Low American life expectancy:

Separating longstanding differences from mortality trends, 1960-2009

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Introduction

What is known about the low life expectancy at age 50 of USA compared to other highly developed countries?

- *Cross-sectional studies*: USA has comparatively high early adult mortality and low old age mortality
- *Trend studies*: The USA experienced comparatively strong heart disease mortality reduction, but weak declines from other causes of death, notably strokes, cancers and mental disorders over the past half-century

Initial levels of mortality bear little correlation with mortality trends

Current study: We quantify the effects of past differences in the age-specific **mortality levels (1960)** and differences in age-specific **mortality trends (1960-2009)** to recent **life expectancy differences (2009)** between 18 highly developed countries. This is the first time trends and levels are compared on the same scale.

Approach

Contour-replacement decomposition
(Jdanov & Shkolnikov 2014, MPIDR WP 2014-010)

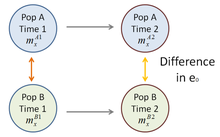
a) Step-wise replacements from A2 to A1 to B1 to B2 for each age
b) After each replacement, calculate the difference in life expectancy.
c) Reverse steps a & b, from B2 to B1 to A1 to A2
d) Average elementary contributions

Result: two age-specific components:
1. differences in the initial age structure of mortality (orange arrow)
2. different age-specific mortality trends (the grey arrows)

The sum of these two age-specific components exactly equals the classic decomposition of e_0 differences between A2 and B2 into age-specific components (yellow arrow).

Data come from the Human Mortality Database and the WHO mortality database

Illustration of the step-wise decomposition algorithm



Summary and Interpretation of Results

- Most of the current gaps in life expectancy between USA and others lie in past age-specific mortality differences
- **Men**: American men experienced above average mortality reductions over young working ages (50-70), but worse trends at older ages.
- **Women**: American women had comparatively weak mortality reductions at all ages.

Possible Explanations

- **Smoking**: Controlling for smoking attenuated but did not alter this pattern (Fig 2)
- **CVD**: stronger reduction in USA – in absence of CVD Americans had stronger initial advantage and weaker trends (Fig 3)
- **Obesity**: USA declines comparatively stronger at younger than older ages. Obesity unlikely to be major contributor.
- **Health care system**: Weak-trend countries (Scandinavian countries, Netherlands, USA) have very different health care systems. Notable that American men had strong mortality declines over ages not covered by Medicare, but weak declines at old ages, where American health care is thought to outperform other countries (NRC report 2011).
- **Selection**: Consistent with high young, low old age mortality – but attenuation of pattern would mean that USA is getting relatively less heterogeneous compared to other countries. Any evidence of this?
- **Data issues**:: Age misreporting that is weakening over time consistent with weakening USA advantage at old ages. Unlikely to explain the high early adult mortality.

Results

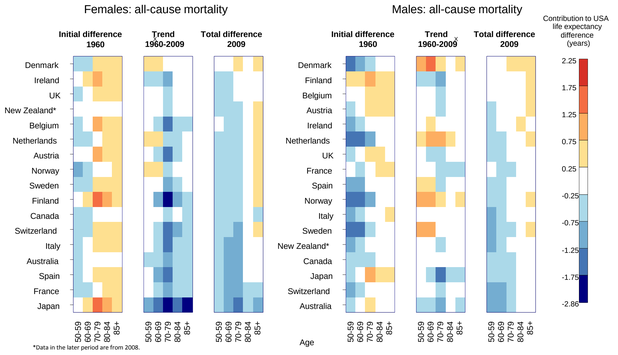


Figure 1: Decomposition of the 2009 difference in remaining life expectancy at age 50 between the United States and other high-income countries, arranged in order of increasing e_{50} in 2009. Each square represents the age contribution to this difference for each country: the total difference is the sum of the initial difference and the trend components. Orange-red hues are to the advantage of the USA while blue colours are to the advantage of other countries.

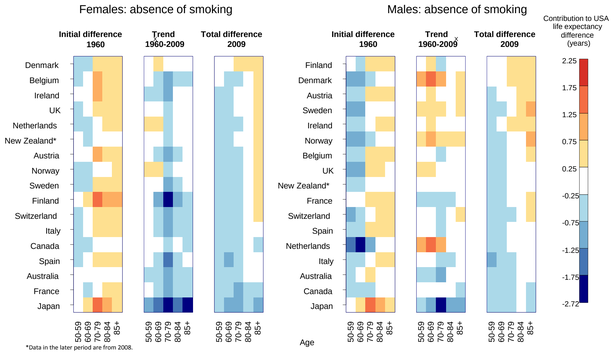


Figure 2: Decomposition of the 2009 difference in remaining life expectancy at age 50 in the absence of smoking between the United States and other high-income countries, arranged in order of increasing e_{50} in 2009. Smoking non-attributable mortality was estimated using the Preston, Glei & Wilmoth method (2010, 2011).

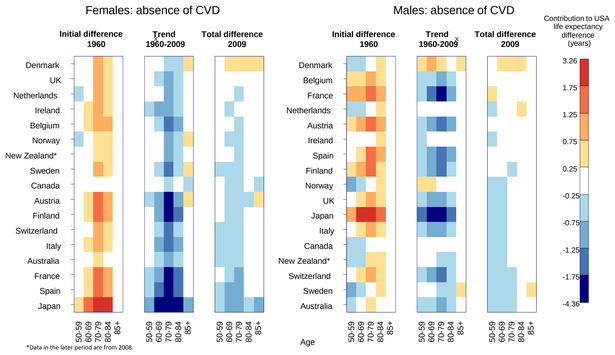


Figure 3: Decomposition of the 2009 difference in remaining life expectancy at age 50 in the absence of CVD between the United States and other high-income countries, arranged in order of increasing e_{50} in 2009. Mortality in the absence of CVD was estimated using traditional cause-deleted life table methods.

Conclusion

- **No single theory or mortality determinant was satisfactory in explaining these international sex-specific divergences.**
- **Too often, the poor standing of Americans in life expectancy tables is linked to contemporary social problems, without any reference to longstanding differences.**
- **Our results make clear that any discussion of American shortfalls in life expectancy must first begin with an examination of the past**

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