Black–White Differences in Infectious Disease Mortality in the United States

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Objectives. This study determined the degree to which Black-White differences in infectious disease mortality are explained by income and education and the extent to which infectious diseases contribute to Black-White differences in all-cause mortality.

Methods. A sample population of the National Longitudinal Mortality Study from 1979 through 1981 was analyzed and followed up through 1989.

Results. Infectious disease mortality among Blacks was higher than among Whites, with a relative risk of 1.53 after adjustment for age and sex and 1.34 after further adjustment for income and education. Death from infectious diseases contributed to 9.3% of the difference in all-cause mortality.

Conclusions. In the United States, infectious diseases account for nearly 10% of the excess all-cause mortality rates in Blacks compared with Whites. (*Am J Public Health.* 2001;91:1251–1253)

In the United States, large mortality differences are observed between Blacks and Whites. Higher mortality rates have been observed in the Black population for both all-cause mortality and specific causes of death.[1] Excess mortality in Blacks can be attributed partially to their lower socioeconomic status. However, after adjustment for income, Blacks still have higher death rates from cardiovascular disease, cancer, and other causes.[2,3]

Overviews of Black–White differences in mortality from infectious diseases are available from a few studies, such as a study on deaths preventable by medical intervention.[4] In that study, however, no estimate was made of the contribution of income and other socioeconomic indicators to the differences that were observed.[4] In addition, no study has provided an overview of the full range of infectious diseases. Because these diseases together account for a considerable proportion of all deaths in the United States,[5] their contribution to the Black–White difference in all-cause mortality might be substantial.

The objectives of this report are (1) to determine the degree to which these mortality differences are explained by socioeconomic indicators such as income and education and (2) to determine the extent to which (certain categories of) infectious diseases contribute to the Black–White difference in all-cause mortality. This knowledge is particularly important because many infectious diseases are preventable, and deaths that might result from these diseases are therefore avoidable.

METHODS

Data for this study were drawn from the National Longitudinal Mortality Study.[6,7] The sample population was selected from 10 Census Bureau Current Population Surveys conducted from 1979 through 1981.[8] The data used in this study were obtained from a public use file for the follow-up period 1979 through 1989.

Individual records in the data source were classified by race/ethnicity, as determined by the question "What is the race of each person in this household?" In this report, we focus on the categories White and Black.

Family income was defined as the total combined income of all members of the respondent's family. Four annual income levels were distinguished: $25 000 or more, $15 000 to $24 999, $10 000 to $14 999, and less than $10 000.

Four education levels were differentiated: at least some years of college, 4 years of high school, 1 to 3 years of high school, and elementary school.

The classification developed by Pinner et al.[5] was used to categorize *International Classification of Diseases, 9th Revision,* codes representing infectious diseases as the underlying cause of death.

The sample was categorized into 3 age groups on the basis of age at the start of follow-up: 20 to 39, 40 to 59, and ≥60 years. The child and adolescent age group (0 to 19 years) was excluded because of insufficient numbers of deaths for meaningful analysis.

Death rates by sex and 5-year age group were calculated by dividing the number of deaths by the number of person-days during the same period. We calculated standardized mortality ratios on the basis of race/ethnicity, using death rates by age and sex for all Blacks and Whites as the standard. Multiplying the standardized mortality ratios by national death rates yielded the age- and sex-standardized death rates presented in Table 2.

Excess mortality was expressed by mortality rate ratios. These ratios were estimated with Poisson regression analysis, with the observed number of deaths as the dependent variable, the number of person-days at risk as the offset variable, and a variable representing Black vs White as the independent variable. In a first series of analyses, age and sex were added to the model to control for these variables. Subsequently, education and income were added to control for socioeconomic differences between Blacks and Whites. All variables were entered as nominal variables, with age represented by 5-year groups and education and income by the 4 groups described above for each.

RESULTS

The total population in this study at the start of follow-up in 1980 was 394 083.

TABLE 1—Differences Between Blacks and Whites in Mortality From Specific Infectious Disease Categories: All Men and Women Aged 20 Years and Older

Infectious Disease	Total No. of Deaths	Rate Ratio[a]			
		No Control for SES		Control for SES	
		RR	95% CI	RR	95% CI
Tuberculosis	22	4.11	1.61, 10.50	3.25	1.22, 8.61
Bacterial meningitis	15	0.84	0.11, 6.29	0.71	0.09, 5.48
Septicemia	299	2.15	1.57, 2.95	1.87	1.35, 2.58
HIV/AIDS	79	2.01	1.08, 3.75	2.32	1.23, 4.38
Hepatobiliary disease	26	2.16	0.74, 6.35	2.05	0.67, 6.28
Mycoses	42	3.05	1.39, 6.69	1.93	0.86, 4.37
Infections of heart	127	0.88	0.44, 1.73	0.73	0.37, 1.46
Respiratory tract infections	1163	1.16	0.94, 1.42	1.03	0.84, 1.27
Gastrointestinal infections	31	2.64	1.08, 6.43	2.16	0.86, 5.44
Infections of kidneys and urinary tract	181	2.57	1.76, 3.77	2.17	1.46, 3.20
All infectious diseases	1985	1.53	1.33, 1.76	1.34	1.16, 1.54

Note. SES = socioeconomic status; RR = rate ratio; CI = confidence interval.
[a]Ratio of Black to White. Adjusted for age and sex.

The overall percentage of Blacks in this population was 9.8%. The Black population was overrepresented in both the lowest income category (17.9%) and the 2 lowest education levels (15.6% and 15.8%). The rate ratio (Black vs White), after age and sex were controlled for, was 1.53 (95% confidence interval [CI] = 1.33, 1.76). After further adjustment for family income and education, the rate ratio was reduced to 1.34 (95% CI = 1.16, 1.54). This reduction of 0.19 is attributable primarily to the Black population's lower overall income and only marginally to its lower overall education.

Table 1 shows differences between Blacks and Whites in mortality from specific infectious disease categories. The disease categories with significant differences in rate ratios after adjustment for family income and education were tuberculosis, septicemia, HIV/AIDS, and infections of the kidneys and urinary tract.

Table 2 shows the absolute contributions of infectious disease mortality to the differences between Blacks and Whites in total mortality. Although death due to all infectious diseases constituted only 4.9% of all causes of death, these diseases did contribute to 9.3% of the difference in all-cause mortality rates between Blacks and Whites.

TABLE 2—Contribution of Infectious Disease Mortality to the Differences Between Blacks and Whites in Total Mortality: All Men and Women Aged 20 Years and Older

Cause-of-Death Group	Mortality Rate/ 100 000 Person-Years	Age- and Sex-Adjusted Death Rate		Difference	
		Blacks	Whites	Rate/Person	% of Difference in All-Cause Mortality Rates
All causes	11 969.9	14 965.4	11 700.6	3264.8	100
All infectious diseases	588.8	866.7	563.9	302.8	9.3
Tuberculosis	6.5	21.6	5.1	16.4	0.5
Bacterial meningitis	4.4	3.3	4.5	–1.2	–0.04
Septicemia	88.7	178.2	80.7	97.4	3.0
HIV/AIDS	23.4	51.3	20.6	30.8	0.9
Hepatobiliary disease	7.7	13.8	7.1	6.7	0.2
Mycoses	12.5	32.0	10.7	21.3	0.7
Infections of heart	37.7	32.4	38.1	–5.8	–0.2
Respiratory tract infections	345.0	390.1	341.0	49.1	1.5
Gastrointestinal infections	9.2	21.8	8.0	13.7	0.4
Infections of kidneys and urinary tract	53.7	119.2	47.8	71.4	2.2

Seventy-one percent was attributable to the disease categories tuberculosis, septicemia, HIV or AIDS, and infections of the kidneys and urinary tract.

DISCUSSION

After adjustment for family income and education, Black–White infectious disease mortality differences decreased by approximately 36% (rate ratio decreased from 1.53 to 1.34). In this same sample, all-cause mortality ratios decreased by approximately 55% after adjusting for family income and education (from 1.29 to 1.13). This reduction is fairly consistent with the reductions in all-cause mortality rate ratios for these 2 racial/ethnic groups that are observed in other studies.[2,3,7,9]

Income, education, and several known risk factors such as smoking, diabetes, and increased blood pressure, cholesterol, body mass index, and alcohol intake are known to contribute only partly to the excess deaths in the Black population.[3] Other factors—probably specific to certain infectious diseases—also are involved. The infectious disease categories with a significantly higher rate ratio among Blacks, even after adjustment for family income and education, were tuberculosis, HIV/AIDS, septicemia, and infections of the kidneys and urinary tract.

Increased risk of tuberculosis associated with race/ethnicity is primarily accounted for by socioeconomic factors other than income and education and, in particular, by crowding.[10] Also, case-fatality rates among Blacks are more than twice those of Whites.[11] Finally, comorbidity of HIV and tuberculosis is a common phenomenon and appears to be more frequent in Blacks.[12] The effect of this comorbidity on death registration is unknown.

HIV/AIDS has been identified as 1 of the 3 leading causes of death in Black males, next to diseases of the heart and cancer. The already considerable disparity in deaths due to HIV/AIDS between Blacks and Whites has increased over the past 15 years,[13] and this has made a large contribution to the increasing Black–White differences in life expectancy.[14] Excess mortality in Blacks due to HIV/AIDS is not related to income and education, and several other contributing factors have been suggested. These include behavioral differences,[15] differences in underlying prevalence or exposure to various etiologic agents causing AIDS-defining conditions such as tuberculosis,[16] and differences in access to care and therapy for HIV-related conditions.[17]

Explanation of higher mortality rate ratios in Blacks for septicemia and infections of the kidneys and urinary tract would require further investigation of the epidemiology of these diseases and responsible pathogens, as well as review of the validity of diagnostic information recorded on death certificates.

This study underlines again that marked differences in mortality exist between racial/ethnic groups in the United States. These differences cannot be explained fully by the considerable differences in income and education between Black–White communities. Increased mortality in Blacks compared with Whites must be explained largely by socioeconomic and other factors that are associated with specific circumstances of the Black population. ■

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Contributors

Both J.H. Richardus and A.E. Kunst planned the study. J.H. Richardus assisted in the data analysis and wrote the paper. A.E. Kunst analyzed the data and contributed to the writing of the paper.

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