Reviewer's report

Title: Falling behind: life expectancy in US counties from 2000 to 2007 in an international context

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Reviewer: James Holt

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This paper reports county-level trends in life expectancy for the United States, using updated mortality data through 2007; in addition, county-level disparities in life expectancy are compared to a moving average (or “frontier”) of mortality based on countries with the lowest mortality per year from 1950 through 2007. The authors find substantial geographic disparities in life expectancy for both men and for women. Compared to the international standard, many US counties’ life expectancy lags several years (or decades) behind, and the number of counties in this situation is increasing over time. This trend is particularly pronounced for blacks in the US. The major impacts of this research are two-fold: first, major racial and geographic disparities in mortality exist in the US; and 2) the US mortality experience is poor compared to other nations, which is especially noteworthy given the high relative levels of per capita spending on health in the US. The authors discuss three major areas that might lead to future improvements in life expectancy: the environment (social, cultural, and physical), modifiable behaviors and risk factors, and the health care system (in terms of quality of care and access to health insurance). They argue that a focus on reducing the leading preventable causes of death has the greatest potential to reduce mortality. In this regard they differentiate between clinical interventions and community interventions (e.g., policies and tailored health promotion and screening efforts). The authors used innovative and sophisticated methods for estimating life expectancy for counties for each year of the study, paying considerable attention to the inherent limitations in dealing with counties with small populations and/or low numbers of deaths, while also taking into account spatial and temporal trends. They adequately described their methodology as well as their validation of the methodology. Their comparison of county-level mortality to an international standard based on
moving averages of the lowest mortality counties is novel. This approach is also very useful in highlighting the absolute differences in life expectancy and for inviting the readers to consider how US counties are lagging behind in terms of time (e.g., ten years behind in terms of where they should or could be in life expectancy).

The authors are also to be commended for championing the value of tracking mortality at the US county level. They also are to be congratulated for the acquisition and analysis of county-level mortality data, which was very difficult if not impossible to acquire during much of the past decade. They make an outstanding point in noting the essential nature of local measurement of not only mortality but of key health risks, in order to establish baseline levels and to inform decision making and to evaluate progress.

This interesting paper is extremely relevant to current debates over health and health care policy in the United States. The authors build upon a substantial body of their previous work, which was original and very influential in highlighting geographic variations in life expectancy in the United States.

Although I suggest no major revisions, the paper could benefit from some minor discretionary revisions that may help improve the presentation and clarity of their findings as noted below:

1) The resolution of the figures and map legends was too coarse, making interpretation difficult.

2) When mapping quantities, it is best to avoid spectral color patterns. The authors may wish to consider adopting an alternative color scheme, such as a light-to-dark color ramp (e.g., reds) or even better, a diverging color ramp (e.g., blue-to-neutral-to-red) to emphasize differences from a meaningful central value (such as the median county-level life expectancy).

3) Figure 1 (a) and (b) are conceptually identical. (These comments also apply equally to Figure 4 (a) and (b). Figure 1 (a) depicts county-level life expectancy while Figure 1 (b) depicts the number of years behind the international life expectancy frontier. The spatial patterns at the county level are statistically identical and are visually nearly identical…the visual differences being due to slightly different data ranges for each of the ten data classes between each map set. An alternative might be to use just one map set (a map set being a map for males and a map for females) and use a combined legend to denote both life
expectancy ranges as well as the number of years behind the frontier. In addition, the legend for Figure 1 (b) includes a data class for “<0”. As the real data range for this class (for Figure 1) is 0-15 years ahead for men and 0-16 years ahead for women, it might be more meaningful to divide this class into more than one class (assuming that the number of counties per class is not too small to permit visual identification on the map). At the very least, the authors should consider using the actual low data value for that data class rather than the less informative “<0”.

4) It would be useful to visualize the 2007 county life expectancy map in comparison to one for the previously published county-level data (1999).

5) On page 5, after the equation, I believe “Incomej” should read “Incomejt” (missing the subscript “t”).

6) The authors should spell out NCHS as National Center for Health Statistics upon first instance of use.

7) The authors should spell out GAVI as Global Alliance for Vaccines and Immunisation.

8) Medicare should not be in all caps (as it is on page 13).

9) On page 12, the authors state that “…more than 85% of American counties have fallen further behind the international life expectancy frontier”. I am not sure how they arrived at this percentage. On page 11, they state: “For males, 1,406 counties fell more behind in 2007…” and “The corresponding figures for females are 2,054 falling more behind”. Given a total of 3141 counties/county equivalents, I’m not sure this corresponds to 85%. I may be misinterpreting this, but it might need to be clarified.

10) In the discussion section there is one paragraph on limitations, with its own subheading “Limitations”. There should be a new subheading for the material that immediately following the limitation paragraph (beginning with “While documenting the pace of relative global decline and rising disparities is novel…”).

In summary, this is a well-conceived and important paper that is both timely and thought-provoking. I believe it will stimulate much important discussion on the causes and potential solutions to the paradox of US county-level life expectancy disparities.

Major Compulsory Revisions: None

Minor Essential Revisions: None
Discretionary Revisions:
Noted Above
The findings and conclusions of this review are those of the reviewer and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.