

The material below is a version of:

Scanlan JP. Interpreting patterns of changes in measures of demographic differences in folate status in light of overall improvements in folate status. *Journal Review* Dec. 2, 2008 (responding to Dowd JB, Aiello AE. Did national folic acid fortification reduce socioeconomic and racial disparities in folate status in the US. *Int J Epidemiol* 2008;37:1059-1066), which appears at <http://journalreview.org/v2/articles/view/18456713.html>

The compression function of journalreview.org site eliminates the paragraph breaks. The version below restores those breaks.

Title: Interpreting patterns of changes in measures of demographic differences in folate status in light of overall improvements in folate status

Text: In discussing the way a national folic acid fortification program tended to increase relative differences between low folate rates of advantaged and disadvantaged groups, while reducing absolute differences in such rates, Down and Aiello [1] overlook the ways that, solely for statistical reasons, various differences between rates of experiencing some outcome will tend to be affected by the overall level of an outcome.

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. Thus, as an outcome like low folate status decreases in overall prevalence, relative differences between rates of experiencing the outcome tend to increase, while relative differences between rates of avoiding the outcome tend to decline. Absolute differences tend to change in the same direction as the smaller of the two relative differences (derived from ratios where one group's rate of experiencing the favorable outcome is used as the numerator for the favorable outcome ratio and the other group's rate of experiencing the adverse outcome is used as the numerator for the adverse outcome ratio). That seemingly complex formulation translates into a pattern whereby, in favorable outcome terms, when overall prevalence of an outcome is comparatively low (below 50 percent for the advantaged group) increases in prevalence tend to increase absolute differences between rates; when overall prevalence is comparatively high (commencing at a point somewhere above 50 percent for the advantaged group) increases in prevalence tend to reduce absolute differences between rates. Over 90 references discussing these patterns are made available on the Measuring Health Disparities page (MHD) of jpscanlan.com. and the nuances of the patterns are explored on the Scanlan's Rule page (SRP) of the same site. Several references are also listed below.[2-5]

The implications of these tendencies in the case of folate status are that, solely for statistical reasons, it is to be expected that, as folate status improves generally, relative differences in low folate status will tend to increase while relative differences in adequate folate status will tend to decline. And that pattern would tend to hold regardless of the initial prevalence of low folate status. In the case of absolute difference, the initial

relationship of the two relative differences is such that further increases in adequate folate status would tend usually to reduce absolute differences between rates of adequate (or low) folate status, though there would be many situations where increases in the favorable outcome will tend to increase absolute differences. See Section E of MHD. But, without more, none of these changes in measures can indicate whether health disparities are increasing or decreasing in any meaningful sense.

Of course, when patterns depart from those described, one may cautiously draw inferences about meaningful changes. The decline in the relative difference between white and Hispanic rates, being contrary to the typical pattern, suggests that the disparity declined in a meaningful sense. But when measures move in the typical direction, drawing inferences about meaningful changes is more difficult.

One plausible approach for doing so is described on the Solutions sub-page of MHD. See also, e.g., references 6-7. The Solutions Database sub-page of MHD provides a downloadable database to implement the approach. Tables A and B to this comment (which can be accessed at: http://www.jpscanlan.com/images/Dowd-Aiello_table.pdf) implement that approach for comparisons of the top and bottom income quartiles and for whites and blacks using data from Dowd and Aiello. In addition to illustrating how relative and absolute differences changed in the typical manner (and that one would reach contrary conclusions about the directions of changes in disparity if one examined the favorable outcome rather than the adverse outcome) Table A, which is based on Table 1 of Dowd and Aiello, shows that, according to the above-referenced approach, there occurred a modest decrease in the income disparity and a negligible decrease in the racial disparity. Table B is based on rates of low folate derived, algebraically, from the relative and absolute differences shown in Table 2 of Dowd and Aiello. In addition to showing the usual patterns of changes in relative and absolute differences in the circumstances, it shows a very small increase in the income disparity and a slightly larger one for the racial disparity. The conclusions about changes in disparities according to the approach underlying Tables A and B are, of course, subject to the caveats repeatedly made concerning that approach.

Dowd and Aiello cite Keppel [8] as noting the limitations of a ranking of the ten largest racial and ethnic health disparities according to relative differences in adverse outcomes because it is the absolute difference that shows the true public health impact of a disparity; and they note that their study further highlights the “risk of assuming that the size of a relative association provides information on the public health significance” of a disparity. In fact, assuming that the absolute difference does best capture the public health significance of a disparity, the size of a relative association does provide information on that issue. But one needs to understand that the larger the relative difference in the adverse outcomes examined by Keppel, the less will tend to be such significance.

Keppel is the principal author of the policy of the National Center for Health Statistics (NCHS) whereby all disparities are to be measured in terms of relative differences in adverse outcomes. The policy is an oblique response to references 3 and 4,[9] and it is

one which I have repeatedly criticized. See Section E.4 of MHD and A.6 of SRP and references mentioned therein. See especially references 10 and 11 below, the latter of which shows how NCHS would read a study on racial and ethnic differences in vaccination rates as showing dramatic increases in disparities in circumstances where the authors of the study found dramatic decreases in disparities.

Appearing in the same session where reference 5 was presented,[12] Keppel indicated that he regards the above-described patterns of correlations between prevalence and each measure of differences between rates to apply to cross-sectional data but not longitudinal data. But there is no basis for such distinction and the various illustrations of these patterns I have made with cross-sectional data are in substantial part intended to show patterns of changes over time as each group's distribution of factors associated with an outcome moves to the right or to the left. A particularly useful feature of the Dowd and Aiello study is that it illustrates how these patterns apply when a program does move each distribution. To be sure, the distributions may not be moving to the same degree. But sorting out the extent to which the distributions are changing similarly or differently over time is precisely the task of the researcher – though a more difficult one than identifying the changes in standard measures of differences between rates. The approach to doing so underlying Tables A and B may be an imperfect one – and NHANES folate information underlying the Dowd and Aiello study might well be useful for illustrating the weaknesses (or strengths) of the approach. But neither relative nor absolute differences examined without regard to the implications of changes in overall prevalence can provide useful information about whether disparities are changing over time in any meaningful sense.

References:

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12. Keppel KG. Measuring Disparities in Health People 2010. Presented at the 7th International Conference on Health Policy Statistics, Philadelphia, PA, Jan. 17-18, 2008