Over the past 20 years there has been an emerging interest in the impact of neighborhoods on health. This growing trend is based on the increased recognition of the need to consider not only individual characteristics and behavior, but also the context in which individuals live when attempting to understand variance in health and disease across population groups after adjusting for individual factors. In an analysis of household income and mortality over a 15-year span in the United States, life expectancy for individuals in the lowest quartile of income varied substantially across local areas by up to 4.5 years. Some communities were clearly more successful at caring for their poorest citizens, and understanding the components that matter is a challenge for researchers and policy makers.

Previous studies have used large data sets and linked these data to census-derived neighborhood variables by using individual zip codes to evaluate the importance of average household income, percent graduated from high school, and racial/ethnic composition as predictors of health outcomes or access to health care. Much of the focus of neighborhood research in chronic disease has been on cardiovascular disease, diabetes mellitus, and obesity, given that poor access to healthy foods and limited opportunities for physical activity are related to potentially health-relevant neighborhood physical and social environments. Measures of having green areas and parks, safe walking spaces such as maintained sidewalks, full-service food stores with fresh fruits and vegetables, recreational sites for sports and physical activity, and reasonable personal safety from crime have all been used to evaluate the quality of neighborhoods. These can be obtained from census data or, more recently, from geospatial data sets that incorporate satellite images. These measures may also be obtained by self-report from residents in response to a survey or generated from direct observation. The additional construct of social connectedness and networks is critical to evaluate as well. Given that place of residence is strongly associated with socioeconomic status and ethnicity, neighborhood characteristics have potential to be notable contributors to health disparities and to understanding why poor people in 1 city may live longer than those in another. As such, neighborhood-level interventions have the potential to significantly improve population health, and reduce health disparities in our Nation’s communities, as well.

In this issue of Circulation, Wing and colleagues investigate the impact of neighborhood-level factors on the progression of subclinical atherosclerosis by assessing coronary artery calcium scores. The analysis used the MESA (Multi-Ethnic Study of Atherosclerosis) cohort that included a diverse sample of 5950 participants from 6 US cities, 51% white and 65% men. The association of changes in coronary artery calcium scores across 6 neighborhood factors was examined over a 12-year period in this ongoing study. Geographic information system–based measures were used in assessing neighborhood density of recreational facilities and healthy food...
stores. Survey-based neighborhood measures evaluated the availability of healthy foods, walking environment, safety, and social cohesion (safety and social cohesion were subsequently combined). Overall findings indicated that increases in the density of neighborhood healthy food stores at a ∼1-mile radius from the home were associated with decreases in coronary artery calcium scores among participants with baseline scores >0.7 Results suggested that the effect of neighborhood access to healthy food stores on the development of subclinical coronary artery disease is one of the operating mechanisms in addition to lifestyle behaviors and traditional cardiovascular risk factors. None of the other 5 neighborhood constructs used in the analyses were significantly associated with within-person changes in coronary artery calcium scores over time.7

This study contained several valuable features that contributed to the research literature.7 A key contribution was its longitudinal design with fixed-effects models that allowed for the ability to strengthen the causal inferences of previously identified associations between neighborhood characteristics and the development of coronary atherosclerosis. The study used change in an established mediating variable as opposed to clinical events, thus strengthening the evidence for causal inference. Measuring multiple dimensions of the neighborhood environment through both geographic information systems and survey method was another strength of the investigation, in that most previous studies used one or the other. Given that neighborhood environments are likely to impact health outcomes through various interrelated mechanisms, the most effective interventions are likely to be those that can influence changes across multiple dimensions. Gaining an understanding of the neighborhood characteristics that should be targeted as risk and protective mechanisms is essential in the development of effective neighborhood interventions aimed at preventing coronary heart disease and other related health outcomes. Wing and colleagues7 have made an important contribution in this area through using a multidimensional approach in their collection of neighborhood-level data.

The study also highlights the role that spatial proximity of healthy food resources has on the progression of coronary heart disease. These findings suggest points of intervention on a neighborhood level that may be particularly impactful for improving health outcomes of its residents. For instance, previous studies have shown that although low-income and minority neighborhoods in the United States often lack supermarkets, they often have a wealth of small local stores5 with the potential of offering healthier food options.8 Taking advantage of these corner stores to enhance the availability of healthy foods may offer multiple benefits, including increased walkability, social interactions, and cohesion, and, according to the present study, improved cardiovascular health.

As with all investigations, however, this study is not without its limitations. For instance, the limited number of items used in the survey to assess neighborhood-level factors points to the need for the development and use of standardized measures that can more precisely capture the intricate mechanisms whereby neighborhood factors impact health outcomes. In this study, no significant associations were evident for the survey-based neighborhood factors of walking environment, social cohesion, and safety. The lack of significant results may have been driven in part by the underdeveloped manner by which the survey-based neighborhood factors were measured. All analyses were adjusted for race/ethnicity, and the sample size may not have permitted stratified models evaluating effects within each race/ethnic group. Based on epidemiological data, incidence and mortality of coronary artery disease varies substantially across race/ethnic and sex categories, and understanding mechanistic pathways within these groups is a research priority.

Definition of what area constitutes a neighborhood is arbitrary. Using geographic information system neighborhood data and setting a 1-mile radius around a home has been used but remains somewhat unsatisfying. Why is this better than a half-mile? What if the person owns a vehicle and can easily travel 3 miles? What about someone with chronic disease that limits mobility and even a half-mile may be excessive? Given the finding of the availability of healthy food stores, evaluation of food-purchasing behavior may be relevant to measure in future studies and limitations to local neighborhood environments can be assessed.9 Similar challenges apply to the spatial proximity of neighborhood recreational environment that may not accurately reflect the physical activity of its residents, because the proximity to worksite may also be important.10 The limited 1-mile radius of spatial proximity used in this study may have more effect on some individuals, for instance, those lacking employment or transportation, whereas workplace or other environments within a larger spatial context may be more relevant for others.

Nevertheless, this study represents an advancement of knowledge toward our understanding of the causal mechanisms whereby neighborhood characteristics impact cardiovascular disease. Given the complexity of this topic, future research should be designed to include greater attention to the nuances and complex mechanisms whereby neighborhoods can impact health; for instance, taking into account neighborhood factors that may not affect all individuals equally, and the ambiguity that can arise by measuring the spatial contexts for various outcomes without supplemental individual-level data, as well. The complex manner by which individuals interact with their environment emphasizes the need for more sophisticated data collection and analytic approaches.
Improving our understanding of the interrelated neighborhood factors that affect health outcomes can lead to the creation of impactful and sustainable interventions that alter the functioning of the systems that cultivate spatial inequities. More research is needed to evaluate the effect of neighborhood on chronic disease health outcomes other than those related to cardiovascular disease. One successful intervention focused on moving the at-risk person to a lower-risk neighborhood through restricted housing vouchers with an effect on obesity and glucose. Others have proposed neighborhood redevelopment to increase recreational green space, healthy food stores, safe walking space, and improved housing. However, this may lead to gentrification and the out-migration of the economically disadvantaged who no longer feel welcomed or who cannot afford to live there. The potential health benefits of ethnic enclaves in neighborhoods merit further study, because this may be a mechanism that enhances social cohesion in some groups. Local and regional policy makers need to implement changes that promote the integration of diverse and healthy neighborhoods and reduce residential social class segregation that perpetuate the existing cycle of food deserts, low economic development, low-functioning schools, more violence, and its related health disparities.

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None

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FOOTNOTES
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REFERENCES


Making Neighborhoods Good for Your Health
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