BRIEF NOTE

Are Geographic Effects on Life Expectancy in Ohio Spurious Because of Race?[1]

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ABSTRACT. **The possibility that significant geographic effects on life expectancy found in Ohio may have been spurious because of race is tested in this paper, which utilizes a regression-based technique to estimate life expectancy for selected cities and their suburbs. Using multivariate analysis in conjunction with race-specific regression models we find that, although white life expectancy values exceed those of blacks, the geographic effects described in an earlier paper were not spurious. Because socioeconomic status is associated with both race and geography, these findings provide support for the argument that socioeconomic status plays an instrumental role in differential life expectancy.**

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INTRODUCTION

Significant substrate geographic effects on life expectancy at birth ($\mathring{e}_o$) were found in Ohio by Swanson and Stockwell (1986). However, it may be the case that these effects are statistically spurious (Rosenberg 1968) because of race. Blacks, who have lower $\mathring{e}_o$ values than whites at national and state levels (National Center for Health Statistics 1985), are concentrated in Ohio's largest cities. Whites constitute the majority in suburban areas and form virtually 100% of the population in rural counties in Ohio (U.S. Bureau of Census 1982). In this paper, we examined the possibility that the geographic effects we found earlier were spurious by comparing black and white $\mathring{e}_o$ values in 1980 for Ohio's seven largest cities and their suburbs. Although our earlier paper included rural counties in its examination of geographic effects on $\mathring{e}_o$ in Ohio, we did not include them in this study because of their lack of blacks.

The major purpose of this paper is to determine if controlling for race changes our earlier findings regarding geographic effects. If no significant urban-suburban differential existed separately for blacks and whites, then our argument concerning geographic effects would be fallacious. If, however, an urban-suburban differential persisted for blacks and whites separately, our earlier findings would be supported along with our suggestion that these geographic effects reflect, in large part, socioeconomic status differentials (Swanson and Stockwell 1986).

METHODS

For the same reasons described in our earlier paper (Swanson and Stockwell 1986), we used a regression-based technique for estimating $\mathring{e}_o$. However, here we use a model designed specifically for 1980 data. This model is different from the one used earlier, which was selected because it produced, on average, more accurate estimates over time. It might be argued that using different models will confound our results. However, this was not the case. The specific model used in our earlier study produced "conservative" results in terms of examining $\mathring{e}_o$ over time (it was more likely to show no change over time because it tends to overestimate $\mathring{e}_o$ in 1930 and underestimate $\mathring{e}_o$ in 1980). However, within 1930 and 1980, the model used earlier produced consistent results with respect to geographic effects. Since we are neither comparing $\mathring{e}_o$ values over time nor exact 1980 $\mathring{e}_o$ values produced by the two separate models, the specific objectives of this study are not compromised. The advantage in using the model designed specifically for 1980 data is that it produces more accurate $\mathring{e}_o$ estimates and reduces bias in terms of under or overestimation. The specific model used to estimate $\mathring{e}_o$, which has been found to be accurate at the substrate level (Swanson 1986, 1987), is reproduced in Table 1.

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TABLE 1

*Characteristics of the regression model used to estimate life expectancy at birth.**

Variable	Regression coefficient
CDR**	−4.244
Ln(P65+)***	3.016
CDR^2	0.027
$Ln(P65+)^2$	0.177
(Ln(P65+))*(CDR)	0.871
(Intercept)	82.276

$R^2 = .74$
Standard error of estimate = .74
$N = 51$

*From Swanson (1986).
**Crude death rate: (Deaths/Population)*1000.
***Percent of the population aged 65 years and over.

The model shown in Table 1 is generally subject to the same restrictions described by Swanson and Stockwell (1986) which, like those noted for the earlier study, do not adversely affect the accuracy of $\mathring{e}_0$ estimates in this one.

Following the development of $\mathring{e}_0$ information, statistical tests determined if there were significant differences in $\mathring{e}_0$ between the urban and suburban areas by race. In these tests, regression models were constructed with $\mathring{e}_0$ as the dependent variable and a "dummy" independent variable representing urban-suburban location.

RESULTS AND DISCUSSION

LIFE EXPECTANCY ESTIMATES. In Table 2 we present 1980 $\mathring{e}_0$ estimates for Ohio's seven largest cities and their suburbs for both the black and white populations. Canton and its corresponding suburb were excluded because, as noted earlier (Swanson and Stockwell 1986), the city of Massillon is also in Stark County, the suburban area of Canton, and represents a confounding effect. The definition of suburb followed that used in the earlier study: it is the "balance of county" area associated with each city. For purposes of comparison, it is useful to know that for Ohio as a whole, $\mathring{e}_0$ in 1980 for blacks and whites was 69 and 73 years, respectively (National Center for Health Statistics 1985).

An inspection of Table 2 indicates that there were geographic effects on $\mathring{e}_0$ for both the black and white populations. For each of the seven areas, the suburban $\mathring{e}_0$ level was higher than that of its corresponding city. Further, on average, the urban-suburban difference for both blacks and whites was about two years.

STATISTICAL ANALYSIS. The characteristics of the regression model used to analyze the geographic effects on black and white $\mathring{e}_0$ values are given in Table 3. Looking first at the model for blacks, the intercept (69.43) provides the expected length of life at birth for the urban black population; the slope coefficient (2.14) gives the average additional years of life obtained by black suburban populations over black urban populations. The slope coefficient is statistically different from zero ($P < .01$), which indicates that for blacks, there is a significant effect on $\mathring{e}_0$ in going from a given city to its corresponding suburb.

The characteristics of the regression model used to analyze the geographical effects on white $\mathring{e}_0$ are also given in Table 3. As before with blacks, the intercept (72.57) provides the expected length of life at birth for urban whites, and the slope coefficient (2.00) provides the additional years of life at birth for suburban whites over whites in corresponding cities. Again, the slope coefficient is statistically significant ($P < .01$), which indicates that for whites as well as blacks, a significant geographic effect exists relative to urban and suburban populations.

The statistical tests indicated that our earlier finding of significant geographic effects was not spurious in regard to race. We found, however, that race does play a role in that white $\mathring{e}_0$ significantly exceeds black $\mathring{e}_0$ both within cities and within suburbs. This finding was based upon two separate regression models constructed using race as the independent dummy variable (black = 0 and white = 1), and $\mathring{e}_0$ as the dependent variable.

One model was constructed for the city populations and the other for the suburban populations. In each model, the slope coefficient was significant ($P < .01$), indicating that white $\mathring{e}_0$ is higher than black $\mathring{e}_0$ within the cities and within their corresponding suburbs. Thus, the closer a city is to being 100% black and its corresponding suburb to being 100% white, the more the apparent geographic effects on $\mathring{e}_0$ will be overstated because the largest $\mathring{e}_0$ differential is between urban blacks and suburban whites. Given this difference, however, it is also clear that the $\mathring{e}_0$ differential across the urban-suburban boundary is virtually identical for blacks and whites: both populations experience, on average, about a two year $\mathring{e}_0$ gain in going from a city to its corresponding suburb. Since race is associated with socioeconomic status (Hogan and Featherman 1977, Leiberson 1970, Mydral 1944,

TABLE 2

Life expectancy at birth for Ohio's seven largest cities and their suburbs, 1980

City	Corresponding surburban area	Black: City	Black: Suburb	White: City	White: Suburb
Akron	Balance of Summit Co.	70	71	73	74
Cincinnati	Balance of Hamilton Co.	70	72	73	75
Cleveland	Balance of Cuyahoga Co.	68	73	71	75
Columbus	Balance of Franklin Co.	70	73	72	75
Dayton	Balance of Montgomery Co.	69	72	73	75
Toledo	Balance of Lucas Co.	70	70	73	74
Youngstown	Balance of Mahoning Co.	69	70	73	74
	$\bar{x}$	69.4	71.6	72.6	74.6
	±SD	0.79	1.27	0.79	0.53

TABLE 3
Regression results for geographic effects by race

Variable	b	Standard error	t-value (b = 0)	P(b = 0)
		Blacks		
Location*	2.14	.565	3.79	.003
(Intercept)	69.43	—	—	—
		R^2 = .55		
		Whites		
Location*	2.00	.360	5.56	.001
(Intercept)	72.57	—	—	—
		R^2 = .72		

*Dummy variable coded as: city = 0 and suburb = 1.

and Taeuber and Taeuber 1965), it is not surprising that our findings support the arguments of researchers who state that this association determines, in large part, the high mortality rates experienced by urban blacks relative to others (Bertoli et al. 1984, Kitagawa and Hauser 1973, Stockwell et al. 1986, Stockwell et al. 1987).

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