Metropolitan Governance, Residential Segregation, and Mortality among African Americans

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ABSTRACT

Objectives. This study tested the hypothesis that the degree to which local government is metropolitanized is associated with mortality rates for African Americans and with residential segregation, which has itself previously been shown to be positively associated with mortality among African Americans.

Methods. One hundred fourteen US standard metropolitan statistical areas were examined. The primary dependent variable was the age-adjusted, race- and sex-specific all-cause mortality rate, averaged for 1990 and 1991. The 2 primary independent variables were residential segregation, as measured by the index of dissimilarity, and metropolitanization of government, as measured by the central city's elasticity score.

Results. Mortality rates for male and female African Americans were lower in metropolitan statistical areas with more metropolitanized local governments and lower levels of residential segregation. Mortality for male and female Whites was not associated in either direction with residential segregation. White male mortality showed no association with level of metropolitanization, but lower White female mortality rates were associated with less metropolitanization.

Conclusions. This study suggests the need for further research into whether policy changes in areas not traditionally thought of as "health policy" areas can improve the health of urban minorities. (*Am J Public Health.* 1998;88:434–438)

Introduction

Research continues to chronicle a precarious state of health for America's urban populations.[1–7] African Americans, many of whom dwell within cities, continue to have mortality rates that significantly exceed those of Whites.[8] Male African Americans in one inner-city area have life expectancies lower than those of their counterparts in Third World countries.[3] Residents in deteriorating neighborhoods experience increased mortality.[1,7] The late 1980s saw a decrease in life expectancy for male African Americans, a result of increased violence and human immunodeficiency virus (HIV) infection.[9]

Cities with the highest mortality rates for African Americans have several characteristics in common. First, they tend to be located in the East, particularly the Northeast, and in the upper Midwest. These cities are also often older, having reached 100 000 in population in the last century or early in this century. Cities with higher African-American mortality often are located in metropolitan areas with high residential segregation.[2,4,5]

These cities also appear to have another common element. Sociological research in the early part of this century documented a particular growth pattern in American cities.[10] As a city grew, the wealthier residents tended to move away from the center of the city, eventually spilling into the areas outside the city's political boundaries. The city would then expand its boundaries to incorporate the areas with the wealthier population,[10] a process that continued in most large cities until after the turn of the present century when, for political reasons, it slowed down and eventually halted.[11] In other cities, however, this process, variously called succession,[10] municipal expansion through annexation,[11] and elasticity,[12] continued.[11,12] Those metropolitan areas where cities have continued to expand are characterized by a regional or metropolitan governance and appear to evidence both lower African-American mortality rates and less residential segregation.

The first aim of this study was to test the hypothesis that mortality is higher in metropolitan areas where the process of metropolitanization is slow or has halted. Second, we tested the hypothesis that areas with little or no metropolitanization have high levels of residential segregation, a factor associated with higher African-American mortality rates.[12,13] Finally, because we believed that the higher mortality rates in areas with no or little metropolitanization were a result of higher levels of segregation, we tested the hypothesis that the association between higher mortality and low metropolitanization areas would no longer hold true once differences in segregation had been taken into account.

Methods

We calculated sex- and race-specific mortality rates at the metropolitan statistical area level using mortality data for 1990 and 1991 from the National Center for Health

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This paper was accepted April 25, 1997.

Statistics Mortality Detail Files (provided through the Inter-University Consortium for Political and Social Research, Ann Arbor, Mich[14,15]) and population data from 1990 Census of Housing and Population Summary Tape 3 on CD-ROM.[16] We age-adjusted rates by the direct method, using the 1940 US population as the standard. Our analysis was confined to mortality among those between 25 and 64 years of age. Separate rates were calculated for each year and then averaged.

We measured the degree to which a metropolitan statistical area had a metropolitan government, using the elasticity score developed by Rusk.[12] This score measures the degree to which a city has captured its region's population growth that occurred in the period between 1950 and 1990. The score takes into account both the initial population density of the city and the extent to which the city expanded its political boundaries during the 1950 to 1990 period. Because the elasticity score captures a process continuing over a period of time, we thought it might be a better reflection of the effects of metropolitan government than would the percentage of the metropolitan area population living within the boundaries of the central city. (A separate analysis using this latter percentage produced results similar to those reported here.) Elasticity scores can range between 4 and 40, low scores indicating a failure of the central city to capture the region's growth.

The logic behind Rusk's elasticity score is that cities with low population densities in 1950 could "capture" the population growth of the region within the city's boundaries. If the city had a high population density, it could nonetheless capture the region's growth by expanding its political boundaries. The elasticity score is calculated by first ranking all metropolitan area central cities into deciles according to their population density in 1950 and the percentage increase in area over the period between 1950 and 1990. The score is the sum of the city's initial density ranking and three times the ranking for percentage increase in municipal territory. We obtained the elasticity scores directly from Rusk.

Although elasticity is a characteristic of cities, we chose metropolitan statistical areas as our unit of analysis to avoid a possible bias. Elastic cities include within their boundaries much of the regional low-density, suburban-style growth. If mortality rates were calculated at the city level, elastic cities would probably have lower rates simply because of the different makeup of their populations, and controlling for education and income might not correct for this difference. By examining metropolitan statistical area mortality rates, however, we may have made it more difficult to show an association between elasticity and mortality. (In a separate analysis not reported here, we used mortality rates for the city rather than the metropolitan area and obtained similar results.)

We selected all metropolitan statistical areas with populations of more than 200 000 that had principal central cities with populations of more than 100 000. Of the 124 metropolitan statistical areas that met these criteria, 10 were excluded because the index of dissimilarity, our measure of residential segregation, could not be calculated.

As just mentioned, we used the index of dissimilarity, which measures the evenness with which a minority population is distributed throughout a region,[17] as our measure of residential segregation. Conceptually, it can be thought of as the percentage of the minority population that would have to move so that each areal unit within the region would have the same proportion of a minority as that group's proportion in the regional population. Our dissimilarity indices were calculated by Roderick J. Harrison and Daniel H. Weinberg of the US Bureau of the Census. The indices were computed for metropolitan areas (with census tracts as the areal units) and were based on population data from the 1990 census.

Socioeconomic status and geographic area of the country have been shown to be associated with mortality[18,19]; therefore, it was necessary that both be controlled in our analysis. For each metropolitan area, we calculated race-specific proportions for those more than 25 years of age who failed to complete high school and for those between 18 and 65 years of age who were living below the federal poverty line. Our control for geographic location was the longitude and latitude of the principal central city in the metropolitan area.

In our analysis, we adjusted for differences among metropolitan areas in factors such as education level, poverty rate, and geographic location by use of weighted linear regressions.

Results

Mortality rates for male African Americans showed the greatest variation, ranging from 2.64 per thousand to 15.09 per thousand (mean = 9.48, SD = 2.18, median = 9.75). Male Whites also showed considerable variation in mortality rates (3.57 to 6.91; mean = 5.04, SD = 0.87, median = 4.92). The variation for female African Americans was similar to that for male Whites, with a range of 2.88 to 6.91 (mean = 4.89, SD = 0.82, median = 4.88). Female Whites had the least variation (1.87 to 3.72; mean = 2.65, SD = 0.32, median = 2.61).

City Elasticity

City elasticity scores in the sample of metropolitan areas ranged from a low of 4 (cities such as New York, Boston, Cleveland, Detroit, and Washington, DC) to a high of 39 (Anchorage). Other cities with a high elasticity score (37) included Bakersfield, Colorado Springs, Tallahassee, and Tucson. Low city elasticity (Table 1) was associated with higher levels of segregation (r = –0.58) but not with higher African-American poverty rates (r = –0.03) or African-American high-school dropout rates (r = –0.09). Geographically, cities with low elasticity were located in the East (r = 0.36) and in the North (r = –0.37). Low city elasticity was associated with lower White poverty rates (r = 0.41) but not White dropout rates (r = –0.03).

The association between segregation and elasticity might have been the result of some other variable associated with

TABLE 1—Pearson Product-Moment Correlation Coefficients for the Associations between Explanatory Variables and Variables Measuring City Elasticity and Segregation, 114 Metropolitan Statistical Areas, 1990/91

	Elasticity	Segregation
Elasticity	. . .	–0.58
Segregation	–0.58	. . .
White education	–0.03	0.28
Black education	–0.09	0.51
Latitude	–0.37	0.16
Longitude	0.36	–0.53
Black poverty	–0.03	0.40
White poverty	0.41	–0.33

segregation. To test this possibility, we estimated a regression equation that included elasticity, longitude, latitude, Black poverty rate, log of Black population, and Black proportion of population as independent variables (Table 2). This equation had an adjusted R^2 value of .64, and a partial F test for the elasticity term was statistically significant ($P < .0001$).

The basic regression model (including race-specific education and poverty variables, along with variables for geographic location) showed adjusted R^2 values of .56 for male Blacks and .49 and .48 for male and female Whites, respectively (Table 3). The R^2 value for female Blacks was lower (.24). When elasticity was added to the basic model, the adjusted R^2 values for male and female Blacks increased to .64 and .28, respectively. The P values for the partial F tests for the elasticity variable were statistically significant. On the other hand, for both male and female Whites, the addition of city elasticity increased the adjusted R^2 value only slightly, and the P value for the F test was significant (.05) only for female Whites.

TABLE 2—Multivariable Regression of Metropolitan Statistical Area (MSA) Segregation onto City Elasticity and Other Selected MSA Characteristics, 1990/91

	Coefficient[a]	F Ratio	P[b]
Latitude	0.002	1.82	.18
Longitude	–0.001	9.96	.002
Log Black population	0.04	33.26	<.0001
MSA Black population, %	–0.0009	1.08	.30
Black poverty	0.52	28.47	<.0001
Elasticity	–0.003	18.03	<.0001
Adjusted R^2	0.64	. . .	. . .

[a]Unstandardized regression coefficient.
[b]For partial F test (last added variable)

Residential Segregation

The mean dissimilarity index for the sample of 114 metropolitan areas was .63 (SD = .11, median = .64). The lowest index was .35 (Anchorage); other areas having low indices were Reno (.37), Albuquerque (.39), Tucson (.42), Lincoln (.43), and San Jose (.43). At the high end of the range were Gary (.90), Detroit (.88), Chicago (.85), Milwaukee (.83), Newark (.82), and Buffalo (.81). Greater segregation (Table 1) was associated with higher African-American poverty rates (r = .38) and dropout rates (r = .49). Dropout rates were also higher for Whites in areas with greater segregation (r = .37), but areas with higher segregation showed lower White poverty rates (r = –.31). Geographically, metropolitan areas with higher segregation levels were located in the East (r = –.52) and in the North (r = .14).

The addition of segregation to the basic model improved the adjusted R^2 value for both male and female Blacks but not for male or female Whites. The partial F test for segregation was statistically significant for both male and female African Americans (Table 3) but not for either male or female Whites. When both elasticity and segregation were included in the equations (Table 4), elasticity no longer added anything to the model. The partial F test for segregation continued to be statistically significant for male Blacks but not for female Blacks.

Discussion

Residential segregation in urban areas is so pervasive that it is difficult to realize that segregation did not always exist to its present degree. At the turn of the century, northern cities had few blocks that were predominantly Black, and some Blacks shared neighborhoods with poor immigrants from Europe.[13] In southern cities, clusters of poor Blacks lived alongside poor Whites, while some wealthier Blacks resided in predominantly White areas.[13] During and just after World War I, this pattern began to change as large numbers of Blacks, for the first time, moved from the rural South to northern and midwestern cities.[20]

Historical research shows that, in the 1920s and 1930s, small local governments located around larger northeastern and midwestern cities sought to separate themselves from city-dwelling racial and ethnic groups viewed as undesirable.[11] Indeed, this is an explanation both for the founding of many suburban municipalities and for why many eastern and midwestern states early in this century enacted laws discouraging annexation and government consolidation.[11] Local governments have been able to adopt policies that have been identified as increasing residential segregation (e.g., zoning and planning restrictions requiring large minimum lot and house sizes).[12,21] Also, local government planning authority is often used to prevent the building of low- and moderate-income housing in small municipalities surrounding cities.[21,22]

That area of residence, or neighborhood, can affect health is at odds with cur-

TABLE 3—Multiple Regression of Metropolitan Statistical Area (MSA) Mortality onto Elasticity and MSA Segregation Separately, Given MSA Education, Geographic Location, and Poverty, 1990/91

	Basic Model,[a]	Basic Model + Elasticity				Basic Model + Segregation			
MSA Mortality	R^2	R^2	β[b]	F Ratio	P[c]	R^2	β[b]	F Ratio	P[c]
Male Blacks	0.56	0.60	–.05	9.66	.002	0.64	7.67	25.87	<.0001
Female Blacks	0.24	0.28	–.02	5.84	.02	0.26	1.75	4.13	.04
Male Whites	0.49	0.50	.009	2.05	.16	0.49	.20	0.10	.76
Female Whites	0.48	0.49	.0005	3.99	.05	0.48	–.07	0.07	.80

[a]Includes MSA education, geographic location, and poverty level.
[b]Unstandardized regression coefficient for added variable.
[c]Significance level for partial F test (last variable added).

TABLE 4—Multiple Regression of Metropolitan Statistical Area (MSA) Mortality onto Elasticity and MSA Segregation Together, Given MSA Education, Geographic Location, and Poverty, 1990/91

		Basic Model[a] + Segregation and Elasticity					
		Segregation			Elasticity		
MSA Mortality	R^2	β^b	F Ratio	P^c	β^b	F Ratio	P^c
Male Blacks	0.64	7.07	15.14	.0002	−.01	0.35	.55
Female Blacks	0.27	.86	0.69	.41	−.02	2.33	.13

[a]Includes MSA education, geographic location, and poverty.
[b]Unstandardized regression coefficient for added variable.
[c]Significance level for partial F test (last variable added).

rent theory, which explains health as the result of individual rational choices and stochastic events.[23] Other social scientists acknowledge that an individual's rational choices influence health but argue that neighborhood influences those choices.[24] A neighborhood can dictate the spectrum of choices available to its residents, whether those choices involve "lifestyle" or health care. This theoretical basis for finding health differences based on neighborhood is supported by research on the association between mortality and residential segregation. Studies have shown an association between the degree of racial segregation of an area and both infant mortality[2,4,25–27] and mortality in adult age groups.[5,28]

Our finding that segregation is positively associated with mortality among adult African Americans is in accord with prior studies.[5,28] Unlike these prior studies, our study controlled for the additional factors of education level and geographic area of the country, and we included many more metropolitan areas. Our finding that less metropolitanization is associated with more segregation is in agreement with the observations of Rusk[12] and Farley and Frey[13] while accounting for other possible confounding variables. Our results also show an association between degree of metropolitanization and Black mortality that is attenuated when segregation is taken into account. It is possible, then, that the association between elasticity and Black mortality is a result of the association between elasticity and segregation. The historical evidence points in this direction.[11]

If the relationship between mortality, segregation, and elasticity is borne out by future research, it offers policy options for dealing with both racial segregation and the health of urban minorities. Federal policy to end residential segregation, the hallmark of which is providing the individual with legally enforceable rights, has largely failed.[20–22] Because the onus of bringing legal action is on the individual, who must retain and pay for a private attorney and meet short time limitation periods, private enforcement of housing discrimination laws has been weak. Even the provisions of the Fair Housing Act that call for government enforcement have been unevenly enforced, both because of budget pressures and because of the lack of political will to proceed with suits.[22] Other policies need to be explored, and policies that promote metropolitan governance may be an important option.

We have argued for a causal path in which city elasticity influences segregation, which in turn influences mortality. Limitations of this study, however, require that our argument be approached with caution. First, this study was cross sectional in design. Specific factors of the particular time period that we failed to take into account may have confounded our results. Future work should include time series analyses of the association between segregation, city elasticity, and mortality.

Another limitation of this study is its ecological design. It is difficult to avoid the problems associated with ecological studies when the predictors of interest, here city elasticity and residential segregation, are themselves ecological.[29,30] Because we used the metropolitan area as our unit of analysis, it is impossible to say with certainty that the mortality we observed occurred in those living within the city rather than in those residing in the suburban areas outside of the city. However, African Americans who live within metropolitan areas are far more likely to live within the city itself than in the suburbs. The ecological design also makes it difficult to assess causation, because some unmeasured variable may be associated both with elasticity and with segregation. Our regression models accounted for some of the most frequently mentioned factors associated with mortality, but these factors were measured at the ecological level, and other important variables may have been left out.

We believe, however, that our study suggests the importance of studying macro-level policies to improve the health of urban populations. Changes at the macro level, in areas that are not traditionally thought of as "health policy" areas, may lead to improvements where attempts at the individual level have failed. □

Acknowledgments

Kevin Hart performed research for this paper as a post-doctoral fellow in health services research under grant T32 HS00044 from the Agency for Health Care Policy and Research.

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Erratum

In: Chavkin W, Breitbart V, Elman D, Wise PH. National survey of the states: policies and practices regarding drug-using pregnant women. *Am J Public Health*. 1998;88:117–119.

The first page should have included the following footnote:

> This work was done as part of a research project on substance abuse and women at The National Center on Addiction and Substance Abuse at Columbia University (CASA).