0.3	0.5	0.4	-0.7	-2.1	UR	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.3	-0.1	0.2
	Relative increase (%)	*UR*	*-58.6*	*-7.7*	*27.0*	*76.7*	*61.8*	*62.5*	*67.7*	*23.7*	*-24.1*	*-40.8*	*UR*	*-10.2*	*5.1*	*-6.1*	*12.4*	*18.7*	*20.3*	*10.8*	*16.0*	*-5.3*	*5.2*

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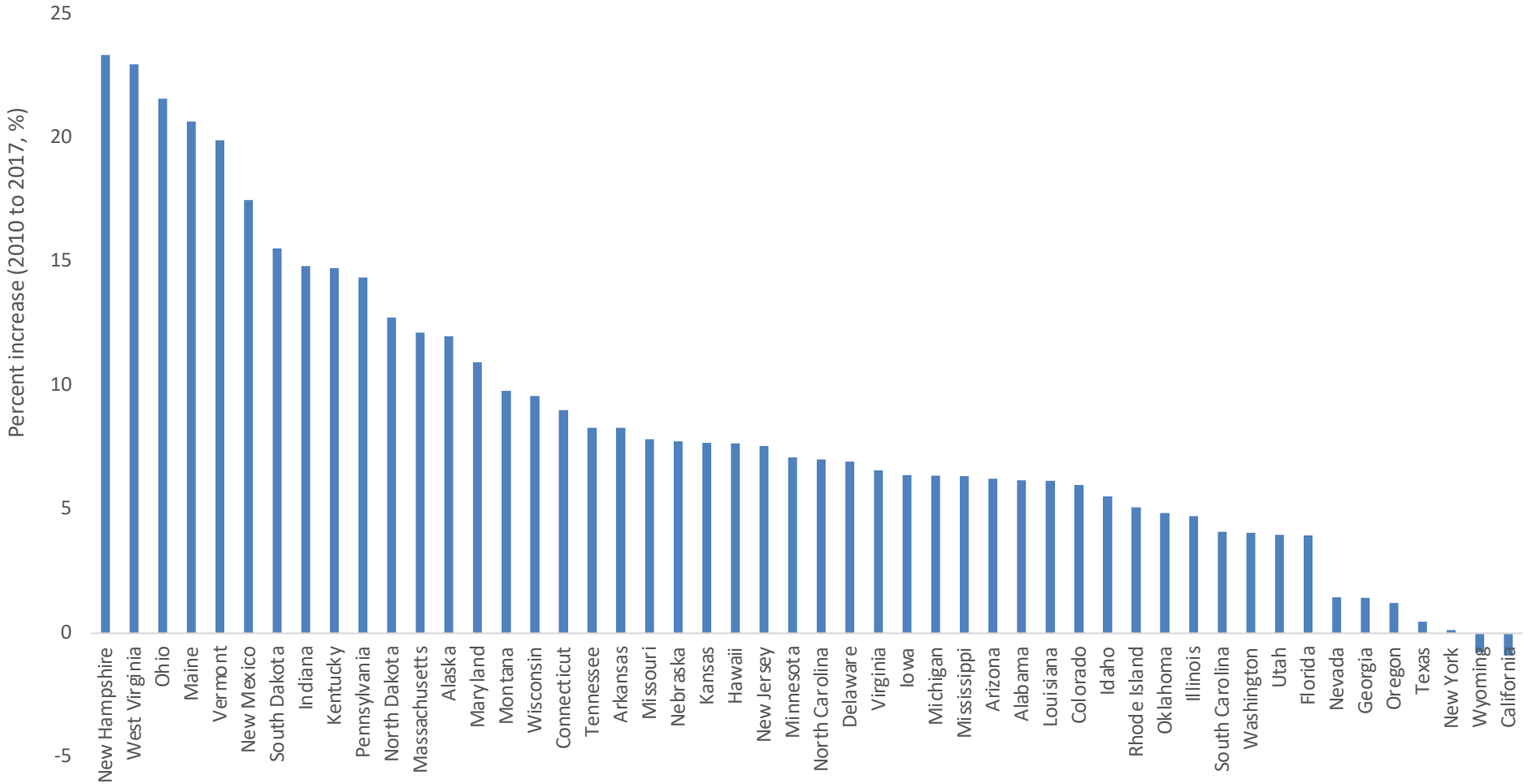
Increase in midlife mortality between 2010 and 2017, by state



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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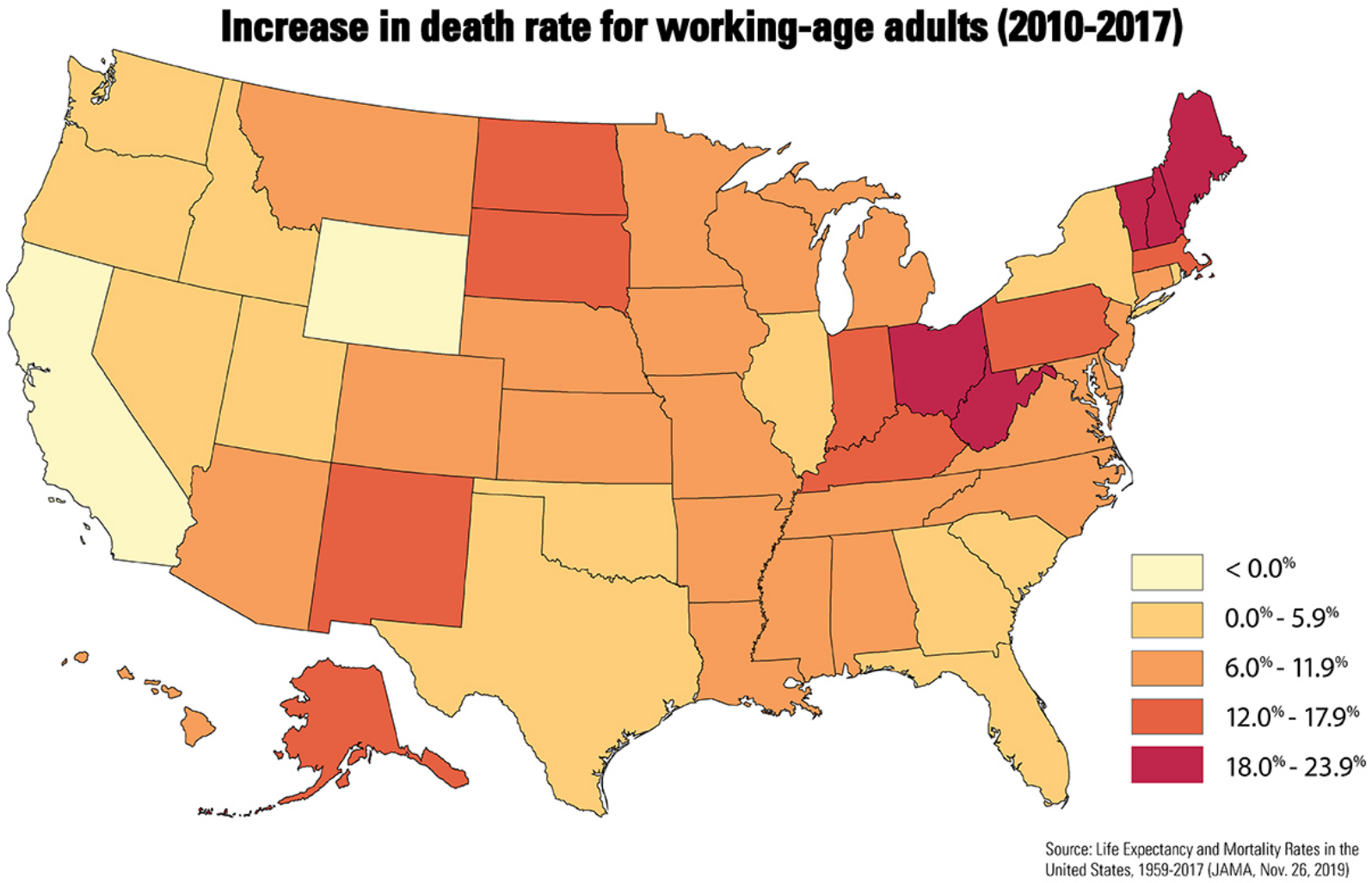
Relative increase in midlife mortality



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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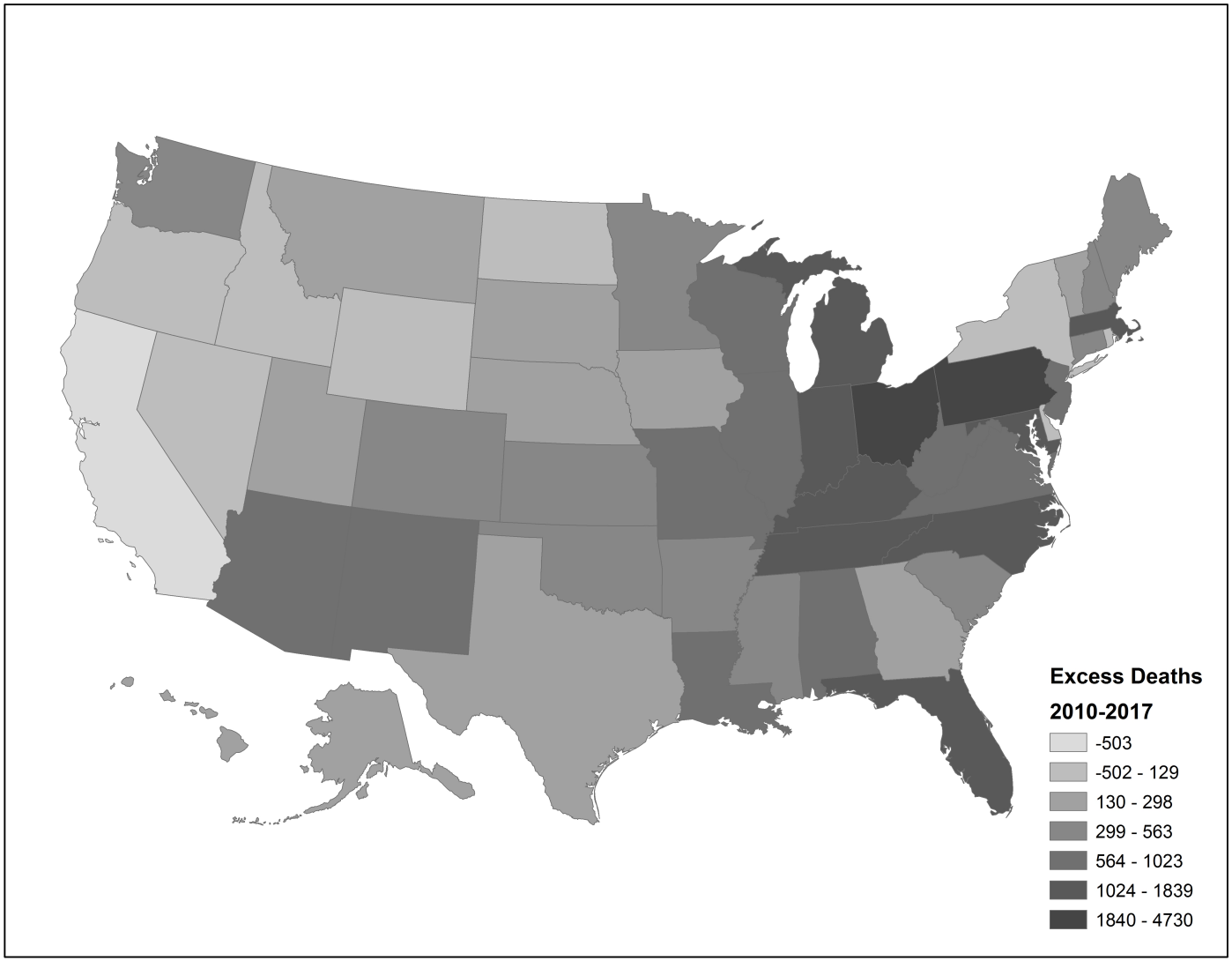
Excess deaths in midlife (2010-2017), by state



Adapted from: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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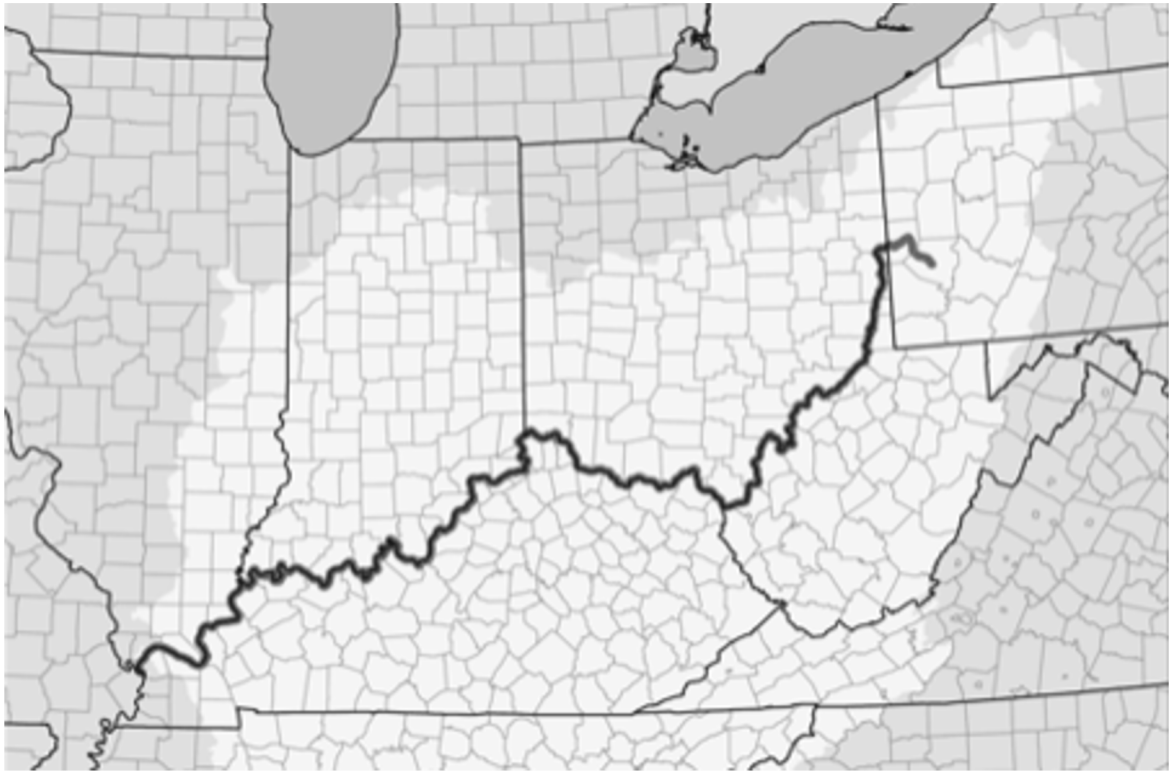
Ohio Valley states

States*	Excess midlife deaths (2010-2017)
Ohio	4,730
Pennsylvania	3,179
Indiana	1,839
Kentucky	1,524
Subtotal	11,272 (32.8%)
UNITED STATES	33,307

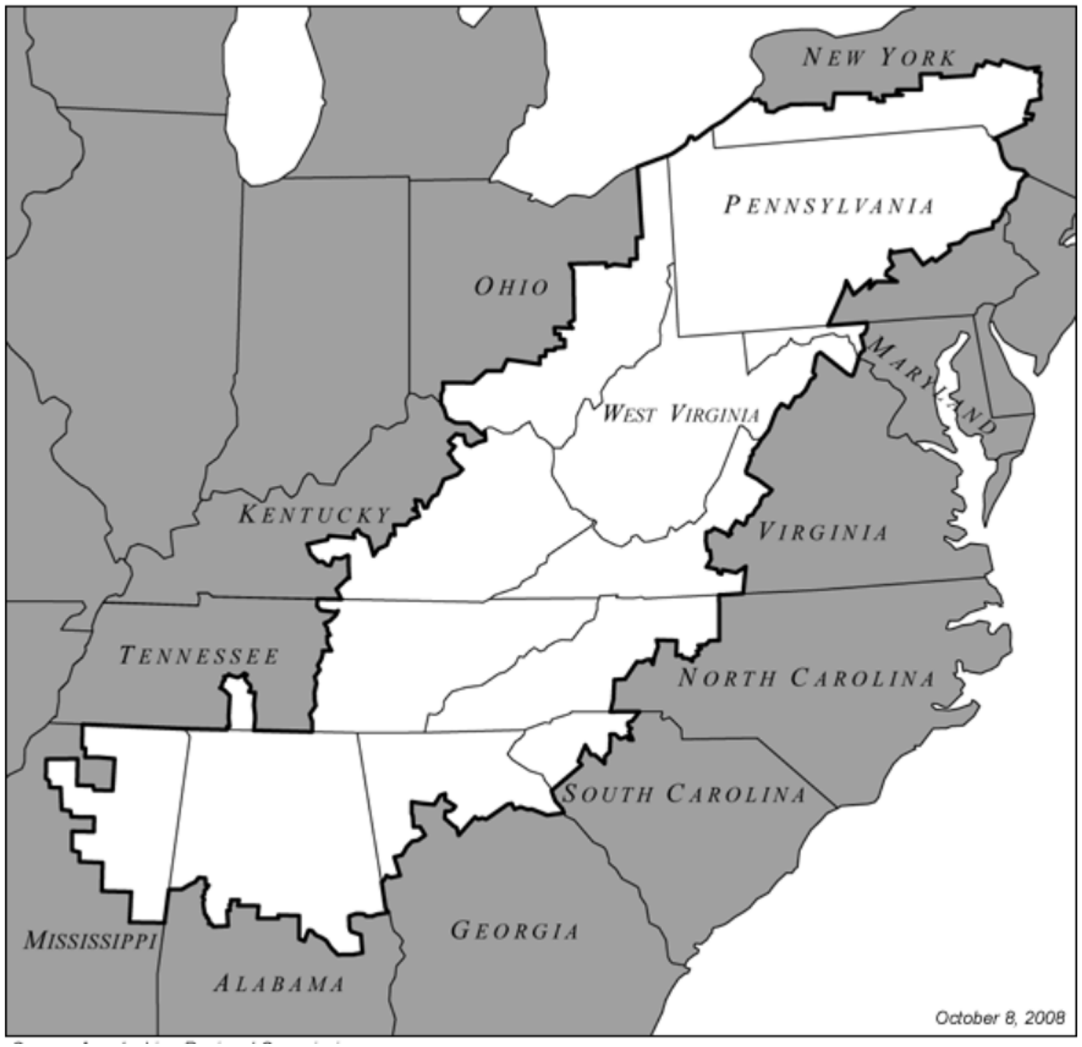


* These four states (Indiana, Kentucky, Ohio, Pennsylvania) account for 10.8% of US population.

Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

Appalachian states

States (N=13)	Excess midlife deaths (2010-2017)
Ohio	4,730
Pennsylvania	3,179
Kentucky	1,524
North Carolina	1,330
Tennessee	1,257
Maryland	1,123
West Virginia	1,023
Virginia	890
Alabama	729
Mississippi	482
South Carolina	453
Georgia	298
New York	38
Subtotal	17,056 (49.6%)
UNITED STATES	33,307



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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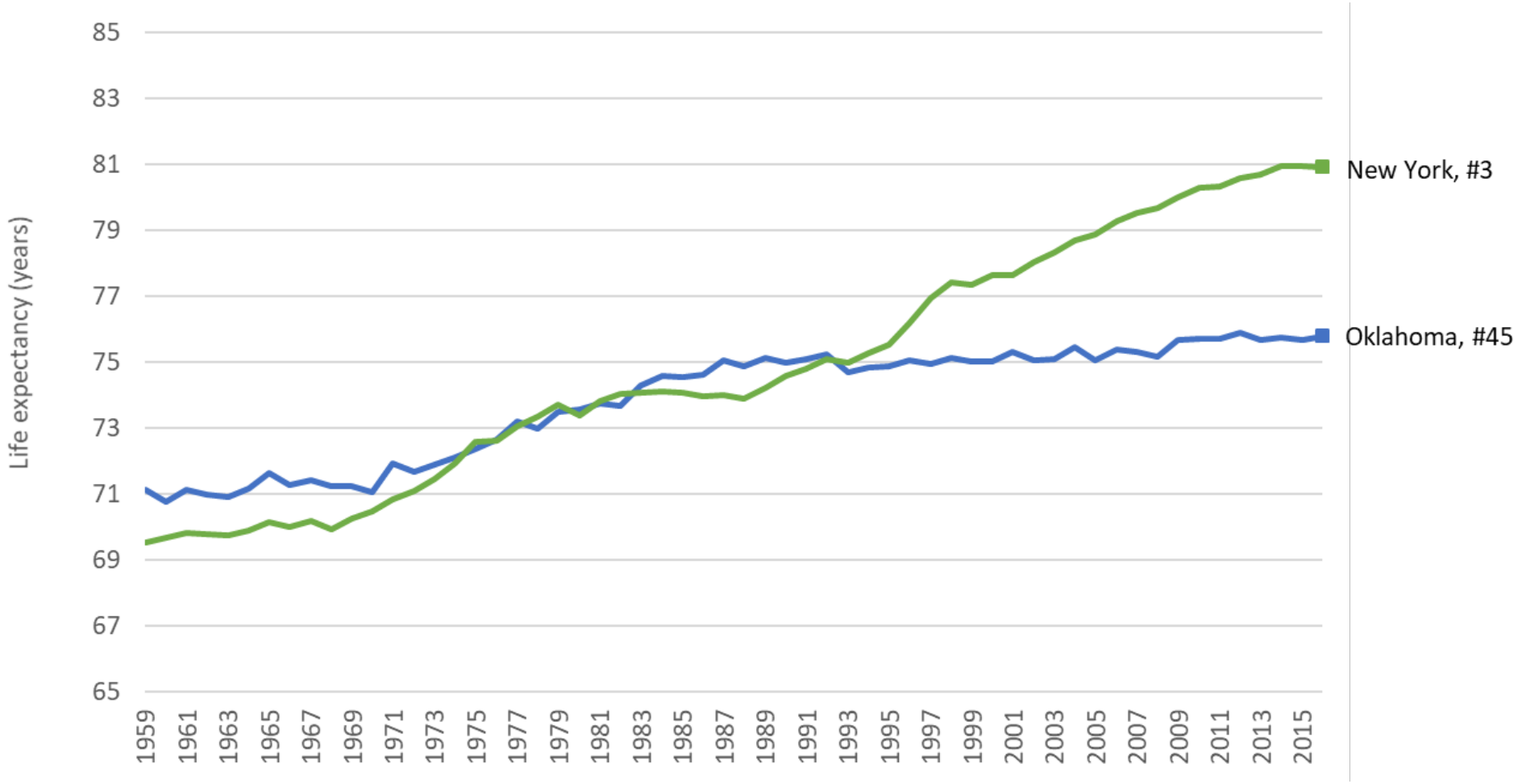
Life expectancy, New York vs. Oklahoma, 1959-2016



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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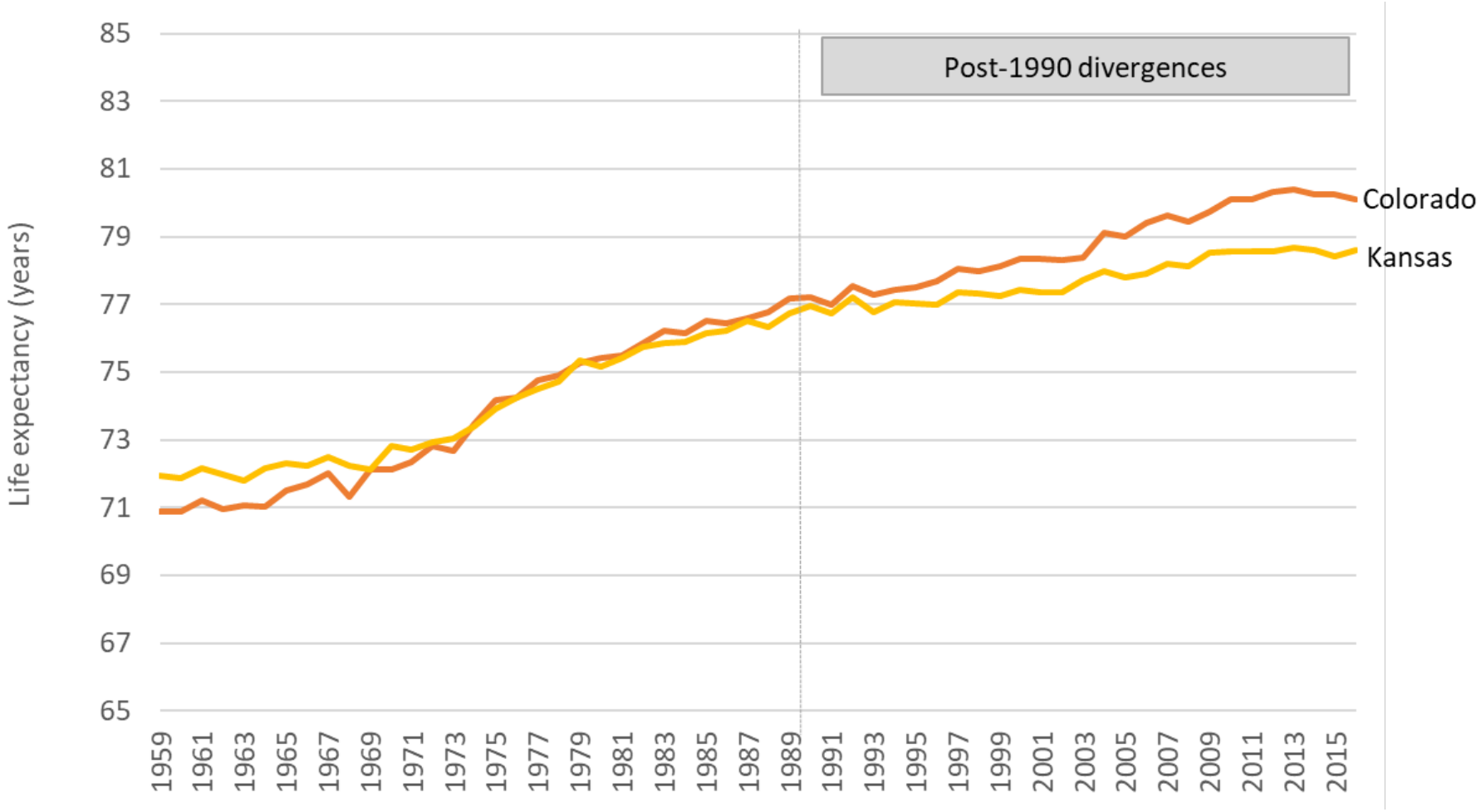
Life expectancy, Colorado vs. Kansas, 1959-2016



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.

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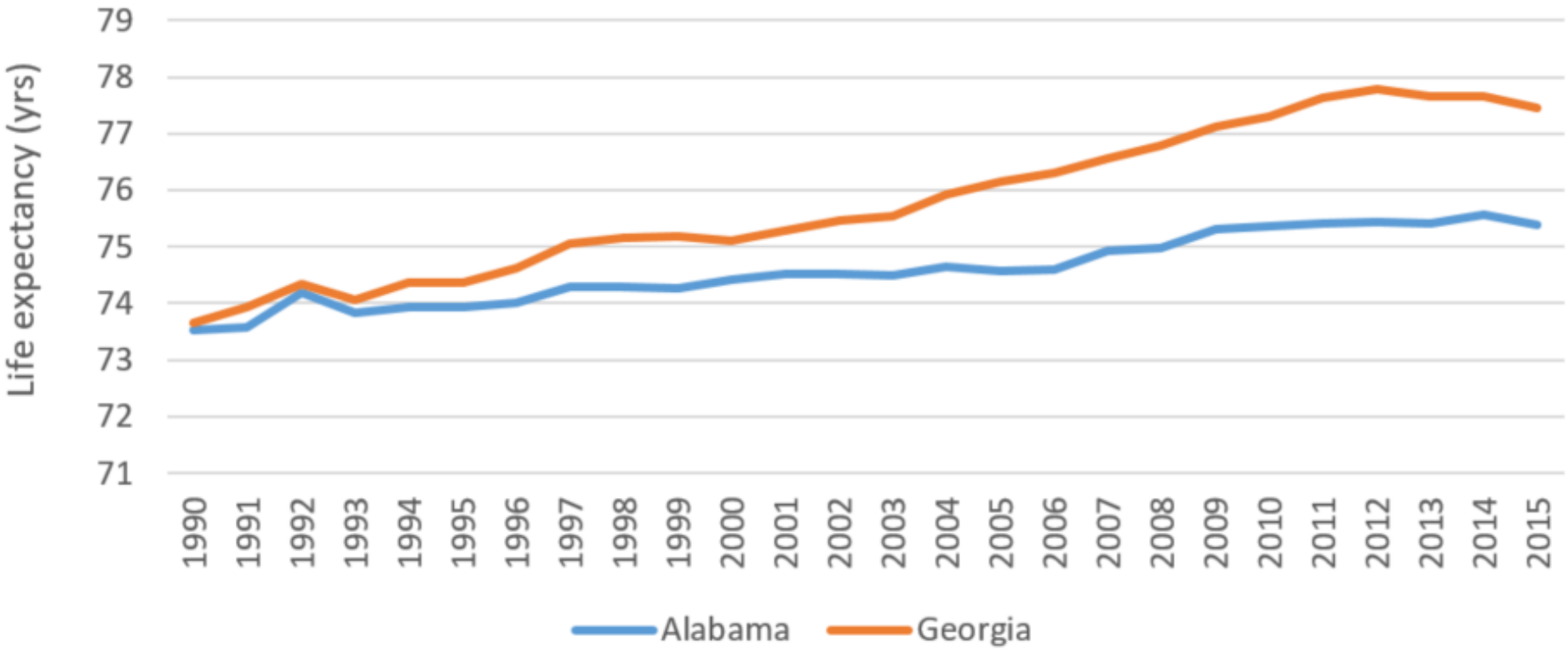
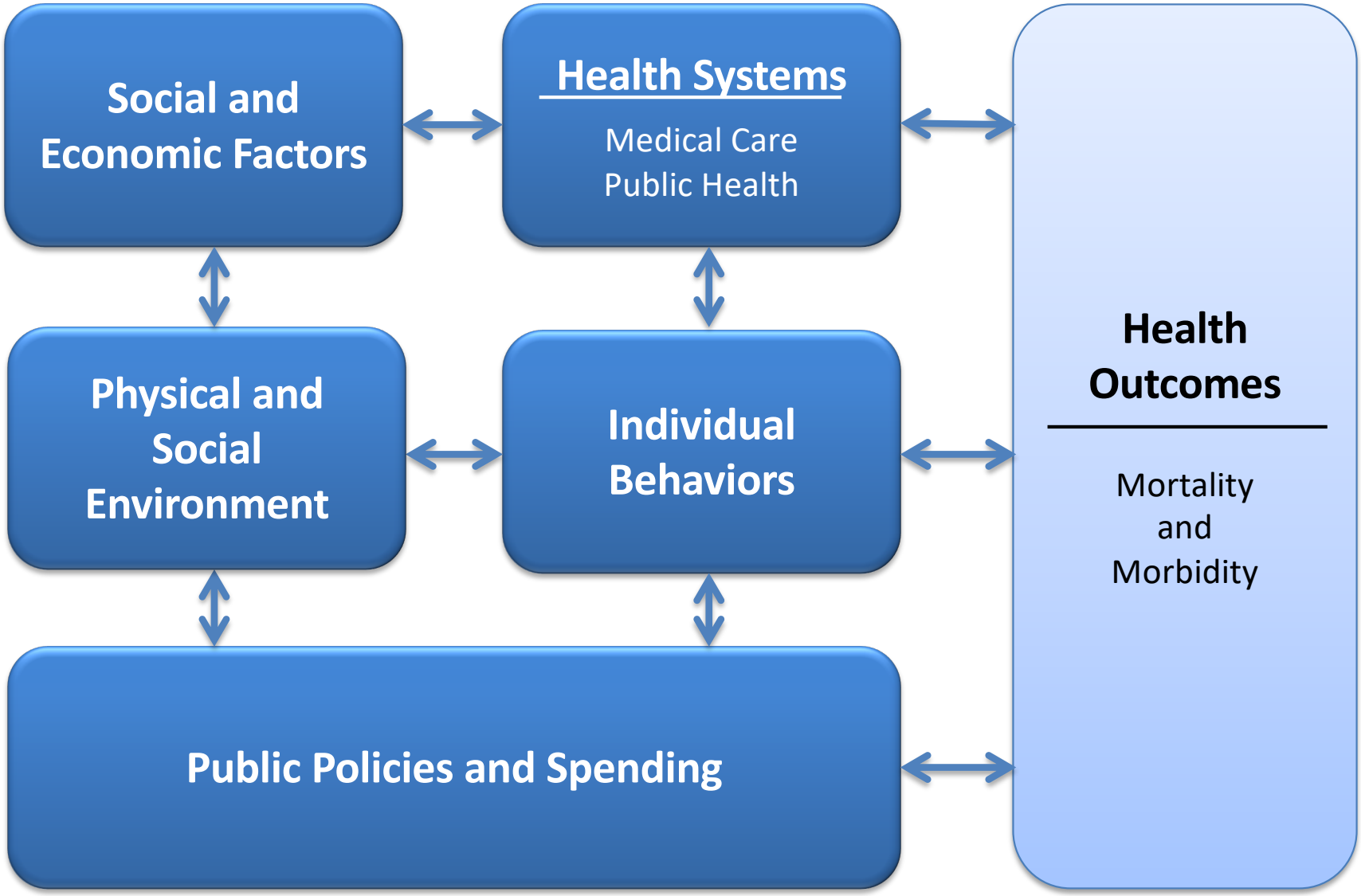
Life expectancy, Alabama vs Georgia, 1990-2015



Source: Woolf et al. *JAMA*. 2019;322(20):1996-2016.



Source: Adapted from Woolf SH, Aron L, eds. *U.S. Health in International Perspective: Shorter Lives, Poorer Health*. Panel on Understanding Cross-National Health Differences Among High-Income Countries. National Research Council, Committee on Population, Division of Behavioral and Social Sciences and Education, and Board on Population Health and Public Health Practice, Institute of Medicine. Washington, DC: The National Academies Press, 2013.

Potential explanations for increasing midlife mortality

- Substance abuse
  - Drugs
  - Alcohol
- Tobacco and obesity
- Deficiencies in health care
- Psychological distress
- Socioeconomic conditions

Upstream contributors to the opioid epidemic

JAMA Internal Medicine | Original Investigation

Association Between Automotive Assembly Plant Closures and Opioid Overdose Mortality in the United States
A Difference-in-Differences Analysis

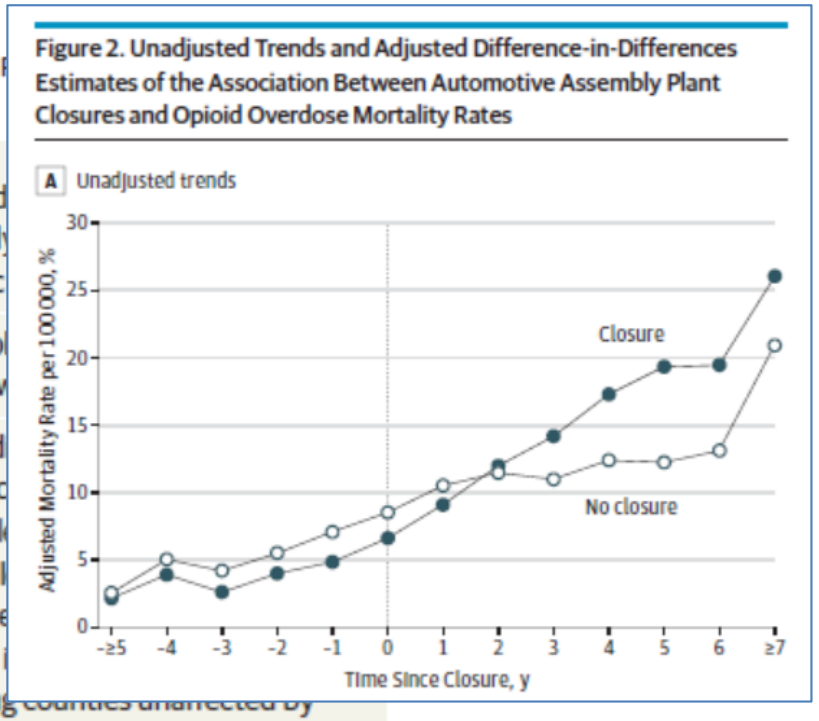
Atheendar S. Venkataramani, MD, PhD; Elizabeth F. Bair, MS; Rourke L. O'Brien,

IMPORTANCE Fading economic opportunity has been hypothesized
associated with the US opioid overdose crisis. Automotive assembly
culturally significant events that substantially erode local economic

OBJECTIVE To estimate the extent to which automotive assembly pl
associated with increasing opioid overdose mortality rates among w

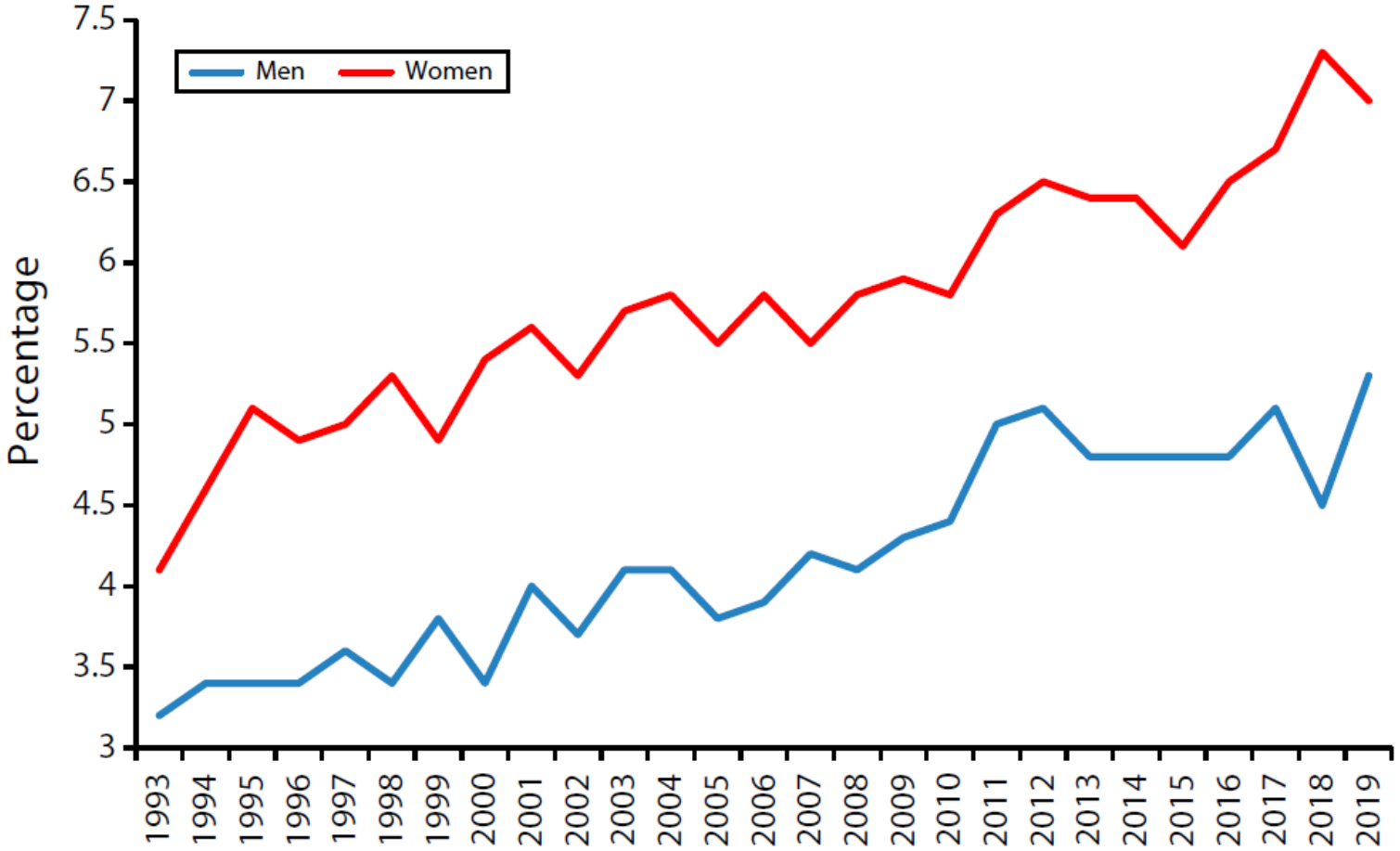
DESIGN, SETTING, AND PARTICIPANTS A county-level difference-in-d
conducted among adults aged 18 to 65 years in 112 manufacturing c
commuting zones (primarily in the US South and Midwest) with at l
automotive assembly plant as of 1999. The study analyzed county-l
January 1, 1999, to December 31, 2016, in age-adjusted, county-leve
mortality rates before vs after automotive assembly plant closures
affected by plant closures compared with changes in manufacturing
plant closures. Data analyses were performed between April 1, 2018, and July 20, 2019.

Figure 2. Unadjusted Trends and Adjusted Difference-in-Differences Estimates of the Association Between Automotive Assembly Plant Closures and Opioid Overdose Mortality Rates



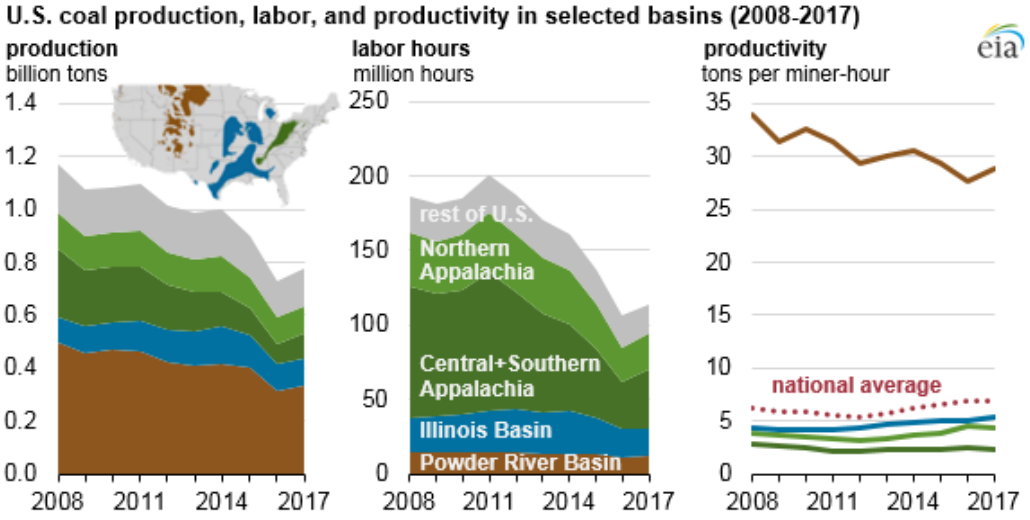
Source: Venkataramani et al. JAMA Intern Med. 2019 Dec 30

30 out of 30 past 30 days in poor mental health



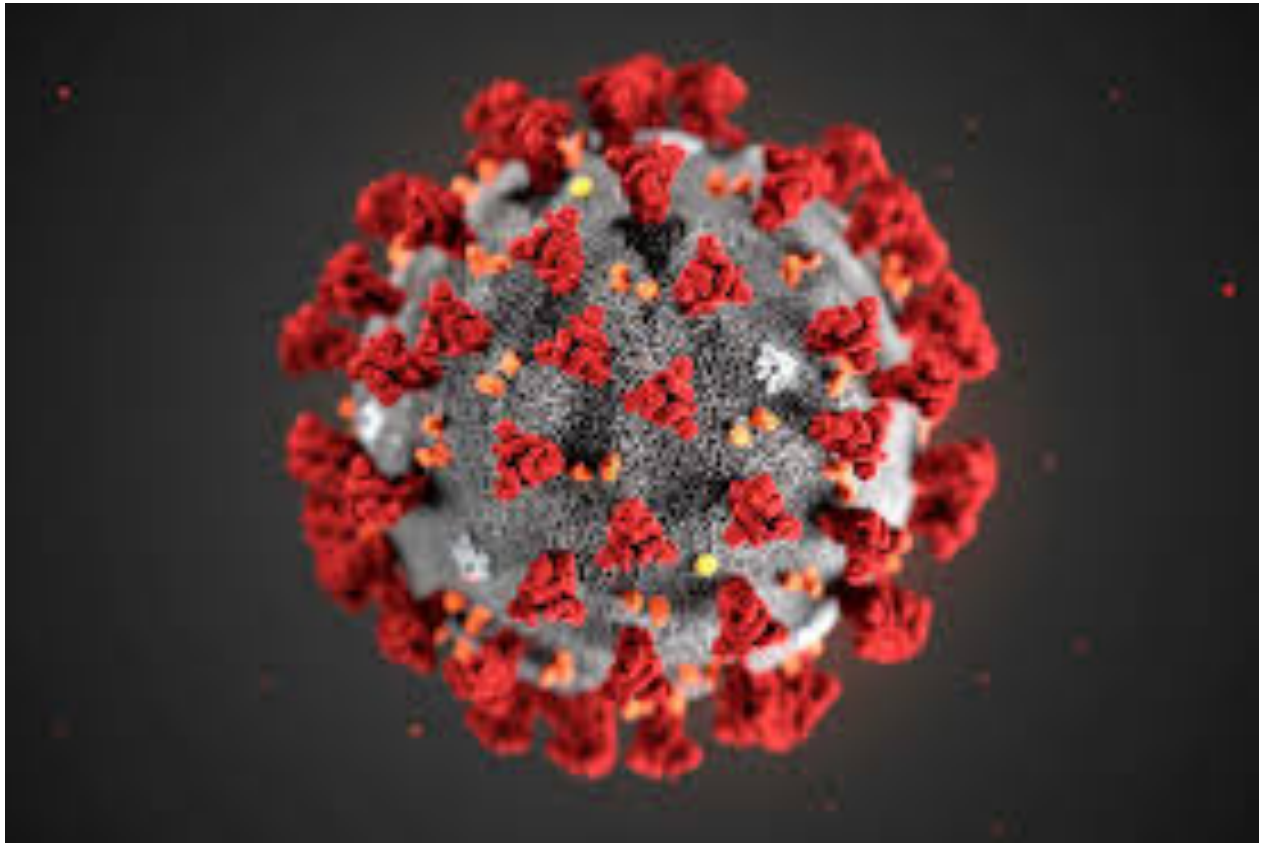
Source: Blanchflower and Oswald. *Am J Public Health*. Published online ahead of print Aug 20, 2020: e1–e7.

Economic policy and health



Center on Society and Health

COVID-19 pandemic



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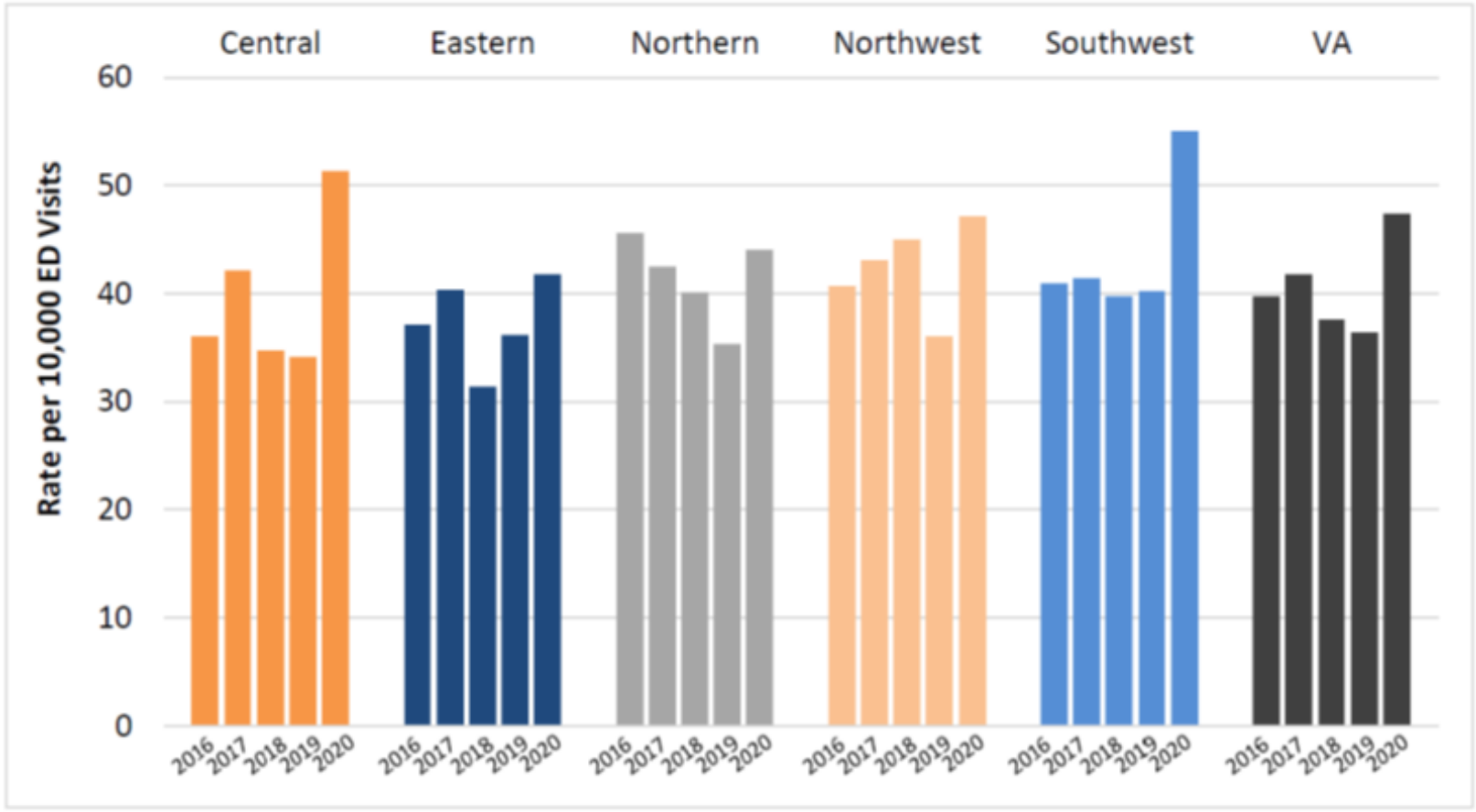
Richmond emergency room experienced a surge in opioid overdoses during pandemic

Increase of 123% occurred during a time when VCU Medical Center was experiencing a lower-than-average number of overall visits.

During the early months of the COVID-19 pandemic (March to June 2020), nonfatal opioid overdose visits to the emergency department at VCU Medical Center increased by 123% over the same period the previous year. At the same time, overall emergency department visits to the medical center dropped by 29%. (Getty Images)

Source:
https://news.vcu.edu/article/Richmond_emergency_room_experienced_a_surge_in_opioid_overdoses

Drug overdose admissions, Virginia, January-March 2020



Source: VA Department of Health

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Conclusions

- The recent decline in US life expectancy originated decades ago, when the US began to lose pace with other high-income countries;
- The decline in life expectancy was driven by increased mortality in "midlife"—young and middle-aged adults (ages 25-64 years);
- The increase in midlife mortality was attributable to deaths from drug overdoses, alcohol abuse, suicides, and a long list of chronic diseases and injuries;
- The increase was greatest in certain states, notably those in the Industrial Midwest and central Appalachia;
- Potential explanations include drug and alcohol abuse, obesity, and systemic causes—including deficiencies in the health care system, psychosocial factors, and economic conditions;
- Further research is needed to elucidate underlying causes, but the urgency of the moment requires a shift in priorities among policymakers.