

**Low American life expectancy:
Separating longstanding differences from mortality trends 1960-2009**

Alyson A. van Raalte and Vladimir M. Shkolnikov

SHORT ABSTRACT

Background: Americans currently have low life expectancy and an outlying age structure of mortality, high early adult mortality and low old age mortality, when compared to other developed countries. The origins and long-term development of these patterns have not been sufficiently determined.

Methods: We used a new decomposition method which allowed us to simultaneously identify the role of initial differences in age-specific mortality (1960) and differences in age-specific mortality trends (1960-2009) to the 2009 gap in life expectancy at age 50 between the United States and 17 other high income countries. Decompositions were performed for all-cause mortality, mortality in the absence of smoking, and mortality in the absence of cardiovascular disease mortality for each sex.

Results: The outlying high early adult, low old age mortality pattern is longstanding, and was even more prominent in 1960. In the interim, American men have experienced comparatively strong mortality declines over working ages (1960-2009), especially once smoking has been accounted for, while American women have experienced comparatively weak declines over nearly all adult ages, compared to other highly developed countries.

Conclusion: The development of the outlying American age pattern of mortality is not readily explained by social or behavioural determinants, nor are sex differences in mortality decline. More attention should be directed to theories that can account for these longstanding differences in the age pattern of mortality.

LONG ABSTRACT

Introduction

Americans currently have low life expectancy and an outlying age structure of mortality, high early adult mortality and low old age mortality, when compared to other developed countries. The origins and long-term development of these patterns have not been sufficiently determined.

In an examination of survival probabilities from age 15 to 70 in 22 OECD countries, no relationship was found between a country's initial level of mortality and mortality trends over successive decades 1970 to 2010 (Verguet and Jamison 2013). This suggests that the two metrics are distinct, and to fully account for between-population gaps in life expectancy both past mortality levels and differences in mortality trends must be examined. Indeed, some evidence from a comparison of long-term mortality developments in the USA and England and Wales suggests that within-country temporal change in mortality is mostly determined by medical and technological advances, while social factors, such as income inequality and socioeconomic disparities, played a larger role in establishing between-country differences in mortality at any given time period (Shkolnikov et al. 2011). Only recently, however, has a new decomposition methodology been developed that allows these two metrics, levels and trends, to be compared on the same scale (Jdanov and Shkolnikov 2014).

Our objective in the current study is to disentangle the effects of past differences in the age-specific mortality levels (1960) and differences in age-specific mortality trends (1960-2009) to recent differences in life expectancy (2009) between 17 highly developed countries using a new step-wise replacement decomposition algorithm (Jdanov and Shkolnikov 2014).

We are particularly interested in how reductions in chronic disease mortality have shaped international differences in age patterns of mortality. As such, we limited our analysis to ages 50 and above since below these ages deaths are dominated by external mortality. Because international differences in mortality have been heavily influenced by differences in the timing and magnitude of the smoking epidemic (Preston et al. 2010), we considered both all-cause mortality and mortality in the absence of smoking. Finally since cardiovascular disease (CVD) mortality has been the major source of mortality improvement over the last 50 years, we further compared these countries in the absence of CVD mortality. We use data from the Human Mortality Database and the WHO Mortality Database.

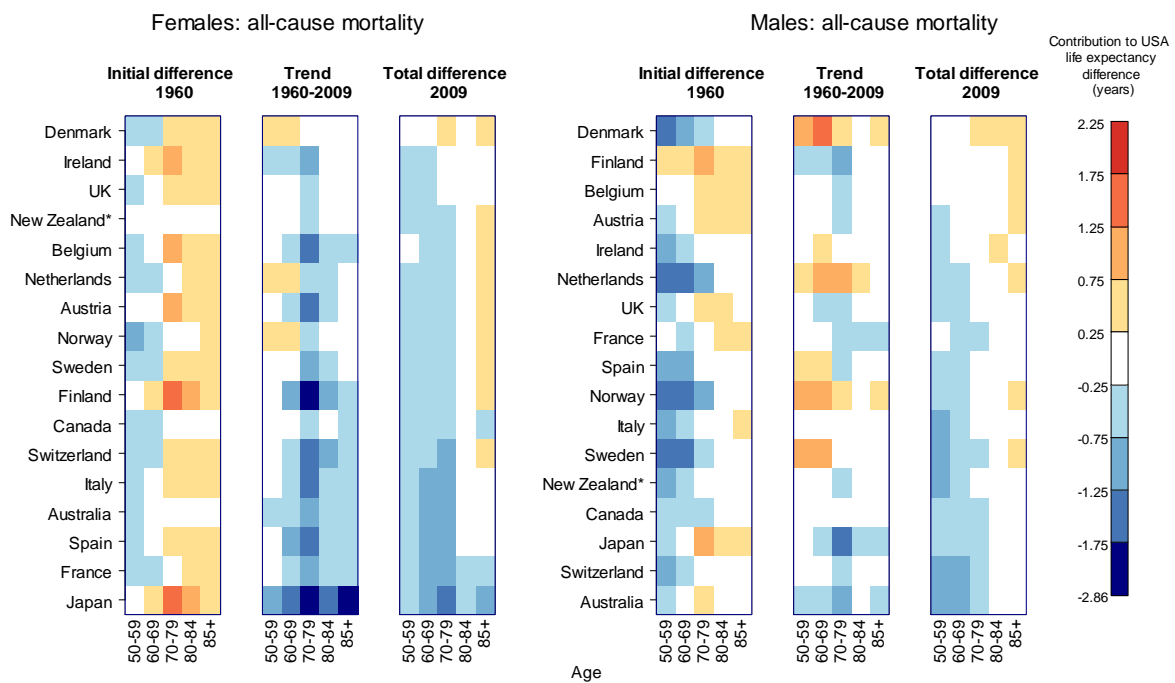
Summary of Results: Americans have among the highest mortality levels over ages 50-69, and among the lowest mortality levels over ages 85+. This is a longstanding but weakening pattern, both due to comparatively stronger mortality declines of Americans in early adulthood (men only) and comparatively weaker mortality declines among older Americans (especially among women). Overall these declines led to American women experiencing below average gains in life expectancy over the 1960-2009 period, while American men experienced about average gains (see Figure 1). Controlling for smoking did not substantially alter this pattern. However, in the complete absence of CVD mortality, Americans would have gained few years of life expectancy over the past 50 years by international comparison (see Figure 2).

Conclusion: The main advantage of our study has been the ability to separate trends and longstanding differences with a newly developed methodology. This methodology complements metrics of rates of mortality declines, but has the advantage of incorporating usually overlooked information about

different initial mortality levels. By doing so, we have uncovered a mostly overlooked phenomenon – that life expectancy differences over late working ages are narrowing between American men and the wealthy country average, while American women are falling further behind over all adult ages. The sharp differences in the age pattern of mortality between the USA and other countries are longstanding and weakening, and our results do not support arguments that solely attribute these differences in life expectancy to smoking, obesity or differences in the health care system.

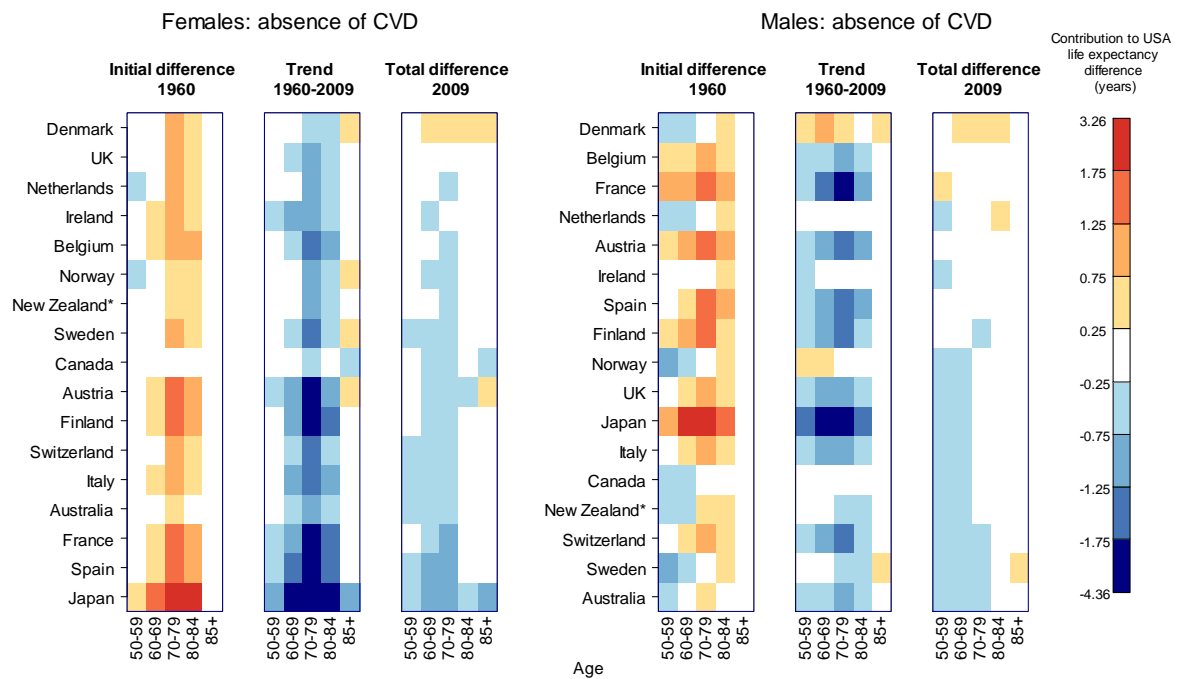
Too often, contemporary social problems are linked to the poor standing of Americans in life expectancy tables, without any reference to longstanding differences. Our results make clear that any discussion of American shortfalls in life expectancy must first begin with an examination of past differences.

Figures



*Data in the later period are from 2008.

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. Yellow-red hues are to the advantage of the USA while blue colours are to the advantage of other countries.



*Data in the later period are from 2008.

Figure 2: Decomposition of 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. 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. Red hues are to the advantage of the USA while blue colours are to the advantage of other countries.

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