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URBAN NEIGHBORHOOD CONTEXT AND MORTALITY IN LATE LIFE

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RUNNING HEAD: Neighborhood and Mortality

URBAN NEIGHBORHOOD CONTEXT AND MORTALITY IN LATE LIFE

ABSTRACT

Objective: To examine the contextual effects of urban neighborhood characteristics on all-cause mortality among adults aged 70 years and older. **Methods:** Survey data are from the Study of Assets and Health Dynamics Among the Oldest Old (AHEAD), a 1993 U.S. national probability sample of noninstitutionalized persons born in 1923 or earlier. Death is assessed between the baseline assessment (1993) and the first follow-up interview (1995). Neighborhood data are from the 1990 Census. Hierarchical logistic regression is used to estimate multilevel models. **Results:** In multilevel models, the effects of neighborhood-level socioeconomic disadvantage were not significantly associated with 2-year all-cause mortality, net of individual-level variables. The log odds of dying between the two time points are higher in high proportion Hispanic neighborhoods, net of individual-level socio-demographic variables, but this effect is partly mediated by individual-level health variables. The log odds of dying are significantly ($p < 0.05$) lower in affluent neighborhoods, controlling for all individual-level variables, including potential health mediators, and controlling for proportion Hispanic. **Discussion:** There are survival-related benefits of living in an affluent urban neighborhood, which we posit may be manifest through the diffusion of innovations in health care and health promotion activities in these areas.

KEYWORDS: Neighborhood, Mortality, Affluence, AHEAD

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URBAN NEIGHBORHOOD CONTEXT AND MORTALITY IN LATE LIFE

A growing body of research indicates that contextual (e.g., neighborhood) characteristics are associated with risk of death among the general population. Among other things, all cause mortality is elevated in areas characterized by low socioeconomic status (SES) (e.g., Anderson et al. 1997; Bond Huie et al. 2002; Karpati, Bassett, & McCord 2006; LeClere et al. 1997; Lochner et al. 2003; Van Lenthe et al. 2005; Waitzman & Smith 1998), high proportion of minorities or residential segregation (Collins & Williams 1999; LeClere et al. 1997), and urban location (House et al. 2000; Smith et al. 1995). Yet, linkages between neighborhoods and mortality have not widely been examined for older adults in particular, for whom aging-related mobility limitations and healthcare needs may make the local environment especially consequential. This paper examines the contextual effects of urban neighborhood characteristics on 2-year all-cause mortality in a secondary analysis of data from the Asset and Health Dynamics Among Older Adults (AHEAD) study, a survey of a nationally representative sample of adults aged 70 years and older in 1993, linked with 1990 U.S. Census data.

Cagney, Browning & Wen (2005) provide a useful framework for understanding why neighborhood context may be uniquely important in late life, with a focus on self-rated health, which is known to significantly be associated with subsequent death (e.g., Idler & Benyamini 1997). This framework emphasizes collective efficacy theory and the work of Sampson and colleagues (Sampson, Raudenbush, & Earls 1997; Sampson, Morenoff, & Earls, 1999), which identifies informal social control and social cohesion as mechanisms that link health status to neighborhood structural factors. As highlighted by Cagney and associates (2005), this orientation points to two key attributes of neighborhoods—poverty and residential stability.

These investigators also note that affluence may additionally be important in generating a cohesive and trusting environment to older persons who “age in place” because it may influence the provision of health services and neighborhood safety. It stands to reason that similar neighborhood attributes also would be influential to the likelihood of death among older adults because of inherent linkages between morbidity and mortality.

Other solid theoretical evidence exists for why adults may be increasingly vulnerable to the overall health effects of their neighborhood environment as they age. Glass & Balfour (2003) describe four mechanisms of greater vulnerability: longer duration of exposure; increased biological, psychological and cognitive vulnerability; changing patterns of spatial use; and reliance on community sources of social integration. Lawton’s Ecological Model of Aging (e.g., Lawton, 1982) provides an additional theoretical rationale for expecting that neighborhood context may influence mortality in late life. This framework treats health outcomes as a function of both the person and their environment. Specifically, personal characteristics are considered "competencies" (e.g., monetary resources), whereas environmental characteristics are considered "press" (e.g., poverty), or recently, as having “buoying” effects (e.g., social services) (Glass & Balfour, 2003). Thus, the influence of the local environment on health is hypothesized to have its own effect, independent of a person’s own standing in society.

However, the few existing studies that have focused specifically on neighborhood context and mortality in late life generally have not found contextual effects, findings that diverge from studies of the general population and are in contrast to the theoretical expectations described above. For example, Yao & Robert (2008) found that neighborhood socioeconomic disadvantage was not statistically significant in predicting all-cause mortality among adults aged 60 years and over, net of individual-level control variables. Similarly, Waitzman & Smith (1998) found no association between poverty-area residence and all-cause mortality among persons added 55 through 74 years. Also, Anderson et al. (1997) found no association between median Census tract income and all-cause mortality among persons aged 65 years or greater.

Given the compelling theoretical evidence that late life mortality may be influenced by neighborhood context, but contrary findings in previous studies of older adults, an additional examination of this topic is warranted. The goals of this analysis are to: 1) Examine the extent to which all-cause mortality in late life differs, on average, among urban neighborhoods, by examining deaths that occurred between the 1993 baseline data collection and the 1995 follow-up survey of the AHEAD sample; and 2) Investigate the extent to which mortality differences may be the result of parallel differences in the characteristics of the people who live in these urban neighborhoods. We focus on urban areas because theories concerning the impact of neighborhood on health assume an urban environment, because neighborhood carries a different meaning in urban versus rural settings, and because the majority of older persons in the U.S. live in metropolitan areas (Fried & Barron, 2005).

METHODS

The Sample

Survey data are from the Study of Assets and Health Dynamics Among the Oldest Old (AHEAD), a U.S. national probability sample in 1993 of noninstitutionalized persons born in 1923 or earlier (i.e. people aged 70 or older) (Soldo, Hurd, Rodgers, & Wallace, 1997). Subjects were selected using a multistage area probability design and a dual-frame sample of Medicare recipients. Within sampled households, one age-eligible individual was sampled; when that person had a spouse, he or she was also included in the sample irrespective of age. The overall response rate of 80 percent yielded an interviewed baseline sample of 8,222 individuals from 6,047 households. The following were dropped from the present analysis: 775 age-ineligible spouses; 791 proxy interviews, which are inappropriate for measuring key variables; and, 532 with missing or invalid data, principally Census tract identifier or cognitive status. To eliminate the household level of clustering, we randomly sampled one person per household, which drops 1,009 persons. The sample is limited to persons living in Census tracts that are at least 75 percent urban, resulting in a final baseline analytic sample size of 3,442 persons. Weights adjust for variation in probabilities of selection, including the over-sampling of African Americans, Hispanics, and residents of Florida, and the analytic selection of one person per household.

Individual-Level Measures

At the individual level, demographic characteristics known to be associated with morbidity and mortality are controlled. Individual-level health status and health behavior risk factors that may mediate effects of neighborhood context on mortality also are controlled.

Mortality. Death information was obtained from the AHEAD/Health and Retirement Study (HRS) Tracker File, which contains follow-up status data for all participants, including deaths verified through the National Death Index (NDI). Although the Tracker File is updated regularly, it is possible that mortality is underestimated due to unknown deaths. Our dependent variable is scored (1) known to have died between the 1993 baseline and 1995 follow-up interview (n = 302, 8.77%) or (0) not known to have died during this time interval.

Sociodemographics. Standard measures included sex, age, marital status, and ethnicity. Educational attainment was assessed as the highest grade of school or year of college completed. Other SES-related measures included household wealth and income, both log transformed.

Self-Rated Poor Health. Respondents were asked, "Would you say your health is excellent, very good, good, fair, or poor?" with responses ranging from (1) excellent to (5) very poor.

Cognition. Cognitive function was assessed with a multidimensional measure largely adapted from the Telephone Interview for Cognitive Status (TICS) (Brandt, Spencer, & Folstein, 1988), with established reliability and validity (Herzog & Wallace, 1997), and a summed score that ranges from 0 to 35.

Depressive Symptoms. Depressive symptoms were a count of eight items experienced "much of the time in the past week" from the Center for Epidemiologic Studies-Depression Scale (CES-D, $\alpha = 0.78$) (Radloff, 1977).

Physical Functioning. A count of six items comprises the activities of daily living (ADL) measure: bathing, dressing, eating, getting across a room, getting out of bed, and toileting. A count of five items comprises the instrumental activities of daily living (IADL) measure: preparing hot meals, shopping for groceries, making telephone calls, taking medications, and managing money.

Self-Reported Physician-Diagnosed CVD. Respondents were asked about three cardiovascular conditions: 1) Whether a doctor ever told them they had a heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; 2) If a doctor ever told them they had a stroke; and 3) If they have diabetes. Self-reported physician diagnosed CVD was a count of these three conditions, ranging from 0 – 3. Our operationalization of CVD is consistent with National Cholesterol Education Program guidelines (Expert Panel on Detection, Evaluation, and Treatment of High Blood Pressure in Adults, 2001), and partials out the unique effect of heart disease on mortality because it is the leading cause of death in the U.S.

Other Medical Conditions. A count of five other medical conditions also was controlled in our analysis: psychiatric problems, cancer, lung disease, arthritis, and high blood pressure.

Health Behavior Risk Factors. The effects of the following two health behavior risk factors for death are included: ever having smoked cigarettes, scored 0 (no) or 1 (yes); and body mass index (BMI), calculated by dividing self-reported weight (in kilograms) by squared height (in meters).

Neighborhood-Level Variables

Six neighborhood-level variables are analyzed: 1) a socioeconomic disadvantage principal component (proportion of: residents aged 25 or older without a high school degree; households receiving public assistance income; residents living below the poverty level; and residents aged 16 or older who are unemployed); 2) affluence (proportion of households with incomes of $50,000 or more); 3) the proportion of residents who are African American; 4) the proportion of residents who are Hispanic; 5) residential stability (the proportion of people age 5 or older who lived in the same house for the past five years); and 6) old age prevalence (the proportion of persons who are over the age of 65 years).

Analysis

Normalized grand sample weights are applied so that findings can be generalized to the urban population of U.S. older adults. Descriptive statistics are calculated with Stata statistical software. Multilevel hierarchical logistic regression models for predicting 2-year mortality are estimated with HLM 6.02 (LaPlace iterations). The contextual-level variables are grand mean-centered. The gross variance in the odds of dying between 1993 and 1995 that is associated with neighborhood context is estimated with an unconditional model containing only a random intercept at the neighborhood-level. The unadjusted associations between mortality and each of the neighborhood-level variables also are assessed, as is the overall impact on the odds of dying of all individual-level sociodemographic factors. Subsequently, neighborhood-level variables are added to test for significant ($p \leq 0.05$) effects, net of individual-level sociodemographic factors. Neighborhood-level variables that were significant in the previous step are then removed and potential health mediators are added to the individual-level sociodemographic model. Finally, the key neighborhood-level variables are added back to test for significant ($p \leq 0.05$) effects on the odds of dying, net of both individual-level sociodemographic and health factors.

RESULTS

Sample Characteristics

As shown in Table 1, the sample is diverse in its sociodemographic characteristics. There are nearly twice as many women as men, as would be expected in an older population. The average age is seven years greater than the minimum age, but there is substantial variation in this attribute, with a maximum age of over 100 years. Although the sample is predominantly non-Hispanic white, there is substantial representation of African Americans; the proportion Hispanic is low in part because this is an older sample. The most common marital statuses are married and widowed. Education, income, and wealth are all highly variable. A hypothetical average participant rates their health as “good,” is not cognitively impaired (a score of 0 – 12 is indicative of impairment; Freund & Szinovacz, 2002), endorses less than two of eight depressive symptoms, reports minimal ADL and IADL assistance needs, reports no CVD risk conditions, reports approximately one of the other co-morbid conditions, has smoked cigarettes at some time in his/her life, and is slightly overweight.

TABLE 1 ABOUT HERE

Neighborhood Characteristics

As can be seen by the standard deviations in Table 2, the neighborhoods contained within this sample are heterogeneous in their sociodemographic characteristics. The principal component score is difficult to interpret descriptively because it is centered at zero. Consequently, it is more instructive to look at its constituent elements. For each element, the minimum approaches zero (not shown). However, other areas are characterized by concentrated disadvantage, as evidenced by the maximum values: without a high school degree, 86.3 percent; receiving public assistance, 73.5 percent; below poverty level, 86.0 percent; and, unemployment, 48.7 percent. Affluence is similarly distributed, being absent in some neighborhoods and the defining characteristic in other neighborhoods (maximum = 86.5%).

TABLE 2 ABOUT HERE

On average, the tracts have a high density of non-Hispanic whites, although some tracts are entirely African American, whereas others are entirely Hispanic. The neighborhoods tend to have a high proportion of residentially stable households, although this type of household is uncommon in other neighborhoods (minimum = 19.7%). On average, the proportion of persons

65 years or older is low, but some neighborhoods have a high density of older persons (maximum = 82.14%).

Socioeconomic disadvantage is most strongly correlated with low affluence, as would be expected, and both measures are moderately correlated with the density of African Americans and Hispanics. Other correlations among neighborhood characteristics are of modest magnitude.

Multilevel Models

The null model indicates that there is significant variation in the log odds of dying between the baseline and follow-up interview across the Census tracts ($\tau = 0.09$; $p < 0.00$).

Turning to the columns at the far right of Table 2, it can be seen that two of the neighborhood-level characteristics are significantly associated with the odds of dying when only that characteristic is considered in the multilevel analysis. Specifically, socioeconomic disadvantage is associated with higher odds of dying whereas affluence is associated with lower odds of dying. Proportion African American and proportion Hispanic approach statistical significance, but the coefficients for other neighborhood-level characteristics are not statistically different from zero.

Table 3 presents multilevel logistic regression results for the odds of being deceased at follow-up, controlling for baseline individual-level sociodemographic characteristics. Model 3a is the base model that contains only individual-level sociodemographic variables; other models are elaborations of this base model. As can be seen, baseline characteristics associated with subsequent death are generally consistent with previous research on mortality. Specifically, among older adults, the odds of dying over the next two years are greater for males than females, increase with older initial age, and decrease at higher levels of household wealth and income.

Marital status, ethnicity and years of education do not contribute to subsequent mortality net of other variables in the model. This pattern of sociodemographic differences in the odds of dying is duplicated in the other models that contain only sociodemographic characteristics at the individual level (Models 3b and 3c).

TABLE 3 ABOUT HERE

When these individual-level sociodemographic characteristics are statistically controlled in Model 3a, there remains small but statistically significant between-neighborhood variation in the odds of dying over the next two years.

Ensuing models test whether this variation can be attributed to specific attributes of the neighborhood. Although all of the variables in Table 2 were tested, only those neighborhood-level variables that attain statistical significance ($p \leq .05$) in multivariate analysis are presented in Table 3. The neighborhood-level characteristics that do not meet this criterion are: sociodemographic disadvantage (OR = X; CI = X,X), proportion African American (OR = X; CI = X,X), proportion residentially stable (OR = X, CI = X,X), and proportion age 65 and older (OR = X; CI = X,X). In contrast, as can be seen in Table 3, the odds of dying are lower in areas of greater affluence (Model 3b) and higher proportion Hispanic (Model 3c), net of the individual-level sociodemographic characteristics. When neighborhood affluence and proportion Hispanic are included in the model simultaneously (Model 3d), both become marginally non-significant ($p < 0.08$), although the magnitude of their effects on mortality is not substantially altered.

Table 4 adds individual-level health status to the models presented in Table 3 to ascertain whether neighborhood effects are mediated by differences in health. As can be seen in Model

4a, six of the nine baseline health variables are significantly associated with subsequent mortality in the expected direction, with the exceptions being depressive symptoms, ADL assistance, and IADL assistance, the latter of which is bounded by a confidence interval of 1.00. The odds of dying are relatively high for persons who at baseline rated their health as poor, evidenced cognitive deficits, reported cardiovascular or other medical conditions, ever smoked, and had a high body mass index.

TABLE 4 ABOUT HERE

The addition of the health status variables produces some changes in the sociodemographic predictors of mortality. Specifically, the odds ratios for household wealth and income now include 1.00, whereas the odds ratio for education no longer includes 1.00. In contrast, the coefficients for age, gender, marital status, and ethnicity are unchanged. This pattern of sociodemographic and health status associations with mortality is duplicated in multilevel models that contain specific level-2 characteristics (Models 4b and 4c).

Net of both individual-level sociodemographic characteristics and health status, there remains statistically significant between-neighborhood variation. As shown in Model 4b, the odds of dying are significantly lower in areas of greater affluence even when individual-level health is controlled, meaning that individual-level health status does not mediate its effect on the odds of death. In contrast, the effect of proportion Hispanic is no longer statistically significant, although the point estimate does not change substantially (falling from 2.30 to 2.19) once individual-level health variables are accounted for, meaning that a small portion of its influence on the odds of dying is mediated by individual-level health status. As shown in Model 4d, the significant effect of neighborhood affluence is maintained when proportion Hispanic simultaneously is controlled.

DISCUSSION

This study adds to the growing body of research on aging that examines the health effects of neighborhood context by using multilevel modeling techniques to study all-cause mortality. Consistent with other studies (e.g., Waitzman & Smith 1998, Yao & Robert 2008), we found that the effects of neighborhood-level socioeconomic disadvantage were not significantly associated with late life mortality once a myriad of individual-level variables were controlled. Our analysis examined a host of other theoretically-relevant neighborhood-level characteristics, however, some of which did demonstrate meaningful associations with mortality. In particular, the log odds of dying between the two time points are higher in high proportion Hispanic neighborhoods, net of individual-level socio-demographic variables, including individual-level Hispanic ethnicity. This finding suggests that in addition to one's own ethnicity, the ethnicity of one's neighbors also may influence mortality in older adults, although it is possible that neighborhood ethnic composition is a surrogate for neighborhood socioeconomic status and/or other contextual factors not examined in this study. Ultimately, however, we found that the neighborhood effect of proportion Hispanic is, at least partly, mediated by individual-level health variables.

In contrast, the log odds of dying are lower in affluent neighborhoods, controlling for all individual-level variables, including the potential health mediators, and controlling for proportion Hispanic at the neighborhood-level. Thus, it appears to be the presence of economic resources that may be incumbent with neighborhood affluence that matters to the risk of death in late life, rather than the absence of such resources that are associated with neighborhood socioeconomic disadvantage. The socioeconomic disadvantage factor we examined captures the linear effect on mortality of the continuum from poverty to affluence, whereas the affluence variable captures the additional effect of density of high income earners. That is, the proportion of affluent residents in the neighborhood is a measure of the distinctive contribution of high income households, suggesting that the association between mortality and neighborhood socioeconomic status operates as a step function, with the upper end being unique from the entirety of the spectrum.

Why might this be the case? On a historical scale, it is helpful to bear in mind the broad influence of socioeconomic conditions on mortality at any given time (Preston 1975). It is possible that the adoption of health innovations is most pervasive among the socioeconomically advantaged, regardless of need, and/or that innovative health resources are disproportionately distributed to those in affluent areas. Hurley, Pham, and Claxton (2005), referring to findings from the Community Tracking Study, concluded that investments in health care are focused on affluent communities and that there is a geographic component to the growing disparities in access to specialty services and pharmaceuticals between poorer and wealthier communities. Thus, from the Ecological Model of Aging perspective, persons living in affluent communities may benefit from the buoying effects of positive environmental press in the form of innovative healthcare, independent of their own SES, whereas those not living in affluent areas are not privy to the same health-related benefits from their local environment that may counter balance individual-level SES.

In urban areas, neighborhoods are typified by high concentrations of the poor, ethnic minorities, and recent immigrants on the one hand, and very wealthy persons on the other hand, which magnify these healthcare disparities. For example, the observed lower prevalence of poverty-associated diseases in affluent areas can be attributed in part to higher quality healthcare in such areas (Preston 1975). With more preventive and salutary resources available to them, residents in advantaged neighborhoods may have more of their health care needs met, placing them at lower risk for untreated chronic conditions and, ultimately, lower risk of death. Thus, innovation in health care may be quite influential in some urban neighborhoods where the demarcation between affluence and other gradients in residential socioeconomic status provides a fundamental advantage in terms of the morbidity and mortality of its residents.

There are limitations to this research to acknowledge. As discussed in other analyses of the AHEAD data (Herzog & Rodgers, 1999), results may be biased towards a well-functioning population. In addition, selection effects related to unique characteristics of persons who reside in certain Census tracts cannot be ruled out as an alternative explanation for our results. Also, the use of self-reported assessments of health leaves open the possibility for confounding by differences in awareness of specific health conditions. Finally, whereas other researchers have found significant mortality-related neighborhood disadvantage effects for cardiovascular deaths in late life (e.g., Diez Roux et al. 2006), the cases of cause-specific mortality were too few to analyze in our study and it is possible that similar effects were undetectable.

Notwithstanding these limitations, our analysis offers unique insight into associations between neighborhood characteristics and all-cause mortality in late life on a national level. Two of our key findings indicate that the negative press of neighborhood socio-economic disadvantage is attenuated by individual-level socio-demographic characteristics and the negative press of high proportion of Hispanic residents is partly mediated by individual-level health behavior and risk factors. The third key finding is that neighborhood affluence maintains a significant impact on the log odds of dying, net of both individual-level socio-demographic and health factors, a "buoying" effect. We posit that the survival-related benefits of living in an affluent neighborhood may manifest themselves through the diffusion of innovations in health care in these areas, in addition to health promotion behaviors and resources that are prominent in economically advantaged urban locales.

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TABLE 1. Individual-level characteristics (unweighted) of sample of U.S. urban adults aged 70+ in 1993, *n* = 3,442

	% or Mean	SD
Individual-Level Sociodemographic Variables		
Gender		
Female	63.97	
Male	36.03	
Age (years)	77.20	5.71
Ethnicity		
Non-Hispanic White	75.25	
African American	17.14	
Hispanic	6.30	
Other	1.31	
Marital status		
Married	39.16	
Widowed	48.78	
Separated/Divorced	7.67	
Never married	4.39	
Education (years)	11.15	3.61
Income (thousands $)	25.57	63.50
Wealth (thousands $)	169.64	392.19
Individual-level health variables		
Poor health rating (1-5)	2.96	1.16
Cognition (1 – 35)	19.54	5.83
Depressive symptoms (0 – 8)	1.70	2.03
ADL assistance (0-6)	0.54	1.13
IADL assistance (0-5)	0.35	0.79
Cardiovascular risk conditions (0-3)	0.39	0.49
Other medical conditions (0-5)	1.08	0.92
Ever smoked cigarettes (/never)	0.55	
Body Mass Index	25.59	4.53

Table 2. Correlations of Census-tract variables and simple multilevel logistic regressions of mortality.

Tract-Level Variables	Correlation[a] I.	II.	III.	IV.	V.	VI.		*OR*[b]	95% *CI*
I. Socioeconomic Disadvantage[c]	1.000							1.19	1.08, 1.31
II. Affluent[d]	-0.749***	1.000						0.24	0.11, 0.53
III. African American[d]	0.577***	-0.346***	1.000					1.39	1.00, 1.94
IV. Hispanic[d]	0.377***	-0.222***	-0.138***	1.000				1.78	0.99, 3.21
V. Residentially Stable[d]	0.018	0.145***	0.177***	-0.084**	1.000			1.15	0.43, 3.06
VI. Aged 65 and Older[d]	-0.054†	-0.126***	-0.127***	-0.173***	0.187***	1.000		0.37	0.10, 1.39
M	-0.014	0.251	0.195	0.119	0.534	0.143			
SD	1.053	0.172	0.311	0.209	0.134	0.086			
Range	-2.61-5.38	0.0-0.86	0.0-1.00	0.0-1.00	0.11-0.82	0.01-0.82			

Notes: Mortality was regressed separately on each Level 2 variable; no individual-level characteristics were controlled.

[a] N_j = 1,217 tracts.

[b] N_j = 1,217 tracts; N_i = 3,442 individuals.

[c] Factor score.

[d] Proportion.

† $p < .10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 3. Multilevel logistic regressions of mortality among U.S. urban adults aged 70+ in 1993

Independent Variables	Model 3a OR (95% CI)	Model 3b OR (95% CI)	Model 3c OR (95% CI)	Model 3d OR (95% CI)
Individual-level sociodemographic variables				
Female (/male)	0.53(0.39,0.71)	0.53(0.40,0.71)	0.52(0.39,0.70)	0.53(0.39,0.71)
Age (years)	1.08(1.06,1.10)	1.08(1.06,1.10)	1.08(1.06,1.10)	1.08(1.06,1.10)
Widowed[a]	1.07(0.77,1.49)	1.07(0.77,1.49)	1.07(0.77,1.49)	1.07(0.78,1.49)
Separated or divorced[a]	0.91(0.56,1.50)	0.89(0.54,1.46)	0.92(0.56,1.50)	0.90(0.55,1.47)
Never Married[a]	1.15(0.64,2.09)	1.13(0.63,2.04)	1.13(0.62,2.04)	1.11(0.62,2.00)
African American[b]	0.94(0.68,1.29)	0.86(0.62,1.19)	0.95(0.69,1.31)	0.88(0.64,1.22)
Hispanic[b]	0.96(0.57,1.63)	0.90(0.53,1.53)	0.60(0.30,1.20)	0.59(0.30,1.19)
Other ethnicity[b]	0.60(0.17,2.13)	0.60(0.17,2.12)	0.56(0.16,1.98)	0.57(0.16,2.00)
Years of education	1.01(0.97,1.05)	1.02(0.98,1.06)	1.02(0.98,1.06)	1.02(0.98,1.06)
Household wealth (log)	0.67(0.51,0.87)	0.71(0.54,0.93)	0.67(0.52,0.88)	0.71(0.54,0.93)
Household income (log)	0.84(0.73,0.97)	0.84(0.73,0.97)	0.84(0.73,0.97)	0.84(0.73,0.97)
Census Tract-Level Variables				
Affluence[c]		0.38(0.15,0.96)		0.42(0.17,1.07)
Hispanic[c]			2.30(1.02,5.17)	2.08(0.92,4.70)
Intercept Variance Component				
Between-group (τ)	0.0037 ($p \leq .01$)	0.0031 ($p \leq .02$)	0.0032 ($p \leq .04$)	0.0030 ($p \leq .06$)

[a] Reference group = married.
[b] Reference group = non-Hispanic white.
[c] Proportion.

Table 4. Multilevel logistic regressions of mortality among U.S. urban adults aged 70+ in 1993

Independent Variables	Model 4a OR (95% CI)	Model 4b OR (95% CI)	Model 4c OR (95% CI)	Model 4d OR (95% CI)
Individual-level sociodemographic variables				
Female (/male)	0.60(0.43,0.82)	0.60(0.43,0.83)	0.59(0.43,0.81)	0.58(0.43,0.80)
Age (years)	1.06(1.04,1.09)	1.06(1.04,1.09)	1.06(1.04,1.09)	1.06(1.04,1.09)
Widowed[a]	1.11(0.79,1.57)	1.12(0.79,1.58)	1.11(0.79,1.57)	1.13(0.80,1.59)
Separated or divorced[a]	0.94(0.56,1.60)	0.92(0.54,1.55)	0.95(0.56,1.62)	0.93(0.55,1.58)
Never Married[a]	1.20(0.65,2.21)	1.19(0.64,2.18)	1.18(0.64,2.18)	1.18(0.64,2.18)
African American[b]	0.88(0.62,1.26)	0.81(0.57,1.15)	0.90(0.64,1.28)	0.82(0.57,1.17)
Hispanic[b]	0.89(0.62,1.26)	0.84(0.49,1.45)	0.58(0.27,1.23)	0.56(0.27,1.17)
Other ethnicity[b]	0.60(0.16,2.27)	0.60(0.16,2.24)	0.58(0.15,2.20)	0.57(0.15,2.14)
Years of education	1.06(1.01,1.11)	1.07(1.02,1.11)	1.06(1.01,1.11)	1.06(1.02,1.12)
Household wealth (log)	0.81(0.62,1.07)	0.87(0.66,1.16)	0.82(0.62,1.08)	0.88(0.66,1.17)
Household income (log)	0.88(0.76,1.03)	0.89(0.77,1.03)	0.88(0.76,1.03)	0.89(0.77,1.03)
Individual-level health variables				
Poor health rating (1-5)	1.25(1.10,1.43)	1.25(1.10,1.42)	1.25(1.10,1.42)	1.26(1.11,1.43)
Cognition (1-35)	0.96(0.94,0.99)	0.96(0.94,0.90)	0.96(0.94,0.99)	0.97(0.94,0.99)
Depressive symptoms (0-8)	1.04(0.97,1.11)	1.04(0.98,1.11)	1.04(0.97,1.11)	1.04(0.98,1.11)
ADL assistance (0-6)	1.08(0.95,1.23)	1.08(0.95,1.23)	1.07(0.95,1.22)	1.09(0.96,1.24)
IADL assistance (0-5)	1.17(0.99,1.38)	1.18(1.00,1.39)	1.18(1.00,1.40)	1.20(1.02,1.42)
Cardiovascular risk conditions (0-3)	1.34(1.12,1.60)	1.34(1.13,1.61)	1.34(1.13,1.61)	1.27(0.96,1.69)
Other medical conditions (0-5)	1.28(1.10,1.49)	1.28(1.10,1.49)	1.29(1.11,1.50)	1.28(1.11,1.47)
Ever smoked cigarettes (/no)	1.76(1.30,2.40)	1.76(1.30,2.39)	1.78(1.31,2.40)	1.78(1.32,2.41)
Body mass index	0.95(0.93,0.98)	0.95(0.93,0.98)	0.95(0.93,0.98)	0.95(0.92,0.98)
Census Tract-Level Variables				
Affluence[c]		0.34(0.13,0.88)		0.37(0.14,0.97)
Hispanic[c]			2.19(0.90,5.36)	1.92(0.80,4.64)
Intercept Variance Component				
Between-group (τ)	0.0035 ($p \leq .02$)	0.0030 ($p \leq .03$)	0.0033 ($p \leq .02$)	0.0030($p \leq .03$)

[a] Reference group = married.
[b] Reference group = non-Hispanic white.
[c] Proportion.