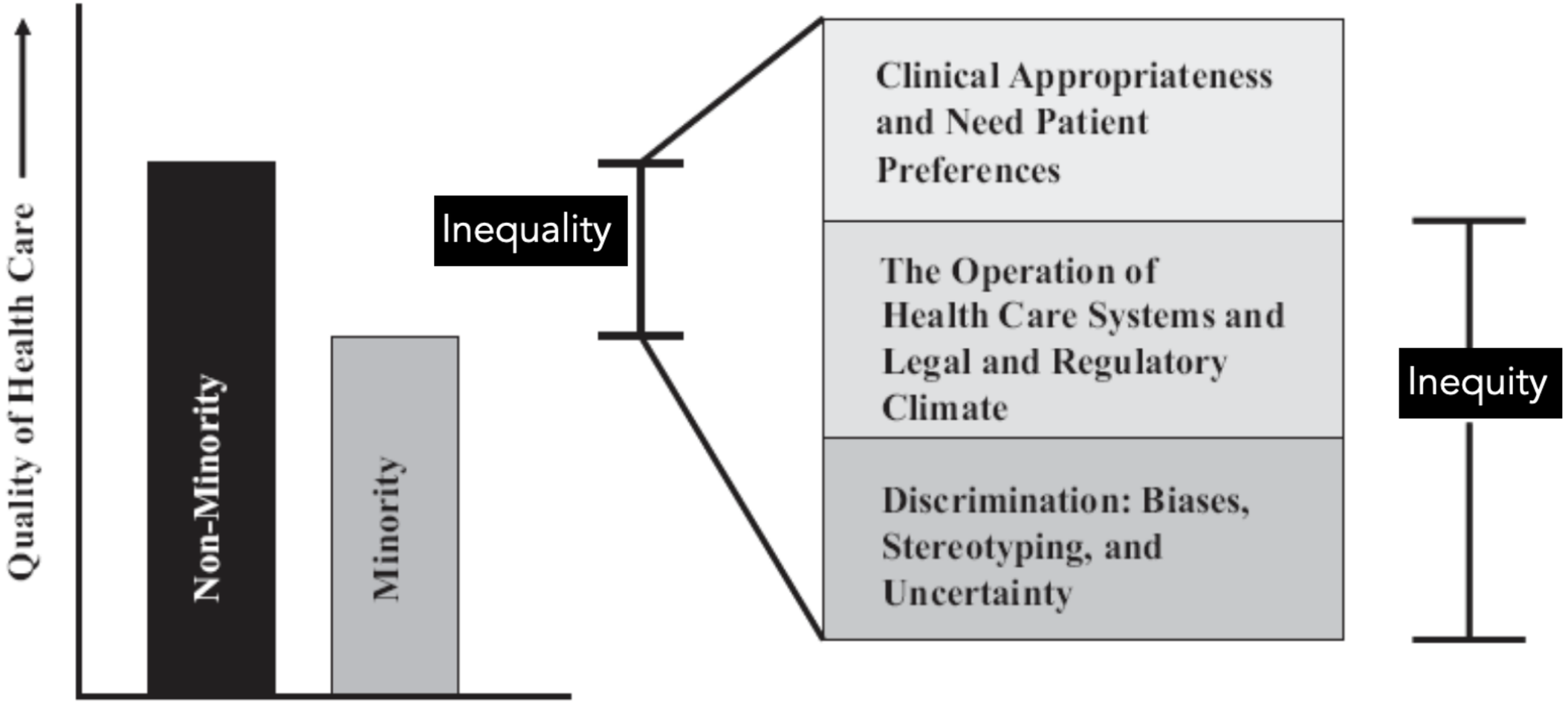
Measuring Health Equity: Beyond Description

The Ecosystem of Health Equity Measures: A Workshop

Sam Harper
McGill University

2023-06-21



Adapted from McGuire et al. (2006)

Moving beyond description is essential for progress

From description to explanation

- The “substance” we want to decompose is health inequality—a difference in health between social groups.
- Ultimately, we want to know why health inequalities are changing over time, or why they differ between populations
  - Risk factors?
  - Demographic composition?
  - Social conditions?
- Unpacking the ‘components’ of health inequality is an opportunity to better integrate the monitoring of health inequalities with the etiology of health inequalities.

- Racial inequality in BP due to risk factors?
- Tobacco, sodium, alcohol, BMI

> …black participants with [high] blood pressure level have generally better risk factor characteristics… but the risk factors that we studied could not explain the higher blood pressure levels observed among black participants.

American Journal of Epidemiology

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Practice of Epidemiology

Using Decomposition Analysis to Identify Modifiable Racial Disparities in the Distribution of Blood Pressure in the United States

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To lower the prevalence of hypertension and racial disparities in hypertension, public health agencies have attempted to reduce modifiable risk factors for high blood pressure, such as excess sodium intake or high body mass index. In the present study, we used decomposition methods to identify how population-level reductions in key risk factors for hypertension could reshape entire population distributions of blood pressure and associated disparities among racial/ethnic groups. We compared blood pressure distributions among non-Hispanic white, non-Hispanic black, and Mexican-American persons using data from the US National Health and Nutrition Examination Survey (2003–2010). When using standard adjusted logistic regression analysis, we found that differences in body mass index were the only significant explanatory correlate to racial disparities in blood pressure. By contrast, our decomposition approach provided more nuanced revelations; we found that disparities in hypertension related to tobacco use might be masked by differences in body mass index that significantly increase the disparities between black and white participants. Analysis of disparities between white and Mexican-American participants also reveal hidden relationships between tobacco use, body mass index, and blood pressure. Decomposition offers an approach to understand how modifying risk factors might alter population-level health disparities in overall outcome distributions that can be obscured by standard regression analyses.

Basu et al. (2015)

Grappling with intersectional identities

- Health inequalities generated by interlocking systems of power and oppression.
- But often studied by single axes of:
  - Race, ethnicity, gender, sexual orientation, age, disability status, socioeconomic position, geography
  - Inattention to joint effects
- Inadequate data systems

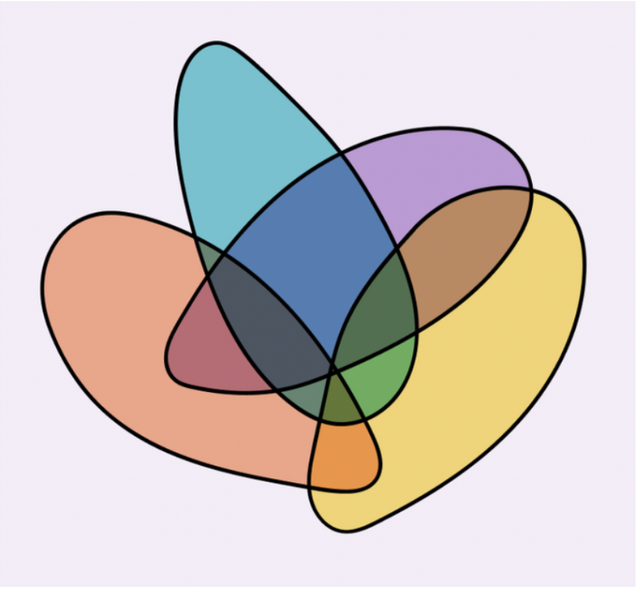
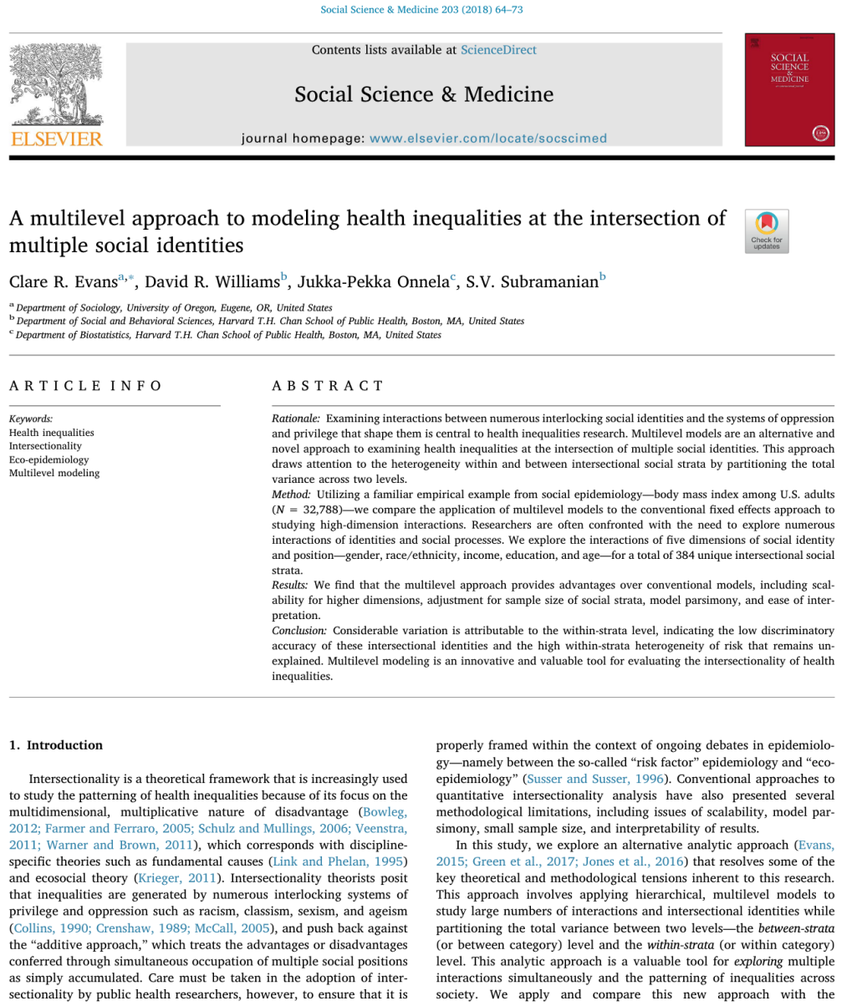


Image credit: Culture Amp

New approaches to measurement

- Multilevel analysis of individual heterogeneity and discriminatory accuracy (MAIHDA)
- Partial pooling of (intersectoral) social strata
- Can reveal heterogeneity beyond simple additive effects.



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A multilevel approach to modeling health inequalities at the intersection of multiple social identities

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ABSTRACT

Rationale: Examining interactions between numerous interlocking social identities and the systems of oppression and privilege that shape them is central to health inequalities research. Multilevel models are an alternative and novel approach to examining health inequalities at the intersection of multiple social identities. This approach draws attention to the heterogeneity within and between intersectional social strata by partitioning the total variance across two levels.
Method: Utilizing a familiar empirical example from social epidemiology—body mass index among U.S. adults (N = 32,788)—we compare the application of multilevel models to the conventional fixed effects approach to studying high-dimension interactions. Researchers are often confronted with the need to explore numerous interactions of identities and social processes. We explore the interactions of five dimensions of social identity and position—gender, race/ethnicity, income, education, and age—for a total of 384 unique intersectional social strata.
Results: We find that the multilevel approach provides advantages over conventional models, including scalability for higher dimensions, adjustment for sample size of social strata, model parsimony, and ease of interpretation.
Conclusion: Considerable variation is attributable to the within-strata level, indicating the low discriminatory accuracy of these intersectional identities and the high within-strata heterogeneity of risk that remains unexplained. Multilevel modeling is an innovative and valuable tool for evaluating the intersectionality of health inequalities.

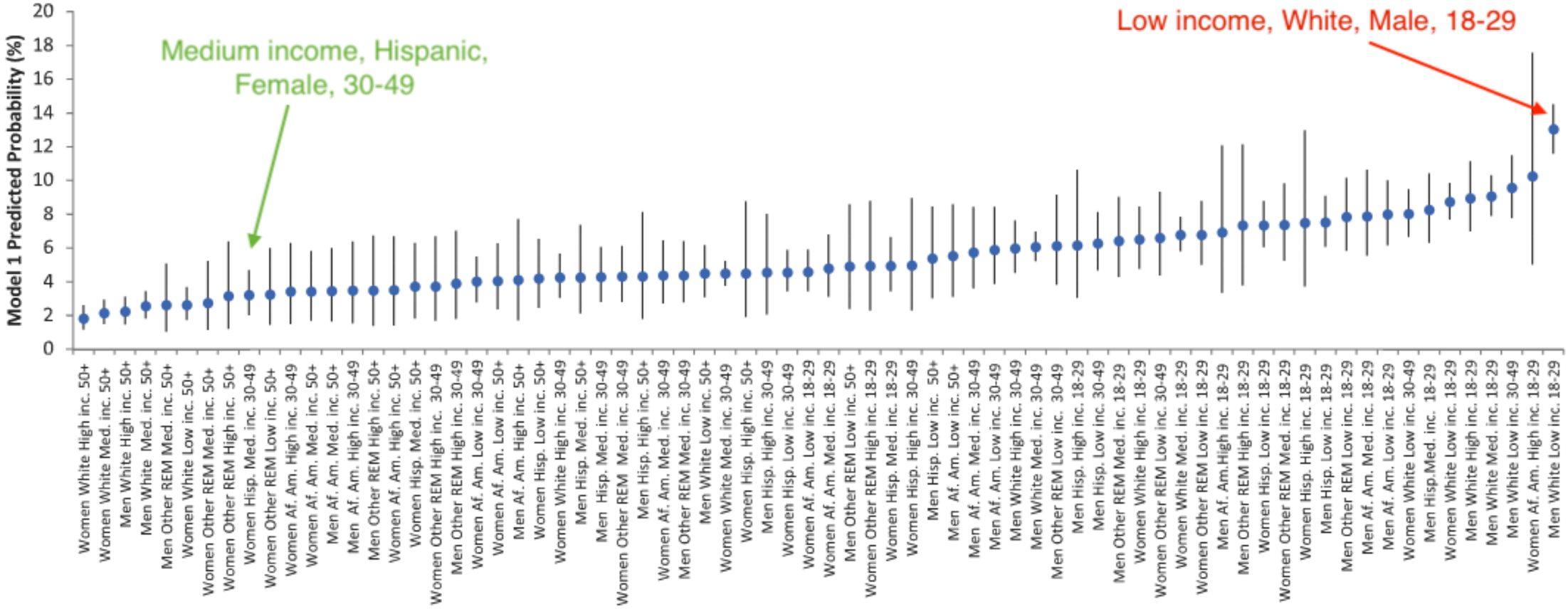
1. Introduction

Intersectionality is a theoretical framework that is increasingly used to study the patterning of health inequalities because of its focus on the multidimensional, multiplicative nature of disadvantage (Bowleg, 2012; Farmer and Ferraro, 2005; Schulz and Mullings, 2006; Veenstra, 2011; Warner and Brown, 2011), which corresponds with discipline-specific theories such as fundamental causes (Link and Phelan, 1995) and ecosocial theory (Krieger, 2011). Intersectionality theorists posit that inequalities are generated by numerous interlocking systems of privilege and oppression such as racism, classism, sexism, and ageism (Collins, 1990; Crenshaw, 1989; McCall, 2005), and push back against the "additive approach," which treats the advantages or disadvantages conferred through simultaneous occupation of multiple social positions as simply accumulated. Care must be taken in the adoption of intersectionality by public health researchers, however, to ensure that it is properly framed within the context of ongoing debates in epidemiology—namely between the so-called "risk factor" epidemiology and "eco-epidemiology" (Susser and Susser, 1996). Conventional approaches to quantitative intersectionality analysis have also presented several methodological limitations, including issues of scalability, model parsimony, small sample size, and interpretability of results.

In this study, we explore an alternative analytic approach (Evans, 2015; Green et al., 2017; Jones et al., 2016) that resolves some of the key theoretical and methodological tensions inherent to this research. This approach involves applying hierarchical, multilevel models to study large numbers of interactions and intersectional identities while partitioning the total variance between two levels—the *between-strata* (or between category) level and the *within-strata* (or within category) level. This analytic approach is a valuable tool for *exploring* multiple interactions simultaneously and the patterning of inequalities across society. We apply and compare this new approach with the

See Evans et al. (2018), Merlo (2018).

- MAIHDA allows a deeper look at multi-dimensional heterogeneity.



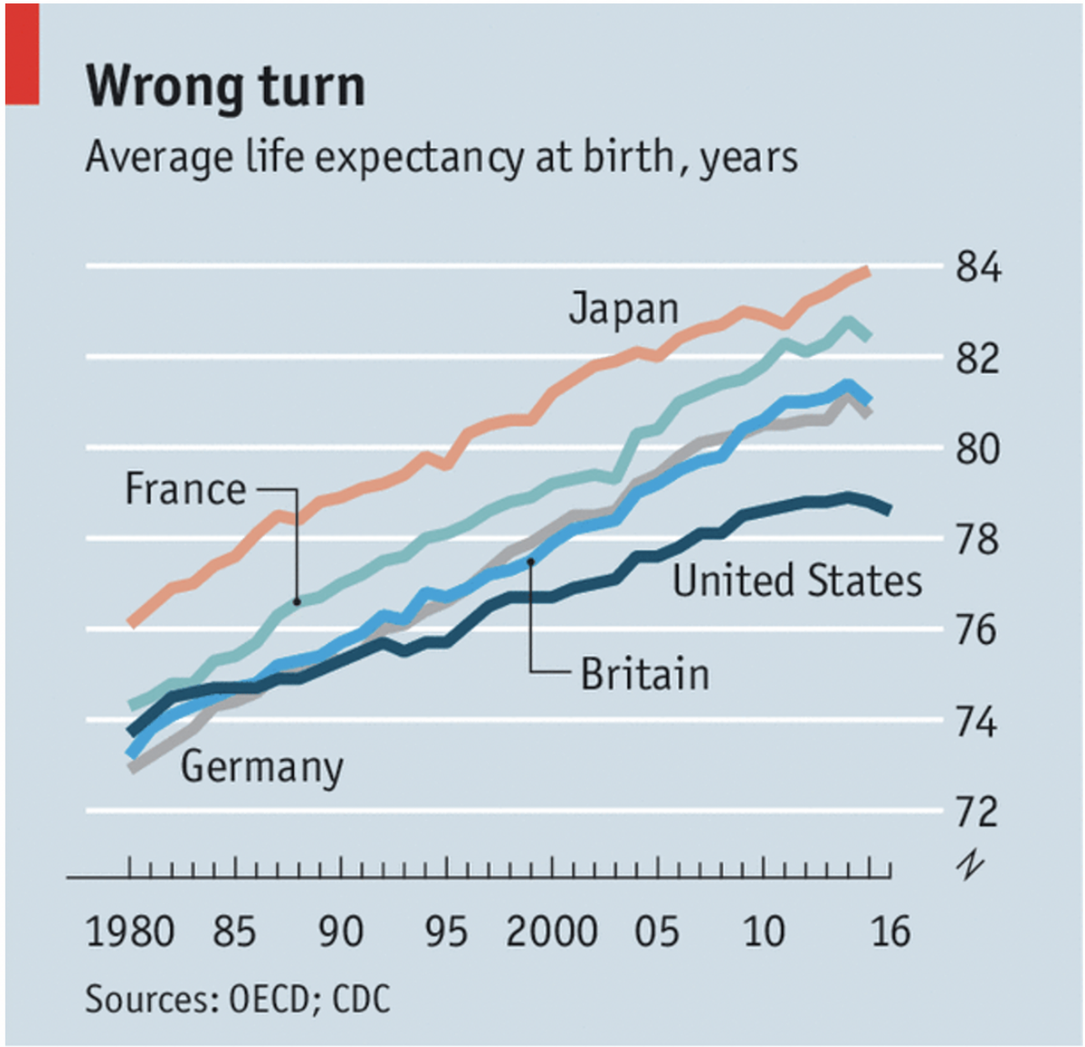
Persmark et al. (2020) on the probability of reporting opioid use disorder.

Decomposition also provides opportunities to reconcile trends and explanations for inequalities.

United States | Not great, again

Life expectancy in America has declined for two years in a row

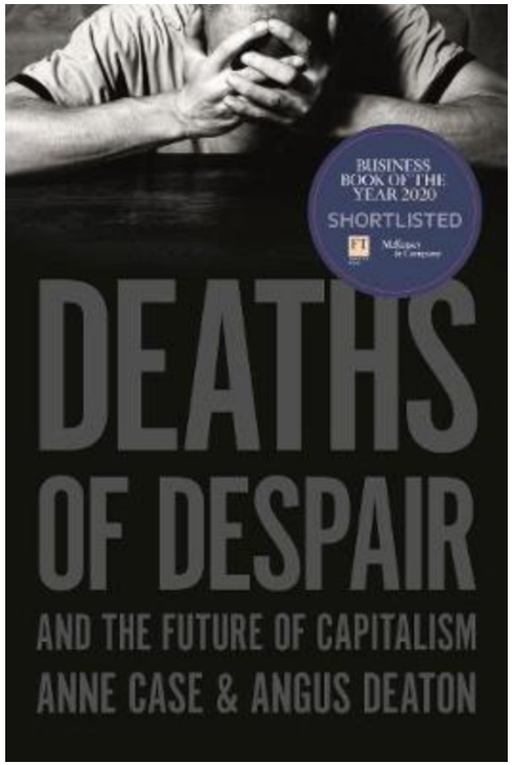
That's not really meant to happen in developed countries



Source: The Economist, Jan 4th, 2018.

Power of simple narratives

> Our contribution was to link drug overdoses, suicides, and alcohol-related deaths, to note that all were rising together, that together they were afflicting mostly whites, and that, among that group, the long fall in total mortality had stopped or reversed. We also chose the collective label “deaths of despair,” which helped publicize the combined epidemic and emphasize that it included more than just drug overdose.



Case and Deaton (2020). Also see Case and Deaton (2015)

THE NEW YORK TIMES, SUNDAY, MARCH 8, 2020

DAVID LEONHARDT

Dying of 'Despair' in America

WHEN the economists Anne Case and Angus Deaton first published their research on

"Deaths of despair" (from alcohol, drugs and suicide) among white adults

5 per 100,000 — 147 per 100,000

- Focus on low educated, rural, middle aged white men
- Emphasis on pain and disintegration of economic opportunties

White Men's Burdens

Drug overdoses, alcoholism and suicide are taking a toll on blue-collar workers.

By ARLIE RUSSELL HOCHSCHILD

A 43-YEAR-OLD WHITE MAN I will call Darin was recently divorced and recovering from a car accident when he was fired from his job in a biscuit factory. "We all have different bottoms," he explained to me in an interview in a small town in coal country. "I reached mine after I overheard the man I'd always assumed was my real dad introduce me as his stepson. That was my bottom." Then it was a quart of whiskey a day.

"Deaths of Despair and the Future of Capitalism" is about just such men. But it begins with a larger mystery. Over the last century, Americans' life expectancy at birth has risen from 49 to 77. Yet in recent years, that rise has faltered. Among white people age 45-54 — or a time many view as the prime of life — deaths have risen. Especially vulnerable are white men without a four-year bachelor's degree. Curiously,

DEATHS OF DESPAIR AND THE FUTURE OF CAPITALISM
By Anne Case and Angus Deaton
312 pp. Princeton University Press. $27.95.

And where might the blue-collar man work? Often for a temp agency or contractor with high turnover, and little employer commitment. So he won't attend the office Christmas party (there won't be one) or play on the union baseball team (there is no union). He's less likely to go to church, organize the Lion's Club fund-raiser, coach Little League or vote. Most important, four out of 10 such men won't be coming home to a wife. Many are several girlfriends past

public narrative
in heroic wars
by one, they ar
with pill, alcohol
death notice.

Though repet
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clear, the style i
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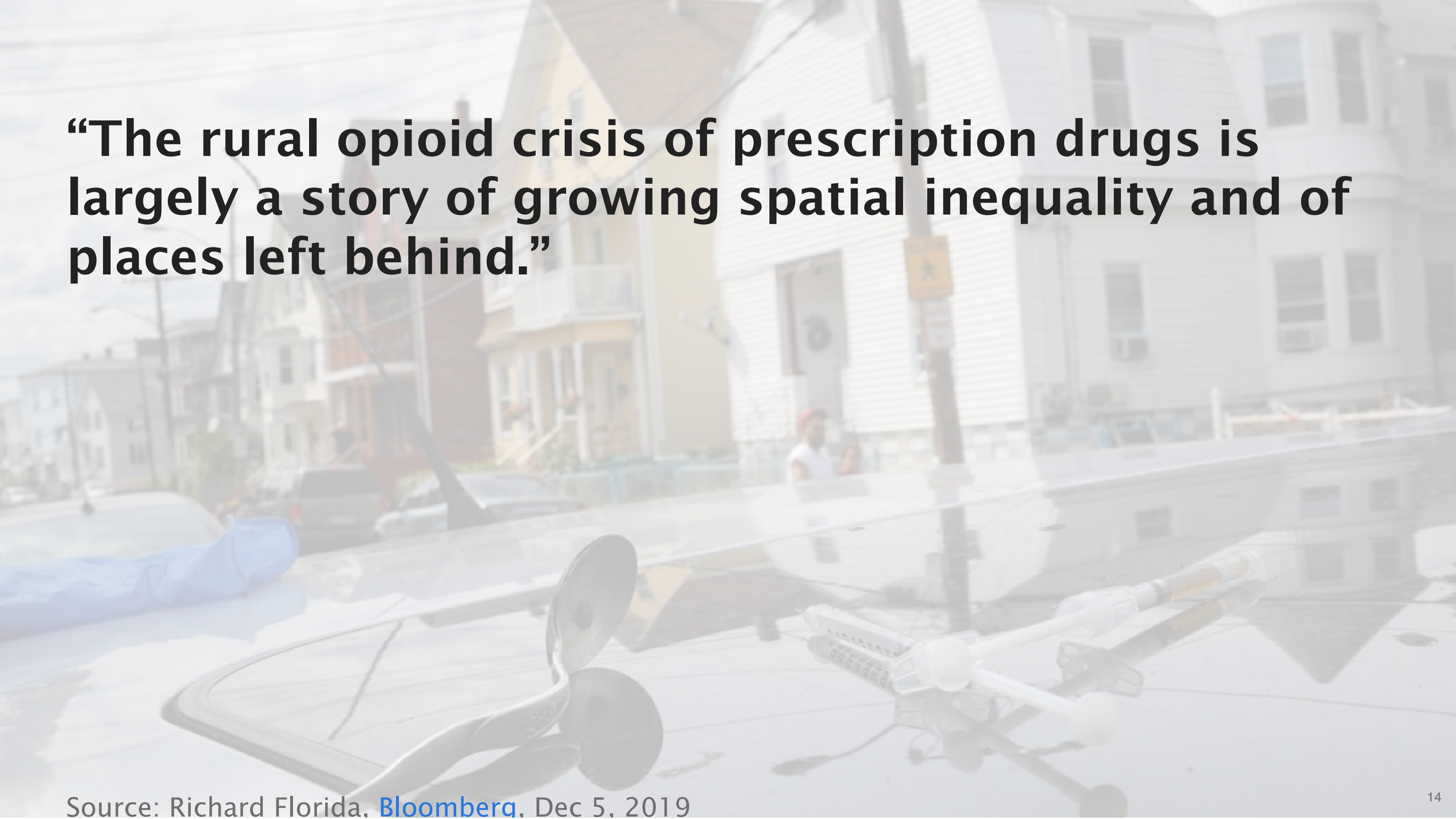

“The rural opioid crisis of prescription drugs is largely a story of growing spatial inequality and of places left behind.”

Source: Richard Florida, Bloomberg, Dec 5, 2019

- Narratives about inequalities are opportunities for investigation.
- Theories must be reconciled with plausible links to population patterns of exposure.
- We ‘decomposed’ the recent life expectancy decline.

ANNUAL REVIEWS

Annual Review of Public Health

Declining Life Expectancy in the United States: Missing the Trees for the Forest

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Keywords

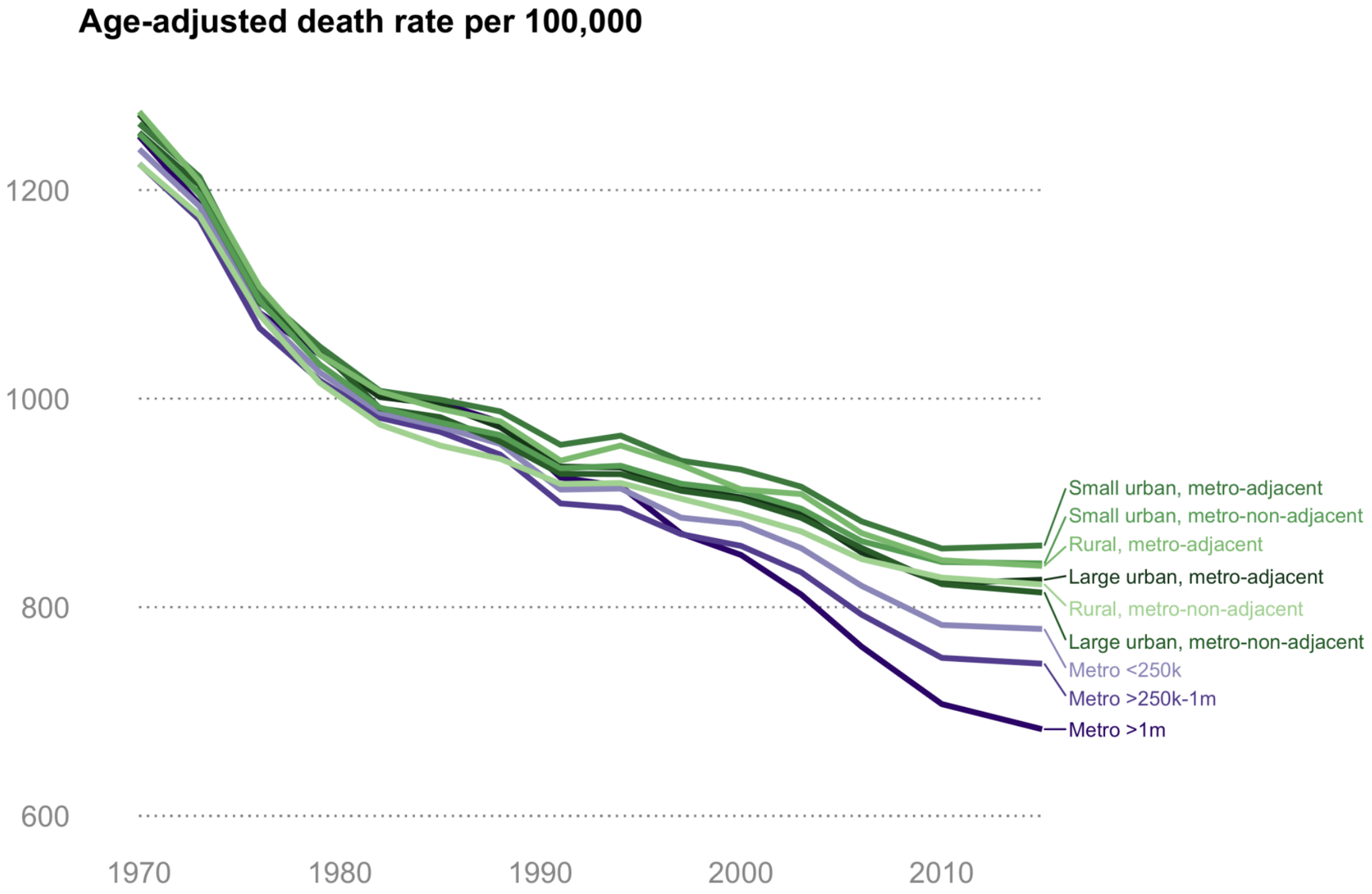
life expectancy, opioids, cardiovascular diseases, suicide, homicide, health inequalities

Abstract

In recent years, life expectancy in the United States has stagnated, followed by three consecutive years of decline. The decline is small in absolute terms but is unprecedented and has generated considerable research interest and theorizing about potential causes. Recent trends show that the decline has affected nearly all race/ethnic and gender groups, and the proximate causes of the decline are increases in opioid overdose deaths, suicide, homicide, and Alzheimer’s disease. A slowdown in the long-term decline in mortality from cardiovascular diseases has also prevented life expectancy from improving further. Although a popular explanation for the decline is the cumulative decline in living standards across generations, recent trends suggest that distinct mechanisms for specific causes of death are more plausible explanations. Interventions to stem the increase in overdose deaths, reduce access to mechanisms that contribute to violent deaths, and decrease cardiovascu-

Harper et al. (2021)

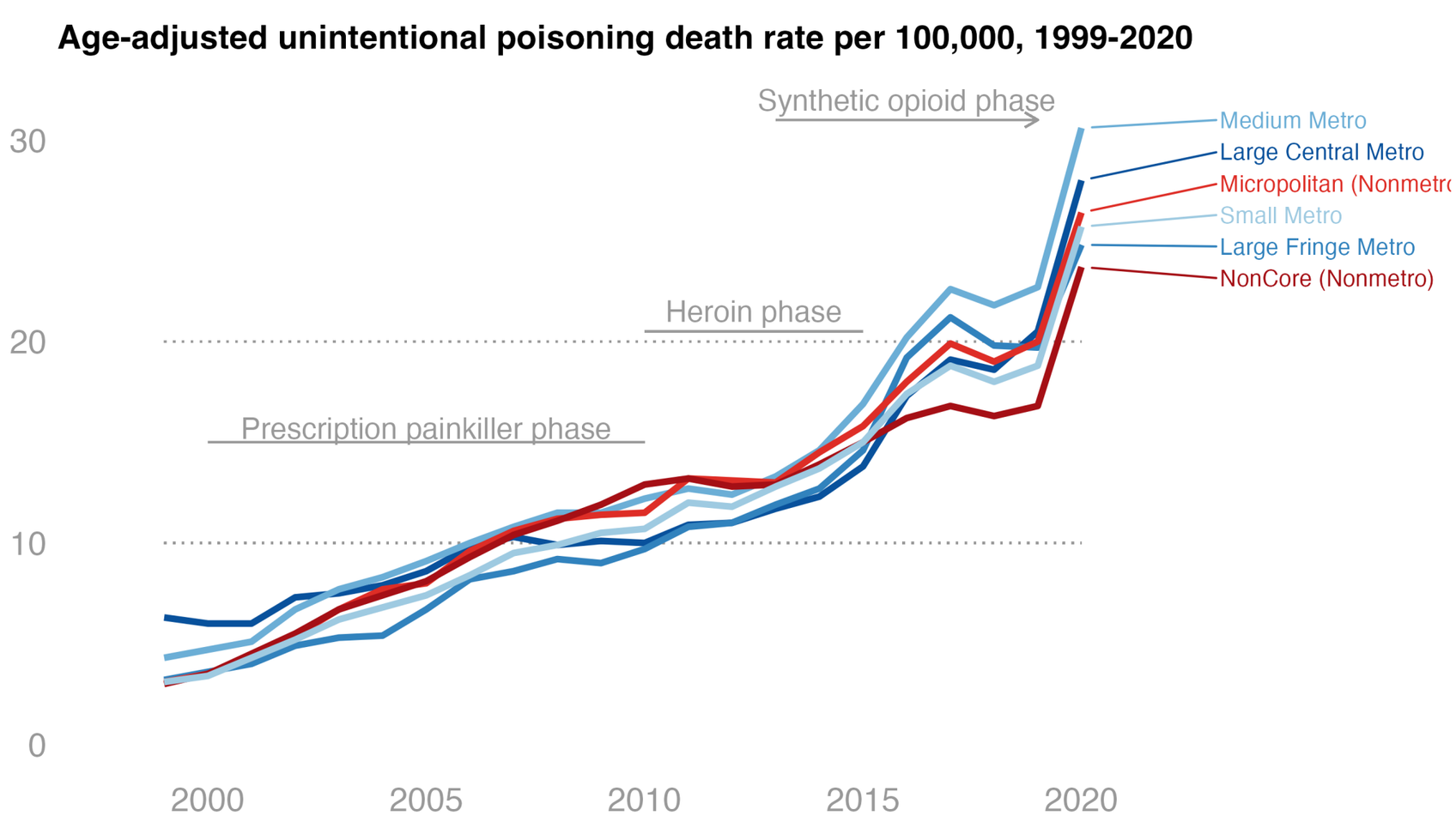
- Rural-urban mortality gap began widening in 1980s.
- Slower CVD declines.



Source: Author's calculations.

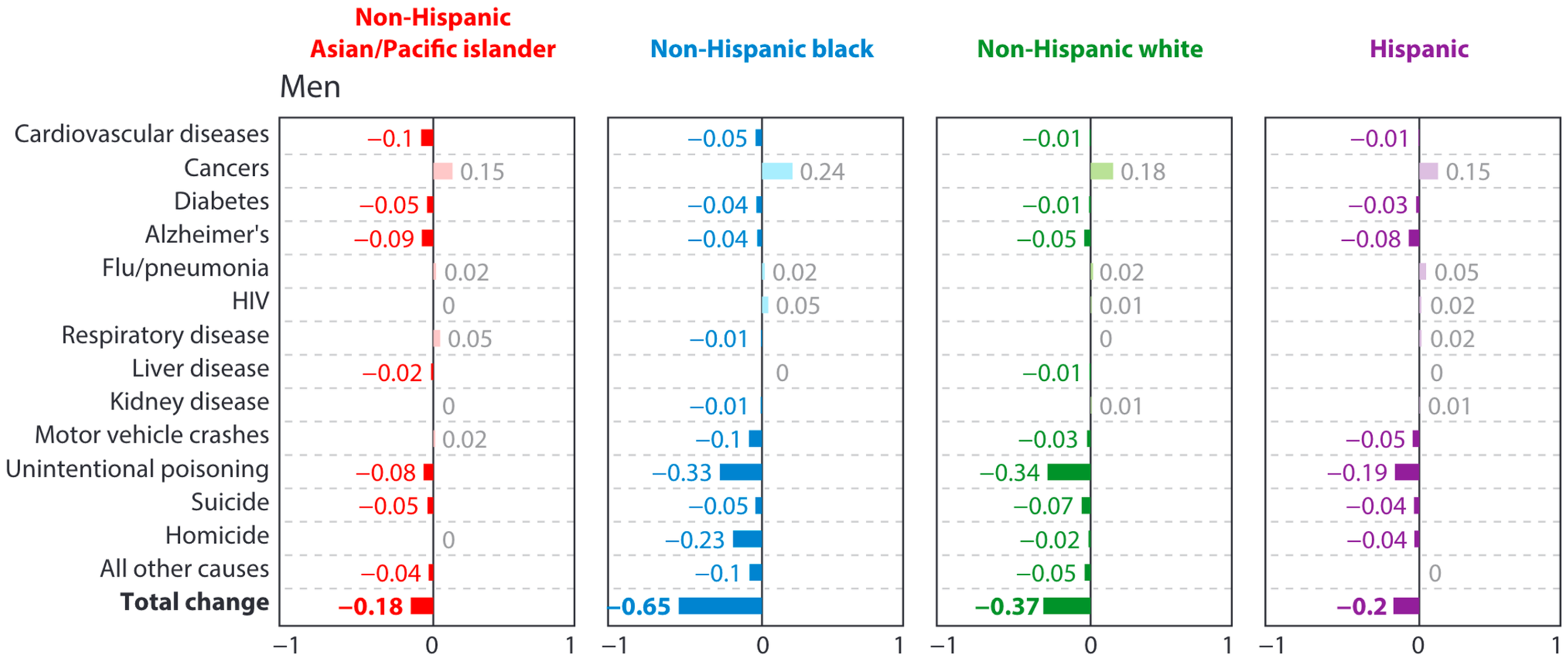
The story of rural opioid deaths masks population-wide impacts.

Ignores large (growing) impact of CVD.



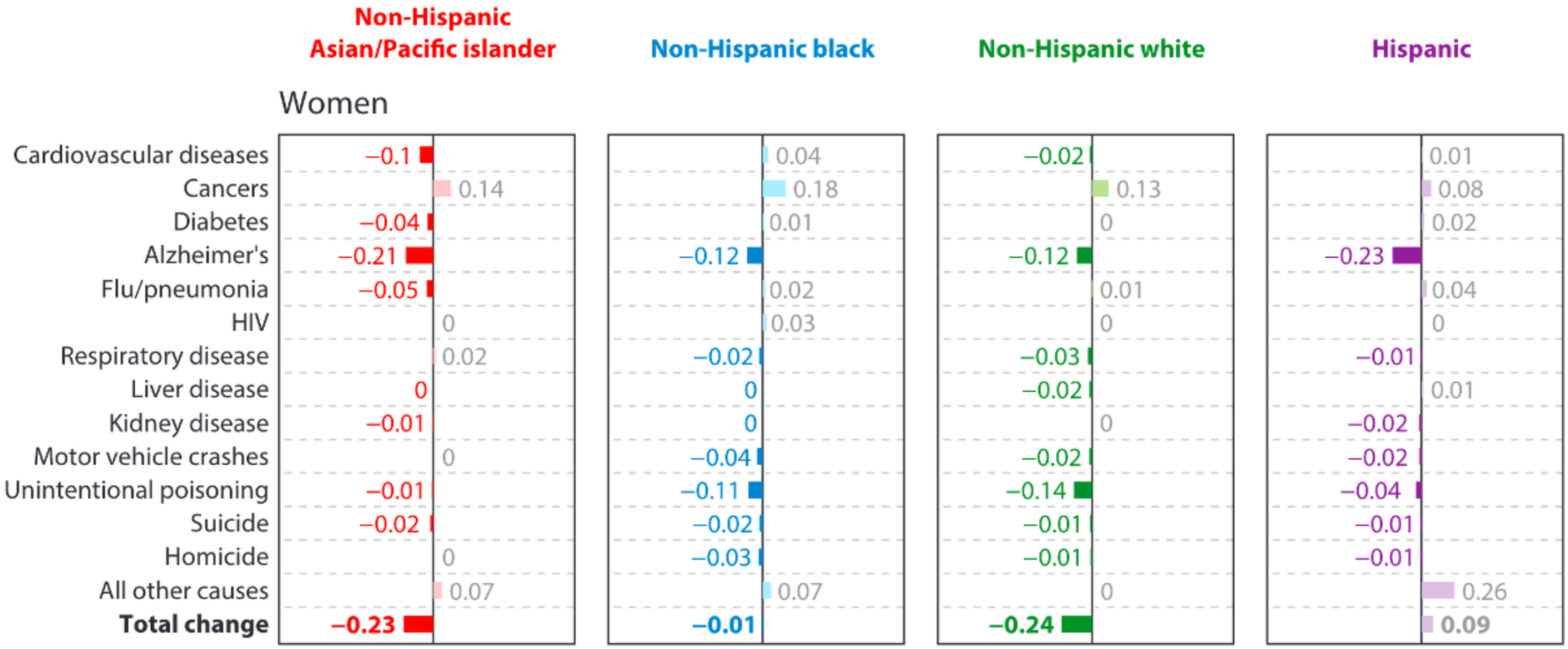
Source: Author's calculations.

Years of life lost 2014-2017, by gender, race, and cause



Harper et al. (2021)

Years of life lost 2014-2017, by gender, race, and cause

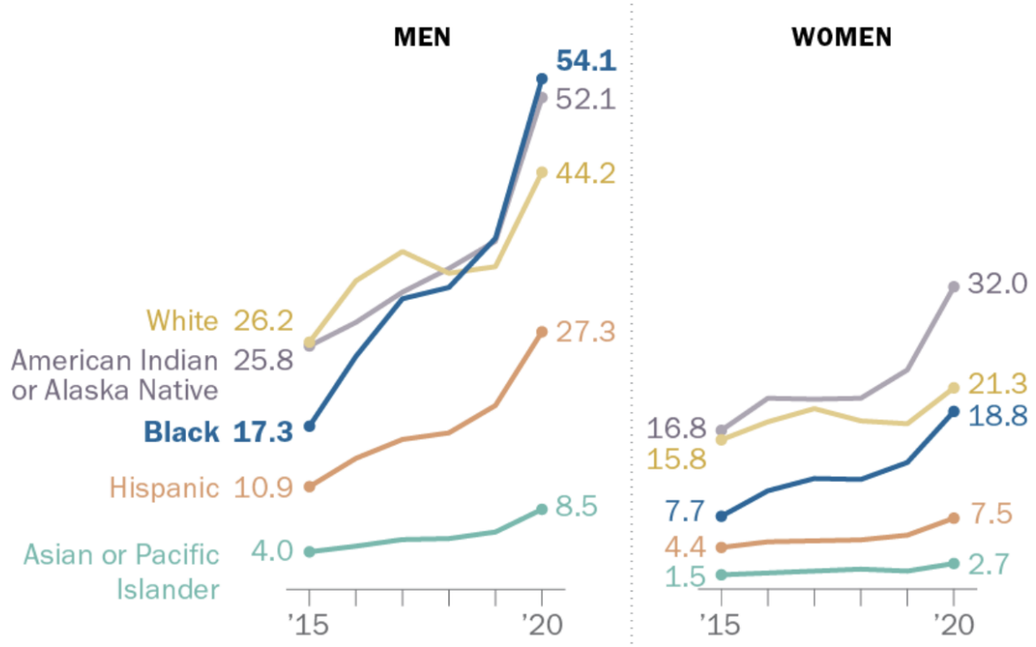


Harper et al. (2021)

- Much faster increases in opioid overdoses among Blacks *and* American Indian and Alaska Natives in recent years.
- Cannot be chiefly explained by the loss of economic opportunities among rural white men.

Drug overdose death rate among Black men in the U.S. more than tripled between 2015 and 2020

U.S. drug overdose death rate per 100,000 people, by race and ethnicity (age-adjusted)



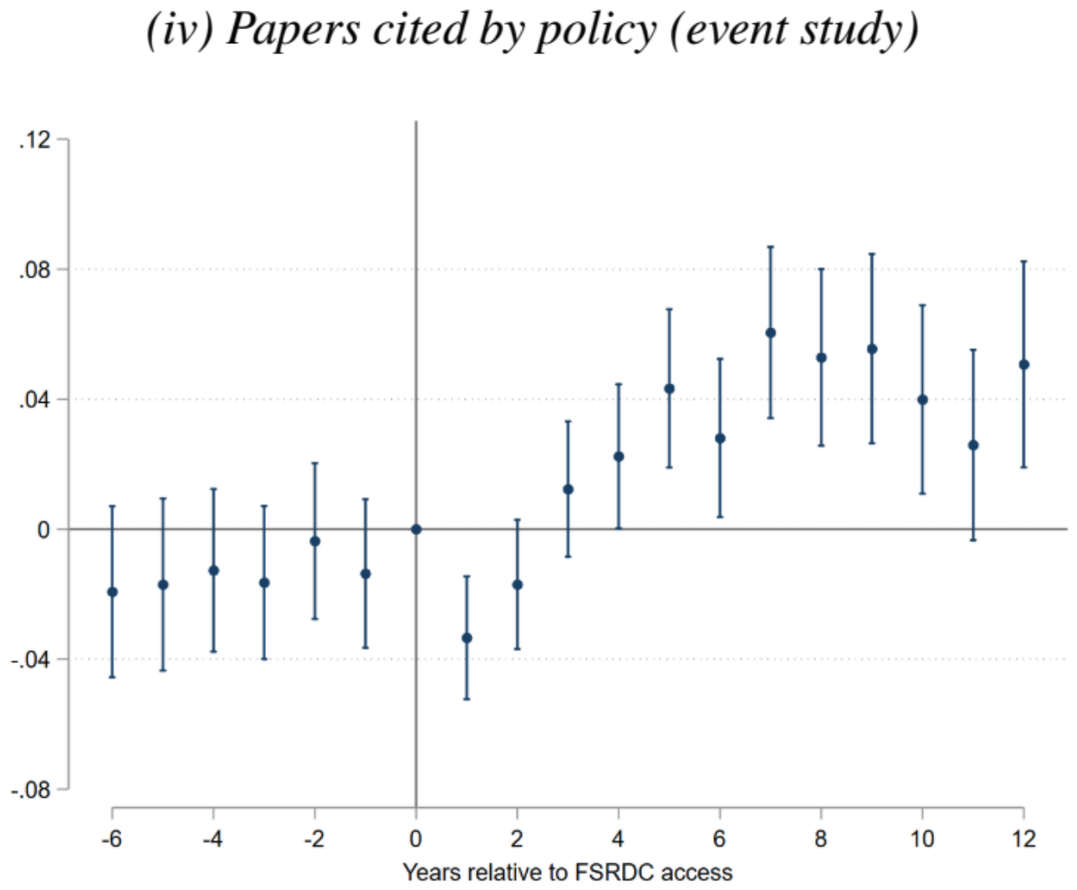
Note: All racial categories include people of one race, as well as those who are multiracial. For those who are multiracial, the CDC selects a single race to allow for consistent comparisons. All racial groups refer to non-Hispanic members of those groups, while Hispanics are of any race.
Source: Centers for Disease Control and Prevention.

PEW RESEARCH CENTER

Source: Pew Research Center

Access to better data improves science

- 30 confidential data centers created 1994-2019.
- Improved researcher productivity.
- Stronger research designs.
- Outputs from improved access saw increased citation by policy documents.



Nagaraj and Tranchero (2023)

Parting thoughts

- Novel empirical methods exist to go beyond just describing health inequalities.
- When used properly, explanatory methods can help to provide key evidence on why health inequalities exist and change over time.
- Narratives matter: they identify heroes and villains, emphasize particular causes and populations, set the agenda for interventions, and minimize alternative explanations and solutions.

References

Basu S, Hong A, Siddiqi A. Using decomposition analysis to identify modifiable racial disparities in the distribution of blood pressure in the united states. Am J Epidemiol. 2015 Aug;182(4):345–53.

Case A, Deaton A. Rising morbidity and mortality in midlife among white non-hispanic americans in the 21st century. Proc Natl Acad Sci U S A. 2015 Dec;112(49):15078–83.

Case A, Deaton A. Deaths of despair and the future of capitalism. In: Deaths of despair and the future of capitalism. Princeton University Press; 2020.

Evans CR, Williams DR, Onnela JP, Subramanian SV. A multilevel approach to modeling health inequalities at the intersection of multiple social identities. Soc Sci Med. 2018 Apr;203:64–73.

Harper S, Riddell CA, King NB. Declining life expectancy in the united states: Missing the trees for the forest. Annu Rev Public Health. 2021 Apr;42:381–403.

McGuire TG, Alegria M, Cook BL, Wells KB, Zaslavsky AM. Implementing the institute of medicine definition of disparities: An application to mental health care. Health services research. 2006;41(5):1979–2005.

Merlo J. Multilevel analysis of individual heterogeneity and discriminatory accuracy (MAIHDA) within an intersectional framework. Soc Sci Med. 2018 Apr;203:74–80.

Nagaraj A, Tranchero M. How does data access shape science? Evidence from the impact of U.S. Census's research data centers on economics research [Internet]. National Bureau of Economic Research; 2023 Jun. Available from: https://doi.org/10.3386%2Fw31372

Persmark A, Wemrell M, Evans CR, Subramanian S, Leckie G, Merlo J. Intersectional inequalities and the US opioid crisis: Challenging dominant narratives and revealing heterogeneities. Critical Public