Special Article

CONTRIBUTION OF MAJOR DISEASES TO DISPARITIES IN MORTALITY

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ABSTRACT

Background Mortality from all causes is higher for persons with fewer years of education and for blacks, but it is unknown which diseases contribute most to these disparities.

Methods We estimated cause-specific risks of death from data from the National Health Interview Survey conducted from 1986 through 1994 and from linked vital statistics. Using these risk estimates, we calculated potential years of life lost and potential gains in life expectancy related to specific causes, with stratification according to education level and race.

Results Persons without a high-school education lost 12.8 potential life-years per person in the population, as compared with 3.6 for persons who graduated from high school (ratio, 3.5; $P<0.001$). Ischemic heart disease contributed most (11.7 percent) to the difference according to education in potential life-years lost (with all cardiovascular diseases accounting for 35.3 percent). All cancers accounted for 26.5 percent, including 7.7 percent due to lung cancer; other lung diseases and pneumonia contributed 10.1 percent of the total, whereas human immunodeficiency virus (HIV) disease accounted for none of the difference according to education. The pattern of disparities according to level of income was similar to that according to level of education. Blacks and whites lost 7.0 and 5.2 potential life-years per person, respectively, as a result of deaths from any cause (ratio, 1.35; $P<0.001$). Cardiovascular diseases accounted for one third of this disparity, in large part because of hypertension (15.0 percent); HIV disease (11.2 percent) contributed almost as much as ischemic heart disease (5.5 percent), stroke (2.8 percent), and cancer (3.4 percent) combined; trauma and diabetes mellitus accounted for 10.7 percent and 8.5 percent, respectively.

Conclusions Although many conditions contribute to socioeconomic and racial disparities in potential life-years lost, a few conditions account for most of these disparities — smoking-related diseases in the case of mortality among persons with fewer years of education, and hypertension, HIV, diabetes mellitus, and trauma in the case of mortality among black persons. These findings have important implications for targeting efforts to reduce existing disparities in mortality rates. (N Engl J Med 2002;347:1585-92.)

MORTALITY rates in the United States have declined dramatically over the past century. Yet persons with fewer years of education and black persons still live approximately six fewer years than better-educated persons and whites, respectively.[1,2] Consequently, the Healthy People 2010 initiative[3] has made the elimination of disparities in health its primary goal.

The task of eliminating health disparities seems overwhelming, since minorities and the less educated have higher mortality rates for a wide range of diseases, including stroke,[4,5] diabetes,[6,7] cancer,[8-11] heart disease,[12-15] the acquired immunodeficiency syndrome (AIDS),[16,17] and lung disease.[11,18] However, we might achieve greater success by targeting the diseases that have the greatest influence on disparities in mortality. In this study, therefore, we estimated the differences associated with race and level of education in terms of potential life-years lost and potential gains in life expectancy related to specific causes, with the goal of determining which contribute most to the disparities.

METHODS

Study Design

Using nationally representative data, we estimated cause-specific risks of death among adults in the United States. These estimates were then used in a simulation model to calculate the differences according to level of education and race in potential years of life lost and potential gains in life expectancy. Both statistics measure the influence of different causes on premature death. Potential life-years lost are the years a person would have lived (up to an age cutoff) had he or she not died, with the number of years attributed to a specific cause.[19] The potential gain in life expectancy is the increase in life expectancy that would result if a specific cause of death were eliminated. Unlike the former method, it does not assume that the person would have survived until the cutoff age.

Sources of Data

We examined data from the National Health Interview Survey conducted from 1986 through 1994; this survey is conducted an-

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nually on a cross-sectional probability sample of U.S. households representing the civilian, noninstitutionalized population.[20] The National Health Interview Survey contains demographic and health information on each household member. This information is linked to data on mortality from the National Death Index (with causes coded with the use of the ninth revision of the *International Classification of Diseases* [ICD-9]) through December 1997.[21]

From the sample of 1,009,451 persons, we excluded 281,491 persons less than 18 years of age (27.9 percent of total) because data on deaths in this age group were unavailable. We excluded 23,902 persons (2.4 percent) with insufficient data for adequate matching with the National Death Index data,[21] 4848 persons (0.5 percent) with missing data on education, and 77,812 persons (7.7 percent) who were not classified as either black or white.

Data on mortality from the National Health Interview Survey extend only to 1997 and thus do not reflect recent improvements in mortality rates among patients with AIDS.[22] From 1994 to 1999, the annual mortality rate for patients with AIDS dropped by 75.7 percent for white men, 55.8 percent for black men, 59.5 percent for white women, and 42.1 percent for black women.[17] According to these trends, we proportionately decreased estimates from National Health Interview Survey data regarding the risk of death from AIDS.

Estimating Cause-Specific Mortality

We used the Kaplan–Meier product-limit method to estimate the one-year risk of cause-specific death for each subgroup defined by age, race, sex, and education.[23] We dichotomized education using a cutoff of completion of high school, and we used one-year age strata. We examined the underlying cause of death, determined by an algorithm that identified the single, initiating cause ultimately leading to death from among all causes listed on the death certificate.[1,24] We examined deaths from cardiovascular disease, cancer, infection, diabetes mellitus, renal disease, liver disease, rheumatologic disease, alcohol-related diseases, trauma (accidents, suicide, and homicide), and more specific types of cardiovascular disease, cancer, and infection. The remainder of deaths were categorized as due to other causes. Using locally weighted scatter-plot smoothing,[25] we smoothed the hazard probabilities according to cause of death and strata defined by sex, race, and education.

For the survival analyses, we used weights made up of three components. We used original probability weights from the National Health Interview Survey, which account for the sampling methods. We also used an "ineligibility weight," equal to the inverse of the predicted probability of linkage with the National Death Index (based on a logistic-regression analysis that used age, sex, race, and income as predictors). Thus, subjects who were demographically more similar to ineligible persons were assigned greater weights. Each yearly sample represents the total U.S. population. Thus, combining nine samples (those for 1986 through 1994) would result in estimates for a sample nine times as large. We therefore used a third weighting method[26] to adjust for the combining of nine National Health Interview Survey samples. This weight equals the proportion of the estimated population for a particular yearly sample to the combined estimated population for 1986 through 1994. Thus, a National Health Interview Survey subject in 1986 had a cohort weight of 0.12 (2.36×10^8 subjects in the estimated population of the 1986 National Health Interview Survey divided by 1.97×10^9 subjects in the combined estimated population).

Estimating Potential Life-Years Lost and Potential Gains in Life Expectancy

Estimates of cause-specific risks of death were used in a state-transition Monte Carlo simulation to model deaths among adults in the United States. Persons entered the simulation at the age of 25 years and were followed in one-year cycles until death. At each cycle transition, individual persons either survived to the next year (thus aging one year) or died from a specific cause. A set of risks of cause-specific death estimated as a function of age, sex, level of education, and race (as described above) determined each transition.

To compare deaths according to level of education, we simulated a corresponding population of persons with more and less education who were 25 years of age (100 million in each group) with the sex and race distribution of the total adult population of the United States, on the basis of data from the 2000 National Health Interview Survey. This simulated population consisted of white men (42.0 percent), black men (5.7 percent), white women (45.2 percent), and black women (7.0 percent). To compare deaths according to race, we used a simulated population of black persons and white persons 25 years of age that included men with more education (high-school graduation or greater, 38.3 percent), men with less education (no high-school graduation, 9.5 percent), women with more education (42.1 percent), and women with less education (10.2 percent).

From this simulation, we estimated potential life-years lost as the difference between age at death and the maximal number of years a person could have lived, which we set at 75 (i.e., no life-years were considered lost after the age of 75 years). We estimated the potential gain in life expectancy for each cause of death as the change in life expectancy when the mortality for that particular cause was set to zero. To make the results of the calculations for potential gains in life expectancy and potential life-years lost comparable, we truncated life expectancy at the age of 75.

We estimated standard errors using percentile nonparametric bootstrap methods with 1000 repetitions.[27] Because of the large sample, we estimated 99 percent confidence intervals. We used Stata version 7.0 software for survival analyses and SAS version 8.0 for smoothing hazard probabilities and for the simulation.

Sensitivity Analyses and Validation of the Simulation Model

Estimation of potential life-years lost before the age of 85, the use of other cutoffs for education categories, and categorization of education into six groups did not significantly change the results. We also compared income groups, using annual family income ($<\$20{,}000$ vs. $\geq\$20{,}000$) and the poverty-line cutoff, which is based on family income adjusted for household size. Results for income were unaffected by the use of other cutoffs and were similar to the disparities according to level of education.

Errors in the identification of the underlying cause of death may occur. In particular, death from ischemic heart disease may be misattributed to hypertension, since these are common coexisting conditions. Our results were unchanged when we recategorized deaths from hypertension as deaths from ischemic heart disease when ischemic heart disease was listed anywhere on the death certificate.

To validate the simulation model, we compared the results of the simulation with empirical estimates for the combined survey cohort (with an average of 7.4 years of follow-up). We repeated the simulation model for seven annual cycles, using a population similar to the National Health Interview Survey cohort in age, sex, race, and level of education. The simulation and the empirical results were similar.

RESULTS

Educational Disparities in Potential Life-Years Lost

When adjusted for age, sex, and race, the number of potential life-years lost from all causes of death was 3.5 times as great for persons with less education than for persons with more education. Persons with less education and those with more education lost 12.8 and 3.6 potential life-years before 75 years of age per person, respectively, a difference of 9.2 years (99 percent confidence interval, 8.5 to 10.7) (Table 1). Less-edu-

cated persons lost more potential life-years than more-educated persons for every specific cause we examined, though not all differences were statistically significant. Ischemic heart disease contributed most to the educational disparity in life-years lost (11.7 percent of the total difference in life-years lost), followed by lung cancer (7.7 percent), stroke (5.8 percent), congestive heart failure (5.1 percent), pneumonia (5.1 percent), and lung disease (5.0 percent). Hypertension contributed only 3.5 percent, and no difference due to infection with the human immunodeficiency virus (HIV) was observed.

Racial Disparities in Potential Life-Years Lost

When adjusted for age, sex, and level of education, the number of potential life-years lost from all causes

TABLE 1. RACIAL AND EDUCATIONAL DISPARITY IN POTENTIAL LIFE-YEARS LOST PER 1000 PERSONS BEFORE THE AGE OF 75.*

CAUSE OF DEATH	EDUCATIONAL DIFFERENCE IN LIFE-YEARS LOST (99% CI)	% OF OVERALL EDUCATIONAL DIFFERENCE†	RACIAL DIFFERENCE IN LIFE-YEARS LOST (99% CI)	% OF OVERALL RACIAL DIFFERENCE‡
Cardiovascular disease	3241 (2815 to 4591)	35.3	612 (147 to 1157)	34.0
Ischemic heart disease	1075 (849 to 2184)	11.7	98 (−235 to 521)	5.5
Cerebrovascular stroke	537 (204 to 1008)	5.8	50 (−138 to 207)	2.8
Hypertension	324 (138 to 450)	3.5	270 (136 to 422)	15.0
Congestive heart failure	471 (184 to 1000)	5.1	2 (−143 to 185)	0.1
Other atherosclerotic disease	414 (145 to 706)	4.5	102 (−26 to 272)	5.6
Other cardiovascular disease	420 (230 to 750)	4.6	90 (−41 to 273)	5.0
Cancer	2437 (1703 to 2968)	26.5	55 (−177 to 503)	3.4
Lung	706 (411 to 1102)	7.7	63 (−136 to 306)	3.5
Breast	246 (107 to 423)	2.7	−36 (−101 to 130)	−2.0
Colon	299 (44 to 455)	3.3	−25 (−92 to 144)	−1.4
Liver	13 (−19 to 75)	0.1	28 (−12 to 152)	1.5
Pancreas	123 (42 to 196)	1.3	34 (−33 to 112)	1.9
Esophagus	47 (−7 to 81)	0.5	44 (1 to 133)	2.4
Stomach	83 (5 to 138)	0.9	36 (−6 to 85)	2.4
Uterus or ovary	63 (−1 to 112)	0.7	−17 (−48 to 36)	−1.0
Cervix	47 (15 to 83)	0.5	8 (−7 to 62)	0.5
Prostate	35 (−52 to 109)	0.4	59 (−14 to 185)	3.3
Bladder or kidney	62 (−18 to 158)	0.7	−36 (−79 to 66)	−2.0
Leukemia or lymphoma	251 (70 to 429)	2.7	−44 (−140 to 59)	−2.4
Other	464 (226 to 817)	5.1	−61 (−202 to 88)	−3.4
Infection	839 (515 to 1253)	9.1	381 (219 to 623)	21.1
Tuberculosis	14 (−5 to 31)	0.2	11 (−3 to 76)	0.6
Pneumonia	471 (200 to 842)	5.1	93 (−65 to 229)	5.2
Viral hepatitis	14 (−5 to 55)	0.1	2 (−23 to 73)	0.1
Sepsis	141 (34 to 248)	1.5	61 (1 to 142)	3.4
HIV	3 (−13 to 47)	0.0	202 (161 to 279)	11.2
Other infections	197 (75 to 346)	2.1	11 (−34 to 135)	0.6
Lung disease	461 (169 to 723)	5.0	−104 (−193 to 100)	−5.8
Diabetes mellitus	361 (200 to 556)	3.9	153 (4 to 298)	8.5
Renal disease	77 (−12 to 216)	0.8	72 (−33 to 192)	4.0
Liver disease	215 (104 to 329)	2.3	46 (−9 to 123)	2.6
Rheumatologic diseases	5 (−24 to 28)	0.0	24 (−12 to 78)	1.4
Alcohol-related diseases	29 (0 to 90)	0.3	14 (−11 to 112)	0.8
All trauma	487 (350 to 718)	5.3	193 (117 to 517)	10.7
Motor vehicle accident	130 (61 to 218)	1.4	45 (3 to 170)	2.5
Suicide	82 (8 to 177)	0.9	−45 (−98 to 91)	−2.5
Homicide	48 (3 to 99)	0.5	153 (113 to 352)	8.5
Other accidents	227 (124 to 381)	2.5	40 (−59 to 148)	2.2
All other causes	1033 (836 to 1692)	11.2	357 (139 to 654)	19.8
Total	9186 (8490 to 10,718)	100.0	1803 (1404 to 2781)	100.0

*The number of potential life-years lost per 1000 persons was calculated as (Σ[75 − age at death for those dying before 75 years of age] ÷ n) × 1000, where n is the number of persons at risk for death in the population at base line. For educational differences, persons with less than a high-school education were compared with those who completed high school, with adjustment for age, sex, and race. For racial differences, blacks were compared with whites, with adjustment for age, sex, and level of education. CI denotes confidence interval, and HIV human immunodeficiency virus. Because of rounding, columns may not sum to the totals shown.

†These values are the percent contribution of a specific cause of death to the overall difference in potential life-years lost to death from all causes between persons with less education and those with more education.

‡These values are the percent contribution of a specific cause of death to the overall difference in potential life-years lost to death for all causes between blacks and whites.

of death was 35 percent greater for blacks than for whites. Black persons and white persons lost 7.0 and 5.2 potential life-years before the age of 75 per person, respectively, a difference of 1.8 years (99 percent confidence interval, 1.4 to 2.8).

Blacks fared worse than whites for the majority of specific causes that we examined (Table 1). Death from hypertension contributed most to the racial disparity in potential life-years lost (15.0 percent), followed by HIV disease (11.2 percent), diabetes (8.5 percent), and homicide (8.5 percent). These estimates have been adjusted for recent declines in mortality from HIV.[17]

Of the major categories of disease, cardiovascular disease contributed most to the disparity in mortality from any cause (34.0 percent), followed by infection (21.1 percent) and trauma (10.7 percent). Cancer contributed only 3.4 percent to the racial disparity in potential life-years lost, even though cancer was the predominant cause of death among white persons (33 percent of the total life-years lost) and the second most common cause among black persons (25 percent). Deaths from cardiovascular disease ranked first among black persons (31 percent) and second among white persons (30 percent). All results were similar when potential life-years lost before the age of 85 years, rather than the age of 75 years, were examined.

Potential Gains in Life Expectancy

For each person, potential life-years lost was attributed to a single cause. Had the person not died from that cause, however, he or she might have died prematurely from another cause. Consequently, potential life-years lost may not accurately account for "competing risks" of death and may give excessive weight to causes of death occurring at younger ages.[28] The measure of potential gains in life expectancy avoids this limitation by estimating the change in life expectancy that would result if a particular cause of death were eliminated.[29]

The disparity in life expectancy according to educational level (up to 75 years of age) was 9.19 years overall (8.71 years among blacks and 9.27 years among whites). The elimination of ischemic heart disease would result in the biggest change, decreasing the disparity according to educational level to 8.35 years (a decrease of 0.84 year per person), followed by lung cancer (decrease, 0.54 year), stroke (decrease, 0.42 year), pneumonia (decrease, 0.37 year), congestive heart failure (decrease, 0.36 year), lung disease (decrease, 0.36 year), colon cancer (decrease, 0.32 year), diabetes (decrease, 0.28 year), hypertension (decrease, 0.25 year), breast cancer (decrease, 0.19 year), and leukemia or lymphoma (decrease, 0.18 year) (Fig. 1).

When categorized into six groups, education level appeared to have some dose–response effect on mortality. As compared with persons with less than a ninth-grade education, the life expectancy was 7.4 years greater for those with some high-school education, 13.1 years greater for those who graduated from high school, 12.4 years greater for those with some college education, 13.0 years greater for college graduates, and 12.8 years greater for those with a graduate-level education.

The disparity in life expectancy according to race (up to 75 years of age) was 1.80 years overall (1.46 years among less-educated persons and 1.94 years among more-educated persons). The elimination of hypertension would have the biggest effect, decreasing this disparity to 1.57 years (a decrease of 0.23 year per person) (Fig. 1). HIV remained the second most important cause of the disparity (a decrease of 0.18 year per person), followed by homicide (decrease, 0.13 year), diabetes (decrease, 0.12 year), colon cancer (decrease, 0.08 year), pneumonia (decrease, 0.08 year), and ischemic heart disease (decrease, 0.06 year).

Potential life-years lost and gains in life expectancy produce similar rankings of the importance of specific diseases to the disparities in mortality. Thus, the results in the analysis of potential life-years lost appear robust against the problem of competing risks.

Marginal Effect of Education and Race

Adjustment for race had a minimal effect on the educational disparity in potential life-years lost (Fig. 2). For death from all causes, the disparity was 9.3 years per person (99 percent confidence interval, 8.7 to 10.7) without adjustment for race, and 9.2 years per person (99 percent confidence interval, 8.5 to 10.7) with such adjustment. The educational disparity in potential life-years lost was statistically significant for every specific cause of death except renal and rheumatologic diseases, regardless of adjustment for race.

For all causes, the racial disparity was 2.9 potential life-years lost per person (99 percent confidence interval, 2.4 to 3.9) without adjustment for education and 1.8 per person (99 percent confidence interval, 1.4 to 2.8) with such adjustment. Irrespective of adjustments for education, blacks lost significantly more potential life-years than whites due to cardiovascular disease, infections, diabetes, liver disease, and trauma (Fig. 3). Adjustment for education had the greatest effect on racial disparities in deaths from cardiovascular disease and cancer, the two causes for which the educational disparity was largest.

Adjustment for Recent Trends in Mortality from HIV Disease

After protease inhibitors were introduced in 1996, mortality from HIV disease declined dramatically.[22] When we adjusted for this trend, the contribution of HIV to the racial disparity in potential life-years lost was 11.2 percent. Before this trend (with mortality es-

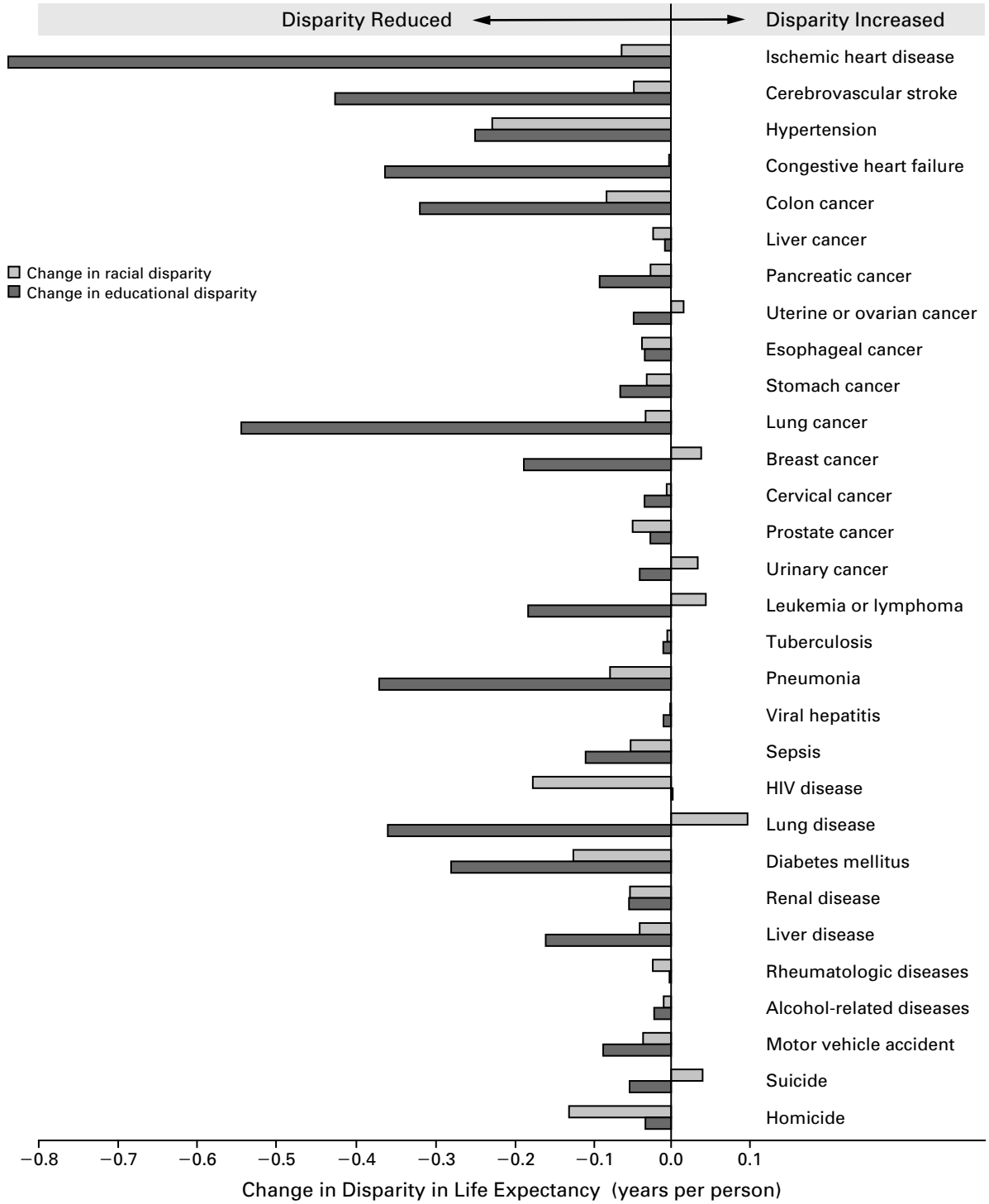

Figure 1. Change in the Disparity in Life Expectancy If Selected Diseases Were Eliminated.

The change in the disparity in life expectancy according to educational level is calculated as $(LE_{\text{less educated}} - LE_{\text{more educated}}) - (LE_{\text{less educated}} - LE_{\text{more educated}}$ when the cause-specific risk of death is set to zero), with LE denoting life expectancy until 75 years of age. The change in the disparity in life expectancy according to race is calculated as $(LE_{\text{blacks}} - LE_{\text{whites}}) - (LE_{\text{blacks}} - LE_{\text{whites}}$ when the cause-specific risk of death is set to zero), with LE denoting life expectancy until 75 years of age.

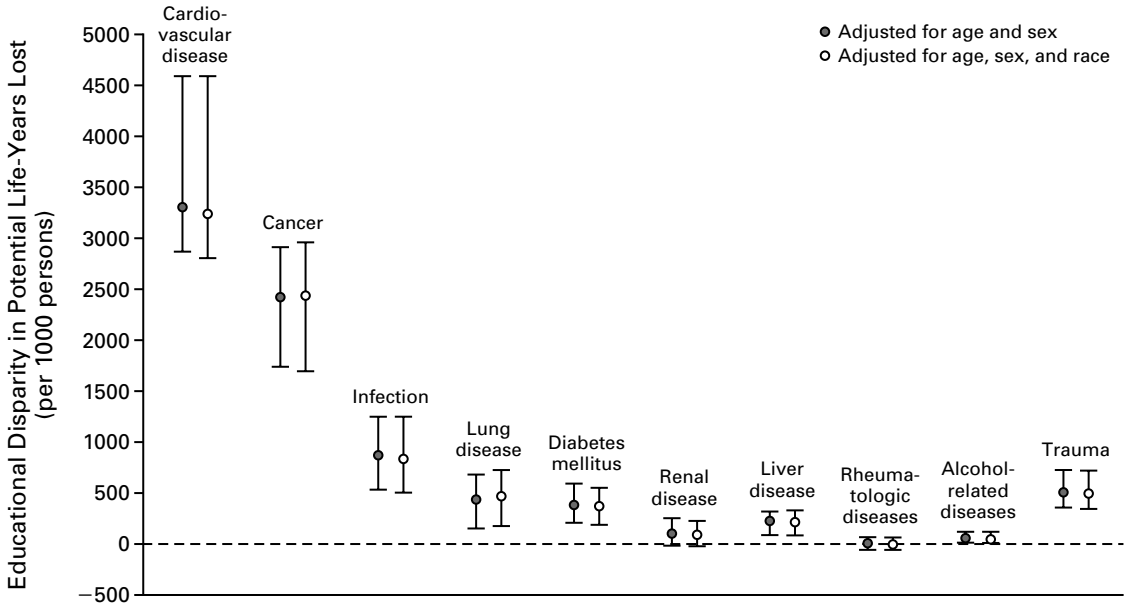

Figure 2. The Effect of Adjustment for Race on the Disparity in Potential Life-Years Lost between Persons with Less Education and Those with More Education, According to the Specific Cause of Death.

Potential life-years lost are calculated as years of potential life lost before 75 years of age. Trauma includes deaths from accidents, suicides, and homicides. The I bars represent 99 percent confidence intervals.

timates from the 1994 National Health Interview Survey), HIV contributed 17.4 percent to the total racial disparity in potential life-years lost. Recent improvements in mortality from HIV have favored whites more than blacks. Had mortality from HIV disease improved equally, the racial disparity in mortality from HIV disease would have dropped further, contributing only 6.5 percent.

DISCUSSION

Though numerous studies have found racial and educational differences in mortality, only a small number have attempted to identify which diseases contribute most to existing disparities.[11,14,15,30-35] These studies have been limited in several ways. First, almost all[11,14,15,31,32,34] compared mortality risk ratios, which fail to reflect absolute numbers of deaths or age at death. For example, the relative risk of death from prostate cancer for blacks as compared with whites is particularly large,[34] which suggests that it contributes substantially to the racial disparity in life expectancy. However, we estimate that this cause contributes only 3.3 percent to the total disparity in potential life-years lost — mainly because death from prostate cancer tends to occur late in life and, to a lesser extent, because it is a relatively uncommon cause of death. Previous studies are also limited because they examined data collected before the HIV epidemic,[30] examined data from outside the United States,[11,31,33] examined racial or educational disparities but not both,[35] and lacked sufficient details about specific causes of death.[35]

Our study provides important information for policy makers, researchers, and clinicians. So far, much of the research attempting to understand health disparities has focused on ischemic heart disease. A recent review of the literature found 63 studies that examined racial differences in the use of cardiovascular procedures.[36] Though significant disparities in the use of coronary angiography, angioplasty, and bypass surgery are evident, the broader implications of these findings for directing future research and interventions must be considered. Ischemic heart disease contributes only 5.5 percent to the total racial disparity in potential life-years lost. HIV disease and hypertension each contribute two to three times as much.

Though we have not examined factors that might explain these disparities, such as health insurance, access to care, quality of care, or health-related behavior, our results indicate areas that warrant the investment of greater resources. The top six contributors to the educational disparity in mortality are ischemic heart disease, lung cancer, stroke, pneumonia, congestive heart failure, and lung disease, which together contribute 40.4 percent to the total disparity according to educational level in potential life-years lost. All six are smoking-related diseases, suggesting that interven-

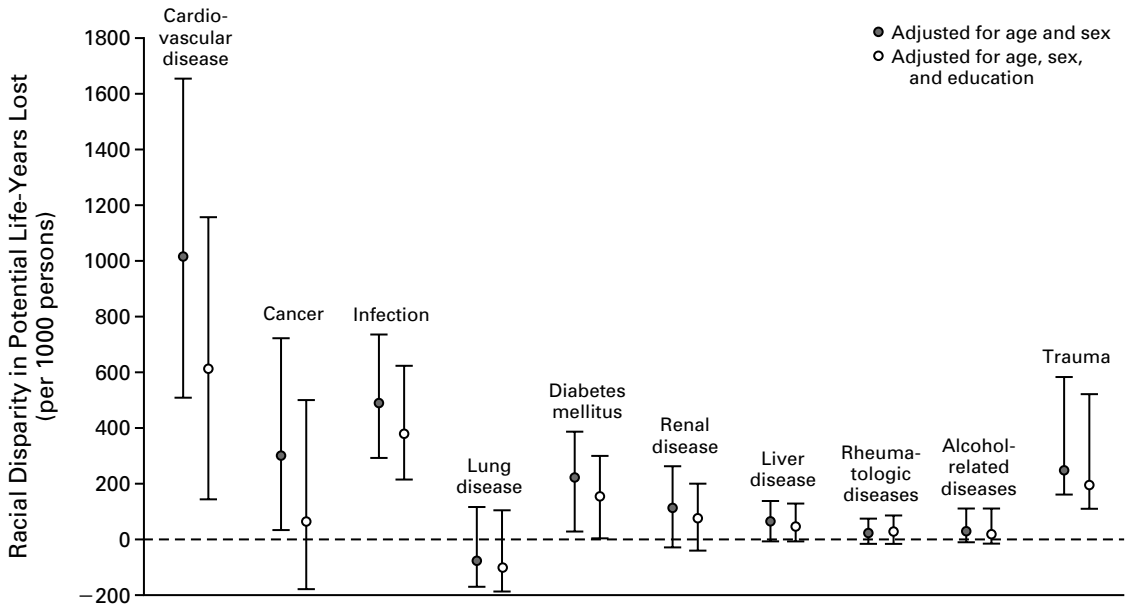

Figure 3. The Effect of Adjustment for Level of Education on the Disparity in Potential Life-Years Lost between Black Persons and White Persons, According to the Specific Cause of Death.

Trauma includes deaths from accidents, suicides, and homicides. The I bars represent 99 percent confidence intervals.

tions to prevent smoking could have an enormous impact. Also, future research and interventions should target screening and treatment for hypertension and prevention and treatment of HIV infection among blacks. Improvements in the delivery of cardiac-revascularization procedures would have a much smaller effect on racial disparities.

Disentangling the effects of race and education on health is often challenging. A few observations deserve mention. First, the disparity in life expectancy when it is truncated at 75 years of age is greater according to level of education than according to race (9.2 and 1.8 years, respectively). These estimates were truncated at 75 years so they would be comparable to the estimates of potential life-years lost. Without any age cutoff, however, the disparities in life expectancy according to level of education and race are 4.9 and 6.3 years, respectively, which are similar to values reported in previous studies[1,2] and suggest that much of the racial disparity occurs after the age of 75. Regardless of which cutoff is used, the relative importance of different causes of death to the overall disparity in mortality remains the same for both educational and racial disparities.

Second, the level of education and race each appear to have strong, independent effects that persist after adjustment for the other. Third, the patterns of racial and educational disparity are markedly different, which suggests that different sets of factors may explain these patterns. As previously mentioned, smoking-related diseases are more strongly associated with level of education than with race. We did not examine cigarette use; however, the results are consistent with studies showing that rates of smoking are higher among less-educated persons but vary less according to race.[37-39]

Our study assumes that dying from one disease is noninformative about the risk of death from another. Since violation of this assumption is more likely when two diseases with similar risk factors (i.e., correlated competing hazards) are examined, conclusions about stroke as compared with ischemic heart disease, for example, require some caution. Less concern is warranted for unrelated diseases, such as HIV and cancer,[40] and also when patterns of mortality are compared according to race and level of education.

In addition, death certificates may inaccurately record the true cause of death, and the underlying cause-of-death coding could be biased. The person filling out the death certificate does not determine the underlying cause. Instead, the National Center for Health Statistics follows a widely used coding algorithm, which may reduce the potential for bias. Misclassification may still occur, however, and the study results should be viewed with this potential limitation in mind.

Given limited resources to eliminate health disparities, we need to focus our efforts so as to achieve the maximal gain. Our data suggest that targeting ische-

mic heart disease and lung cancer would be most useful in reducing the educational disparity in mortality, whereas targeting hypertension, HIV, trauma, and diabetes would have the greatest effect on the racial disparity.

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