Reviewer's report

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

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Reviewer: Luc Bonneux

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Major comments:

* The authors assign to period life expectancies characteristics they do not have. Period life expectancy is age specific mortality treated as a Markov process, nothing more. In good epidemiologic practice, you compare death rates using the statistically most parsimonious methods, and then translate these differences in life expectancies for transparency (as for example Richard Peto did in his papers on smoking). I am sorry, but building only on life expectancy is not good practice in epidemiologic demography.

* It is not true that you need statistical models to "calculate stable death rates". Variance in small numbers does not go away by modelling (it can only be hidden by added assumptions). The SMR is parsimonious, and yields the smallest error (at the prize of theoretical loss of comparability). I guess medical statisticians, trained in ranking figures with small numbers and great variance (as in-hospital mortality), might not be happy with the used methods for ranking and interpretation (but I am not statistically competent).

* The authors refer to a paper in Plos Med to refute the remark of migration. The paper referred uses simulation based on arguable assumptions (as always in simulation): the life expectancy differences between the best off and worst off classes are more in the range of six than of one year. One to two years is the added effect of immigration, remaining unexplained after correction for known confounders such as socio economic status. At least in Europe (and I guess in Florida and California), one observes high life expectancies in coastal areas, retreats of wealthy pensioners (housing is expensive and the cost of living is higher). In a small country as Belgium, with a homogeneous lifestyle in the middle aged and elderly (the immigrant populations are young) and excellent health care insurance coverage, we observe mean differences in life expectancy between the old industrial areas and the coastal area of four years. In the old industrial areas, the elderly that stay are (ex-) heavy smokers and workers in the damaging coal and steel industry surviving on small pensions. In the EU, you can define the old industrial areas ("rust belts") everywhere by their low life expectancy, and sharply so. The difference between "old industrial area" and "wealthy pensioners retreat" explains four years of life expectancy, so does the difference in regional levels of taxation in EU countries (at least in the UK, Belgium and France). If I might chide the authors for their extrapolations of observed data to interventions advice, I might speculate that doubling taxation
will increase life expectancy with four years.

* I still would suggest to cut the speculation. One of the clumsy characteristics that make life expectancy less informative is that they lose all information of age and cause of death. Mortality in the Netherlands stagnated for twenty years between 1980 and 2000: even with the benefit of hindsight, we have no clue. The forwarded explanations seem reasonable, but do not hold (life expectancy stagnated particularly in women over 65, but these did not smoke, and from a still puritan religious tradition they had sober life styles. Levels of health care spending were among the highest in Europe). We even have no clue why the reverse happened around 2002, and the Dutch speedily started to catch up.

* Boundaries are sharp predictors of life expectancy in the EU: the difference between Portugal and Spain is many years. In Germany, all "eastern" states without exception still have lower life expectancies than any western state with but one exception, twenty years after unification.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests.