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Using Cause-of-Death Data to Better Understand the U.S Increasing Disadvantage in Mortality

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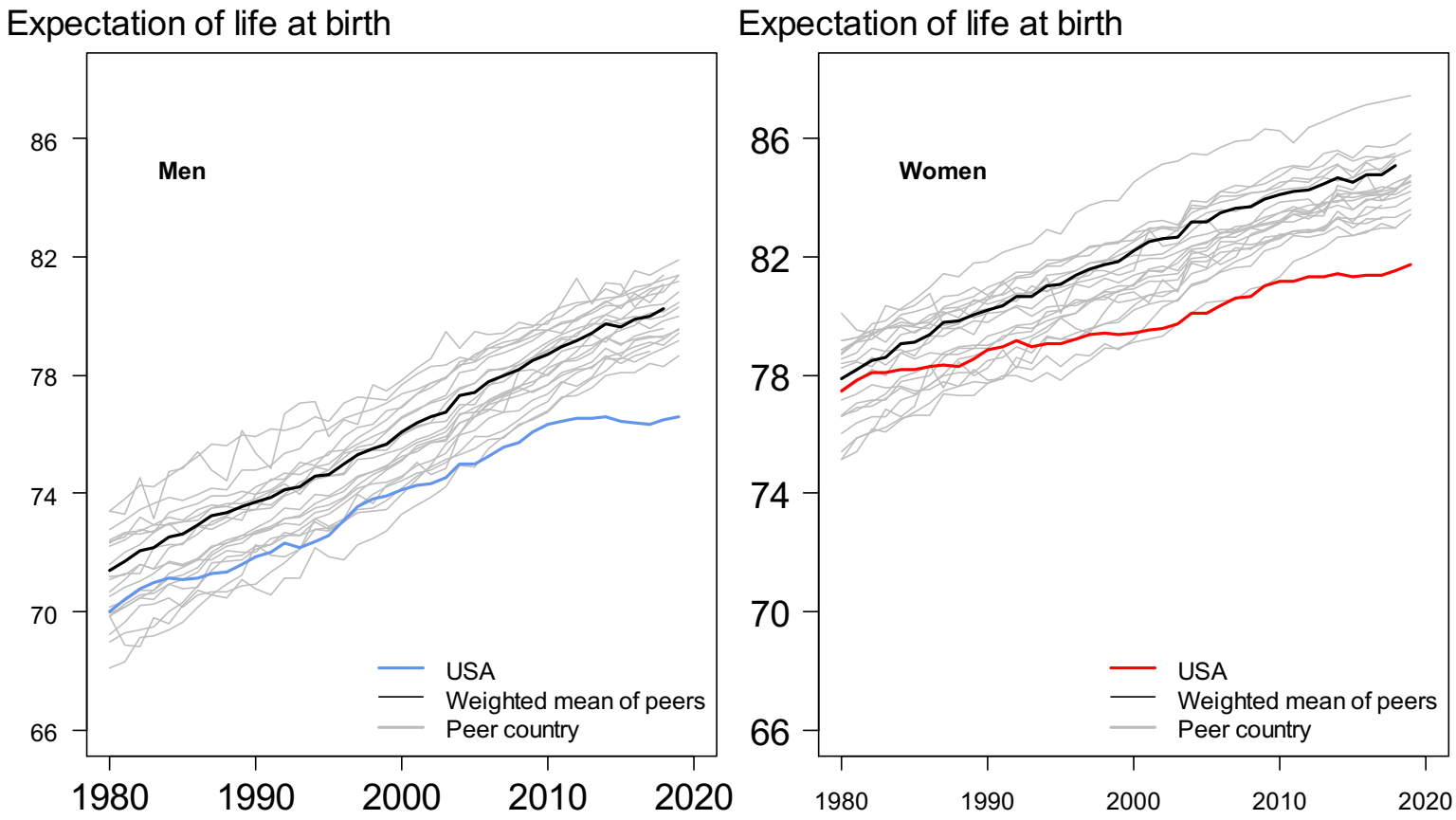
Research question

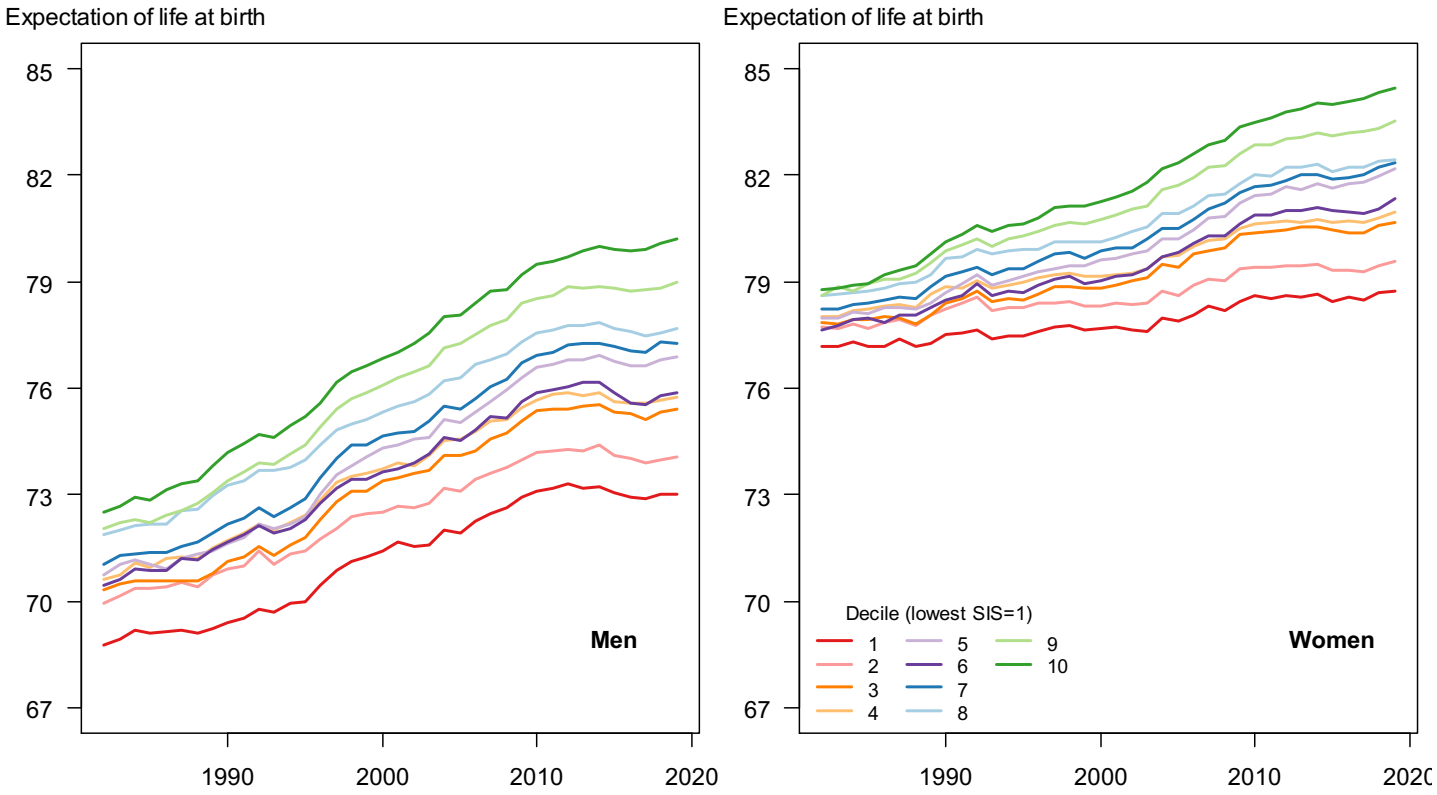
How do mortality disparities within the US contribute to the US international disadvantage in life expectancy ?

The US disadvantage in mortality



Source: constructed from HMD data.

County-level socioeconomic inequalities in mortality



Source: constructed from NCHS Multiple Mortality Files.

Builds on the USMDB project usa.mortality.org

The United States Mortality DataBase: lifetable series for all

- US Census Regions, Divisions and states since 1959
- soon to be extended back to 1937

=> HMD methods protocol

- US counties since 1982

=> statistical methods for small-population areas (Alexander, Zagheni , Barbieri, 2017)

Overview of methods

1. Construct a single socioeconomic score (SES) for each US county (Singh and Siahpush, 2002, 2006)
2. Rank counties, weight by population, and group into deciles of approx. equal size (~10% total US population)
3. Compute lifetable series and cause-specific mortality rates
   a. for each SES decile for 1982-2019 (lifetables), 2000-2019 (rates)
   b. for peer countries and the US for corresponding years
4. Estimate cause-of-death contributions to life expectancy difference between US/SES decile and peer countries

Data and sources

1. Socioeconomic scores (by county) : 2000 Census
2. US mortality (1982-2019)
   - Individual birth and death records (NCHS-NAPHSIS)
     With sex, age at death, county of residence, and underlying cause of death
   - July 1st population estimates (Census Bureau)
     By sex, age and county
3. Peer countries' lifetables (1980-2019): Human Mortality Database
4. Peer countries' cause-specific mortality rates (2000-2017+): WHO
   (Australia, Austria, Belgium, Canada, Germany, Denmark, Spain, Finland, France, the UK, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Sweden)

Socioeconomic score

- Socioeconomic variables used to construct the SES score:
  1. % pop. 25+ with <9 years of education
  2. % pop. 25+ with 4+ years of college
  3. % pop. 16+ in white collar occupations
  4. Unemployment rate
  5. Median household income adj. for state median housing costs
  6. Ratio of median income in 1st and 5th quintiles
  7. % pop. < Federal poverty threshold
  8. Median home value (owner occupied units)
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  10. % housing with no telephone
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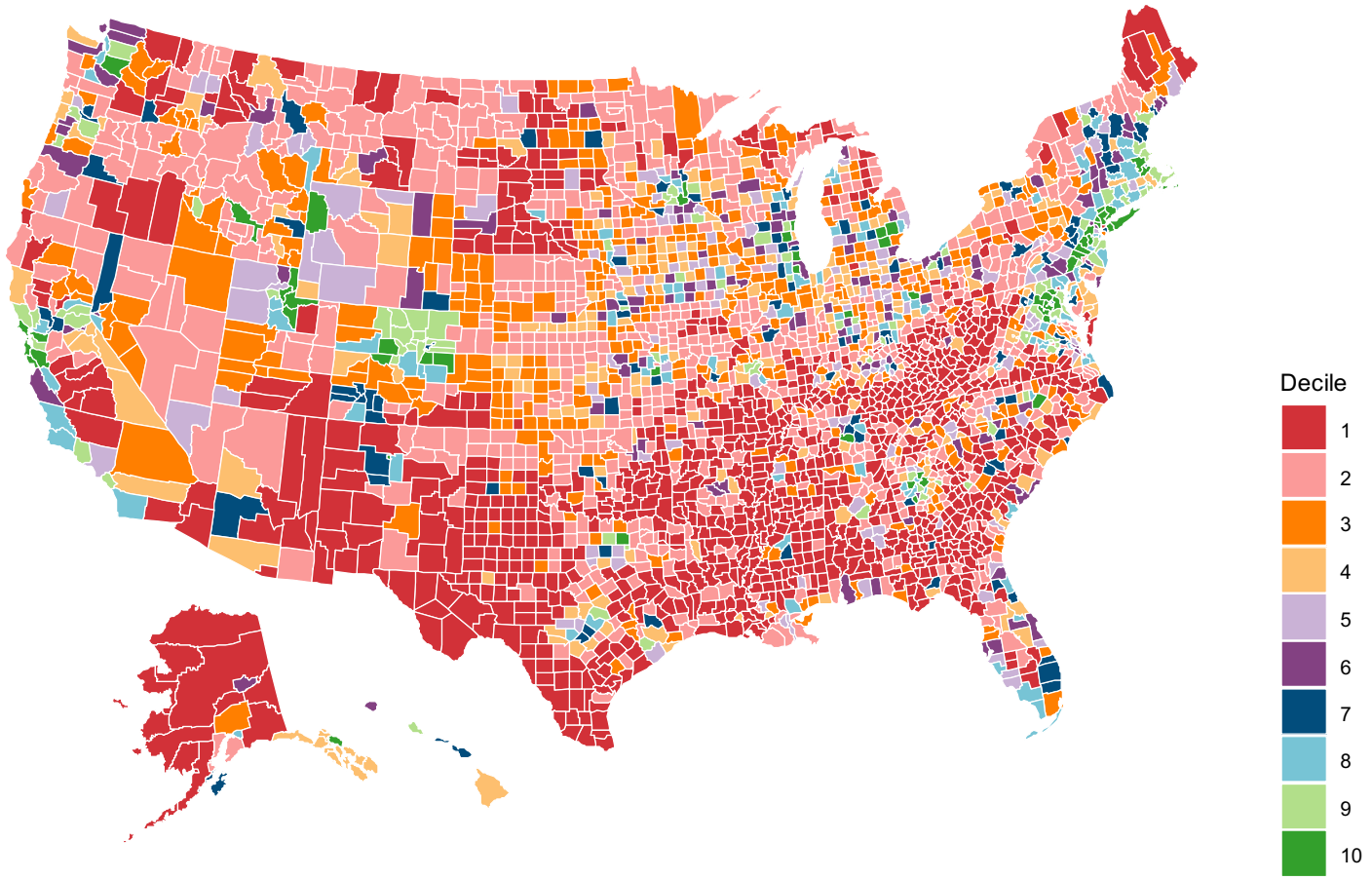
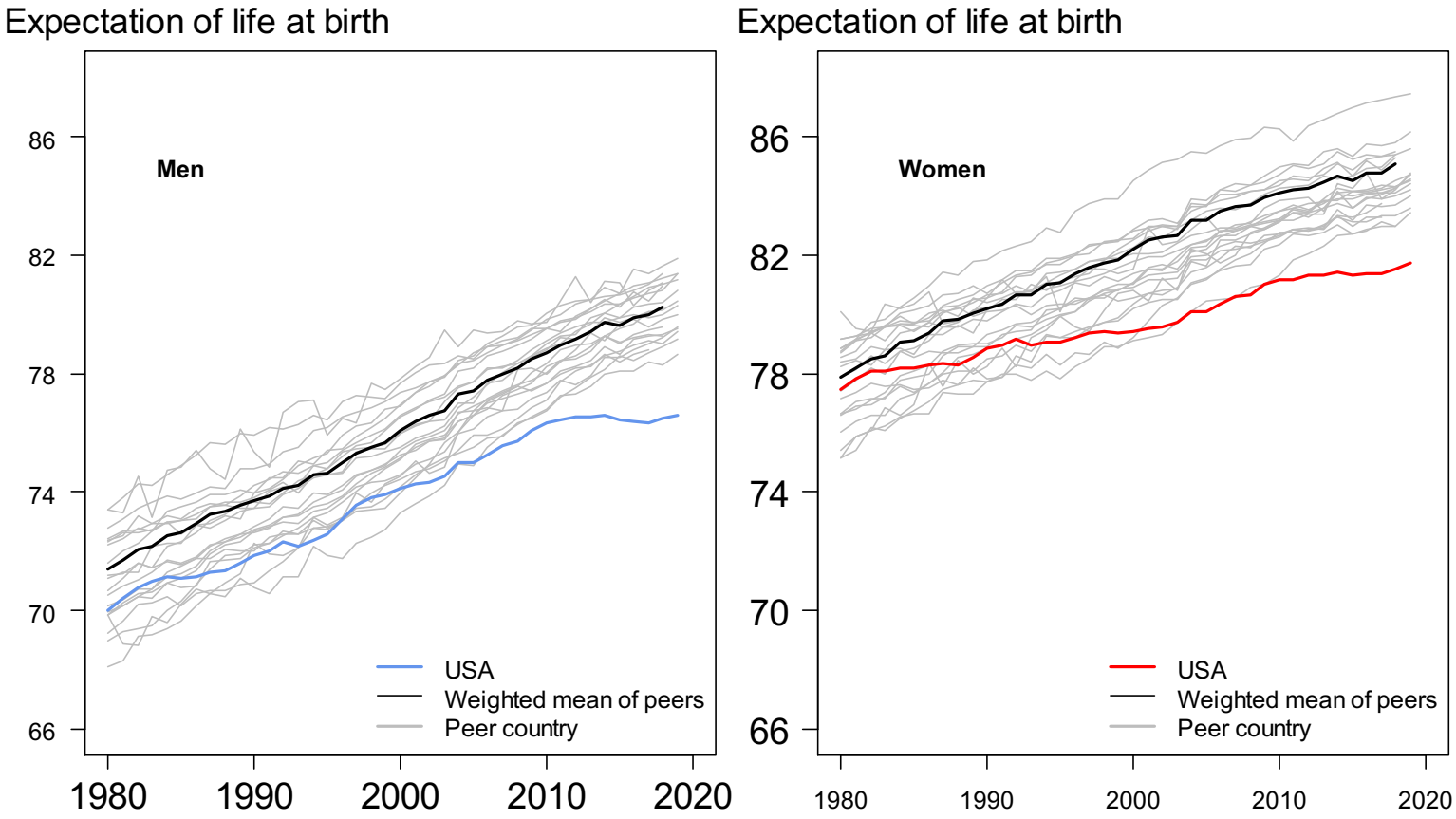
Construction of deciles

- Extraction of socioeconomic variables for each county from the census
- Principal Component Analysis
  1. Standardization
  2. Correlation matrix
  3. Extraction of principal components
- Correlations with 1st component applied to each variable for each county and summed up to yield a single SES score
- Counties ranked on their scores and weighted by their population
- Grouping of counties in 10 categories (deciles), each representing about 10% of the US population

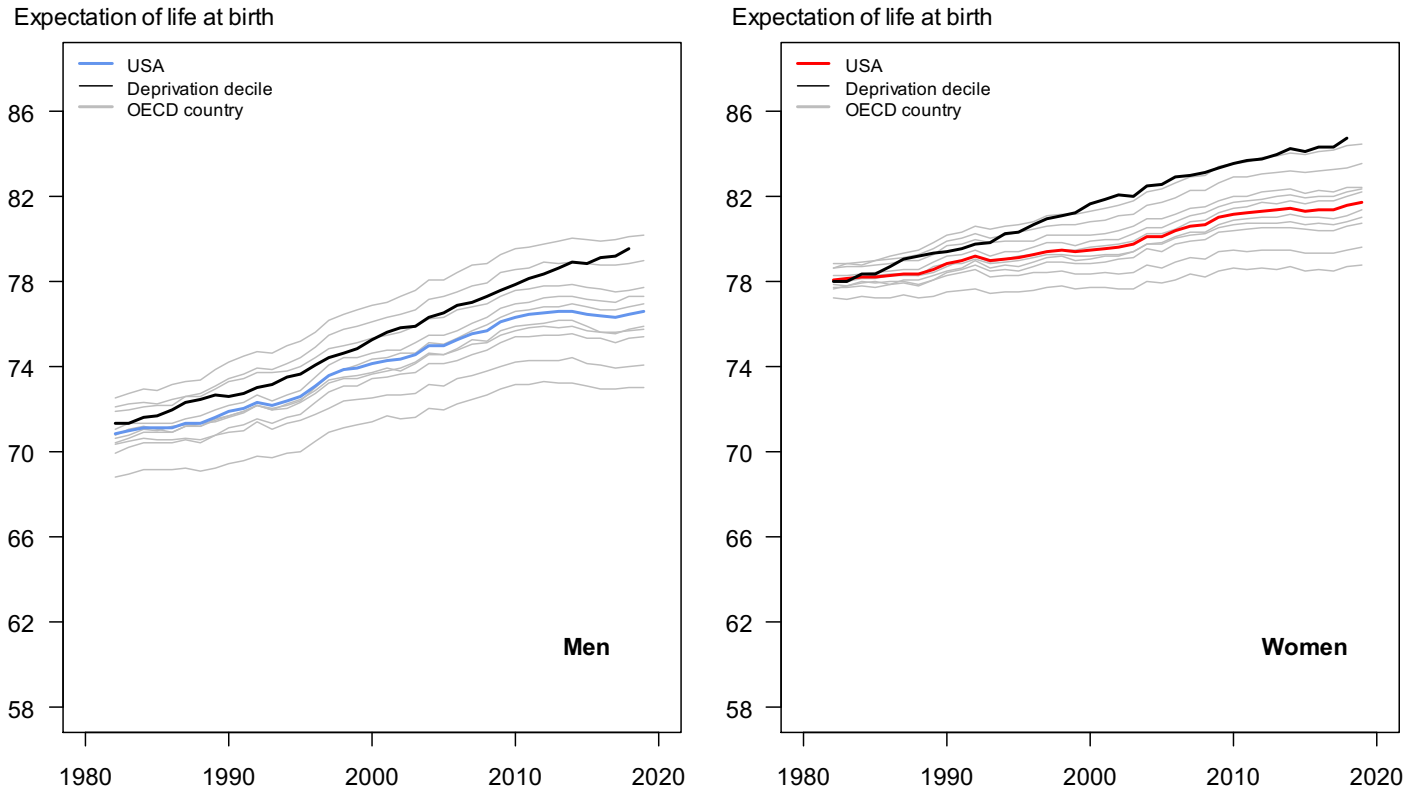
Distribution of counties by socioeconomic decile in 2000



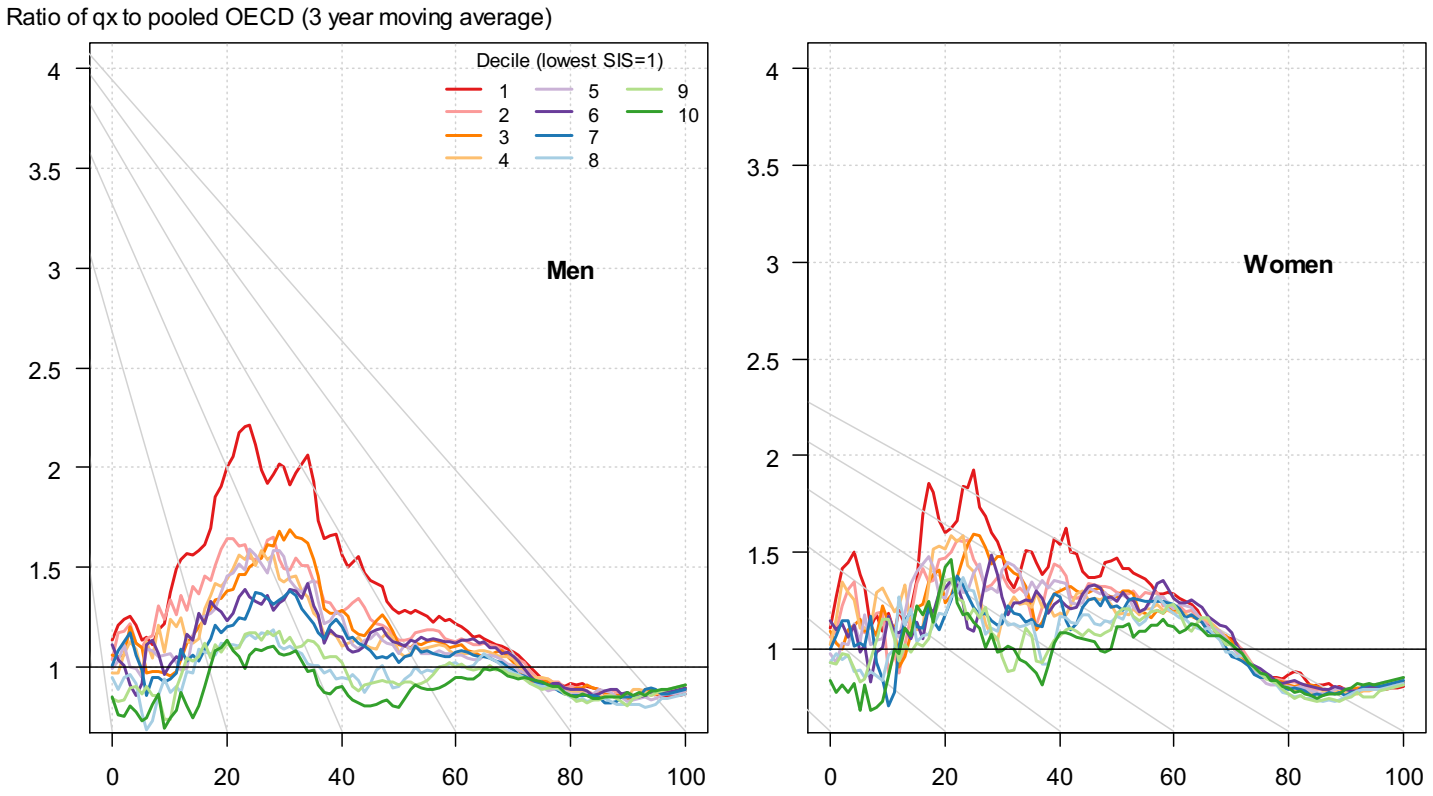
The US disadvantage in mortality



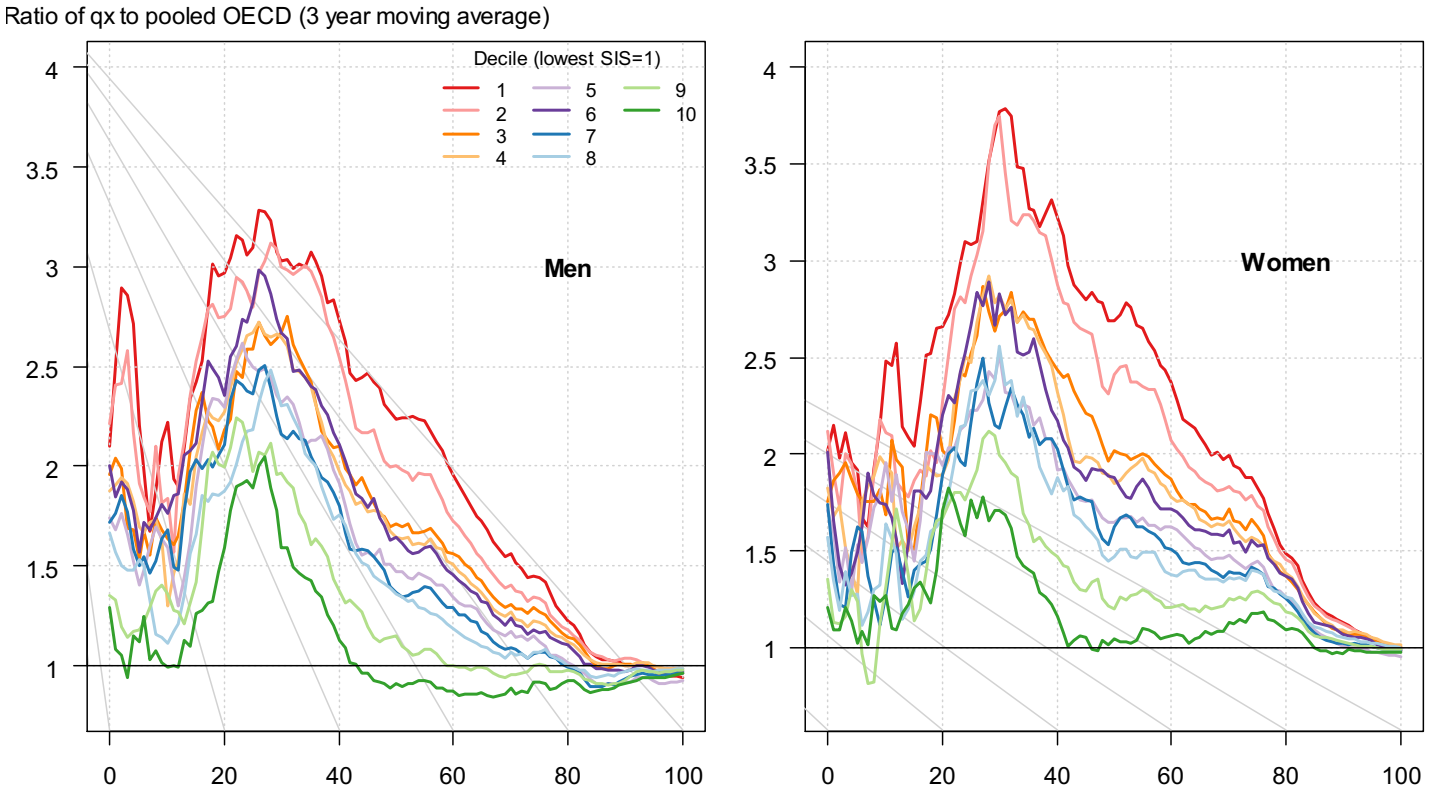
County-level socioeconomic inequalities in mortality and the US disadvantage in mortality



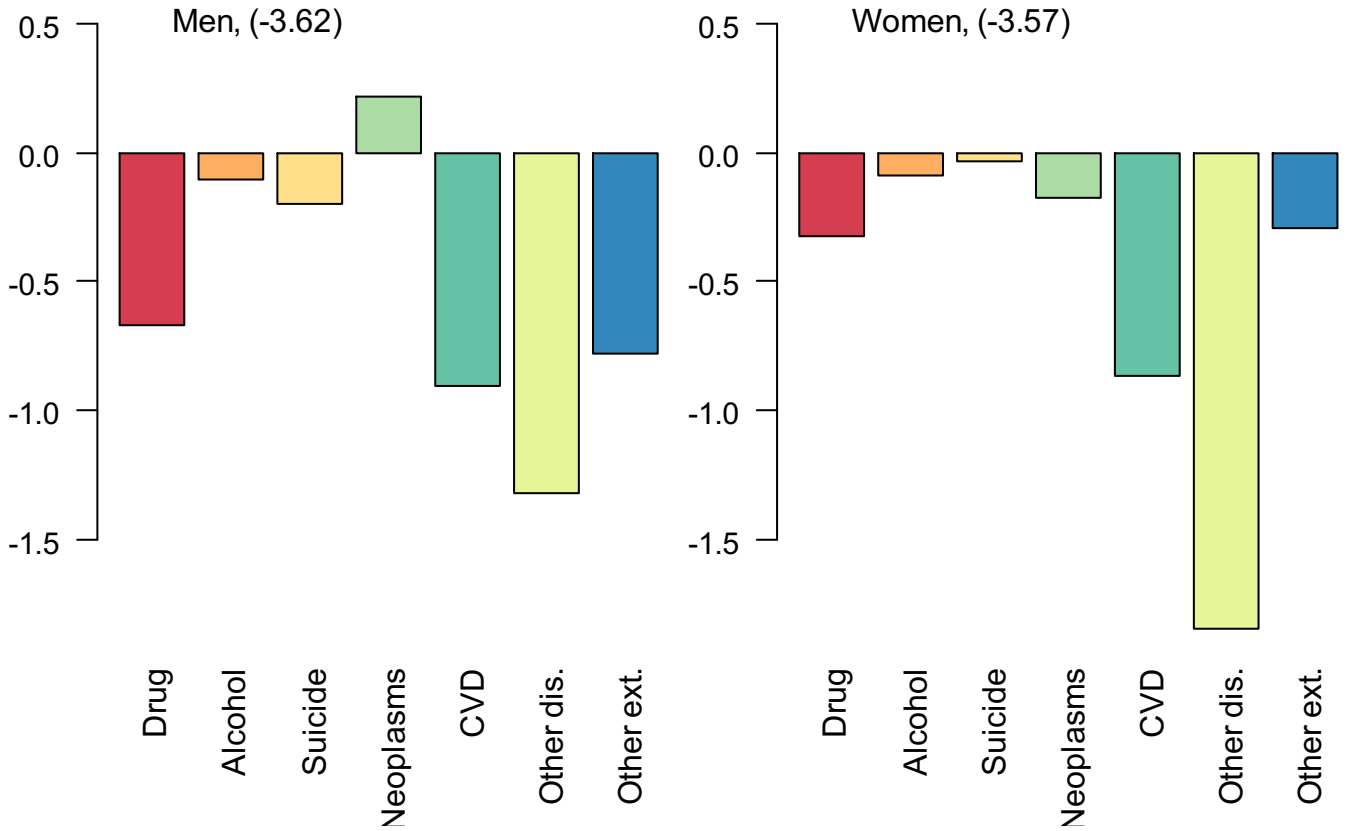
Ratio of qx values, US Deciles/Pooled OECD, 1982



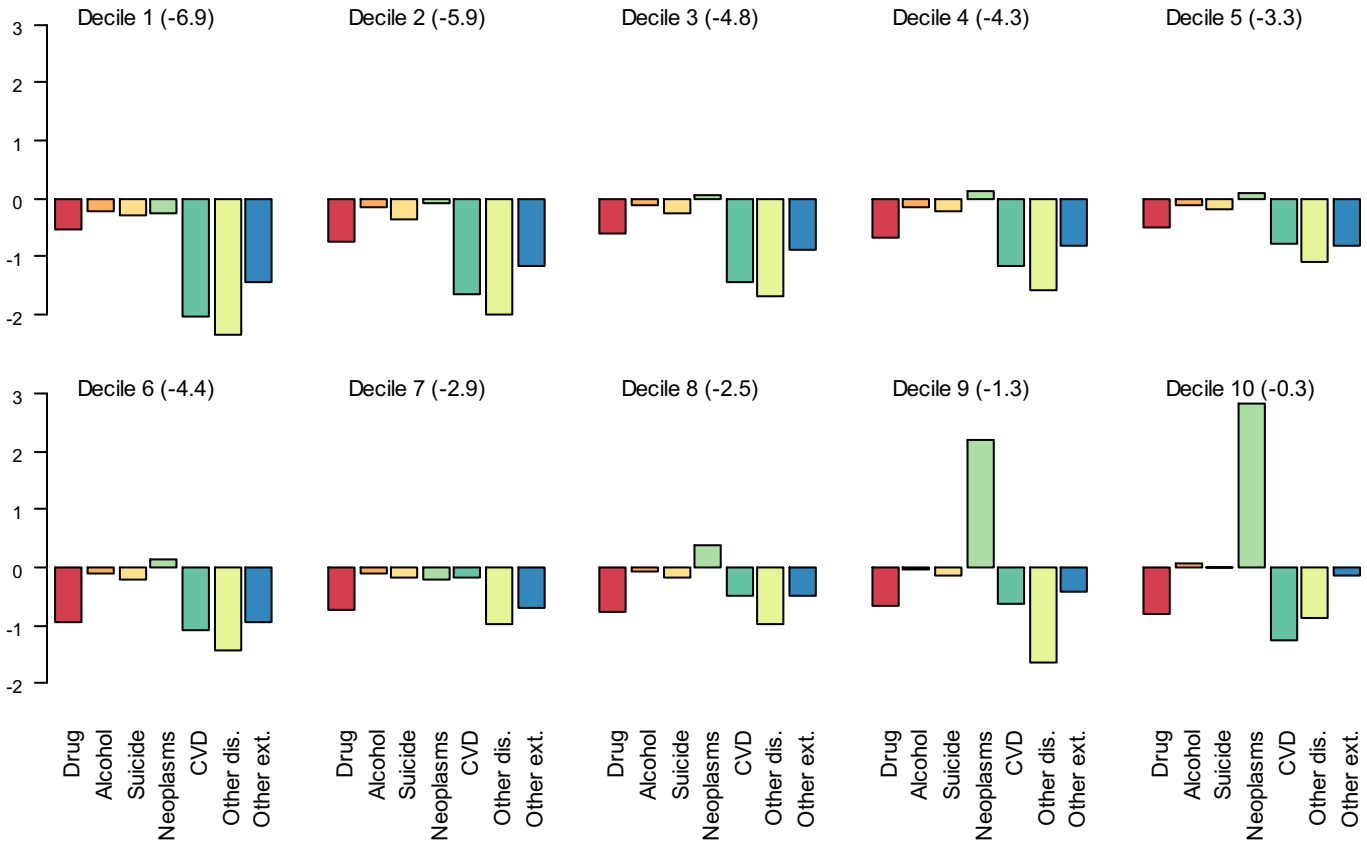
Ratio of qx values, US Deciles/Pooled OECD, 2019



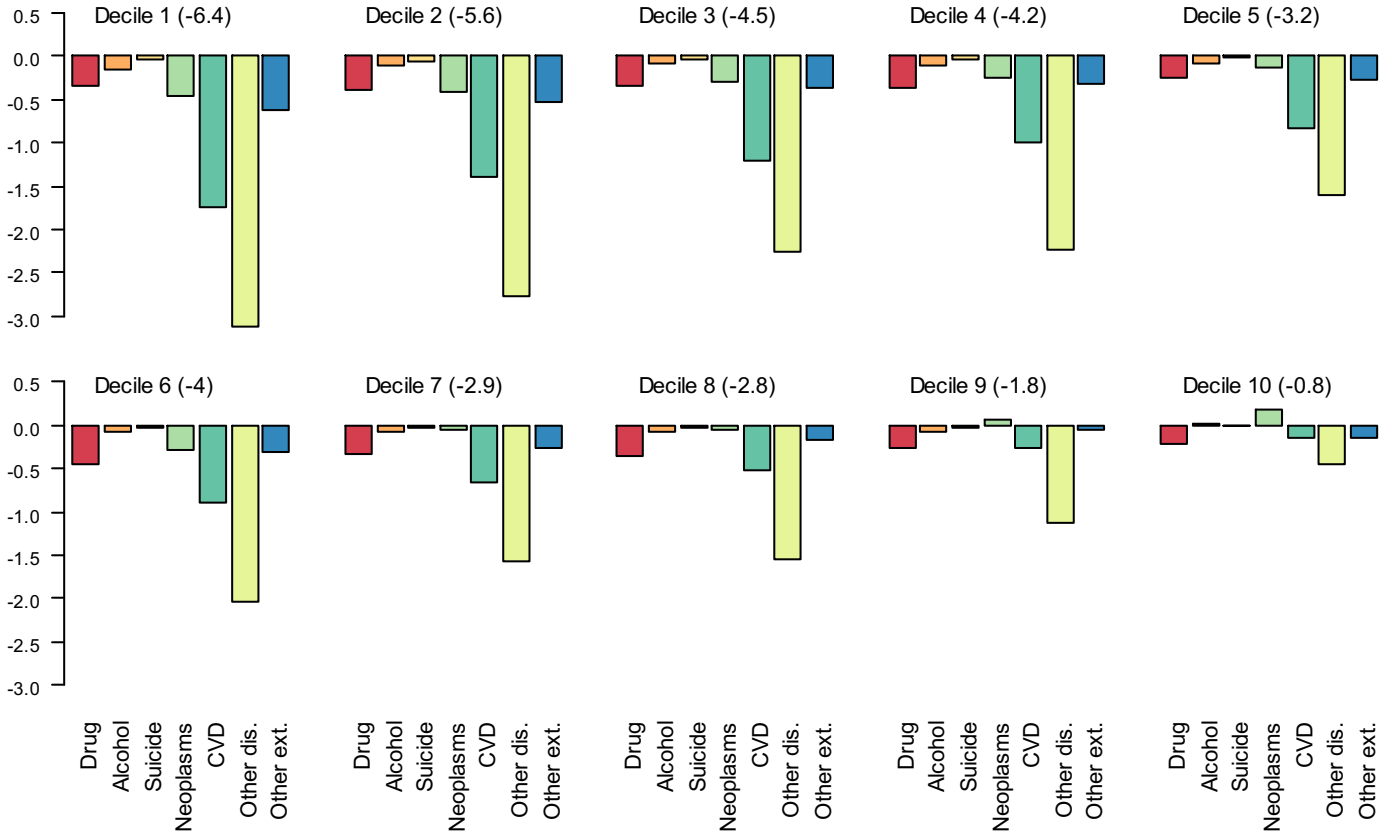
Cause-of-death contributions to the US disadvantage in life expectancy at birth (US vs. weighted mean of peers), 2017



Cause-of-death contributions to life expectancy gap between SES deciles and aggregate of peer countries, all ages combined, men, 2017



Cause-of-death contributions to life expectancy gap between SES deciles and aggregate of peer countries, all ages combined, women, 2017



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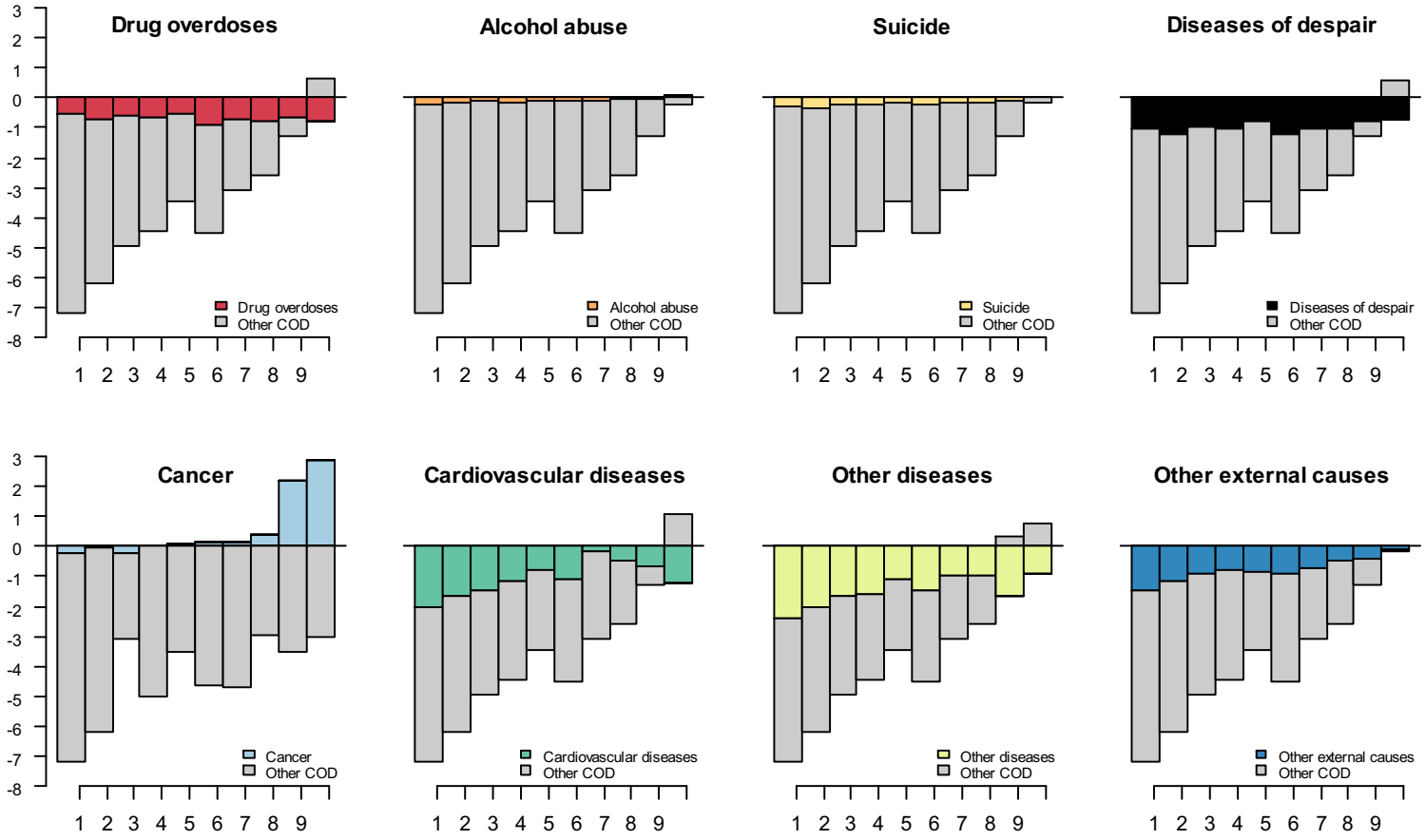

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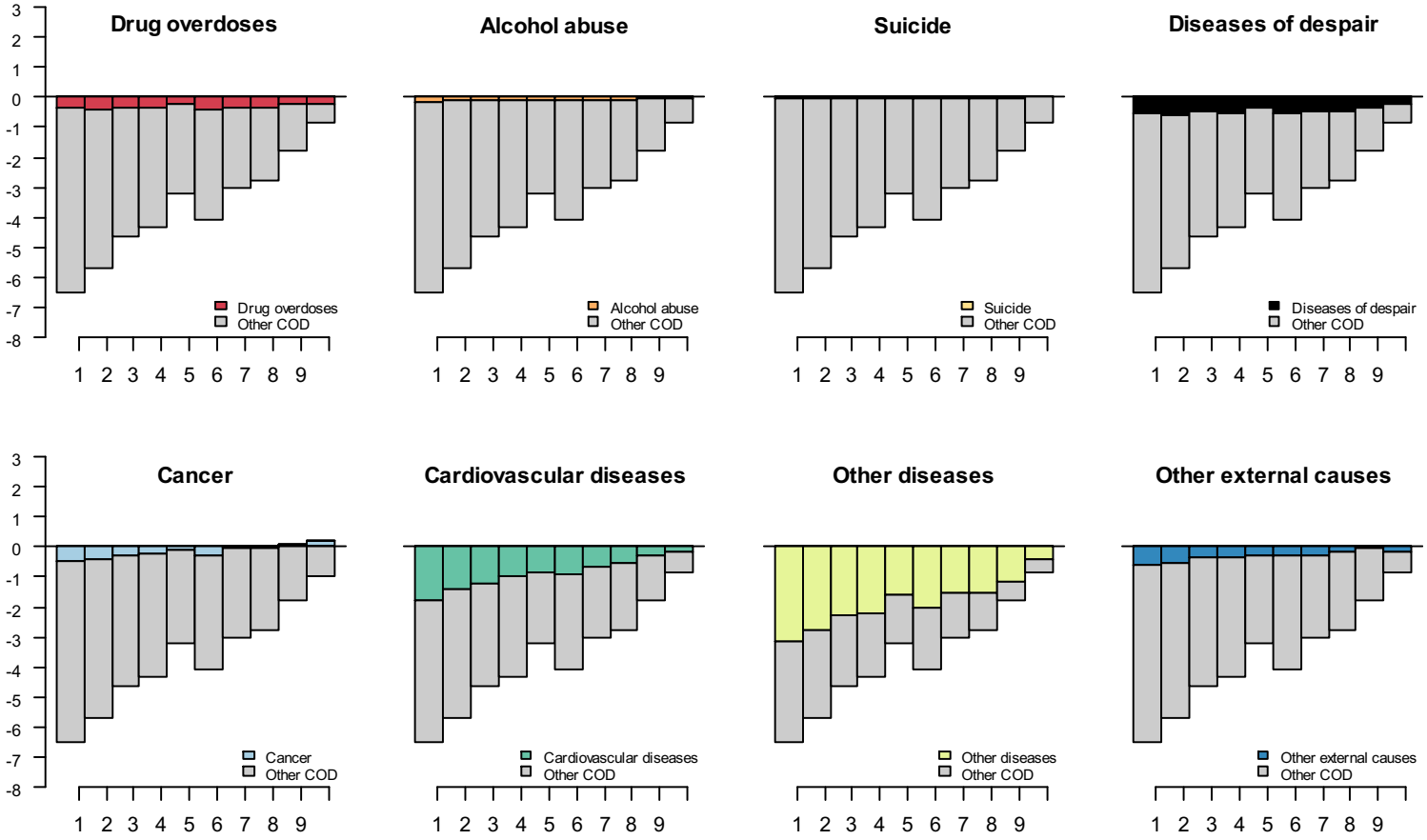
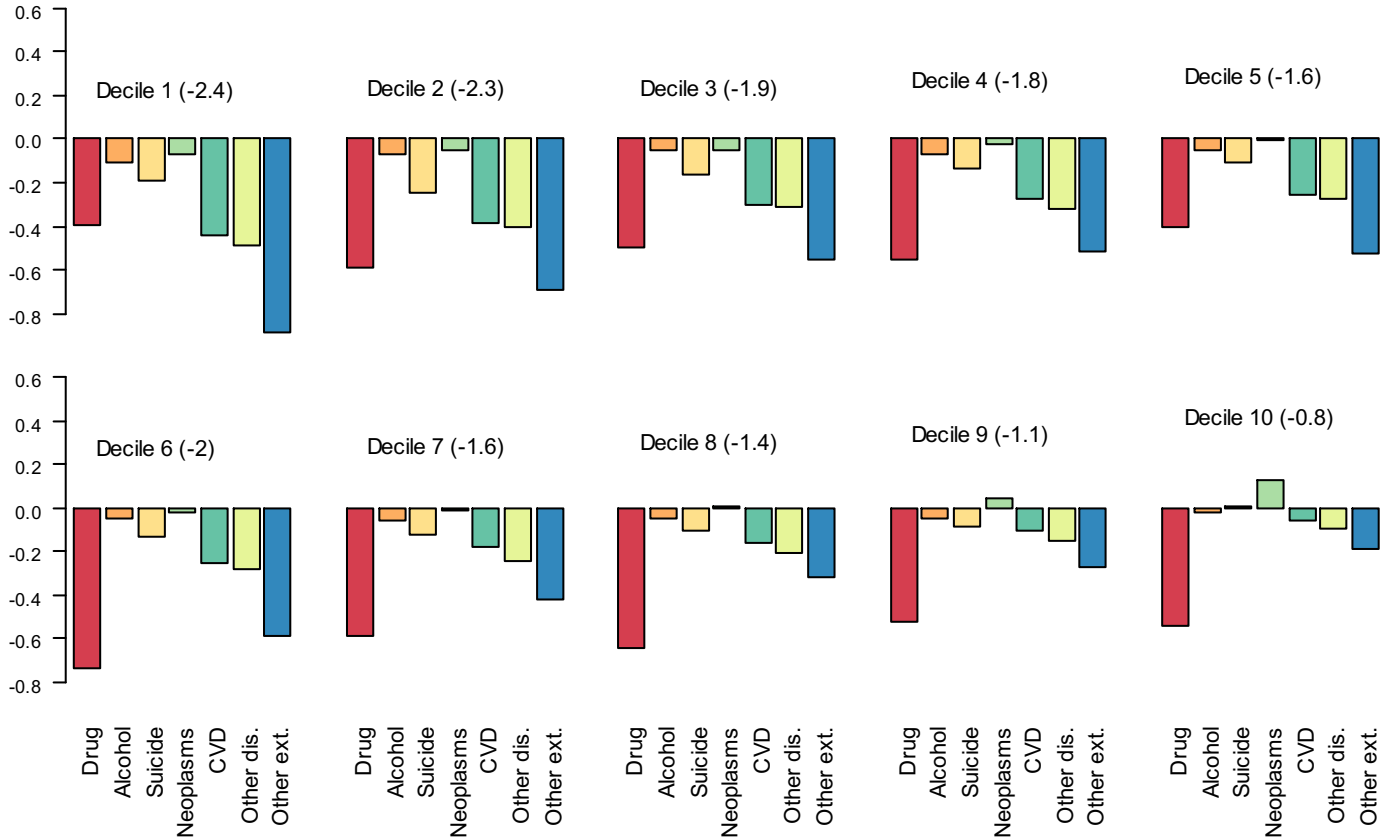
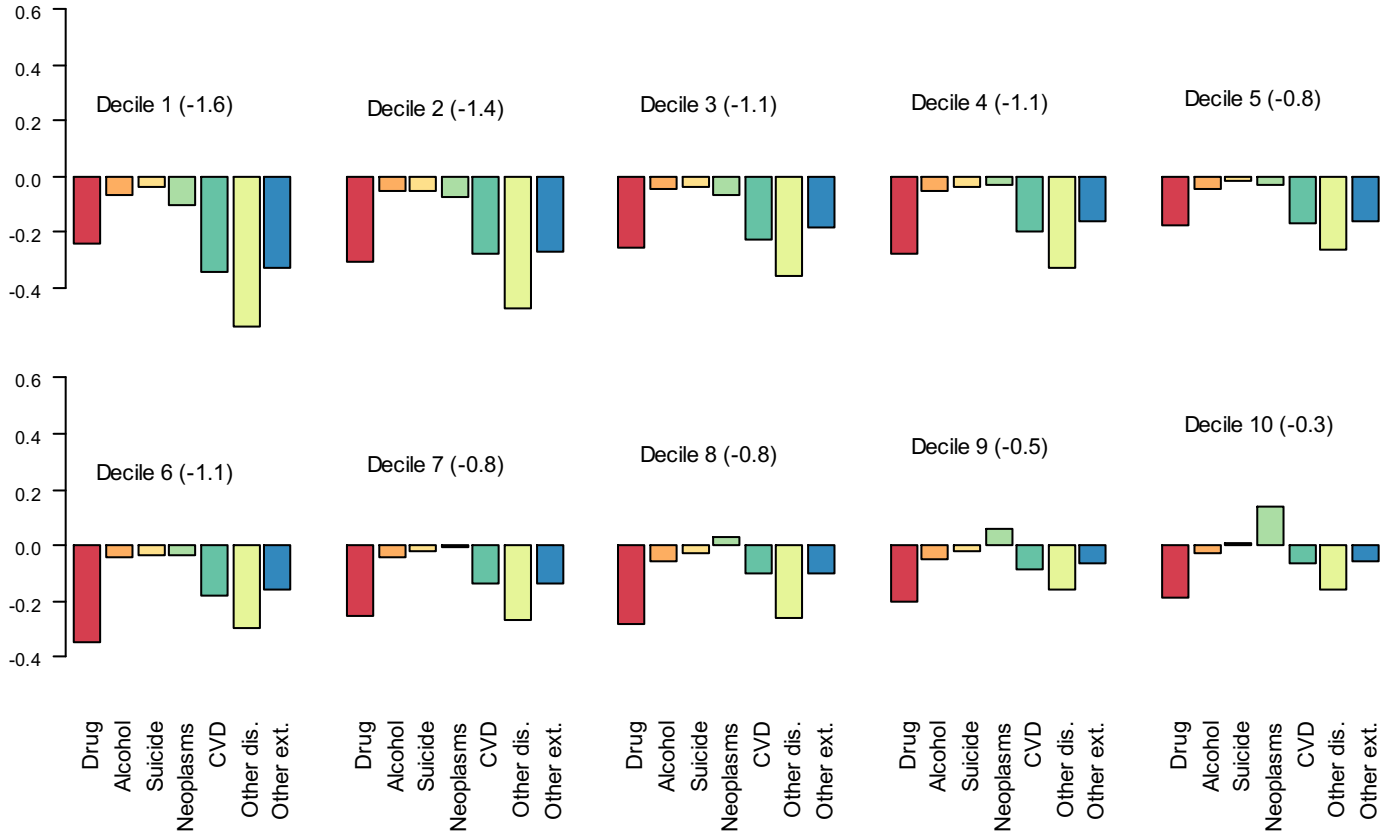


Cause-of-death contributions to life expectancy gap between SES deciles and aggregate of peer countries, ages 20-50, men, 2017



Cause-of-death contributions to life expectancy gap between SES deciles and aggregate of peer countries, ages 20-50, women, 2017



Conclusion

1. County-level socioeconomic disparities in mortality are large in the United States…
2. … but even the 10% Americans of either sex in the most affluent counties are not doing that well compared with peer countries
3. All cause-of-death categories contribute to the disadvantage, except for cancer (for men)
4. Mortality is particularly high in the US (especially for women) relative to the comparison group at young adult ages (20-50 years old), in large part due to the diseases of despair
5. After age 85, US men are doing relatively well in terms of survival relatively to peer countries but their advantage is eroding

Acknowledgments

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