

[The comment below was posted on journalreview.org on May 21, 2010. Following the closing of that site, the comment was posted here in September 2012.]

Relative differences cannot effectively identify reporting heterogeneity

Relying principally on relative differences in mortality between persons in various self-rated health (SRH) categories, Huisman et al.[1] have conducted a study attempting to show whether there existed a greater association between self-rated health and mortality among persons with higher education than among persons with lower education. With the primary education group as their reference category, the authors find a statistically significant greater association between SRH and mortality for tertiary educated men. But the study fails to consider reasons why the size of relative difference between mortality rates of different SRH categories is not a useful indicator of the strength of an association.

I first note, however, that the authors mention as one of the strengths of their study the large sample size and then go on to point out that “even in a study of this magnitude” there were only a limited number of deaths in extreme categories. But it is questionable whether one should even regard the study as of large magnitude since there seem to be many things as to which there are too few deaths to draw firm conclusions. At the outset of their results analysis, the authors attach significance to the fact that, while the crude mortality rate for those rating their health “very good” was higher in the primary education group (12.3%) compared with the tertiary education group (3.8%), among those rating their health “bad,” the primary education group had a lower mortality rate (33.8%) than the tertiary education group (35.3%). But the latter figure was based on only 6 deaths and 5 deaths would have reflected a 29.4% rate. Thus, the higher death rate in the tertiary education group certainly does not suggest anything meaningful. And given the general patterns – including that the mortality rate in the three intermediary SRH categories combined was 21.4% for the primary education group compared with 8.8% for the tertiary education group – it is quite likely that a larger study (or perhaps an age and gender adjusted analysis in this study) would show among those rating their health “bad” a larger mortality rate for the primary education group than the tertiary education group. In any case, it is a mistake to read the comparison in the “bad” category as suggesting of anything meaningful.

Turning to the more important issue, one will commonly observe patterns whereby poorer health is associated with larger proportionate increases in mortality among higher education groups than among lower education groups regardless of any meaningful difference in the predictive value of SRH health in the different education groups. For reasons inherent in the shapes of normal risk distributions, the rarer an outcome the greater tends to be the relative difference in experiencing it and the smaller tends to be the relative difference in avoiding it.[2-5] A corollary to such pattern is one whereby a factor that increases the risk of an adverse outcome will tend to increase it proportionately more in the group with the lower adverse outcome rate (though reducing the opposite outcome more in the other group.)[3-5]

In Table A(H) to this comment,[6] (which also appears as Table A to the Reporting Heterogeneity sub-page of the Scanlan’s Rule page of jpscanlan.com[7]) illustrates the

underlying tendency with data from Table 1 of the Huisman article. Table A(H) shows that as one moves from more common to less common outcomes – that is, from (1) health less than “very good” to (2) mortality to (3) “bad” health – relative differences between the primary education group and tertiary education group rates of experiencing the outcomes increase while the relative differences in avoiding the outcomes decrease. (In interpreting the table, keep in mind that the patterns are unrelated to mortality rates within health categories, but solely involve rates of falling into the categories.)

In Houweling et al.[8] an article that was under submission when the instant article was published, two of the instant authors themselves recognized this pattern (if not necessarily the forces driving it[9]). In the instant study, however, the only suggestion of recognition of such pattern is found in a statement that the comparative sizes of relative differences observed in the study did not appear to be explained by the lower base mortality rates of the higher education groups. The authors so conclude on the basis of larger absolute differences in mortality rates between those with “very good” and “good” health and those with “less than good” health “in the higher educated (where mortality was lower).”

According to the patterns described in Houweling et al., larger absolute differences between health categories in the group with the lower base rates would suggest a meaningful stronger association between poorer self-rated health and mortality within such group – as would my own reasoning in similar work.[2,10] But in such circumstances it is the larger absolute differences in the more educated groups on which researchers should focus rather than on the larger relative difference in such groups. For the latter pattern will commonly occur whether or not the association between self-rated health and mortality is stronger in such groups in any meaningful sense.

Further, however, the authors presented no data illustrating the broad statement as to larger absolute differences in higher education groups and did not present sufficient data to enable one to replicate the results to which they refer. The only data on mortality rates within individual SRH categories is that found in the study’s Table 1. That table presents, or enables one to derive, only the mortality rates within SRH rating categories undifferentiated by gender or age, and only for the following SRH categories: (1) “very good”; (2) less than “very good”; (3) “good,” “fair,” and “sometimes good/sometimes bad” combined; (4) better than “bad”; and (5) “bad.” Given that there are too few deaths in the “bad” category to treat “bad” as a separate category, the most useful analysis of the available data would compare “very good” with all other categories combined. Such analysis is set out in Table B(H) to this comment.[6] While the results are not entirely consistent across all education categories, at least as to the primary education and tertiary education groups one observes the pattern that the distributional forces mentioned above would tend to promote regardless of any meaningful difference in the association between self-rated health and mortality – that is, (a) larger relative differences in mortality for the tertiary education group, (2) larger relative differences in survival for the primary education group, and (3) larger absolute differences in mortality/survival for the primary education group.

These comparisons, to be sure, differ from the “very good” and “good” versus “less than good” comparisons mentioned in the article. And possibly the data relied upon by the authors soundly contradicts the pattern just described. But, particularly given that the comparative size of absolute differences is the key indicator, complete data for each health category ought to be set out.

Finally, I note that the last column of Table B(H) shows that, according to the procedure discussed on the Solutions sub-page of the Measuring Health Disparities page of jpscanlan.com, [11] and which is theoretically unaffected by the overall prevalence of an outcome, the association between rating one’s health less than “very good” and mortality is slightly stronger in the tertiary education group than in the primary education group. But the association is weaker in the two intermediate groups than in the primary group. So the patterns, which may or may not be significant, are difficult to interpret.

In any case, it is an approach such as that underlying the last column of Table B(H) (or some other approach not affected by the overall prevalence of an outcome, if such exists) – with categories probably best dichotomized at “very good” and “good” versus “less than good” as the authors did for their absolute difference comparisons, as well with adjustment for age and stratification by gender – on which efforts to appraise differing associations between self-rated health and mortality should be based.

See also the Subgroups Effects sub-page [12] and the Illogical Premises sub-page [13] of the Scanlan’s Rule page of jpscanlan.com, both of which discuss reasons why it would be illogical to expect something like poor self-rated health to cause proportionate increase for groups with different baseline mortality rates.

References:

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6. Tables accompany comment on Huisman et al.:

http://jpscanlan.com/images/Tables_for_Huisman_IJE_2007_Comment.pdf

7. Reporting Heterogeneity sub-page of Measuring Health Disparities page of jpscanlan.com:

<http://www.jpscanlan.com/measuringhealthdisp/reportingheterogeneity.html>

8. Houweling TAJ, Kunst AE, Huisman M, Mackenbach JP. Using relative and absolute measures for monitoring health inequalities: experiences from cross-national analyses on maternal and child health. *International Journal for Equity in Health* 2007;6:15:

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http://jpscanlan.com/images/Comment_on_Eikemo_et_al.pdf

10 Scanlan's Rule page of jpscanlan.com: <http://jpscanlan.com/scanlansrule.html>

11. Solutions sub-page of Measuring Health Disparities page of jpscanlan.com:

<http://www.jpscanlan.com/measuringhealthdisp/solutions.html>

12. Subgroup Effects sub-page of Scanlan's Rule page of jpscanlan.com:

<http://www.jpscanlan.com/scanlansrule/subgroupeffects.html>

13. Illogical Premises sub-page of of Scanlan's Rule page of jpscanlan.com:

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