

The Cancer Burden of Southern-Born African Americans: Analysis of a Social-Geographic Legacy

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AMERICANS ARE A HIGHLY MOBILE PEOPLE. IN 1990, only 62 percent resided in their state of birth, a drop from a high of 70 percent in 1940 (U.S. Bureau of the Census 1993a). Epidemiological studies of migrants almost always show that their mortality patterns more closely resemble those of their birthplace than those of their place of residence at death (Haenszel 1970; Staszweski 1976; Modan 1980; Fishbough, Podar, and Laporte 1992; Geddes et al. 1993). But the vast majority of the more than 60 migrant studies that support this observation compared international migrants from countries like Great Britain, Italy, Japan, Poland, and the former Soviet Union to destinations like Australia, Israel, and the United States. Does risk of death accompany migrants who move within the same country, for example, from New York to Florida, California to Oregon, and Alabama to New Jersey?

Interstate migration has been a particularly powerful force in African-American history. In 1910, 90 percent of the African-American population of the United States resided in the South, and almost 75 percent lived in rural environments. The boll weevil, floods, and the introduction of mechanical cotton pickers broke up the Southern sharecropper

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economy and the Southern-black rural geographic concentration in a way that Lincoln's abolition of slavery and the Civil War did not. Two world wars sent European Americans into the military and expanded the need for production workers in Northern cities. African Americans moved north to fill this void (Taeuber and Taeuber 1965; Lemann 1991).

The migration of more than six million African Americans from the South to the North and the West during the period 1910 to 1960 led to profound changes in civil rights, education, housing, politics, social welfare, and virtually every other facet of American life. We will explore a less visible, but nevertheless important, aspect of this massive internal migration: the burden of excess mortality associated with African Americans. Using cancer as a set of sentinel diseases, we compare the death rates of blacks born in the South and elsewhere in the United States, review explanations for the patterns we uncovered, and discuss the implications of the findings for research and disease-prevention policies.

A Migrant Study of Cancer Mortality among African Americans

In 1985, Secretary of the U.S. Department of Health and Human Services Margaret Heckler's Task Force on Black and Minority Health (1985) drew attention to the health problems of African Americans in a multi-volume comparison of black, Asian and Pacific Islander, Native American, Hispanic, and non-Hispanic white American population rates of death and morbidity. After adjusting for age, blacks had higher death rates for almost every major cause of death than other minorities and non-Hispanic whites. An average annual total of 139,000 deaths occurred among African Americans who were less than 70 years old during the period 1979 to 1981. The task force calculated that the total would have been less than 80,000 had blacks experienced the same death rate as non-Hispanic whites. The 58,700 annual excess deaths among black Americans represented 98 percent of the excess deaths among all minorities.

Almost one-half of the excess mortality reported by Secretary Heckler's task force (U.S. Department of Health and Human Services 1985) was for cancer, heart disease, and stroke. The majority of deaths from these causes occurs among the elderly population. Nearly all elderly black residents of the South were born there as well. Furthermore, 65 percent of the elderly African-American residents of the Northeast in

1980 were born in the South; 78 percent of their Midwestern counterparts were Southern born; and 83 percent of elderly black residents of the American West were born in the South (U.S. Bureau of the Census 1993b). Do Southern-born black Americans disproportionately contribute to the excess of African-American mortality in every region of the United States? Imbedded in this general question are two distinct research questions that are answered for cancer in this article.

- Do African Americans who were born in the South have higher, similar, or lower cancer mortality rates than their counterparts born in the Northeast, Midwest, and West? We refer to this as the "Southern-born" question (see the appendix for a list of the states in each region).
- Do Southern-born blacks who migrated to, and resided in, the Northeast, Midwest, and West have higher, similar, or lower cancer mortality rates than their counterparts who were born, and continued to reside, in the South? We label this the "Southern migrant" question.

African Americans have a serious cancer problem. Cancer incidence data (number of new cases per year per 100,000 persons) are collected by the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program. SEER obtains data from population-based registries that cover about 10 percent of the U.S. population. These data show the age-adjusted cancer incidence rate of black male Americans to be more than 25 percent higher than that of nonminority males, and the cancer incidence rate of black females to be about 5 percent higher than that of their nonminority counterparts (Ries, Hankey, and Edwards 1991). Black males also showed the largest increase in cancer incidence during the 1970s and 1980s.

The survival rate (chances of surviving cancer once it is diagnosed) is also calculated from SEER data. The data show that blacks have lower cancer survival rates than non-Hispanic whites. Hence, the difference between blacks and other groups in cancer mortality (number of deaths per 100,000 persons) is even bigger than it is for cancer incidence. Secretary Heckler's minority task force found 8,000 excess minority cancer deaths a year (U.S. Department of Health and Human Services 1985). All 8,000 were among blacks. Furthermore, cancer mortality rates have been increasing for over half a century among blacks, especially males, com-

pared with rates observed among white males during the same period. Improvements in diagnostic practices and reporting of cancer among black Americans can only partly account for these increases (Gordon, Crittenden, and Haenszel 1961; Lilienfeld, Levin, and Kessler 1972; U.S. Department of Health and Human Services 1985). Perhaps the most direct way of summarizing the seriousness of the black cancer mortality problem is to compare age-adjusted rates in the year 1991, the final year of our data set (U.S. Department of Health and Human Services 1994). Using the 1940 population of the United States as the population standard, the male cancer death rate was 242.4 per 100,000 for blacks, compared with 159.5 whites: a 52 percent difference that has been steadily increasing. The comparable difference for black and white females was 23 percent (136.3 versus 111.2 per 100,000).

Two databases were joined for this migrant study. One was the National Center for Health Statistics (NCHS) mortality detail files, from which we extracted all black cancer deaths in the United States during the years 1979 to 1991.

The second data set was created for us by the U.S. Bureau of the Census (1993b). The bureau published population counts by age, race/ethnicity, and region and state of birth and residence in 1980, but it did not divide the population into males and females. We contracted with the bureau to subdivide the 1980 data by sex and to provide a similar database for 1990. Linear interpolation was used to estimate the population-at-risk for the period 1981 to 1989. The 1980 population was used for 1979, and the 1990 population was used for 1991.

Age-specific and age-adjusted cancer mortality rates were calculated by region of residence for male and female African-American residents of the United States who were born in the Northeast, Midwest, South, and West. We also calculated rates for foreign-born blacks, which we do not present here, but will briefly consider in our discussion. We used the direct method of age adjustment; the 1960 population of the United States as the standard vector to allow comparisons with previous cancer studies (Greenberg 1983); and 95 percent confidence limits were calculated for the age-adjusted rates. Death rates were calculated for total cancer and for the 17 specific types of cancer listed here with their international classification of disease codes: esophagus [150], stomach [151], colon and rectum [153-4], pancreas [157], larynx [161], trachea, bronchus, and lung [162], female breast [174], cervix [180], ovary [183], prostate [185], bladder [188], kidney [189], brain and central nervous

system [191-2], Hodgkin's disease [201], non-Hodgkin's lymphoma [200,202], multiple myeloma [203], and leukemia [204-8]. We also subtracted the sum of these 17 from the total and calculated an "other" aggregate.

To answer the Southern-born question, we compared Southern-born and all other rates in each region for each type of cancer. For example, table 1 shows that the all-cancers rate for Southern-born black males who resided in the Northeast was 348.4 per 100,000. This rate is significantly higher than the rates for the three other Northeastern populations (244.7, 293.7, 206.7). A total of 120 cancer site-gender-region comparisons was made of populations born and not born in the South:

$$15 \text{ male causes} \times 4 \text{ regional comparisons} + 15 \text{ female causes} \\ \times 4 \text{ regional comparisons}$$

To answer the Southern-migrant question, we compared the death rates of Southern-born Northeastern, Midwestern, and Western residents with the rates of populations who were born, and resided, in the South. For example, the all-sites cancer death rates of Southern-born migrant males who resided in the Northeast, Midwest, and West were 348.4, 327.9, and 291.6, respectively. The first two are higher than the 298.3 per 100,000 among males who were born and resided in the South. Ninety site-gender-region comparisons were made of Southern-born migrants and Southern-born nonmigrants in order to answer the Southern-migrant question:

$$15 \text{ male causes} \times 3 \text{ regional comparisons} + 15 \text{ female causes} \\ \times 3 \text{ regional comparisons}$$

Age-standardized cancer rates are a useful summary measure, but age-specific rates can provide additional information about when an excess of cancer deaths begins to be apparent. We compared age-specific rates of Southern-born migrants with those of persons born in the Northeast and Midwest in order to ascertain ages at which the excesses could be detected.

Results

Over 670,000 black residents of the United States died of cancer during the period 1979 to 1991. Eighty-four percent were born in the South.

TABLE 1
Age-Adjusted Cancer Mortality Rate for All Cancers and Stomach Cancer among African Americans from 1979 to 1991^a

Region		Rate of all cancers ^b		Rate of stomach cancer ^b	
Birth	Residence	Males	Females	Males	Females
Northeast	Northeast	244.7 (240.8,248.6)	152.1 (149.6,154.6)	8.9 (8.1,9.7)	3.8 (3.4,4.2)
North Central	Northeast	293.7 (274.2,313.2)	158.1 (146.2,170.0)	14.7 (10.1,19.3)	3.4 (1.6,5.2)
South	Northeast	348.4 (345.0,351.8)	179.6 (177.5,181.7)	16.7 (16.0,17.4)	7.2 (6.8,7.6)
West	Northeast	206.7 (170.5,242.9)	93.2 (71.0,115.4)	15.5 (5.4,25.6)	4.4 (-2.9,0)
Northeast	North Central	250.7 (233.5,267.9)	154.9 (143.1,166.7)	10.6 (7.1,14.1)	3.1 (1.4,4.8)
North Central	North Central	257.0 (253.0,261.0)	150.8 (148.3,153.3)	8.0 (7.3,8.7)	3.5 (3.1,3.9)
South	North Central	327.9 (325.2,330.6)	177.1 (175.3,178.9)	14.9 (14.3,15.5)	6.1 (5.8,6.4)
West	North Central	195.3 (164.3,226.3)	111.9 (91.7,132.1)	5.5 (0.3,10.7)	1.3 (-.8,3.4)
Northeast	South	242.8 (231.4,254.2)	133.2 (126.0,140.4)	8.0 (5.9,10.1)	3.5 (2.3,4.7)
North Central	South	220.5 (207.7,233.3)	128.6 (119.8,137.4)	8.1 (5.6,10.6)	2.7 (1.4,4.0)
South	South	298.3 (297.0,299.6)	153.6 (152.8,154.4)	13.6 (13.3,13.9)	5.6 (5.5,5.7)
West	South	75.6 (63.3,87.9)	40.4 (33.0,47.8)	4.1 (1.1,7.0)	1.3 (-1.2,7)
Northeast	West	210.7 (193.0,228.4)	141.9 (129.6,154.2)	6.9 (3.7,10.1)	4.8 (2.5,7.1)
North Central	West	257.2 (246.1,268.3)	171.1 (163.1,179.0)	7.6 (5.6,9.6)	3.5 (2.4,4.6)
South	West	291.6 (287.8,295.4)	166.4 (163.8,169.0)	14.4 (13.6,15.2)	5.7 (5.2,6.2)
West	West	148.0 (140.0,156.0)	105.8 (100.1,111.5)	4.0 (2.6,5.4)	2.7 (1.8,3.6)

^a Rate per 100,000.

^b 95 percent confidence limits are shown in parentheses.

Only 6 percent were born in the Midwest, 6 percent in the Northeast, and less than 1 percent in the West. Another 2 percent were foreign born, and the birth location of less than 1 percent was unknown.

Space does not permit us to show all the age-adjusted and age-specific death rates for all 17 causes. Tables 1 and 2 show the age-adjusted rates for an all-cancers total; cancer of the stomach; prostate; female breast; and trachea, bronchus, and lung (referred to hereafter as lung). Table 1 shows a marked difference in death rates between those born in the South and those born in the Northeast, Midwest, and West. Regarding the Southern-born question, we found that African Americans who were born in the South had the highest total cancer age-adjusted death rate in every region of residence, with the exception of African-American females who were born in the North Central region and resided in the West: this latter group had a higher cancer death rate than their Southern-born counterparts who lived in the West. Their death rates were significantly higher than every other rate in seven of these eight gender-region comparisons ($p < .05$). Regarding the Southern-migrant question, blacks who were born in the South, but migrated to and resided in the Northeast and Midwest, had significantly higher death rates than Southern-born blacks who resided in the South ($p < .05$). In short, the aggregate of all cancers shows high rates among Southern-born blacks, especially those who relocated to the Northeast and Midwest. The average cancer death rate among those who were part of the massive migration of African Americans out of the South to the Northeast, Midwest, and West was 43 percent higher than the rate for blacks who were born in the Northeast, Midwest, and West.

We chose stomach cancer as a sentinel disease for this research because studies of many populations suggest that poverty, lack of refrigeration, and gastric infections at a young age increase the probability of stomach cancer later in life (Staszewski 1976; Parsonnet et al. 1991; La Vecchia et al. 1993). If birth and early exposures in the South are associated with high mortality later in life, then stomach cancer should show a large Southern-born excess of cancer deaths. Table 1 shows the strongest and most consistent Southern-born and Southern-migrant excesses found in this research. The Southern-born stomach cancer rate was higher in every gender-region comparison (eight of eight). In fact, the Southern-born cancer rates were 50 percent or more higher in 20 of the 24 comparisons of Southern-born and other-born rates of stomach cancer. In addition, Southern-born migrants to the Northeast, Midwest, and West had

TABLE 2
Age-Adjusted Cancer Mortality Rate for Breast, Prostate, and Lung among African Americans from 1979 to 1991^a

Region		Prostate ^b		Breast ^b		Trachea, Bronchus, Lung ^b	
Birth	Residence	Males	Females	Males	Females	Males	Females
Northeast	Northeast	31.0 (29.5,32.5)	29.6 (28.5,30.7)	81.8 (79.6,84.0)	31.6 (30.5,32.7)		
North Central	Northeast	45.1 (36.6,53.6)	31.2 (26.0,36.4)	97.4 (86.5,108.3)	35.5 (29.9,41.1)		
South	Northeast	48.9 (47.7,50.1)	32.1 (31.3,32.9)	113.4 (111.5,115.3)	29.3 (28.5,30.1)		
West	Northeast	31.7 (17.1,46.3)	21.1 (10.2,32.0)	58.2 (38.8,77.8)	20.0 (9.4,30.6)		
Northeast	North Central	35.2 (28.4,42.0)	28.4 (23.4,33.4)	87.4 (77.4,97.4)	34.7 (29.1,40.3)		
North Central	North Central	30.4 (28.9,31.9)	27.6 (26.6,28.6)	92.3 (89.9,94.7)	33.0 (31.8,34.2)		
South	North Central	47.5 (46.5,48.5)	31.4 (30.7,32.1)	112.9 (111.3,114.5)	30.8 (30.1,31.5)		
West	North Central	35.9 (22.1,49.7)	30.1 (19.6,40.6)	81.1 (60.9,101.3)	20.9 (11.9,29.9)		
Northeast	South	38.2 (33.3,43.1)	26.8 (23.7,29.9)	80.7 (74.2,87.2)	24.7 (21.6,27.8)		
North Central	South	32.5 (27.2,37.8)	25.4 (21.6,29.2)	81.6 (73.9,89.3)	22.0 (18.3,25.7)		
South	South	45.1 (44.6,45.6)	27.7 (27.4,28.0)	98.5 (97.7,99.3)	22.3 (22.0,22.6)		
West	South	8.2 (3.9,12.5)	8.5 (5.1,11.9)	27.9 (20.3,35.5)	7.3 (4.0,10.6)		
Northeast	West	29.5 (21.9,37.1)	32.6 (27.0,38.2)	75.2 (65.0,85.4)	36.2 (29.9,42.5)		
North Central	West	40.9 (36.1,45.7)	33.6 (30.2,37.0)	92.7 (86.1,99.3)	36.7 (33.0,40.4)		
South	West	44.9 (43.4,46.4)	30.8 (29.7,31.9)	94.5 (92.4,96.6)	30.2 (29.1,31.3)		
West	West	18.8 (15.7,21.9)	24.8 (22.1,27.5)	51.0 (46.3,55.7)	19.1 (16.6,21.6)		

^a Rate per 100,000.

^b 95 percent confidence limits are shown in parentheses.

higher death rates than their counterparts who were born, and resided, in the South.

Table 2 presents the rates for prostate, female breast, and lung cancer. These three were chosen because, along with colorectal cancer, they were the major causes of cancer-related deaths among African Americans. Southern-born African Americans had the highest prostate cancer death rate in every regional comparison, and their rate was significantly higher in nine of the 12 comparisons ($p < .05$). Southern-born migrants on average had an age-adjusted death rate for prostate cancer that was more than 80 percent higher than the death rate of native-born residents of the Northeast, Midwest, and West.

Breast cancer death rates among Southern-born black females were less elevated than rates observed for stomach and prostate cancer. Black Southern-born females had the highest breast cancer death rate in three of the four regions. Northeastern, Midwestern, and Western blacks who were Southern born had significantly higher death rates than their counterparts who were both born, and resided, in the South ($p < .05$): the average difference was 15 percent.

The results for male and female cancer of the lung are notable because of the unusual female results. Southern-born black females averaged about 10 percent lower lung cancer death rates than their counterparts born in the Northeast and Midwest in three of the four regional comparisons.

In strong contrast to the exception for female lung cancer, Southern-born male lung cancer death rates were higher in all four regional comparisons, and were significantly higher in three of the four ($p < .05$). The rates for Southern-born male migrants to the Northeast, Midwest, and West were on average almost 50 percent higher than those of their counterparts who remained in the South ($p < .05$).

In addition to female lung cancer, we found three other cancers that did not manifest elevated rates among the Southern born: bladder, Hodgkin's disease, and non-Hodgkin's lymphoma. Furthermore, while focusing on the high rates of cancer among the Southern born, we also noted that Western-born African Americans had the lowest cancer death rates in more than 70 percent of the cause-sex-region comparisons.

Overall, with respect to the Southern-born question, Southern-born African Americans had the highest cancer death rates in 66 percent (79 of 120, $p < .01$) of the cause-gender-region comparisons. In 18 percent of the comparisons (22 of 120), the death rates of Southern-born blacks

are significantly higher than all the others in the region ($p < .05$). Less than one such instance would be expected by chance. Indeed, in only one of the 120 comparisons did a birth region other than the South have a significantly higher rate ($p < .05$) than all the other comparative regions.

With respect to the Southern-migrant question, Southern-born migrants had higher rates than their nonmigrating counterparts in 80 percent (72 of 90) of the comparisons ($p < .01$). These differences were statistically significant in 44 percent (40 of 90) of the comparisons at $p < .05$. Only 2 to 3 (of 90) would have been expected by chance.

Age-Specific Rates

Table 3 shows age-specific death rates for regions of birth and residence, selected because they were responsible for 90 percent of all black American cancer deaths during the study period (601,000 out of 670,000). Table 3 does not show elevated cancer death rates among Southern-born blacks who were less than 24 years old. Evidence of elevated rates starts in the 25- to 34-year-old age group, but the difference is less than 10 percent. The average difference between Southern-born migrants and nonmigrants born in the Northeast and Midwest increased to 28 percent in the 35- to 44-year-old age group, and dropped back to 18 percent in the 45- to 64-year-old population. The biggest difference between persons born in the Northeast and Midwest and persons who migrated to those regions from the South was among the elderly: an average of over 30 percent.

Discussion and Conclusions

Because the data and the results represent regional aggregates, we must first acknowledge the potential of ecological fallacy: that is, attributing patterns to individuals based on data about large groups. With this caveat noted, we found that Southern-born African Americans almost always had higher cancer-related death rates than their counterparts born in the Northeast, Midwest, and West. Furthermore, Southern-born migrants almost always had higher rates than persons who were born and remained in the South. In other words, Southern-born migrants, espe-

TABLE 3
Age-Specific Cancer Mortality Rates for the Black Population in the United States from 1979 to 1991

Sex	Population		Age group ^a											Total ^b
	Born in	Reside in	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+			
Male	Midwest	Midwest	4.8	9.6	7.3	15.2	58.0	296.3	796.5	1263.0	1979.5	257.0		
	South	Midwest	5.0	4.8	7.6	16.9	80.3	352.3	931.0	1714.2	2778.3	327.9		
	Northeast	Northeast	3.9	4.5	7.7	19.1	75.0	299.1	735.6	1200.3	1874.4	244.7		
	South	Northeast	5.7	5.4	6.3	20.7	102.0	395.8	995.9	1810.8	2796.7	348.4		
Female	Midwest	Midwest	4.7	3.6	5.2	18.8	66.0	218.5	502.8	648.0	941.9	150.8		
	South	Midwest	1.0	3.8	5.6	20.2	81.6	233.6	519.3	819.2	1286.7	177.1		
	Northeast	Northeast	4.2	3.2	5.5	18.3	77.2	236.3	475.4	662.7	922.4	152.1		
	South	Northeast	4.4	1.8	5.5	20.0	85.2	267.2	539.3	829.9	1226.9	179.6		
Male	South	South	4.6	3.7	7.4	16.3	74.9	328.0	885.5	1558.6	2383.9	298.3		
Female	South	South	4.3	3.5	5.7	19.6	72.7	209.6	461.0	699.9	1048.8	153.6		

^a Rates per 100,000.

^b Age adjusted.

cially migrants to the Northeast and Midwest, had the highest cancer mortality rates in a population with high cancer rates. Elevation of cancer death rates among the Southern born was apparent by the age group 35 to 44, reaching a difference of over 30 percent for the population 65 years and older.

Disease Competition

There are four plausible explanations for these elevated rates: First, cancer is competing with heart disease, stroke, diabetes, and other chronic diseases as a cause of death. It is possible that more Southern-born blacks died of cancer because so many Northern and Western-born blacks died of causes other than cancer. To examine this possibility, we calculated age-adjusted death rates for all causes of death, for cancer, and for selected, specific, potential competitive causes for black males and females for the years 1979 to 1981 (Greenberg and Schneider 1992). These calculations showed that disease competition did not constrain death rates from cancer because Southern-born American blacks also had the highest death rates from potentially competitive chronic diseases. For example, age-adjusted death rates from heart disease were, respectively, 46 and 29 percent higher among Southern-born migrants to the Northeast and Midwest than among blacks who were born, and resided, in those regions.

Genetic Differences

A second plausible explanation for the results is the operation of a genetic characteristic identified with Southern-born African Americans. However, migration studies, in general, and research about African-American cancers, in particular, do not lend support to a genetic factor affecting many of the major causes of cancer death among African Americans in the United States (U.S. Department of Health and Human Services 1985, 1986).

Data Limitations

Data limitations offer a third set of alternative explanations. Most of these explanations cannot be dismissed. The use of region of birth and death as surrogates for factors contributing to cancer is a data limitation.

For example, just because individuals were born in the same region, state, county, or town does not mean that they shared the same exposures and behaviors. Because much of the historical data about African Americans is anecdotal, we cannot say with certainty that migrants formed a random sample of Southern-born blacks. For example, we do not know if migrants disproportionately came from rural areas and settled in large cities, which means that we cannot dismiss the possibility that the regional differences we found do not constitute the urban-rural differences reported in many cancer studies (Lilienfeld, Levin, and Kessler 1972; Levin 1974; Greenberg 1983). If migrants were self-selected because they were extremely poor and malnourished, then they would be expected to have a higher probability than nonmigrants of contracting and dying from most forms of cancer. Only detailed case histories can provide the information needed to examine this alternative hypothesis.

Another problem with the data we used is that it does not report length of residence in the region of either birth or death. Nor does it report any other region(s) of residence. Without this information, we have no way of precisely documenting residential histories. The resident who moved to Chicago from Mississippi shortly after birth should be categorized differently than the individual who resettled in Chicago after retirement. These concerns cannot be resolved without more and better data.

Better and more frequent autopsies in the North and West, compared with their performance in the South, could also partly explain the high rates of cancer among Southern-born migrants to the North and West. That is, Southern-born blacks who relocated in the North and West may have the same probability of contracting cancer as their counterparts who did not migrate, but the more advanced medical systems of the urban Northern and Western cities were perhaps better able to detect and report cancer than the less developed medical systems that existed in the South. However, the cancers with the largest Southern-born excess and migration effects are not among those with the worst identification (Percy and Stanek 1979). Furthermore, the study period is one in which the overwhelming majority of cancers are histologically confirmed.

To summarize: selective migration of high-risk people and absence of data about length of time spent in regions of birth and residence are plausible alternative explanations of these results. These alternative hypotheses cannot be examined without more data.

Economic, Social, and Other Environmental Factors

The fourth plausible explanation is the presence at the sites of origin and destination of a set of factors that are critical to carcinogenesis. These factors have been discussed in the literature (U.S. Department of Health and Human Services 1985, 1986; American Cancer Society 1990; Boring, Squires, and Heath 1992; *Annals of Epidemiology* 1993). Bal (1992, 5) summarizes them as a “depressing array of economic, social, and situational problems.” Our migrant study does not permit us to address the relative contribution of different factors to the elevated cancer rates of Southern-born blacks, especially of Southern-born blacks who migrated to the Northeast and Midwest, but it does identify the kinds of cancers that manifest the interactions of these factors. Excluding multiple myeloma, the highest elevation of Southern-born and Southern-migrant cancer death rates were of the breast (female), esophagus, larynx, lung (male), pancreas, prostate, and stomach. Nutritional imbalances, tobacco smoking, and poverty are etiologic factors common to nearly all of these sites. Kumanyika (1993) characterized the African-American diet as high in fat and salt, low in calcium and fiber, and containing few fruits and vegetables, factors that are associated with increased risk of cancers of the breast, esophagus, pancreas, prostate, and stomach.

Chen (1993) reported that black males have high cigarette-smoking rates, are more likely to smoke cigarettes with a high tar content, and are less likely to stop smoking than their white counterparts. These characteristics increase the chances that black males will contract cancer, especially of the respiratory system. The lower rate of lung cancer among Southern-born black females is consistent with previous research that showed lower rates of smoking and death from lung cancer for Southern-born white females (Greenberg et al. 1983). Perhaps, their black counterparts also were slow to embrace the cigarette-smoking habit.

Low socioeconomic status, we believe, is a surrogate for a set of negative environmental characteristics: poor housing, dangerous jobs, unemployment, less frequent use of cancer-screening services, and a lower survival rate after contracting cancer (see Freeman 1993; Reynolds 1993; Baquet and Hunter 1995). Were Southern-born black Americans more economically disadvantaged than blacks born elsewhere? The data are incomplete and largely anecdotal, but they suggest that Southern-born black Ameri-

cans were severely deprived. Lemann (1991), for example, describes the Southern black population as reflected in the lives of poor sharecroppers from Clarksdale, Mississippi, who were badly oppressed by Southern plantation owners. They lived without adequate food, clothing, and shelter. Nutrition was problematic; refrigeration and medical care were rare. Family life was unstable because the population was frequently forced to relocate to maintain a subsistence existence. Lemann shows that many of these high-risk situations accompanied migrants to Chicago, where they encountered a segregated and hostile urban environment (see also Taeuber and Taeuber 1965; U.S. Commission on Civil Rights 1959).

We are not arguing that Northern-born and foreign-born blacks lived a comfortable existence. Accounts from a variety of cities, however, suggest that they earned higher wages than their Southern-born counterparts, were better educated, and were more politically active. For example, writing about New York City, Glazer and Moynihan (1970) described the African-American population before the mass migration of Southern blacks as primarily domestics, laborers, waiters, and unskilled workers. But, they added, there was a "tiny 'upper class' of minor government employees and professionals" (p. 26). Further, they noted that, as late as 1930, from 20 to 25 percent of New York City's black population came from the West Indies. This population had originally enjoyed higher status; upon arrival in the United States, it produced much of the political leadership of New York City's black community.

Census tabulations support the contention that the economic status of Southern-born African Americans was lower than that of their Northern counterparts (U.S. Bureau of the Census 1987). For instance, using specially constructed tabulations from the 1970 census, Long and Heltman (1974) found that 45- to 64-year-old blacks who were born in the West were twice as likely as their Southern-born counterparts to have graduated from high school. In addition, 31 percent of Western-born blacks in this age group worked in professional, technical, managerial, administrative, clerical, sales, and other white-collar occupations, compared with only 14 percent of Southern-born blacks. African Americans residing in the Midwest and Northeast fell between the two. The difference in indicators of economic and occupational status by region of birth persisted in the populations aged 16 to 24 and 25 to 44 years.

Accounts of black male exposure to carcinogenic agents in the workplace are rare and mostly anecdotal. Nevertheless, it is likely that male,

Southern-born migrants were employed in relatively hazardous factory and construction jobs in the Northeast and Midwest (Kipen et al. 1991), doubtless contributing to their high carcinogenic burden.

Furthermore, we must not overlook the fact that migration itself is stressful (Hull 1979). Emigrants leave familiar environments and people and must try to adapt to new ones. Migrants who are poor, suffer from nutritional deficiencies, have high-risk behaviors, and encounter major stresses in their areas of resettlement, like Southern-born black Americans, should be at higher risk of illness and injury than nonmigrants. Blacks and economically disadvantaged populations are less likely to be screened for cancer and, not surprisingly, have lower survival rates than whites and more affluent persons (U.S. Department of Health and Human Services 1985, 1986; Boring, Squires, and Heath 1992; Alexander 1995). There are no cancer survival studies of blacks that divide them into migrant and nonmigrant populations. Nevertheless, we suspect that Southern-born black migrants have been among the last populations to have cancers diagnosed and treated because of their poverty and the greater difficulty they would face in establishing links with the medical system. Hence, we suspect that Southern-born migrants carry the additional burden of a low cancer survival rate.

Research Needs

We need to try to investigate migrant populations systematically, using nonmigrants as controls. For example, we need to identify the nutritional elements in the Southern-born African-American population that may substantially contribute to high levels of cancers. The appearance of elevated death rates by the 35- to 44-year-old population implies that imprinting for high risk of these cancers occurs at a relatively young age, perhaps in combination with high-risk alcohol, smoking, and sexual behaviors and with occupational exposures that compromise immunity.

To further explore such links, this study should be replicated with incident, rather than mortal, cases of cancer. For instance, the SEER program gathers information on a sample of new African-American cancer cases. Because SEER contains information not available on the NCHS mortality tapes, and because follow-up is most feasible with people who are alive, SEER data could be used to replicate and expand our study. Follow-up should pursue the residential history of cancer cases, with the goal of linking locations; examining pre- and postmigration stresses;

studying behaviors, carcinogenic exposures, and the quantity and quality of cancer screening; and viewing the impact of changing economic social conditions.

Although we have focused on cancer as a set of sentinel diseases, this same research should be pursued for other major causes of mortality and morbidity, especially diabetes, heart disease, homicide, and other diseases with substantial African-American excess deaths and incidence. In addition, further research should examine the disease burden of those who are foreign born. Initial data suggest that this population is wealthier and healthier than the vast majority of migrant populations of the past (Siem and Bollini 1992; Stephen et al. 1994). Yet we know relatively little about its propensity to develop cancer and other morbid and fatal conditions. For example, calculation of age-adjusted cancer death rates for the foreign-born U.S. black population shows rates that, not surprisingly, far more closely resemble those of the Dominican Republic, Haiti, and Jamaica, the source of much of the foreign-born black population, than those of native-born black Americans (Segi 1978). A study of the foreign-born, black-American population, then, can help explain the relation between locational history and carcinogenesis.

The National Cancer Institute (NCI) has pioneered international cancer studies (Ziegler et al. 1993). We urge the NCI to consistently add both region of birth and residence within the United States to their international comparisons in future studies.

Our final and inevitable observation about migration research is that epidemiological investigations are seriously hindered by inconsistent and insufficient databases. Feinlieb (1993) succinctly summarized three categories of need:

1. more and consistent ethnic/racial detail in vital statistics
2. resolution of the problems of racial/ethnic definitions and counts in U.S. censuses
3. postcensus population estimates

Until these needs are met, distinguishing direct and indirect cause-and-effect disease relations will be difficult.

Policy Implications

Our research has implications for two policy issues: Migrant studies show that both the direct progeny of migrants and their second generation

tend to contract diseases resembling those of native-born populations rather than the diseases of their parents' country (Haenszel 1970; Modan 1980; Fishbough, Podar, and Laporte 1992; Geddes et al. 1993). When these rates are combined with the much lower rates of cancer among foreign-born blacks, we conclude that the persistent increases in black male cancer mortality rates will end. We expect the overall cancer death rate to fall as the population of black Americans born in the South decreases and the proportion born in the North, West, and foreign countries increases and ages. Initial evidence should be observed in the 35- to 54-year-old age group, and will probably appear first in the Northeast. We feel confident in our prediction because in 1980 Southern-born African Americans comprised 58 percent of the New Jersey black population aged 35 to 64 years, and the foreign-borns, 6 percent. A decade later, the proportions were 44 and 15 percent, respectively. This means that, as early as the year 2000, a rate decrease should begin to appear for some of the cancers whose rates have been elevated among the Southern born.

Because each cause of death requires its own resource commitments and its particular prevention and control strategies, a trend toward lower cancer rates among blacks affects health planning and resource allocation decisions. This is especially true at the state level and among hospitals and nongovernmental organizations, like the American Cancer Society, that have organized to reduce the cancer burden (McCoy, Ritchey, and McCoy 1992). Any reduction in rates may be attributed to their efforts, whereas the effects of early imprinting may be lost.

Second, an essential step in formulating a solution to a problem is frank recognition of the facts behind it. There is no doubt that resources must be allocated to address the excess of cancer and other diseases among African Americans. In the United States, however, we fear that too much attention has been focused on isolating the contributions of socioeconomic status and race to excess risk. Although this may be a useful exercise for scientists, the excess, we think, resulted from the intersection of very low socioeconomic status and some high-risk behaviors. Trying to disassemble this conjunction poses political dangers because the dichotomy buys into some of the most obdurate ideological politics of the United States in the late twentieth century.

For instance, the NCI and the Department of Health and Human Services have allocated resources to minority health programs. If experts successfully argue that excess risk disappears when socioeconomic status is controlled, then minority-based programs become potentially vulnera-

ble. Furthermore, it is simpler to reduce the number of poor by creative statistics than to redefine the number of black Americans; to find a poor population with low cancer rates than an American-born black population with low cancer rates; and to contend that a cancer prevention program aimed at the poor cannot succeed because poverty is endemic.

We hope that the research reported in this paper provides a sufficiently strong historical-geographic nexus to support the argument that excess mortality and morbidity among African Americans combines socioeconomic status and behavioral elements. We believe that these must be addressed together rather than fall victim to a partisan political debate about race and high-risk behaviors.

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Appendix: States and Regions

The Northeast region includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

The Midwestern, or North Central, region includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

The Southern region includes Alabama, Arkansas, Delaware, the District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

The Western region includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.