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An overview of the Human Mortality Database ongoing developments

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New HMD developments/projects

1. Adding Cause-of-death information to the HMD
2. Subnational Mortality Databases
3. MortX: Beyond the HMD



Project 1:

Including cause-of-death information in the HMD

- Main idea:
To enrich the HMD with cause-of-death data series for selected countries
- Other international cause-specific mortality database have important limitations
 - WHO: Not-user friendly (diversity of format, lack of documentation, changes in classifications/shortlists...)
 - EUROSTAT: Limited to 10/15 years and to European countries



Basic principles

- For all HMD countries with cause-of-death data coded to the ICD
- Back to 1950 or earliest year available
- Data series consistent with all-cause series:
 - Cause-specific death counts
 - Age-specific cause-specific death rates
- Shortlist of <100 exclusive cause-of-death categories (mostly compatible with EUROSTAT and NCHS)
- Emphasis on disruptions arising from revisions of the ICD



COD series

Ready to publish	In-progress
Canada (1950-2009)	Austria (1970-2015)
England and Wales (1950-2013)	Italy (1955-2014)
France (1958-2013)	Spain (1970-2015)
Japan (1950-2013)	
Norway (1951-2012)	
Sweden (1952-2012)	
The United States (1959-2016)	



Project 3

Subnational Mortality Databases

- Motivations
 - To monitor geographic inequalities in mortality
 - To identify “laggards” and “pioneers” in longevity within a country (E./W. Germany)
- Previous independent work with HMD technical support:
 - Canada (provinces)
 - Japan (prefectures)
- Current HMD work:
 - Germany (various geographic units; since 1982 for the landers)
 - The United States (states/counties)
- HMD-like mortality series with same basic principles (comparability, accessibility, flexibility, quality control)



Status of the United States Mortality DataBase (USMDB)

Return to main USMDB page

USMDB Menu

- User's Agreement
- Acknowledgments
- Overview
- Frequently Asked Questions (FAQ)
- Research Team
- Explanatory Notes
- Methods
- Documentation
- Citation Guidelines
- Contact us

Links

- UC Berkeley Department of Demography
- INED
- HMD
- NCHS

United States Mortality Database

Magali Barbieri, Director
University of California, Berkeley & INED, France

John Wilmoth, Founding Director
United Nations & formerly University of California, Berkeley

General Project Description: The United States Mortality Database (USMDB) brings you the first clearly documented historical set of complete state-level life tables, updated to the latest year of available data, designed to foster research on geographic variations in mortality across the United States and to monitor trends in health inequalities. This data set currently includes complete and abridged life tables by sex for each of the US 9 Census Divisions, 4 Census Regions, 50 States and the District of Columbia, for each year since 1959 with mortality values up to age 110. The data are available for free to all interested upon registration.

The USMDB is an outgrowth of the Human Mortality Database (HMD) project. It was developed to provide detailed mortality and population data to researchers, students, journalist, policy analysts, and others interested in state-level mortality trends and geographic variations in the length of life within the United States. The USMDB has been created by the HMD team at the University of California, Berkeley in collaboration with the Mortality Branch at the National Center for Health Statistics, Centers for Disease Control (NCHS) and with support from the Center on the Economics and Demography of Aging (CEDA) and from the French Institute for Demographic Studies (INED). It has been funded by grants from the National Institutes of Health (R01-AG040245) and from the Society of Actuaries-REX Pool Fund.

For more information, please begin by reading an overview of the database. If you have comments or questions, or trouble gaining access to the data, please write to us (usmdb@mortality.org).

Disclaimer: This is a preliminary version of the USMDB. We have made our best efforts to deliver a high quality copy of the Database and to verify that the regional life tables contained therein have been constructed on the basis of sound scientific judgement. However, we make no warranties to that effect, and we shall not be liable for any damage that may result from errors in the Database. Furthermore, while we will seek to continuously update the USMDB, the information herein may not be entirely up-to-date or complete.

Data description: The United States Mortality Database provides open access to complete and abridged life tables for every calendar year since 1959 for the 50 U.S. states and the District of Columbia, for the 9 Census Divisions, the 4 Census Regions, and for the nation as a whole.

The life tables are provided in six different age by time format and they can be downloaded either as CSV or as Tab-delimited text files. **The entire set of lifetables can be downloaded in this bundled file ([lifetables.zip](#)) or the user can select lifetables for a given state, division, region, or the nation from the tables below.**

Lifetables by Geographic Level

Geographic Level: National

[USA: United States](#)

Geographic Level: Census Region (Reg)

Reg1: Northeast	Reg1: South
Reg2: Midwest	Reg1: West

Geographic Level: Census Division (Div)

Div1: New England	Div4: West North Central	Div7: West South Central
Div2: Middle Atlantic	Div5: South Atlantic	Div8: Mountain
Div3: East North Central	Div6: East South Central	Div9: Pacific

Geographic Level: State



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<http://usa.mortality.org/>

Status of the United States Mortality DataBase (USMDB)

The screenshot shows the website usa.mortality.org in a web browser. The page title is "United States Mortality Data". The main content area is titled "Lifetables by Geographic Level". It lists four levels of geographic hierarchy, each with a list of links to download data for that level. The links are color-coded: blue for the current level and grey for sub-levels.

Geographic Level: National

- [USA: United States](#)

Geographic Level: Census Region (Reg)

- [Reg1: Northeast](#)
- [Reg2: Midwest](#)
- [Reg3: South](#)
- [Reg4: West](#)

Geographic Level: Census Division (Div)

- [Div1: New England](#)
- [Div2: Middle Atlantic](#)
- [Div3: East North Central](#)
- [Div4: West North Central](#)
- [Div5: South Atlantic](#)
- [Div6: East South Central](#)
- [Div7: West South Central](#)
- [Div8: Mountain](#)
- [Div9: Pacific](#)

Geographic Level: State

AL: Alabama	KY: Kentucky	ND: North Dakota
AK: Alaska	LA: Louisiana	OH: Ohio
AZ: Arizona	ME: Maine	OK: Oklahoma
AR: Arkansas	MD: Maryland	OR: Oregon
CA: California	MA: Massachusetts	PA: Pennsylvania
CO: Colorado	MI: Michigan	RI: Rhode Island
CT: Connecticut	MN: Minnesota	SC: South Carolina
DE: Delaware	MS: Mississippi	SD: South Dakota
DC: District of Columbia	MO: Missouri	TN: Tennessee
FL: Florida	MT: Montana	TX: Texas
GA: Georgia	NE: Nebraska	UT: Utah
HI: Hawaii	NV: Nevada	VT: Vermont
ID: Idaho	NH: New Hampshire	VA: Virginia
IL: Illinois	NJ: New Jersey	WA: Washington
IN: Indiana	NM: New Mexico	WY: West Virginia
IA: Iowa	NY: New York	WI: Wisconsin
KS: Kansas	NC: North Carolina	WY: Wyoming



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Output

- 1959-2015 Period life tables by sex, single year of age
- For the United States
 - Census Regions (4)
 - Census Divisions (9)
 - States (50)
 - And the District of Columbia
- Additional formats to be made available
 - Abridged life tables (5-year age groups)
 - 5- and 10-year periods



Project 3

MortX: Expanding to other parts of the world

- HMD limited to countries with data of the highest quality
- Interest of scientists to monitor mortality trends in Latin America, Asia, Africa
- International effort to improve data collection (vital statistics) systems (Millenium/Sustainable Development Goals)
- Using the HMD approach to expand to other regions of the world



Main challenges

- Availability of data of “reasonable” quality (Census data and vital statistics)
- Develop the HMD tools to evaluate input data quality
- Non-HMD methods require to adjust unreliable/incomplete input data (beyond the HMD => indirect estimation)
- Impact of data quality issues on the measurement of biometric risks and mortality improvement models
- Human resources => Need for additional funds
- Exploratory work with selected case studies (Chile, Costa-Rica, Hong Kong and Mexico)
partly funded by a grant from the AXA Research Fund





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The contribution of drug-related deaths to the US disadvantage in mortality

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Motivation

US mortality trends since 1980:

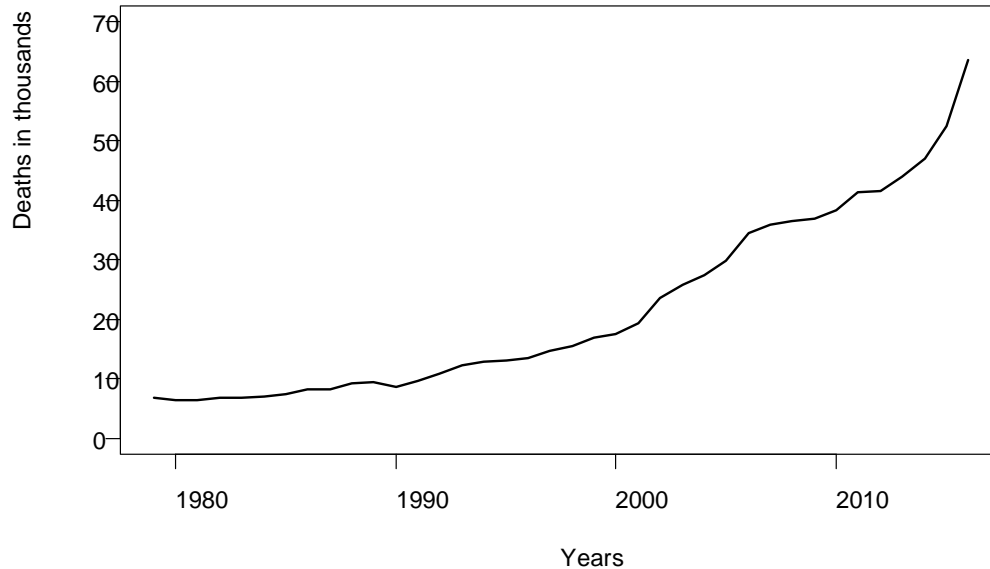
1. Exponential increase in drug-related deaths
2. Growing gap in life expectancy at birth between the US and other high-income democracies

⇒ How much does the drug epidemic contribute to the US disadvantage in mortality?



Drug-related deaths in the US

A rapid increase in the number of deaths due to drug poisoning (mostly opioids) in 1980-2016 (Case and Deaton, 2015, 2017)



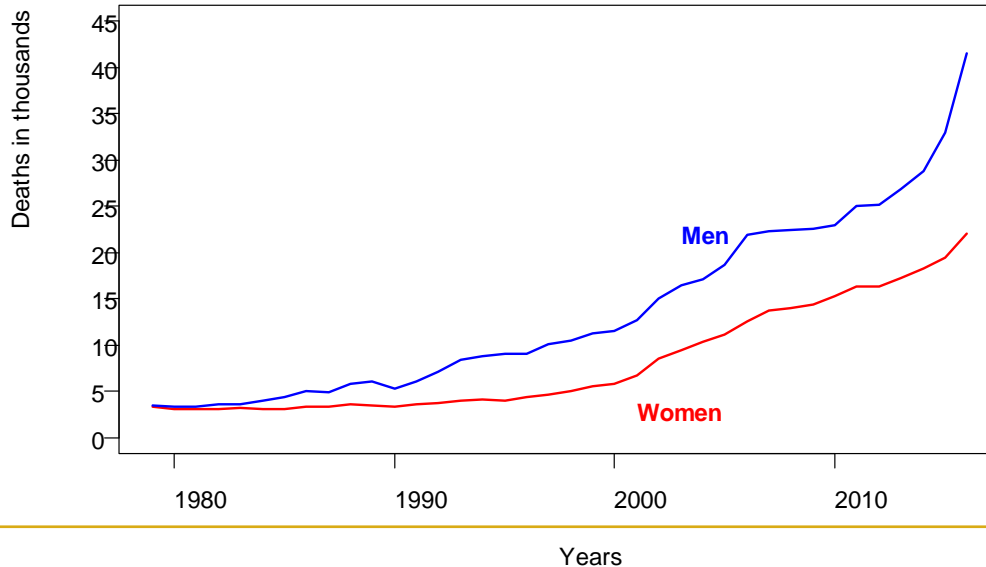
Source: reconstruction of the number of drug-related deaths (prescription and illicit drugs) for years 1979-2016 adjusted for ICD change (using the 1996 bridge coding study).



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The US drug epidemic

- 600 000 deaths due to drug poisoning (overdoses) since 2000 (x 10 in 35 years => from 6 500 in 1980 to 65 000 in 2016)
- 75-85% of all drug overdoses = 20-50 years old
- Same trend for both sexes but women less affected than men.



Growing US mortality disadvantage

- The divergence with other high-income market economies started around 1980 (« Shorter lives, poorer health », National Research Council 2013)
- The US disadvantaged affects a large range of health and mortality indicators
- American men and women are similarly disadvantaged
- 2/3 of the gap in life expectancy at birth attributable to ages below 50 years (Ho, 2013)



Study goals

1. Update analysis of US lag in life expectancy at birth with other high-income countries
2. Compare trends in drug-related mortality in the US with other countries
3. Measure the contribution of drug poisoning to the increasing gap in life expectancy



Research design

Data:

1. Human Mortality Database
(1980-2014 life tables by sex for the US + 18 countries)
2. World Health Organization mortality database
(2000-2014 deaths by cause in 12 countries + the US)

Methods :

- Age-standardized mortality rates for 7 broad cause-of-death categories (drug poisoning, alcohol and chronic liver diseases, suicide, cancer, cardiovascular diseases, other diseases, other external causes) for each country in 2014
- Decomposition method to quantify the contribution of drug poisoning to the difference in life expectancy at birth



Drug-related mortality

Restrictive definition:

- Underlying cause of death only
- ICD-10 codes (10th Revision of the International Classification of Diseases) = CDC definition :
 - X40-X44 (accidental poisoning – prescription + illicit drugs)
 - X85 (homicide by drug poisoning)
 - Y10-Y14 (drug poisoning with undetermined intent)
 - Y45, Y47, Y49 (consequences of therapeutic use of pharmaceutical or biological substances)

⇒ Excludes

- suicides (X60-X64)
- Mental and behavioural disorders due to psychoactive substance use (F10-F19)



Drug-related mortality

Restrictive definition:

- Underlying cause of death only
- ICD-10 codes (10th Revision of the International Classification of Diseases) = CDC definition :
 - **X40-X44 (accidental poisoning – prescription + illicit drugs)**
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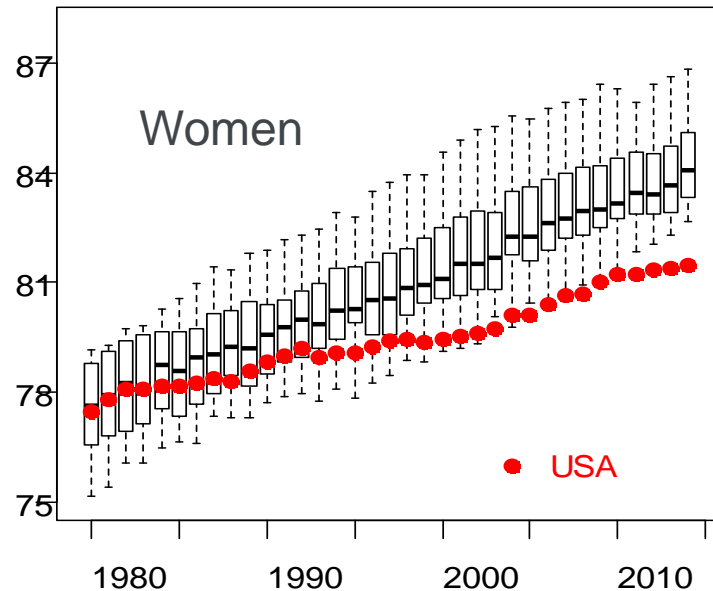
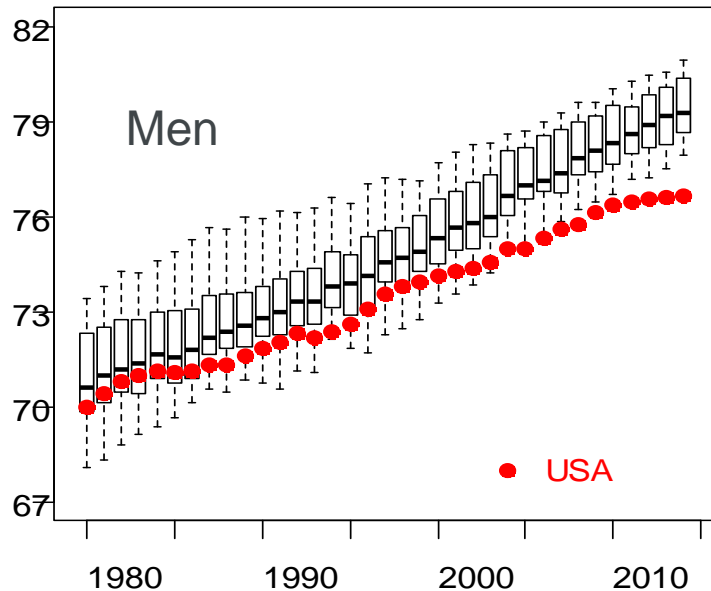
⇒ Excludes

- suicides (X60-X64)
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Trends in life expectancy at birth in the US and 18 other high-income countries, 1980-2014

Life expectancy at birth

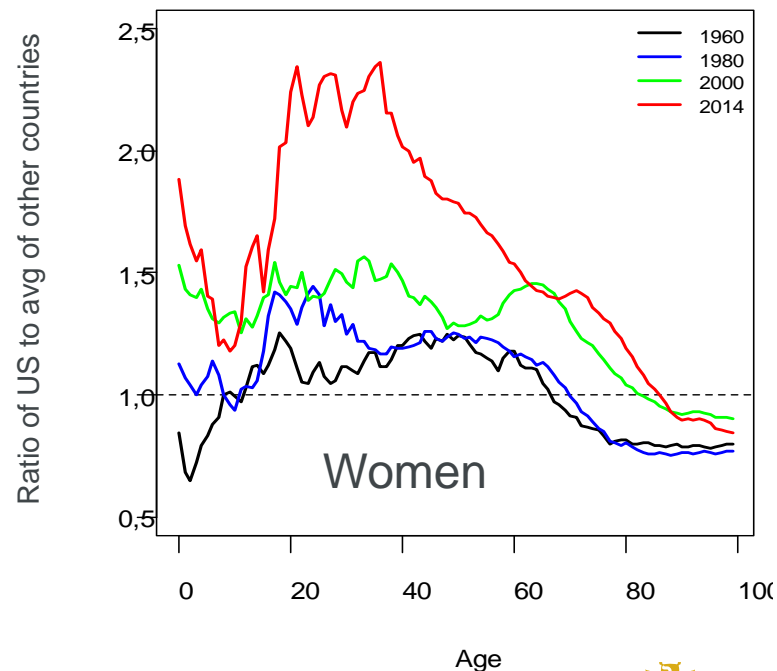
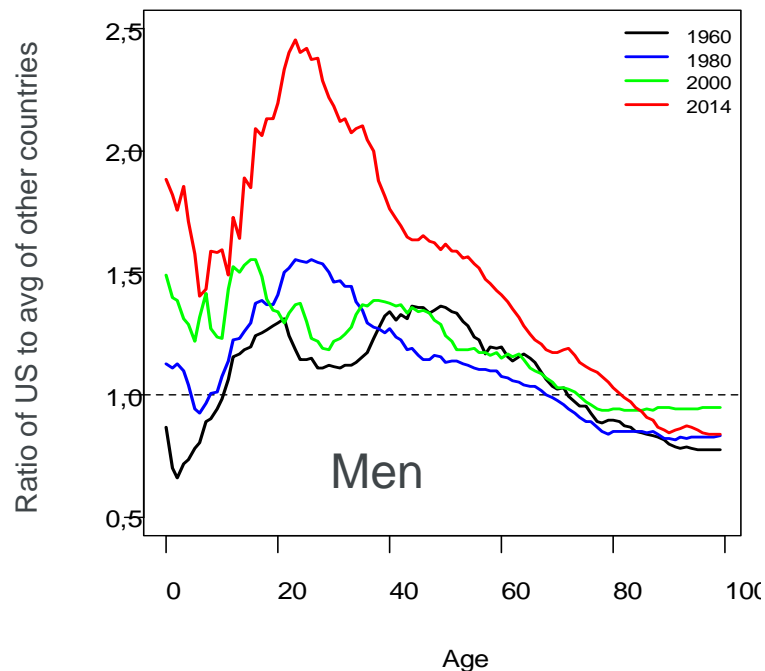


Source: HMD data for Australia, Austria, Belgium, Denmark, Finland, France, Iceland, Ireland, Japan, Luxembourg, New-Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and Germany.



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Ratio of the age-specific death rates (all causes) in the US to the average in 18 other high-income countries, 1960, 1980, 2000 and 2014

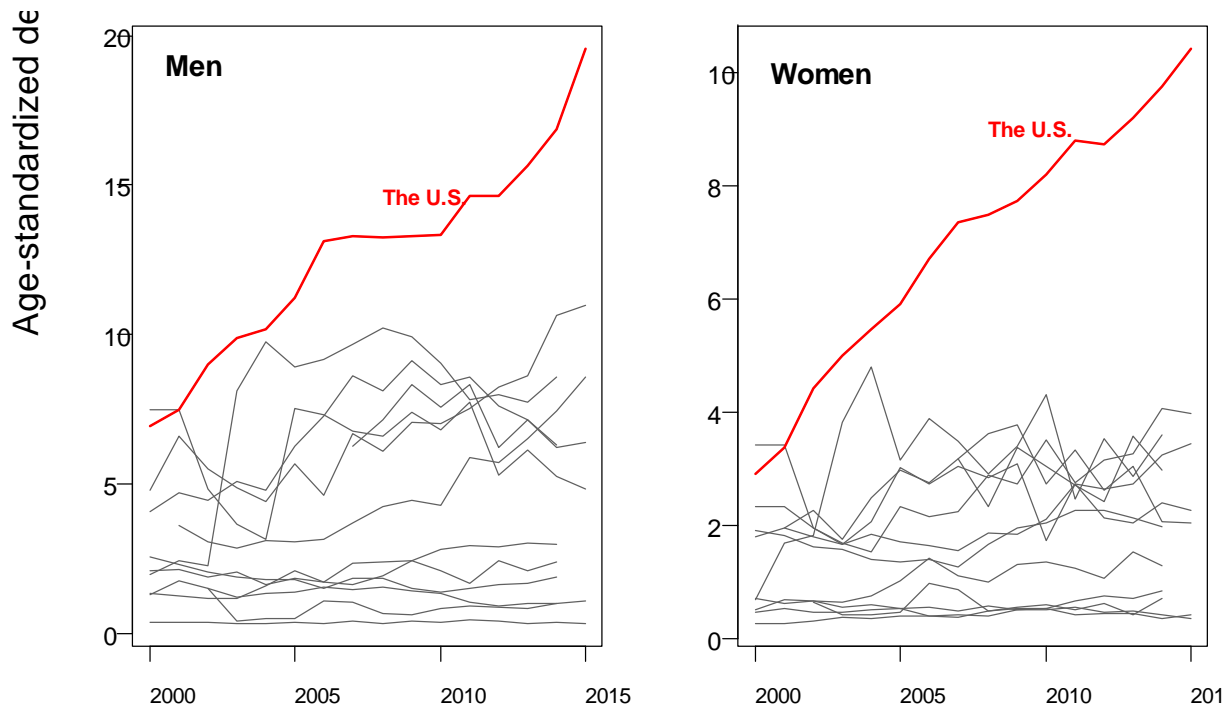


Source: HMD data for Australia, Austria, Belgium, Denmark, Finland, France, Iceland, Ireland, Japan, Luxembourg, New-Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and Germany.



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Drug-related age-standardized mortality rate in the US and 12 other high-income countries, 2000-2014

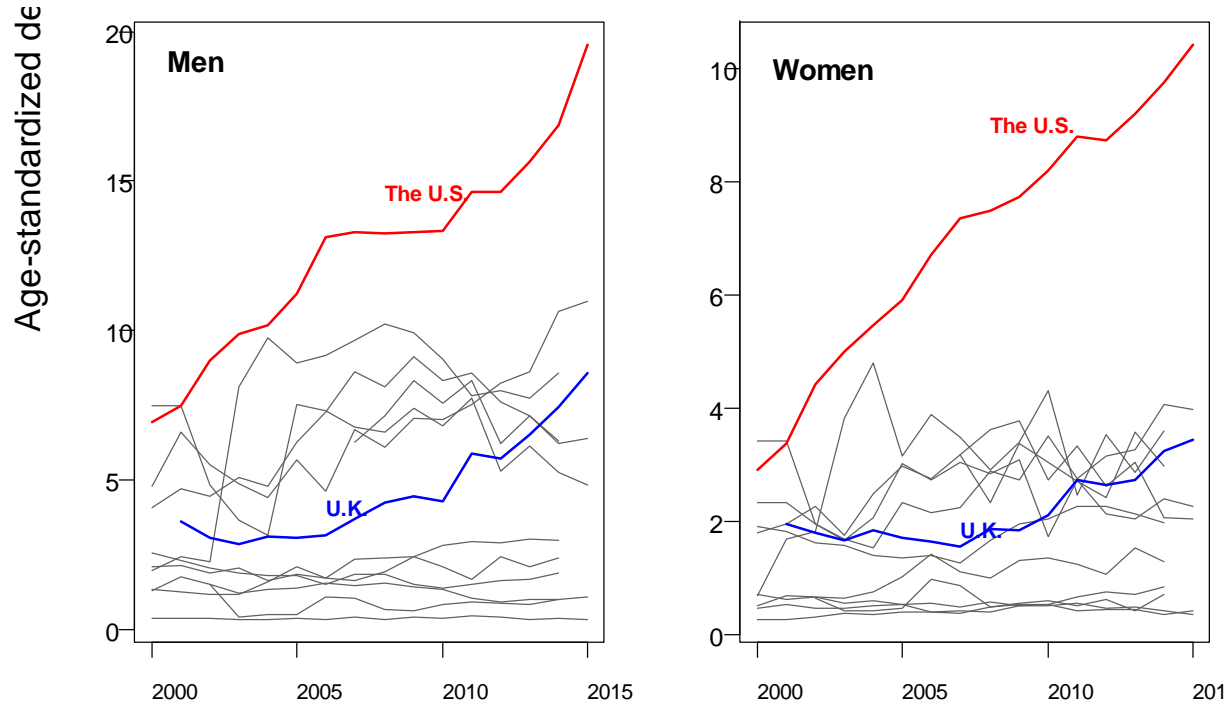


Source: HMD and WHO data for Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Japan, Norway, Spain, Sweden and the United Kingdom.



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Drug-related age-standardized mortality rate in the US and 12 other high-income countries, 2000-2014

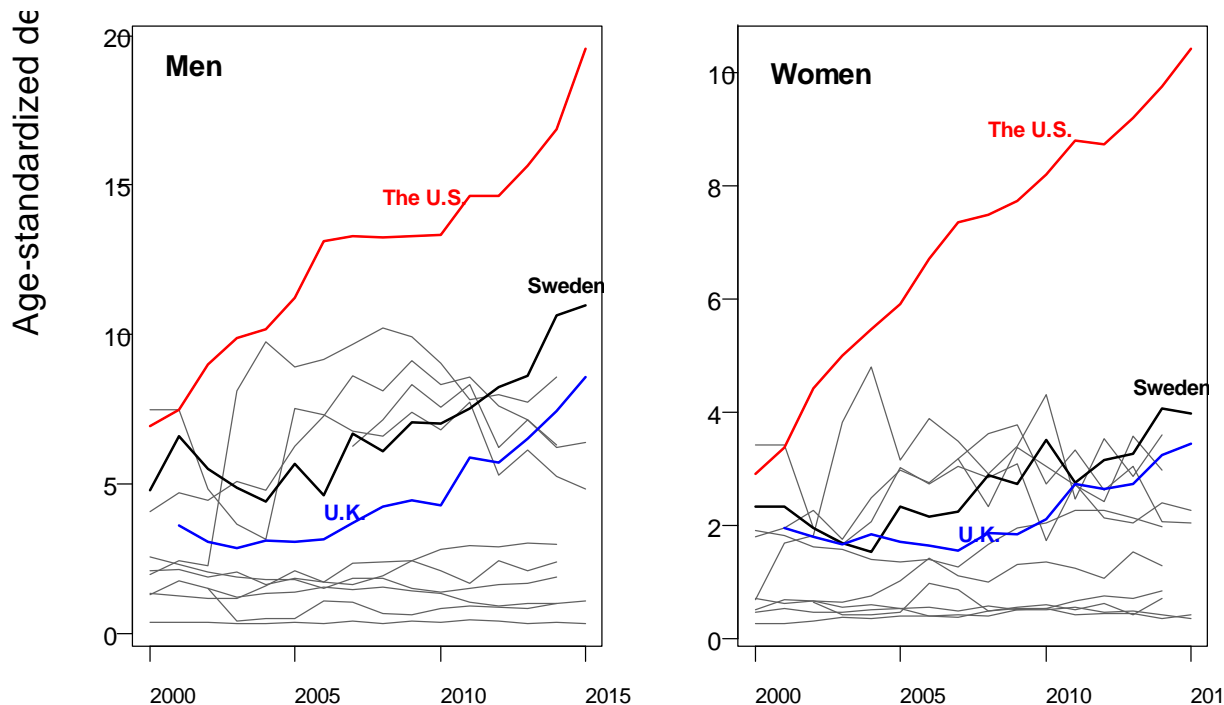


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Drug-related age-standardized mortality rate in the US and 12 other high-income countries, 2000-2014

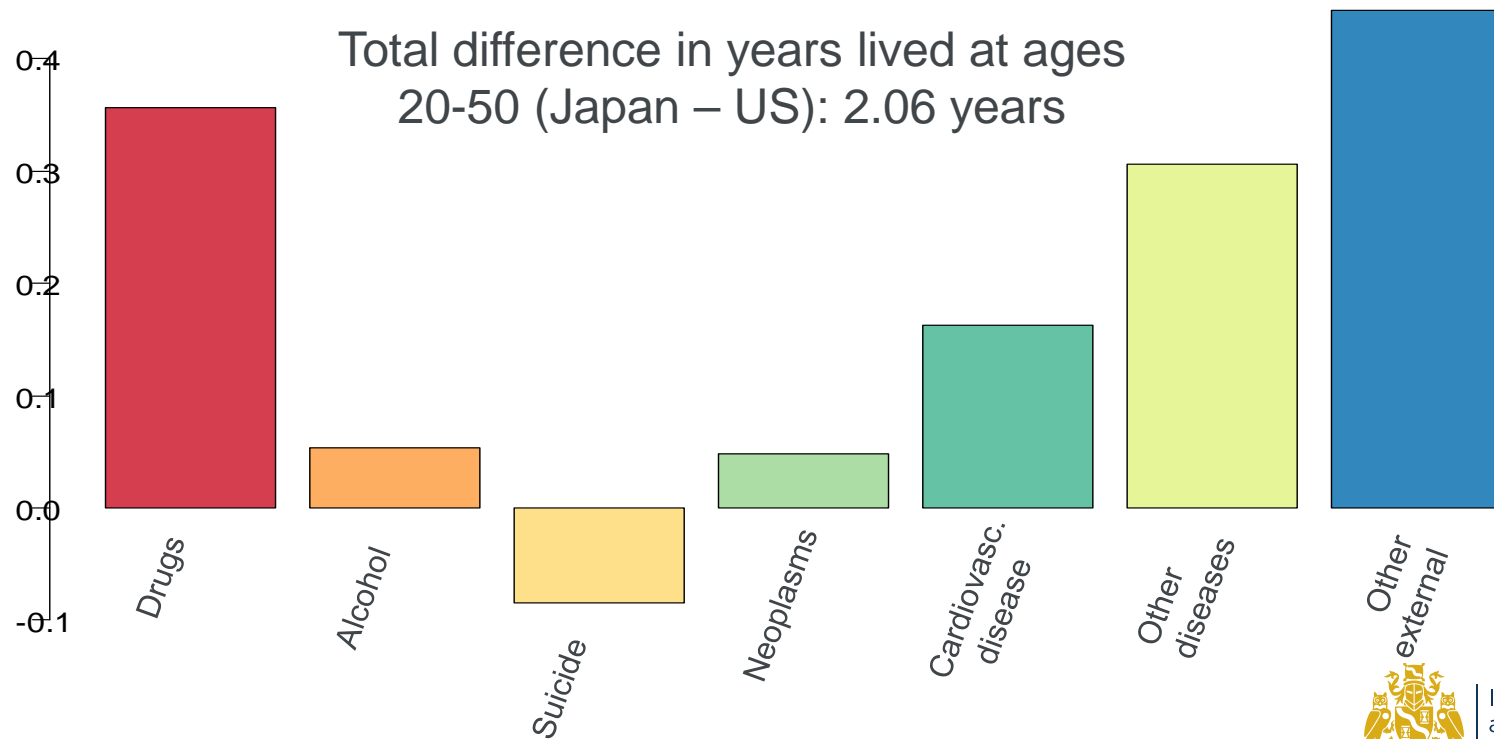


Source: HMD and WHO data for Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Japan, Norway, Spain, Sweden and the United Kingdom.

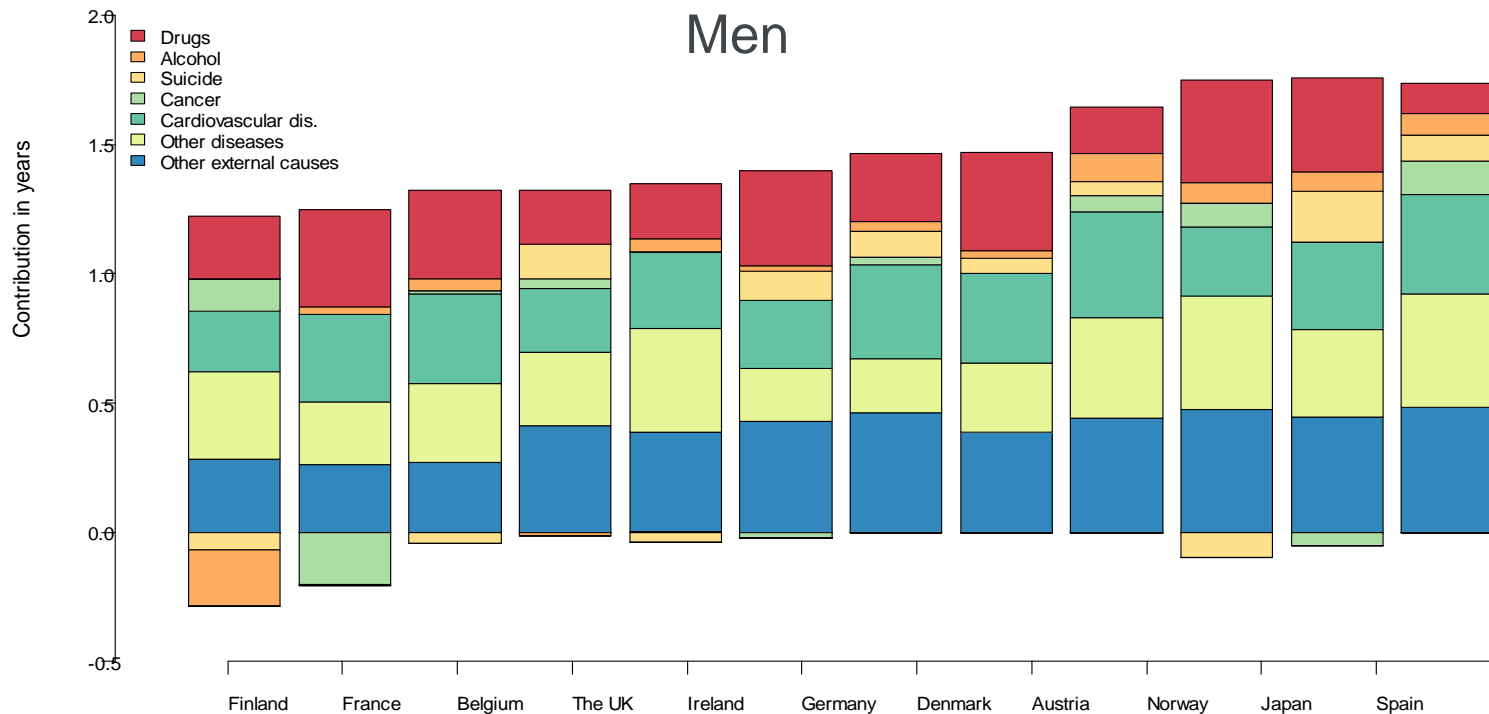


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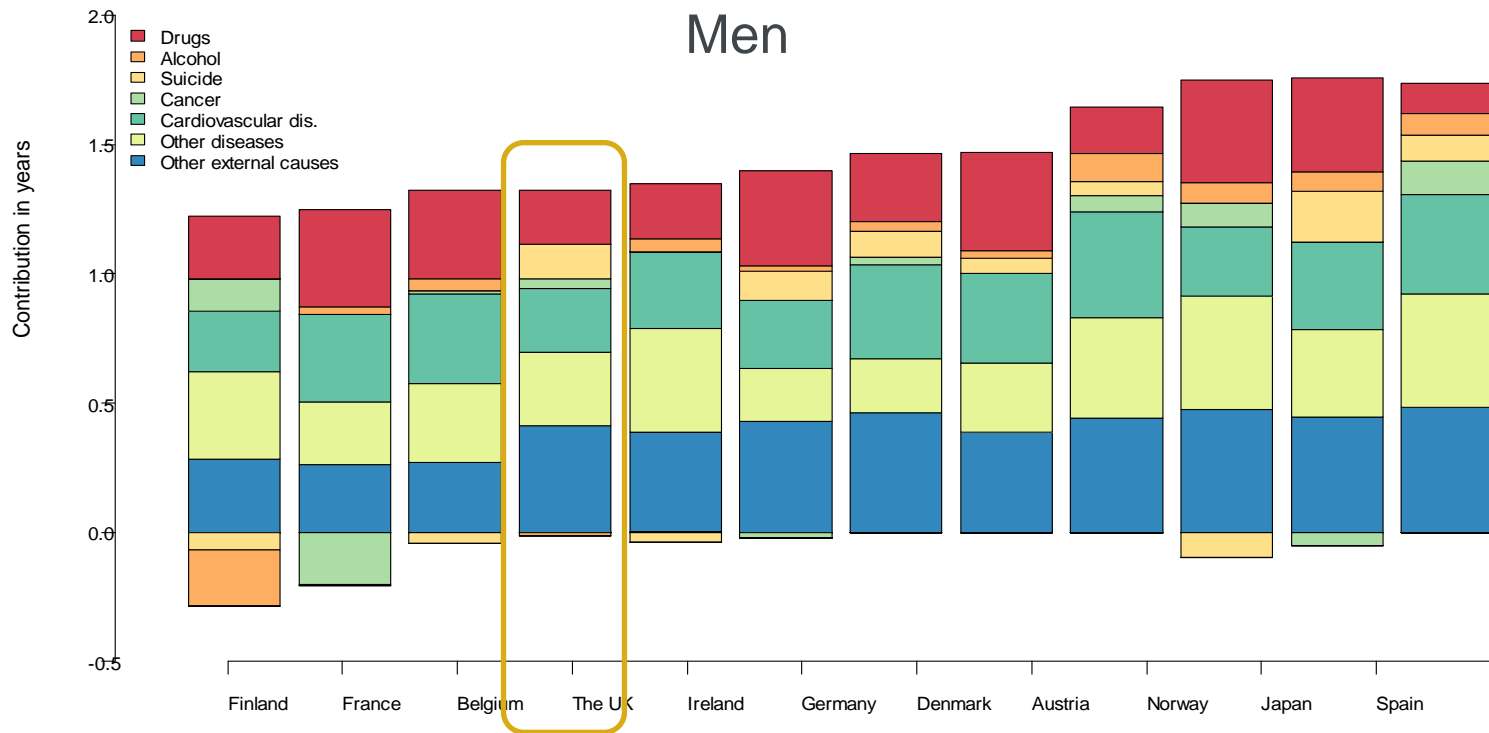
Decomposition by cause of the difference in years lived at ages 20 to 50 between the US and Japan in 2014



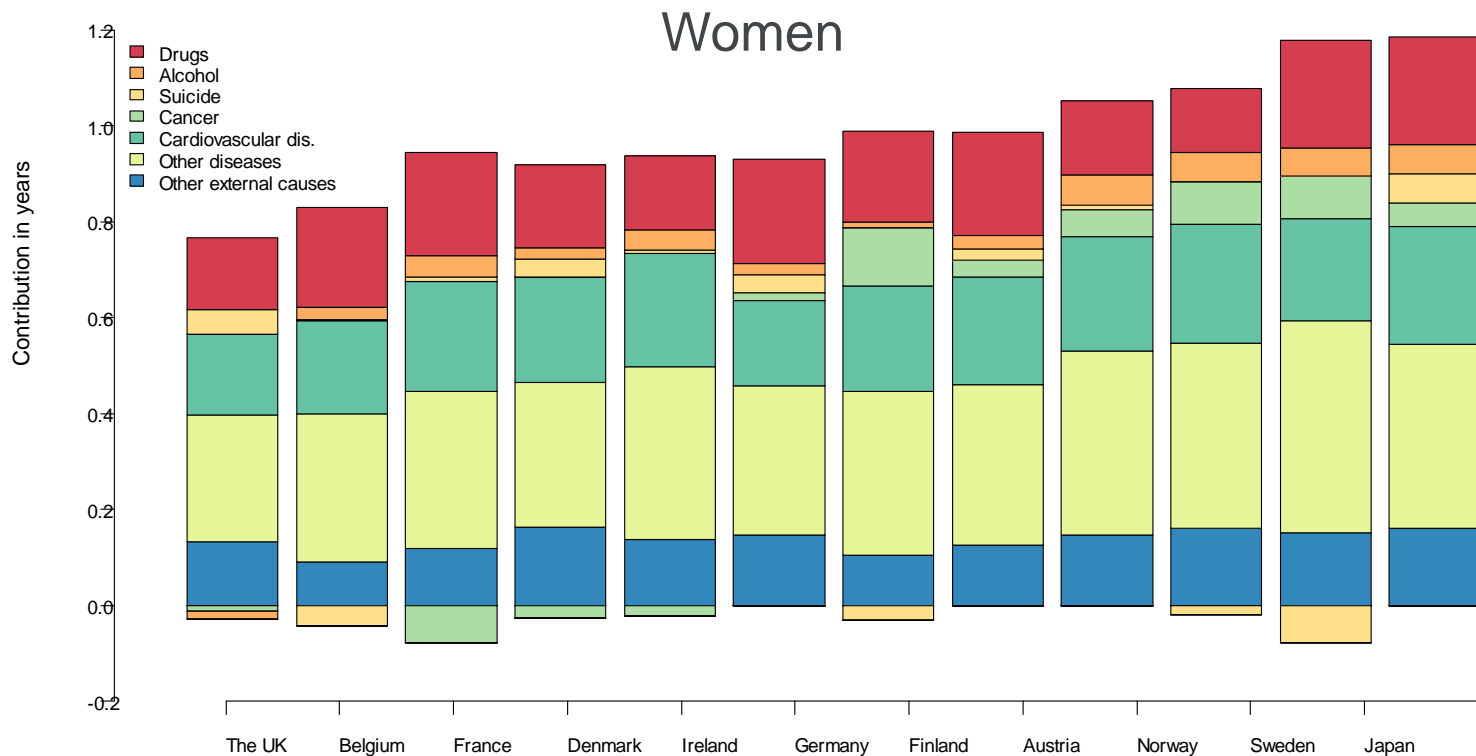
Decomposition of the difference in years lived at ages 20-50 between the US and 13 high-income countries in 2014



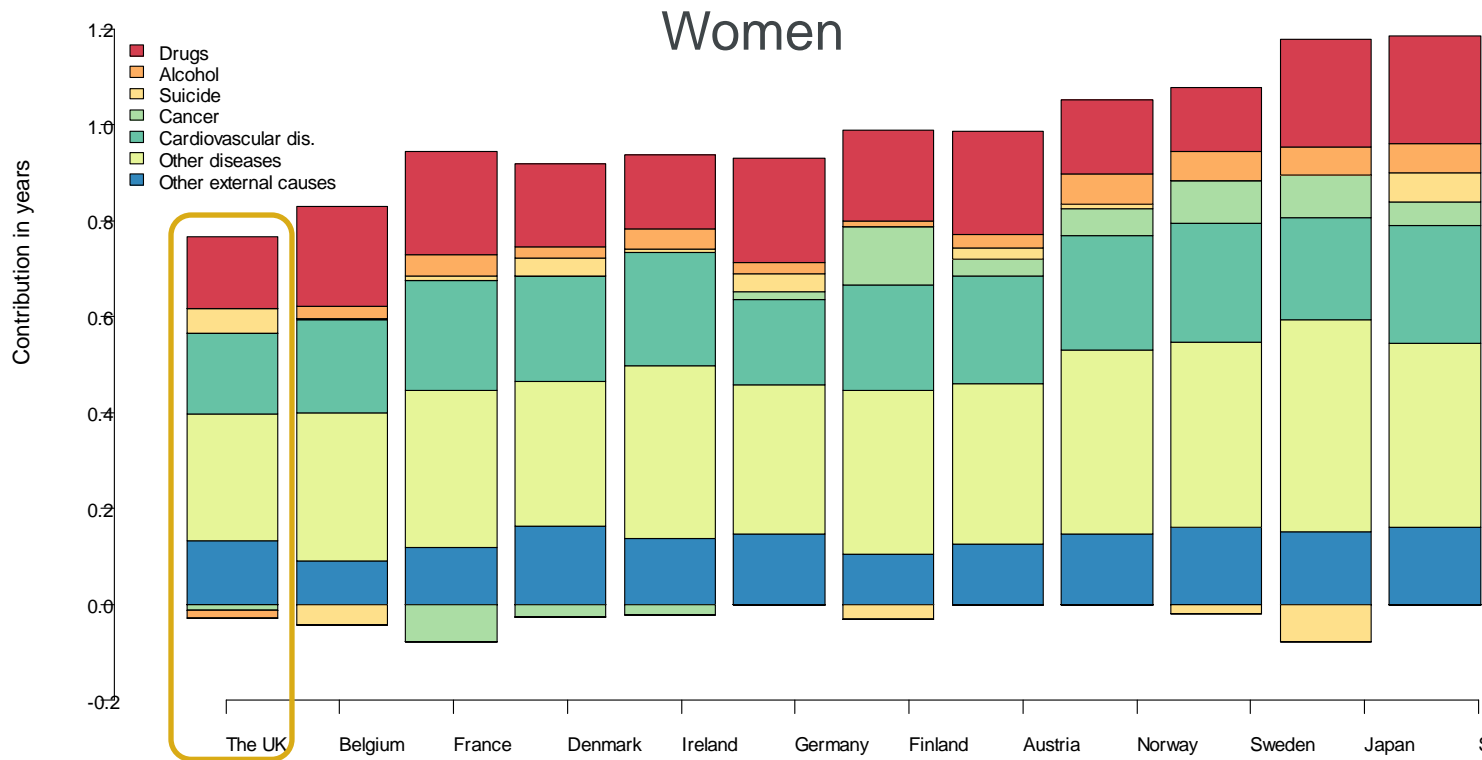
Decomposition of the difference in years lived at ages 20-50 between the US and 13 high-income countries in 2014



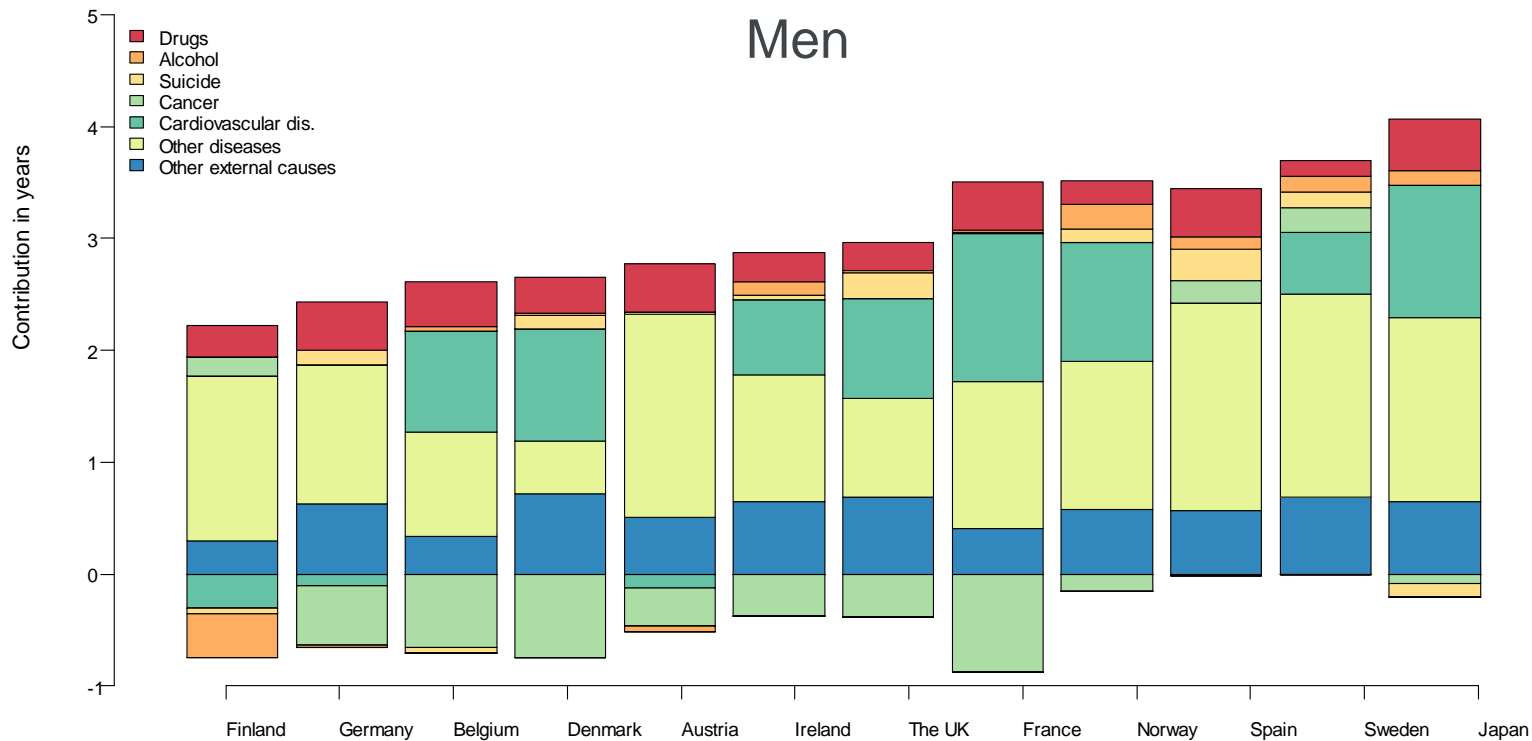
Decomposition of the difference in years lived at ages 20-50 between the US and 13 high-income countries in 2014



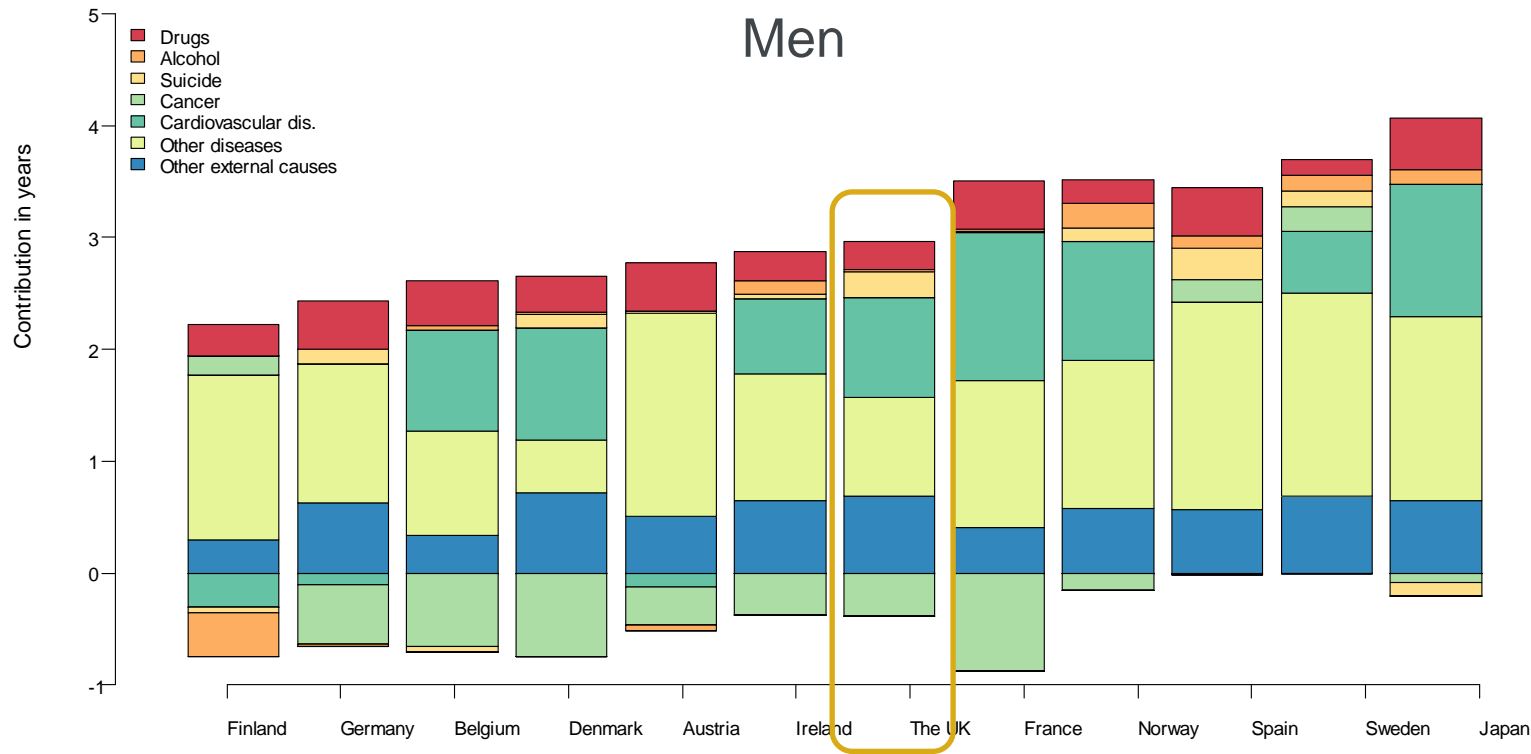
Decomposition of the difference in years lived at ages 20-50 between the US and 13 high-income countries in 2014



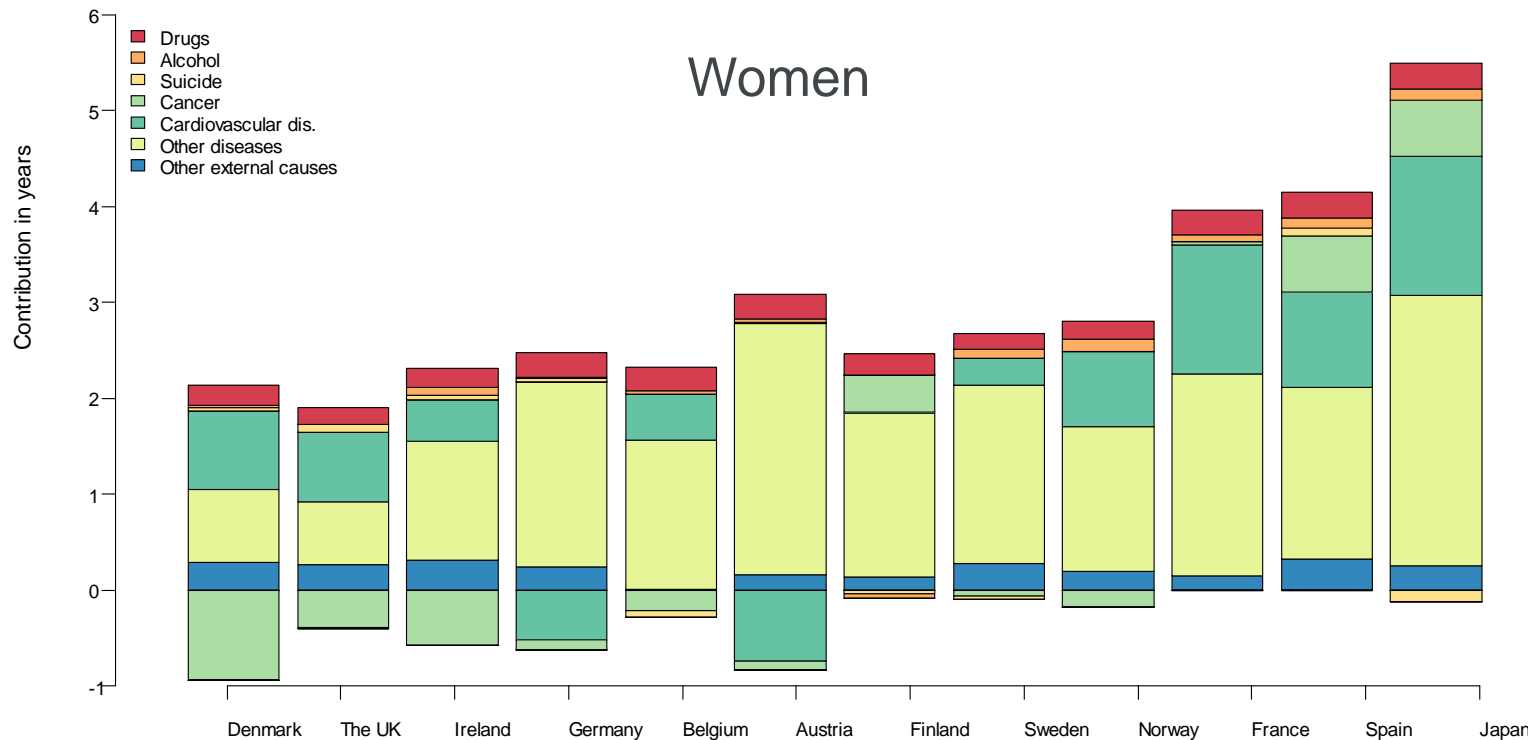
Decomposition of the difference in life expectancy at birth between the US and 13 high-income countries in 2014



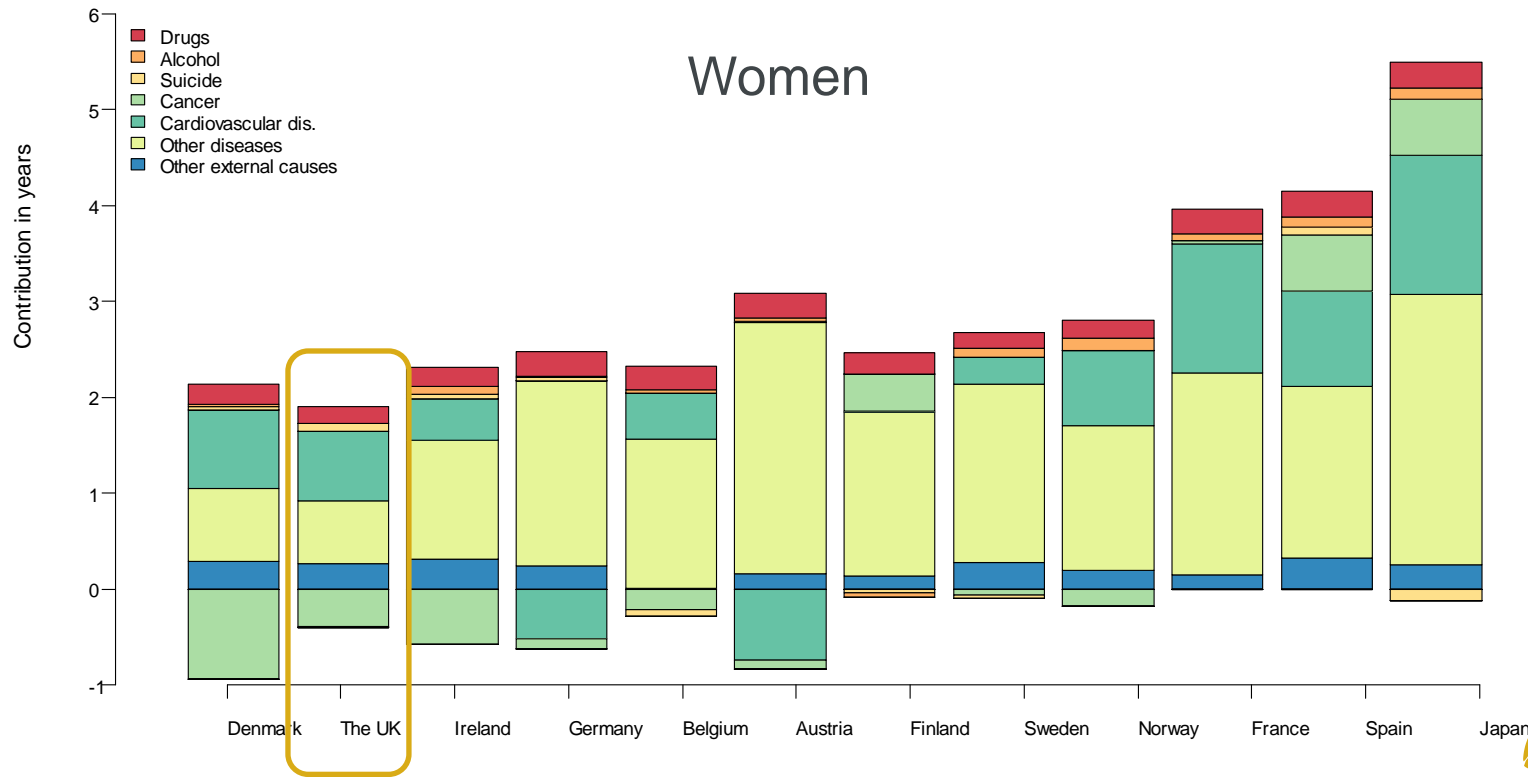
Decomposition of the difference in life expectancy at birth between the US and 13 high-income countries in 2014



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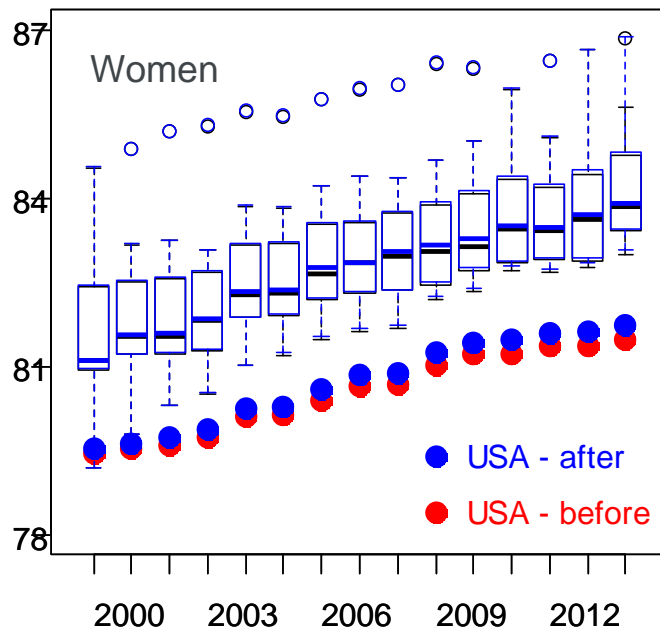
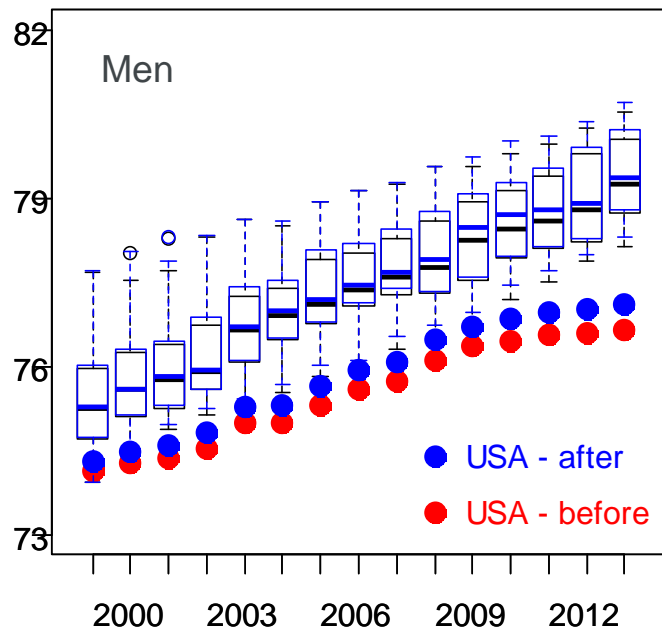
Decomposition of the difference in life expectancy at birth between the US and 13 high-income countries in 2014



Trends in life expectancy at birth in the US and 12 other high-income countries in 1980-2014

Before and after eliminating drug-related deaths

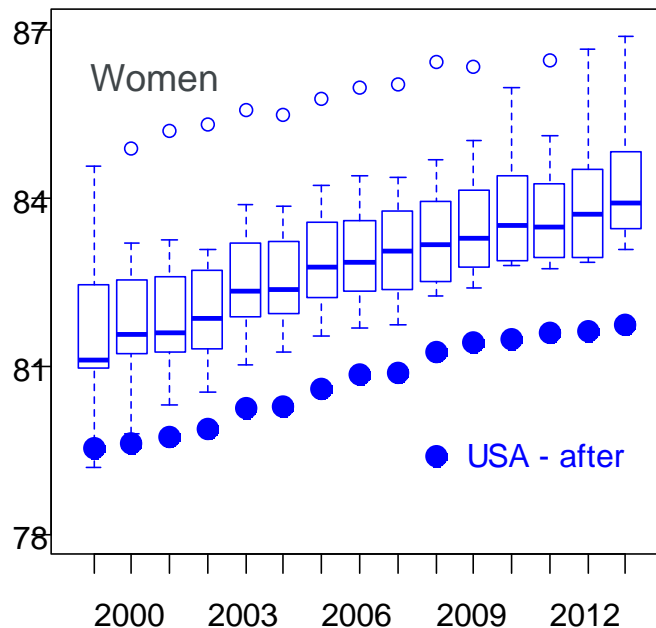
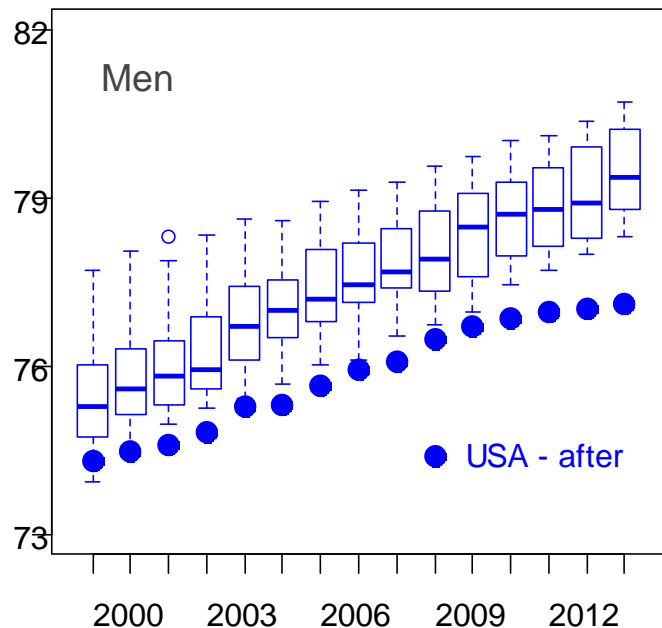
Life expectancy at birth



Trends in life expectancy at birth in the US and 12 other high-income countries in 1980-2014

After eliminating drug-related deaths

Life expectancy at birth



Conclusion

- The mortality crisis associated with the drug epidemics is very specific to the United States (at least for now)
- Drug overdoses « explain » 30 to 40% of excess US mortality for working-age adults (20-50 years old) compared to other countries
- Concentrating on the factors particular to the US could help identify the main drivers of the mortality crisis
- Controlling drug-related mortality would hardly close the survival gap between the US and other countries



**Questions?
Comments?
Suggestions?**



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