



# *Differential Mortality in New York City (1988–1992)*

## *Part Two: Excess Mortality in the South Bronx*

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**Abstract.** *To display the extent of variations in mortality according to geographic regions in New York City, we have compared mortality in New York City as a whole with that of the South Bronx. Mortality records for 1988 to 1992 and 1990 US census data for New York City were linked. The 471,000 residents of the South Bronx were younger, less educated, and more likely to lack health insurance than other New Yorkers. Using age- and gender-stratified populations and mortality in New York City as standards, age-adjusted death rates and excess mortality in the South Bronx were determined. All-cause mortality in the South Bronx was 26% higher than the city as a whole. Mortality for AIDS, injury and poisoning, drug and alcohol abuse, and cardiovascular diseases were 50% to 100% higher in the South Bronx than in New York City; years of potential life lost before age 65 in the South Bronx were 41.6% and 44.2% higher for men and women, respectively, than in New York City; AIDS accounted for the largest single share of excess premature deaths (21.8%). In summary, inequalities in health status, reflected by higher mortality rates in the South Bronx, are consistent with, and perhaps caused by, lower socioeconomic status and deficient medical care among residents of this inner-city community.*

While death rates in the United States have fallen in recent decades, that improvement has not been distributed equally. For example, during the 1980s the gap in the death rates separating blacks and whites widened.<sup>1,2</sup> Determinants of variation in mortality rates may include socioeconomic status, health behavior, and medical care.<sup>3,4</sup> Geography is a marker for, and, perhaps, a factor

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determining these as well as other environmental and individual risk factors.<sup>5,6</sup>

The South Bronx is widely viewed as archetypical of inner-city America. Its residents are almost entirely Hispanic or non-Hispanic blacks. A comparison of mortality rates in the South Bronx with the whole city of New York provides an opportunity to display the sharp disparities in health status associated with environmental disadvantage, and also, to explore the contribution of particular causes of death to the geographic variations in mortality. In this study we investigated whether residents of the South Bronx do experience an increased overall risk of death and early death, and analyze the effect that trauma, substance abuse, acquired immunodeficiency syndrome (AIDS), and cardiovascular disease have on the excess mortality among the 470,000 residents of the South Bronx.

## *Materials and Methods*

### **Data Source**

This analysis was based on the mortality data for 1988 to 1992 in New York City, and on 1990 census data, obtained from the Bronx Data Center of Lehman College.<sup>7</sup> The data were summary statistics provided for each ZIP code by age and gender. Race was self-classified as "white", "black", "Asian", etc. Ethnicity was further defined as Hispanic or non-Hispanic. In this data summary, ZIP code was the base unit for each category, presented by number of people. Whites included "Hispanic whites" and "non-Hispanic whites" and blacks included "Hispanic blacks" and "non-Hispanic blacks".

The mortality records from the Health Department of New York City<sup>8</sup> provide individual information on all deaths (total 371,071) registered from 1988 to 1992. Each death was recorded by age, gender, race, ZIP code and underlying cause of death, the latter coded according to the ninth revision of the International Classification of Diseases (ICD-9). The major causes of death included in this analysis were total circulatory diseases (ICD-9 390–459), coronary heart disease (ICD-9 410–414); hypertensive

related disease, including stroke (ICD-9 430–438) and hypertensive disease (ICD-9 401–404); neoplasms (ICD-9 140–239); AIDS (ICD-9 42–44); injury and poisoning (ICD-9 800–999) and alcohol and drug abuse (ICD-9 291, 292, 303, 304, 305, 571.0–571.3).

### **Study Area**

In the Bronx, three regions (East, North, and South) are recognized by the Health Systems Agency of New York City.<sup>9</sup> They were created by aggregating ZIP codes of contiguous neighborhoods that share similar sociodemographic and health status characteristics. New York City is divided into 58 neighborhoods. By aggregating neighborhoods that share similar sociodemographic health status characteristics, transportation links, and historical use patterns, regions were developed. In this study, we are concerned with the mortality experience of the South Bronx population and compare it with New York City as whole. The South Bronx is composed of three regions: Morris Heights/Tremont, Highbridge/Morrisania, and Mott Haven/Hunts Point. Figure 1 portrays the location of the South Bronx in relation to New York City's five boroughs.

### **Data Analysis**

Socioeconomic characteristics of populations in the South Bronx and New York City were displayed. Mortality analysis included the leading causes of death in both populations. Data were further stratified by 10-year age groups. Analysis of the distribution of selected causes of death by age and gender permitted computation of age-gender specific death rates for selected diseases and for all causes of death. Years of potential life lost (YPLL) per 1,000 persons annually before age 65 further displayed differences in premature mortality between those living in the South Bronx and all New Yorkers. This was calculated from the age- and gender-specific death rates. The age at death was based on the midpoint of the 10-year age groups under age 65.

Using the New York City total population of 1990 as the standard, age-gender adjusted mortality rates for selected causes of death in the South Bronx were estimated. Furthermore, age- and

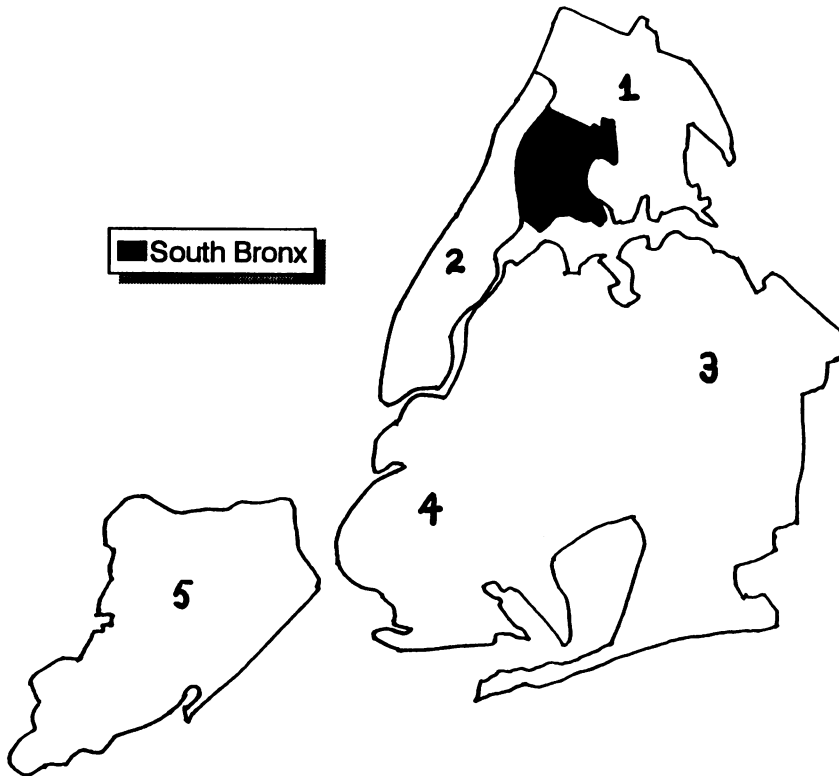


FIG. 1. Location of the South Bronx in New York City (1 = Bronx, 2 = Manhattan, 3 = Queens, 4 = Brooklyn, 5 =Staten Island).

gender-specific death rates for selected causes of death in New York City were used as references to calculate standard mortality ratios (SMRs), in which the observed deaths in 5 years for each age group, gender, and cause of death were divided by the expected number of deaths, based on the population of each gender and age group and the reference death rates. The excess deaths for selected causes of diseases and for different age groups and gender in the South Bronx were calculated by the difference between observed deaths and the expected deaths based on New York City mortality rates.

As race and ethnicity in the South Bronx differed from that of New York City, the mortality rates of the South Bronx were compared to that of New York City according to race/ethnicity. Unfortunately, it was impossible from the summary census data to

define the age- and gender-specific groups for non-Hispanic whites or blacks, although this was available in the mortality data. This disparity of race/ethnicity between denominator and numerator prevented comparison of blacks' and whites' mortality rates in the South Bronx and elsewhere New York City. It was possible, however, to compare Hispanics by geographic regions; this was done for the South Bronx and New York City.

## Results

### Population Characteristics

The total population of the South Bronx in 1990 was 470,703. Residents of the South Bronx were younger, poorer, had less education, were more likely to be unemployed, and included more ethnic minorities than did New York City as a whole (Table I).

TABLE I  
SOCIOECONOMIC CHARACTERISTICS OF SOUTH BRONX  
AND NEW YORK CITY, 1990

Characteristics	South Bronx	New York City
Total Population	470,703	7,529,634
		%
Age <35 Years	65.4	51.8
35-64 Years	28.3	35.1
≥65	6.3	13.1
Sex Males	46.6	46.9
Race Non-Hispanic Blacks	38.4	25.0
Hispanic	57.3	23.2
Non-Hispanic Whites	2.7	44.5
Medicaid Eligible	54.5	21.4
Poverty Line* ≤50%	25.9	10.0
51%-99%	20.0	9.3
100%-199%	22.3	16.7
≥200%	31.8	64.0
Education < 9th Grade	24.3	14.1
9-H.S. Graduate	54.2	43.9
≥ Some College	21.5	42.0
Unemployed	18.0	9.0
Infant Mortality Rates (1/1,000 live births)	12.8	11.2

\* 100% means at poverty line.

## Mortality Rates

The leading causes of death (Table II) in New York City and the South Bronx were circulatory disease and neoplasms. Both were, however, more prominent for the city as a whole than for the South Bronx. By contrast, deaths caused by AIDS, injury, and poisoning in the South Bronx (24.2%), were twice as frequent as in New York City (12.8%).

Age-stratified mortality rates per year for total and selected causes of diseases by gender are shown on Table III. An excess of mortality in the South Bronx is seen for stroke, hypertensive disease, AIDS, injury, and poisoning, as well as for alcohol and drug abuse in both males and females in all age groups. For example, women in the South Bronx were roughly a decade ahead of women of New York City in stroke and hypertensive mortality. The disparity for total mortality was particularly evident, and to the disadvantage of the South Bronx, among younger persons. This difference narrowed with advancing age and ultimately reversed after age 75. Among women, neoplasms accounted for

TABLE II  
LEADING CAUSES OF DEATH IN THE SOUTH BRONX  
AND NEW YORK CITY, 1988-1992

Cause (ICD code)	South Bronx			NY City		
	%	Rank	Rate*	%	Rank	Rate
Circulatory Dis. (390-459)	30.9	1	1,245.6	43.8	1	2,158.0
Neoplasms (140-239)	14.8	2	597.6	21.0	2	1,037.1
Injury & Poisoning (800-999)	12.1	3	498.3	6.4	5	313.9
AIDS (042-044)	12.1	4	486.5	6.4	4	314.6
Respiratory Dis (460-519)	7.2	5	290.2	7.5	3	367.8
Digestive Dis. (520-579)	4.9	6	197.6	3.4	6	169.6
Mental Disorders (290-319)	3.3	7	133.0	1.7	9	83.8
Conditions originating in the perinatal period (760-779)	2.8	8	112.3	1.3	11	63.9
Endocrine, Nutritional, Metabolic Dis & Immunity Disorders (240-279)	2.5	9	98.8	1.8	8	87.7
Genitourinary Dis. (580-629)	2.3	10	92.6	1.9	7	92.2
Infectious & Parasitic Dis (Except AIDS) (001-139)	2.0	1.1	81.8	1.4	10	67.7
Others	5.1			5.1		
	100.0			100.0		

\* Crude death rates (per 100,000).

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**TABLE III**  
 CHIEF CAUSES OF ANNUAL MORTALITY RATE (PER 100,000) BY AGE AND  
 GENDER IN THE SOUTH BRONX AND NEW YORK CITY, 1988-1992

	Males		Females		
	S.Bx	NYC	S.Bx	NYC	
		<35 Years			
CHD	1.83	1.55	1.03	0.86	
Stroke & HT	3.41	2.38	3.10	1.82	
Neoplasms	8.12	7.67	8.00	9.62	
AIDS	72.23	58.59	35.60	20.93	
Injury & Poisoning	167.02	102.57	32.25	20.27	
Alcohol, Drug Abuse	18.21	14.38	9.16	5.13	
Total	376.49	276.08	170.92	120.55	
		35-44 Years			
CHD	48.41	30.90	18.09	9.63	
Stroke & HT	37.06	19.99	26.26	12.90	
Neoplasms	59.00	55.14	55.43	62.82	
AIDS	574.11	329.87	152.30	61.48	
Injury & Poisoning	235.24	115.76	39.10	24.70	
Alcohol, Drug Abuse	200.45	96.06	64.19	23.90	
Total	1,505.24	832.87	495.40	274.44	
		45-54 Years			
CHD	188.26	147.43	82.37	52.74	
Stroke & HT	93.58	53.28	65.58	32.36	
Neoplasms	224.60	196.93	161.55	175.80	
AIDS	300.56	194.43	52.78	22.04	
Injury & Poisoning	151.93	90.82	25.59	20.21	
Alcohol, Drug Abuse	195.97	90.98	25.59	17.24	
Total	1,626.11	1,090.83	608.61	463.15	
		55-64 Years			
CHD	581.02	479.55	338.71	227.73	
Stroke & HT	174.47	101.55	128.76	66.20	
Neoplasms	567.85	548.95	374.67	402.35	
AIDS	95.47	78.91	22.04	8.68	
Injury & Poisoning	108.63	75.58	25.52	22.14	
Alcohol, Drug Abuse	166.24	76.11	32.48	16.56	
Total	2,436.00	2,052.81	1,336.27	1,109.46	
		65-74 Years			
CHD	1,348.94	1,152.05	747.33	635.87	
Stroke & HT	334.80	174.27	199.18	130.50	
Neoplasms	1,277.43	996.66	574.49	630.77	
AIDS	39.01	22.46	6.58	3.02	
Injury & Poisoning	146.27	82.71	34.57	34.39	
Alcohol, Drug Abuse	149.52	57.79	23.05	13.06	
Total	4,739.15	3,922.95	2,334.16	2,276.83	
		≥75 Years			
CHD	2,943.11	3,963.82	2,673.73	3,320.21	
Stroke & HT	459.52	410.57	537.33	435.97	
Neoplasms	1,799.78	1,957.32	958.41	1,067.55	
AIDS	10.94	4.81	2.58	1.08	
Injury & Poisoning	175.05	159.98	113.67	100.96	
Alcohol, Drug Abuse	27.35	26.69	12.92	5.48	
Total	8,326.04	10,761.26	6,884.53	8,112.20	

CHD, coronary heart disease; HT, hypertensive disease; NYC, New York City; S.Bx, South Bronx.

fewer deaths in the South Bronx than in New York City, in each age group.

Age- and gender-adjusted, all-cause mortality rates in the 5 years were 6,190.5 and 4,928.2 per 100,000 persons in the South Bronx and New York City, respectively. This was explained primarily by higher death rates for hypertensive disease and stroke, AIDS, injury and poisoning, alcohol and drug abuse in the South Bronx (Fig. 2). In sharp contrast, coronary heart disease and neoplasm death rates in the South Bronx did not differ from those of New York City as a whole (1,463.6 vs 1,489.2 for coronary heart disease and 1,048.0 vs 1,037.1 for neoplasms in the South Bronx and New York City, respectively).

### Years of Potential Life Lost

One way to display the burden of excess and premature mortality is by YPLL before age 65 (Table IV). Overall, YPLL values were more than twice as high for males as for females, for all causes

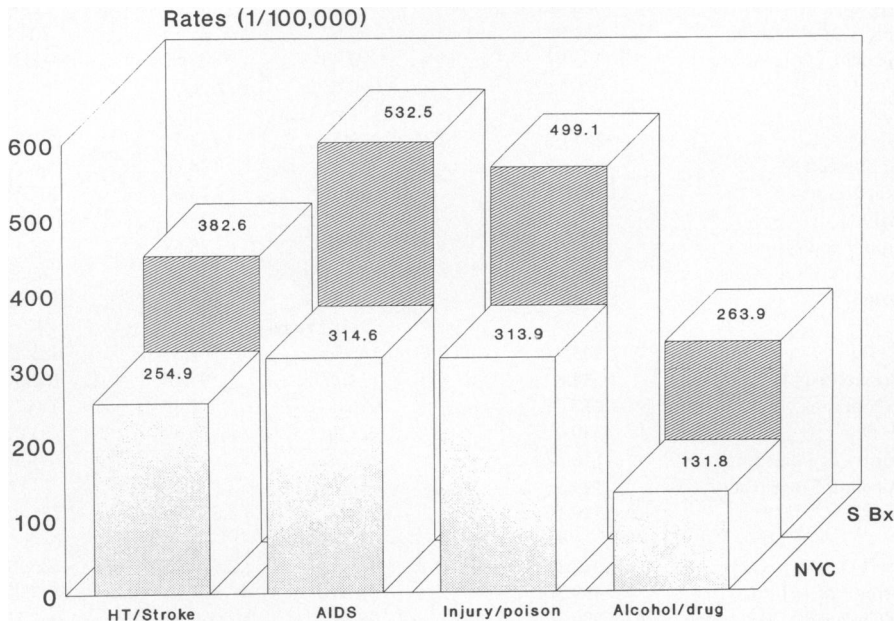


FIG. 2. Age and Gender Adjusted Death Rates\* in the South Bronx and New York City, 1988–1992. HT, hypertension; Alcohol/drug, alcohol and drug abuse; S Bx, South Bronx; NYC, New York City.



**TABLE IV**  
YEARS OF POTENTIAL LIFE LOST PER YEAR PER 1,000 PERSONS BELOW AGE 65  
IN THE SOUTH BRONX AND NEW YORK CITY

	Males		Females	
	S Bx	NYC	S Bx	NYC
Total CVD	16.0	14.9	10.5	7.9
CHD	6.3	6.7	3.6	3.0
HT & Stroke	4.1	3.0	3.5	2.1
Neoplasms	9.2	10.8	8.6	11.1
AIDS	47.7	35.1	17.9	9.0
Injury & Poisoning	67.6	36.8	12.2	7.2
Alcohol, Drug Abuse	15.7	10.3	5.8	2.9
All Causes	206.1	145.5	87.5	60.7

CVD, cardiovascular disease; CHD, coronary heart disease; HT, hypertensive disease; S Bx, South Bronx; NYC, New York City.

as well as for total cardiovascular disease, AIDS, injury/poisoning, and alcohol/drug abuse. In men, premature deaths caused by AIDS, violence, and substance abuse, account for more than half of all YPLL. By contrast, for women, YPLL for these conditions was roughly a third of the total. For both males and females, the extent and distribution of YPLL differed between the South Bronx and New York City. Males and females in the South Bronx lost, respectively, 41.6% and 44.2% more years of life under age 65 than the average of all New York City residents. In addition, for both males and females, those in the South Bronx had a higher rate of YPLL for AIDS, injury and substance abuse, and total cardiovascular disease than did New York City as a whole. Of note is that premature death caused by coronary heart disease was similar among males in the South Bronx and New York City. For stroke and hypertensive disease, however, residents of the South Bronx were at a substantial disadvantage.

### Excess Mortality in the South Bronx

Using mortality rates of New York City as a reference, the SMR in the South Bronx for all causes was 1.33 and 1.53 for the total population and those under 65 years, respectively. When mortality rates of 1990 US whites were used as a reference,<sup>10</sup> SMR for those under 65 years in the South Bronx was 2.59.

TABLE V  
STANDARDIZED MORTALITY RATIOS\* BY AGE GROUP  
IN SOUTH BRONX, 1988–1992

Age	Observed Deaths Number	Standardized Mortality Ratio	Annual Excess Deaths Per 100,000	% of Excess Deaths
Males				
<35	2,874	1.41	110	27.1
35–44	1,990	1.88	706	30.2
45–54	1,477	1.63	631	18.5
55–64	1,480	1.39	683	13.4
65–74	1,458	1.42	1,401	13.9
≥75	1,522	0.94	–536	—
Females				
<35	1,329	1.46	54	25.6
35–44	849	1.90	234	24.4
45–54	761	1.43	184	14.0
55–64	1,152	1.39	378	19.9
65–74	1,418	1.19	365	13.5
≥75	2,665	1.02	108	2.6

\* Mortality rates of New York City as reference.

SMRs by age group with New York City's mortality rates as reference are displayed in Table V. For both males and females, more than 84% of excess deaths occurred in those under age 65, and more than half the excess deaths were in those under age 45, (57% for males and 50% for females). Thus, while the largest absolute number of excess deaths for males fell between the ages of 65 and 74, the difference in ratio was greatest for ages 35 to 44.

Among males, the majority of observed excess deaths under age 65 in the South Bronx (59%) were related to AIDS, injury and poisoning, and substance abuse (Table VI). Cardiovascular disease accounted for 12.9% of excess death. In contrast, cardiovascular deaths accounted for the largest proportion of total excess mortality (26.3%) among females in the South Bronx, followed by AIDS (23.9%). Combining males and females, AIDS was the most important single cause of premature death in the South Bronx (21.8%), followed by injury and poisoning (20.7%), and cardiovascular disease (17.4%). Together, these three categories accounted for 60% of excess premature deaths.

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**TABLE VI**  
STANDARDIZED MORTALITY RATIOS\* BY CAUSES OF DEATH  
IN SOUTH BRONX UNDER AGE 65 YEARS, 1988-1992

Cause	Number Observed Deaths	Standardized Mortality Ratio	Annual Excess Deaths Per 100,000	% of Excess Deaths
<b>Males</b>				
CVD	1,218	1.41	34	12.9
CHD	602	1.32	14	5.3
HT	266	1.73	11	4.1
Neoplasms	689	1.06	4	1.5
AIDS	1,649	1.53	55	20.8
Inj/Pois	1,790	1.68	69	26.3
Alcoh/Dg	683	1.87	30	11.5
All Causes	7,821	1.54	263	100.0
<b>Females</b>				
CVD	926	1.64	31	26.3
CHD	434	1.59	14	11.7
ST/HT	262	1.97	11	9.4
Neoplasms	682	0.95	-3	—
AIDS	622	2.12	28	23.9
Inj/Pois	371	1.53	11	9.3
Alcoh/Dg	241	2.06	11	9.0
All Cause	4,088	1.51	118	100.0
<b>Males + Females</b>				
CVD	2,144	1.50	33	17.4
CHD	1,036	1.42	14	7.5
ST/HT	528	1.84	11	5.8
Neoplasms	1,371	1.00	—	—
AIDS	2,271	1.66	41	21.8
Inj/Pois	2,161	1.65	39	20.7
Alcoh/Dg	924	1.91	20	10.7
All Causes	11,909	1.53	187	100.0

\* The mortality rates of New York City as reference. CVD, cardiovascular disease; CHD, coronary heart disease; HT, hypertensive disease; Inj/pois, injury and poisoning; Alcoh/Dg, alcohol and drug abuse.

**Hispanic Mortality in the South Bronx and New York City**

Because available data made such a comparison possible, Table VII compares the age- and sex-adjusted mortality rates for Hispanics in the South Bronx with the corresponding rates for New York City. Overall, death rates for Hispanics in the South Bronx were 22.6% higher than for Hispanics in New York City as a whole. Hispanics in the South Bronx had higher death rates for cardiovascular disease, neoplasms, and AIDS than did those living elsewhere in New York City. Death rates for hypertensive disease and stroke, AIDS, injury and poisoning, and alcohol and drug

**TABLE VII**  
 AGE AND SEX ADJUSTED DEATH RATES\* FOR SELECTED CAUSE OF DISEASES  
 AMONG HISPANICS, IN THE SOUTH BRONX AND NEW YORK CITY, 1988-1992

	South Bronx	New York City
Total CVD	1,673.85	1,425.14
CHD	1,045.38	918.12
ST/HT	273.41	213.30
Neoplasms	657.19	619.62
AIDS	454.66	362.90
Injury/Poisoning	482.28	346.95
Alcohol/Drug Abuse	233.30	163.12
All Causes	4,605.16	3,756.73

\* Population of New York City as standard; CVD, cardiovascular disease; CHD, coronary heart disease; ST/HT, stroke and hypertensive disease.

abuse were particularly high. Unfortunately, the available data do not permit similar comparison for whites or blacks.

### *Discussion*

The principal finding here is that residents of the South Bronx are, compared to all New Yorkers, at vastly greater risk of an earlier death. Almost all causes of death pose a greater risk for those living in the South Bronx than elsewhere. Perhaps of even greater concern is that virtually all excess mortality occurred among those under age 75, and most under age 45. AIDS, overall, was the major cause of excess death in the younger population. There were, however, gender differences, in that violence, AIDS, and substance abuse in males, and cardiovascular disease in females, were the most important contributors to these adverse experiences.

The higher mortality rates caused by AIDS, injury and poisoning, alcohol and drug abuse, and cardiovascular disease may be explained by such factors as race/ethnicity, socioeconomic status, and age distribution, as well as medical and health care. Compared with New York City as a whole, those in the South Bronx had a lower socioeconomic status, reflected by a higher proportion of minority groups; a higher rate of poverty; a lower level of education; and a higher incidence of violence, unemployment, and drug abuse. Lower socioeconomic status has been associated with a higher mortality rate for almost all diseases.<sup>11-13</sup> Clearly, the effect

of socioeconomic disadvantage must be mediated by factors more proximate to disease, such as increased tobacco and alcohol consumption,<sup>14,15</sup> or for example, in the case of unemployed persons, increased incidence of hypertension.<sup>16</sup>

The most distinctive factor about the South Bronx population compared with New York City was its higher proportion of minorities. Uncertainty surrounds the extent to which minority status is a surrogate for low socioeconomic status or is, in itself, a determinant of excess mortality. Our data have limited power to address this issue. However, we could compare the experience of Hispanics in the South Bronx to Hispanics in New York City as whole. US Hispanics generally have lower total mortality rates than do non-Hispanic whites and non-Hispanic blacks for neoplasms and cardiovascular disease.<sup>17,18</sup> Thus, if ethnicity were the primary or exclusive factor, the South Bronx would be expected to have equal or lower death rates for these conditions compared with New York City, since nearly half of the South Bronx population is Hispanic. In fact, the opposite was the case. But, in addition, mortality rates for these selected diseases among Hispanics in the South Bronx were higher than for Hispanics living elsewhere in New York City. These geographic differences in mortality must, therefore, reflect more than simple genetic or ethnic effects.

Inadequate access to medical care may also contribute to the higher observed mortality rates. Medicaid insures the largest fraction of South Bronx residents. There is evidence that participants in this insurance system may not enjoy adequate access to medical care.<sup>19</sup> The number of primary care physicians per 1,000 residents in the South Bronx and New York City were 1.0 and 1.6, respectively.<sup>20</sup> This 60% difference in primary care availability may be expressed in the rate of hospitalization for conditions that are believed to be preventable by adequate ambulatory care. The hospital admission rate for ambulatory-care-sensitive conditions was, in the South Bronx, 23.8 per 1,000 population, double the New York City average (11.8).<sup>20</sup> Hospital admission rates for pediatric ambulatory-care-sensitive conditions (a comparable indicator of access to outpatient primary care services for persons 0 to

4 years of age) in the South Bronx was 71.8, compared to the New York City average rate of 53.5. The substance-abuse hospital admission rate in the South Bronx, 19.8 per 1,000 population, was again more than twice that for New York City (7.5).<sup>20</sup> Infant mortality rate in the South Bronx (12.8 per 1,000 live births) also exceeded that of the city as a whole (11.2).<sup>20</sup>

These findings are, in general, neither unexpected nor unprecedented. Two decades ago, in Roxbury and adjacent areas of Boston (1972 to 1973), it was found that the areas with the lowest socioeconomic status had the highest excess death rate.<sup>6</sup>

A decade ago, it was reported that residents of another deprived New York City community, Harlem, experienced a strikingly high mortality rate.<sup>5</sup> While Harlem and the South Bronx differ in important respects, they share many characteristics of disadvantage. Our data indicate that they also share the disadvantage of excess and premature mortality. The current data are, in general, consistent with the findings in Harlem at the time of the previous census. Using mortality rates of US whites as a reference, the SMRs in McCord's study and this study were 2.75 vs 2.59, respectively. Like Harlem, the South Bronx is an inner-city community lagging behind as the country as a whole realizes improved life expectancy. Of note here is that now, in the South Bronx, deaths related to violence, alcohol, and drug abuse are less important both as causes of death and in accounting for excess mortality than was the case in Harlem. A decade ago, in Harlem, these conditions accounted for nearly half (44.5%) of excess deaths. By contrast, now, in the South Bronx, violence, alcohol, and drug abuse explain 31.4% of excess mortality. Thus, while the relative mortality disadvantage of the South Bronx remains roughly equivalent to the Harlem situation in 1980, the distribution of causes of death have changed significantly. In particular, the dramatic effect of AIDS, which accounts for 21.8% of premature mortality, has replaced a good part of what was violence- and substance-related death in Harlem. Neoplasms, which had been one of the important cause of excess deaths in McCord's study of central Harlem, have become considerably less important now in the South Bronx. At the same

time, cardiovascular death, which was the leading cause of excess death in Harlem, remains in the South Bronx a major cause of premature mortality.

Clearly, medical care alone cannot be expected to alter dramatically these grim statistics. The consequences of violence, substance abuse, and sexually transmitted infection can be treated, but real improvement will depend on effective prevention. Increasing income, more and better employment, and improved educational levels should translate into improved nutrition and reduced use of drugs, alcohol, and attendant crime and violence.<sup>21</sup>

Nevertheless, appropriate medical care services might still make important differences. For example, cardiovascular disease was the largest single cause of excess death for females and a major factor for males in the South Bronx. Stroke and hypertensive disease, in contrast to the age- and gender-adjusted equality of mortality rates for coronary heart disease, accounted for most excess cardiovascular mortality. Thus, more tertiary intervention, such as increased capacity for coronary revascularization, is not likely to improve health outcomes by much. On the other hand, improved detection and treatment of hypertension might be very productive.

The limitations of this analysis relate to its dependence on 1990 US census data and death certification. There might have been some underestimation in the census data because of undercounting aliens, minorities, and illegal immigrants. In general, undercounting during the census was thought to be very low, because several coverage improvement programs were implemented to avoid bias.<sup>22</sup> Undercounting in regard to mortality records is less likely to have occurred. The net result, for undercounted minorities, might be to artificially inflate the death rates. In addition, considerable inaccuracy is known to attend death-certificate recording.<sup>23,24</sup> However, we have no evidence that this is associated with systematic bias. The availability of 371,071 death certificates, as well as concentration on large categories of mortality, tends to increase our confidence in the broad conclusions presented here.

## Summary

Sharply higher mortality rates were found in the South Bronx. A deprived environment and impoverished social support services conspire with inadequate medical care to produce a chilling pattern of avoidable and unnecessary premature mortality. Better health status for those who live in the South Bronx will depend on an improvement in socioeconomic status, as well as the establishment of an effective preventive and therapeutic medical and health care system.

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