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Understanding the way choice of measure tends to dictate the results of studies of the way improvements in health care affect health inequalities avoidable mortality

The study by James et al.[1] examining the way reductions in avoidable mortality reduced health inequalities in avoidable mortality in Canada, as measured in terms of absolute differences between mortality rates of groups of higher and lower socioeconomic status, illustrates the way the choice of measure of inequality has a high probability of dictating the results of a health inequalities study. When groups have different baseline rates of some outcome and something causes the outcome to decline among all groups, that generally leads to an increasing relative difference between rates of experiencing the outcome and declining relative differences between rates of avoiding the outcome.[2-6] The situation with respect to absolute differences is somewhat different. When an outcome that is almost universal declines, absolute differences will tend to increase for a time. Then, at the point where the (increasing) ratio of the more susceptible group's rate of experiencing the outcome to that of the less susceptible group approximates the (declining) ratio of the less susceptible group's rate of avoiding the outcome to that of the more susceptible group's rate of avoiding the outcome, the absolute difference starts to decline and continues to decline as the outcome becomes increasingly rare.[2,6,7] But in the case of relatively rare outcomes like mortality, the standard pattern is generally for the absolute difference to increase as the outcome declines.

By choosing to measure inequality in terms of absolute difference, the authors almost guaranteed that they would find inequalities to decline, and they note that the relative difference between the avoidable mortality rates of the poorest and richest quintiles increased. Thus, the study contrasts strikingly with the recent study by Korda et al.[8] Examining the way improved medical care affected inequalities in avoidable mortality in Australia, Korda et al. chose to measure inequality in terms of relative differences in mortality and found those inequalities to increase. Had Korda et al. instead used absolute differences, as James et al. did – or, for that matter, relative differences in survival [9] – Korda et al. would have found inequalities to decline. But the study by James et al. could also be strikingly contrasted with the innumerable studies of inequalities in mortality that, because the authors chose to measure inequality in terms of relative differences in mortality, found that during times of declining mortality socioeconomic inequality in mortality increased. Many and perhaps most of these studies would have reached opposite results had they chosen the measure used by James et al.

James et al. defend the use of absolute differences on the basis of the "closer relation [of absolute differences] to the overall health burden." And certainly there is something to be said for the greater importance of absolute than relative differences in that regard. It should be recognized, however, that in some cases where a very common outcome is declining (including that of failing to receive some beneficial procedure that is becoming increasingly available, as discussed elsewhere [7,10]), the absolute difference will

increase. There will also be circumstances where the absolute difference between rates of experiencing some outcome may increase even when the disadvantaged group has, in a meaningful way, benefited less from an overall improvement. Such possibilities are evident in Table 1 of references 2 and 6. The former shows, for example, that if a decline in poverty caused 100% of whites but only 90% of blacks between the poverty line and 75% of the poverty line to escape poverty, in absolute terms the black poverty rate still would decline more than the white poverty rate.

Thus, it is essential to recognize that there are certain ways that each measure of difference tends to change solely because the prevalence of an outcome changes. In order to reasonably discuss whether inequalities are increasing or increasing, one must understand those patterns and endeavor to sort out whether observed patterns of changes in differences between rates of advantaged and disadvantaged groups are other than what would be expected solely because of overall changes in the prevalence of an outcome. That does not seem to be an easy thing to do and there is some question whether it is possible to do at all, at least when one examines an outcome like mortality.[2,6,11]. But there is little point in studying changing health inequalities without consideration of the way certain patterns of changes in each measure of inequality tend generally to accompany changes in overall prevalence of an outcome.

Finally, in noting that poorer quintiles have a greater opportunity for absolute risk reductions, the authors cite Anderson et al. [12] for the proposition that medical care often has the same relative effectiveness across socioeconomic groups, which then will reduce absolute differences. While Anderson et al. do point out that the same relative reduction for higher and lower socioeconomic groups will cause greater absolute reductions for lower socioeconomic groups (given the higher base rates in lower socioeconomic groups), they seem more to say that whether measures that reduce adverse outcomes will tend to show the same relative effectiveness across socioeconomic groups is something that clinical epidemiologists should study. In any case, any expectation that an intervention that reduces mortality will effect the same relative reduction in mortality for groups with different baseline rates is unwarranted. Rather, the expectation should be that the intervention will tend to reduce mortality proportionately more for the group with the lower baseline mortality rate while increasing survival proportionately more for the group with the higher baseline mortality rate.[4,5,13] Indeed, there is no reason ever to expect a factor to have the same relative effect on outcome rates of each group (save by happenstance). For certainly there is no more reason to expect a factor to cause an equivalent proportionate decrease on both groups' rates of one outcome (say, mortality) than there is to expect it to cause an equivalent proportionate increase in rates of the opposite outcome (survival), and it is mathematically impossible to do both (as should be evident from the tables in references 2, 5, and 6, and as shown in a simple example in reference 14[14]).

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