A low mortality benchmark for the United States

Summary

We calculate a preliminary series of bestpossible lifetables for the United States from 1959 to 2004, defined on the basis of the age-specific aggregate of the lowest observed age-cause specific death rates among the 50 states and the District of Columbia.

it looks like someone thinks to do this about every 30 years: Whelpton (1947), Wunsch (1975), Vallin & Meslé (2008). We're bucking

The resulting highest-possible life expectancy shows a gradual increasing trend over the period, on average 1.9 and 2.2 years higher than the highest state life expectancy in each year for males and females, respectively.

The US low-morality lifetable is a useful gauge of future mortality trends. We compare state mortality patterns to benchmark life expectancy to quantify the potential for immediately acheivable improvement.

We will also compare with

Data and Method

All death count data come from restricted NCHS mortality microdata files. Single-age population denominators and complete state lifetables come from a beta version of the U.S. States project of the HMD. Death counts by causes of death are first grouped into 11 large cause groups and then converted to fractions in abridged

age groups.

use the same 30 causes used by Vallin & Meslé (2008)

Fractions are then multiplied into singleage all-cause death rates to produce a first estimate of single-age causespecific death rates. In order to eliminate stochastic zeros, cause-specific schedules are then smoothed over age and time using the method proposed by Camarda (2012), and then constrained to sum to the independently-smoothed all-cause mortality rates for each state.

this means we used the MortalitySmooth package

We then produce the minimum mortality rate schedule $m(x)^{min}$ by summing the lowest-observed cause-specific rates within each age and sex:

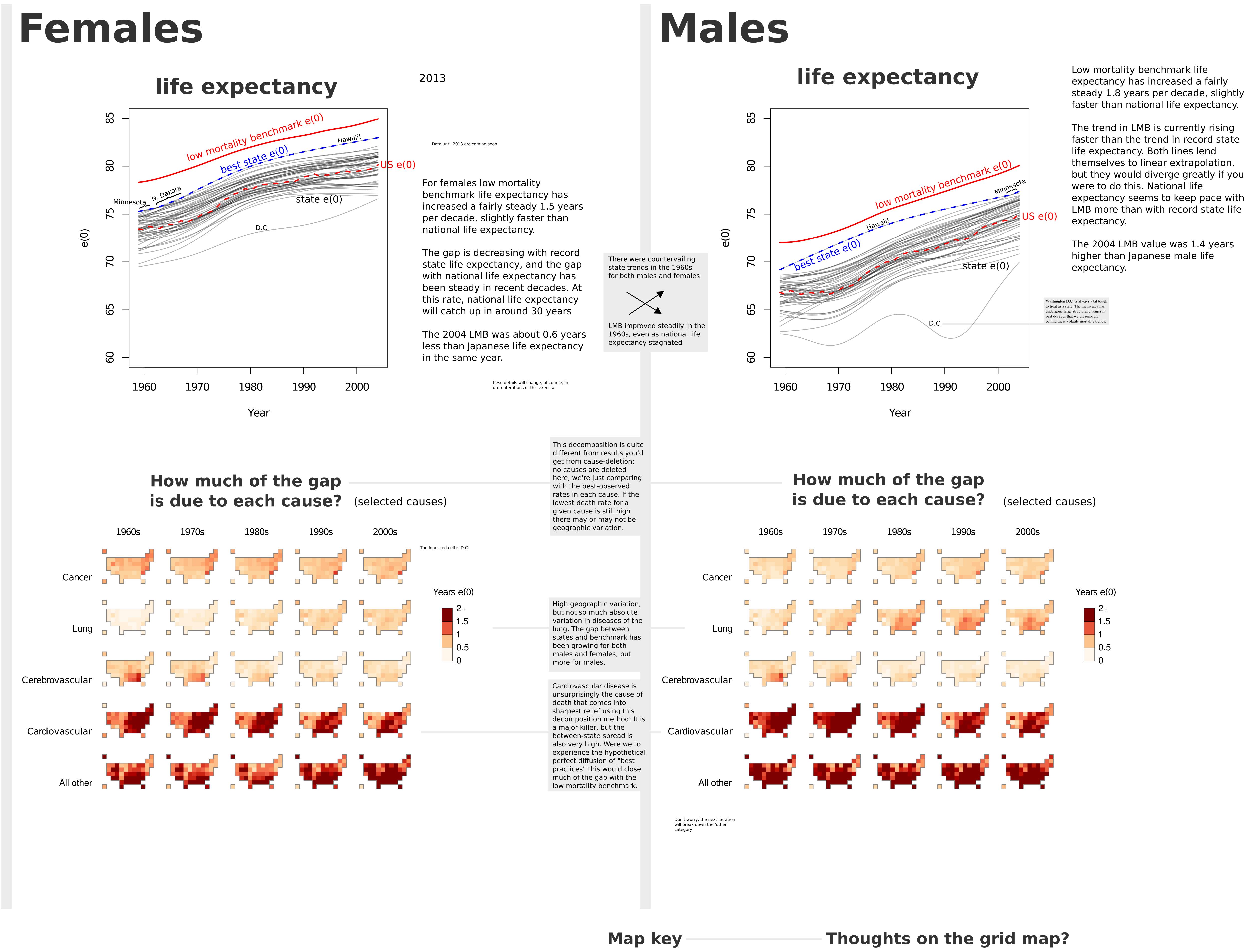
The minimum mortality schedule is then used to compute benchmark lowmortality life expectancy.

The difference between each state and the benchmark life expectancy of each year is then decomposed by age and cause using the generic decomposition method proposed by Horiuchi et. al.

Second thoughts

Clearly this procedure is not scaleinvariant: If we were to repeat the same exercise for US counties rather than states, it would produce a higher benchmark life expectancy, and likewise if we increase the number of causes. Ir this way we can arbitarily push the value higher or lower. For this reason, we are going try modeling select quantiles from a latent distribution of rates. (hat tip to Jutta Gampe)

here, but a generic method is nice since it will be easy to adapt to decompose indices of



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Further material

Low mortality benchmark life expectancy lends itself to comparison with international record life expectancy. At least two papers being presented in this PAA use record life expectancy in an instrumental way to guide mortality projections. We speculate that some version of this benchmark trend could serve a similar auxiliary role in projections. See e.g.,



A. Medford 37-1 (today at 10:15): "Best Practice Life Expectancy and Extreme Value Theory."

M. Pescariu & V. Canudas-Romo 37-2 (today at 10:15): "The Double-Gap Life Expectancy Forecasting Model"



Code

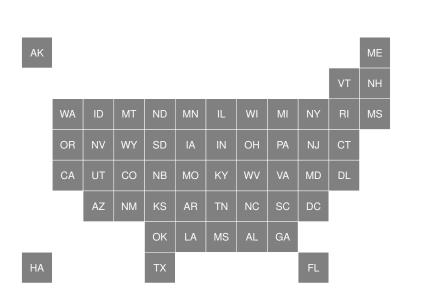
The R code used to process data, produce results, and create figures is in an open repository on github, which also contains the current version of the manuscript.



https://github.com/timriffe/BPLE

Unfortunately, since the data come from restricted files (due to small counts and suppressed geographic information) you need access to a Research Data Center (RDC) from the CDC in order to reproduce these results or do this kind of work in general. See http://www.cdc.gov/rdc/

Low mortality benchmark life expectancy displays a linear trend over the period studied, much more linear than any of the state trends or the national trend. During times of stagnation (1960s) and accelerated improvement (1970s), the benchmark mortality improved at roughly the same steady rate. This benchmark shows us the improvements that can be acheived now, without any technological advancements. Perhaps the linear trend can be used to temper or guide mortality projections as well.





comparing with a moving kind of like life expectancy

one state that is better than al performing states need to be