

# Selected Comparisons of Measures of Health Disparities

## A Review Using Databases Relevant to Healthy People 2010 Cancer-Related Objectives

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# Executive Summary

The purpose of this report is to empirically evaluate the performance and suitability of various measures of health disparity for the purpose of monitoring disparities in cancer-related health outcomes. As such, it extends the work of a prior monograph in which we evaluated several measures of health disparity on theoretical grounds (1), and it is worthwhile to briefly revisit the overall conclusions of that report.

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## Overall Conclusions from the Theoretical Review (1)

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*First*, we concluded that all measures of health disparity implicitly or explicitly contain value judgments concerning the relative importance of capturing different aspects of health disparity. Two of the most important considerations concern -

- 1) How much weight to give to *individuals*? For example, if we measure the disparity in prostate cancer mortality among U.S. states in 2000 without weighting states by their population size, California and Wyoming receive equal weight despite the fact that California has nearly 70 times as many males as Wyoming. Thus, in an unweighted analysis of U.S. states individual males in California receive approximately 1/70<sup>th</sup> the weight of males in Wyoming. Both are correct but they reflect contrasting values about how to treat groups and individuals in measuring health disparity.
- 2) How much to weight the health of individuals of different social groups? Should our measures of health disparity be more sensitive to health improvement among the socially disadvantaged than the advantaged?

It would be advantageous if such value judgments

were made more explicit by researchers when measuring health disparities.

*Second*, for the purpose of measuring and monitoring trends in health disparities we argued for a population health-oriented approach, which is characterized by measuring health disparities as differences from the population average, taking account of the population size of the social groups under consideration, and measuring disparities on both the absolute and relative scale. Some measures of health disparity use the “best” rate or prevalence as their reference point. This may be problematic in some circumstances in cancer-related disparities when the best rate is among a very small, or heterogeneous population sub-group, such as American Indians and Alaska Natives.

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## The Empirical Assessment

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Despite these conclusions from the theoretical review, it remains an empirical question whether, given a particular set of data, the particular method for measuring health disparity makes any substantive difference or would lead to different conclusions about the disparity.

This report presents the results of 22 separate analyses in 10 case studies of trends in selected cancer-related health disparities, for which we empirically compared various summary measures of health disparities. We included assessments of socioeconomic, race / ethnic and geographic disparities in a selected range of cancer-related outcomes, including mortality, incidence, risk factors and

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screening. The goal of these analyses was to examine the consistency of different measures of health disparity across a range of cancer-related outcomes.

Summaries of selected results are shown in Figure S2. The numbers in the table represent % changes in the value of the disparity measure over the specified period. Dark red means disparity has increased by more than 30%, light red indicates disparity increased between 10-29%, yellow means a change (increase or decrease) of less than 10%, light green indicates declines in disparity of 10-29%, and dark green means that disparity has declined by more than 30%. Overall, these graphical examples reinforce the conclusion that how you measure disparity matters. For instance, for race / ethnic disparity in mammography screening, no firm conclusion can be reached about whether disparity got better or worse between 1987 and 2003 - there are both red and green cells indicating increases and decreases depending on which measure is used. The only sensible way to make a conclusion on race / ethnic disparity trends in mammography screening is to decide whether disparity should be measured on a relative or the absolute scale. This is not the case for obesity where all cells are dark green indicating declining socioeconomic disparities or for smoking, where one can reasonably conclude that socioeconomic disparity increased regardless of which measure is used.

To summarize the results of these analyses:

### **1. Does the choice of a measure of disparity matter for assessing cancer-related disparity trends?**

Yes. The 10 case studies revealed a number of situations where substantively different interpretations concerning the level and trend in disparity resulted from using different measures of health disparity on the exact same data. Such differences in interpretation could not be reconciled without reference to consideration of which underlying dimensions of disparity are emphasized in the measures.

### **2. How often does the choice of disparity measure matter?**

Of the 22 separate analyses conducted, 9 (41%) revealed situations where the overall conclusion about the trend in disparity was difficult to make without some apriori judgment about what dimensions of disparity are important (e.g., relative or absolute disparity, whether or not to weight social groups by population size, etc.)

### **3. Why does the choice of disparity measure matter?**

Most of the cases of disagreement between measures of disparity depended on two issues. One is the scale on which disparity should be evaluated. In many cases relative measures of disparity moved in one direction, while absolute measures moved in the opposite direction. For example, the left side of the Figure below shows trends in lung cancer incidence among males for 4 race groups (Whites, Blacks, American Indian/Alaska Natives, and Asian Pacific Islanders) and the right side shows the percentage change since 1990 in two summary measures of absolute and relative disparity. Over this period, absolute disparity declined by roughly 40% while relative disparity increased by roughly 40%. Whether, given this data, one concludes that the situation with respect to racial disparity in lung cancer incidence among males is getting better or worse depends on whether one thinks of disparity as absolute or relative. Thus, specifying whether absolute or relative disparities are more important prior to undertaking any analyses will assist in minimizing disagreement about disparity trends.

The second source of disagreement among disparity measures was whether they weight social groups by population size. In several cases we found that population-weighted disparity measures differed in either magnitude or direction from unweighted disparity measures. In particular, and as might be expected, unweighted measures of disparity appear to

**Figure S1. Graphical Summary of Selected Disparity Trends**

	Relative Disparity*			Absolute Disparity**			Conclusion and Interpretation
	RR	IDisp	RCI	RD	ACI	BGV	
<b>Socioeconomic Disparity in Colorectal Cancer Mortality 1950-2000</b>							
Female	-74.9	-71.1	-172.7	-80.4	-136.6	-92.4	Disparity is clearly numerically smaller among both males and females, but the RCI and ACI indicate an increase in disparity is because the socioeconomic gradient reversed.
Male	-83.2	-76.9	-156.9	-77.6	-139.1	-89.5	
<b>Socioeconomic Disparity in Smoking 1965-2003</b>							
Female	143.1	136.3	-279	-2.6	-199.8	-27	Large increases in disparity with reversal of socioeconomic gradient Large increases in disparity
Male	346.6	390.1	715.5	28.5	274	121.9	
<b>Socioeconomic Disparity in Obesity 1960-2000</b>							
Female	-86	-82	-71.6	-48.4	-40.6	-67.3	Large decreases in disparity Large decreases in disparity
Male	-75.4	-77.3	-89.1	-33.0	-73.8	-54.1	
<b>Mammography Screening 1987-2003</b>							
Education Disparity	191.4	262.1	332.7	-1.4	-25.6		? Depends on value position on absolute vs. relative disparity
Income Disparity	178.4	200.7	443.4	-8.0	-9.1		? Depends on value position on absolute vs. relative disparity
Race / ethnic Disparity	91.8	22.3	125.4	-19.4	-56.5		? Depends on value position on absolute vs. relative disparity
<b>Legend</b>	<b>Disparity Increasing</b>			<b>Disparity Decreasing</b>			
	≥30%	11% to 29%	0 to (-)11%	(-)11% to (-)29%	≤(-)30%		

\* Relative Disparity. RR=Rate Ratio; IDisp=Index of Disparity; RCI=Relative Concentration Index

\*\* Absolute Disparity. RD=Rate Difference; ACI=Absolute Concentration Index; BGV=Between Group Variance

be more sensitive to the movement of rates of disease, especially those of smaller population groups whose rates of disease may be less stable over time.

#### 4. What are the implications for monitoring health disparities?

There is currently a strong emphasis in the US public health policymaking community on monitoring of progress toward eliminating health disparities. The results of the case studies presented in this report demonstrate that it is easily possible to come to fundamentally different conclusions about the extent of progress toward eliminating health disparities using the same data but different measures of health disparity. The naïve use of summary measures of health disparity thus has the potential to lead to confusion among both policymakers and researchers

as to whether disparities are increasing or decreasing, which cancer-related outcomes show the largest disparities, and which health disparities might be specifically targeted for increased study. Such confusion will be minimized and health disparity measurement will be advanced by increased debate and discussion of the issues that generate differences among measures of health disparity:

- How much weight should we give individuals of different social groups when measuring disparity? Counting each individual's health equally implies population-weighted measures of disparity among social groups. Counting each social group's health the same means using unweighted disparity measures (and implies differential weighting of individuals from social groups with different population sizes).

- How much to weight different parts of the health distribution? At any given time some social groups are on-average healthier than others. Over time health changes, and some measures of disparity will give equal consideration (i.e., equal weight) to a given health change, regardless of in which group that change occurs; other measures are more sensitive (i.e., give more weight) to changes in health among the least healthy or among the poor. Which of these perspectives is consistent with our concerns about social disparities in health?
- Should we be more concerned about absolute or relative disparities? Diseases and conditions that exact a large burden on the population, because of their high prevalence, often generate smaller

relative disparities, while rare conditions can generate exceedingly high relative disparities. Which of these perspectives is the appropriate scale on which to measure disparity trends?

In sum, our recommendations from the previous report (1), further clarified here, suggest giving priority to disparity measures on the absolute scale that weight for population size and, where possible, consider the direction of the social gradient in health. That recommendation stands but it does not exclude consideration of issues of relative disparity or what is happening among smaller population groups. For those reasons it may always be useful to adopt a “suite” of health disparity indicators that make clear which aspects of health disparity are changing over time.

**Figure S2. Trends in Lung Cancer Incidence among Males by Race and Trends in Overall Absolute and Relative Racial Disparity, 1990-2001**

