Results Summary

The purpose of this report was to empirically evaluate different methods for measuring social disparities in cancer-related health outcomes, primarily with respect to evaluating disparity trends. The purpose was to determine whether the choice of disparity measure makes a difference for answering the question of whether social disparities in cancer-related outcomes are increasing or decreasing.

With that purpose in mind it is useful to summarize whether interpretations of the trend in disparity are consistent across selected measures of disparity for the 10 case studies used in this report. **Figure 38** provides a graphical comparative summary of the 10 case studies. In each case we have classified the percent change in the magnitude of each disparity measure as either large (≥30%), moderate (10-29%), or small (<10%), with increases in disparity shaded red and decreases shaded green. This categorization is admittedly arbitrary, but it seems reasonable to classify relative changes of 30% or greater as more than moderate. We also give an overall substantive interpretation of the change in disparity based on the (in)consistency of the different measures.

Socioeconomic Disparity Trends

Lung Cancer Incidence

The first two rows of **Figure 38** show the summary for area-socioeconomic disparities in lung cancer incidence for males and females. For females there is broad agreement among almost all of the measures that both relative and absolute area-socioeconomic disparities have substantially increased from 1988 to 1999. In this case, the general conclusion about the disparity trend (i.e., is disparity increasing or decreasing?) does not depend on which measure of disparity is used. Of course, the magnitude of the change varies across measures but this is simply because of the different mathematical properties inherent in each measures calculation.

For lung cancer incidence in males, however, the results across measures are inconsistent. This is a clear example of the importance of choosing a disparity measure based on apriori principles because the empirical result cannot inform the reader about which measure is "right". Any substantive conclusion is therefore entirely dependent on which measure is chosen.

In this case, the value position rests on whether or not disparity measures should be weighted by population size. The unweighted disparity measures (RR, IDisp, RD) would generally suggest that the area-socioeconomic disparity situation is worse in 1999 than 1988 (little change in absolute disparity and increasing relative disparity). On the other hand, population weighted disparity measures (RCI, ACI) suggest improvement: moderate decrease in relative disparity and strong decreases in absolute disparity. This happened because the incidence rate declined more slowly in the 2nd area-socioeconomic quintile (see **Figure 5**), which only contained about 5% of the SEER population. This smaller-population group had less influence on population-weighted disparity measures and greater influence on the unweighted disparity measures.

Colorectal Cancer Mortality

For area-socioeconomic disparities in both female and male colorectal cancer mortality, the results are consistent despite the contradictory red and green shading in cells, which we explain below. By going back to the plots of the raw data shown in **Figure 9** and **Figure 11** it is obvious to the naked eye that both absolute and relative disparities have decreased. Thus, all of the disparity measures register numerical declines. Note however, that the cells for the RCI and ACI are shaded dark red, and the magnitude of change is greater than for the other measures. This is because these measures are sensitive to the direction of the socioeconomic gradient, and only these measures indicate that the socioeconomic gradient shifted from favoring the poor in 1950 to favoring the rich in 2000. The other measures of disparity indicate a reduction but only the RCI and ACI tell us that the social gradient in colorectal cancer mortality actually reversed over this time period and they show that, according to the way they are calculated, disparity worsened, hence the red shading.

This highlights the value of understanding the difference between asking whether disparity "has increased or decreased" and asking whether disparity has become "worse or better." Answers to these seemingly innocuous questions are not straightforward and are often dependent on prior principles of what is important to know about disparity. In this case, even though disparity is smaller in magnitude, for both the RCI and ACI it could be argued that the disparity situation is now "worse" since it is the poor who now have the highest rates of mortality. But, according to a strict interpretation of the *Healthy People 2010* disparity goals it could also be argued that this situation represents progress towards eliminating disparity. Such alternative interpretations beg the question whether we care more about health disparities where the burden is on the disadvantaged than when the burden is on the advantaged.

Prostate Cancer Mortality

Another interesting example in **Figure 38** is the trend in area-socioeconomic disparity for prostate cancer mortality. Among men 45-74 years of age there is consistency among all the measures that disparity has increased (though they differ with respect to the magnitude of the change). But for men 75 and over it is more difficult to come to a firm conclusion. The measures of relative disparity suggest a moderate decline but the measures of absolute disparity suggest a moderate increase. Thus, the conclusion about the trend in socioeconomic disparity in prostate cancer in this age group in this case depends on an apriori value position concerning relative and absolute disparity. Is it more important that we see improvements in relative or absolute disparity? Only when that question is answered can we reach a substantive conclusion about prostate cancer mortality trends in those over 75.

Smoking and Obesity

For some outcomes there is a great deal of consistency among all the measures. For example, it seems clear that socioeconomic disparities in current smoking are increasing among both men and women, while socioeconomic disparities in obesity are decreasing. Given the magnitude of the changes in the prevalence of these two outcomes for virtually all social groups—declining for smoking and rising for obesity—this result may not be surprising.

Race and Ethnic Disparity Trends

Lung Cancer Incidence

For female lung cancer incidence among race and ethnic groups, most relative measures suggest little or no change (though note that the IDisp and MLD move in different directions because the most populous group, whites, moved away from the population average), but rates have moderately declined for most groups, leading to moderate declines in absolute

disparity. For males, however, it is a bit more difficult to judge whether the disparity situation is better or worse in 2001 than in 1999. Relative disparity increased according to all three measures, but, as rates of lung cancer incidence have been declining among males, absolute disparity among race and ethnic groups has also declined. Thus, the overall conclusion about this disparity again depends on whether absolute or relative disparity is thought to be more important.

Breast Cancer Incidence

For racial disparities in the incidence of breast cancer there is virtually no change in disparity among women ages 45-74, regardless of how it is measured. On the contrary, among women ages 75 and over, there is substantive divergence among the measures and it appears that one's interpretation of the disparity trend will depend on the value position with respect to population weighting. The unweighted relative disparity measures (RR, IDisp) indicated strong declines in relative disparity, while the RD declines moderately. Using unweighted measures would therefore lead one to conclude that there has been considerable improvement in race/ethnic disparities in breast cancer incidence. On the contrary, the population weighted measures (MLD, BGV) both indicate that disparity actually increased by around 20% during the 1990s. This difference is very likely due to the fact that the initially low rate among Asian/Pacific Islander women in 1990 increased over the decade. This group represents 0.4% of the population and so had less impact on the population-weighted measures. Thus, the issue of population-weighting is central to interpreting the disparity trend in this case.

Cervical Cancer Incidence

For trends in race and ethnic disparity in cervical cancer incidence disparity trends for both younger and older women are difficult to interpret without specifying whether one thinks absolute or relative disparities are more important. As cervical cancer incidence has been generally declining but declining faster among those with lower rates, relative disparity is increasing, but absolute disparities are decreasing.

Geographic Disparity Trends

Stomach Cancer Mortality

Geographic disparities in stomach cancer mortality appear to have declined, but the unit of geographic aggregation affects the degree of consistency across the measures of relative disparity. For the 4 U.S. regions (Midwest, Northeast, South, West) there has been considerable reduction of disparity across regions, whether measured on the relative or absolute scale. However, as the unit of aggregation moves from regions to divisions to states the extent of disagreement across the measures increases. Among the 50 states, the unweighted disparity measures suggest either a strong increase or no change in disparity, while the population-weighted MLD consistently suggests that relative disparity has declined. Thus, at the level of US states, the issue of whether disparity measures should be weighted by population size has important implications for interpreting the disparity trend.

Comparing Socioeconomic and Race and Ethnic Disparity Trends

Mammography Screening

Finally, the last rows of **Figure 38** show a direct comparison of income, education, and race/ethnic disparity for the same outcome: the proportion of women not receiving a mammogram in the past two years. For all of these cases we find that interpreting the trend in disparity depends on how much emphasis is place on relative or absolute disparities. Generally speaking, as the rates of not receiving a mammogram have declined, they tend to have declined faster among those with initially lower rates in 1987 (see

Figure 34 and **Figure 35**). Relative disparities have thus increased but absolute disparities have declined. With respect to the direct comparison between race/ethnic disparity and socioeconomic disparity, there is general agreement among all of the measures that relative disparities have increased more among socioeconomic than among race/ethnic groups. Similarly, absolute disparity has declined more across race/ethnic groups than across socioeconomic groups, regardless of which disparity measure is used.

Figure 38. Graphical summary of disparity trends