The impact of the COVID-19 pandemic on socio-economic disparities in mortality in the United States

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Why do we care about variations in mortality?

- Equity => public health priority of the US government (« Eliminate health disparities »)
- Demonstrate potential for mortality improvement
- Identify the primary drivers of health outcomes
- Understand how socio-economic factors shape health behavior

Research questions

1. What was the socio-economic gradient in mortality before COVID?
2. Which age groups most contributed to socio-economic disparities in mortality?
3. Do socio-economic disparities in mortality explain the US disadvantage in life expectancy?
4. How has COVID affected previous patterns?

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1. **Group** all US **counties** into 10 socio-economically homogeneous groups
2. **Compute lifetables** for each of the 10 groups of countries

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1. Construction of a county-level Socioeconomic Index Score (SIS) using Principal Component Analysis (Singh 2003, 2006)
2. Distribution of all U.S. counties in 10 groups (deciles) based on their SIS (weighted by population)
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Data and sources

1. Socioeconomic variables (by county)
   - 2000 Census
2. Mortality (1982-2022)
   - Individual death records (NCHS)

     with sex, age at death, underlying cause of death and county/State of residence
   - July 1st population estimates (Census Bureau)

     By sex, age and county/State

Socioeconomic variables to build the SIS

1. **% population aged 25+ <9 years of education**
2. **% population aged 25+ >=12 years education**
3. % population aged 16+ in a white collar occupations
4. Unemployment rate for the population 16+ years
5. Median household income
6. Ratio of average HH income in lowest to highest quintile
7. % population <Federal poverty threshold
8. Median home value for owner occupied units
9. Median gross rent for rental units
10. % housing without telephone
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Construction of socioeconomic deciles

- Extraction/calculation of socioeconomic variables from the 2000 census
- Principal Component Analysis
  1. Normalization of variables
  2. Construction of variance/covariance matrix
  3. Extraction of principal components
- Correlations on 1st component applied to each variable to build the SIS
- Ranking of counties on the SIS
- Split into 10 groups (deciles) after weighing by population size

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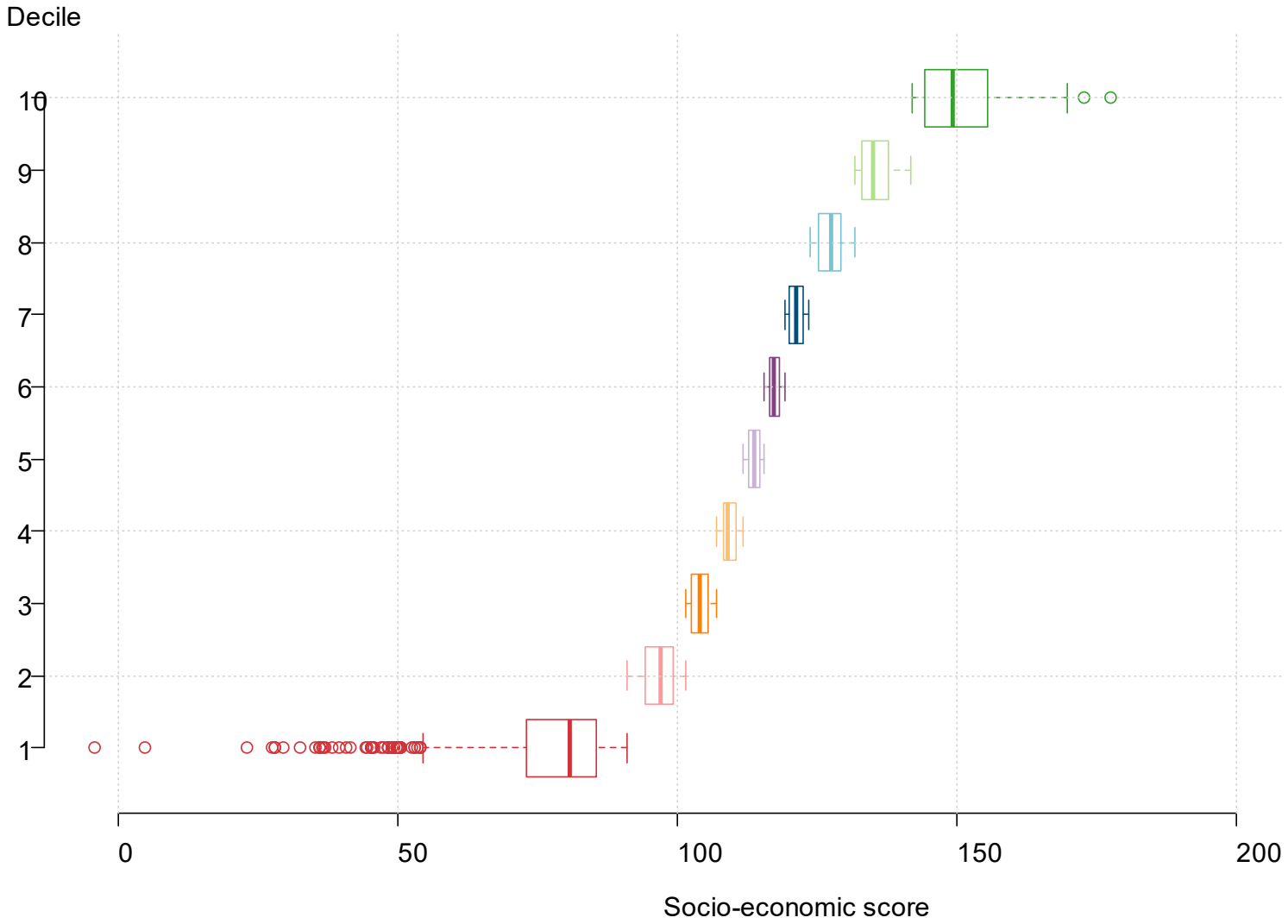
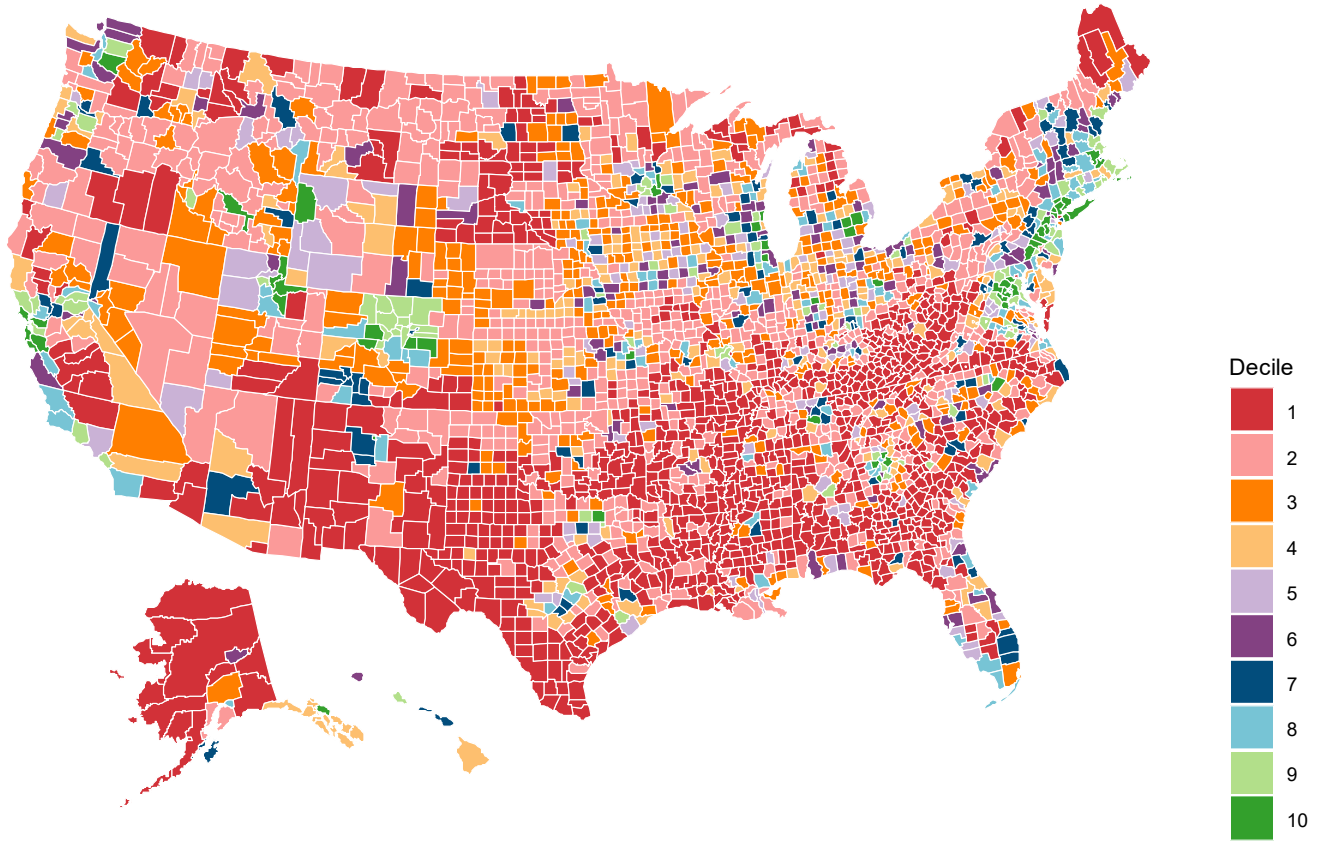
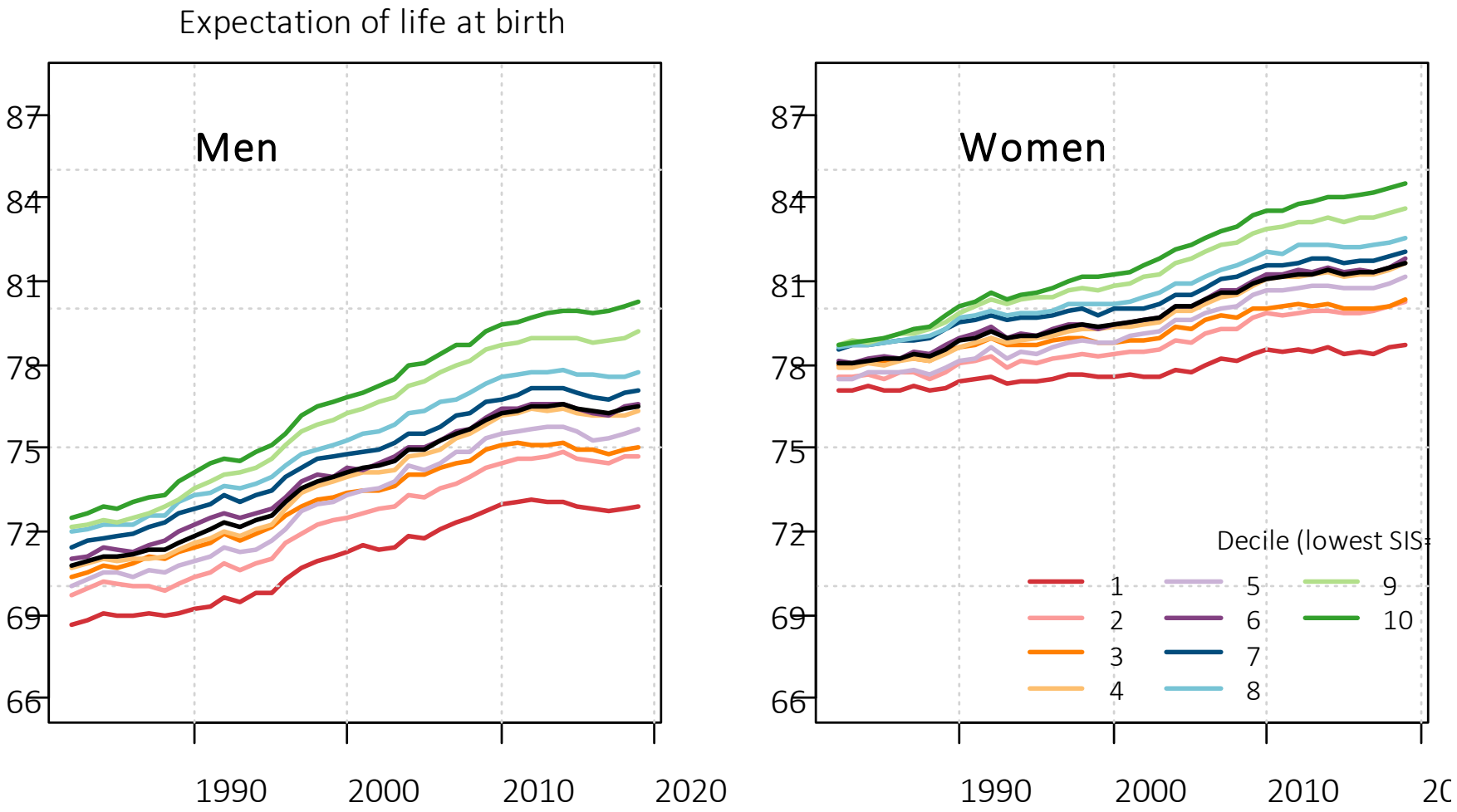
County distribution on socioeconomic score within each decile



Distribution of counties by socioeconomic decile in 2000



A clear and increasing gradient in mortality from 1982 to 2019



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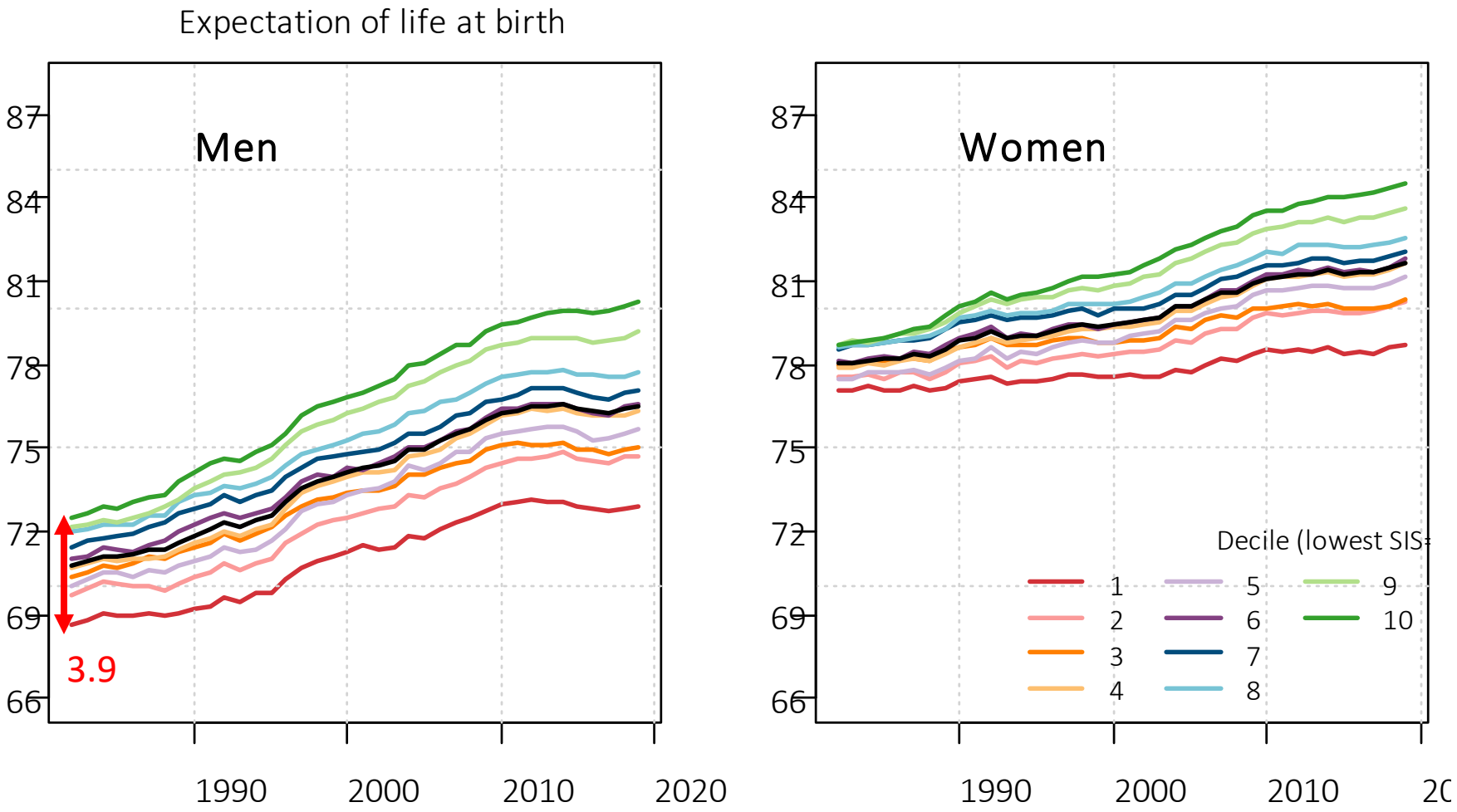

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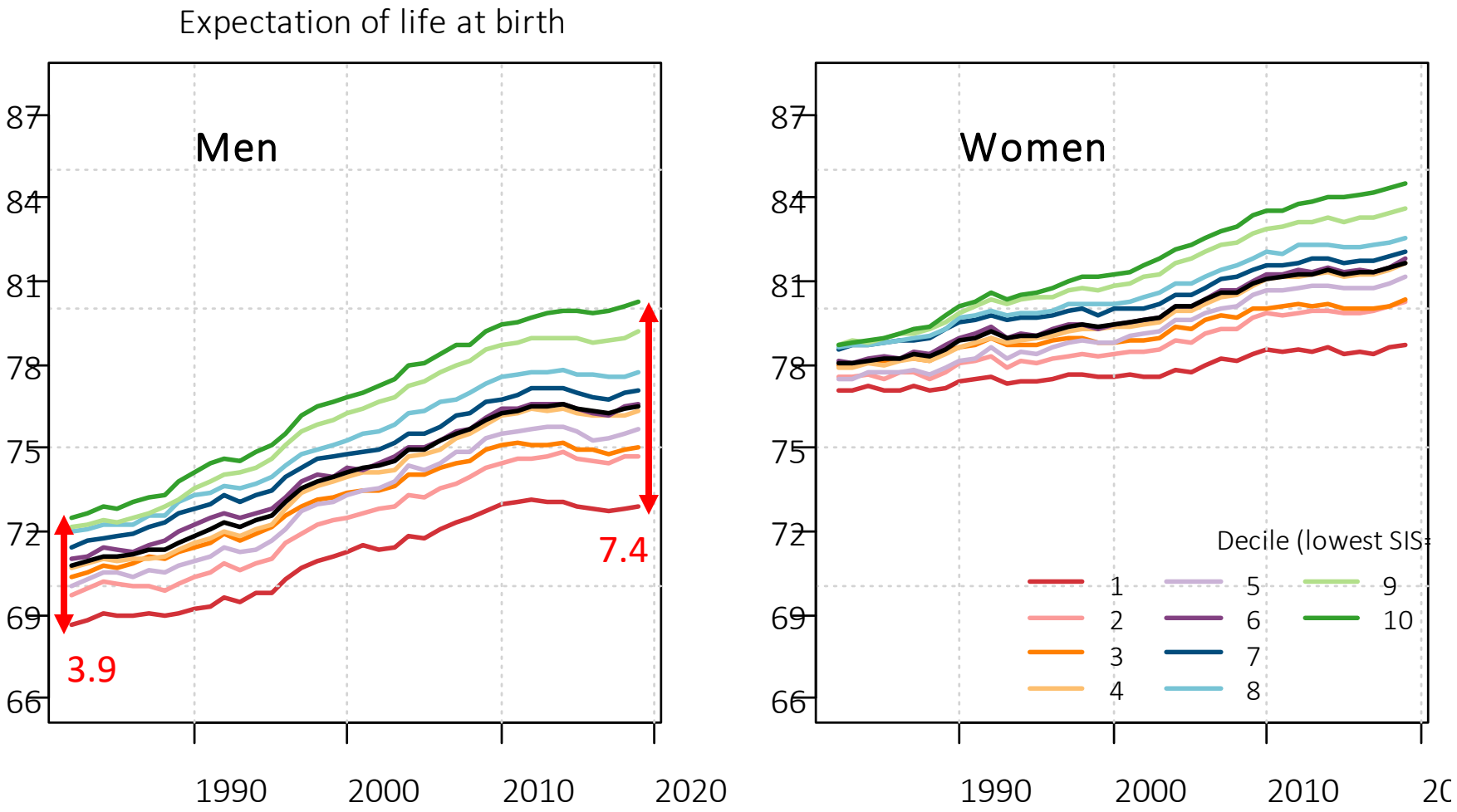

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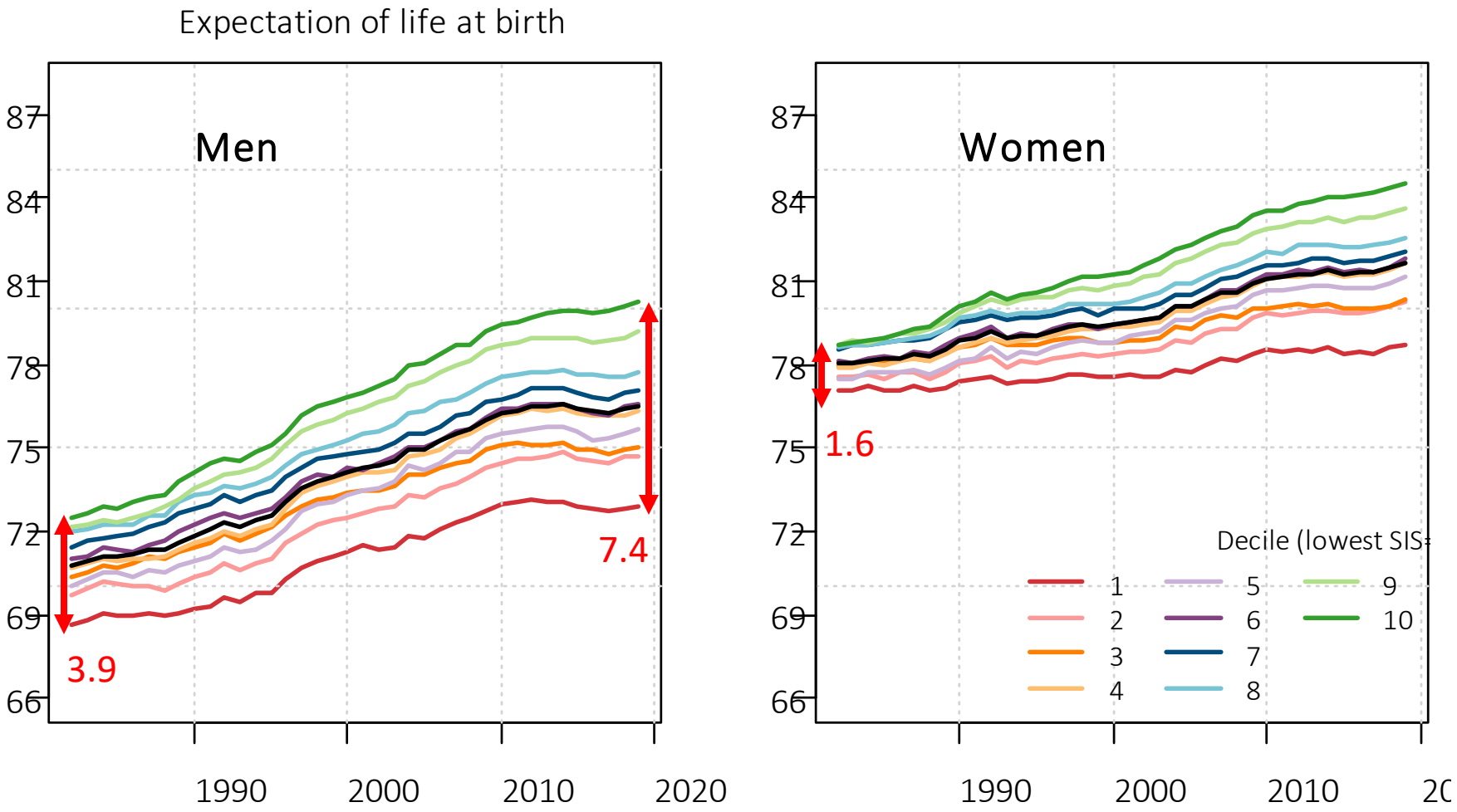

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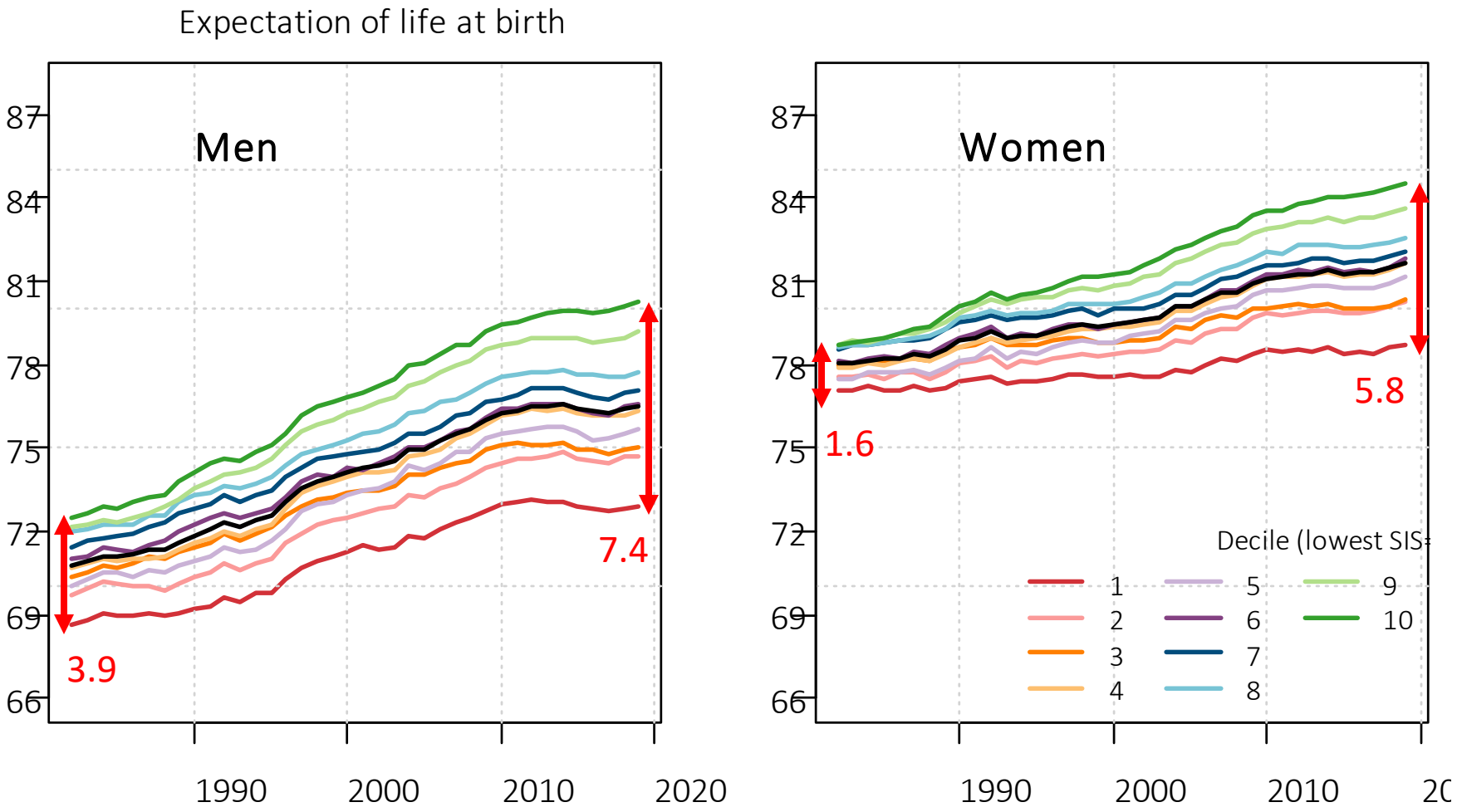
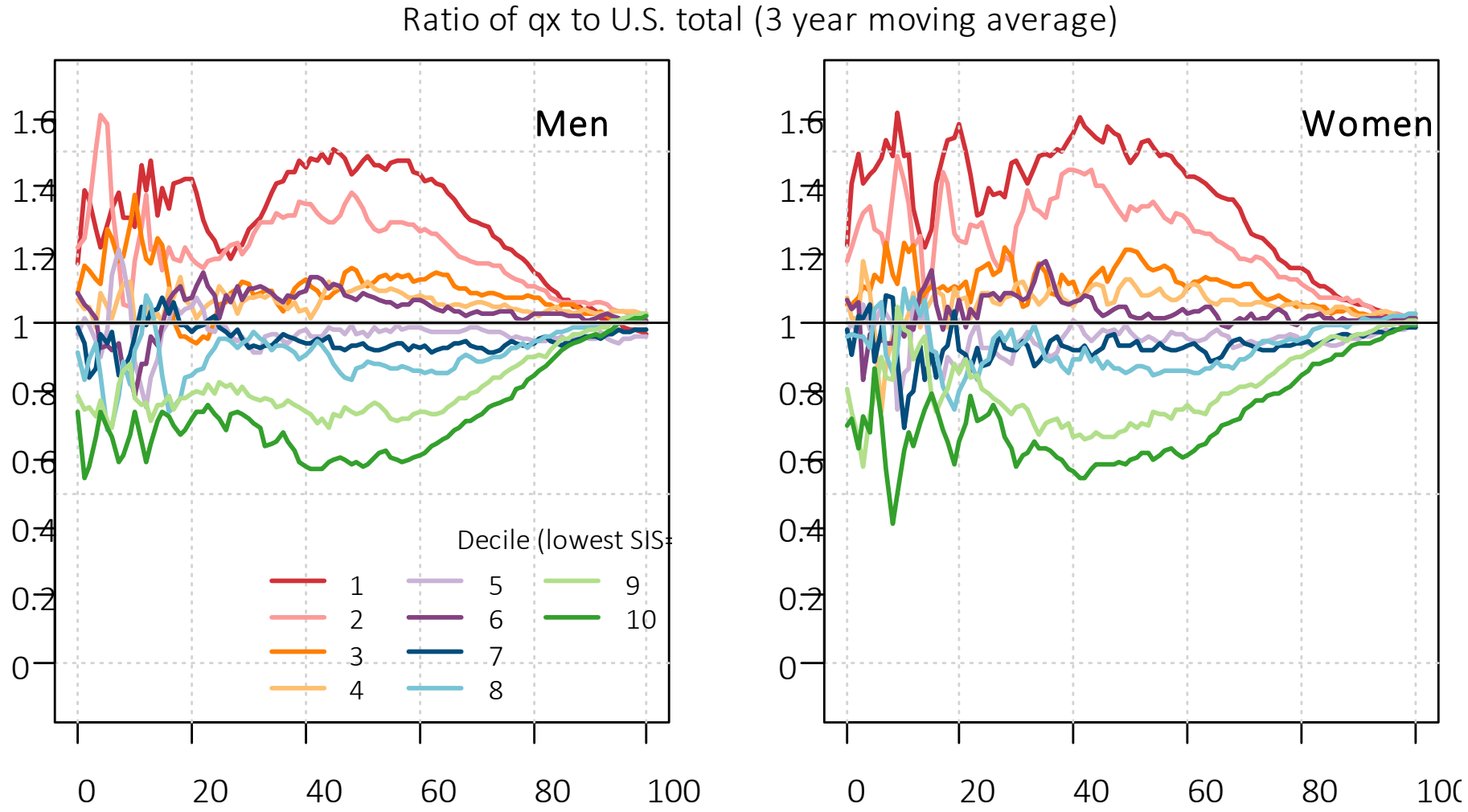
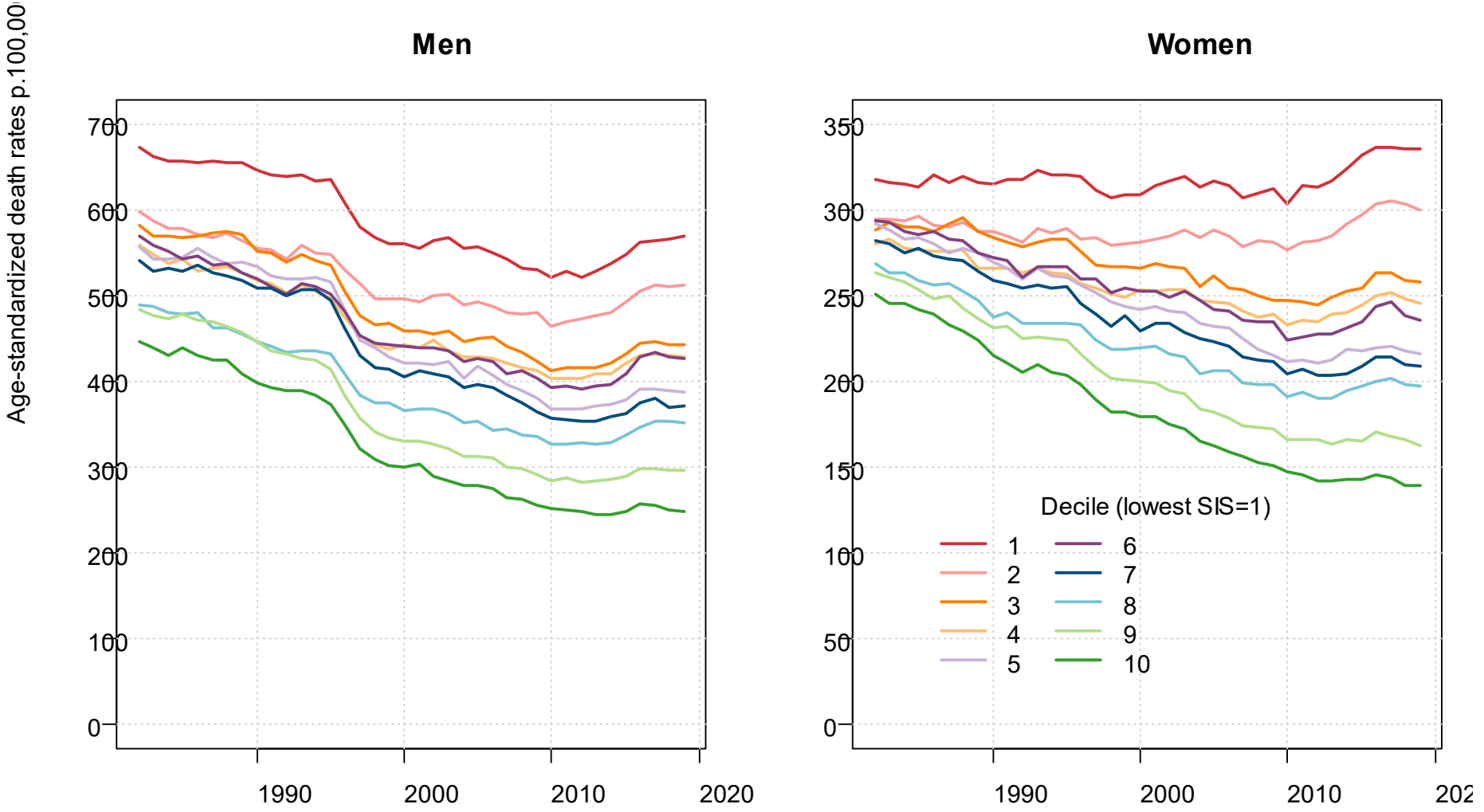


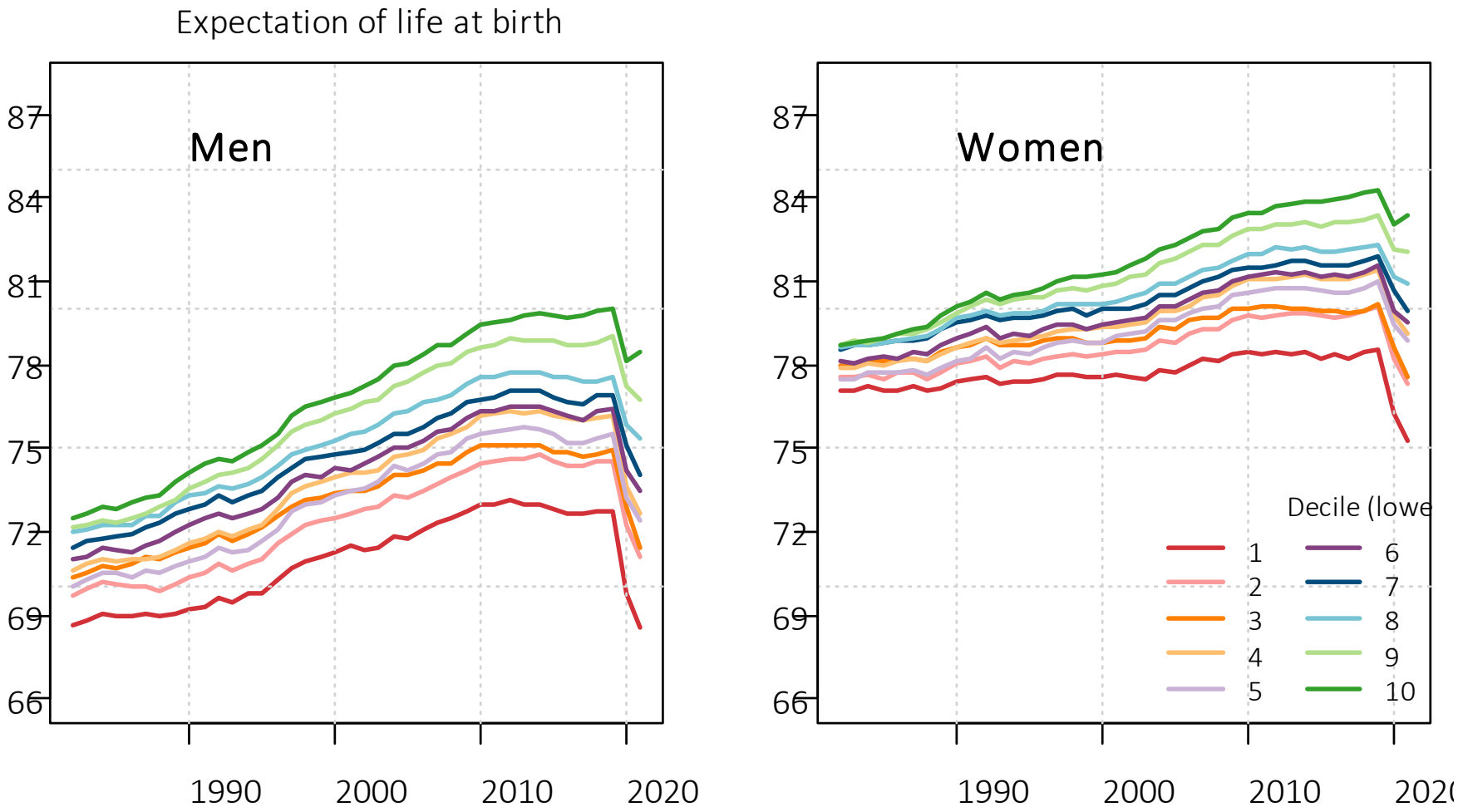
Largest inequalities among children and working-age adults



Age-standardized death rates at ages 20-64 years by SES decile, 1982-2019



A major drop in life expectancy at birth in 2020 and in 2021



From -1.6 to -4.2 for men.

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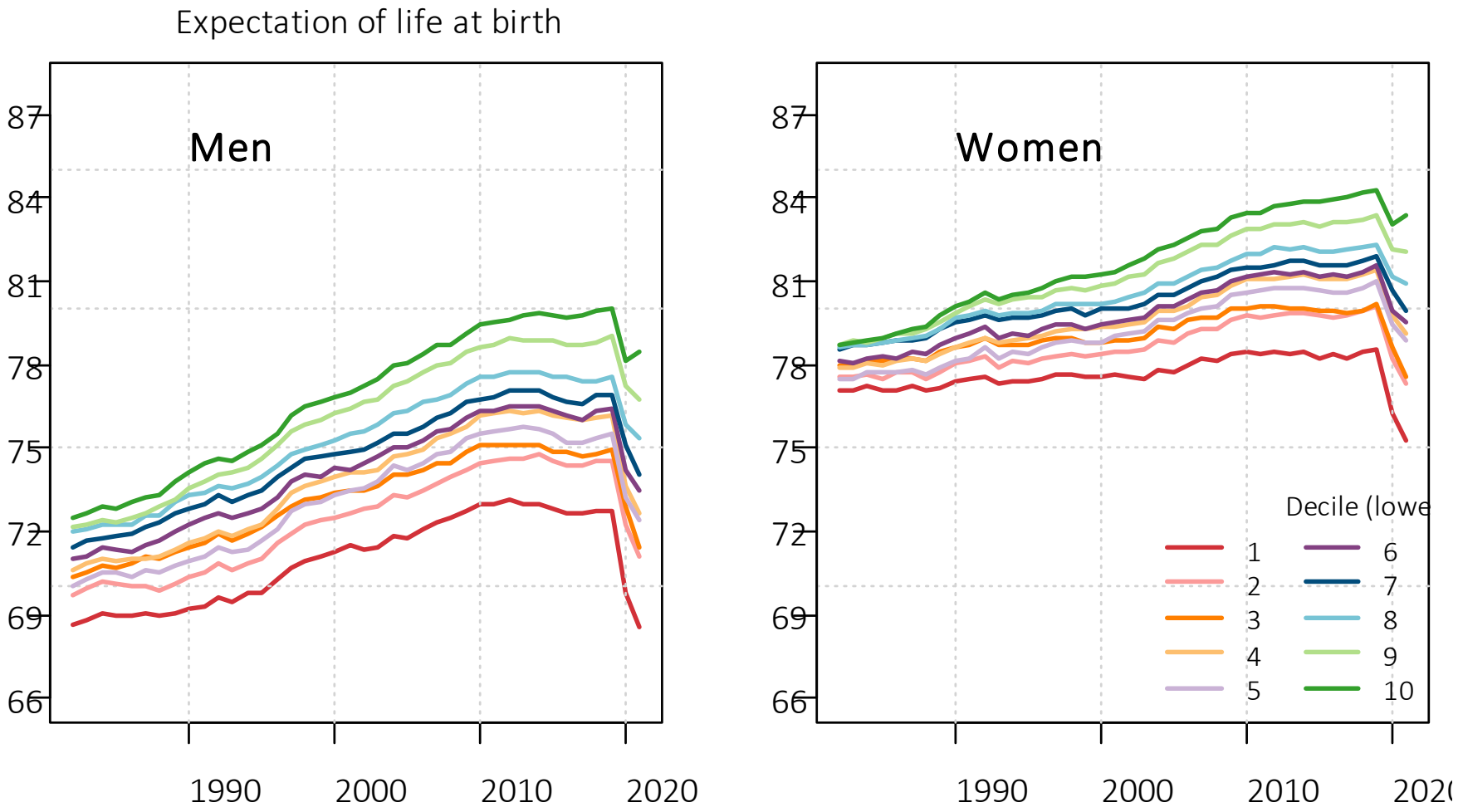
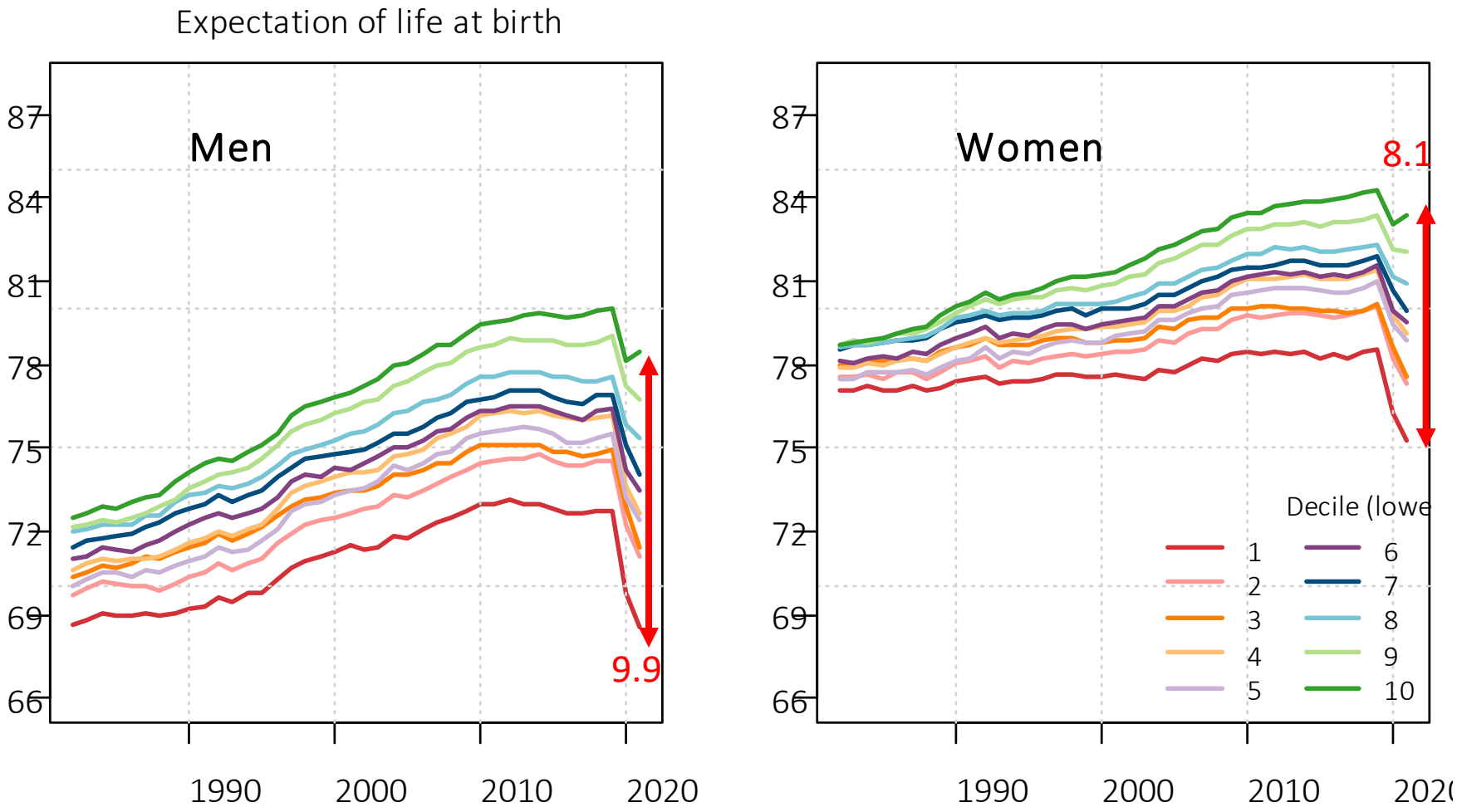


From -1.6 to -4.2 for men.

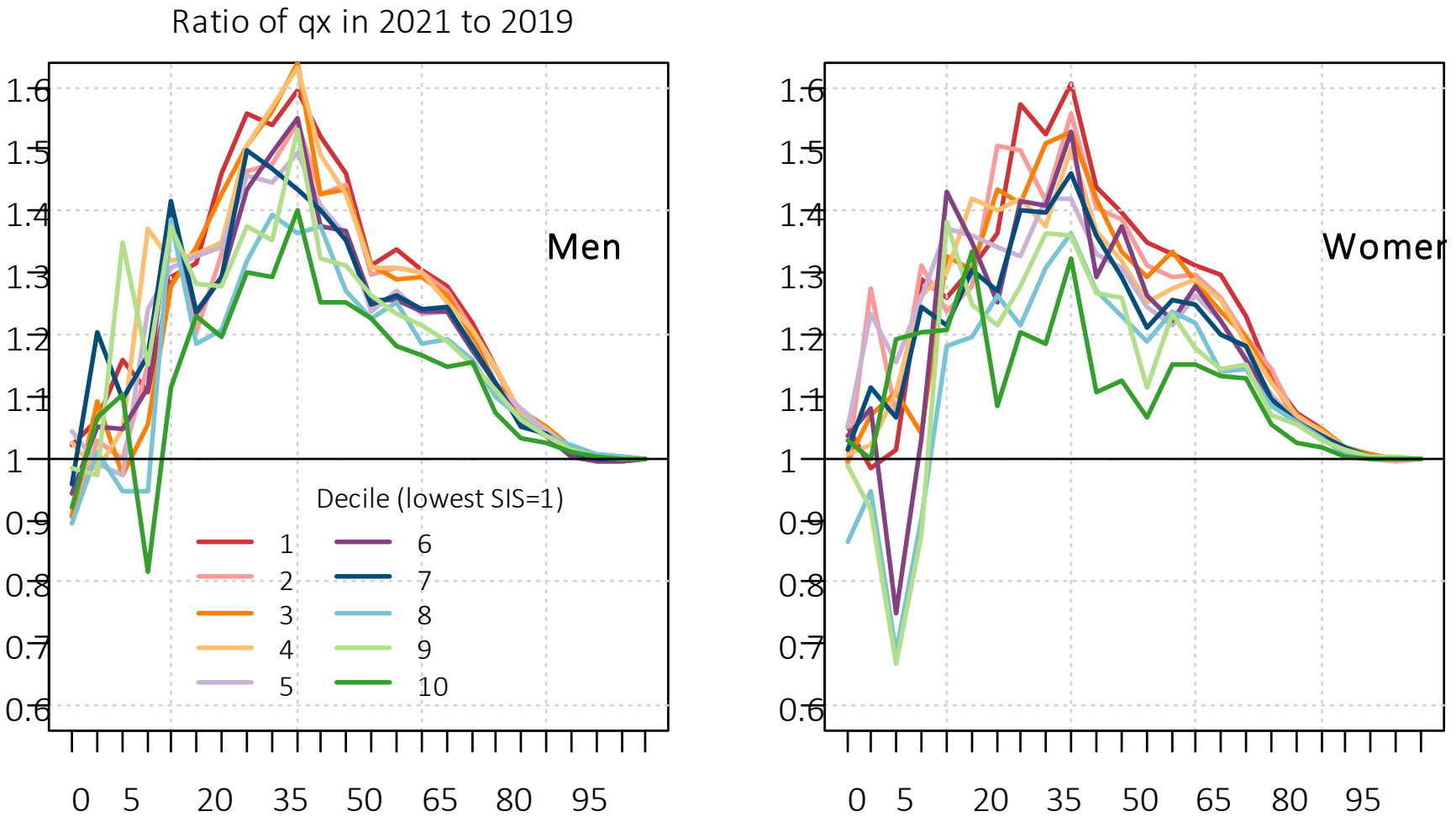
From -1 to -3.3 for women.

An increase in SIS disparities

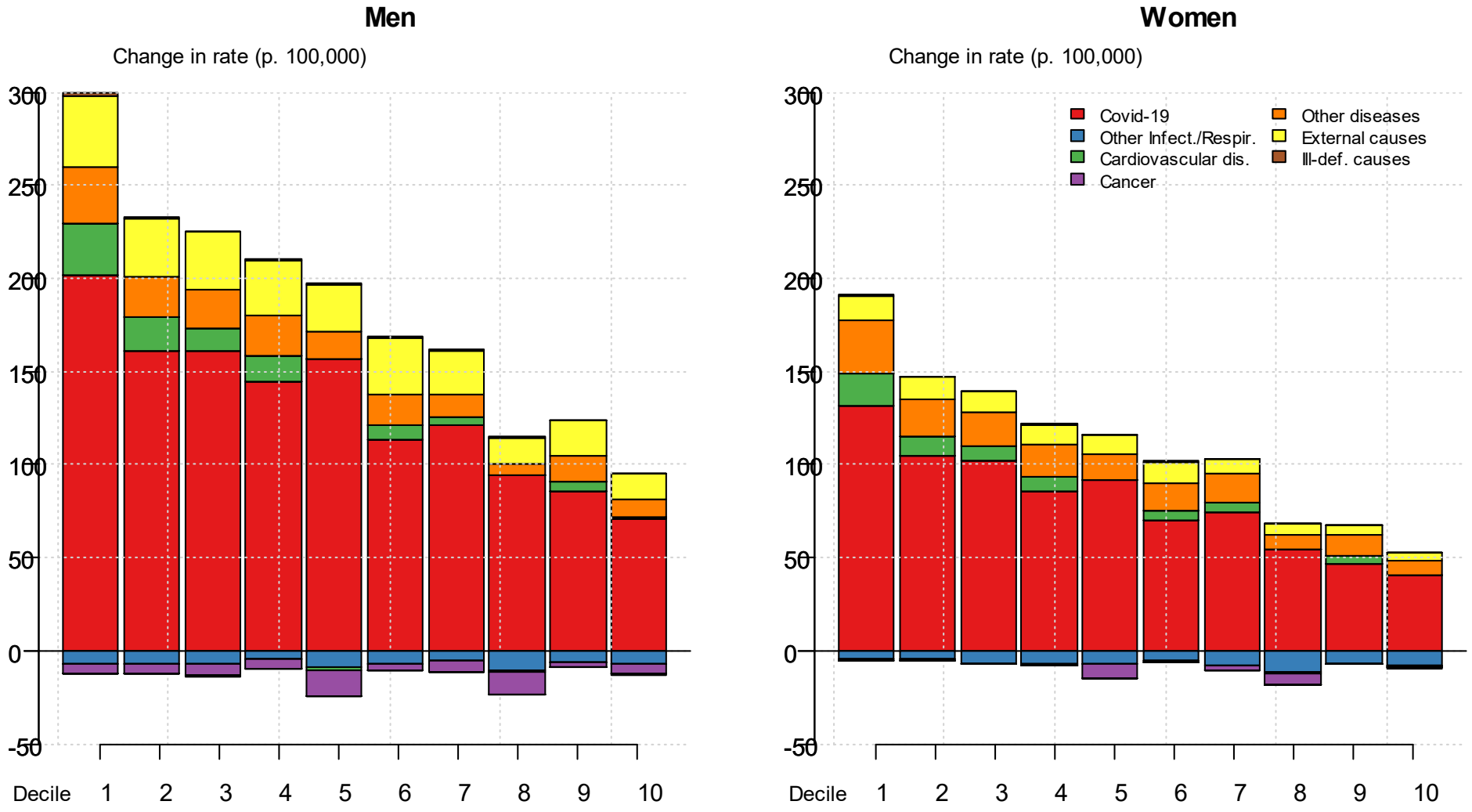


From 2019 to 2021 the gap increased by 2.5 years for each sex.

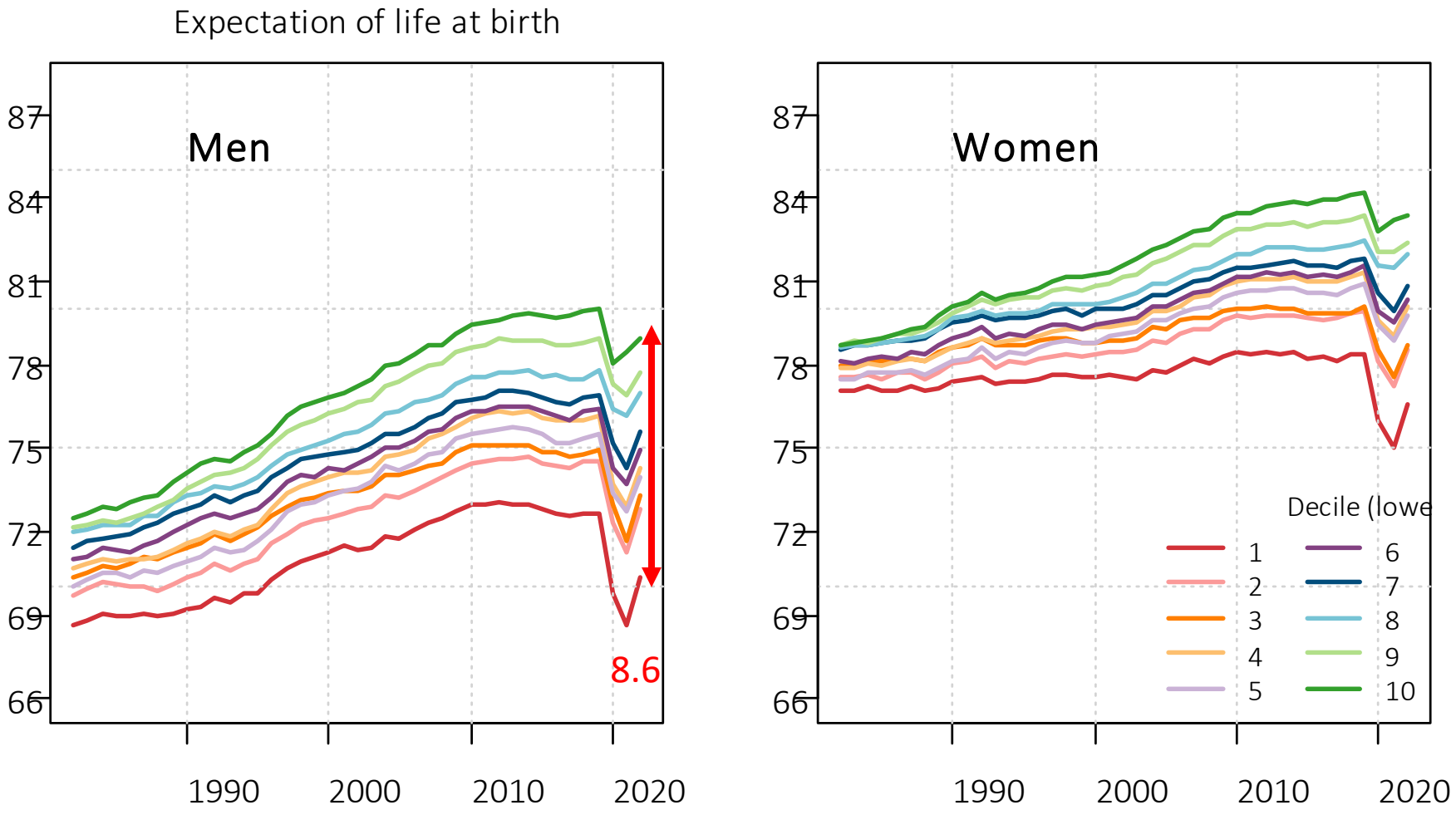
Excess mortality in 2021 among working-age adults



Causes of death contributing to mortality increases from 2019 to 2021



A partial rebound in 2022



Gap D10-D1 from 7.4 in 2019 to 9.9 in 2021 and 8.6 in 2022 for men.

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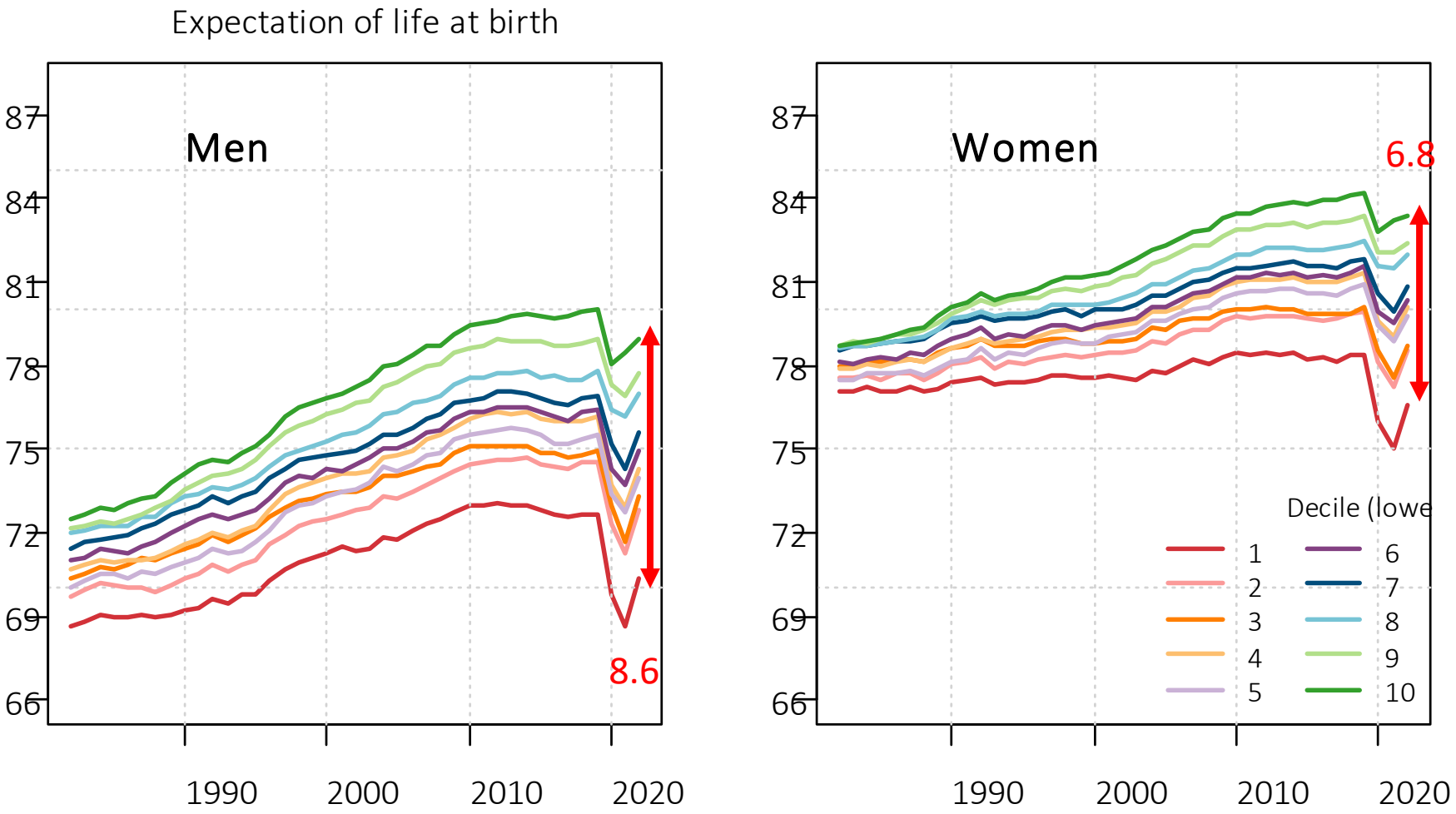

Gap D10-D1 from 5.8 in 2019 to 8.1 in 2021 and 6.8 in 2022 for women.

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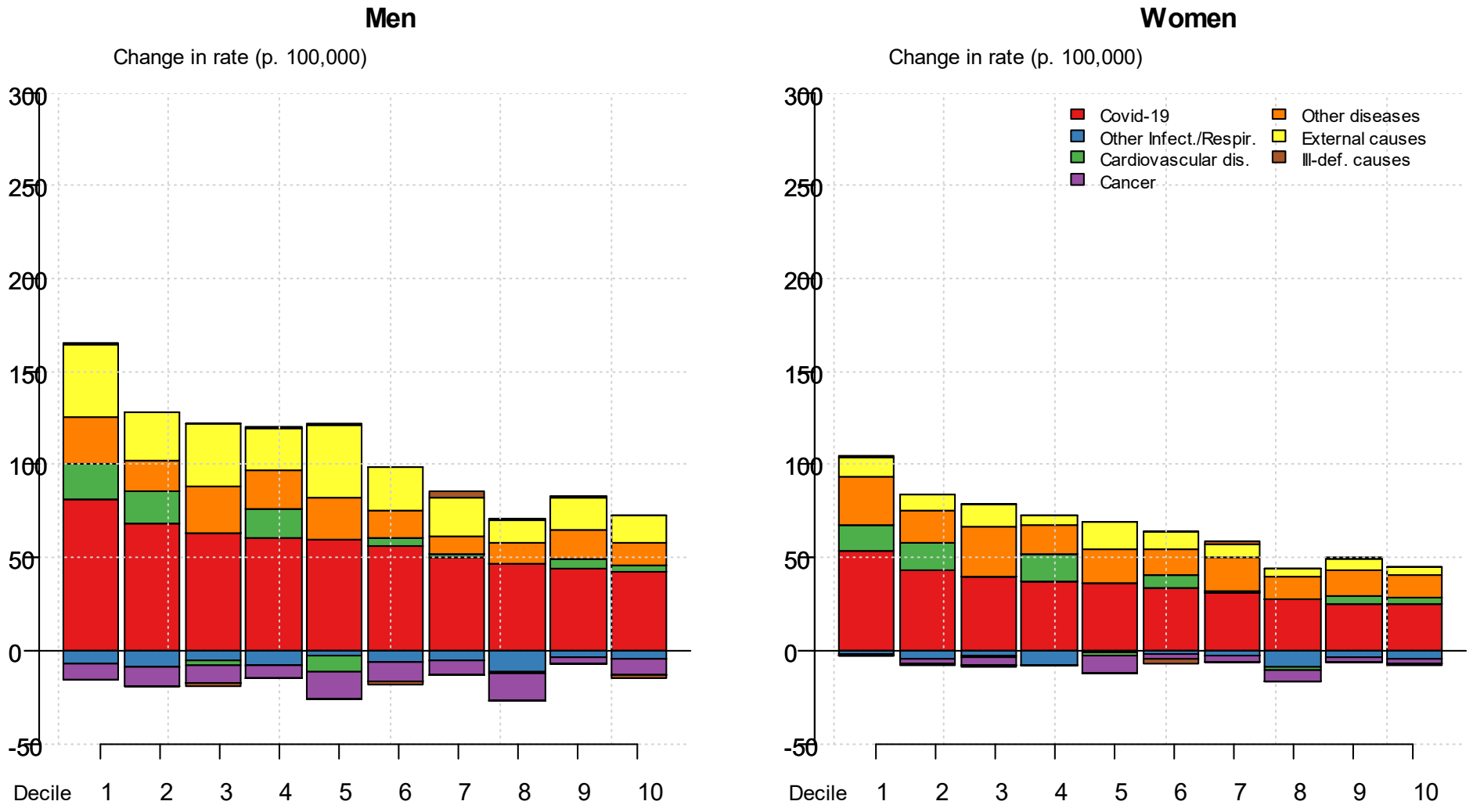

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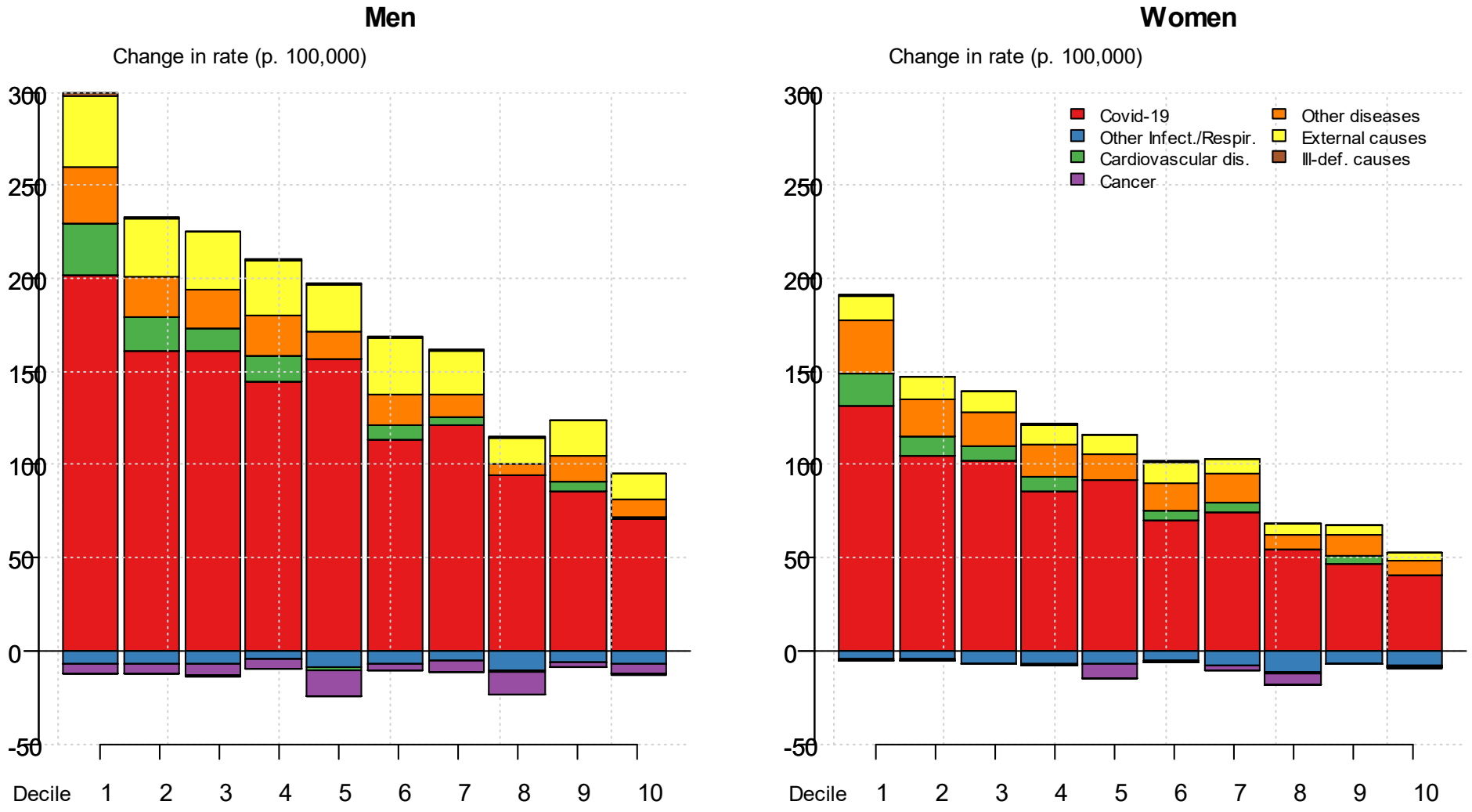
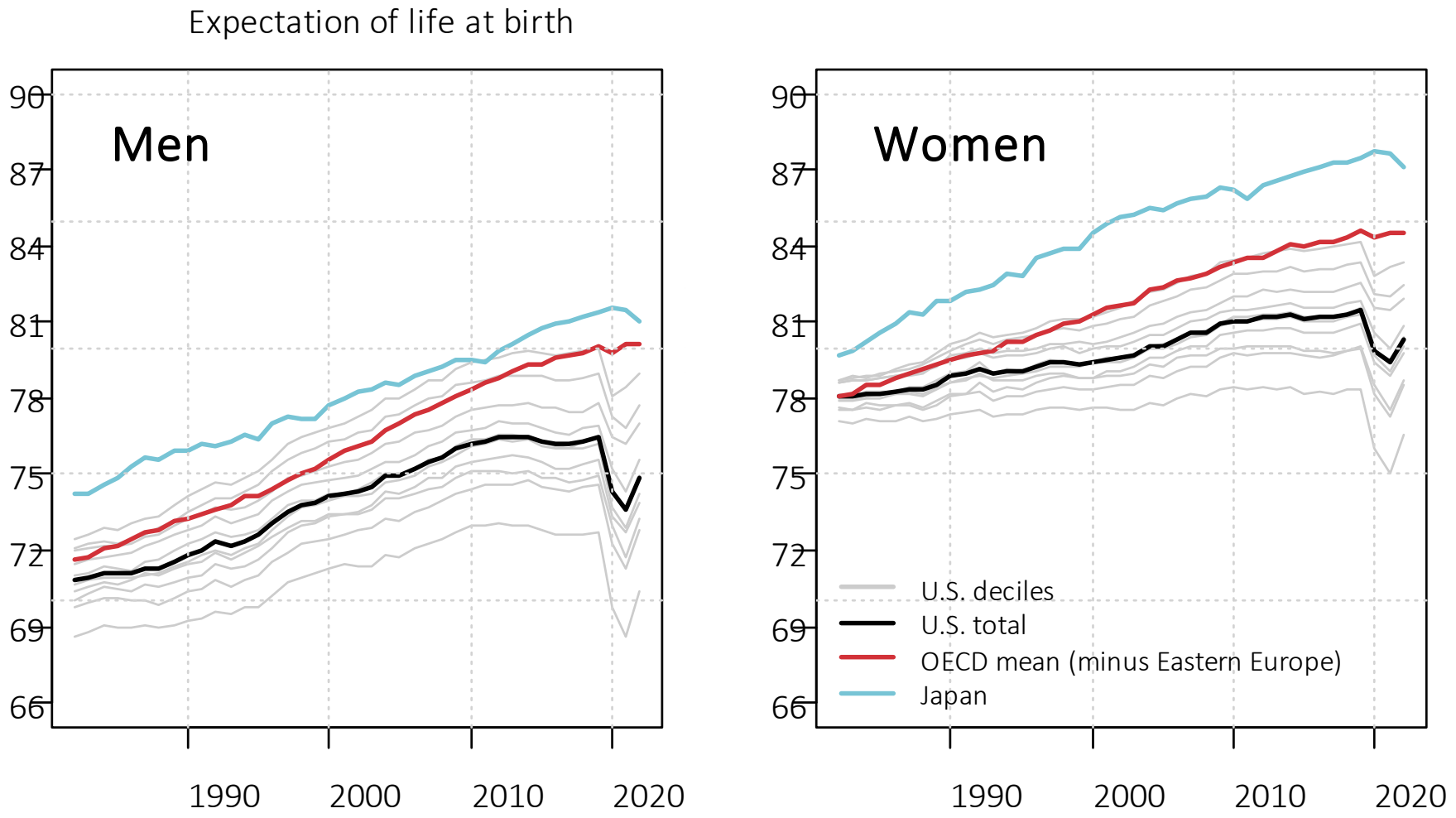


An increasing divergence with peers



Conclusion

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2. It resulted in a rise in the SIS gradient in mortality
3. It increased the gap with other high-income countries
4. Its impact was particularly severe for working-age adults
5. Its effects were as much biological as social and behavioral

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Next steps

- Monitor future trends
- Analyze residential/geographic sorting of populations through migration (increased residential segregation?)
- Look at specific groups within each decile (urban/rural; racial/ethnic groups…)
- Combine individual-level and aggregate-level analyses
- Identify characteristics of counties doing « better than expected » based on their SIS (using USMDB data)

Acknowledgments

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However, the authors are solely responsible for the content of this presentation, which does not necessarily represent the official views of the SOA and of the National Institutes of Health.

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