Choosing a Suite of Health Disparity Indicators

Monitoring progress toward the elimination of disparities in cancer-related health objectives involves a number of ethical, conceptual, and methodological issues that must be given careful consideration to answer the question of which measure or measures should be employed to monitor progress toward the elimination of health disparities between social groups.

One possibly useful way to approach the measurement of health disparity is to consider a sequence of methodological approaches.

- First, we cannot emphasize enough the close inspection of the underlying subgroup-specific health outcomes (rate or prevalence, etc), either via tabular or graphical inspection. This is likely to reveal important population health patterns, highlight the situation of specific subgroups of interest, and lend an understanding of any underlying heterogeneity that a summary measure of health disparity may not emphasize.

- Next, consider the relevant question that is to be answered. If one is interested in the health disparity between two particular groups—for example, the trend in the disparity between black and white males in lung cancer mortality—then the use of a pairwise comparison of trends is sufficient.

- Even for assessing health-disparity trends between two groups using a pairwise comparison, we recommend using both an absolute and a relative disparity measure. This is especially warranted when making long-term comparisons that may involve steep declines or increases for all social groups. Although the relative disparity measure gives some indication of the progress (or lack thereof) one group is making, regardless of the actual level of health, absolute disparity measures provide a context in which to judge the public health impact of relative health disparities. Thus, we would argue for the primacy of the absolute indicator of disparity. Efforts to improve public health often rely on the absolute burden of disease; thus, the absolute disproportionality in health disparity also should have priority. This is the case especially when comparing the size of social-group disparity across different cancer outcomes and risk factors. We also understand, however, that this in no way excludes particular cases in which the relative inequality may be judged—for other equally good reasons—to be of high priority despite low levels of disproportionate absolute burden. For instance, the two-fold relative disparity in cervical cancer between black and white women may be judged to be especially important because it is a health disparity that is almost entirely avoidable through the routine use of screening, even though the absolute disparity involves only about 5 deaths per 100,000.

- If one is interested in monitoring the health disparity trend across the entire range of

subgroups within a social-group category—for example, across all racial/ethnic groups rather than comparing, say, blacks and whites—or if the social-group category has many subgroups—such as the disparity across the 50 U.S. states—then summary measures of health disparity are warranted. The first decision involved in choosing a summary measure is dictated by whether or not the social groups in question have a natural ordering.

Summary Indicators

Ordered Social Groups

If the social group does have a natural ordering, as with education and income groups, then we recommend using either the Absolute Concentration Index (*ACI*) or Slope Index of Inequality (*SII*) as a measure of absolute health disparity, and the Relative Concentration Index (*RCI*) or the Relative Index of Inequality (*RII*) as a measure of relative disparity. The major reasons for choosing these particular measures are that

- they account for changes in the underlying population distributions in the social groups over time and use information across the entire range of social groups;

- they are flexible enough to allow different levels of aversion to disparity to be incorporated; and

- they are sensitive to the direction of the social gradient in health.

Although this last criterion mainly is what distinguishes these measures from other summary measures of inequality, such as the Gini coefficient or the Index of Dissimilarity, we would also reemphasize that, if the social groups in the middle of the distribution (e.g., those with a high-school education as opposed to those with less or more education) experience a disproportionate burden of ill health, our selected measures may indicate that no disparity exists when it in fact could be argued otherwise. Of course, if the sequence laid out above is adhered to, then Step 1—a simple and careful inspection of the basic subgroup data—should reveal this.

This is part of the "cost" of using summary measures of disparity, but in this case a comparison of the *RCI* or *RII* with another measure of disproportionality that is not strictly sensitive to health gradients, such as the Gini coefficient or Theil index, may reveal important information about the social distribution of health. Lastly, because the *RCI* has a mathematical relationship to the *RII*, and the *ACI* has such a relationship to the *SII*, they always will result in the same rank ordering of health distributions. That being said, one additional desirable feature of the *ACI* and *RCI* is the ability to graph their associated health concentration curves. Although the ability of any summary measure of health disparity to communicate important information about disparity trends to health policy makers may be limited, the *ACI* and *RCI* may serve this purpose better than the *RII* and *SII*.

Unordered Social Groups

Our recommendations for health disparity measures for ordered groups restate the recommendations of earlier reviews of health disparity measures (60,70). In the context of the *Healthy People 2010 goals*, however, groups with a natural ordering represent only a small number of the social groups across which we want to eliminate disparities in cancer-related health outcomes. Therefore, we also need to think about disparity measures that can be applied to unordered social groups. Again, we would emphasize choosing a summary measure of health disparity only when one is interested in monitoring the extent of disparity across more than two or three social groups. For comparisons of two specific groups, there is no substitute for simple pairwise measures of absolute and relative disparity.

If comparisons across multiple unordered groups are needed, we recommend the Between-Group Variance (*BGV*) as a summary of absolute disparity and the general entropy class of measures developed by Henri Theil as summary measures of relative disparity (more specifically, the Theil index and the Mean Log Deviation). An important reason for choosing the Between-Group Variance and the entropy-based measures is that they are disparity measures that can be decomposed perfectly into between-social-group and within-social-group components, given a continuous health outcome. This cannot be said of other measures, such as the Gini coefficient and Atkinson's measure (97,98). The ability of the variance and the entropy class of disparity measures to decompose disparity is important because it allows one to look at any number of cross-classified social groups, whether ordered or not. For example, race and income, or gender and education, can be examined jointly to assess the trend in disparity between certain dimensions of society. We could look first, for example, at the trend in between-race disparity in cancer survival time and see whether the disparity is increasing or decreasing. We then could look at the disparity between race-education groups over time. It may be that, while the between-race disparity is decreasing, educational disparities within race groups actually are increasing. In addition, the entropy-based measures also can be decomposed to investigate the relative effects of changing social group distributions versus changing health distributions. This is important because both of these aspects of the population constantly are changing over time. Understanding the relative impact of health changes versus compositional changes in social groups is important for understanding the prospects for intervening to eliminate health disparities. Thus, because of their decomposition properties, the entropy measures may be useful tools for describing and understanding the stratification of cancer-related health outcomes across time.

Our recommendation for measures of health disparity, for both ordered and unordered social groups, come from explicitly adopting the population health perspective toward monitoring health disparities. By taking a population health perspective, we emphasize using the total population as the reference group for measuring health disparity, weighting social groups according to the number of individuals they represent, and examining both absolute and relative disparities in health. By doing so, we are able to account for changes in the distribution of

individuals across social groups over time, a fact that has clear population health consequences, and we also are able to express health disparities in a way that emphasizes their overall burden on population health.

Table 5. Summary Table of Advantages and Disadvantages of Potential Health Disparity Measures

Disparity Measure	Symbol	Absolute or Relative	Reference Group	All Social Groups	Reflect SES Gradient	Social Group Weighting	Inequality Aversion Parameter	Graphical Analogue
Total Disparity								
Inter-Individual Difference	*IID*	Variable	ATBO[a]	No	No	No	Yes	No
Individual-Mean Difference	*IMD*	Variable	Average	No	No	No	Yes	No
Social Group Disparity								
Absolute Difference	*AD*	Absolute	Best	No	Yes	No	No	Yes
Relative Difference	*RD*	Relative	Best	No	Yes	No	No	Yes
Regression-Based Relative Effect	*RRE*	Relative	Best	Yes	Yes	No[b]	No	Yes
Regression-Based Absolute Effect	*RAE*	Absolute	Best	Yes	Yes	No[b]	No	Yes
Slope Index of Inequality	*SII*	Absolute	Average	Yes	Yes	Yes	No	Yes
Relative Index of Inequality	*RII*	Relative	Average	Yes	Yes	Yes	No	Yes
Index of Disparity	ID_{isp}	Relative	Best	Yes	No	No	No	No
Population Attributable Risk	*PAR*	Absolute	Best	Yes	No	Yes	No	Yes
Population Attributable Risk%	*PAR%*	Relative	Best	Yes	No	Yes	No	No
Index of Dissimilarity	*ID*	Absolute	Average	Yes	No	Yes	No	Yes
Index of Dissimilarity%	*ID%*	Relative	Average	Yes	No	Yes	No	No
Relative Concentration Index	*RCI*	Relative	Average	Yes	Yes	Yes	Yes	Yes
Absolute Concentration Index	*ACI*	Absolute	Average	Yes	Yes	Yes	Yes	Yes
Between-Group Variance	*BGV*	Absolute	Average	Yes	No	Yes	Yes	No
Squared Coefficient of Variation	CV^2	Relative	Average	Yes	No	Yes	No	No
Atkinson's Measure	*A*	Relative	Average	Yes	No	Yes	Yes	No
Gini Coefficient	*Gini*	Relative	Average	Yes	No	Yes	No	Yes
Theil Index	*T*	Relative	Average	Yes	No	Yes	Yes	No
Mean Log Deviation	*MLD*	Relative	Average	Yes	No	Yes	Yes	No
Variance of Logarithms	*VarLog*	Relative	Average	Yes	No	Yes	No	No

[a]All those better off.

[b]In the case of regression-with grouped data.