

EXCESS MORTALITY AMONG BLACKS AND WHITES IN THE UNITED STATES

ARLINE T. GERONIMUS, Sc.D., JOHN BOUND, Ph.D., TIMOTHY A. WAIDMANN, Ph.D.,
 MARIANNE M. HILLEMEIER, M.S.N., P.N.P., M.P.H., AND PATRICIA B. BURNS, M.P.H.

ABSTRACT

Background Although the general relations between race, socioeconomic status, and mortality in the United States are well known, specific patterns of excess mortality are not well understood.

Methods Using standard demographic techniques, we analyzed death certificates and census data and made sex-specific population-level estimates of the 1990 death rates for people 15 to 64 years of age. We studied mortality among blacks in selected areas of New York City, Detroit, Los Angeles, and Alabama (in one area of persistent poverty and one higher-income area each) and among whites in areas of New York City, metropolitan Detroit, Kentucky, and Alabama (one area of poverty and one higher-income area each). Sixteen areas were studied in all.

Results When they were compared with the nationwide age-standardized annual death rate for whites, the death rates for both sexes in each of the poverty areas were excessive, especially among blacks (standardized mortality ratios for men and women in Harlem, 4.11 and 3.38; in Watts, 2.92 and 2.60; in central Detroit, 2.79 and 2.58; and in the Black Belt area of Alabama, 1.81 and 1.89). Boys in Harlem who reached the age of 15 had a 37 percent chance of surviving to the age of 65; for girls, the likelihood was 65 percent. Of the higher-income black areas studied, Queens–Bronx had the income level most similar to that of whites and the lowest standardized mortality ratios (men, 1.18; women, 1.08). Of the areas where poor whites were studied, Detroit had the highest standardized mortality ratios (men, 2.01; women, 1.90). On the Lower East Side of Manhattan, in Appalachia, and in Northeast Alabama, the ratios for whites were below the national average for blacks (men, 1.90; women, 1.95).

Conclusions Although differences in mortality rates before the age of 65 between advantaged and disadvantaged groups in the United States are sometimes vast, there are important differences among impoverished communities in patterns of excess mortality. (N Engl J Med 1996;335:1552-8.)

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NATIONWIDE and statewide studies in the United States indicate that young and middle-aged black Americans have disproportionately high morbidity and mortality¹⁻⁵ and that differences between socioeconomic groups in premature mortality may be increasing.⁶ These findings may seriously understate the health problems of blacks living in areas of con-

centrated poverty. McCord and Freeman⁷ estimated that black men living in Harlem in 1980 had less chance of surviving to the age of 65 than men in Bangladesh. It is uncertain whether the findings in Harlem can be generalized to other areas of poverty in the United States or to other black communities.

We estimated the 1990 death rates of people 15 to 64 years of age in eight persistently poor geographic areas and eight geographically proximate, but more advantaged areas, matched for race. We studied the extent to which disadvantaged people in the prime of life have shorter life expectancy than people in more advantaged groups and than the national averages. We also compared mortality rates among different types of communities with persistent poverty.

METHODS**Study Groups**

Summary data on the 16 areas studied are shown in Table 1. The geographic areas where the groups resided are described in greater detail in the Appendix. Our analyses of black populations include only blacks in those areas, and the analyses of white populations include only whites. In each area, two geographically proximate groups of people of the same race — one poor and one of higher income — were selected for study. In keeping with the distribution of income nationally, the black groups (both poor and higher-income) tended to be less well off than the white groups, and the disparities between the more disadvantaged and less disadvantaged groups were greater in the urban North than in the rural South.

The areas studied were not randomly selected areas of concentrated poverty. Instead, they were chosen for their racial and geographic diversity, given the constraints of the data. Each group needed to be large enough for detailed analyses of mortality in persons 15 to 64 years of age to be performed. In the case of blacks, this requirement limited us to major cities and southern rural areas. Our study was also limited to states that provide information on vital statistics with geographic identifiers and, for areas with large Hispanic populations, differentiation between non-Hispanic and Hispanic residents.

Statistical Analysis

For each group, we combined information from death certificates for the three years from 1989 to 1991 with age-stratified counts of persons of each sex from the 1990 U.S. Census to calculate age- and sex-specific rates of death, both overall and from

From the Department of Health Behavior and Health Education, School of Public Health (A.T.G., P.B.B.), the Population Studies Center (A.T.G., J.B., M.M.H.), and the Departments of Economics (J.B.) and Sociology (M.M.H.), University of Michigan, Ann Arbor; the National Bureau for Economic Research, Cambridge, Mass. (J.B.); and the Urban Institute Health Policy Center, Washington, D.C. (T.A.W.). Address reprint requests to Dr. Geronimus at the Department of Health Behavior and Health Education, University of Michigan School of Public Health, 1420 Washington Heights, Ann Arbor, MI 48109-2029.

specific causes. To reduce bias due to undercounting in the census, we adjusted the population counts. Specific estimates of undercounting in local areas could not be obtained for every group. We replicated the analyses for Harlem with adjustment for both local and national rates of undercounting. Because the conclusions were the same regardless of the adjustment made, estimates for all the study populations are based on the adjustment for undercounting nationally.

We then computed age- and cause-specific standardized mortality ratios and annualized excess-death rates.^{9,10} To ensure that the reported measures were comparable among the study groups, we standardized our calculations with reference to the age distribution of the white population nationwide, according to sex.¹¹ For each group, we calculated the number of deaths that would be expected among whites nationwide if their age- and cause-specific death rates were the same as those of the study group. To compute the standardized mortality ratios, we divided the number of expected deaths by the number of observed deaths in the white population nationwide. We calculated excess-death rates as 100,000 times the difference between expected deaths and observed deaths, divided by the white population nationwide.

We used Greville's method^{10,11} to derive the likelihood that a 15-year-old living in a given area would survive to a specified age. We used standard life-table methods to calculate the average number of years of life lost between the ages of 15 and 65 in each group.¹² Using standard multidecrement life-table techniques,^{12,13} we also estimated how many of the years of life lost between the ages of 15 and 65 in that group could be attributed to a particular cause of death, when competing mortality risks were taken into account.

We classified deaths according to their underlying causes, using the diagnostic categories of the *International Classification of Diseases, 9th Revision (ICD-9)*. After examining many causes, we report on those found to be especially important in explaining the disparities in death rates: diseases of the circulatory system (ICD-9 codes 390 to 459); cancer (codes 140 to 208); accidents (codes E800 to E949); human immunodeficiency virus (HIV) infection (codes 042 to 044); homicide (codes E960 to E969); infectious disease, pneumonia, and influenza (codes 001 to 041, 045 to 139, and 480 to 487); and a separate category that included all the remaining causes.

Using standard methods, we estimated the sampling variability associated with each measure of mortality.^{10,12,13} For every possible pair of groups, we conducted two-tailed statistical tests of the hypothesis that the measures of mortality would be the same. For the poor populations, the estimated 95 percent confidence intervals never exceeded 11 percent above or below the standardized mortality ratio, 84 deaths more or less than the excess-death rate, 0.03 more or less than the probability of survival, or 0.88 year more or less than the number of years of life lost.

RESULTS

Summary Measures

Table 2 shows annualized excess-death rates and standardized mortality ratios according to sex for people 15 to 64 years old in each study group, relative to the national averages among whites, and the probability of survival to the age of 65 among persons who had survived to the age of 15. The death rates for both sexes in every group of poor blacks were excessive. The disparity was not as great in the Black Belt area of Alabama as in central Detroit, Watts, or Harlem, and it was greatest in Harlem. Mortality rates among blacks in Black Belt Alabama were similar to the national average for blacks and to the rates in northern Alabama, the comparison group, but all the other groups of poor blacks had

TABLE 1. SUMMARY DATA ON THE STUDY AREAS, 1990.*

AREA	NO. OF INHABITANTS†	MEAN FAMILY INCOME (\$)	FAMILIES BELOW THE POVERTY LEVEL‡ (%)
U.S. population			
Total	248,709,873	43,803	10.0
Whites	199,827,064	49,248	6.4
Blacks	29,930,524	29,337	25.7
Blacks			
New York City			
Harlem	101,697	24,174	33.1
Queens–Bronx	170,380	51,606	5.7
Detroit			
Central	98,833	19,841	44.3
Northwest	132,668	41,127	15.1
Los Angeles			
Watts	98,488	23,743	35.4
Crenshaw–Baldwin Hills	100,744	40,419	15.7
Alabama			
Black Belt	93,695	17,222	48.7
Northern	116,490	23,935	28.6
Whites			
New York City			
Lower East Side	158,452	34,208	21.3
Queens	144,216	54,836	5.7
Detroit metropolitan area			
Detroit	126,752	29,334	22.0
Sterling Heights	113,452	54,424	2.7
Kentucky			
Appalachia	109,794	18,925	34.6
Western	113,163	31,002	14.1
Alabama			
Northeast	167,037	30,480	13.6
Southwest	102,527	36,500	8.6

*Data are from the 1990 U.S. Census. The makeup of the study groups is described in the Methods section, and the 16 regions are described in the Appendix. In each pair of areas, the one listed first is the lower-income area, and the one listed second is the comparison area of higher socioeconomic status.

†Numbers shown refer to only black residents or only white residents, depending on the area studied.

‡The poverty levels were those defined by the Bureau of the Census.⁸

higher mortality rates than their comparison groups. The disparity between Harlem and its comparison group (Queens–Bronx) was particularly large, with standardized mortality ratios of 4.11 among men and 3.38 among women in Harlem, as compared with ratios of 1.18 and 1.08, respectively, in Queens–Bronx. Black residents in the latter area had mortality rates similar to the national average for whites.

People living in the poor white areas generally had mortality rates exceeding the national average for whites. Except for white men in Detroit, however, they had mortality rates below the national average for blacks. People in poor white areas generally had higher mortality rates than people in their comparison groups. In the case of Detroit, this difference was marked. The standardized mortality ratios for whites were 2.01 among men and 1.90 among women in Detroit, as compared with 0.41 among men and 0.54 among women in Sterling Heights.

TABLE 2. MEASURES OF MORTALITY AMONG BLACKS AND WHITES 15 TO 64 YEARS OLD IN SELECTED POPULATIONS, ACCORDING TO SEX, 1989-1991.*

GROUP	ANNUAL DEATH RATE	TOTAL NO. OF DEATHS	ANNUAL EXCESS-DEATH RATE	STANDARDIZED MORTALITY RATIO (95% CONFIDENCE INTERVAL)	PROBABILITY OF SURVIVAL FROM THE AGE OF 15 TO THE AGE OF 65
U.S. male population					
Whites	417	—	0	1.00	0.77
Blacks	791	—	374	1.90	0.62
Black men					
Poor populations					
Harlem	1713	1600	1296	4.11 (3.91-4.32)	0.37
Central Detroit	1163	1881	746	2.79 (2.67-2.92)	0.50
Watts	1216	1449	799	2.92 (2.77-3.07)	0.50
Black Belt Alabama	755	516	338	1.81 (1.66-1.97)	0.63
Comparison populations					
Queens-Bronx	491	822	74	1.18 (1.10-1.26)	0.75
Northwest Detroit	691	1101	274	1.66 (1.56-1.76)	0.66
Crenshaw-Baldwin Hills	781	871	364	1.87 (1.75-2.00)	0.63
Northern Alabama	728	697	311	1.75 (1.62-1.88)	0.64
White men					
Poor populations					
Lower East Side	625	782	208	1.50 (1.40-1.61)	0.69
Detroit	838	898	421	2.01 (1.88-2.15)	0.60
Appalachia	574	602	157	1.38 (1.27-1.49)	0.70
Northeast Alabama	544	968	127	1.30 (1.22-1.39)	0.71
Comparison populations					
Queens	363	521	-54	0.87 (0.80-0.95)	0.80
Sterling Heights	172	192	-245	0.41 (0.36-0.47)	0.89
Western Kentucky	360	418	-57	0.86 (0.78-0.95)	0.80
Southwest Alabama	462	512	46	1.11 (1.02-1.21)	0.75
U.S. female population					
Whites	225	—	0	1.00	0.87
Blacks	439	—	214	1.95	0.77
Black women					
Poor populations					
Harlem	759	803	535	3.38 (3.15-3.62)	0.65
Central Detroit	580	960	355	2.58 (2.42-2.75)	0.71
Watts	584	795	359	2.60 (2.43-2.79)	0.71
Black Belt Alabama	425	342	201	1.89 (1.70-2.10)	0.77
Comparison populations					
Queens-Bronx	242	456	18	1.08 (0.98-1.18)	0.87
Northwest Detroit	335	572	110	1.49 (1.37-1.62)	0.82
Crenshaw-Baldwin Hills	347	447	122	1.54 (1.41-1.69)	0.81
Northern Alabama	470	469	246	2.09 (1.91-2.29)	0.75
White women					
Poor populations					
Lower East Side	250	268	26	1.11 (0.99-1.26)	0.86
Detroit	428	440	203	1.90 (1.73-2.09)	0.77
Appalachia	311	321	87	1.39 (1.24-1.55)	0.82
Northeast Alabama	283	508	58	1.26 (1.15-1.37)	0.84
Comparison populations					
Queens	190	315	-35	0.84 (0.76-0.94)	0.89
Sterling Heights	121	126	-104	0.54 (0.45-0.64)	0.93
Western Kentucky	203	240	-21	0.91 (0.80-1.03)	0.88
Southwest Alabama	197	222	-27	0.88 (0.77-1.00)	0.88

*The annual death rates shown are per 100,000 members of the population, after standardization for age.

Probability of Survival

Typical white Americans who were 15 years old had a higher likelihood of surviving to the age of 65 than blacks nationwide or poor 15-year-olds in any of the poor study groups. With the exception of white residents of Detroit, the poor whites had higher probabilities of survival than the blacks ($P < 0.001$). Among the poor black groups, people in Harlem, central Detroit, and Watts had a lower probability of surviving to the age of 65 than people in Black Belt Alabama ($P < 0.001$). The lowest probability of survival to the age of 65 was in Harlem, among blacks: 0.37 in men and 0.65 in women. For men, this represents less than half the probability of survival of whites nationwide. For poor whites, the lowest probability of survival was in Detroit (men, 0.60; women, 0.77). The probability that a 15-year-old girl in Harlem would survive to the age of 45 was the same as the probability that a typical white girl anywhere in the United States would survive to the age of 65; for boys in Harlem, this probability was lower ($P < 0.001$) (data not shown).

There was marked variation among the groups studied in the average number of years of life lost between the ages of 15 and 65 (Fig. 1 and 2). Among men from Harlem, an average of 14 years were lost; among men from central Detroit, 11 years; among men from Watts, 12 years; and among men from Black Belt Alabama, 7 years. Poor whites generally lost more years of life than whites either nationally or in the four comparison groups of higher-income whites. Except in Detroit, poor whites lost fewer years than poor blacks. Queens–Bronx was the only black area that compared favorably with some advantaged white areas.

Causes of Excess Mortality

Specific causes of excess death in the poor groups are shown in Table 3. Diseases of the circulatory system were important contributors to excess mortality in every group, and in most instances they were the leading cause. HIV was the principal cause of excess death among men in Harlem and the Lower East Side, and the second most common cause among women. Accidents were the leading cause of excess mortality among men in Appalachia, and the second most common cause among men in Black Belt Alabama. Homicide was the leading cause of excess death among men in Watts, the second most common cause among men of either race in Detroit, and the third most common cause among men in Harlem. Cancer was an important cause of excess mortality among both sexes in many groups, notably residents of Harlem, Watts, and both the poor black and poor white areas of Detroit, and infections were a prominent cause among both men and women in Harlem.

Figures 1 and 2 show the average number of years of life lost between the ages of 15 and 65 in each

study group that could be attributed to HIV, homicide, and all other causes combined. By studying years of life lost, we magnified the contributions of HIV and homicide to excess mortality, because more people died at earlier ages from these causes than from other important causes, such as diseases of the circulatory system or cancer. Even so, only excess deaths in the Lower East Side are explained by these causes. Among poor black urban men, excluding these causes would substantially reduce excess mortality, but the number of excess deaths would remain considerable, especially in Harlem.

DISCUSSION

Our findings paint a stark portrait of social inequalities in mortality, but also a varied and complicated one. The differences between the advantaged and disadvantaged groups were sometimes vast. The situation in Harlem in 1990 was particularly dire. Comparison of the estimates by McCord and Freeman⁷ with ours shows that in Harlem mortality among women relative to that nationwide has not improved since 1980, whereas mortality among men has deteriorated. On the other hand, groups that might have been expected to have excess-mortality rates equivalent to or higher than the rates in Harlem did not.

Our results show that there are important differences among impoverished communities in patterns of mortality. The data suggest that reducing excess mortality may require interventions that address local conditions and mortality risks. For example, our findings underscore the need for interventions to reduce the incidence of diseases of the circulatory system in all the locations examined, but they suggest that HIV, homicide, and accident prevention need to be emphasized differently in different places.

Our findings are generally consistent with the association between race and excess mortality in the United States that is often reported. However, the poverty rate and the location of a group (urban and northern vs. rural and southern) are also important. White residents of Detroit fared as poorly as residents of some black areas that we studied. One black comparison group (that in Queens–Bronx) had a mortality rate only slightly higher than the national average for whites.

Thirty percent of the people in the Queens–Bronx area were black immigrants from the West Indies, but analyses that do not include this foreign-born population indicate that this factor does not explain the favorable mortality profile. An alternative explanation is that when a black population has the same degree of economic advantage as a white population, it also has a favorable mortality rate. In the groups we studied, the number of years of life lost generally increased with the percentage of people in the group who were living in poverty, with the pov-

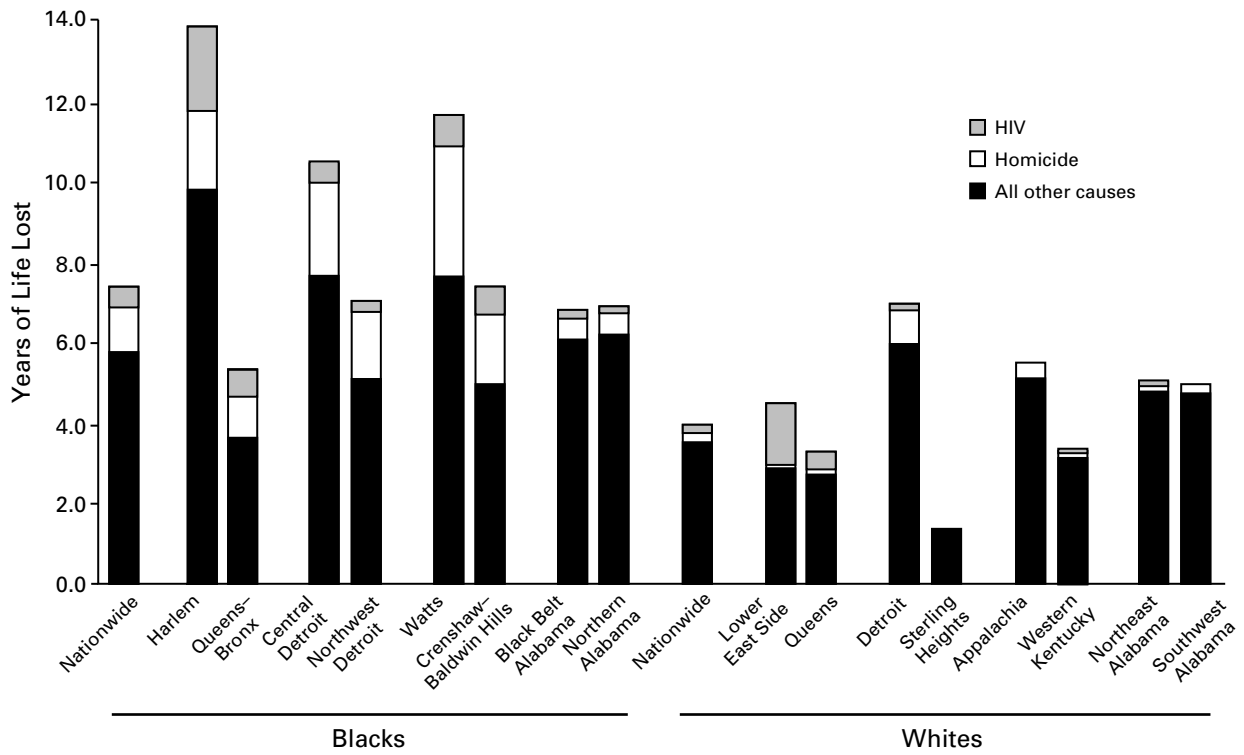


Figure 1. Average Years of Life Lost between the Ages of 15 and 65 in Men and Boys, According to Study Area and for Selected Causes of Death.

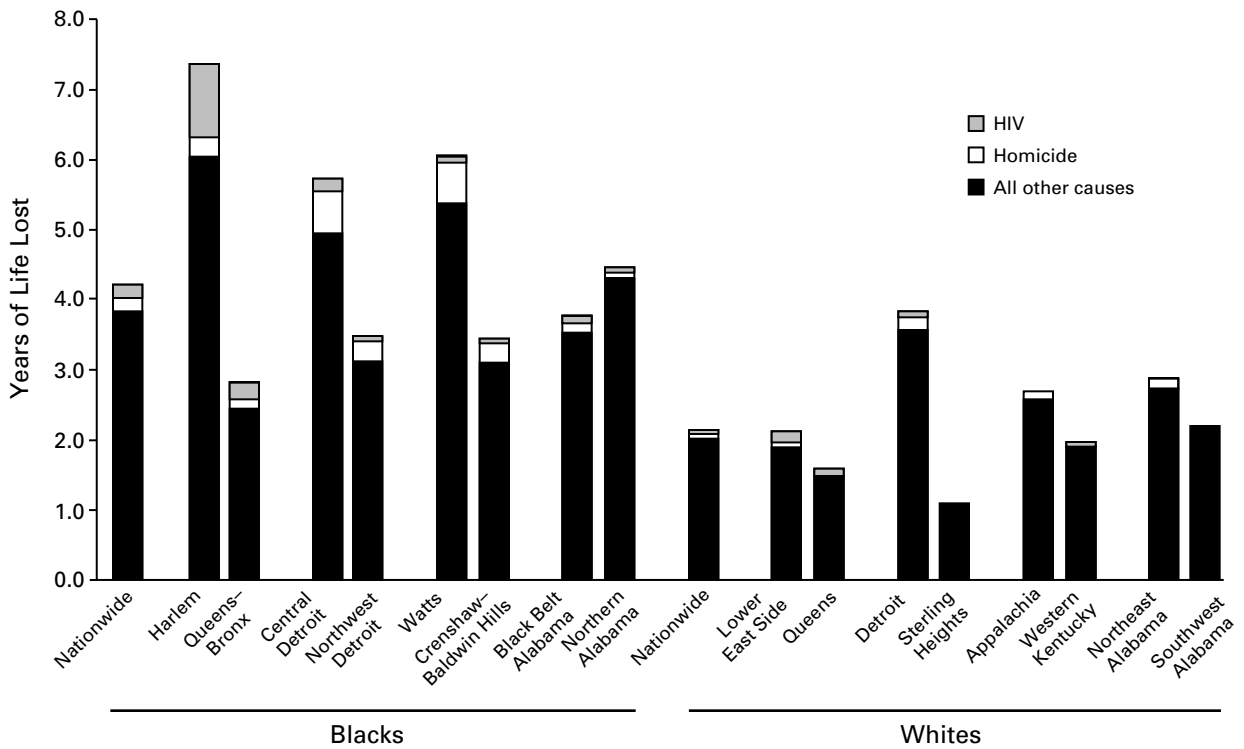


Figure 2. Average Years of Life Lost between the Ages of 15 and 65 in Women and Girls, According to Study Area and for Selected Causes of Death.

EXCESS MORTALITY AMONG BLACKS AND WHITES IN THE UNITED STATES

TABLE 3. CAUSES OF EXCESS MORTALITY AMONG POOR BLACKS AND WHITES 15 TO 64 YEARS OLD, ACCORDING TO SEX, 1989–1991.

CAUSE OF DEATH	NATIONWIDE DEATH RATE PER 100,000 IN WHITES	No. of Excess Deaths per 100,000											
		BLACKS NATIONWIDE						POOR BLACKS			POOR WHITES		
					Harlem	Detroit	Watts	Black Belt Alabama	Lower East Side	Detroit	Appalachia	Northeast Alabama	
Men													
Diseases of circulatory system	123	95	205	192	239	114	15	138	51	64			
Cancer	103	61	118	76	76	37	-13	56	25	19			
Accidents	54	11	20	-2	36	83	-24	6	58	26			
HIV	23	38	296	38	61	-8	145	-1	-20	-15			
Homicide	12	73	175	187	259	32	14	62	23	1			
Infection, pneumonia, influenza	11	23	150	37	12	10	20	18	1	-1			
All other causes	92	72	332	217	116	69	52	142	20	35			
Total*	417	375	1296	746	799	338	208	421	157	127			
Women													
Diseases of circulatory system	52	89	137	146	159	118	20	93	40	41			
Cancer	93	32	53	39	50	8	-10	30	20	-4			
Accidents	18	2	2	-2	14	12	-12	0	17	20			
HIV	2	13	99	15	6	3	16	2	-2	-2			
Homicide	3	12	20	40	37	12	2	12	4	3			
Infections, pneumonia, influenza	6	14	72	20	11	8	4	7	1	0			
All other causes	50	53	152	97	83	40	6	59	7	0			
Total*	225	215	535	355	359	201	26	203	87	58			

*Because of rounding, columns may not sum to the totals shown.

erty rate accounting for more than half the racial differences in mortality (data not shown).

Although we could not study the extent to which individual economic well-being was itself associated with the likelihood of premature death, our findings were consistent with recent analyses showing that controlling for indicators of individual socioeconomic status accounts for some, but not all, the racial disparity in mortality among people of comparable age.^{5,14} Other factors that may matter include population density, household crowding, and correlates of residential segregation, such as residence in an area that is medically or socially underserved, one with dilapidated housing stock or a high crime rate, or one with excessive exposure to environmental hazards. Relevant psychosocial factors may be associated with chronic uncertainty, racial stress, or ongoing problems with social injustice and community disruption.¹⁵⁻¹⁸

The data we obtained in Harlem and Black Belt Alabama highlight the importance of accounting for social factors that are not represented in typical measures of socioeconomic status. Black Belt Alabama had the lowest excess mortality of the poor black groups, although it had the highest rate of poverty, whereas Harlem had the highest excess mortality but the lowest poverty rate. These findings remained valid after adjustment for cost-of-living differences between the rural South and the urban North.^{19,20}

More generally, our findings underscore the importance of conducting repeated analyses at the population level in several areas as complements to analyses of individuals or single areas. Population analysis can take into account a more complete and longer-term set of social factors that affect mortality,²¹ and the study of multiple populations yields more evidence about the generalizability of data and permits extreme or anomalous populations to be identified. The consideration of current or historical features peculiar to such populations can improve an understanding of the social epidemiology of excess mortality.

That young people in some areas of the United States cannot expect to survive through middle adulthood is a disturbing manifestation of social inequality. Living with high levels of risk and uncertainty may affect social behavior and health habits and exacerbate the risk of disease.⁴ In addition, young people and middle-aged adults provide financial support and care for their families. As public policy shifts away from supporting poor families, we should consider the implications of excess mortality for the ability of adults in persistently poor populations to shoulder more economic responsibilities than they already have.

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APPENDIX

The 16 population groups (defined according to race and socioeconomic status) for which data are presented in this article included residents of the following neighborhoods, counties, and health center districts.

Poor blacks — *Harlem*: the Central Harlem Health Center District. *Central Detroit*: the Central, University, Central Business District, Foch, Jefferson–Mack, Airport, St. Jean, Chene, and Jeffries neighborhoods. *Watts*: the Watts area of South Central Los Angeles and adjacent areas to the south and west. *Black Belt Alabama*: Dallas, Fayette, Greene, Bibb, Sumter, Hale, Lamar, Marengo, Marion, Perry, and Pickens counties.

Poor whites — *Lower East Side (and Brooklyn)*: areas in the southern part of the Lower East Side Health Center District (Manhattan) and the Williamsburg–Greenpoint Health Center District, directly across the East River in Brooklyn. *Detroit*: areas on the northeastern and southern edges of Detroit, including Delray, Clark Park, Chadsey, Condon, Springwells, Jeffries, State Fair, Burbank, Denby, Finney, Mt. Olivet, Grant, Davison, Pershing, and Nolan. *Appalachia*: Clay, Jackson, Knox, Lee, Leslie, Owsley, Rockcastle, and Wolfe counties (Kentucky). *Northeast Alabama*: De Kalb, Jackson, and Marshall counties.

More-affluent blacks — *Queens–Bronx*: sections of the Jamaica East and Flushing Health Center Districts (eastern Queens) and the Pelham Bay Health Center District (north Bronx), including Woodlawn, Wakefield, Williamsbridge, Baychester, Edenwald, Eastchester, Glen Oaks, New Hyde Park, Floral Park, Bellerose, Bellaire, and Queens Village. *Northwest Detroit*: Palmer Park, Pembroke, Bagley, Redford, Rosedale Park, Evergreen, and Greenfield. *Crenshaw–Baldwin Hills*: areas of suburban Los Angeles, including Crenshaw, Ladera Heights, Leimert Park, Baldwin Hills, and Windsor Hills. *Northern Alabama*: Blount, Winston, Calhoun, Walker, Cherokee, Clay, Talladega, Cleburne, Colbert, Cullman, St. Clair, De Kalb, Etowah, Franklin, Jackson, Shelby, Lauderdale, Lawrence, Marshall, and Morgan counties.

More-affluent whites — *Queens*: sections of the Maspeth–Forest Hills Health Center District, including Rego Park, Forest Hills, Middle Village, and Maspeth. *Sterling Heights, Mich.*: a northern suburb of Detroit. *Western Kentucky*: Ballard, Calloway, Fulton, Graves, Hickman, Marshall, and Carlisle counties. *Southwest Alabama*: Monroe, Clarke, Choctaw, Conecuh, Dallas, Washington, Perry, Sumter, Marengo, and Wilcox counties.

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