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Neighborhoods and the Health of the Elderly: Challenges in Using National Survey Data

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Introduction

A growing literature has demonstrated that neighborhoods of residence affect health and may contribute to socioeconomic disparities in health. Contextual effects have been documented across a wide spectrum of populations, including both children and adults. However, neighborhood effects on the health of the elderly are currently understudied. Neighborhoods of residence across the lifecourse are likely to affect health status in late life and to contribute to observed disparities for several reasons. Neighborhoods have been demonstrated to have effects on health throughout early and mid life. Further, for most people, their most salient health events occur later in life. Thus, one would expect features of both current neighborhoods of residence and of those from over the lifecourse to affect elderly health. Neighborhood features may be protective or harmful for health of persons once in old age. Given the rapidly aging population, and the potential economic and social benefits of having older persons age in place, understanding the effects of neighborhoods on the health of the elderly is important for the formulation of public policy.

In this paper, we provide an overview of what is known about neighborhoods and health in late life and discuss the potential and challenges of using national survey data to study this topic. We begin with a theoretical model of how neighborhoods affect health throughout the lifecourse. We then review the literature linking neighborhoods to health in late life. The advantages and challenges in using national survey data such as the Health and Retirement Survey (HRS) and Panel Study of Income Dynamics (PSID) are then discussed. We end with a list of recommended topics for further investigation.

Framework

Neighborhoods may influence late-life health through a number of pathways (see Figure 1). The IOM (1991) disablement framework, which distinguishes among disease, functional limitation, and disability, serves as the starting point for this framework. We extend the IOM framework to include mortality and self-rated general health status, which are both influenced by disease, functional limitation, and disability, as well as the variety of individual and neighborhood factors that influence health in general.

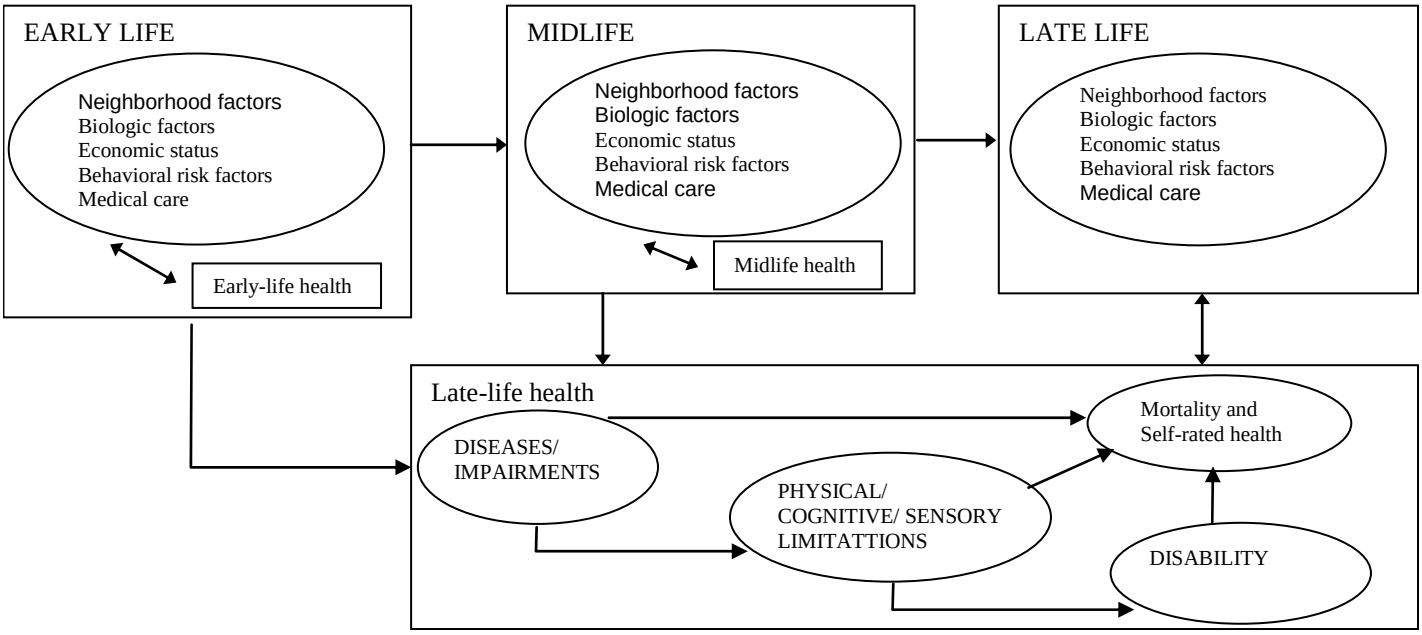
We highlight this process in late-life in the Figure, although the process happens continuously throughout the lifecourse; that is, similar "early-life health" and "mid-life health" boxes exist, which we simplify in the figure due to space constraints. Importantly, neighborhood effects, like most risk factors, are likely to be cumulative and may influence late-life health as much as the current environment. Thus, the neighborhood inhabited at birth and in early childhood, during adulthood, and at retirement all influence health. However, most studies to date have focused on contemporaneous neighborhood influences at a given stage in life, rather than the influence of neighborhood exposures over the lifetime on health outcomes in late life.

Drawing upon Krause (1996) and Taylor et al. (1997), we highlight four key domains of neighborhoods that may affect the health of elderly persons: *environmental stressors; pollutants; safety/mobility/access measures* that are outgrowths of the built environment; and the *social and economic environment.*

The first domain, broadly defined as ***environmental stressors***, relates to features of the physical environment that produce chronic stress over the life course. As argued by McEwen and Stellar (1993) and Seeman and Chen (2002), stressors in the environment interact with individual factors (e.g., genetic predisposition and other biologic factors), leading to differences in the susceptibility to stress, stress-related disease, and accompanying functional decline (Steptoe & Feldman, 2001). Elements of the built environment may also be stressors, such as excessive noise, traffic, poor housing quality (e.g. rodents and cockroaches, dilapidated structures, inadequate running water or heat) and extreme weather patterns (Ellen *et al.* 2001).

The second domain, ***environmental pollutants***, encompasses exposures that might bring about chronic conditions or exacerbate these conditions. We include in this domain air, water, and other toxic pollutants. For example, repeated exposure to toxic waste sites may result in malignancies later in life (American Cancer Society, 2002), which in turn may lead to functional decline (Teno *et al.,* 2001; Michael *et al.*, 2000). Thus, exposure to water contamination or toxic wastes is likely to affect health status, particularly though cumulated effects in the lifecourse. Similarly, air pollution may make it difficult for someone with chronic obstructive pulmonary disease to climb stairs without resting or to go for a walk outside (Mannino, 2002). Other evidence, found in Graig (1993) demonstrates the noxious effects of carbon monoxide on health in lower SES areas. In a recent article, Pope and colleagues found that air quality increased the risk of lung cancer (Pope *et al.*, 2002).

Figure 1. The Late-life Disablement Process: Influences Over the Life Course



The third domain includes features related to ***safety, mobility, and access***. Again these factors may operate on late-life health either through a cumulative process on the underlying health trajectory or by directly facilitating/impeding activities in old age. For example, by providing safe places to participate in physical activity, the availability of parks and recreation may facilitate healthy behaviors that have a beneficial affect on health well into late life (Brownson *et al*, 2001; Jackson & Kochtitzky, 2001). In addition, by enhancing the current environment, such features may promote functioning outside the home in late-life (Centers for Disease Control and Prevention, 1999). Better street connectivity, sidewalks, and curbs further enhance the mobility of elderly persons and enable them to maintain physical activity by walking. Physical activity has been demonstrated to have a protective effect on physical functioning decline in the elderly (Seeman and Chen, 2002). The built environment may also contribute to unintentional injury. Poor upkeep of housing units, including stairwells, may increase the likelihood of falls. Further, there is evidence that home upkeep declines with advancing age (Reschovsky and Newman, 1981) and may thus contribute to more injuries from falls.

Injuries are a particular concern for older persons as they lead to functional limitations and may contribute to declining health trajectories.

Access to basic services in the community is also likely to influence the health of elders. For instance, having an accessible health care provider will enable elderly persons to obtain needed medical attention more easily (IOM, 2002). Similarly, ready access to a full service grocery store will provide better and more affordable access to food supplies. Proper nutrition is known to contribute to better health in the elderly (IOM, 2000). The presence of religious institutions in the community may provide social supports that have protective effects on health (Krause, 1998).

Access to basic services and mobility are both enhanced by public transportation and street connectivity (i.e., streets lead to other streets and stores, rather than just ending in cul-de-sacs). Having access to a car, or the use of mass transit, may enable greater mobility and utilization of local resources. Street connectivity may result in smaller walkable neighborhoods and create the opportunity to walk, both recreationally and to complete necessary errands independently. Research has demonstrated that people walk more when they live in communities that have greater housing and population density and more street connectivity. This, in turn, enhances opportunities for social interaction.

The ***social and economic environment*** is the fourth domain. A key factor in this domain is crime (Lawton, Nahemow and Yeh, 1980). Fear of crime is an important factor in reducing physical activity outside the home for elderly persons (Dowd, Sisson and Kern, 1981). It is also a stressor that can influence health through pathways related to chronic stress. Fear of crime is related both to actual crime levels and to deteriorated aspects of the physical environment such as vacant buildings, litter and homeless persons (Rohe and Burby, 1988; Krause, 1996). Another important stressor in the social environment is the presence of discrimination. Discrimination, whether racial or gender-based, has a negative influence on health. (Krieger and Higgins, 2002; Williams, 1999). Further, discrimination has been linked to inequities in the delivery of high quality medical care (IOM, 2002), resulting in fewer resources to restore health in the case of adverse health events or to treat ongoing chronic conditions.

There is also evidence that social relationships are related to health among the elderly (House, Landis and Umberson, 1988). Aspects of the social environment may be either negative or protective. For instance, segregation may be associated with poor neighborhood resources and thus lead to poor health. However, the availability of social support in one's immediate neighborhood may be related to the number of persons of similar cultural background and in the same age groups. Thus, segregation may also be associated with environments that provide social support within minority enclaves and minimal exposure to discrimination related to majority-occupied neighborhoods. Population density may also be related to the level and quality of social contacts. In densely populated areas, it is not easy to distinguish residents from strangers. When people are perceived as strangers and there is little ability to interact, there are higher rates of crime and fewer social networks established to serve as social supports. Population density itself has been negatively related to health due both to stress and the increased presence of infectious disease (Graig, 1993). Other social supports may be provided by the presence of religious institutions or other services in the community that have protective effects on health (Krause, 1998).

Finally, there is a well-documented literature on the effects of the socioeconomic aspects of neighborhoods on health (see Roberts (1999), Yen and Syme (1999) and Morenoff and Lynch 2002 for reviews). These studies consistently demonstrate that neighborhood socioeconomic characteristics (such as concentrated poverty, poor educational attainment and high unemployment) are associated with poorer health

status, controlling for individual income. The exact mechanism through which these socioeconomic factors influence health is not well established. Presumably socioeconomic status of the neighborhood influences the three other factors described above -- environmental stressors; pollutants; safety/mobility/access – which in turn alters health. .Of particular importance for the elderly is the fact that these pathways appear to be strongly associated with a variety of health and behavioral outcomes early in life that influence health cumulatively throughout the lifecourse.

Prior Studies Linking Neighborhoods Characteristics to Health in Late Life

The literature on neighborhood influences on health in late life has been motivated by a number of practical and theoretical considerations. Late-life neighborhood influences have been investigated by gerontologists interested in housing preferences of older adults (Lawton et al. 1980); by psychologists interested in maximizing the health and well-being of older adults (Lawton et al. 1980, 1984; Krause, 1996); and by sociologists and social epidemiologists interested in identifying environmental risk factors that bring about chronic disease, disability, and death (Balfour and Kaplan, 2002; Clarke and George, 2005; Yen and Kaplan, 1999). More recently applied studies have turned to the role of the built environment in encouraging physical activity (Li et al. 2005) and deterring disability in late life (Clarke and George, 2005; Schootman et al. 2006).

Although studies explicitly focusing on late life have been relatively limited in number, they have included a range of health-related measures (e.g., functional and disability status, self-assessed health, and well-being). Comparisons across studies are complicated by the variation in neighborhood measures, with some studies relying on data provided by respondents, others by observers, and still others relying on links to census and other external data. Not only have the measures varied across studies, but the definition of neighborhood – e.g., census block, census tract, county, school district – differs as well, with this choice driven largely by the availability of data.

Many of the studies are cross-sectional, making it difficult to sort out causal relationships. With few exceptions (Krause 1996; Robert and Li, 2001; Lawton, et al. 1984), studies are generally based on local samples, offering rich detail on neighborhoods, but little generalizability (Balfour and Kaplan, 2002; Cagney et al., 2005; Clarke and George, 2005; Kubzansky et al. 2005; Li et al. 2005; Schootman et al. 2006; Usai and Keil, 1987; Yen and Kaplan, 2002). Moreover, with few exceptions (Cagney et al. 2005; Robert and Li, 2001), sample sizes have not been adequate to support comparisons of neighborhood influences on important subgroups of older adults (e.g., by age, race/ethnicity, or socioeconomic status). Recently, the literature has been adopting more advanced modeling techniques, relying on multilevel regression models to distinguish compositional effects from contextual effects (Subramanian et al. 2003).

Functional status and disability

Despite attention to the environmental component in conceptual models of disability (IOM, 1991), studies of disability onset have traditionally ignored the role that the neighborhood environment plays in the disablement process (Stuck 1999). Although sizeable regional variation in disability prevalence has been established (Lin, 2000; Lin and Zimmer 2002), variation on a more local level has been examined in only three studies. Balfour and Kaplan (2002) studied 883 persons aged 55 and older in Alameda County between 1994 and 1995. They found that several self-reported problems with neighborhoods were related to functional loss, including excessive noise, inadequate lighting and night, heavy traffic and limited access to public transportation. Importantly, their study was longitudinal, focusing on the onset (rather than the presence) of

disability. More recently, Clarke and George (2005) examined the role of the built environment in the disablement process for a sample of 4,154 older adults drawn from central North Carolina. Using survey data linked to 1990 census tract data, they found that older adults report greater independence in IADLs when they live in environments with more land use diversity and that among those with functional limitations housing density is inversely related to self-care disability. A third study by Schootman and colleagues examined the risk of onset of lower body limitations among 563 middle-aged African Americans around St. Loius, Missouri. Using assessments by surveyors of neighborhood conditions, they found that people living in neighborhoods with 4-5 vs 0-1 fair/poor conditions were more than 3 times as likely to develop a lower body limitation. However, they found no association between perceptions of neighborhood quality and lower body limitations.

Self-assessed health

There are also a small number of studies addressing the effect of neighborhoods on self-assessed health in late life. These studies tend to indicate that deteriorated neighborhoods influence health. For instance, Krause (1996) studied 1103 elderly Medicare beneficiaries in 1992. He found that individuals living in the most deteriorated neighborhoods (as measured by interviewer assessment of overall condition of dwelling, condition of other buildings in the neighborhood, condition of yards and sidewalks, amount of noise, and air quality) reported lower health status. These findings persisted even when socioeconomic factors were controlled for, although income was not measured by individual or family income but through a self-reported measure of financial strain. The study also suggested there may be threshold effects related to neighborhood deterioration. In a follow-up study (Krause, 1999), he found that persons who relied heavily on religious coping were protected from the noxious effects of living in a dilapidated neighborhood on changes in self-rated health over time. A third study by Cagney and colleagues (2005) examined the role of neighborhoods in racial disparities in self-rated health. Analyzing data for a sample of 636 Chicago residents ages 55 and older, they found that a neighborhood's affluence contributes positively to self-rated health and explains some of the association between race and self-rated health. However, a measure of a neighborhood's social resources was not associated with self-assessed health in this older population.

Well-being

A few additional studies have focused on the psychological well-being of older adults and how it is influenced by the environmental context. Lawton (1970) was one of the earliest studies to examine the influence of the 'suprapersonal environment' that is the characteristics of other people in physical proximity to an individual. He hypothesized that the greater the deviation of an individual from the suprapersonal environment, the stronger the negative influence of the environment on well-being. In a follow-up study Lawton and colleagues (1984) tested this hypothesis by analyzing data from the 1968 National Senior Citizens Survey, which included a self-assessed item on the estimated percentage of older people in the neighborhood. They found high age density was associated with activity participation, social interaction, morale, and perceived quality of life. Their measure of age density was however subject to considerable measurement error. Usuai and Keil (1987) studied the relationship between age concentration and life satisfaction for a sample of people 60 years of age and older living in Jefferson County, Kentucky. Their measure of age concentration was calculated from linkages to tract-level 1980 census data. They found that age concentration has a small but negative relationship with life satisfaction.

More recently, Kubzansky and colleagues (2005) examined the relationship between the environmental context and the onset of depression in late life. The authors linked tract-level 1980 census data to surveys of 2,109 older adults from New Haven, Connecticut. They further supplemented these data with additional density-based measures on health, financial, social, recreational, and food-related services and an index of undesirable amenities, constructed from the yellow pages. They found living in poor neighborhoods was associated with higher levels of depressive symptoms in older adults and that the greater the percentage of elderly people in the neighborhood, the better the mental health of an older individual. Variation in access to services did not explain neighborhood variations in depressive symptoms. Ostir and colleagues (2003) studied neighborhood composition and depressive symptoms among older Mexican Americans living in 5 southwestern states (N=3050). They found that greater neighborhood poverty was associated with higher depressive symptoms and that the concentration of Mexican Americans was inversely related to depression in this population.

Mortality

The literature on the effects of neighborhoods on the elderly is equally sparse. Only three studies have considered the effects of neighborhoods on persons over 65. In a large cross-sectional study, Anderson and colleagues (1996) linked census tract socioeconomic data (median income) to individual SES data (family income from the Current Population Survey) for 233,600 individuals from the National Longitudinal Mortality Study. They performed separate analyses for individuals aged 25-64 and for those aged 65 and older. They found that mortality was not associated with either individual or census tract income for the elderly, except among white men. For elderly white men, individual income was associated with higher mortality. This is in contrast to findings for persons aged 25-64. After accounting for family income affects black men and women residing in low income areas had 40% and 30% respectively higher mortality than those residing in higher SES areas. This study points to potentially different effects of neighborhoods on the elderly compared to younger adults. However, the study only included a single neighborhood measure, median census tract income, and not a broader range of neighborhood characteristics. Yen and Kaplan (1999) analyzed data from the 1983 wave of the Alameda County Study (n=1,129) and deaths over 11 years. They found that age- and sex-adjusted risk of death was higher for residents in low social environment neighborhoods (those with few commercial stores, low population socioeconomic status, and poor environment/housing) even after account was taken of individual income level, education, race/ethnicity, perceived health status, smoking status, body mass index, and alcohol consumption. Finally, Eschbach and colleagues (2004) compared morbidity and mortality rates for Hispanics according the percentage of Mexican Americans living in the census tract. They found that over 7 years of follow-up the odds of mortality (and of disease prevalence) decreased as a function of percentage of Mexican. They concluded that socio-cultural advantages conferred on Mexican Americans by living in high-density Mexican American neighborhoods outweighed the disadvantages conferred by the high poverty of those neighborhoods.

Challenges in Studying Neighborhoods in Late Life

Prior studies of the effects of neighborhoods on the health of the elderly have been based primarily on small-area studies. The advantage of such studies is that they are typically based on primary data collections, so that detailed information can be collected regarding features of the neighborhood environment. The disadvantage is that they are based on limited geographic areas, often one city or county, and the results cannot

be generalized beyond the geographic area of study. Further, the sample sizes are often too small to disaggregate the population into subgroups of interest, limiting the ability to study the role of neighborhoods in explaining disparities in health among the elderly.

An alternative approach is to use national survey data, which have the advantages of generalizability and large sample sizes. In particular, it is possible to study subpopulations of the elderly. However, information on neighborhood features has to be linked from external secondary databases such as the census. This approach also has challenges, such as the types of neighborhood features that can be studied and the definition of neighborhood boundaries. In addition, there are many technical challenges in performing such linkages, particularly in longitudinal data sets. In this section of the paper, we highlight the strengths and challenges in using two large, nationally representative data bases for the study of neighborhood effects on health in the elderly, the Health and Retirement Survey and the Panel Study of Income Dynamics. To date, these data sets have not been widely used for the study of neighborhoods and the elderly.

The Health and Retirement Survey (HRS), conducted by the University of Michigan, began in 1992 as a national longitudinal study of the initially noninstitutionalized population initially born between 1931 and 1941 (i.e., age 51 to 61 at the time of the baseline survey) and their spouses. Respondents and their spouses were reinterviewed in 1994 and 1996. In 1998, the HRS was combined with its sister survey (AHEAD) of persons ages 70 and older in 1993 and missing cohorts were added to form a uniform survey of people ages 51 and older. Respondents to the 1998 wave and their spouses were reinterviewed every two years thereafter. The birth cohorts from 1948-1953 (early baby boomers) were added to the sampling frame in 2004. In the past the surveys used a mixture of modes, conducting most new interviews in person and most reinterviews by phone. The plans for the 2006 and 2008 surveys are to interview half of the respondents in person in each of these waves.

The PSID is a longitudinal survey of a representative sample of U.S. individuals and the families in which they reside. The PSID sample, originating in 1968, consisted of two independent samples: a cross-sectional national sample (the SRC sample) and a national sample of low-income families. (See Hill (1992) for details.) The PSID has interviewed and reinterviewed individuals from families in the core, whether or not they were living in the same dwelling or with the same people. Adults have been followed as they have grown older, and children have been observed as they advance through childhood and into adulthood, forming family units of their own or “split-offs.” As a consequence of low attrition rates (on average 2-5% between each wave) and the success in following split-offs, the sample size has grown from 4,800 families in 1968 to 8,000 families in 2005. The PSID was collected in face-to-face interviews using paper and pencil questionnaires between 1968 and 1972. Thereafter, the majority of interviews were conducted over the telephone.

The HRS has many strengths for studying the effect of neighborhoods on the health of the elderly. These include detailed measures of health and socioeconomic status and large sample sizes. The HRS has a large number of near elderly and elderly respondents; in 2002 there were 16,612 over age 50 and 10,405 over age 65. Thus, it is possible to study the effects of neighborhoods on late life health for important subpopulations of the elderly such as minorities, women and persons of low socioeconomic status. There are also a large number of census tracts (4,917 for persons over age 50 and 3,699 for persons over age 65) with a great diversity in neighborhood features. A description of neighborhood features for the HRS respondents and their variation is provided in Table 1 below for some of the major categories of neighborhood characteristics described in the previous section. The survey includes geocoded information with identifiers for state, county, zip code, and census tract and block-numbering areas for each respondent in each year, so that variables can be linked to the survey at multiple levels of aggregation.

The HRS contains detailed measures of health status, including disability and functional limitation items (ADL and IADL), chronic conditions, affect (measured by the CES-D scale and the CIDI-SF for major depressive episodes), self-assessed physical and mental health, self-reported information on height and weight and mortality through linkage to the National Death Index. The survey also has excellent measures of socioeconomic status, including both income and assets. It further contains oversamples of Black and Hispanic elderly and the oldest-old, and is thus particularly useful for studying these subpopulations of the elderly.

The PSID contains relatively fewer older respondents than the HRS (3912 persons over age 50 and 1,377 over age 65 in 2003). Due to smaller sample sizes, the PSID is more limited in its ability to study subpopulations of the elderly compared to the HRS. However, it is possible to study earlier-life neighborhood effects exploiting the panel nature of the PSID. Due to the long panel for the PSID (first fielded in 1968), the PSID is the only national data set currently available to study the effects of early-life and mid-life neighborhoods on health in old age. The PSID geocoded information is very similar to the HRS information. The identifiers include state, county, zip code, and census tract and block-numbering areas for each respondent in each year. Due to migration over nearly 40 years of the initial group sampled in 1968, today the PSID contains people living in a large number of census tracts. In 2003, for persons over age 50 and older there are 1549 census tracts and for those 65 and older, 696 tracts. Thus, there is also a great diversity in neighborhood features represented in this data set, as shown in Table 1 below.

The major advantage of the PSID is that one can construct measures of neighborhood quality over a large portion of sample members' lives, coupled with rich detail on early-life and midlife socioeconomic data at the individual and family levels. The PSID contains a more limited number of health status measures than the HRS, and not all health measures have been collected since the survey began in 1968. The PSID measures difficulty and help with ADLs and IADLs and also includes self-reported information on height, weight, 12 different chronic conditions, and general health status. Over 4,000 PSID sample members have died since 1968, which can be used to support analyses of mortality. Well-being can be measured through the K6, a measure of non-specific psychological distress developed by Kessler and colleagues.[1]

Data from the census can be used to create measures for many of the domains described in the literature review. Table 1 provides information on some representative measures from the 2000 census for each of three domains of neighborhoods: social and economic environment, environmental stressors, and safety/mobility/access. Geocoded data is provided for the 2002 HRS and the 2003 PSID for each of two samples: persons aged 50 and older and those 65 and older. Neighborhoods are defined by census tracts. Data for all persons in the census are provided in the first column for reference.

The census contains a wide range of information on the ***social and economic environment***, including poverty, education, unemployment, racial and ethnic composition and age composition of neighborhoods. These features have a wide range of variability in both the HRS and PSID for persons over age 65. For instance, the percent of persons in poverty in a neighborhood averages 12.7% for elderly respondents in the HRS, with a standard deviation of 10.9%. In the PSID the mean is 12.6% with a standard deviation of 10.8%. Similar variation exists in other aspects of the social and economic environment. For example, for elderly respondents in the HRS, the mean value of the percent of the population in the neighborhood that is non-Hispanic black is 14.7% with a standard deviation of 25.6% In the PSID it is 17.9% with a standard deviation of 29.3%.

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[1] A complete list of the health data, including an assessment of these data, is available on the PSID web site (http://psidonline.isr.umich.edu/Guide/Report_On_Health_QsV2.pdf).

Census data can also be used to create measures of ***environmental stressors***, such as crowding and dilapidated housing. Table 1 provides information on some of these features of neighborhoods for the HRS and PSID. For elderly respondents in the HRS, on average 8.2% of neighborhood housing units are vacant (SD=8.4%). A similar fraction of housing units are vacant in the neighborhoods for elderly PSID respondents, 8.6% (SD=9.0%). Population per square mile, a measure of crowding, averaged 6047 (SD=14,651) for elderly respondents of the HRS and was somewhat lower, 5,308 (SD=12,814) in the PSID.

Finally, measures of ***safety, mobility and access*** can be created from the census. Table 1 includes information on street connectivity, block length and block size. The median block length for persons in the HRS is similar to the PSID (0.57 miles compared to 0.55 miles). Census data can also be used to create measures of street connectivity. Table 1 contains two street connectivity measures: the alpha index and the gamma index. The alpha index is defined as the ratio of the number of actual circuits to the maximum number of circuits. A circuit is a finite, closed path starting and ending at a single node. The average value of the alpha index for neighborhoods of elderly HRS respondents is 0.168 and in the PSID 0.162. The gamma index, another measure of street connectivity, is defined as the ratio of the number of links in the network to the maximum possible number of links between nodes. For elderly HRS respondents, the gamma index in their neighborhoods of residence averages 0.447 and in the PSID it averages 0.443.

While there are many advantages to using these large data sets for studying neighborhood effects in the elderly, there are also several challenges. The most important is that neighborhood features must be linked to the surveys from secondary data sets such as the census. Thus, neighborhood definitions are limited to the geographic boundaries contained in those data sets (block groups, census tracts etc.). While neighborhoods can be defined as aggregates of these boundaries, they may not correspond to theoretical constructs for neighborhoods. Further, some data are only available at the county or MSA level, which may be too large of an area to accurately capture a neighborhood effect of interest

There is, however, some information on neighborhood features from direct observation of interviewers in both the HRS and PSID. Data on neighborhood features was collected in the HRS by interviewers in 2004 for part of the sample. These questions will be repeated in 2006 and 2008. Half of the sample will be interviewed in person in each of those waves. Data collected in 2004 included observations about the quality of the interior rooms, exterior housing structure, and immediate surroundings of the respondent's home or building. For example, the interviewer was asked to describe the type of home, by indicating the type of structure, the number and size of rooms, its cleanliness and appearance. Interviewers were also asked to describe the quality of the neighborhood by indicating distance to other homes/buildings, type of housing in the area (including vacant buildings). Additionally, they were asked to rate the upkeep of nearby structures and the presence of vandalism, trash, boarded houses, homeless people and prostitution, etc. They were also asked to note the visibility of parks, playgrounds or nearby garden areas.

Table 1: Neighborhood Features of Persons Aged 50 and older in the HRS and PSID

	Census (2000)	**HRS (2002)**		**PSID (2003)**	
Census Variables		Age 50 plus sample Means	Age 65 plus sample Means	Age 50 plus sample Means	Age 65 plus sample Means
SOCIAL AND ECONOMIC ENVIRONMENT					
Income and Education					
Median family income	$50,454.60 (23,926)	$52,238.92 (23,218)	$52,024.72 (23,217)	$56,278.00 ($24,963.04)	$52,567.00 ($22,738.28)
Percent of overall population in poverty	0.139 (0.123)	0.127 (0.110)	0.127 (0.109)	0.115 (0.106)	0.126 (0.108)
Percent of elderly population (65+) in poverty	0.112 (0.108)	0.105 (0.094)	0.105 (0.093)	0.094 (0.089)	0.103 (0.090)
Percent of households with public assistance income	0.041 (0.051)	0.038 (0.044)	0.037 (0.043)	0.036 (0.045)	0.038 (0.045)
Percent of population aged 25 and older without high school diploma or equivalent	0.211 (0.142)	0.201 (0.137)	0.202 (0.137)	0.183 (0.129)	0.196 (0.129)
Percent of population 16 and older that is unemployed	0.067 (0.062)	0.063 (0.051)	0.064 (0.052)	0.061 (0.053)	0.063 (0.053)
Racial and Ethnic Composition					
Percent of population that is Hispanic	0.126 (0.212)	0.128 (0.206)	0.128 (0.207)	0.094 (0.165)	0.093 (0.167)
Percent of population that is black, non-Hispanic	0.132 (0.234)	0.144 (0.250)	0.147 (0.256)	0.189 (0.297)	0.179 (0.293)
Percent of population that is white, non-Hispanic	0.680 (0.312)	0.674 (0.312)	0.671 (0.316)	0.662 (0.327)	0.674 (0.325)
Percent of population that is Native Hawaiian or Other Pacific Islander alone, non-Hispanic	0.001 (0.010)	0.001 (0.007)	0.001 (0.004)	0.001 (0.005)	0.001 (0.007)
Percent of population that is other race, non-Hispanic	0.028 (0.057)	0.024 (0.036)	0.025 (0.039)	0.022 (0.028)	0.022 (0.026)
Age Composition					
Percent of population that is 65 years old or more	0.13 (0.073)	0.147 (0.101)	0.153 (0.106)	0.134 (0.091)	0.157 (0.111)
Percent of population that is 85+ years old	0.016 (0.017)	0.017 (0.021)	0.019 (0.023)	0.015 (0.017)	0.018 (0.021)
Foreign born and limited English					
Percent of population that is non-native, foreign born and non-citizens	0.060 (0.089)	0.064 (0.086)	0.064 (0.086)	0.056 (0.078)	0.056 (0.084)
Average years of residency in foreign born populations	17.949 (6.928)	18.251 (6.646)	18.415 (6.673)	18.032 (6.433)	18.198 (7.123)
Percent of population with limited English (5 and older)	0.045 (0.091)	0.041 (0.072)	0.041 (0.071)	0.033 (0.061)	0.035 (0.066)

Urban/Rural Status					
Percent of population that is rural	0.223 (0.374)	0.164 (0.325)	0.149 (0.311)	0.151 (0.311)	0.182 (0.341)
Housing Stock and Stability					
Median value of owner-occupied housing units in 2000 ($)	$133,585.70 (110,536)	$138,642.39 (109,295.47)	$138,665.49 (112,262)	$148,365.00 ($108,895.03)	$139,056.00 ($98,563.74)
Median year structure built	1951 (173.08)	1968 (32.039)	1967 (35.917)	1967 (52.26)	1967 (14.74)
Median year householder moved into owner- or renter-occupied unit	1977 (176.19)	1993 (28.917)	1993 (33.261)	1992 (50.81)	1993 (3.59)
ENVIRONMENTAL STRESSORS					
Percent housing units that are vacant	0.086 (0.090)	0.083 (0.085)	0.082 (0.084)	0.073 (0.075)	0.086 (0.090)
Total population per square mile of land	5,307.10 (11,976)	5,77.05 (14,008)	6,047.27 (14,651)	5,184.80 (10,951.84)	5,307.90 (12,814.01)
Housing units per square mile of land	2,166.70 (5,259.9)	2,488.17 (6,576.85)	2,619.25 (6,930.10)	2,074.80 (4,051.29)	2,180.20 (4,729.22)
Average persons per bedroom for occupied housing units	1.059 (0.367)	1.047 (0.309)	1.047 (0.302)	1.01 (0.27)	1.02 (0.30)
SAFETY/MOBILITY/ACCESS					
Alpha Measure of Street Connectivity	0.161 (0.082)	0.164 (0.080)	0.168 (0.080)	0.158 (0.075)	0.162 (0.079)
Gamma Measure of Street Connectivity	0.442 (0.062)	0.444 (0.056)	0.447 (0.056)	0.440 (0.054)	0.443 (0.056)
Median Block Length (Miles)	0.668 (0.711)	0.589 (0.551)	0.566 (0.516)	0.554 (0.450)	0.553 (0.463)
Median Block Size (Miles)	0.048 (0.156)	0.033 (0.111)	0.030 (0.105)	0.024 (0.083)	0.024 (0.076)
Percent owner- or renter-occupied housing units without a vehicle	0.115 (0.139)	0.112 (0.139)	0.115 (0.142)	0.105 (0.133)	0.114 (0.135)

There is also some data on neighborhood features from direct interviewer observations in the PSID. While the core PSID interview was administered by telephone from 1973 forward, the Child Development Supplements of 1997 and 2002/03 included in-person interviews in which interviewers record characteristics of the neighborhoods. These include the following questions: the house is noisy from noise coming from outside the home; the presence of garbage, litter, or broken glass in the streets; the presence of drug related paraphernalia, condoms, beer, or liquor containers in the streets; rating of most of the housing units in the face block; and general rating of the condition of the street.

There are also logistical challenges in linking survey data from panel data sets such as the HRS and PSID to geographically-based measures from the census. While these survey data sets contain a rich set of information over long periods of time, census tract definitions change with each census. Because of this, it is not possible to determine whether a change in a neighborhood characteristic, such as percent below the poverty threshold is due to a change in the variable (poverty) or a change in the boundary of the census tract. Only the change in the variable itself is of analytic interest. Thus, to analyze these longitudinal data, addresses for all

survey waves must be coded with a single definition of census tract. Typically, data sets are only coded with the census tracts of the most recent census data set. In the case of the PSID, for instance, data from the 1970s contained information using 1970 census boundaries, the 1980s using 1980 boundaries etc. The PSID has, however, recently recoded all addresses since 1968 to 2000 census tracts, which included obtaining the latitude and longitude of the homes of all respondents since 1968. Once longitudinal data sets are recoded into uniform tract definitions they can be merged with similarly recoded census files available from companies such as GeoLytics. GeoLytics has created files of the census data from 1970 to 2000 in terms of 2000 tracts, using proprietary software to map all historical tract definitions into 2000 tract definitions.[2]

A similar mapping of tracts has not been done for the HRS. Currently, the 1992-2000 HRS waves contain information based on 1990 tract definitions. Of note is that the 2000 tract definitions are coded on the 2002 and succeeding waves of the survey. The 2000 wave of the census currently does not contain 2000 census tract boundary definitions, however, the HRS plans to add these census boundaries to the data set in the near future. Further, the HRS will map all addresses from 1992 forward to 2000 census tract boundaries, similar to the coding that has been done for the PSID. Thus, both data sets will contain census tract coding that will permit longitudinal studies of neighborhood factors on elderly health and health transitions.

Another challenge facing research in this area is in assembling the growing array of data on neighborhood factors. The available data come from various sources such as the census and environmental data sources. There is no centralized repository of information for these geospatial data, meaning that each individual research team must compile their own data from disparate sources. A coordinated effort that would make these data available to the public would be beneficial.

Aside from data issues, it is also worth noting that there are methodological issues in neighborhoods research that are present in large national databases as well as primary data collections in small areas. The major methodological problem with all neighborhood studies is that families choose the neighborhoods in which they live. This problem, often labeled as one cause of endogeneity, has been identified as one of the central methodological challenges in undertaking neighborhood research (Morenoff and Lynch, 2002; Sampson, et al., 2002). For example, families and individuals who care more about their health will be less likely to choose to live in an area with high crime, pollution, a poor health care system. As a result, neighborhood factors are likely to be correlated with individual and family-level factors that are also correlated with the dependent variable, i.e., health status, causing estimates of neighborhood effects to be biased (Tienda, 1991; Evans, et al, 1992). Improved knowledge will benefit neighborhoods research using large national data sets as well as small-area studies.

Conclusion

Relatively little is known about how neighborhoods of residence affect the health of the elderly. Large national surveys such as the HRS and PSID hold promise for studying the effects of neighborhoods on late-life health through geocoding of neighborhood information. While primary data collections can provide detailed information on a small set of neighborhoods, the results from such studies may not be generalizable. In contrast, studies based on national surveys do generate findings that can be generalized to the US population. Further, the

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[2]GeoLytics in association with the Urban Institute Census CD Neighborhood Change Database (NCDB) 1970-2000 US Census Tract Data. GeoLytics, Inc., East Brunswick, NJ.

large sample sizes permit important subpopulations, such as minorities, women, or persons of low socioeconomic status, to be studied. The longitudinal nature of these data sets also provides a unique opportunity to observe health trajectories over long periods of time (almost 40 years in the case of the PSID) and to study how neighborhoods of residence affect health over the lifecourse.

However, geocoding neighborhood data onto large secondary databases such as the HRS and PSID creates some limitations for research. Only data collected in secondary and administrative data bases can be used to measure neighborhood characteristics. Desired data elements may not be collected in uniform ways across all geographic areas in the United States. Further, the geographic boundaries are limited to administrative units such as zip codes, census tracts or blocks. These may not correspond to theoretical concepts of neighborhoods and thus create measurement error. Geographic boundaries, such as census tracts, also change over time. If uniform boundary definitions do not exist in longitudinal data sets, the data will not be analytically useful for neighborhoods research. It is noteworthy that there is currently no centralized repository of information for geospatial data on neighborhood characteristics. A coordinated effort that would make these data available to the public is needed.

The study of neighborhood effects on the health of the elderly would also benefit from additional methodological research that is relevant for both national and small-area studies. A better understanding of what defines a neighborhood for elderly persons is a central definitional issue that will require further study. For instance, what social and other activities define the neighborhood context for elderly persons? It will also be important to gain a better understanding of the potential endogeneity of neighborhood effects on health so that causality can be identified in statistical modelling.

Understanding the effects of neighborhoods over the lifecourse versus the current neighborhood of residence are important goals for future research. It would be important to establish which factors matter at what points in the lifecourse. Which of these are actionable by public policy and could therefore be used to improve health in old age? More research is also needed to understand which neighborhood factors affect which health outcomes. In particular, it will be important to identify which features of neighborhoods are protective and which are deleterious to the health and disability trajectories of the elderly.

It is also worth noting that understanding the effects of neighborhoods on elderly health requires expertise and insights from multiple disciplines, such as economics, urban planning and epidemiology. Multidisciplinary teams would likely be in the best position to generate new and important research on contextual effects of neighborhoods on health over the lifecourse.

In summary, there is currently little research on the effect of neighborhoods on the health of the elderly. Given the rapidly aging population, and the potential economic and social benefits of having older persons age in place, understanding the effects of neighborhoods on the health of the elderly will become an increasingly important research and policy issue. National data sets, such as the HRS and PSID have many advantages for this type of research, as well as some challenges.

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