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Study shows different adjustment approaches rather than different relative and absolute perspectives

The title of the article by Khang et al.[1] and various portions of its content, especially Table 4, give the impression that the article contrasts relative and absolute perspectives concerning the way risk factors explain socioeconomic inequalities in mortality from various causes. But in several places the article makes clear that in fact it contrasts the percentage reduction in relative differences between rates achieved by a standard adjustment for risk factors with the percentage reduction in absolute differences between rates that would be achieved by eliminating all risk factors. Adjustment of inequalities for risk factors is a different thing from determining what inequalities would be if there were no risk factors at all, and the implications of such difference are of some consequence to the apparent theme of the article.

A standard adjustment for risk factors involves determining what the rates of the groups being compared would be if each group had the same risk profile. This is usually done by attributing the advantaged group's risk profile to the disadvantaged group, though it can also be done by attributing the disadvantaged group's risk profile to the advantaged group. The two methods may yield somewhat different results. But each will yield exactly the same percentage reduction in the absolute difference between rates that it yields for the relative difference between rates.

An adjustment approach that determines what two groups' rates would be if there were no risk factors is an entirely different matter. There are reasons why such an approach would be expected to yield larger absolute than relative reductions in differences between mortality rates of advantaged and disadvantaged groups. A large absolute reduction is a function of two factors: (1) the adjustment approach eliminates the effects of the disproportionate concentration of disadvantaged groups in high risk populations by making the absolute difference between advantaged and disadvantaged groups for the entire population the same as that in the low-risk population; (2) since mortality is low in low-risk populations, absolute differences between advantaged and disadvantaged groups tend to be small in such populations.[2-4] The elimination of the effect of the disproportionate concentration of disadvantaged groups in high-risk populations tends also to reduce relative differences in mortality. However, while the low mortality in low-risk populations is typically associated with smaller absolute differences between advantaged and disadvantaged groups in such populations than in high-risk populations, low mortality in low-risk populations is typically associated with larger relative differences between mortality rates of advantaged and disadvantaged groups in such populations than in high-risk populations.[3- 6] Thus, the latter factor tends to counteract, to varying degrees, the effect of the former factor. There may even be situations where the relative difference between advantaged and disadvantaged groups is greater within the low-risk population than within the population at large, and, hence where the latter adjustment approach of Khang et al. may increase the relative difference between rates.

On the other hand, the relative difference in survival tends to be smaller in low-risk populations than in high-risk populations.[3-6] Thus, if the latter adjustment approach of Khang et al. were applied to differences in survival, while it would achieve the same proportionate reduction in the absolute difference as when applied to the difference in mortality, it would achieve a much larger proportionate reduction in the relative difference in survival than the relative difference in mortality. And such reduction might well be proportionately larger than the reduction in the absolute difference. So while the approach might well reduce absolute differences more than relative differences in mortality, there is some question as to the meaning of such greater reduction.

The data in the Khang study seem not to be broken down in a way that allows illustration of these patterns with respect to high-income and low-income groups and the risk factors identified by the authors. But Table 1 does provide information that allows such illustration with respect to groups that can be deemed advantaged and disadvantaged according to age. Table A to this comment, which can be accessed at http://www.jpscanlan.com/images/Khang_Tables_A_and_B.pdf, is based on information in Khang's Table 1. Men age 30-34 are treated as the advantaged group and men aged 55-64 are treated as the disadvantaged group. The risk profiles are based on the three blood pressure categories.

The first row of Table A presents the actual total mortality rates of the advantaged and disadvantaged groups just defined, along with (1) the absolute difference in mortality rates, (2) the disadvantaged group's excess relative risk of mortality, and (3) the disadvantaged group's relative survival disadvantage. The second row presents results of a standard approach to adjustment for risk factors based on attributing the risk profile of the advantaged group to the disadvantaged group. The final columns show the effects of such adjustment on the three measures of difference just described. Such adjustment reduces each measure by exactly same proportionate amount (9.7%).

The third row then presents the results of the second adjustment approach of Khang et al. – that is, an approach that shows the effect of elimination of all risk factors. Such approach yields a 12.78% reduction in the absolute difference compared with a negligible reduction in the relative difference in mortality (0.44%). But the approach results in a proportionate reduction in the relative survival shortfall of the disadvantaged group (12.93%) that is not only far higher than the reduction in the relative mortality difference, but slightly higher than the reduction in the absolute difference.

Table B then presents the two groups' mortality and survival rates for each of the three levels of risk along with the three measures of differences referenced above. The patterns shown in the table are in accord with the tendencies described above – that is, that the lower the risk category, the smaller the absolute difference, the larger the relative difference in mortality, and the smaller the relative difference in survival. The table also shows the way the advantaged and disadvantaged groups are distributed among the risk levels. Thus, in accordance with the description of the interaction of factors described earlier, the table illustrates why the result in Table A are generally what should be expected in the circumstances.

One could perform the same analyses in other ways based on the data in Table 1 of Khang et al., including by treating the different risk categories as the advantaged and disadvantaged groups, and treating the age groupings as the risk factors. The top two rows would allow an analysis by income group with age as the risk factor. And it is possible that I have simply overlooked a way figures could be derived from the various tables that would allow an analysis by the risk factors identified by Khang according to income group. While results of any such analysis might well differ somewhat from those just described, it is unlikely that they would differ dramatically.

At any rate, while the Khang study may provide some useful information about the role of risk factors in explaining health inequalities, the study does not provide the differing relative and absolute perspectives that it suggests is its purpose.

Finally, this study is akin to an earlier study co-authored by one the instant authors (reference 17 to the Khang study).[7]. The earlier study also conflated the effect on inequalities of adjusting for risk factors (discussed in terms of the reduction in the relative differences) with the effect of eliminating all risk factors (discussed in terms of reduction in absolute differences). The earlier study thus implicated many of the points raised here, as discussed in a comment on that study.[4].

References:

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