DESCRIPTIVE AND ANALYTIC EPIDEMIOLOGIC STUDIES TO IDENTIFY MODIFIABLE DETERMINANTS OF DISPARITIES IN MORTALITY RATES BETWEEN BLACKS AND WHITES

Introduction: Descriptive and epidemiologic studies of US national data reveal no sustained decrease in disparities in mortality between Blacks and Whites since World War II. In contrast, descriptive studies of variations in racial mortality trends across comparable geographic areas might lead to the formulation of hypotheses for testing in analytical epidemiologic studies to identify modifiable determinants.

Methodology: Using the CDC Wonder system, the 41 peer-geographic areas to Davidson County, Tennessee, in which Meharry Medical College resides, were identified. For 1999–2000, race- and sex-specific, age-adjusted annual mortality rate ratios (MRRs) for Blacks compared to Whites, stratified by age (<1, 1–24, 25–64, and ≥65 years), were calculated. In 39 of the 41, MRR was >1.0, indicating higher death rates for Blacks.

Results: In 20 counties with low Black:White poverty ratios, MRRs were higher in 18 and achieved statistical significance in 13. In 21 counties with high Black:White poverty ratios, MRRs were higher in 20 counties and achieved statistical significance in 19. No MRRs were significantly lower for Blacks.

Conclusion: This new pathway includes descriptive data to explore racial mortality trends across peer-geographic areas to formulate hypotheses for analytical epidemiologic studies for the identification of modifiable determinants of disparities in mortality rates between Blacks and Whites. (*Ethn Dis.* 2007;17:280–283)

Key Words: African Americans, Epidemiologic Methods, Mortality

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INTRODUCTION

An overarching goal of the Healthy People 2010 initiative is to eliminate health disparities, including those reflected by race.¹ Unfortunately, descriptive epidemiologic studies of US national data have indicated no sustained proportional decrease in the disparity in mortality between Blacks and Whites since World War II,² despite federal, state, and local Healthy People efforts. In contrast, descriptive studies to explore similarities and differences in racial mortality trends across comparable geographic areas³ might facilitate formulation of hypotheses for testing in analytical epidemiologic studies to identify modifiable determinants of differences in mortality between Blacks and Whites.² For example, examining midsized geographic areas with similar demographic characteristics but dissimilar health outcomes, which are the focus of this paper, could lead to the formulation of hypotheses regarding modifiable determinants of health. The outcome of such analytic epidemiologic studies could have important clinical, public health, and policy implications.

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Address correspondence and reprint requests to Robert S. Levine, MD; National Center for Primary Care; Morehouse School of Medicine; 720 Westview Dr SW; Atlanta, GA 30310. 615-308-4443; rlevine@msm.edu ...examining mid-sized geographic areas with similar demographic characteristics but dissimilar health outcomes, which are the focus of this paper, could lead to the formulation of hypotheses regarding modifiable determinants of health.

METHODS

To explore the possibility that regional successes in reducing disparities between Black and White populations are obscured by national trends that show no reductions in disparities, we obtained race-specific, age-adjusted annual overall mortality data for 41 peer-geographic areas, stratified by Black:White poverty rate ratios (low and high).⁴ Specifically, using the CDC Wonder system,⁵ available in the public domain, we identified the 41 peer-geographic areas to Davidson County, Tennessee, in which Meharry Medical College resides. They were comparable with respect to population size, percent poverty, age distribution, and frontier status (an area is considered "frontier" if fewer than seven persons live in one square mile).⁶ We calculated race- and gender-specific, age-adjusted annual overall mortality



Fig 1. Average age-adjusted all-cause mortality rates^{*} for Blacks and Whites ages >1 year in 20 peer geographic areas with low Black:White poverty rate ratios, United States, 1999–2000

rates, stratified by age (<1, 1-24, 25-64, and \geq 65 years) for Blacks and Whites. Black and White rates were compared in each of the 41 peergeographic areas by using two measures: 1) for ages greater than or equal to one year, age-adjusted (year 2000 standard), race-specific, age-stratified mortality rates; and 2) ratios of the race-specific, age-adjusted mortality rates (mortality rate ratios [MRR]). Each rate included the total number of deaths per 100,000 population-at-risk and 95% confidence intervals. As summary measures, the overall mean plus or minus standard deviation for MRRs were computed for each age group.

RESULTS

In 39 of the 41 peer-geographic areas, the Black:White MRR was >1.0,

which indicates higher death rates for Blacks. In addition, in the 20 counties with low Black:White poverty ratios, average age-adjusted all-cause mortality rates for Blacks as compared to Whites were significantly higher in 13 counties, nonsignificantly higher in five counties, and nonsignificantly lower in two counties (Figure 1). In the 21 counties with high Black:White poverty ratios, average age-adjusted all-cause mortality rates for Blacks as compared to Whites were significantly higher in 19 counties, nonsignificantly higher in one county, and significantly lower in one county (Figure 2). Four distinct Black:White mortality patterns were evident (Table 1): 1) relatively high mortality rates for both Blacks and Whites and a low Black:White mortality rate ratio; 2) high mortality rates for Blacks but low mortality rates for Whites, with high Black:White mortality rate ratios; 3) low mortality rates for both Blacks and

Whites, with mortality rate ratios approximating equality; and 4) low mortality rates for Blacks but relatively high mortality rates for Whites with a mortality rate ratio approximating unity.

At least one county among the eight in the lowest quintile for MRR (≤ 1.15) is found in each of these four strata. These eight counties also have the lowest mortality rates for Blacks in their particular strata. The lowest rates for Blacks, found in Essex, Mass, and Norfolk, Mass, are also lower than the lowest rates for either Blacks or Whites.

CONCLUSION

In contrast to the findings from descriptive epidemiologic studies of US national data, among these peer-geographic areas, racial equality in mortality rates has been achieved or closely approximated in both densely and non-



Fig 2. Average age-adjusted all-cause mortality rates* for Blacks and Whites ages >1 year in 21 peer-geographic areas with high Black:White poverty rate ratios, United States, 1999–2000

densely populated counties. Even though Black:White disparities in ageadjusted overall mortality have remained unchanged in the United States as a whole for >60 years, these data from peer-geographic areas clearly show a wide range of absolute mortality rates that can be categorized into four different patterns. Each of these may provide clues to potentially modifiable determinants. Thus, these descriptive data represent the first step in a new pathway to formulate hypotheses to identify modifiable determinants of the disparities in mortality rates between Blacks and Whites. The analysis and

interpretation of future analytical epidemiologic studies designed to test specific hypotheses may facilitate interventions to decrease disparities in mortality between Blacks and Whites. For example, people living in places with low Black:White poverty rate ratios, such as Bernalillo, NM, and El Paso, Tex, may have easier access to health care and/or other modifiable risk factors that contribute to the low mortality rates for Blacks and Whites as well as MRRs approximating equality in these areas. In addition, the finding that Blacks have lower mortality rates than Whites in Essex, Mass, despite high

Black:White poverty rate ratios, raises many hypotheses regarding local determinants that require further testing. Such hypotheses are directly testable in multilevel study designs combining case-control or prospective cohort studies with qualitative investigations of contextual factors (eg, educational attainment, household income, or other socioeconomic factors) and group-level characteristics that influence mortality rates and disparities. Such multilevel designs which combine traditional epidemiology with health services research methods could lead to particularly informative results.

Four Black:White mortality patterns

	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Black mortality rates	High	High	Low	Low
White mortality rates	High	Low	Low	High
Black:White mortality ratio	Low	High	Equality	Unity
Examples of peer-geographic counties with these characteristics	Baltimore City, Md	Washington, DC Mecklenberg, NC	Bernalillo, NM El Paso, Tex	Suffolk, Mass

The analysis and interpretation of future analytical epidemiologic studies designed to test specific hypotheses may facilitate interventions to decrease disparities in mortality between Blacks and Whites.

Descriptive data are useful to formulate, not test, hypotheses. Additional limitations include but are not limited to misclassification of race and/or ethnicity, the need to refine the definition of a peer-geographic area, and perhaps most importantly the use of Whites as the basis for measuring disparities in mortality, especially in circumstances where non-Whites/non-Blacks tend to have comparable mortality rates. With respect to misclassification of race and/or ethnicity, Hispanics are sometimes classified as White, sometimes as Black, and sometimes as other. In this group of peer counties, however, the percent Hispanics varies from 5% to 10%, so any misclassification is unlikely to have a major impact on the findings.⁴ Finally, factors leading to favorable outcomes in places with a high degree of ethnic diversity and relatively low proportions of Blacks (eg,

El Paso, Tex, and Bernalillo, NM), may not be generalizable to counties with different racial/ethnic demographics.

Despite these and other limitations, the observed variation in magnitude and direction of racial mortality rates, as well as the identification of communities having successfully achieved low rates for both Blacks and Whites, support the use of peer-geographic areas to formulate hypotheses about modifiable determinants of health that lead to disparities in mortality between Blacks and Whites. For almost 60 years no sustained proportional decrease in mortality between Blacks and Whites has been seen, despite absolute declines in both races. During this time, emphasis has been on the evaluation of US national data and small neighborhoods. This new pathway includes descriptive data to explore similarities and differences in racial mortality trends across mid-size peer-geographic areas. These, in turn, provide a rational basis for future analytical epidemiologic studies and multi-level heath services research to identify modifiable determinants of disparities in mortality rates between Blacks and Whites. This new pathway could, at least in theory, lead to reductions in disparities in mortality rates between Blacks and Whites over the next decade.

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