

From: Keppel, Kenneth G. (CDC/CCHIS/NCHS) <kgk1@CDC.GOV>

To: jps@jpscanlan.com

Cc: Percy, Jeffrey N. (CDC/CCHIS/NCHS) <jvp0@CDC.GOV>, Klein, Richard J. (CDC/CCHIS/NCHS) <rjk6@CDC.GOV>

Date: Thursday, May 22, 2008 08:01 am

Subject: Measuring disparities

Jim,

It was good to meet you in Philadelphia. Since we met I have been looking more closely at what can happen to disparities over time.

My conclusions are illustrated in the attachment. Disparities can be measured as the outcome becomes rarer. Meaningful decreases in disparity

will result as long as greater proportional improvements occur for groups with the most unfavorable rates.

I would be glad to discuss this issue further.

Ken

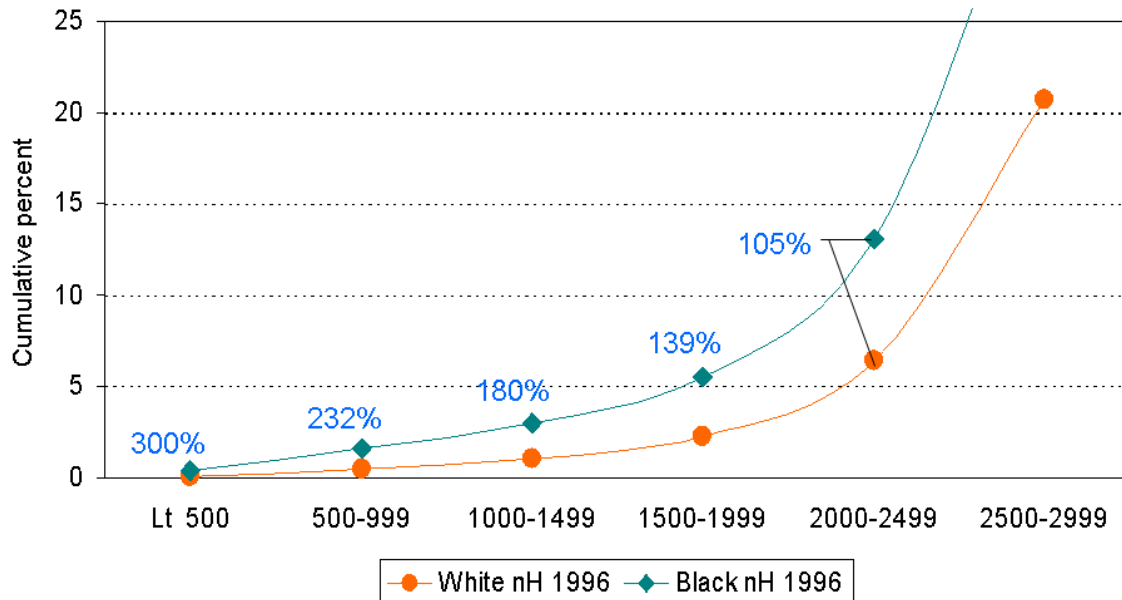
<<Birthweight example.4.doc>>

Attachments:  Birthweight example.4.doc (220KB)

Response to Jim Scanlan:

Jim Scanlan has described a phenomenon that occurs when the relative disparity between two groups is compared for successively rarer categories of an indicator measured on a continuous scale (such as income, education or birthweight). According to Scanlan: “the rarer the outcome, the greater the (relative) disparity in experiencing the outcome”. This association is evident in Figure 1, where the cumulative distribution of infants by birthweight is shown for black non-Hispanic and white non-Hispanic mothers in 1996. For each birthweight category the cumulative percent of infants weighing less than the upper end of each category is shown on the vertical axis. In 1996, for example, the percent of infants weighing less than 2500 grams was 6.4 percent for white non-Hispanic mothers and 13.1 percent for black non-Hispanic mothers. The relative disparity between black and white mothers, with white mothers as the reference group, is 105 percent. At successively lower (“rarer”) birthweight categories the relative disparity increases, to 139 percent at 1500-1999 grams, 180 percent at 1000-1499 grams, 232 percent at 500-999 grams, and 300 percent at 1500-1999 grams, and so on.

Figure 1. Cumulative percent of low birthweight infants for non-Hispanic black and non-Hispanic white mothers and the percent difference, U.S. 1996

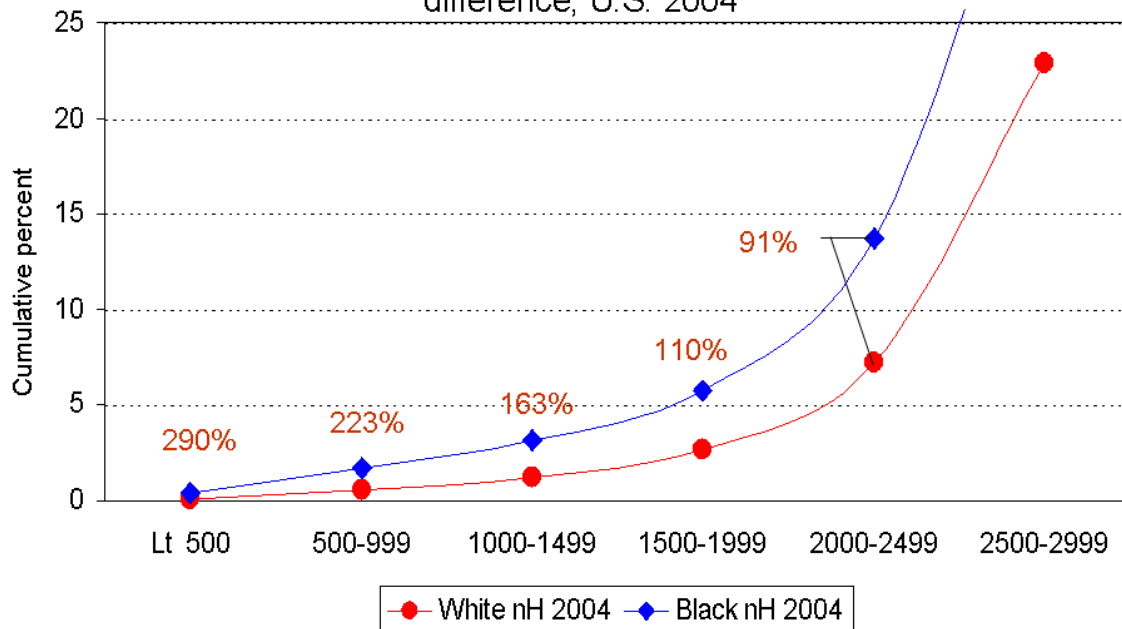


% difference between non-Hispanic black and white mothers in the cumulative percent of infants at or below each weight category.

Source: National Vital Statistics System

The same pattern is evident in Figure 2 for the cumulative percent of low birthweight infants in 2004. The percent difference between infants of black and white mothers increases from 91 percent at 2000-2499 grams to 290 percent at less than 500 grams. Here again, the relative disparity between infants born to black and white mothers increases as the cumulative percent of low birthweight infants is restricted to successively lower birthweight categories. These two examples are consistent with Scanlan's rubric. It is important to note, however, that these observations are based on cross-sectional data for 1996 and for 2004.

Figure 2. Cumulative percent of low birthweight infants for non-Hispanic black and non-Hispanic white mothers and the percent difference, U.S. 2004

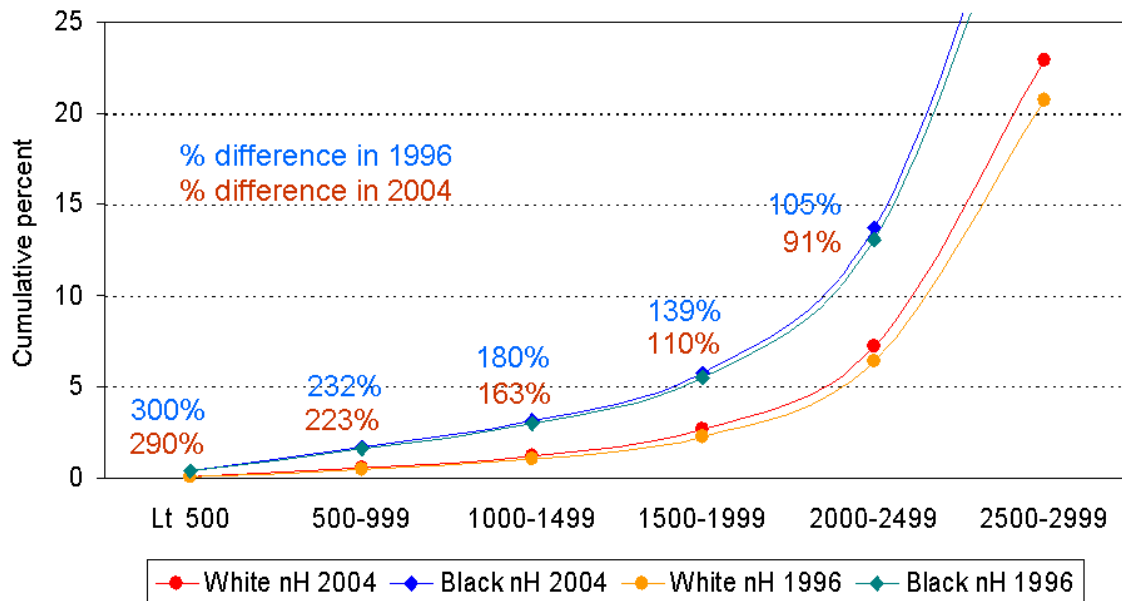


% percent difference between non-Hispanic black and white mothers in the cumulative percent of infants at or below each weight category.

Source: National Vital Statistics System

In Figure 3, the race/origin-specific cumulative distributions for 1996 and 2004 are shown on the same graph. Between 1996 and 2004 the cumulative percent of infants at each birthweight category increased for both black and white mothers, that is, infants born at these low birthweight categories became more frequent. The percent differences in 1996 are again shown in blue and the percent differences in 2004 are shown in red. In this example, the relative disparity between black and white mothers decreases at each birthweight category: from 105 percent to 91 percent at 2000-2499 grams, from 139 percent to 110 percent at 1500-1999 grams, and so on. According to Scanlan’s rubric, if the (relative) disparity increases as the outcome becomes rarer, then we might expect the (relative) disparity to decrease as the outcome becomes more frequent. This result is, therefore, consistent with Scanlan’s rubric.

Figure 3. Cumulative percent of low birthweight infants for non-Hispanic black and non-Hispanic white mothers and the percent difference, U.S. 1996 and 2004



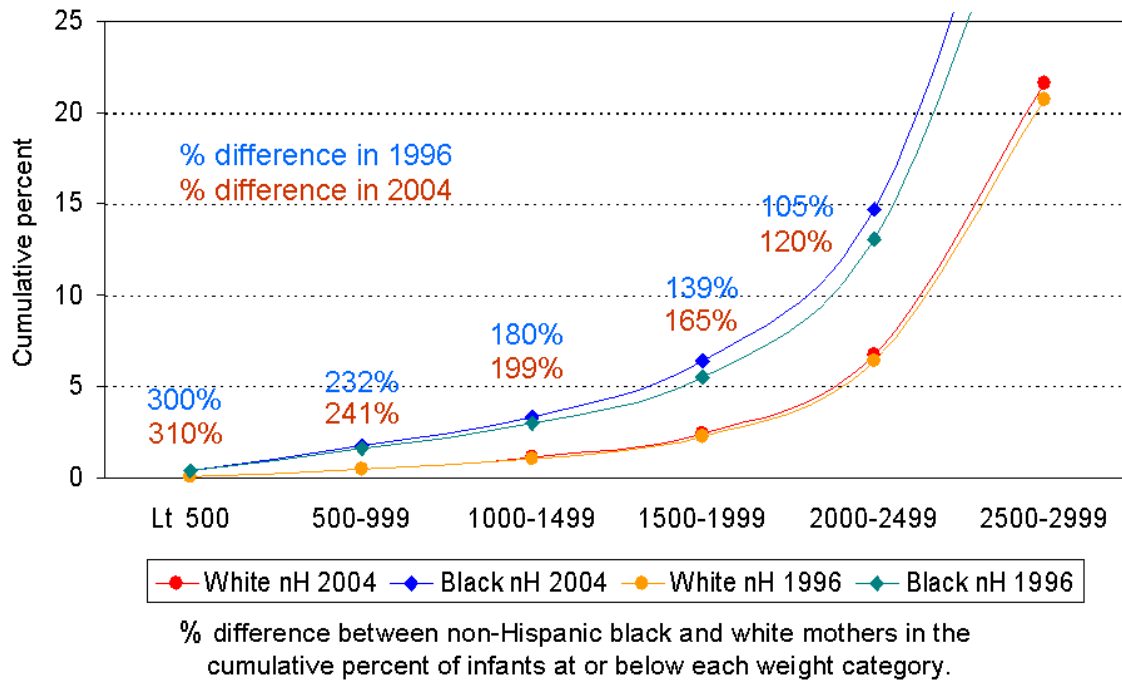
% difference between non-Hispanic black and white mothers in the cumulative percent of infants at or below each weight category.

Source: National Vital Statistics System

In Figure 3, the outcome (low birthweight) became more frequent over time for both black and white mothers. However, the percent of low birthweight infants increased by greater proportions for white mothers than for black mothers at each birthweight category. For white mothers, for example, the cumulative percent of low birthweight infants at 2000-2499 grams increased by 12.4 percent between 1996 and 2004 and the cumulative percent for black mothers increased by 4.7 percent.

For illustrative purposes, the proportional changes for black and white mothers are reversed in Figure 4. For example, the cumulative percent of low birthweight infants at 2000-2499grams for black mothers in 1996 is increased by 12.4 percent and the cumulative percent for white mothers is increased by 4.7 percent. The percent differences at the earlier time are shown in blue and the percent differences at the later time are in red. In this example, the relative disparity between black and white mothers increases at each birthweight category. As in Figure 3, the outcome (low birthweight) becomes more frequent over time for both black and white mothers. However, in this example, the disparity increases from 1996 to 2004.

Figure 4. Cumulative percent of low birthweight infants for non-Hispanic black and white infants, (proportional changes for the two populations between 1996 and 2004 are reversed)



In both examples, the outcome—the cumulative percent of low birthweight infants—becomes more frequent. In Figure 3 the disparity between black and white mothers decreases and in Figure 4 the disparity increases. What differs between these two examples is the *relative change* in the outcome for black and white mothers. In the first example, the cumulative percent of low birthweight infants increases by a greater proportion for white mothers relative to black mothers. In the second example, the cumulative percent of low birthweight infants increases more for black mothers. **It is the difference in the degree of change between the two groups over time that determines whether the relative disparity increases or decreases.**

In this example the adverse outcome becomes more frequent but the same principle would apply if the outcome becomes rarer. This situation can be simulated by reversing the data years in this example. Comparing 2004 with 1996, the cumulative percent of low birthweight infants would decline for both black and white mothers. The change in disparity would still be governed by the relative change in the percents for black and white mothers. If the decline in the cumulative percent of low birthweight infants was greater for white mothers, the disparity would increase (Table 3). If the decline was greater for black mothers the disparity would decrease (Table 4).

The change in disparity is not determined by whether the outcome becomes rarer or more frequent. It is the change in the rate for the reference group (infants born to white mothers) relative to the change in the rate for the other group (infants born to black mothers) that determines whether the disparity increases or decreases. When rates worsen more for the reference group compared to the other group, the disparity will decline. When rates worsen more for the other group compared to the reference group the disparity will increase. Conversely, when rates improve more for the reference group compared to the other group, the disparity will increase; and when rates improve more for other group compared to the reference group, the disparity will decrease. As we have indicated previously, if the rate in the disadvantaged group can be improved relative to the rate in the reference group, disparity will be reduced and eventually eliminated.