

THE INFLUENCE OF COMMUNITY FACTORS ON HEALTH:



AN ANNOTATED BIBLIOGRAPHY A PolicyLink Report Fall 2004

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PREFACE

For many years, foundations, practitioners, researchers, community-based organizations and policymakers have worked to reduce the higher rates of certain diseases and health conditions among low-income communities of color. We are making progress, but we are still far from reaching the goal of good health for all.

The California Endowment recognizes the need for new strategies to address this issue. In 2002, the foundation undertook an in-depth investigation of how the places where people live can affect their health. PolicyLink, a national nonprofit research, communications, capacity building and advocacy organization dedicated to advancing policies to achieve economic and social equity, has been an important partner in these efforts. PolicyLink interviewed community leaders, researchers and policymakers as well as compiled a comprehensive literature review to draft an important report-*Reducing Health Disparities Through a Focus on Communities*-that lays out a new community framework to address the challenges of health disparities. The California Endowment has moved forward with innovative grant-making strategies that invest in strengthening communities to improve health.

The following annotated bibliography emerged from this first stage of our partnership. Developed by PolicyLink, the bibliography highlights groundbreaking research on how community factors affect health.

The California Endowment's efforts have been under the leadership of Marion Standish, Program Director. The PolicyLink team that produced this bibliography was led by Senior Associate Rebecca Flournoy. Flournoy and consultant Irene Yen coordinated the research and did much of the drafting and editing. Director of Research Victor Rubin reviewed and helped shape the document. Yen conducted the literature review for "Neighborhood Influences on Health." Yen and Victoria Breckwich Vasquez, University of California at Berkeley doctoral researcher, conducted the literature review for "Communities Not Defined by Neighborhood."

We hope that this document will help researchers, health professionals, policymakers, community leaders and other foundations develop creative new ideas for programs and policies to reduce health disparities.



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CONTENTS

I. INTRODUCTION	1
II. NEIGHBORHOOD INFLUENCES ON HEALTH	3
A. Literature Reviews and Conceptual Frameworks on Neighborhoods and Health	3
B. Racial Residential Segregation and Health	11
C. Neighborhood Socioeconomic Status and Health.....	17
D. Physical Environments: Direct Effects on Health	22
1. Housing and Health	22
2. Environmental Hazards and Health.....	28
E. Physical Environments: Effects on Health Behaviors	35
1. Neighborhood Influences on Physical Activity and Diet/Nutrition	35
2. Neighborhood Influences on Drug/Alcohol/Cigarette Use	43
3. Neighborhood Influences on Multiple Health Behaviors.....	45
F. Social Relationships and Health.....	49
G. Overall Neighborhood Conditions and Health.....	57
H. Measurement of Neighborhood Effects on Health	69
III. COMMUNITIES NOT DEFINED BY NEIGHBORHOOD	73
A. Health Effects of Immigration into U.S. Communities	73
B. Migrant Communities and Health.....	82
C. Geographically Dispersed Communities and Health	87

I. INTRODUCTION

Researchers are working to understand the troubling presence of health disparities—the higher incidence of certain diseases and conditions, including heart disease, high blood pressure, and infant mortality—in low-income communities and communities of color. Some studies have looked at health care access and quality-related issues, others have focused on how socioeconomic status, race, and ethnicity affect health. A relatively new development in the field is studying how community conditions affect health. Researchers are finding differences in health outcomes between neighborhoods even after adjusting for individual risk factors—suggesting that neighborhood effects on health extend beyond just the characteristics of the individuals who live there. Given the highly segregated nature—by race and socioeconomic status—of many communities in the United States, it is important to consider how community factors may influence health disparities.

In 2002, PolicyLink received a grant from The California Endowment to help develop frameworks and strategies that will help to reduce health disparities in California. A primary focus of the work was to better understand how environments in low-income communities of color contribute to health disparities. PolicyLink produced *Reducing Health Disparities Through a Focus on Communities*, which presents a framework for understanding the effects of community factors on health, discusses research findings from interviews and a literature review, and examines implications for programs and policies to strengthen community factors and improve health.

As part of this work, PolicyLink staff and consultants produced an annotated bibliography based on a review of literature that addressed connections between community factors and health. That version of the bibliography has been updated to include more than 150 entries. The information included here is not an exhaustive list of articles in each category, but it does include much of the key literature on community factors and health. Articles and reports were identified through journal database searches, Internet searches of relevant reports and book chapters, and recommendations from expert advisors. To limit the scope of the document, only literature that makes explicit links between community factors and health, and addresses factors present at the community level, is included. The large bodies of work on health services and on broad structural issues that influence communities, such as political economy and income inequality, are not explored in depth, even though these factors certainly influence conditions at the neighborhood level. In addition, only articles that were published before March 2004, when the final phase of research was completed, are included.

This document provides insight into the ways that researchers have investigated community effects on health, their findings, and the program and policy implications that researchers have drawn from their work. The work focuses on the role of social structures, social relationships, and peer influences; the role of institutions and services (e.g., schools, police,

and health care institutions); the role of direct environmental factors (e.g., exposure to toxins) and indirect environmental factors that influence behavior (e.g., access to healthy foods); the role of structural factors (e.g., race relations and public policies that affect the neighborhood and local residents); and the changing nature of all of these factors over the life-course. Evidence on these community influences on health is accumulating rapidly. Public health professionals can benefit from a better understanding of the community influences that affect health and the ways that interventions and policies addressing community factors could influence health. Practitioners in areas like urban planning, social welfare, public policy, and the like can benefit from understanding how policies and programs that are not explicitly about health can actually have important health impacts.

The first section, "Neighborhood Influences on Health," includes research on how living in a particular neighborhood or area affects health. Overall, the studies in this section show a clear connection between neighborhood factors (such as housing access and quality, exposure to environmental toxins, access to grocery stores and recreation centers, and community social relationships) and health outcomes (such as asthma, heart disease, depression, self-reported health, and mortality). The articles in this section also address conceptual frameworks for understanding these connections as well as measurement challenges.

The second section, "Communities Not Defined by Neighborhood," focuses on how communities that are defined by shared characteristics or experiences, rather than by a shared neighborhood, can influence health. For example, immigrants entering neighborhoods in the United States demonstrate the effects of place as they move from one community to another. For parts of the year, migrant farm workers do not live in a single neighborhood, but they do have a mobile community that is characterized by common demographic characteristics and shared experiences related to their jobs. Rural areas and urban Indians may have communities that share particular experiences, even though they do not live in close proximity to others who are part of their community.

II. NEIGHBORHOOD INFLUENCES ON HEALTH

In the past few years, interest in neighborhood or area effects on health has increased tremendously. Public health researchers have recognized that models of disease etiology that focus exclusively on individual characteristics—demographic, biologic, personality, or behavioral factors—are insufficient to explain the complex set of factors that contribute to poor health. The health behaviors and outcomes of individuals are influenced by the neighborhood environments in which they live.

A. LITERATURE REVIEWS AND CONCEPTUAL FRAMEWORKS ON NEIGHBORHOODS AND HEALTH

This section includes articles that provide conceptual frameworks for understanding links between neighborhood factors and health, summarize evidence on these links, and discuss implications for future research, practice, and policy. Most of the conceptual frameworks on neighborhoods and health focus on the intersection of 1) neighborhood social relationships and norms; 2) community institutions and services; 3) direct environmental factors (such as exposure to air pollution) and indirect environmental factors that influence behavior (such as access to healthy foods); and 4) broader structural issues that affect the neighborhood. Several of the frameworks highlight how these factors may operate differently at different points in the life-course, and how the effects of neighborhood factors accumulate to affect health over time. Some of the literature also describes methodological challenges in studying links between neighborhoods and health, which include: 1) distinguishing between neighborhood and individual effects; 2) accurately measuring neighborhood characteristics and health outcomes; 3) capturing nonlinear effects; and 4) distinguishing association from causation.

Given the relationship between neighborhoods and health, many of the authors discuss the need for intervening to change environments to improve health. These interventions, the authors suggest, could take the form of neighborhood-level community development strategies, comprehensive place-based strategies, and public policies.

The California Campaign to Eliminate Racial and Ethnic Disparities in Health. *Health for all: eliminating racial and ethnic health disparities.* Washington, D.C.: The American Public Health Association and Prevention Institute; 2003.

This report was produced by a statewide coalition of leaders from the public and private arenas of policy, health care, public health, and philanthropy in California. The authors discuss roots and pathways to health disparities and make recommendations on how California should work to reduce and eliminate disparities. Based on a literature review, analysis of health-related data, stakeholder interviews, and a deliberative process, the group identifies a set of 20 community factors linked to California's priority medical issues. These are grouped into four areas of key community factors for reducing health disparities: 1) *built environment* (such as nutrition-promoting environment, housing, environmental quality, and aesthetic/ambiance); 2) *social capital* (such as social cohesion, civic participation, and social/behavior norms); 3) *services and institutions* (such as public health, health, and human services; education and literacy; and community-based organizations); 4) *structural factors* (economic capital, media/marketing, and ethnic, racial, and intergroup relations). In addition to these community factors, the report discusses the importance of providing high-quality medical care for all. The report addresses the need for key public and private institutions to partner with communities to address health disparities. Examples of actions that could be taken by the health care sector, community-based organizations, schools, state and local governments, and businesses are provided.

Dannenberg AL, Jackson RJ, et al. 2003. The impact of community design and land-use choices on public health: a scientific research agenda. *American Journal of Public Health.* 2003;93:1500–1508.

This article describes a research agenda on the ways the built environment influences the physical and mental health of its residents. The research agenda was developed at a May 2002 workshop hosted by the Centers for Disease Control and Prevention. The workshop's goal was to promote information sharing and future collaboration among researchers with expertise in a range of fields, including physical activity, air pollution, urban planning, epidemiology, and social marketing.

The article describes the 37 research questions generated by workshop participants. Research questions were grouped into the following themes: physical activity and transportation choices; schools and children; unintentional and intentional injuries; impact on persons with disabilities; air and water quality; mental health; social capital; environmental justice; and cross-cutting issues. Authors selected 18 of the questions for further elaboration, including utility, feasibility and the ability to generalize. The report outlines how the proposed research will help identify best practices for designing new communities and revitalizing old ones to promote physical and mental health.

Ellen IG, Dillman K, Mijanovich T. Neighborhood effects on health: exploring the links and assessing the evidence. *Journal of Urban Affairs*. 2001;23:391–408.

This article is an extensive review of the relationship between neighborhood and health and methodological challenges. The authors categorize the ways neighborhood might affect health in three ways: direct threats created by the neighborhood's environment; indirect threats through neighborhood influences on health-related behavior; and quality and availability of health care services. The authors review evidence linking five health outcomes to residence in a neighborhood: 1) low birthweight and infant mortality; 2) physical health of children, discussing cockroach allergen, mites, mold, heating, and asthma, lead and central nervous system damage, and influences on behaviors; 3) physical health of adults, discussing increased risk of death and cardiovascular disease by neighborhood characteristics; 4) differences in health behaviors by neighborhood characteristics; and 5) mental health and neighborhoods, discussing violence and ambient social hazards such as gang activity, drug dealing, and property damage.

Four challenges of studying neighborhood effects on health are described. The first is *distinguishing between neighborhood and individual effects*. Individual characteristics are likely influenced by the neighborhood in which an individual lives. Consequently, to the extent that researchers adjust for these individual characteristics, the importance of neighborhood is underestimated. To the extent that residents self-select into neighborhoods on the basis of individual characteristics (e.g., preference for a healthy environment), the effect of the neighborhood may be overestimated. The second is *measuring relevant neighborhood characteristics*. These characteristics often do not explain exactly what it is about a neighborhood that affects health. Definitions of neighborhood boundaries (e.g., census tracts) are often imperfect. In addition, many studies measure neighborhood characteristics at a single point and do not consider how long a person has lived in a particular neighborhood. The third challenge is *capturing nonlinear effects*. Neighborhood effects may exhibit a threshold effect or interact with individual characteristics. The fourth challenge is *measuring relevant health outcomes*.

Ellen, IG, Turner MA. Does neighborhood matter? Assessing recent evidence. *Housing Policy Debate*. 1997;8:833–866.

This article synthesizes findings from a wide range of empirical research into how neighborhoods affect families and children. It presents a conceptual framework that neighborhood conditions probably affect individuals in different ways at different life stages through six distinct mechanisms: 1) quality of local services; 2) socialization by adults; 3) peer influences; 4) social networks; 5) exposure to crime and violence; and 6) physical distance and isolation. It also identifies methodological challenges in measuring the effects of neighborhood conditions

on individual outcomes. In summarizing research findings, the authors find that existing studies provide little empirical evidence about the causal mechanisms through which neighborhood environment influences individual outcomes. They conclude by suggesting priorities for future research.

Fitzpatrick K, LaGory M. *Unhealthy Places: The Ecology of Risk in the Urban Landscape*. New York: Routledge; 2000.

This book explores the connection between place and health in America's metropolitan areas. The authors discuss how social structures affect health behaviors and health by influencing health beliefs, community norms, opportunities for healthy behavior, and risk and protective factors. The authors also describe the health impacts of environmental factors such as the presence of health hazards, segregation, access to resources beyond the local community, level of socioeconomic resources, and community attachment and trust. They describe strategies to address health disparities, including neighborhood-level community development strategies and comprehensive place-based strategies such as the Healthy Cities initiatives.

Halfon N, Hochstein M. Life course health development: an integrated framework for developing health policy and research. *Milbank Quarterly*. 2002;80:433–479.

This paper describes the Life Course Health Development (LCHD) framework—an integrated framework that helps to explain how health trajectories develop over an individual's lifetime. It also describes how the LCHD framework can guide new approaches to health policy and research. The framework shows that 1) health is a consequence of multiple determinants operating within multiple contexts that change as a person develops; 2) health development is an adaptive process between these contexts and biobehavioral regulatory systems; 3) different health trajectories are the product of cumulative risk and protective factors; and 4) the timing and sequence of biological, psychological, cultural, and historical events and experiences influence individual and population health and development. The authors illustrate how risk factors, protective factors, and early-life experiences affect long-term health and disease outcomes. They then provide an integrated conceptual model to translate this into health policies, practices, and systems.

Institute of Medicine. Neighborhood and community. In: Shonkoff J, Phillips DA, ed. *From neurons to neighborhoods: the science of early childhood development*. Washington, DC: National Academy Press; 2000;328–336.

This chapter of an Institute of Medicine report focuses on why and to what extent neighborhood contexts influence young children's development and the efficacy of intervention

programs directed at them. The chapter also briefly summarizes theories of how neighborhoods affect children's development. *Stress* theory emphasizes the importance of exposure to physical toxins and social and psychological conditions (e.g., community violence). *Social organization* theory emphasizes role models and value consensus. *Institutional* explanations argue that neighborhood institutions (schools, police) are important. *Epidemic* theories suggest the power of peer influences. Studies examining neighborhood effects on young children, it is reported, show that there are many more differences among families and children *within* neighborhoods than *between* neighborhoods.

Institute of Medicine. *Promoting health: intervention strategies from social and behavioral research*. Washington, DC: National Academy Press; 2000.

This Institute of Medicine report consists of papers on the role of social and behavioral factors that influence health and disease. The papers take an ecological approach to public health interventions—that is, they use ecological models that assume that differences in levels of health and well-being are affected by a dynamic interaction among biology, behavior, and the environment that unfolds over the life course of individuals, families, and communities. Ecological models assume that age, gender, race, ethnicity, and socioeconomic differences shape the context in which individuals function and are critical determinants of health and well-being. As a result, the report advises that efforts to improve health should address not only downstream individual-level phenomena and “mainstream” factors (population-based interventions), but also upstream, societal-level phenomena (i.e., public policies).

Kaplan GA. What is the role of the social environment in understanding inequalities in health? *Annals of the New York Academy of Sciences*. 1999;896:116–120.

This article is the written version of a presentation at a 1998 meeting sponsored by the New York Academy of Sciences to introduce a panel of speakers discussing animal research that demonstrated the importance of social rank for health and the health effects of racial discrimination. The author presents a framework for considering how the social environment influences health. In this framework, social and economic policies influence institutions, which in turn influence neighborhoods and communities, which in turn influence living conditions, which in turn influence social relationships, which influence individual risk factors. The author argues that interdisciplinary interventions in the social environment are needed to reduce inequalities in health. Examples of social and economic policies include those that lead to segregation of the African American community and those that determine working conditions. The author calls for more research on how racial discrimination, high-stress jobs, low social rank, or living in an area with low social capital contributes to day-to-day experiences of people, and how these experiences influence biology and behavior. The author also argues that some of the interventions that may be needed to address health inequalities could be outside of medicine and public health.

Macintyre S, Maciver S, Sooma A. Area, class, and health: should we be focusing on places or people? *Journal of Social Policy*. 1993;22:213–234.

This paper briefly reviews the epidemiologic literature on places and health. The authors note that most researchers use aggregated individual-level data (e.g., census tract data) to study the effects of place, and they call for more research studying features of place directly. The authors categorize the effects that place might have on health in five ways: 1) physical features of the environment, such as air, water, latitude, climate; 2) availability of healthy and unhealthy environments, such as housing, employment, affordable and nutritious food, and safe and healthy recreation; 3) availability of public and private services, such as education, transportation, street cleaning and lighting, churches and other community organizations, and health and welfare services; 4) social-cultural features of a neighborhood, including norms and values, community integration and networks of community support, levels of crime, and perceived threats to safety; and 5) the reputation of a neighborhood, which may affect the self-esteem of the residents.

The authors also present data on two areas in Glasgow, Scotland, that differed in neighborhood characteristics and mortality experiences. The neighborhood with worse health outcomes had more lead content in the drinking water, a smaller proportion of shopping areas, more expensive locally available food, less access to recreation, less access to transportation, less access to health care services, higher crime rates, and lower perceptions of the neighborhood. The authors recommend targeting health promotion and public health policy efforts to improve social and physical environments in working class areas, rather than only targeting efforts to improve individual health behaviors.

McGinnis JM, Williams-Russo P, Knickman, JR. The case for more active policy attention to health promotion. *Health Affairs*. 2002;21:78–93.

This paper argues that more attention should be paid to policy opportunities for promoting population health. First the authors revisit the problems inherent in investing in medical care at the expense of prevention. They then highlight the medical and nonmedical determinants of health that influence an individual's health prospects—including genetics, social circumstances, environmental conditions, behavioral choices, and medical care.

In the past, the authors note, a lack of consensus on the relative contributions of these determinants to individual and population health status, as well as a lack of agreement about how to influence these factors, has slowed investments in health promotion. The authors discuss successful health promotion investments, including state-run initiatives such as tobacco reduction among minors in California and the Healthy People initiative. To improve population health, the authors recommend public investment in leadership, economic incentives, and research.

National Research Council. *Equality of opportunity and the importance of place: summary of a workshop*. Iannotta J, Ross I, ed. Washington, DC: National Academy Press; 2002.

This document resulted from a meeting convened by the National Research Council at the request of the Office of the Assistant Secretary for Planning and Evaluation of the U.S. Department of Health and Human Services, with the objective of understanding how place may influence the outcomes of people-oriented programs. The conference proceedings summarize commissioned research on the impact of neighborhoods on the well-being of their residents. The five papers commissioned for this workshop explore the importance of place along key themes: 1) neighborhood effects and child development; 2) spatial factors that could influence the success or failure of welfare-to-work programs; 3) neighborhood effects on health; 4) data needs and interactions of variables that complicate investigations of place and opportunity; and 5) creating effective public policy to address people and place.

The papers highlight that neighborhoods influence well-being and health outcomes such as injuries and severe asthma attacks for young people, that high-stress neighborhoods (with violent crime used as a marker of stress) influence birthweights, and that collective efficacy may have potential to reduce neighborhood crime and improve birthweights and other outcomes. Collective efficacy is defined as shared values and sense of community, along with a belief in the willingness of others to help others in the community. Finally, the proceedings summarize what research is still needed. For example, what are the basic conditions and opportunities in neighborhoods that represent a minimum standard for residents to prosper? What impacts of neighborhood factors and spatial barriers would be useful in designing more effective and efficient intervention programs? What is the role of social policy in addressing place-based conditions?

PolicyLink. *Reducing health disparities through a focus on communities*. Oakland: PolicyLink; 2002.

This report highlights policies and practices aimed at reducing health disparities in low-income communities and communities of color. It presents evidence from research and practice of the key role that neighborhood factors play in determining health outcomes and explores the relationship between the communities in which people live and their health. The report presents a framework that highlights: 1) *social and economic conditions* (neighborhood socioeconomic level, cultural characteristics, social support and networks, community organization, and reputation of the neighborhood); 2) *physical environment* (physical features of the neighborhood such as air and water, physical spaces such as housing and parks, public safety, and physical access to opportunities for employment and health-promoting

activities); and 3) *services* (access and quality of health services) such as neighborhood-level public services, community institutions, and commercial services. The report also proposes principles and strategies to reduce health disparities that focus not only on individuals, but also on the neighborhoods and communities in which people live. The authors highlight the potential role of community building, which features engaged community residents and leaders, as well as coalition building, community organizing, and advocacy, in improving low-income neighborhoods and addressing structural issues and policies at city, state, and federal levels that affect these communities.

Yen IH, Syme SL. The social environment and health: a discussion of the epidemiologic literature. *Annual Review of Public Health*. 1999;20:287–308.

The authors review the epidemiological literature on the social environment and health and discuss the practicality of intervening to change environments rather than individuals. The epidemiological literature reviewed in this article includes literature on: 1) community socioeconomic status and health; 2) discrimination and racial segregation and health; 3) income inequality and health; and 4) quality of the environment (e.g., neighborhood services, neighborhood crime) and other neighborhood problems such as health, litter, and traffic.

The article includes a historical discussion of the sociological work of Durkheim, which demonstrated suicide rates to be a group rather than an individual phenomenon; the Chicago School of Sociology and subsequent research establishing links between health and measures of social disorganization and social control; and the tradition of social area analysis, which used factor analysis of census data and found that social areas could be distinguished by three dimensions: socioeconomic status, family stability (e.g., household composition, divorce, and proportion elderly), and ethnicity or segregation. The authors suggest that three methodological issues remain in this area of research: 1) selection issues, pointing to the difficulty in establishing with cross-sectional research whether individuals select environments based on their preferences for health behaviors; 2) the difficulty distinguishing association from causation and; 3) multilevel methods, which incorporate individual and community characteristics.

B. RACIAL RESIDENTIAL SEGREGATION AND HEALTH

The studies described in this section explore associations between racial residential segregation and health for African Americans and Latinos. A number of the articles discuss contextual information on the origins of residential segregation, including the role of institutional racism, discriminatory public policies, and discriminatory actions of individuals.

Racial residential segregation is measured in various ways, including 1) unevenness in the distribution of racial groups within a region; 2) isolation from other groups; 3) clustering of racial or ethnic neighborhoods together; 4) proximity to central cities; and 5) density of the segregated group compared to other groups. The studies show that segregation affects mortality, birth outcomes, tuberculosis, and depression. Health risks related to segregation remain even after adjustments are made for individual family income. In most cases, racial residential segregation increases the risk of these outcomes for both African Americans and Latinos. For Latinos, however, studies have shown that segregation may have some protective effects, such as slightly reducing mortality rates and depression.

The studies identify some of the ways in which segregation may affect health. The many detrimental effects of segregation are probably related to such factors as 1) concentrated poverty; 2) lack of access to education and employment opportunities, which determines socioeconomic status and access to other opportunities and resources; 3) high-density living environments; and 4) low-quality physical environments with poor housing quality, high levels of crime, multiple sources of stress, and lack of access to services like grocery stores and medical services. In some cases, segregation may confer protective effects by offering social support and reduced exposure to discrimination. The authors discuss the need for interventions to improve conditions in racially segregated communities, such as efforts to increase access to health care or reduce exposures to environmental toxins. The authors also highlight the need for programs and policies that address racial residential segregation and racial disparities in socioeconomic status.

Acevedo-Garcia D. Zip code-level risk factors for tuberculosis: neighborhood environment and residential segregation in New Jersey, 1985-1992. *American Journal of Public Health.* 2001;91:734–741.

This study examines zip code-level risk factors associated with very high tuberculosis (TB) rates among non-Hispanic whites, African Americans, Hispanics, and Asians in New Jersey (1985–1992). Exposure indices (poverty, crowded housing, and dilapidated housing) and segregation indices (contact with immigrants, racial/ethnic isolation, and density) were used to characterize zip codes.

The authors found that for Hispanics and African Americans, zip code-level risk factors were associated with very high TB rates. TB is geographically concentrated in urban areas and disproportionately affects racial/ethnic minorities. Whites and Asians have few population-based risk factors for TB, although imported cases of TB among Asians are common. Zip code-level risk factors associated with very high TB rates vary by racial/ethnic group. Hispanics and African Americans have very high TB rates associated with risk factors that facilitate the transmission of TB—poverty, overcrowded and dilapidated housing, and high contact with immigrants. Whereas racial/ethnic isolation has protective effects for whites, it is detrimental for African Americans and Hispanics because it typically occurs in combination with low-quality and high-density living environments.

Acevedo-Garcia D, Lochner K. 2003. Residential segregation and health. In: Kawachi I, Berkman L, ed. *Neighborhoods and health.* Oxford: Oxford University Press; 2003:265-287.

This chapter reviews 15 studies on residential segregation and black mortality rates. The authors found that residential segregation was associated with black mortality rates in general and with black infant mortality rates. They hypothesized that segregation affects the health of blacks through concentrated poverty, quality of the neighborhood environment, and individual socioeconomic attainment. All studies found socioeconomic status mediated part, but not all, of the relationship between segregation and mortality.

Residential segregation can be described through five dimensions: 1) unevenness in the distribution of blacks and whites compared to the region overall; 2) isolation, or average probability of contact between blacks and whites in the neighborhood; 3) clustering of black neighborhoods together; 4) centralization, or proximity of black neighborhoods to the central city rather than the suburbs; and 5) concentration, or density of a segregated group compared to other groups. Although most public health research has used unevenness in the distribution of blacks and whites compared to the region overall as a measure of segregation, isolation is actually more associated with socioeconomic status and neighbor-

hood quality. The authors noted that population composition in a neighborhood was not a measure of regional segregating forces. They also noted that segregation, if combined with resources, may have protective effects due to decreased incidence of discrimination.

Ellen IG. Is segregation bad for your health? The case of low birthweight. Brookings-Wharton Papers on Urban Affairs. Washington, DC: Brookings Institution Press; 2000.

The author examines how segregation affects birth outcomes among black mothers by comparing the influences of segregation on birth outcomes among black and nonblack mothers. Black mothers have a disproportionate number of low birthweight (LBW) babies—36.7 percent of all LBW babies are born to black mothers, even though black mothers only account for 18.5 percent of total births. The author found that low social class circumstances of the mother markedly increased a black mother's risk of having a LBW baby. She also reports that black mothers living in more segregated areas were more likely to have LBW babies than were black mothers living in less segregated areas. For nonblack women, there was no difference in their likelihood of having LBW babies based on the level of residential segregation.

The results of several of the author's regression analyses suggest that the degree to which black mothers are concentrated near the central city was the factor most related to birth outcomes. A key finding of this paper is that most of the apparent effect of racial segregation on black mothers seems to operate through racial segregation's effects on the social status of the mother or through influences on her behavior during pregnancy. The results of this study imply that increasing residential integration in U.S. metropolitan areas could help to diminish troubling and persistent racial disparities in birth outcomes.

Jackson SA, Anderson RT. The relation of residential segregation to all-cause mortality: a study in black and white. *American Journal of Public Health*. 2000;90:615–617.

This article investigates the relationship between 11-year mortality risk and residential segregation. The authors find that individuals living in census tracts with higher segregation are at an increased risk of mortality, even after adjusting for individual family income. Percentage of blacks in a given census tract is the indicator of minority residential segregation in this study: a high percentage of blacks corresponds to greater segregation. Overall, the mortality risk of black men age 25-44 living in areas with the highest segregation is almost three times that of black men living in areas with the lowest segregation. The mortality risk for black women living in areas with the highest segregation is almost twice that of black women in the areas with the lowest segregation. For nonblacks (authors

categorized the people into two groups, blacks and nonblacks; the dataset consisted of a range of racial/ethnic groups including Asians and Latinos), the risk associated with living in a segregated neighborhood is greatest for those ages 45–64, with a 60 percent increased risk for women and a 30 percent increased risk for men.

LeClere FB, Rogers RG, Peters KD. Ethnicity and mortality in the United States: individual and community correlates. *Social Forces*. 1997;76:169–198.

The authors used retrospective cohort data to determine the role of contextual factors in mortality for ethnic adults. They note that mortality models should include individual health behaviors/risk factors and community measures of health care access and local resources. The data used in this study allowed for a distinction to be made between individual and neighborhood effects.

The authors found that living in low-income neighborhoods with high concentrations of African Americans increased the likelihood of death for all residents (regardless of race), especially among young and middle-aged men. Thus, neighborhoods may be at least partially responsible for the higher mortality among African Americans. In contrast, a higher concentration of Latino residents in a community served as a buffer for mortality for Mexican Americans. The authors tried to uncover how neighborhood influences on mortality differed for different ethnic groups and genders. They found that neighborhood income and ethnic concentration had the strongest effects on ethnic differentials. For men's mortality specifically, other neighborhood variables that were statistically important were proportion of female-headed families, families with incomes below the poverty level headed by females, and the educational attainment of adults over age 25 in the census tract. Women's mortality is particularly influenced by residential segregation. Whereas a proportion of high-educational attainment of the neighbors did not improve the mortality effects for men, it did for women in segregated areas. That is, women who lived in segregated areas where their neighbors had high educational attainment had lower mortality rates.

Ostir GV, Eschbach K, Markides KS, Goodwin JS. Neighborhood composition and depressive symptoms among older Mexican Americans. *Journal of Epidemiologic Community Health*. 2003;57:987–992.

This article examines the association between neighborhood composition (i.e., percentage of Mexican Americans living in a census tract, percentage of households with incomes below the poverty line) and depressive symptoms for older Mexican Americans. Data for the study came from a population-based study of Mexican Americans age 65 or older not living in institutions. The authors did not find support for one of their hypotheses—namely, that an increased proportion of households with poverty-level income is associated with

increased depressive symptoms. A 10 percent increase in the percentage living in poverty was associated with a 0.76 point increase in the depressive symptoms score (range 0–60). The authors found some evidence that an increased proportion of older Mexican Americans is associated with decreased depressive symptoms. Older Mexican Americans who lived in census tracts with higher proportions of Mexican Americans reported lower levels of depressive symptoms.

Polednak AP. Trends in U.S. urban black infant mortality, by degree of residential segregation. *American Journal of Public Health*. 1996;86:723–726.

This article examines associations between residential segregation and urban black infant mortality rates. The authors found that white infant mortality rates were unrelated to the segregation index. The segregation index was a significant predictor of black infant mortality, even when another variable—the black poverty rate—was included in the model. The black poverty rate and rate of unmarried black mothers were highly correlated with the segregation index. When the authors included all three variables in the model, the only significant variable was the rate of unmarried black mothers.

Thirteen of the 19 areas with black infant mortality rates exceeding 20 deaths per 1,000 live births were located the Middle Atlantic and East North Central regions, which included several hypersegregated areas. Black infant mortality rates were lowest in the west, which also had the least residential segregation. The authors note that black/white segregation could affect infant mortality through concentrations of poverty or lower quality of life for blacks and whites living within these isolated communities. The relationship between unmarried mothers and the infant mortality rate, the authors note, may be attributable to social factors such as unemployment and to nutritional and health care factors. The higher infant mortality rate in hypersegregated areas may be associated with the concentration of poverty, poorer neighborhood quality (e.g., high-density housing, crime, noise, psychological stresses), and higher prevalence of specific risk factors (e.g., maternal medical-nutritional factors, education, reproductive patterns, smoking, and drug use).

Schulz AJ, Williams DR, Israel BA, Bex Lempert L. Racial and spatial relations as fundamental determinants of health in Detroit. *The Milbank Quarterly*. 2002;80:677–707.

The authors present an overview of racial disparities in health, the historic causes of racial segregation in Detroit, a description of the level of segregation, practical consequences of segregation (e.g., inner-city blacks commuting to the suburbs for work), and the health consequences of the segregation. In Detroit, expanding highway systems and the availability of inexpensive land outside the city contributed to employers relocating to the suburbs. This shift, combined with discriminatory housing practices, contributed to increasing

segregation of African Americans in Detroit. As businesses and employment opportunities moved out, the tax base eroded, which caused deterioration in public services such as police, public schools, and firefighting. Property values and employment opportunities continued to decline. Many African Americans in Detroit were left isolated in high-poverty urban areas with few resources and opportunities. High-poverty neighborhoods have more stressors and fewer social support resources, along with fewer grocery stores, higher-priced foods, fewer fresh foods, and more liquor stores.

Efforts to improve health in racially segregated communities may choose to focus on proximate factors, such as increasing access to health care or enhancing social connections, and intermediate factors, such as limiting the number of local industrial facilities. Civic engagement and political influence play an important role in the success of efforts to address political and regulatory systems. The authors discuss the need, particularly in areas with decentralized local governments, for political alliances that cross governmental boundaries.

Williams D, Collins C. Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Reports*. 2001;116:404–416.

The authors review evidence that racial residential segregation is a key determinant of racial differences in health. They present contextual information on the historical and political origins of racial residential segregation, including the role of institutional racism in the form of legislation, policies in economic institutions, and federal housing policies, as well as the role of discriminatory practices by individuals. They also discuss the current extent of segregation in the United States. They note that no immigrant group has lived under the high levels of segregation that currently exist for African Americans—levels that in many cities have remained essentially unchanged since 1940.

The authors also describe the impact of segregation on educational and employment opportunities as well as the resulting effects on socioeconomic status, which determines access to opportunities and resources at both individual and community levels. They note that poor blacks are more likely than are poor whites to be concentrated in high-poverty neighborhoods. These neighborhoods are often characterized by physical environments with poor overall housing quality; lack of access to services like grocery stores and medical services; targeted marketing by alcohol and tobacco advertisers; high levels of crime; and multiple sources of stress. Although the authors focus largely on the experience of African Americans, they recommend further inquiry into the role of residential segregation in the health of Latinos and other ethnic groups and subgroups. To eliminate racial disparities in health, racial segregation and racial disparities in socioeconomic status must be addressed, and interventions must be targeted at both individuals and the geographic context where they live.

C. NEIGHBORHOOD SOCIOECONOMIC STATUS AND HEALTH

The studies in this section explore associations between socioeconomic status and health. Studies have found that people at every socioeconomic level have worse health outcomes than do people at a higher socioeconomic level. Several articles indicate that a neighborhood's overall socioeconomic status (SES) influences residents' health beyond the effects of an individual resident's SES. Low neighborhood SES has negative effects on likelihood of smoking, physical activity, depression, hostility, and mortality risk. Children in lower SES neighborhoods have higher injury rates and more behavioral and emotional difficulties. Possible explanations for the relationship between low neighborhood SES and negative effects on health include residents' health behaviors, sense of inequality and position in the social hierarchy, psychological stress, higher crime, poor housing, lack of transportation, and greater exposure to environmental contaminants. It should be noted, however, that some evidence suggests that living in a high SES neighborhood is not always protective: Mexican Americans with very low incomes in one study had the highest mortality risk if they lived in the highest SES neighborhoods.

The U.S. Department of Housing and Urban Development conducted an unusual and important study that investigated the effects of moving from a high-poverty to a low-poverty area. Families were randomly assigned to groups that continued to get assistance to live in their current neighborhood, got vouchers that could only be used in lower-poverty neighborhoods, or got vouchers that could be used anywhere. The researchers followed the groups to study the effects of changing a person's neighborhood environment. For families who moved to a low-poverty area, there were documented improvements that included gains in mental and physical health, increased safety, less exposure to violence, and improvements in self-reported health. The study also found, however, that families who were not required to move to low-poverty neighborhoods did not move. There may be factors related to social support, concerns about discrimination, increased commute times, ability to afford to move, or other factors that would make moves to low-poverty neighborhoods a bad option for some families. Studies of neighborhood socioeconomic status and health suggest that programs or policies that help residents of low-income neighborhoods move to higher-income neighborhoods can improve health for the people who move, but also that there is a need to improve conditions in low-income neighborhoods for those who cannot or do not want to move.

Adler NE, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, Syme SL. Socioeconomic status and health: the challenge of the gradient. *American Psychologist*. 1994;49:15–24.

The authors introduced the idea of an association between socioeconomic status (SES) and health that follows a gradient. They found that people at the high end of the SES spectrum do better in terms of health than do people in the middle of the spectrum, and people in the middle do better than do people at the low end of the SES spectrum. Because SES is associated with health even at the higher ends of the SES spectrum, the authors suggest, the association between SES and health is an important phenomenon requiring further inquiry.

What is it about low SES that causes poor health? After reviewing various studies in which the data represent a range of SES levels, the authors present some possible mechanisms. They argue that genetic factors could not be driving the associations between SES and health. They suggest, by way of example, that physical size or intellectual capacity could lead to lower social position and poorer health. In the Whitehall study of civil servants, the association between job status and health remains even after taking into consideration height and body mass index. The authors note that genetics are still strongly influenced by environment, so they could not be the primary mechanism. Another mechanism suggested by some observers is that people with poor health may drift to lower SES levels over time—the drift hypothesis. The counterargument to the drift hypothesis is that even if only the head of household's SES is used to measure SES, there is still an association with health for other family members. A third possible mechanism is that SES influences biological functions that determine health status. Few studies at this point have examined SES to determine whether this sort of effect could be discerned. The authors speculate that a person's position in the social hierarchy could have a direct effect on his or her health. To support this, the authors turn to the income inequality research of Richard Wilkinson and to research on dominance hierarchies in primates.

Anderson RT, Sorlie P, et al. Mortality effects of community socioeconomic status. *Epidemiology*. 1997;8:42–47.

The authors used a large national database to study the relationship between median census tract income and 11-year mortality risk. Individual family income had a stronger relationship to mortality risk than did median census tract income adjusted for individual family income; however, median census tract income did contribute to mortality risk beyond individual family income. Black men and women living in low-income areas had mortality rates that were 40 percent and 30 percent higher, respectively, than were mortality rates among their counterparts living in high-income areas, even after adjusting for individual family income. For white men and women living in low-income areas, the mortality rates were 26 percent and 16 percent higher, respectively, than were mortality rates among their counterparts living in

high-income areas. Among men, the mortality risks associated with low individual family income levels were similar for black and white men, but the mortality risks associated with low median census tract income were greater for black men. The authors conclude that mortality risks are associated with living in a low-income neighborhood beyond the health risk of having a low family income.

Bosma H, Van de Mheen H, Borsboom GJJM, Mackenbach JP. Neighborhood socioeconomic status and all-cause mortality. *American Journal of Epidemiology*. 2001;153:363–371.

In this article, the authors report on a survey conducted in the Netherlands that found that people living in a neighborhood with a high percentage of unemployed/disabled or poor people had an increased risk of mortality, even after adjusting for individual socioeconomic characteristics. Lower socioeconomic status (SES) neighborhoods had a higher prevalence of poor housing conditions, social disintegration, unhealthy psychological profiles, and unhealthy behaviors. This study provides evidence that neighborhood SES is independently associated with health outcomes. It also suggests pathways through which neighborhood SES might affect health outcomes.

Del Conte A, Kling J. A synthesis of MTO research on self-sufficiency, safety and health, and behavior and delinquency. *Poverty Research News*. 2001;5:3–6.

This article summarizes research findings from the U.S. Department of Housing and Urban Development's Moving to Opportunity (MTO) demonstration project. MTO was implemented in five large cities with populations of at least 400,000 located in metropolitan areas with at least 1.5 million people. Only very low-income families with children who lived in public housing or Section 8 project-based housing located in central-city neighborhoods with high concentrations of poverty were eligible to participate in the program. Participants were assigned randomly to three groups. People in the experimental group were given an opportunity to relocate from a high-poverty neighborhood to a low-poverty neighborhood. The people in this group received rental vouchers that could only be used in census tracts where less than 10 percent of the population was below the poverty line, and they received counseling and assistance in finding a private rental unit. People in the control group continued to receive Section 8 assistance, and people in a comparison group received rental vouchers that could be used anywhere (not restricted to low-poverty areas).

The authors offer an overview of some of the program's early findings. The MTO research to date, the authors note, suggests generally positive improvements in mental and physical health among relocated families. One of the primary successes of MTO was strong evidence of increased safety and less victimization and exposure to violence across all sites.

Another success was the improvement in self-reported health among the experimental group compared to control group participants. The physical and mental health of children who relocated markedly improved at two of the sites. There was also evidence of fewer behavior problems among youth and fewer arrests in the experimental groups.

Durkin MS, Davidson LL, Kuhn L, et al. Low-income neighborhoods and the risk of severe pediatric injury: a small-area analysis in northern Manhattan. *American Journal of Public Health.* 1994;84:587–592.

This article presents an ecological analysis of intentional and unintentional injuries among children resulting in hospitalization or death in northern Manhattan. The authors found a dose-response relationship between census tract characteristics—including the percentage of low-income households, single-parent families, people without high school degrees, and unemployment—and injury rates. Because this was a true ecological analysis, it could establish disparities but could not address whether these were due to area or individual features.

Haan M, Kaplan GA, Camacho T. Poverty and health: prospective evidence from the Alameda County study. *American Journal of Epidemiology.* 1987;125:989–998.

To examine the reasons for the association between socioeconomic status and poor health, the authors examined the nine-year mortality experience of a random sample of residents ages 35 and over in Oakland, California. The study results support the hypothesis that properties of the sociophysical environment may be important contributors to the association between low socioeconomic status and excess mortality, and that this contribution is independent of individual behaviors. The investigators performed a multivariate analysis, adjusting for baseline individual characteristics, and found that people living in a poverty area in Alameda County experienced higher age-, race-, and sex-adjusted mortality rates over the nine-year follow-up period than did residents of nonpoverty areas of the county. Age-adjusted mortality rates in poverty areas, in comparison to rates in nonpoverty areas, were 44 percent higher for white males, 36 percent higher for white females, and 29 percent higher for nonwhite females. Among nonwhite males, almost no difference in mortality rates was found for those living in a poverty area and those living in a nonpoverty area. The associations between residence in a poverty area and mortality remained adjustments for individuals' age, sex, race, baseline physical health status, low income, lack of medical care, unemployment, education, health practices, social isolation, psychological uncertainty, or depression.

The authors suggest that residents of poverty areas may be exposed to higher crime rates, poorer housing, less available transportation, and higher levels of environmental contaminants.

Leventhal T, Brooks-Gunn J. Moving to better neighborhoods improves health and family life among New York families. *Poverty Research News*. 2001;5:1576–1582.

The authors discuss family and health outcomes for families who moved from a high-poverty neighborhood in the Moving to Opportunity (MTO) study in New York. Families who moved from a high-poverty to a low-poverty area were found to have slightly increased family income from increased employment and decreased receipt of welfare. The most dramatic gains among the families who moved were seen in the effects on health. Mothers who moved to low-poverty areas were 15 percent less likely to report depression symptoms, and 15 percent were less likely to report anxiety symptoms than were mothers who did not move. Children who moved into low-poverty areas reported better physical and mental health. Such children were less likely to report being depressed and reported arguing less frequently. Some MTO families were not required to move to a low-poverty area but had vouchers that would have allowed them to do so. The authors report that moving patterns in the MTO study indicate that families who were not required to move to low-poverty neighborhoods did not voluntarily make those moves on their own.

Leventhal T, Brooks-Gunn J. The neighborhoods they live in: the effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin*. 2000;126:309–337.

This article is an extensive review of the effects of neighborhood residence on child and adolescent outcomes. It includes historical background of neighborhood studies, methodological issues, and possible pathways linking neighborhoods and child development outcomes. The authors report that high socioeconomic status neighborhoods are associated with achievement, whereas low socioeconomic status neighborhoods and residential instability are associated with behavioral and emotional difficulties.

Winkleby MA, Cubbin C. Influence of individual and neighborhood socioeconomic status on mortality among black, Mexican American, and white women and men in the United States. *Journal of Epidemiologic Community Health*. 2003;57:444–452.

The authors' analysis of national survey data found that black and Mexican American women and men lived in lower socioeconomic status (SES) neighborhoods than did white women and men. Death rates generally increased as neighborhood SES decreased; however, one exception to this pattern was that death rates for Mexican American women and men were highest for individuals with the lowest family incomes who lived in the highest SES neighborhoods. Hypothetically, and not taking individual SES into consideration, deaths could be reduced by about 20 percent for each of the six population groups—black, white, and Mexican American men and women—if the people in each group had the same death rates as their racial/ethnic and gender counterparts living in the highest SES neighborhoods.

D. PHYSICAL ENVIRONMENTS: DIRECT EFFECTS ON HEALTH

The term, physical environments, refers to the physical properties of environments, including housing conditions and quality and exposure to toxins and pollutants in air, land, or water. The articles in this section focus on physical environments with direct effects on health. Poor physical housing conditions, for example, are associated with a variety of illnesses and injuries. Exposure to environmental toxins can also cause illness, and there is evidence that communities of color are disproportionately exposed to such toxins.

I. HOUSING AND HEALTH

The studies described in this section focus on relationships between housing quality and health. A number of studies have found that poor-quality housing conditions—for example, cold, hot, or damp housing, mold, pest infestation, lead paint, and overcrowded housing—are associated with health problems such as respiratory infections, asthma, lead poisoning, tuberculosis, infectious diseases, and injuries in children. Access to affordable housing can also affect health, because paying a large proportion of one's income for housing can mean increased stress and fewer dollars for other necessities. The location of affordable housing affects health, because concentrated affordable housing can lead to segregation of low-income people in areas with poor neighborhood conditions and poor access to jobs. Housing improvements have been found to be associated with improvements in self-reported mental and physical health.

The authors of these articles make several recommendations to improve housing and health, among them the following: 1) develop more affordable housing options; 2) strengthen housing maintenance codes; 3) increase resources for housing code inspections and enforcement; 4) expand the Healthy Homes program run by the U.S. Department of Housing and Urban Development to address more housing conditions; 5) increase redevelopment efforts; 6) use information on community characteristics when designing injury prevention programs; 7) target efforts to improve housing conditions at tracts of rental housing with high vacancy rates; 8) expand the role of public health agencies in housing inspection and education; and 9) develop new partnerships among community groups, public health agencies, and other government agencies to improve housing and health.

BurrIDGE R, Ormandy D. *Unhealthy housing: research, remedies, and reform*. London: Spon Press; 1993.

This collection of essays on housing in the United Kingdom summarizes research on housing and health and suggests options for change. The research reviewed in the book includes studies on the health consequences of cold or warm housing, damp housing, mold, high-rise housing, pest infestation, crowded housing, features of housing that lead to injuries, and homelessness. One chapter discusses the lack of indicators for healthy housing, despite the existence of many studies demonstrating associations between housing features and health. That chapter also presents a list of housing indicators in eight categories: 1) architecture and urban design; 2) housing administration; 3) societal factors; 4) household demography; 5) external and internal environmental conditions; 6) ergonomics and safety; 7) individual human factors; and 8) residential mobility and choice. Another chapter discusses the Building Research Establishment's Environmental Assessment Method as a means to assess the impacts of new buildings on the health of building occupants and on the environment (e.g., air and water pollution issues, land use).

Freeman L. *America's affordable housing crisis: a contract unfulfilled*. *American Journal of Public Health*. 2002;92:709–712.

This paper puts forth a public health argument for making access to healthy housing a federal entitlement, similar to food stamps or Medicaid. The author notes that current policies are not adequate to provide housing assistance to everyone who has housing need. He argues that affordability is the key housing issue to address from a policy perspective, since it is the single largest expenditure for most households and has the potential to affect all other domains of life. Housing is considered to be affordable if a household pays up to 30 percent of its income to housing. Statistics indicate that more people did not have affordable housing in 1999 than did in 1989. For example, in 1989 17 percent of renters paid more than 50 percent of their income for rent; in 1999, 20 percent of renters paid more than 50 percent of their income for rent. The author argues that housing policy must be set at the federal level, which is most efficient and avoids local governments competing with their neighbors to provide the most minimal benefits to avoid attracting larger numbers of poor people.

Fullilove MT, Green L, Fullilove RE. *Building momentum: an ethnographic study of inner-city redevelopment*. *American Journal of Public Health*. 1999;89:840-845.

This article documents the evolution of the Harlem Congregation for Community Improvement's Bradhurst redevelopment project from 1994 to 1998. Ethnographic data, including field notes, maps and photographs of the streetscape, focus groups, and interviews were used to document community changes and effects on residents. Analysis revealed

several themes. Families who moved into newly renovated apartments enjoyed their clean and safe apartments, became active in tenants' associations, turned from concerns about shelter to other areas of their lives such as job training and spending more time with family and friends. While the lives of these families improved in many ways, the redevelopment efforts left much of the area in a dilapidated condition, and even those who were doing well often "felt like they were drowning in the sorrow of others" in the community. Loss of housing had led residents to become isolated from one another, as residents moved, became homeless, and experienced disruptions in their social networks. Many residents were nostalgic for the strong social ties and other positive aspects of the neighborhood that had existed before it declined.

Overall, the authors found that the renovation efforts were a positive experience for residents. Living conditions improved, and there were more positive social exchanges and reduced dominance of the drug culture. One resident commented, "Everyone is in a new environment. People have a different attitude." The authors suggest that restoring homes and stores create opportunities for greater social cohesion and attachment to the neighborhood. To make this happen, the authors highlight the need for community organizing efforts. The authors also discuss the need for processes that will allow residents to "mourn their losses, join in a new search for meaning, and commit to rebuilding efforts" as they work to re-establish trusting relationships after years of trauma—a result of community disintegration and related health problems like drug addiction. They highlight the need for partners beyond the neighborhood to help with restoration efforts.

The Greenlining Institute. *Housing: the foundation for individual and community health*. San Francisco: The Greenlining Institute; 2002.

This booklet discusses how housing policies have contributed to health problems and suggests possible solutions. The need for affordable housing is stressed, and California's diminishing housing options are highlighted. The authors discuss how housing is related to health, through physical conditions, affordability, and location of the housing. They note that *poor physical housing conditions* are associated with respiratory infections, asthma, lead poisoning, tuberculosis, and injuries in children. About *affordability*, they note that paying a large proportion of one's income for housing leaves fewer dollars for other necessities, such as food. About *location*, the authors say that affordable housing is increasingly concentrated in core urban areas or older suburbs. This concentration has led to segregation of low-income people in these areas, who are then burdened by a combination of poor physical conditions, little job growth, and limited tax base for public services. To address these issues, the authors recommend promoting public policies to build housing stock, modifying policies that determine how communities grow, and advocating for cities and counties to develop enough affordable housing.

Krieger J, Higgins DL. Housing and health: time again for public health action. *American Journal of Public Health.* 2002;92:230–236.

The authors discuss how the quality and accessibility of housing is related to health. They consider the relationship of housing to infectious diseases, chronic illnesses, injuries, poor nutrition, and mental disorders. The authors also examine neighborhood effects on health. They note that substandard housing is not equally distributed throughout the population, and that the same populations who have poor housing—including low-income people and people of color—also have poor health. In addition, the authors discuss the historical relationship between public health and housing conditions, including the sanitary reform movement and the development of housing regulations.

The authors recommend several approaches to improving the quality of housing: strengthening housing codes and providing resources for their enforcement; expanding and providing additional resources for Healthy Homes programs initiated by county and city health departments to provide education and resources for people to improve housing quality; increasing collaboration between public health agencies and other government agencies and community groups; and having public health agencies advocate for policies to ensure access to affordable and healthy housing and remediation of unhealthy housing.

O’Campo P, Rao RP, Gielen AC, et al. Injury-producing events among children in low-income communities: the role of community characteristics. *Journal of Urban Health.* 2000;77:34–49.

This study found that census tract rates of housing violations were associated with children under age 5 experiencing an event that could lead to injury. The researchers used both individual-level data and neighborhood characteristics but did not attempt to distinguish between area characteristics and individual characteristics. The authors conclude that information on community characteristics could be useful in designing community-based injury prevention interventions.

Saegert SC, Klitzman S, Nicholas F, Cooperman-Mroczek J, Nassar S. Healthy housing: a structured review of published evaluations of US interventions to improve health by modifying housing in the United States, 1990–2001. *American Journal of Public Health.* 2003;93:1471–1477.

This review article characterizes and evaluates the success of public health interventions related to housing. Reviewers content-analyzed 72 articles of interventions conducted in the United States from 1990 to 2001. The reviewers’ goals were to describe each intervention and its evaluation method, identify each study’s strengths and limitations, and

identify directions for future research, policy, and practice. Most of the interventions used one-time treatment attempts. Of the interventions reviewed, 92 percent addressed a single condition (usually lead poisoning, injury or asthma), 57 percent targeted children, and 13 percent targeted seniors. Most reported statistically significant results, though only 14 percent were judged to be extremely successful.

Results of the review indicate that current interventions are limited by narrow definitions of housing and health, brief time spans, and limited geographic and social scales. The authors recommend greater use of an ecological paradigm that incorporates increased focus on the social determinants of persistent disparities in health. A stronger focus on multilevel (individual, family, community, and/or state) determinants of health outcomes is also recommended as a more effective approach to health interventions as they relate to housing.

Sargent JD, Bailey A, Simon Blake PM, Dalton MA. Census tract analysis of lead exposure in Rhode Island children. *Environmental Research*. 1997;74:159–68.

The authors of this article on lead exposure find that recent immigrants, especially Hispanic and Southeast Asian refugee families, are more likely to move into neighborhoods in which the housing is deteriorating, which increases their chances for lead exposure. These populations may be replacing more traditional risk groups in these neighborhoods, such as African American children. Immigrant groups may be forced to live in these areas because their limited financial resources require them to seek neighborhoods with the lowest average rents. The authors recommend policy changes to improve housing conditions targeted at tracts of rental housing with high vacancy rates to have the greatest impact on lead exposure prevalence. They also state the limitations involved in individually based studies of lead exposure that result in a limited understanding of poor and highly mobile populations due to study dropout rates.

Shaw, M. Housing and public health. *Annual Review of Public Health*. 2004;25:397–418.

In this overview of the impact of housing on health from both a historical and contemporary perspective, the author first discusses ways in which *material disparities affect individuals and families* living in substandard homes. Examples include poor ventilation and low-quality construction/maintenance. Such housing conditions have been linked to respiratory disease, lead poisoning, and increased injury. Next, the author considers *effects of the meaning of home on individuals and families*, pointing out how adequate housing can provide a sense of privacy, security, and control for individuals. In turn, inadequate housing may influence individuals' health and mental well-being by increasing their level of stress as they are affected by security and long-term stability. The author then focuses on how the *material disparities of*

housing affect neighborhoods and communities, pointing to evidence showing that lower-quality features of a community's environment can have a negative impact on that community's ability to be healthy. Last, the author considers how the *meaning of home collectively affects neighborhoods and communities*, examining how housing location and environment can directly affect a community's social cohesiveness and the ability of its citizens to work together to create change. The author concludes that public health officials must address the need for better-quality housing at both the individual and neighborhood/community level. Recognizing public health's strong historic link with housing, the author emphasizes that improved housing is a critical element in tackling contemporary health inequalities more broadly.

Thomson H, Morrison D, Petticrew M, et al. Health effects of housing improvement: systematic review of intervention studies. *British Medical Journal*. 2001;323:187–190.

The authors review studies of the health effects of housing improvements, refurbishment, and energy-efficiency measures, such as installing insulation and heating. The studies reviewed generally found that such housing improvements were associated with improvements in self-reported mental and physical health and in social outcomes. They comment, however, that most available studies are of poor quality (for example, with small populations or no comparison groups), so their usefulness is limited. The authors discuss methodological challenges that make studying housing interventions difficult—including the fact that housing interventions often occur along with other interventions—and they call for combining qualitative and quantitative methods to study housing interventions.

2. ENVIRONMENTAL HAZARDS AND HEALTH

This section includes articles documenting connections between environmental hazards and health. Environmental hazards include air pollution, contaminated drinking water, contaminated fish consumption, lead, agricultural chemicals, and proximity to hazardous waste sites, nuclear plants, waste treatment sites, transportation corridors, mining waste, and chemical and manufacturing plants.

Although the disproportionate exposure of communities of color to environmental hazards is well documented, there is less literature on the connections between exposure to environmental hazards and specific health outcomes. The articles in this section discuss associations between outdoor air pollution and the exacerbation of asthma, outdoor air pollution and the development of new cases of asthma, outdoor air pollution and lifetime cancer risks, exposure to traffic and asthma and cancer risks, neighborhood economic status and lead exposure, proximity to transportation corridors and lead exposure, proximity to mining areas and lead exposure, and proximity to brownfields and mortality rates due to cancer, respiratory diseases, and other major causes of death. The authors cited in this section discuss the challenges in measuring exposure—particularly cumulative environmental hazard exposures—as well as in measuring these hazards' contributions to health outcomes.

Suggested approaches for reducing environmental hazards include: 1) greater public participation in decision making and community planning; 2) participation in the environmental justice movement; 3) partnerships between government and community organizations; 4) policy efforts to reduce motor vehicle traffic, 5) more attention to such contextual factors as tax structure, zoning policies, transportation policies, and regional economic development and land use patterns, and the intersection of these factors with race, ethnicity, and class; and 6) more attention to the overall role of broad political and economic forces in shaping disproportionate exposures to environmental hazards and health risks.

Brown P. Race, class, and environmental health: a review and systematization of the literature. *Environmental Research*. 1995;69:15–30.

This article reviews the environmental health literature on the differential exposure to human-produced toxic hazards by race and class. Studies of proximity to hazardous waste sites (including landfills, incinerators, and Superfund sites), exposure to air pollution, and exposure to hazardous substances (including toxic releases, pesticides, and fish consumption) show that poor and minority populations have higher exposure to hazards. For example, a national study of commercial hazardous waste facilities in 1986 found that communities with a commercial toxic waste site had double the percentage of minority residents as did communities without a commercial toxic waste site. Furthermore, studies of environmental regulatory decisions show procedural inequities. For example, hazardous waste sites in minority communities take longer to be placed on cleanup lists, and less reliable cleanup methods are approved for such sites; and fines for violating pollution laws in white communities are higher than fines for violating pollution laws in minority communities.

Although blacks have been shown to have higher exposure to air pollution and higher lung cancer rates, the Environmental Protection Agency (EPA) does not accept this as proof of a causal connection. The only disease acknowledged by the EPA to be clearly affected by disparities in exposure by race and class is lead poisoning. The authors discuss the difficulty of establishing definite causal links between exposure to hazardous wastes and diseases. They also discuss the difficulties in measuring exposure in populations and thus in establishing exposure's definite contributions to health disparities. They point out that racism and inequity underlie both instances in which decisions are explicitly made to place hazards in low-income and minority communities because little opposition is expected and in instances where poor and minority communities migrate to contaminated areas because these areas are less desirable and thus more affordable. Finally, noting the limits of traditional individualistic epidemiology to study the differential exposure to human-produced toxic hazards by race and class, the authors point to the need to study race and class in the context of the tax structure, zoning policies, and other determinants of land use and the need for community participation and in-depth ethnographic analysis.

Elreedy S, Krieger N, Ryan PB, et al. Relations between individual and neighborhood-based measures of socioeconomic position and bone lead concentrations among community-exposed men: the normative aging study. *American Journal of Epidemiology*. 1999;150:129–141.

The authors investigated relations between individual and neighborhood-based measures of the socioeconomic position of white men in Boston and their bone lead concentrations. The subjects in the study were white men ages 50–92 who were healthy when they

enrolled in the study in the 1960s. This study gathered individual and neighborhood-based measures of socioeconomic status for these men. The lead concentration in the subjects' tibias was measured in 1991 and 1995. Even after controlling for age and smoking, the authors found that bone lead concentrations were higher in men who did not graduate from high school than they were in men who had at least four years of college. Men without a high school diploma had higher lead concentrations if they lived in a neighborhood with low overall educational level levels; however, there was no association between geographic location and lead concentrations in men with a college degree.

Friedman MS, Powell KE, Hutwagner L, Graham LM, Teague WG. Impact of changes in transportation and commuting behaviors during the 1996 Summer Olympic Games in Atlanta on air quality and childhood asthma. *Journal of the American Medical Association*. 2001;7:897-905.

This ecological study shows that reduced downtown traffic congestion in Atlanta during the 1996 Olympic Games was associated with prolonged reduction in ozone pollution and significantly lower rates of children's asthma-related hospitalizations, emergency department visits, and urgent care center visits. Atlanta's efforts to reduce downtown traffic congestion during the Olympics included using an integrated, 24-hour-a-day public transportation system, promoting alternative work hours, and closing the downtown sector to private automobile use. The Georgia Environmental Protection Agency measured associated reductions in ozone by using the average of peak one-hour ozone concentrations from three monitoring sites in the study area. Analysis showed that the decrease in asthma events recorded in the Medicaid database during Atlanta's alternative transportation plan was large enough to be statistically significant. The authors conclude that these results support efforts to reduce air pollution and improve respiratory health through reductions in motor vehicle traffic.

Lee C. Environmental justice: building a unified vision of health and the environment. *Environmental Health Perspective*. 2002;110:141-144.

This article points to emerging literature on health and the environment that has begun to document serious environmental inequities in several areas—lead poisoning; air pollution and ambient air quality; groundwater contamination and drinking water safety; proximity to noxious facilities, mining waste, and nuclear plants; location of municipal landfills, incinerators, and abandoned toxic waste sites; placement of transportation thoroughfares; illegal dumping; occupational health and safety; use of agricultural chemicals; contaminated fish consumption; habitat destruction; Superfund site cleanup; and unequal enforcement of environmental laws.

The author discusses the evolution of the environmental justice movement and stresses the need for “holistic, integrative, and unifying strategies that address social, economic, and health improvement simultaneously,” public participation in decisionmaking and community planning, and implementation of strategies at multiple levels. The author cites several examples of partnerships between government and community organizations that have resulted in community planning processes to address environmental health issues.

Litt JS, Tran NL, Burke TA. Examining urban brownfields through the public health “macroscope.” *Environmental Health Perspectives*. 2002;110(Suppl 2):183-193.

According to the U.S. Environmental Protection Agency, brownfields are “abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.” The authors trace the historic operations of 182 vacant industrial sites in southeast Baltimore. They constructed a brownfields scoring algorithm by developing a database on chemical substances used in past processes or released on site, as recorded in facility files or other industrial records. For each chemical identified, the authors assigned hazard scores and chemical persistence weights. Hazard scores were determined by health-effect weightings based on evidence that deemed the chemical a “recognized” or “suspected” toxicant. Chemical persistence refers to how long the substance stays in the environment. The authors aggregated site-specific scores in each of the 23 census tracts.

The authors combined these environmental measures with census and health data to investigate any connections between brownfields and community health, measured by mortality rates due to a variety of conditions. Compared to communities with lowest exposures, communities with the highest exposures to brownfields had higher mortality rates due to cancer (27 percent excess), lung cancer (33 percent excess), respiratory diseases (39 percent excess), and the major causes of death (i.e., liver, diabetes, stroke, chronic obstructive pulmonary disease, heart disease, cancer, injury, and influenza and pneumonia [20 percent excess]). The authors call for systematic surveillance of environmental hazards in brownfields. They also suggest that policymakers can use research findings on the health consequences of exposure to specific substances as guidelines for environmental policy around cleanup and redevelopment of brownfields.

Macey GP, Her X, Reibling ET, Ericson J. An investigation of environmental racism claims: testing environmental management approaches with a geographic information system. *Environmental Management*. June 2001;27:893-907.

This research explores the concept of using environmental management tools to evaluate the existence of environmental racism in a number of communities in Los Angeles, California.

The authors note that environmental racism, which maintains that people of color are exposed to greater quantities of toxins due to racial discrimination in policymaking and inequitable enforcement of environmental regulations, has been well established by various rigorous scientific studies. The authors maintain that environmental management tools that provide data on environmental exposures offer a useful approach to sifting through complex issues of environmental racism.

Combining data from specific environmental management tools (such as the Environmental Protection Agency's Toxic Release Inventory, Cumulative Exposure Project and the Los Angeles County Department of Health Services' Hot Zone Census Tract Assessment) with racial and socioeconomic data, researchers evaluated claims that people of color in South Central Los Angeles are disproportionately exposed to environmental lead. Analysis shows that race is strongly associated with the number of cases of elevated blood lead levels in South Central Los Angeles, irrespective of poverty status. Results indicate that proximity to transportation corridors was consistently the strongest indicator of environmental lead exposure. In addition, median home values were significantly positively related to elevated blood levels. Results highlight the importance for social scientists and environmental justice advocates to consider the complex interplay among race, transportation networks, and housing values that occur within urban environments.

Malcoe LH, Lynch RA, Kegler MC, Skaggs VJ. Lead sources, behaviors, and socioeconomic factors in relation to blood lead of Native American and White children: a community-based assessment of a former mining area. *Environmental Health Perspectives*. 2002;110(Suppl 2):221-231.

This study was conducted among Native American and white children living in Ottawa County, Oklahoma. Ottawa County was part of the Tri-State Mining Region of Oklahoma, Kansas, and Missouri, one of the world's largest lead and zinc mining areas from the late 1800s until 1950. The northeastern portion of Ottawa County was designated a superfund site in 1984. The Environmental Protection Agency (EPA) found high soil lead concentrations in 65 percent of the samples from residences in the superfund site area. The study location for this article was in the area surrounding the superfund site, where soil lead contamination had not been investigated. Investigators collected blood samples from the study children, home soil samples, house dust samples, and interior and exterior paint samples, all of which were assessed for lead levels. Children with higher blood lead concentrations lived in homes with higher levels of lead in the soil, dust, and interior paint. The authors found that at levels far below the EPA residential hazard levels, exposure to floor dust lead was strongly associated with elevated blood levels in children.

McConnell R, Berhane K, Gilliland F, et al. Asthma in exercising children exposed to ozone: a cohort study. *The Lancet*. 2002;359:386-391.

This study investigates whether exposure to outdoor air pollution during exercise or time outdoors affects the development of new cases of asthma. Children with no history of asthma were recruited from 12 communities in southern California and followed for five years. The authors found that the risk of developing asthma in high-ozone areas was greater for children who played three or more sports than for children who played no sports—but number of sports played did not have an effect on children who lived in communities with low-ozone concentrations. Furthermore, in high-ozone communities, the incidence of asthma tended to increase with the number of team sports played. Time spent outdoors also increased risk for asthma in high-ozone communities, but not in low-ozone communities. The authors conclude that the combination of air pollution and outdoor exercise could contribute to development of new cases of asthma in children.

Morello-Frosch R, Pastor M Jr., Porras C, Sadd J. Environmental justice and regional inequality in southern California: implications for future research. *Environmental Health Perspectives*. 2002;110(Suppl 2):149-154.

The authors of this article consider several critical environmental justice issues using data on Southern California. They investigated *environmental exposures* and found that census tracts hosting a treatment, storage, and disposal facility (TSDF) had significantly higher percentages of people of color, lower per capita incomes, and a lower proportion of registered voters. The authors found that working-class communities of color located in predominantly industrial areas were most affected. They also found that Latinos were twice as likely as were Anglos to live in a tract with facilities that emit highly toxic chemicals, followed closely by African Americans. The authors also considered the *implications of outdoor air pollution exposures for health disparities in lifetime cancer risks* and found that 70 percent of excess cancer incidence was associated with mobile sources (e.g., cars), and with local industrial facilities, service industries, and other local sources. While nonmobile sources accounted for the vast majority of the local air pollution, mobile sources were most closely related to estimated excess cancer incidence. The authors gathered longitudinal data on the location of TSDFs over 20 years and found that there was little evidence to support the “*minority move-in*” hypothesis, which speculates that people of color are disproportionately exposed to pollution because they move into areas where TSDFs already exist. The authors found that *neighborhoods that have undergone transitions in ethnic and racial composition* appear to be at increased risk for the siting of TSDFs, even after controlling for economic and other demographic indicators. This may be related to weak social and political networks, which could make it difficult to organize against new TSDF sitings.

The authors advocate for more research into the origins of and reasons for the persistence of inequities in environmental health risks. To study this issue, they recommend using a social

inequality framework (based on race, class, and income) that integrates insights from fields such as economics and sociology, and they urge researchers to examine the role of political and economic forces that lead to environmental inequality. The authors also discuss the importance of measuring cumulative exposures and considering what these exposures mean for health risks. In terms of policy recommendations, the authors discuss the need for pollution reduction efforts to address the role of regional economic development, land use patterns, suburbanization, and transportation corridors in contributing to disproportionate pollution exposures and distribution of health risks. The authors highlight the importance of community participation in developing “long-term regulatory, enforcement, and regional development initiatives that are politically and economically sustainable and that protect public health.”

Rene AA, D. E. Daniels DE, Martin SA Jr. Impact of environmental inequity on health outcome: where is the epidemiological evidence? *Journal of the National Medical Association*. 2000;92:275–80.

The authors perform a meta-analysis of epidemiological studies on the impact of environmental inequity on health outcomes. They acknowledge that waste treatment, storage, and disposal facilities and chemical and manufacturing plants are disproportionately located in minority and low-income communities in the United States. They conclude, however, that there is little evidence to associate adverse health impacts resulting from environmental inequity. The authors recommend that additional research based on analytic epidemiological methods would contribute to better determining relationships between toxic environmental exposures and health outcomes.

Vliet PV, Knape M, de Hartog J, Janssen N, Harssema H, Brunekreef B. Motor vehicle exhaust and chronic respiratory symptoms in children living near freeways. *Environmental Research*. 1997;74:122-132.

This cross-sectional study examines whether motor vehicle exhaust from freeways has an effect on the respiratory health of children in the province of South Holland, Netherlands. Children attending schools situated less than 1,000 meters from major freeways completed questionnaires regarding chronic respiratory symptoms such as cough, wheeze, runny nose, and doctor-diagnosed asthma. Results indicate that those children living near major freeways had more respiratory symptoms with increasing density of traffic, as measured by specific counts of gasoline vehicles and diesel trucks. In addition, more symptoms were reported for children living within 100 meters of the freeways than for children living farther away, and associations between dense truck traffic and respiratory symptoms were stronger for girls than they were for boys. The study's authors conclude that long-term exposure to traffic-related air pollution, in particular, diesel exhaust particles, may increase chronic respiratory symptoms.

E. PHYSICAL ENVIRONMENTS: EFFECTS ON HEALTH BEHAVIORS

A number of researchers have investigated neighborhood factors that affect health through their influence on health behaviors. The presence or absence of supermarkets and liquor stores, parks or exercise facilities, urban sprawl, perceived safety, and public transportation are among the factors found to affect personal health behaviors, such as diet and exercise, that are associated with risks of health conditions such as heart disease and diabetes.

I. NEIGHBORHOOD INFLUENCES ON PHYSICAL ACTIVITY AND DIET/NUTRITION

Researchers investigating obesity and health have begun to focus on neighborhood factors that may make it easier or harder for people to eat healthy foods and be physically active. Some studies discussed in this section focus on how development patterns and transportation systems influence physical activity. For example, there is some evidence that access to exercise facilities, high levels of neighborhood safety, and living in compact and walkable neighborhoods may increase physical activity. Several studies in this section address how neighborhood environments affect eating behaviors. These studies have found that for African Americans, the presence of supermarkets is associated with meeting dietary recommendations. The presence of supermarkets was not associated with the diets of whites, which may be related to greater access to private transportation and therefore stores outside the immediate neighborhood. The authors recommend changes in economic, land use, and transportation policies to improve community conditions in ways that could increase healthy diet and physical activity behaviors.

Burdette HL, Whitaker RC. Neighborhood playgrounds, fast food restaurants, and crime: relationships to overweight in low-income preschool children. Preventive Medicine. 2004;38:57–63.

The authors conducted a large cross-sectional study of more than 7,000 low-income 3- and 4-year-olds in Cincinnati, Ohio. All of the children in the study were enrolled in the Special Supplemental Food and Nutrition Program for Women, Infants, and Children (WIC) program. The purpose of the study was to test the hypotheses that preschool children who are overweight, in comparison with children who are not overweight, live (1) farther away from the nearest playground, (2) closer to the nearest fast-food restaurant, and (3) in neighbor-

hoods with higher crime rates. The investigators used innovative data handling and Geographic Information System (GIS) mapping techniques. Data from WIC's database were used to calculate each child's body mass index. Playgrounds were tracked in a database created by the county health department. Fast-food restaurants were identified using specified criteria (e.g., had franchises in multiple states, served complete meals without waiters or waitresses), and their addresses were located using the Internet or phone books. Crime statistics were used to measure neighborhood safety. Ultimately, the authors found no difference between preschool children who were overweight and children who were not overweight in mean distance to the nearest playground or fast-food restaurant; they also found no difference between the two groups of preschool children by measures of neighborhood safety.

Centers for Disease Control and Prevention. Neighborhood safety and the prevalence of physical inactivity—selected states. *Morbidity and Mortality Weekly Report*. 1999;38:143–146.

In this study, the National Center for Chronic Disease Prevention and Health Promotion analyzed cross-sectional national data. Respondents who reported higher levels of perceived neighborhood safety also reported lower prevalence of inactivity. This was especially the case with respondents who were age 65 or older and racial/ethnic minorities. Neighborhood safety did not seem to matter to respondents with more than a high school education. One limitation of this cross-sectional study, the authors note, is that the data may be confounded by unmeasured individual characteristics.

Evenson KR, Sarmiento OL, Macon ML, Tawney KW, Ammerman AS. Environmental, policy, and cultural factors related to physical activity among Latina immigrants. *Women & Health*. 2002;36:43-57.

The authors conducted six focus groups with Latina immigrants in two North Carolina counties that were chosen based on the prevalence of Latino immigrants. Each group comprised six to 11 Latinas who had not exercised regularly in the past six months. Most of the women were from Mexico. The sessions were all conducted in Spanish, transcribed, and translated into English. The women identified the following environmental and policy barriers to physical activity: inadequate transportation, lack of facilities (e.g., lack of sidewalks, parks not close to home), cost, and safety concerns. They identified cultural factors as well: gender roles (e.g., sports are for men), importance of family, lack of support from husband, child care, language, and isolation in the community. Based on these findings, the authors recommended environmental and policy interventions to promote physical activity among Latinas. For example, to address environmental barriers they suggest providing public transportation and parks, and to address cultural factors, they suggest providing activities for the whole family, child care exchanges, and supporting women's social networks.

Ewing R, Schmid T, Killingsworth R, Zlot A, Raudenbush S. Relationship between urban sprawl and physical activity, obesity, and morbidity. *American Journal of Health Promotion*. 2003;18:47–57.

The authors of this study analyzed a large nationally representative sample of people to assess associations between urban sprawl and health problems. Sprawl was defined as any environment characterized by: 1) a population widely dispersed in low-density residential development; 2) rigid separation of homes, shops, and workplaces; 3) a lack of distinct, thriving activity centers; and 4) a network of roads marked by large block size and poor access from one place to another. To measure sprawl in metropolitan areas, the authors used a 22-variable metropolitan sprawl index. To measure sprawl in counties, the authors developed a separate measure that was able to assess, at the metropolitan level, residential density and street accessibility.

Using the county index of sprawl, the investigators found that residents of more compact places reported spending more leisure time walking than did residents of more sprawling places. The number of minutes people walked varied directly with the county index. The county index of sprawl was also associated with obesity and hypertension. According to the authors, this report has several limitations: using a cross-sectional design; measuring physical activity only by leisure activity (i.e., excluding occupation-, household-, and transportation-associated physical activity); not taking into consideration climate and topography; and not taking into consideration diet and food environment. The authors recommend further research on this topic.

Flournoy R, et al. *Regional development and physical activity: issues and strategies for promoting health equity*. Oakland: PolicyLink; 2002.

This report explores the connection among development patterns, physical activity, and poor health. The authors examine how neighborhoods that have become racially segregated and economically isolated as a result of sprawling development patterns offer few opportunities for physical activity. They discuss: 1) disparities in levels of physical activity and in related health outcomes; 2) disparities in accessibility, cost, safety, and quality of local sites where people might have opportunities to be physically active; and 3) strategies to increase local opportunities for physical activity. Approaches to increase opportunities for physical activity include community efforts to encourage recreational physical activity; improve access to recreational facilities; improve access to safe and attractive local parks; use schools sites as community centers; reform the way schools are designed and built; improve pedestrian safety; make walking to school safer; increase safety from crime; improve community design; and improve public transportation. Examples of community-driven approaches in each area are highlighted.

Frank LD, Engelke P. *How land use and transportation systems impact public health: a literature review of the relationship between physical activity and built form. ACES: Active Community Environments Initiative Working Paper #1; 2000.*

This report reviews the literature on how urban form affects public health, specifically through the ways in which the built environment encourages or discourages physical activity levels. The public health literature widely accepts the hypothesis that physical activity is important for health: it decreases the risks of cardiovascular disease, colon cancer, and diabetes; maintains muscle strength; is necessary for normal skeletal development during childhood; may lower obesity levels; and may relieve depression, anxiety, and mental illness. Two sets of variables are believed to negatively influence the decision to walk or bike: personal barriers and environmental barriers to physical activity. *Personal barriers* are subjective considerations that operate on an individual level (e.g., lack of time, perceived or real physical inability to exercise, lack of motivation, lack of social support, child care responsibilities, lack of social support, and lack of health knowledge). *Environmental barriers* are objective considerations that hinder a person's ability to act (e.g., lack of exercise facilities, lack of sidewalks, lack of bike lanes, nearby public parks, or hiking/biking trails).

The urban planning literature focuses on two sets of variables believed to be relevant to travel behavior: transportation system characteristics and land development variables. *Transportation systems* influence travel behavior. A grid pattern of streets, for example, decreases trip distances and increases route choices, making walking or biking more desirable. Traffic-calming measures have been shown to lead to greater street activity, fewer pedestrian injuries, less pollution, and other desirable outcomes. *Land development* patterns can also influence travel behavior. The conventional wisdom suggests that low density increases distances, thereby decreasing walking and biking. Mixed uses of land can be associated with shorter distances. For example, allocating space for work and services promotes shorter distances for mid-day errands by office workers. Studies of urban form consistently find that walking and biking levels are higher in traditional neighborhoods than they are in standard suburban ones.

The Greenlining Institute. *Transportation options: links to better health. San Francisco: The Greenlining Institute; 2002.*

This booklet discusses how transportation policies affect health and suggests possible solutions to address transportation inequities. The authors note that government spending emphasizes cars over public transportation, and that pollution from car emissions contributes to respiratory diseases and asthma attacks. Transportation systems and street design also can influence how much we walk or bike. Race and class are intertwined in the debate about transportation policy. Bus riders are disproportionately poor, people of

color, women, children, the elderly, and the disabled. Light-rail systems are the preferred public transportation systems for commuters, often middle- and upper-class workers, but they are capital-intensive and require large government subsidies. Transportation policy options to improve health include increasing funding for public transportation, making transportation spending more accountable to the community, and empowering groups most affected by public transportation decisions.

Jackson RJ, Koschitzky C. Creating a healthy environment: the impact of the built environment on public health. Washington, DC: Sprawl Watch Clearinghouse; 2001.

This monograph reviews the relationship between the built environment and health. The authors make several points: first, land use decisions, sprawl, and transportation systems affect air quality and respiratory health. Second, parks and trails, as well as mixed-use land and the walkability of transportation routes, can present opportunities or barriers to physical activity. Third, urban design can influence pedestrian and bicyclist injuries and deaths. Fourth, sidewalks, depressed curbs, and transportation systems can affect mobility and quality of life for elderly and disabled residents. And, fifth, land use decisions can affect community water quality, sanitation, and incidence of disease outbreaks.

Morland K, Wing S, Diez Roux A. The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study. *American Journal of Public Health.* 2002;92:1761–1767.

The authors measured the association between the physical availability of food stores and food service places—the presence of supermarkets, grocery stores, restaurants, and fast-food outlets—and people's adherence to health authorities' recommendations for a healthy diet. Healthy diet was measured in terms of 1) servings of fruits and vegetables per day; 2) percentage of calories from fat; 3) saturated fat; and 4) dietary cholesterol.

Among blacks, the presence of supermarkets was found to be associated with meeting dietary recommendations. In fruit and vegetable consumption, there was a dose-response association among blacks corresponding to the number of supermarkets in their census tract. Only 8 percent of blacks—vs. 31 percent of whites—lived in a census tract with at least one supermarket. The presence of a small grocery store in an area showed little association with the reported diets of blacks. Seventy-nine percent of blacks lived in areas with full-service restaurants, which were associated with lower intake of saturated fats. Nearly 60 percent of black respondents lived in neighborhoods with at least one fast-food restaurant. However, the results indicated that there was little association between the presence of fast-food restaurants and reported dietary intake of recommended foods and nutrients. For whites, the presence of supermarkets, grocery stores, restaurants, and fast-

food outlets was not found to be associated with diet. The authors noted that whites were more likely than blacks to have access to private transportation; hence, the diets of whites might not be as influenced by the proximity of food services.

Morland K, Wing S, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *American Journal of Preventive Medicine*. 2002;22:23–29.

The authors examine the distribution of food stores and food service places in Mississippi, North Carolina, Maryland, and Minnesota by neighborhood wealth and racial segregation. They found that there were three times fewer supermarkets in the poorest neighborhoods than in wealthier neighborhoods. Medium-wealth neighborhoods had the highest prevalence of convenience stores attached to gas stations. Bars and taverns were three times more common in the lowest-wealth neighborhoods than in the highest-wealth neighborhoods. Predominantly white neighborhoods had more than four times as many supermarkets as did predominantly black neighborhoods. Residents of the poorest neighborhoods had the lowest levels of car ownership, and blacks were less likely to own cars than were whites. Lack of private transportation may make it especially difficult for residents to obtain healthy food.

Without access to supermarkets that offer a wide variety of foods at lower prices, poor and minority communities may not have equal access to the variety of health food choices available to wealthy and nonminority communities. Attributing their findings to economic policies that have supported corporate retail chains, home loan policies that have favored whites, and land use policies that have favored affluent white neighborhoods, the authors suggest changes in economic and land use policies to address these inequities.

Sallis JF, Hovell MF, et al. Distance between homes and exercise facilities related to frequency of exercise among San Diego residents. *Public Health Reports*. 1990;105:179–185.

For this study, the authors conducted a random sample survey of residents of San Diego, California, to investigate the influence of physical environment on exercise. After adjusting for residents' age, education, and income, the authors found that people who reported exercising three or more times per week had a higher density of pay exercise facilities near their homes. Although it is difficult to establish causation, access to recreation facilities is often suggested as a determinant of physical activity.

Timpero A, Crawford D, Telford A, Salmon J. Perceptions about the local neighborhood and walking and cycling among children. *Preventive Medicine*. 2004;38:39–47.

The authors examined cross-sectional associations between children's and parent's perceptions of the local neighborhood—traffic density, road safety, presence of strangers, sporting facilities, public transport—and walking and biking among children ages 5–6 and ages 10–12 in Melbourne, Australia. Older boys walked or biked to all destinations (e.g., school, playgrounds, friends' houses, shops, sports venues) more often than did younger boys. Among the older boys, those with the highest socioeconomic status (SES) walked or biked to public transport more often than did boys with the lowest SES. Among the older girls, those with the highest SES walked to or from school more often than did girls with a medium level of SES.

Parental beliefs about the local neighborhood were not logically related to their children's walking or biking behavior among the families with children ages 5–6. Thus, for example, boys whose parents believed that there was heavy traffic in their local streets were more than twice as likely as were other boys to walk or bike to destinations at least three times a week. In multivariate analyses, more logical associations were revealed. Among girls ages 10–12, for example, those who believed there were no parks near where they lived and whose parents believed that their child needed to cross several roads to reach play areas, that there were few sporting venues, and that there was limited public transport, were less likely to walk or bike to destinations. The authors suggest that improving road and pedestrian features may be important strategies for increasing children's local walking and biking.

Transportation and Land Use Coalition (TALC), Center for Third World Organizing (CTWO), People United for a Better Oakland (PUEBLO). *Roadblocks to Health: Transportation Barriers to Healthy Communities*. Oakland, CA: TALC; 2002.

This report, the product of a two-year collaboration between social justice organizers and transportation advocates, identifies transportation barriers to health care, nutritious food, and physical activity among residents of 15 low-income communities in Alameda, Contra Costa, and Santa Clara counties in California. Geographic Information System (GIS) mapping analysis, community survey, and other research findings presented in this report indicate that large numbers of poor, elderly, and minority residents in these communities have little or no access to hospitals, grocery stores, and parks. Study investigators found that only 28 percent of residents in Alameda County's disadvantaged neighborhoods have transit access to a hospital; African American residents in Alameda County are more than twice as likely as were white residents to be hit by a car and killed or hospitalized; in Contra Costa County's disadvantaged neighborhoods, only 20 percent of residents have

transit access to a hospital, 33 percent have transit access to a community clinic, and 39 percent have walking access to a supermarket; and residents of suburban Gilroy in Santa Clara County have 7 percent transit access to hospitals and 33 percent transit access to supermarkets.

The report includes several policy recommendations: 1) meet basic transit needs of low-income communities of color; 2) make health access a top priority in transportation policy and planning; 3) make Medi-Cal transportation assistance available to all recipients; 4) direct public resources toward disadvantaged neighborhoods without displacing existing residents; 5) guard against reductions in transportation access to health care; and 6) support innovative efforts to ensure food security in low-income neighborhoods.

Yen IH, Kaplan GA. Poverty area residence and changes in physical activity level: evidence from the Alameda County study. *American Journal of Public Health*. 1998;88: 1709–1712.

The authors investigated the effects of poverty area residence on change in physical activity using longitudinal survey data from Alameda County, California, for 1965 and 1974. Their findings support the importance of place in influencing physical activity. Mean physical activity was found to be lower among poverty area residents than among non-poverty area residents in both years.

For both poverty area and non-poverty area residents, mean physical activity decreased from 1965 to 1974. Even after adjusting for age, sex, baseline physical activity scores, individual income, education, smoking status, body mass index, and alcohol consumption, there were greater decreases in physical activity over the 1965–1974 period among poverty area residents than among non-poverty area residents. Race and income were differentially associated with changes in physical activity depending on the area of residence. Blacks and nonblacks in poverty areas showed similar decreases in physical activity between 1965 and 1974, and people with different incomes living in poverty areas showed similar decreases in physical activity over the period. This study supports other research suggesting that poverty areas may have a leveling effect on health outcomes, with everyone in poverty areas experiencing limited access to resources. In non-poverty areas, race and individual income were associated with changes in physical activity levels—which suggests that residents of non-poverty areas may have differential access to resources depending on their race or income.

2. NEIGHBORHOOD INFLUENCES ON DRUG/ALCOHOL/CIGARETTE USE

A number of studies have investigated neighborhood factors that might be associated with drug and alcohol use and smoking. Many of these studies have found that more disadvantaged neighborhoods are linked to more smoking and substance dependency, although one study found that alcohol and cigarette consumption among early adolescents was higher in wealthier neighborhoods than it was in poorer ones. Some studies have found that the density of alcohol outlets in a neighborhood is associated with pedestrian accidents and alcohol-related hospital admissions. Liquor stores are more likely to be located in predominantly African American areas than in predominantly white neighborhoods. To address substance use and abuse and associated injury hazards, researchers suggest interventions to address community factors associated with substance use as well as policies (e.g., environmental traffic safety measures and zoning regulations) to reduce pedestrian hazards and limit bar density.

Ennett ST, Flewelling RL, Lindrooth C, Norton EC. School and neighborhood characteristics associated with school rates of alcohol, cigarette, and marijuana use. *Journal of Health and Social Behavior*. 1997;38:55–71.

This study investigated the use of alcohol, cigarettes, and marijuana by early adolescents in 36 elementary schools in a midwestern state. The authors examined characteristics of neighborhoods and schools potentially related to school prevalence rates as well as whether these characteristics have independent effects or whether neighborhood characteristics are mediated by school characteristics. Neighborhood and school characteristics were measured using student, parent, and archival data. The researchers found attributes of neighborhoods and schools to be statistically significantly related to school rates of lifetime alcohol and cigarette use and current cigarette use. Contrary to what would be expected under some social science theories, alcohol and cigarette consumption was higher among adolescents in schools in more advantaged neighborhoods than it was among adolescents in schools in less advantaged neighborhoods.

Kadushin C, Reber Saxe L, Livert D. The substance use system: social and neighborhood environments associated with substance use and misuse. *Substance Use and Misuse*. 1998;33:1681–1710.

The authors examined the substance use system through a large survey of adults from primarily inner-city neighborhoods in the United States. After controlling for individual characteristics such as race, sex, age, and socioeconomic status, the authors found that both

the physical and social environment were predictors of alcohol and drug dependency. These findings, the authors suggest, point to the difficulty of bringing about change in drug and alcohol use without fundamental change in the environments where such use takes place.

Kleinschmidt I, Hills M, Elliott P. Smoking behavior can be predicted by neighborhood deprivation measures. *Journal of Epidemiology and Community Health*. 1995;49:72–77.

This study, based on a large random sample survey of adults in a region of England, investigated whether area socioeconomic deprivation predicted variation in the smoking behavior of individuals. After adjusting for individual socioeconomic status, the authors found that neighborhood deprivation was a significant predictor of smoking.

LaScala EA, Johnson FW, Gruenewald P, et al. Neighborhood and alcohol-related pedestrian injury collisions: a geostatistical analysis. *Prevention Science*. 2001;2:123–134.

The authors conducted a geostatistical analysis of ecological data from four California communities to examine the relationships of neighborhood characteristics, including alcohol availability and alcohol consumption patterns, to pedestrian injury collisions. The authors found that both alcohol consumption and greater density of alcohol outlets were independently related to had been drinking (HBD) pedestrian collisions. Cross-street densities were related to non-HBD collisions. The data showed that pedestrian collisions were most likely to occur in urban areas with high population densities, low-income populations, and higher proportions of younger or older age groups. The authors recommend adopting environmental traffic safety measures, zoning regulations that limit bar density in highly populated areas, and responsible alcohol service practices (which might involve collaboration among restaurants and bars, public transportation, and private cab services).

LaVeist TA, Wallace JM Jr. Health risk and inequitable distribution of liquor stores in African American neighborhoods. *Social Science Medicine*. 2000;51:613–617.

The authors of this study used multivariate analysis to examine the relationship among community racial composition, median income of neighborhood residents, and per capita number of alcohol outlets in 194 census tracts in Baltimore, Maryland. Controlling for census tract socioeconomic status, the investigators found that liquor stores were more likely to be located in predominantly African American neighborhoods than they were in predominantly white neighborhoods. Census tracts that were both low income and

predominantly African American had the most liquor stores per capita. The authors suggest that additional research on the impact of alcohol on the social, psychological, and physiological health of low-income urban populations is needed.

Tatlow JR, Clapp JD, et al. The relationship between the geographic density of alcohol outlets and alcohol-related hospital admissions in San Diego County. *Journal of Community Health*. 2000;25:79–88.

This study examined the relationship between the density of alcohol outlets and the number of alcohol-related hospital admissions in San Diego County, California. Using hospital discharge data, the authors classified alcohol-related admissions if alcohol or alcoholic were included in the diagnosis. Diseases such as chronic hepatitis, cirrhosis of the liver without mention of alcohol, biliary cirrhosis, other chronic nonalcoholic liver disease, unspecified chronic liver disease without mention of alcohol, portal hypertension, and chronic pancreatitis were also included as these are highly attributable to alcohol. The study took into consideration demographic variables from the census: the number of males, the percentage of adults in the zip code 55 years old and older, and the median income for each zip code. Geographic density of alcohol liquor outlets was significantly associated with alcohol-related hospital admissions.

3. NEIGHBORHOOD INFLUENCES ON MULTIPLE HEALTH BEHAVIORS

The studies described in this section have considered how neighborhood environments affect several health behaviors. These studies have found that living in an economically disadvantaged area is related to greater prevalence of heart disease, increased incidence of cardiovascular disease, and increased cardiovascular disease mortality as well as to higher levels of cardiovascular and overall health risk factors, such as smoking, poor diet, higher blood pressure, higher body mass index, and physical inactivity. Strong effects of neighborhood environments on cardiovascular risk factors observed in African Americans may be related to residential segregation. Researchers recommend that efforts to reduce coronary heart disease should focus on both places and people.

Cubbin C, Hadden WC, Winkleby MA. Neighborhood context and cardiovascular disease risk factors: the contribution of material deprivation. *Ethnicity and Disease*. 2000;11:687–700.

The authors used a large national sample to investigate the association of neighborhood material deprivation and cardiovascular disease risk factors. In general, people of all age/ethnicity groups living in disadvantaged areas had higher levels of cardiovascular disease risk factors, except for cholesterol, even when individual characteristics were included in the model. Individual socioeconomic status was more highly associated with risk factors in men than it was in women, and the effect of neighborhood deprivation in men was less than it was in women. Neighborhood deprivation had the strongest impact on black women, where it was independently associated with diabetes, smoking, higher incidence of myocardial infarction, and higher blood pressure. Deprivation was independently associated with physical inactivity and smoking in white women and with physical inactivity in Mexican American women. Neighborhood deprivation was independently associated with physical inactivity, smoking, higher blood pressure, and, surprisingly, with lower cholesterol in black men, and with physical inactivity in white and Mexican American men. In general, low individual socioeconomic status was associated with increased risk factors, though this was true less often in Mexican Americans.

The authors suggested that the strong effects seen in African Americans may be due to residential segregation. They viewed their deprivation index as a proxy for neighborhood characteristics that might include less access to nutritious and affordable foods and recreation spaces; high exposure to tobacco advertising; high levels of stressful events such as crime, density, noise, and traffic; low levels of municipal services; and political and cultural norms and values that may influence health behaviors.

Diehr P, Koepsell T, Cheadle A, Psaty B, Wagner E, Curry S. Do communities differ in health behaviors? *Journal of Clinical Epidemiology*. 1993;46:1141–1149.

The authors studied individual- and community-level variation in health behaviors for 15 communities in the western United States. The prevalence of smoking, consumption of alcohol and dietary fat, and use of seatbelts varied significantly in these communities. Residents of communities with higher unemployment rates, for example, had high smoking rates, a higher percentage of calories from fats, and less alcohol consumption. Furthermore, such differences persisted when controls were used for demographic, health status, and other health behavioral characteristics of the people in the communities. The findings of this study affirm the potential importance of contextual effects on individual health behavior and thus support the theory that changing the community environment may offer effective ways to change individual health behavior.

Diez Roux AV. Residential environments and cardiovascular risk. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*. 2003;80:569–589.

This review article presents the rationale for studying the relationship between residential environments and cardiovascular health. In the first research area discussed, *neighborhood socioeconomic characteristics and cardiovascular disease*, the author notes that three studies have linked socioeconomically disadvantaged neighborhoods to a higher prevalence of coronary heart disease; two studies have linked neighborhood disadvantage to higher cardiovascular disease (CVD) mortality; and one study has linked neighborhood disadvantage to greater incidence of CVD. Five studies have linked neighborhood disadvantage to smoking, diet, blood pressure, blood lipids, and body mass index. In the second area of research, the *effects of residential environments on physical activity*, 19 quantitative studies have assessed the relationship between perceived and objectively determined attributes of the physical environment and physical activity behavior. The most consistent evidence regarding effects of environmental factors on physical activity in adults is observed for accessibility of facilities, opportunities for activity, and aesthetic qualities of an area. The author comments that this literature is limited in its conceptualization and measurement of environmental features since measures are neither objective nor validated. In a third area of research, the *effects of residential environments on diet*, it appears there has been little research relating specific features of the local food environment to the actual dietary behaviors of individuals. The author found no studies that examine changes in diet as a response to local changes in food availability or cost. The author calls for longitudinal studies with more direct observation of local environments.

Hart C, Ecob R, Davey G. People, places and coronary heart disease risk factors: a multilevel analysis of the Scottish Heart health study archive. *Social Science and Medicine*. 1997;45:893–902.

The authors investigated geographic variations in coronary heart disease, looking at four coronary heart disease risk factors—diastolic blood pressure, cholesterol, alcohol consumption, and smoking—by district in Scotland. After controlling for individual socioeconomic status and other individual factors, the authors found that prevalence of three out of the four coronary risk factors (diastolic blood pressure, cholesterol, and alcohol consumption) varied by district. The authors suggest that efforts to reduce coronary heart disease should focus on both places and individuals.

Karvonen S, Rimpelä A. Socio-regional context as a determinant of adolescents' health behavior in Finland. *Social Science and Medicine*. 1996;43:1467–1474.

The authors investigated whether socioregional context influences the health behavior of adolescents in Finland, and whether it modifies differences by socioeconomic background of adolescents. To perform this study, the investigators linked individual-level data obtained from the Finnish Adolescent Health and Lifestyle Survey with a database that included socioeconomic characteristics of municipalities. In a series of logistic regression models, the authors analyzed factors related to four health behaviors: daily smoking, weekly alcohol use, use of high-fat milk products, and frequent physical activity. The socioeconomic status of the adolescents was related to all four health behaviors. Controlling for adolescents' individual characteristics, the authors found that adolescents' use of alcohol and high-fat milk products was associated with socioregional context.

Lee RE, Cubbin C. Neighborhood context and youth cardiovascular health behaviors. *American Journal of Public Health*. 2002;92:3.

The authors studied relationships among race/ethnicity (black, white, and Latino), socioeconomic status (SES), and cardiovascular disease among youths and investigated whether neighborhood characteristics (SES, social disorganization, racial/ethnic minority concentration, urbanization) are associated with behaviors related to cardiovascular disease (dietary habits, physical activity, and smoking) independently of individual characteristics. Low SES was found to be associated with poorer dietary habits, less physical activity, and higher odds of smoking among youths. After adjustments for SES, black youths had less healthy diets than and were less likely to smoke than were white youths; and Hispanic youths had healthier diets, were less likely to smoke, and were less likely to be physically active than were white youths. Neighborhood characteristics were found to be associated with dietary habits but not with physical activity or smoking. Low neighborhood SES and high neighborhood social disorganization were found to be independently associated with poor dietary habits. Neighborhoods with higher incomes, lower levels of poverty, higher education, higher housing values, lower percentage of blue-collar workers, lower levels of mobility, higher percentage of Hispanic residents, and higher percentage of multiunit housing were associated with healthier dietary habits. The authors concluded that changes in neighborhood social structures and policies that reduce social inequalities may help improve behaviors related to cardiovascular health.

F. SOCIAL RELATIONSHIPS AND HEALTH

The studies described in this section investigate the influence of social relationships on health. Social relationships are described using various terms and measures—among them, relationships and connections to people, levels of interpersonal trust and mutual aid, social cohesion and collective efficacy, social support, group membership, mutual respect, and social power or the ability to work together to achieve desired ends. Social power is related to public health constructs such as community capacity, competence, and empowerment.

Various measures of social relationships have been linked to mortality, self-rated health, birth outcomes, violence, and mental health. Some authors suggest that the mechanisms by which social capital may improve the health of a neighborhood include: promoting more rapid dissemination of health information; norms encouraging healthy behaviors; exerting social control over deviant health-related behavior or collective efficacy to prevent crime; increasing access to services through political processes and more egalitarian patterns of political participation; and psychosocial processes.

Drawing from the findings of their studies of social relationships and health, several researchers suggest: 1) tracking indicators of community factors that affect quality of life; 2) considering a policy's potential to promote social capital when evaluating local policies; and 3) promoting policies to reduce inequalities in wealth, facilitate political participation, reduce racial residential segregation, improve child care and working conditions for women, increase neighborhood stabilization, increase economic development, and increase investment in community capacity building.

Buka SF, Brennan RT, Rich-Edwards JW, Raudenbush S, Earls F. Neighborhood support and the birth weight of urban infants. *American Journal of Epidemiology*. 2003;157:1-8.

The authors used survey and U.S. Census data to test the hypothesis that the specific features of urban neighborhoods—i.e., material disadvantage and residents' perceptions of the level of cohesion and support in their neighborhood—may account in part for the lower birthweights of infants of African American women.

The distribution of births showed the residential segregation of Chicago. More than 85 percent of births to African American women occurred in only 39 percent of the neighborhoods. Before statistical adjustment of the data, infants born to African American mothers were found to be, on average, 297 grams lighter than those born to white mothers. After adjusting for individual-level risk factors, this difference was reduced to 154 grams. For African American mothers only, mean birthweight decreased significantly as the neighborhood level of economic disadvantage increased. For white mothers only, a significant positive association was found between perceived levels of neighborhood social support and infant birthweight. The results of this study support the hypothesis that social support is significantly associated with infant birthweight, but only for white mothers.

Duncan TE, Duncan SC, Okut H, Strycker LA, Hix-Small H. A multilevel contextual model of neighborhood collective efficacy. *American Journal of Community Psychology*. 2003;32:245–252.

The authors used data from different sources and a multilevel framework to examine hypothesized relations among neighborhood-, family-, and individual-level variables and perceptions of neighborhood collective efficacy. Collective efficacy was measured by survey responses to questions about social cohesion and social control (e.g., “This is a close-knit neighborhood”) and by questions about the likelihood that neighbors would take action if certain situations (e.g., children spray-painting graffiti) occurred.

Study results indicated that age at the individual level, marital status at the family level, and poverty and perceived gang activity at the neighborhood level predicted neighborhood collective efficacy. At the individual level, age was a significant predictor of neighborhood collective efficacy, with perceptions of collective efficacy generally higher among older respondents than they were among younger respondents. At the family level, marital status was a significant predictor of collective efficacy, with two-parent families generally having higher perceptions of collective efficacy than did single-parent families. At the neighborhood level, violent criminal behavior was the only significant predictor of variance in collective efficacy. Neighborhoods whose members perceived greater levels of violent criminal activity, as well as neighborhoods with greater numbers of police arrests for violent criminal behavior, had lower perceptions of collective efficacy.

The Greenlining Institute. *Community ties: connections to health*. San Francisco: Greenlining Institute; 2002.

This booklet focuses on social capital, defined as relationships and connections between people that create feelings of trust, reciprocity, and cooperation. The authors provide a brief overview of the concept of social capital, then discuss programs and policies that have

the potential to increase social capital and improve health. Community organizing is cited as one way to increase social capital. To incorporate social capital into public policy, some cities are tracking indicators that affect quality of life. Other cities have pledged to consider a policy's potential to promote social capital when evaluating local policies.

James SA, Schulz AJ, Van Olphen J. Social capital, poverty, and community health: an exploration of the linkages. In: Saegert S, Thompson JP, Warren MR, ed. *Social capital and poor communities*. New York: Russell Sage Foundation; 2001:165-188.

This chapter explores linkages among social capital, poverty, and community health. The authors begin by discussing two definitions of social capital. One definition, Coleman/Putman, emphasizes social trust, group membership, and mutual respect. This definition is used in public health research on social capital. Another definition of social capital, Bourdieu, explicitly includes social power or the ability of groups to achieve desired ends. Public health research has not addressed social power as part of social capital, but social power is similar to other constructs in public health, such as community competence, capacity, and empowerment. It is important to distinguish between these two definitions of social capital, the authors note, because poor communities might have extremely strong social networks and organization but lack the political power to make institutional changes in their community. In addition, the authors comment, social capital can have negative consequences for people outside of cohesive groups with political power, such as is manifested in racism, sexism, and homophobia.

In addition to discussing the definition of social capital, the authors review U.S. studies that address infant and adult mortality and social capital. Such studies have found that state-level collective disrespect experienced by blacks is associated with adult mortality, greater income inequality is associated with higher adult and infant mortality, and states with higher income inequality also invest less in human capital, such as education. Together these studies suggest that equitable sharing of resources is associated with decreased mortality for the entire community. The authors of this chapter propose two levels of public policies to develop social capital in poor communities: 1) community capacity building, and 2) progressive legislation to counter poverty and racism. They stress the need to involve community-based organizations in initiatives to develop community capacity and the importance of economic development as an underlying goal of these initiatives. The authors suggest policies that reduce inequalities in wealth, facilitate political participation, and limit residential segregation by race. They also point to the need to address the health disparities experienced by low-income women who are single mothers and suggest policies related to child care, parental leave, and working conditions of women.

Johnell K, Merlo J, Lynch J, Blennow G. Neighborhood social participation and women's use of anxiolytic-hypnotic drugs: a multilevel analysis. *Journal of Epidemiology and Community Health*. 2004;58:59–64.

The investigators in this Swedish study sought to identify and quantify a hypothesized collective effect of the neighborhood on individual use of anxiolytic-hypnotic drugs (AHDs), which are commonly prescribed to address anxiety or sleep-related disorders. The investigators analyzed cross-sectional data from women living in 95 neighborhoods in Malmö, Sweden. A key study finding was that both individual and neighborhood social participation were independently associated with AHD use. The researchers defined *individual social participation* as possible involvement in 13 formal or informal activities (such as participation in meetings of organizations; attending theater/cinema, arts exhibitions, church, or sports event; writing a letter to the editor of a newspaper/journal; and attending large gatherings of relatives or private party) during past 12 months. Items were summed, and participants involved in three or fewer activities were classified as having “low social participation.” The researchers assessed *neighborhood social participation* by determining the proportion of persons in the neighborhood classified as having individual “low social participation.”

A low level of neighborhood social participation was associated with higher probability of AHD use independent of individual age, low social participation, low educational level, and living alone. This association was reduced after accounting for individual disability pension, low self-rated health, stress, and medication for somatic disorders. The researchers found that overall, 1.7 percent of total individual differences in the propensity for using AHD were explained by the neighborhood-level social participation. They concluded that neighborhood level of social participation seemed to affect individual use of AHD, possibly through individual characteristics.

Kawachi I. Social capital and community effects on population and individual health. *Annals of the New York Academy of Sciences*. 1999;896:120–130.

This article discusses social capital and community effects on population and individual health. The definition of social capital used in the article is “features of social relationships—such as levels of interpersonal trust and norms of reciprocity and mutual aid—that facilitate collective action for mutual benefit.” The author notes that social capital is believed to play an important role in the functioning of community life across a variety of domains, ranging from prevention of juvenile delinquency and crime, promotion of successful youth development, and enhancement of schooling and education to encouragement of political participation. More recently, researchers have begun to apply the concept to explain variations in health status across geographic localities.

The author summarizes his research findings linking state-level social capital to mortality and self-rated health. He hypothesizes that social capital at the state level leads to higher levels of political participation, which in turn leads to more welfare benefits and opportunities for the poor. The author's research on social capital uses three components of the U.S. General Social Surveys: 1) civic trust ("Generally speaking, would you say most people can be trusted?"); 2) collective perceptions of reciprocity ("Would you say that most of the time people try to be helpful, or are they mostly looking out for themselves?"); and 3) per capita membership in voluntary organizations (e.g., church groups, sports groups, professional societies, political groups, fraternal organizations). At the neighborhood level, the author suggests, social capital operates through social control, healthy norms, and access to social support. The declining social capital seen in America over the past two to three decades, he notes, may be attributable to increasing income inequality.

Kawachi I, Kennedy BP, et al. Crime: social disorganization and relative deprivation. *Social Science and Medicine*. 1999;48:719–731.

This article presents a conceptual framework for investigating the influence of the social context on community health, using crime as the indicator of collective well-being. The authors argue that two sets of societal characteristics influence the level of crime: 1) the degree of relative deprivation in society (for instance, measured by the extent of income inequality), and 2) the degree of cohesiveness in social relations among citizens (measured, e.g., by indicators of social capital and collective efficacy). To test their conceptual framework, they used state-level ecologic data on violent crimes and property crimes within the United States.

The authors report that a state's income inequality was highly correlated with state rates of homicide, aggravated assault, and robbery. High levels of interpersonal mistrust were highly correlated with homicides, assault, robbery, and burglary. Proportion of households headed by females was highly correlated with these same crimes as well as with rape and motor vehicle theft. These correlations were higher than the correlations between indicators of deprivation and crime. The authors discuss the probable interdependence of crime and social capital, arguing that increased crime is likely to lead to decreased social capital, while decreased social capital is likely to lead to even more crime. The authors suggest that this study has implications for crime control policies, which could attempt to decrease income inequality, increase social cohesion through housing-based neighborhood stabilization (through tenant buyouts, rehabilitation of existing low-income housing, low-income housing tax credits), and dispersing the concentration of new public housing to decrease residential segregation.

Kawachi I, Kennedy BP, et al. Social capital and self-rated health: a contextual analysis. *American Journal of Public Health.* 1999;89:1187–1193.

The authors explore the association between social capital and self-rated health. Self-rated health data for individuals living in 39 U.S. states and social capital indicators, aggregated to the state level, were used. The authors found that individual-level factors (e.g., low income, low education, smoking) were strongly associated with self-rated poor health. Even after adjusting for these proximal variables, however, they found a contextual effect of low social capital on risk of self-rated poor health. The largest effect of social capital was on the lowest-income people.

The authors suggest five mechanisms through which social capital may influence health in neighborhoods: 1) promoting more rapid dissemination of health information; 2) norms encouraging healthy behaviors; 3) exerting social control over deviant health-related behavior, or collective efficacy to prevent crime; 4) increasing access to local services through political processes; and 5) psychosocial processes. They cite research that socially isolated individuals who live in cohesive communities are in better health than are socially isolated individuals in noncohesive communities. Finally, they hypothesize that social capital may be good for health because it leads to egalitarian patterns of political participation. A state is a large area with heterogeneous communities that is more prone to bias than are more homogeneous units like census tracts. Nonetheless, this study provides an important ecological framework from which to examine the relationship between social capital and health.

Kawachi I, Kennedy BP, et al. Women's status and the health of women and men: a view from the states. *Social Science and Medicine.* 1999;48:21–32.

The authors performed a cross-sectional and ecologic study that examined state-level data on the status of women in each of the 50 U.S. states in relation to measures of women's and men's levels of health. This study assessed the status of women in each state using four composite indices developed and published by the Institute for Women's Policy Research. The *women's political participation index* (measured by such items as women's voter registration and representation in elected office) was inversely correlated with female mortality rates and remained so after adjusting for median income, income inequality, and poverty. Women's political participation was associated even more strongly with decreased male mortality rates. The *women's employment and earnings index* (which includes measures such as women's earnings, the male/female wage gap, and women's participation in the labor force) was significantly associated with male mortality. This index was not significantly associated with female mortality; however, it was associated with specific causes of death in women, including cerebrovascular disease, cervical cancer, and, marginally, with ischemic heart disease. The *women's economic autonomy index* (measured by women's

access to health insurance, educational attainment, business ownership, and percentage of women above the poverty level) was strongly related to male and female mortality rates, even after adjusting for income inequality. The *women's reproductive rights index* (which measured legislative and political indicators related to women's reproductive well-being and autonomy) was not related to overall mortality in men or women, but it was related to infant mortality.

When cause-specific mortality in the states was considered, most causes of death (including cardiovascular diseases) were found to be associated with the four composite indices; a few causes of death (malignant neoplasms and suicide), however, generally were not associated with the indices. Women's political participation and economic autonomy were strongly related to female mortality rates, but they were even more strongly related to men's mortality rates. This finding, the authors suggest, might be evidence that inequalities generally were detrimental to health. Noting that southern states tended to score poorly on the four indices, the authors also suggested that the result could be related to racial discrimination. When data were analyzed separately for white women and black women, the indices remained strongly correlated to mortality rates for white women but not black women. This result suggests that the state-level indices may have been a better indication of the status of women for white women than they were for black women.

Mullings L, Wali A, et al. Qualitative methodologies and community participation in examining reproductive experiences: the Harlem Birth Right Project. *Maternal and Child Health Journal*. 2002;5:85–93.

The authors report on the Harlem Birth Right Project, which sought to improve our understanding of interacting social forces that contribute to racial disparities in reproductive health. To involve the community in the Harlem Birth Right Project, the research team recruited organizations with long-standing relationships and commitment to Harlem; created a community advisory board; organized community dialogue groups; and hosted two general community meetings to describe the project and solicit advice.

The authors report that the use of qualitative methods and community partnership uncovered important aspects of the social context of women's lives that might not have emerged through traditional epidemiologic research. Women in central Harlem were found to experience substantial stressors and strains associated with the environment, housing, economic concerns, health care, and social service delivery. For low-income women, for example, the effort to piece together income and benefits from a number of sources was a source of chronic strain. For middle-income women, a dominant theme was fragility of status due in part to their disproportionate concentration in the public sector, which is particularly vulnerable to cuts in federal and state funding, downsizing, and privatization.

Pregnancy often led to greater perceived severity of the stresses and attempts to increase income, job benefits, nutrition, child care, and access to quality health care intensified during pregnancy. Men were found to play more important roles in the women's lives than is typically recognized, leading investigators to recommend that interventions to improve reproductive health for women must include men and address men's conditions. The authors conclude by recommending that programs be developed to address women's concerns with recognition of their individual and institutional context and struggles.

Muntaner C, Lynch J, et al. 1999. The social class determinants of income inequality and social cohesion. *International Journal of Health Services*. 1999;29:699–732.

This article is a response to an article by Richard Wilkinson in which he commented on a previous article by the authors. These authors argue that public health research theorizing that income inequality negatively affects health through social cohesion ignores the importance of other dimensions of class relationships. Wilkinson defines social cohesion as participation in public affairs, civic responsibility, or involvement in public life. He further includes individual psychology as a key element of social cohesion, such as emotions, stress, helplessness, and disrespect.

These authors suggest that Wilkinson's definition overlooks that social class determines the type of social cohesion that emerges in communities and that Wilkinson's proposed indicators (e.g., voting participation, newspaper readership, or number of cultural voluntary associations) exclude or minimize forms of social cohesion in working-class communities. They conduct analyses that suggest that social cohesion concepts should take into consideration social class variation. Organizational membership among working class individuals could include union membership, for example. If the concept overlooks social class, working class communities could be assessed to be less cohesive than they actually are.

Ross CE, and Jang SJ. Neighborhood disorder, fear, and mistrust: the buffering role of social ties with neighbors. *American Journal of Community Psychology*. 2000;28:401–420.

This article reports findings from a telephone survey of Illinois residents: that living in a neighborhood with a high level of disorder—as measured by a disorder scale including self-reported neighborhood graffiti, noise, vandalism, abandoned buildings, cleanliness, care of homes, loitering, crime, and drug and alcohol use—was significantly related to mistrust and fear of victimization. Perceived social ties with neighbors, but not formal participation in neighborhood organizations, reduced the fear- and mistrust-producing effects of disorder.

Sampson RJ, Raudenbush SW, et al. Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*. 1997;277:918–924.

The authors of this study hypothesized that collective efficacy—defined as social cohesion among neighbors combined with their willingness to intervene on behalf of the common good— is linked to reduced violence. They report findings from a multilevel analysis of survey data from residents of 343 neighborhoods in Chicago, Illinois, showing that collective efficacy is inversely associated with violence, when adjusting for individual characteristics and prior violence. Associations of concentrated disadvantage and residential instability with violence are largely mediated by collective efficacy.

G. OVERALL NEIGHBORHOOD CONDITIONS AND HEALTH

The studies described in this section examine clusters of neighborhood characteristics and their association with health. They use various approaches to measure neighborhood conditions. Specific studies focus on one or more of the following: crime and violence, lighting at night, traffic, noise, trash and litter, access to public transportation, median income levels, median education levels, percentage of people unemployed, percentage of home ownership, residential stability, building conditions, air quality, places to shop, number of elderly living alone, and housing quality.

Neighborhood problems have been found in some of the studies to be associated in adults and youth with psychological distress, including depression, substance abuse, schizophrenia, and anxiety. Neighborhood problems have also been associated with self-reported poor health, mortality, smoking-related diseases, diabetic eye disorders, loss of function in older adults, coronary heart disease, and low birthweight. Some studies found a linear relationship between neighborhood conditions and health, suggesting that the effects of place are not limited to areas with the poorest neighborhood conditions. There is some evidence from the studies that social support may help reduce the health risks of living in an environment with multiple problems.

Studying the effects of clusters of neighborhood problems may yield a better understanding of the effects of neighborhoods on health than would isolated risk factors. On the basis of their research, many of the authors recommend that health improvement efforts focus on improving individual resources and social connections, as well as the quality of neighborhoods and overall communal life.

Aneshensel CS, Sucoff C. The neighborhood context of adolescent mental health. *Journal of Health and Social Behavior*. 1996;37:293–310.

This article focuses on how structural aspects of neighborhood context—specifically, neighborhood socioeconomic stratification and racial/ethnic segregation—affect adolescents' well-being by shaping adolescents' subjective perceptions of their neighborhoods. Analyzing data from a community-based sample of adolescents in Los Angeles County, California, researchers found that youths in low socioeconomic status (SES) neighborhoods perceive greater neighborhood hazards such as crime, violence, drug use, graffiti, and gangs than do youths in higher SES neighborhoods. This finding was not affected by the racial/ethnic characteristics of the low SES neighborhoods. Researchers also found that adolescents' perception of the neighborhood as dangerous, in turn, influenced the mental health of adolescents: the more threatening the neighborhood, the more common were the symptoms of depression, anxiety, oppositional defiant disorder, and conduct disorder.

Another finding of this study was that social stability and, to a lesser extent, social cohesion, were related to adolescents' mental health. Neither neighborhood nor individual characteristics were strongly associated with self-reported socially cohesive neighborhood. Social cohesion was inversely related to depression. In general, Latino teens experienced more depressive symptoms than did others, except when living in poor neighborhoods with dense concentrations of Latinos. The authors concluded that research into the mental health of young people should consider the socioeconomic and demographic environments in which they live.

Balfour J, Kaplan G. Neighborhood environment and loss of physical function in older adults: evidence from the Alameda County study. *American Journal of Epidemiology*. 2002;155:507–515.

The authors examined the association between neighborhood problems and the incidence of overall and lower extremity functional loss among functionally healthy older adults. The study subjects were functionally healthy adults age 55 in Alameda County, California, who were surveyed as part of an ongoing cohort study. Functional loss was measured by self-report of severe difficulty with physical tasks (e.g., climbing stairs, lifting 10 pounds). Participants rated the severity of six neighborhood problems: 1) traffic, 2) excessive noise, 3) crime, 4) trash and litter, 5) poor lighting at night, and 6) low access to public transportation. Seventeen percent of participants reported multiple neighborhood problems.

Reporting more neighborhood problems was strongly associated with census tract low socioeconomic status, poor housing stock, and greater residential instability. Participants who reported more neighborhood problems were more likely than were participants in

better neighborhoods to experience overall functional loss and even more likely to experience lower extremity loss of function over one year—a finding that held even when adjusting for age, sex, and difficulty in function at baseline. When the researchers analyzed reported neighborhood problems separately, they found noise, lighting, heavy traffic, and limited access to public transportation were most likely to be associated with functional loss.

Collins JW, David RJ. Urban violence and African-American pregnancy outcome: an ecologic study. *Ethnicity and Disease*. 1997;7:184–190.

The authors investigated the extent to which residence in violent communities is an independent risk factor for adverse pregnancy outcomes among African American mothers living in census tracts with median incomes under \$10,000 a year. Using data from 1983 Illinois vital records, Chicago Police Department violent crime rates, and 1980 U.S. Census income data, the researchers performed multivariate analyses that showed the area crime rate to be associated with area low birthweights (LBW) to African American mothers. African American mothers living in the most violent communities had an LBW rate of 16 percent, while African American mothers in the least violent communities had an LBW rate of 12 percent. Statistically significant differences remained after the authors controlled for individual risk factors. The authors concluded that a community's violent crime rate is associated with intrauterine growth retardation among infants born to African American women.

Diez Roux AV, Merkin SS, et al. Neighborhood of residence and incidence of coronary heart disease. *New England Journal of Medicine*. 2001;345:99–106.

The authors examined the relation between characteristics of neighborhoods and the incidence of coronary heart disease. Participants were sampled from the four communities were 45–64 years of age at baseline. As proxies for neighborhoods, the researchers used block groups containing an average of 1,000 people, as defined by the U.S. Census. They constructed a summary score for the socioeconomic environment of each neighborhood that included information about wealth and income, education, and occupation.

During a median of 9.1 years of follow-up, 615 coronary events occurred in 13,009 participants. Controlling for personal socioeconomic indicators, the researchers found that individuals living in the most disadvantaged neighborhoods were more likely to develop coronary heart disease than were those living in the most advantaged neighborhoods. They suggest that neighborhood characteristics may have contributed to the development of cardiovascular risk factors and cardiovascular disease. Finally, the authors discuss the need to understand health disparities by looking at social inequalities, and they recommend both “enhancing the social and psychological resources of individual people, and improving the quality of neighborhoods and communal life.”

Drukker M, Van Os J. Mediators of neighborhood socioeconomic deprivation and quality of life. *Social Psychiatry and Psychiatric Epidemiology*. 2003;38:698–706.

This study investigated associations between neighborhood socioeconomic status and health-related quality of life in Maastricht, Netherlands. The researchers measured socioeconomic deprivation at the neighborhood level with administrative data on single-parent families, ethnicity, nonvoters, unemployment, unemployment for more than one year, social security, social security for more than three years, mean income, mean income for persons employed 52 weeks a year, percentage high income, percentage low income, and percentage economically inactive. They found that neighborhood socioeconomic deprivation was associated with lower levels of perceived physical and mental health. Modeling of the data suggested that lifestyle variables—smoking, drinking, consumption of fruits and vegetables, body mass index, and daily bicycle use—were mediators in these relationships (i.e., on the pathway connecting neighborhood with physical and mental health). Neighborhood coziness (a combination of closeness, warmth, and friendliness) and social contacts also appeared to be mediators for neighborhood socioeconomic deprivation and perceived health.

Eachus J, Williams M, et al. Deprivation and cause specific morbidity: evidence from the Somerset and Avon survey of health. *British Medical Journal*. 1996;312:287–292.

This study investigated cause-specific morbidity and area material deprivation in inner-city, urban, and rural areas in the United Kingdom. The authors used a mail survey, confirmed by practitioner and hospital records, to determine participants' health status. They found that the prevalence of musculoskeletal disorders, angina, myocardial infarction, bronchitis, emphysema, diabetic eye disease, and stroke rose with higher area deprivation. Diabetic eye disorders, emphysema, and bronchitis were most related to the deprivation index. The authors suggest that their findings highlight the need for health services resources to be targeted to deprived areas.

Eames M, Ben-Shlomo Y, Marmot MG. Social deprivation and premature mortality: regional comparison across England. *British Medical Journal*. 1993;307:1097–1102.

The authors performed an ecological study in England to investigate the pattern and size of the relationship between social deprivation in electoral wards and premature mortality. Using 1981 census variables and data on mortality for 1981–85, the researchers investigated this relationship for each of England's 14 health regions. The primary outcome measure was mortality under age 65 from all causes, coronary heart disease, and smoking-related diseases in men and women. This study found a strong link between the social deprivation of an area and premature mortality. There was a linear relationship between area deprivation and

all-cause mortality, coronary heart disease, and smoking-related diseases in England. This relationship indicates that the effects of place are not limited to the poorest areas. The authors note that there were variations in mortality between regions with equal levels of deprivation, they but suggest that current targets for reducing coronary heart disease mortality may be achievable if the mortality in poor areas can be reduced to the rates in affluent areas.

Fang J, Madhavan S, Alderman MH. Low birth weight: race and maternal nativity—impact of community income. *Pediatrics*. 1999;317:749–753.

This study among white and black mothers in New York City investigated community income as a cofactor in the association of low birthweight (LBW), race, and maternal nativity in New York City from 1988 to 1994. Census tracts of the city were aggregated by per capita income as low-, middle-, and high-income communities. Black mothers were classified as U.S.-born and foreign-born (from the Caribbean, South America, and Africa).

LBW was significantly less frequent among whites than it was among blacks; however, this overall finding masked substantial variation among blacks, determined by maternal nativity and the income level of the community in which the women lived. Overall, black women had a substantially higher risk of giving birth to LBW infants than did whites (13.1 percent vs. 4.8 percent). Foreign-born black mothers had a birth weight advantage over U.S.-born black mothers (10.0 percent vs. 16.7 percent). Controlling for community income gave both U.S.- and foreign-born black mothers the same risk levels of LBW. In the poorest communities, risks of LBW were the same for white and black women, regardless of nativity and other sociodemographic factors. Overall, the study showed that early life experiences related to nativity may have enduring health impacts, and that the association of maternal nativity to birth outcome is strongly influenced by the socioeconomic characteristics of the community where the mother currently lives. The authors note that selective migration, where immigrants represent a subset of the population that may be healthier than others, may explain some of the nativity-based findings.

Garbarino J, Dubrow N, Kostelny K, Pardo C. *Children in Danger: Coping with the Consequences of Community Violence*. San Francisco: Jossey-Bass Publishers; 1992.

This book offers a community psychology perspective on children in dangerous environments. U.S. psychologists have argued that shame, diminished self-esteem, and negative identity play a crucial role in generating violence. Witnessing violence leads to other psychological consequences such as developmental impairment, emotional trauma, fear, and hatred as well as more violence. The younger the child is when exposed to violence, the more likely the exposure is to have negative consequences. In one study, children

who had witnessed violence or experienced trauma before age 11 were three times more likely to develop psychiatric symptoms than were those who experienced trauma in their teens. Living with chronic community violence is linked to difficulty concentrating, impaired memory, anxious attachments to parents, aggressive play, and uncaring behavior.

The authors suggest that schools are an important point of intervention to help children who grow up in dangerous environments. Having researched effective schools literature, the authors summarize the effective characteristics of quality programs for at-risk children. They refer to a study of schools in England by Rutter and colleagues comparing middle-class environments in the Isle of Wight with those of disadvantaged neighborhoods in inner-city London. This study found that children's development was influenced by the overall social organization of the school itself, and that some schools were able to have a positive and beneficial influence on students. The study also found that students' different outcomes at different schools were related to the schools' characteristics as social institutions, influenced by staff, rather than external factors.

Harburg E, et al. Socioecological stressor areas and black-white blood pressure: Detroit. *Journal of Chronic Disease*. 1973;26:595–611.

This 1973 study in Detroit investigated associations between predominantly white and predominantly black high-stress and low-stress census tracts and blood pressure. Stress scores were assigned to census tracts on the basis of a factor analysis: of 1) socioeconomic variables (median income, median education, percent unemployed, percent home ownership, percent professional/managerial) in the census tract; and 2) instability variables (adult crime rate, juvenile crime rate, marital instability, percent in residence for five years or more) in the census tract. Factor scores were ranked separately among predominantly black census tracts (50 percent black or more) and among the remaining census tracts, labeled white. The researchers defined high- and low-stress areas as the extreme quartiles of the factor scores—that is, the high-stress black census tracts were the tracts with stress scores in the highest quartile; similarly, the low-stress tracts had scores in the lowest quartile. The researchers found that black men living in high-stress census tracts had higher blood pressure than did black men living in low-stress census tracts. Similar but smaller differences were seen for black women, and no differences were seen by area for white men or women.

Kaplan GA. People and places: contrasting perspectives on the association between social class and health. *International Journal of Health Services*. 1996;26:507–519.

The author emphasizes the importance of considering the clustering together of many risk factors rather than depending on isolated risk factors to explain disparities in health in different areas. Citing a substantial body of evidence demonstrating a strong association between socioeconomic variables and health outcomes, he notes that most analyses conceptualize socioeconomic status as an individual characteristic. The author criticizes the usual tendency to view socioeconomic characteristics as individual characteristics, arguing that some characteristics of groups related to social class (e.g., equity of income distribution) can be measured only at the group level.

To support his argument, the author uses the Alameda County Study in California. First, he summarizes that study's finding that residence in a poverty area is associated with increased mortality rates as well as a subsequent factor analysis of the census tract characteristics intended to determine which characteristics were associated with increased mortality. He notes that clustering of characteristics predicted mortality, while individual census tract characteristics did not. In addition, the author combined variables collected in the questionnaire into scales, categorizing the variables into demands and resources. He then compared telephone survey data with mortality data and found survey respondents with high demands and low resources to be more than 10 times as likely as were respondents with low demands and high resources to die in census tracts with high mortality.

Klinenberg E. *Heat Wave: A Social Autopsy of Disaster*. Chicago: The University of Chicago Press; 2002.

The author investigates the conditions that allowed a one-week heatwave in Chicago to result in more than 700 deaths. The victims of the heatwave were disproportionately elderly, African American, and poor, and deaths were concentrated in low-income African American neighborhoods. The author discusses the role of: 1) *literal social isolation from friends, family and support networks* due to the increasing number of people living alone, fear of crime, degradation or elimination of public spaces, and the tendency for older men to lose support networks as they age; 2) *community conditions*, such as abandoned buildings, violent crime, low population density, and poor quality infrastructure; and 3) *city government programs and policies*, such as a political structure for organizing programs that has no clear lines of responsibility, and a consumer-oriented market system of governance that underserves people with the weakest capabilities and greatest needs. The author also discusses how city officials and media organizations framed the problem of the heatwave and resulting deaths as a natural disaster, without addressing the underlying social and political problems that contributed to the many heat-related deaths.

Krause N. Neighborhood deterioration and self-rated health in later life. *Psychology and Aging*. 1996;11:342–352.

The investigators in this study hypothesized that older adults who live in deteriorated neighborhoods will report more physical health problems than will elderly people who live in better physical environments. They performed a multivariate analysis, controlling for age, sex, education, and self-reported chronic financial strain, that showed a relationship between neighborhood deterioration (such as building condition, noise, and air quality as judged by a rater) and self-reported health. They also found what appeared to be a threshold for the relationship between neighborhood deterioration and self-reported health. People who lived in an area with greater neighborhood deterioration had higher levels of friendship strain but not marital strain or strain with other relatives—a finding that supports the hypothesis that neighborhood deterioration might be associated with older residents' fear of moving about their neighborhood.

Latkin CA, Curry AD. Stressful neighborhoods and depression: a prospective study of the impact of neighborhood disorder. *Journal of Health and Social Behavior*. 2003;44:34–44.

This study examined the relationships among perceptions of one's neighborhood, measures of social support and social integration, and level of subsequent depressive symptoms. The study sample was a community group of individuals screened for an HIV prevention intervention in Baltimore, most of whom were current or former drug users and very poor. Neighborhood perceptions were measured with a scale assessing perceptions of vandalism, litter, vacant housing, groups of teenagers hanging out, burglary, people selling drugs, and people being robbed on the street in the neighborhood. Social support was measured by the number of people in the participants' social networks. Depression was measured using the Centers for Epidemiological Studies Depression Scale.

The researchers had two primary research questions: 1) Is social disorganization an important chronic stressor that leads to higher levels of depressive symptoms in inner-city environments? 2) Is there a main effect or buffering effect of social support among persons living in high-crime areas with high levels of environmental stress? After adjusting for baseline levels of depressive symptoms, the authors found that perceptions of neighborhood characteristics (vandalism, litter or trash, vacant housing, teenagers hanging out, burglary, drug selling, and robbery) predicted depressive symptoms at a nine-month follow-up. Social support did not buffer or reduce the negative effects of neighborhoods with high levels of social disorder. The authors concluded that the data support theories of social disorganization and social stress and suggest the need for structural interventions.

Malmstrom M, et al. Neighborhood environment and self-reported health status: a multilevel analysis. *American Journal of Public Health*. 1999;89:1181–1186.

This study investigated the connection between neighborhood deprivation and self-reported poor health status in Sweden. The researchers performed a multivariate analysis of data using a large random sample of adults. The analysis showed that neighborhood deprivation was related to self-reported poor health. For each increase in the level of neighborhood deprivation, the prevalence of self-reported poor health increased.

O’Campo P, Aronson R, Johnson T. Economic, physical, and political characteristics of neighborhood of residence and risk of low birth weight, Working Paper WP-96-08. Baltimore, MD: Hopkins Population Center; 1996.

The authors investigate two questions: 1) whether neighborhood factors directly and indirectly influence the risk of low birthweight (LBW); and 2) whether neighborhood factors moderate the relation between individual-level risk factors and LBW. The authors concluded that high crime, low neighborhood wealth, and low levels of neighborhood political organization are direct neighborhood-level LBW determinants. They present a theoretically based framework that describes the mechanisms by which neighborhoods may lead to adverse health outcomes through the association of race and neighborhood wealth rather than neighborhood income. They note that interactions and confounding between individual-level and neighborhood-level characteristics in this study posed a problem. Using multilevel analyses to control for neighborhood levels of wealth, the authors found that the two-fold gap between African American and white LBW was no longer significant.

O’Campo P, Xue X, Wang MC, Caughy M. Neighborhood risk factors for low birthweight in Baltimore: a multilevel analysis. *American Journal of Public Health*. 1997;87:1113–1118.

The authors performed multilevel regression analysis to assess the contribution of macro-level neighborhood factors to low birthweight (LBW) in 29 neighborhoods in Baltimore, Maryland. To perform the study, they linked census tract-level data on social risk—social stratification, community empowerment, and environmental stressors—to birth certificate records. The researchers found that macro-level neighborhood factors had both direct associations and interactions with LBW. All individual risk factors for LBW behaved differently in different neighborhoods. Thus, for example, women living in high-risk neighborhoods benefited less from prenatal care than did women living in lower-risk neighborhoods. Early initiation of prenatal care reduced the odds of LBW births the most for people living in higher-wealth areas, lower unemployment areas, and in areas with the highest rates of housing violations. The researchers did not find a significant effect of membership in neighborhood community organizations on LBW.

Roberts EM. Neighborhood social environments and the distribution of low birthweight in Chicago. *American Journal of Public Health.* 1997;87:597–603.

This study looked at low birthweight (LBW) by census tract in the Chicago metropolitan area in 1990. The authors found that community economic hardship and housing costs were related to residents' higher likelihood of having LBW babies. In contrast, higher community socioeconomic status, higher levels of crowded housing, and higher percentages of young and African American residents were associated with reduced likelihood of LBW. One surprising finding was that being African American was associated with a lower risk of LBW. Further analysis of data by race suggested that the risk of LBW for African Americans was lowest in predominantly African American neighborhoods. The authors point to research documenting strong social networks in these communities that might explain this protective effect.

Silver E, Mulvey EP, Swanson JW. Neighborhood structural characteristics and mental disorder: Faris and Dunham revisited. *Social Science Medicine.* 2002;55:1457–1470.

The authors of this study examined individual- and community-level risk factors for schizophrenia, major depression, and substance abuse disorder using data from the Epidemiological Catchment Area (ECA) project—a large-scale general population survey conducted in five U.S. cities (New Haven, CT., Baltimore, Durham, NC., and Los Angeles). The authors linked ECA survey responses to census data to characterize neighborhoods. After controlling for individual-level characteristics, they found that neighborhood disadvantage was associated with higher rates of major depression and substance abuse disorder, and that neighborhood residential mobility was associated with higher rates of schizophrenia, major depression, and substance abuse disorder.

Stephoe A, Feldman PJ. Neighborhood problems as sources of chronic stress: development of a measure of neighborhood problems, and associations with socioeconomic status and health. *Annals of Behavioral Medicine.* 2001;23:177–185.

This study in the United Kingdom investigated associations among neighborhood problems, socioeconomic status, and health. To measure neighborhood stress, the researchers developed a simple questionnaire and included it in a postal survey in higher- and lower-socioeconomic status (SES) areas in London. Respondents were asked to indicate on a three-point scale the extent to which 10 items (litter, smells, walking around after dark, problems with dogs, noise, lack of entertainment, traffic and road safety, places to shop, vandalism, disturbance by neighbors or youngsters) is a problem in their area. All measures

of neighborhood problems were subjective. The authors did not conduct any direct observation of the neighborhoods where respondents lived.

As predicted, people living in lower SES areas reported more problems with their neighborhoods than did people living in higher SES areas. Neighborhood problems were not related to smoking, frequency of eating fruit or vegetables, alcohol consumption, or physical activity. Neighborhood problems were, however, associated with three other health outcomes: 1) self-rated health (21 percent of the people in the lowest neighborhood problem quartile reported fair or poor health, 34 percent in the highest neighborhood problem quartile reported fair or poor health); 2) psychological health (22 percent in the lowest problem quartile reported psychological distress); and 3) physical function (21 percent in the lowest problem quartile had impaired physical function, 37 percent in the highest quartile). Associations between neighborhood problems and these three health outcomes (self-rated health, psychological distress, physical function) remained after the authors took social capital measures into account. The authors commented that their results provide preliminary evidence that residential neighborhood problems constitute sources of chronic stress that may increase the risk of poor health.

Sundquist K, Malmström M, Johansson SE. Neighbourhood deprivation and incidence of coronary heart disease: a multilevel study of 2.6 million women and men in Sweden. *Journal of Epidemiology and Community Health*. 2004;58:71–77.

The authors analyzed 1995-99 data from a longitudinal study of all 2.6 million Swedish men and women ages 40-64 to investigate whether neighborhood deprivation predicts incidence rates for coronary heart disease. This is a comprehensive study with excellent data in a country known for its equity. Neighborhood deprivation was measured using the Care Need Index (CNI)—an adaptation of the Under Privileged Area (UPA) Index developed in the United Kingdom by Jarman. The CNI includes proportions of seven socioeconomic and demographic items for each neighborhood: 1) low educational status; 2) unemployed; 3) elderly living alone; 4) children under age 5; 5) single parents and residents who have moved during the past year; 6) foreign-born people; and 7) residents who have changed houses during the past year. The study population was followed for four years to ascertain nonfatal admissions to the hospital for coronary heart disease, as classified by the WHO International Classification of Diseases version 9 and 10.

To investigate associations between neighborhood deprivation and coronary heart disease, the authors used multilevel regression analysis, with individual characteristics (age, individual income) at the first level and level of neighborhood deprivation at the second level. Data with respect to coronary heart disease were analyzed separately for men and women. The researchers found a strong relation for both women and men between the level of neighborhood deprivation and coronary heart disease incidence rates.

Yen IH, Kaplan GA. Neighborhood social environment and 11-year risk of death: multilevel evidence from the Alameda County study. *American Journal of Epidemiology*. 1999;149:898–907.

This study investigated the relationship between overall neighborhood social environment and 11-year mortality risk. The authors developed a three-component neighborhood social environment scale: 1) commercial stores; 2) population socioeconomic status; and 3) environment/housing. They then analyzed data from the 1983 wave of the Alameda County Study in California and deaths over 11 years using logistic regression models. The researchers found that people living in a low-quality social environment were 58 percent more likely to die than were people who lived in a high-quality social environment, even after adjusting for individual characteristics. When each component of the neighborhood social environment characteristics score was examined separately, each was found to be associated with higher risk for mortality, independent of individual risk factors. People living in neighborhoods with many *commercial stores* were 32 percent more likely to die than were people living in neighborhoods with few stores. People living in neighborhoods with a low *housing score* were 56 percent more likely to die than were people living in neighborhoods with more stores. Living in a *low socioeconomic status neighborhood* was associated with a 53 percent greater chance of dying, but adjustments made for individual family income largely removed this effect.

H. MEASUREMENT OF NEIGHBORHOOD EFFECTS ON HEALTH

As interest in evaluating neighborhood effects on health increases, researchers explore how best to measure neighborhood effects on health. The first studies on neighborhood effects on health were able to identify health disparities by geographic area but were unable to demonstrate that the places where people lived had effects on health unrelated to the health factors of the people who lived in those areas.

More recently, researchers have used multilevel methods to look at the health of neighborhoods after controlling for the health and other characteristics of individuals. Researchers can investigate the effects of place on health through compositional factors (the characteristics of people in particular places), contextual factors (opportunity structures in the local environment such as access to food and transportation resources), and collective factors (sociocultural and historical features of neighborhoods). Methodological challenges for researchers wishing to study the effects of place on health include accurately defining neighborhood boundaries; determining the most appropriate level of geography; determining which characteristics of the social and physical environment are most relevant for health; measuring neighborhood characteristics; and determining the relative influence of neighborhood and individual characteristics.

Curtis SE. Use of survey data and small area statistics to assess the link between individual morbidity and neighborhood deprivation. *Journal of Epidemiology and Community Health*. 1990;44:62–68.

This study found that London residents living in very deprived areas were more likely to report poor health than were those living in privileged areas. The authors used the Under Privileged Area (UPA) Index developed by Jarman to measure deprivation. The UPA uses seven components: 1) proportion of residents who were elderly people living alone; 2) children under age 5 in single-parent families; 3) unskilled manual workers; 4) unemployed adults; 5) occupants of overcrowded housing; 6) residents who had moved within the previous year; and 7) immigrants. Health was measured by the Nottingham health profile, six questions that ask about lack of energy, pain, emotional distress, sleep disturbance, social isolation, and physical immobility. Health care use was also measured with questions about recent doctors visits. The authors found that the UPA was associated with both types of health measures (the health profile questions and health care use) and that the UPA of an area could be used to predict the health status or health services needs of its population.

Diez-Roux AV. Bringing context back into epidemiology: variables and fallacies in multilevel analysis. *American Journal of Public Health*. 1998;88:287–293.

The author of this article recommends including macro-level variables along with individual-level variables in epidemiological studies to make it possible to study the effects of socially determined risks in addition to individually determined risks. The author challenges epidemiologists to develop theoretical models of disease causation that consider how group-level and individual-level variables interact to shape health outcomes. Diez-Roux describes the types of variables used in these analyses and the methodological issues inherent in this type of research.

Diez-Roux AV. Investigating neighborhood and area effects on health. *American Journal of Public Health*. 2001;91:1808–1814.

This article reviews the types of empirical studies that have been used to investigate neighborhood or area effects on health: 1) ecologic studies relating area characteristics to morbidity and mortality rates that did not provide evidence that places were related to health outcomes beyond the health of the individuals who lived in these areas; 2) contextual and multilevel analyses relating area socioeconomic context to health outcomes; and 3) studies comparing small numbers of defined neighborhoods. The author notes that strengthening inferences regarding the presence and magnitude of neighborhood effects will require addressing a series of conceptual and methodological issues. Many of these issues relate to the need to develop theory and specific hypotheses on the processes through which neighborhood and individual factors may jointly influence specific health outcomes. Important challenges included defining neighborhoods or relevant geographic areas and specifying the role of individual-level variables.

Ecob R, Macintyre S. Small area variations in health-related behaviors; do these depend on the behavior itself, its measurement, or on personal characteristics? *Health and Place*. 2000;6:261–274.

The article begins with a review of methodology and literature investigating area effects on health-related behaviors. The authors then discuss a study in West Scotland that examined the patterning, by small areas, of four health-related behaviors (diet, physical activity, smoking, and alcohol consumption). That study concluded that the influence of area on these health-related behaviors varied according to the behavior and the way it is measured, and that the influence of area deprivation and/or of area can vary by age and household deprivation.

Jones K, Duncan C. Individuals and their ecologies: analyzing the geography of chronic illness within a multilevel modeling framework. *Health and Place*. 1995;1:27–30.

In this article, the authors demonstrated the use of the multilevel modeling framework to show an effect of area deprivation on health status in the United Kingdom. Deprivation was measured with an index based on four variables: 1) percent of economically active population who are seeking work; 2) percent of households who rent from the local authority (i.e., public housing dwellers); 3) percent of heads of household who are in Social Classes IV and V; and 4) percent of households without access to a car.

The authors drew two sets of conclusions: substantive and methodological. First, the authors concluded that health outcomes are not simply individual events. After demographic and behavioral variables are taken into consideration in statistical models, there are still differences in chronic illness at an ecological level. Places with low income or a high level of deprivation suffer the worst health. Second, the authors concluded that multilevel modeling is an appropriate statistical tool to investigate individuals in their environments.

Krieger N, Chen JT, et al. Geocoding and monitoring of U.S. socioeconomic inequalities in mortality and cancer incidence: does the choice of area-based measure and geographic level matter? *American Journal of Epidemiology*. 2002;156:471–482.

This study is part of the Public Health Disparities Geocoding Project at the Harvard School of Public Health, created to determine which area-based socioeconomic measures, at which level of geography, would be most appropriate for U.S. public health surveillance systems and research. The authors contribute to the growing public health literature on the use of appropriate health-related measures at different levels of geography. They generated diverse single-variable and composite area-based socioeconomic measures at the census tract, block group, and zip code level for Massachusetts and Rhode Island to investigate their associations with mortality and cancer incidence rates. Considerations for measures include external validity, robustness, completeness, and user-friendliness. On the basis of their analysis, the authors conclude that it is better to expend additional effort to geocode health data to the tract and block group level rather than to receive less informative data from easier-to-obtain zip code-level datasets. The authors also suggest that area-based socioeconomic measures are best served by census tract or block group measures that are: 1) most attuned to capturing economic deprivations, 2) meaningful across regions and over time, and 3) easily understood and based on readily interpretable variables with categorical cutpoints. Finally, the authors recommend analyzing larger regions when measuring income inequality and evaluating area-based socioeconomic measures across more than just one or two outcomes.

Macintyre S, Ellaway A, Cubbins S. Place effects on health: how can we conceptualize, operationalize, and measure them? *Social Science and Medicine*. 2002;55:125–139.

The authors examine the reasons for the historical lack of attention to ecological analysis on the influence of the local environment on human health. The reasons include wariness about the use of ecological data, methodological challenges in analyzing large health datasets, and difficulty understanding the relative importance of individual behavior on chronic disease and other health conditions.

Documenting the resurgence of interest in the role of place on health since the early 1990s, the authors summarize the debate between researchers on the role in health status of place versus people. They conclude that there is no single, universal “area effect on health”; rather, the effects of place on health vary for different populations and areas. Explanations for geographical variations in health can generally be categorized as: 1) *compositional explanations*, which focus on the characteristics of individuals concentrated in particular places; 2) *contextual explanations*, which focus on opportunity structures within the environment that can help or hinder health; and 3) *collective explanations*, which include the sociocultural and historical features of communities. The authors argue for wider consideration of all three types of explanations, with a special focus on nongeographic communities that are not identified by residential neighborhoods.

Finally, the authors suggest that individuals may or may not interact with their environments, and they propose a dynamic of inputs and outputs. A neighborhood may have a certain number of places of worship (an environmental input, a resource that people may choose whether to use), but the number of places is separate from measures of religious participation (output of the activities of local residents). The authors also suggest measures that might be used to test specific hypotheses about the role of place.

III. COMMUNITIES NOT DEFINED BY NEIGHBORHOOD

Some communities are not defined by neighborhoods or other local geographic boundaries, but are defined instead by shared common characteristics or experiences. Immigrants demonstrate the health effects of place as they move from one place to another. Migrant communities, rural populations, and urban Indians are geographically dispersed, yet they often share common concerns with others in their community.

A. HEALTH EFFECTS OF IMMIGRATION INTO U.S. COMMUNITIES

In the publications described in this section, the focus is on the experiences of U.S. immigrants and how such experiences affect immigrants' health status. Immigrants to the United States often move into ethnic enclaves or areas with high concentration of other immigrants. Such ethnic enclaves can serve an adaptive function, allowing immigrants to capitalize on the social, cultural, and economic resources within the enclave.

Researchers have observed that immigrants often have better health outcomes than expected, given their generally low economic status, exposure to stressful conditions such as difficulty accessing health care, and exposure to discrimination or racism. The reasons for immigrants' better health outcomes are not entirely clear. Researchers have suggested that the following factors may play a role: 1) selective migration, with healthier people in the population more likely to immigrate; 2) possible underreporting of disease or misclassification by race or ethnicity; and 3) good social support and protective sociocultural factors. Research also shows that immigrant health worsens after immigrants arrive in the United States.

To improve immigrants' health, researchers suggest policies and programs to support housing access, transportation, employment, community health workers, mobile medical services, naturalization, English classes, legal assistance, leadership training, and political and civic involvement.

Bender DE, Castro D. Explaining the birthweight paradox: Latina immigrants' perceptions of resilience and risk. *Journal of Immigrant Health*. 2000;2:155–173.

The authors used focus groups, photonarratives, and documentation of local extended kin networks to develop a theory of resilience and risk that contributes to favorable health outcomes for Latina immigrants. Protective or resilience factors are positive factors that promote *individual* health status and well-being. Such factors do not necessarily promote

positive health outcomes but may increase resistance to adverse and hazardous events. The authors suggest three different mechanisms that may be responsible for a resilient response: 1) compensation, 2) challenge, and 3) immunization. In the *compensatory model*, stressful/adverse events can be counteracted by individual characteristics and/or external sources of support (e.g., family network). In the *challenge model*, previously stressful events can potentially enhance competence. In the *immunization model*, protective factors modulate the impact of stressors on the quality of adaptation. Resilience can also apply to *groups or communities* in which all of the members are exposed to the same stressful or risk conditions. With such resilience, immigrants may have better health outcomes (including higher birthweight) than expected given their demographic profiles and exposure to stressful conditions such as lack of access to health services, discrimination, and racism.

Berk ML, and Schur CL. The effect of fear on access to care among undocumented Latino immigrants. *Journal of Immigrant Health*. 2001;3:151–156.

This article examines the extent to which undocumented immigrants fear seeking health care and discusses whether such fear is associated with inability to obtain necessary medical care. The population studied included undocumented Latino adults over age 18 living in four major communities in two states with high population concentrations of undocumented persons: Houston and El Paso (in Texas) and Fresno and Los Angeles (in California). Overall, the study found that the lack of documentation, along with the fear associated with a lack of documentation, is a powerful deterrent to people obtaining health care they need. The authors warn policymakers of the deleterious public health and financial impacts of delayed care when restricting access to health care services based on immigration status.

Across all four states, 39 percent of undocumented Latino adults reported that they had been afraid of seeking medical services because of their undocumented status. Overall, persons in the larger cities expressed less concern. Latinos reporting fear were less able to obtain all types of health care measured (medical/surgical, prescriptions, dental care, and eyeglasses). Despite California's Proposition 187, which cut undocumented immigrants off from medical and other public services, no differences were observed in the proportion of undocumented Latinos expressing fear about seeking services in Texas and California. The fact that Latinos in the two larger cities (Houston and Los Angeles) reported less fear about seeking care may be due to better-developed networks of clinics serving Latinos in those cities, making it feel safe and easier to seek care there than in the two smaller cities (Fresno and El Paso). Although publicity and debate related to California's Proposition 187 might have affected both states, the effect of 1996 welfare reform restrictions on immigrants' access to health care services may have had an even greater deterrent effect.

Escobar JI. Immigration and mental health: why are immigrants better off? *Archives of General Psychiatry*. 1998;55:781–782.

The author notes that a number of studies have found that Mexican immigrants to the United States have a much better mental health profile than do people of Mexican descent born in the United States. Place of birth has a more profound influence on the prevalence of psychiatric disorders than do traditional demographic risk factors such as sex, age, and socioeconomic status. Thus, there is rising evidence in support of a negative effect of acculturation on the mental health of Mexican Americans, and a positive effect of the retention of Mexican cultural traditions and the protective or buffering effect of traditional culture, which includes close-knit, extended family networks; a higher proportion of two-parent families and lower rates of divorce and separation; and cultural traditions that may contribute to healthier habits (better eating and less drug use).

Finch BK, Boardman JD, et al. Contextual effects of acculturation on perinatal substance exposure among immigrant and native-born Latinas. *Social Science Quarterly*. 2000;81:421–438.

The authors of this article performed an analysis to determine whether community socioeconomic status and community acculturation between immigrant and native-born pregnant Latinas affects these women's perinatal substance exposure rates. They found that community acculturation has little to no effect on pregnant Latinas who are less likely to interact with the dominant English-speaking culture, but that Latinas with the ability to communicate in English are at greater risk for overall drug use when living in highly acculturated communities. Lower levels of community acculturation increased the relative odds for Spanish-speaking Latinas of testing positive for alcohol, tobacco, and marijuana substance use, while higher community acculturation increased odds for English-speaking Latinas of testing positive for alcohol. Both tobacco and marijuana were influenced by community acculturation. Although community, acculturation, and community poverty were not associated with the odds of testing positive for cocaine, community acculturation was associated with the use of amphetamines.

The authors discuss immigrant enclave theory, which argues that the spatial concentration of particular immigrant groups in ethnic enclaves actually facilitates their economic mobility. Some immigrant groups are able to develop successful economic communities within highly segregated environments because they capitalize on the spatial concentration of social, cultural, and economic resources. The implication is that highly unacculturated communities act as cultural buffers against the more liberal attitudes and behaviors of the dominant U.S. culture regarding drugs and other lifestyle behaviors. The authors suggest that future policy regarding drug use should be guided by individual-level and community-level characteristics.

They also suggest this as a direction for future research regarding Hispanics in that every effort should be made to include contextual-level variables when the effects of acculturation are important to the research question.

Frisbie WP, Cho Y, Hummer RA. Immigration and the health of Asian and Pacific Islander adults in the United States. *American Journal of Epidemiology*. 2001;153:372–380.

The authors discuss the health of Asian and Pacific Islander (API) immigrants, whose population more than doubled in the United States during the 1980s, making it the country's fastest-growing racial/ethnic group. Three-quarters of this growth is due to immigration. The authors investigated the effect of immigrant status (both nativity and duration) on the health of APIs using three years of data from the National Health Interview Survey. They were able to study eight specific API populations: Chinese, Filipino, Asian Indian, Japanese, Korean, Vietnamese, Pacific Islander, and Other Asians. Immigration status was examined with four categories: native born, immigrant (0–4 years), immigrant (5–9 years), and immigrant (10 years or more).

Compared to U.S.-born adults, API immigrants were more likely to report good, very good, or excellent health, taking into consideration age, sex, marital status, living arrangement, family size, educational level, family income, and employment status. Immigrants who had lived in the United States for 0–4, 5–9, or 10 or more years were all at significantly less risk of activity limitations than were APIs born in the United States. The more years they lived in the United States, the more similar immigrant APIs became to U.S.-born APIs with regard to activity limitations. They observed the same pattern for bed days. Compared with the Japanese, all other APIs reported a greater risk of poor or fair health. In terms of physicians visits, immigrants of all durations were less likely to have made three or more visits to a physician in the past year than were U.S.-born APIs. Immigrants who had lived in the United States for less than 10 years had greater odds of having no regular source of care (2.7 times the odds of a U.S.-born person having no regular source of care).

Gonzalez HM, Haan MN, Hinton L. Acculturation and the prevalence of depression in older Mexican Americans: Baseline results of the Sacramento area Latino Study on Aging. *Journal of the American Geriatrics Society*. 2001;49:948–953.

This study estimated the prevalence and risk of depression in older Mexican Americans, by subgroups of acculturation and immigration history. The authors also investigated which psychosocial, behavioral, and health factors are associated with depression. The authors found that the prevalence and risk of depression was higher for older immigrants than it was for U.S.-born Mexican Americans. The authors also found that the association between

birthplace and depression was entirely explained by acculturation. Acculturation was measured by the Geriatric Acculturation Ratings Scale for Mexican Americans, a 19-item scale that assesses English and Spanish language and media use, childhood and current friendships, contact with Latin America, and dietary practices.

Guendelman S. Immigrants may hold clues to protecting health during pregnancy: exploring a paradox. Berkeley, CA: California Wellness Foundation/University of California Wellness Lecture Series; 1995.

This paper focuses on understanding good birth outcomes among Latina and Southeast Asian women. Given the low educational attainment and high incidence of poverty experienced by Latina and Southeast Asian women, one would expect them to be at high risk for poor health, including poor pregnancy outcomes. Yet despite the dramatic differences in risk profiles, these immigrant women's pregnancy outcomes are comparable to those of the overall white population. Guendelman discusses potential reasons for this, including underreporting, misclassification (of ethnicity and race), excess fetal deaths, selective migration, and protective sociocultural factors. These protective factors include nutritious dietary intake, low use of addictive substances, and kin networks and family stability. Acculturation erodes these protective factors at the same time that it improves education, income, and access to prenatal care. The author concludes that more research on the modes of immigrant adaptation is needed to understand how health risks change over time.

Hummer RA, Rogers RG, Nam CB, LeClere FB. Race/ethnicity, nativity, and U.S. adult mortality. *Social Science Quarterly*. 1999;80:136-153.

In 1996, about one-tenth of the U.S. population was foreign-born, the largest foreign-born population in the country's history. Half of the foreign-born population came to the United States in the previous 15 years. For this study, the authors used the National Health Interview Survey and the National Death Index to analyze mortality by race (non-Hispanic whites, non-Hispanic blacks, non-Hispanic Asian and Pacific Islanders, Mexican Americans, and other Hispanics), nativity, and length of time living in the U.S.

The authors found that foreign-born individuals, whether they have lived in the United States for shorter or longer periods, have lower mortality rates than do individuals born in the United States. Native- and foreign-born Mexican Americans have mortality risks similar to those of non-Hispanic whites. When social characteristics (i.e., education and income) are taken into consideration, however, Mexican American mortality is significantly lower than that of native-born, non-Hispanic whites. Asian American mortality is generally lower than that of the other racial/ethnic groups, but this advantage differs by age category. The most favorable Asian American mortality patterns are found among the elderly.

Native-born blacks suffer from the highest mortality of any of the groups. Overall black-white mortality differences were not affected by nativity, most likely because of the small foreign-born proportion of the black population.

Macpherson DW, Gushulak BD. Human mobility and population health: new approaches in a globalizing world. *Perspectives in Biology and Medicine*. 2001;44:390–401.

This paper discusses human population mobility as a health determinant. The authors note that the globalization of economies in the last 25 years has increased both the number of people on the move and the rapidity of their movement. It has also focused attention on global disparities in health determinants. Population mobility presents a challenge to public health programs and policies to prevent importing disease as well as to programs and policies to promote and protect the health of migrants and the local, receiving population.

According to the authors, prevalence gaps—that is, differences in epidemiological disease risk—may have negative, neutral, or positive health consequences for the migrant or receiving population. The authors assert that the inability to detect and contain imported disease threats at national borders requires new policies to facilitate development of policies and programs that address the health consequences of population mobility. Specifically, they argue that attention should be given to addressing disparities in health outcomes, including access to and quality of care for mobile communities. In addition, attention should be focused on the nature and basis of differentials in health risks based on geopolitical distribution of disease as well as cultural, genetic, and economic factors. Health promotion programs should be directed to at-risk populations based on shifting population demographics related to mobility. Finally, the authors suggest, international equalization activities should focus on development and economic status across borders to minimize these prevalence gaps in disease risk.

Markides KS, Coreil J. The health of Hispanics in the southwestern United States: an epidemiologic paradox. *Public Health Reports*. 1986;101:253–265.

The epidemiologic paradox in the title of the article refers to the observation that even though Hispanics are disproportionately socioeconomically disadvantaged, they appear to have unusually good health status measures that do not reflect their disadvantage. This article reviews the research on the relative health advantage or disadvantage of southwestern Hispanics. The authors find that in spite of Hispanics' relatively low socioeconomic status, they have health outcomes similar to whites for infant mortality, life expectancy, mortality from cardiovascular diseases, cancer-related mortality, and functional health status. The authors suggest areas of further research to better understand the reasons for the

observed advantages. For example, perhaps certain cultural practices lead to stronger reproductive health outcomes. Selective migration or the healthy migrant effect may contribute to reproductive health advantages, and dietary factors may explain lower cancer rates. The authors note that there are also some health disadvantages for Hispanics relative to whites, such as higher rates of diabetes, obesity, infectious diseases, and parasitic diseases.

Reyes BI, Mameesh L. Immigration into America's communities: how are communities accommodating their newest arrivals? Oakland, CA: PolicyLink; 2001.

The authors examine immigrants' integration into America's communities, considering both the effects of immigration on existing communities and the opportunities and challenges it presents. In particular, the authors highlight the implications for community building to address immigrant issues. On the one hand, immigrants have the same needs as other low-income communities of color—including housing, transportation, employment, and social services. Yet immigrants often have additional needs—such as English and citizenship classes and legal assistance—and some require a bilingual staff. With diverse cultural traditions, language limitations, varying immigration status, and fear of the public sector, immigrants sometimes pose challenges to integration as well as health sector service delivery. The authors propose several strategies that address immigrant needs, such as naturalization, outreach, political and civic involvement, leadership training, and supportive immigrant policies and programs. Health sector strategies include expanding community health centers located in immigrant communities, offering outreach programs via *promotores* (trained lay health outreach workers), and providing mobile medical services.

Singh GK, Siahpush M. Ethnic-immigrant differentials in health behaviors, morbidity, and cause-specific mortality in the United States: an analysis of two national data bases. *Human Biology*. 2002;74:83–109.

The size of the U.S. immigrant population has grown three-fold between 1980 and 1991. As of March 2000, there were an estimated 28.4 million immigrants in the United States, approximately 10 percent of the U.S. population. This study analyzed two large national datasets and found that immigrants tend to have more favorable health behaviors than their U.S.-born counterparts. For example, U.S.-born blacks ages 18-64 were almost three times more likely than their immigrant counterparts were to report smoking cigarettes (29 percent vs. 10 percent). Asian Pacific Islander (API) and Hispanic immigrants have the lowest smoking rates, and American Indians have the highest (45 percent). In terms of mortality data, the authors found that, for men, after taking into consideration socioeconomic and demographic characteristics, black immigrants ages 25 and older had the lowest overall mortality. This was followed by API and Hispanic immigrants, U.S.-born APIs and Hispanics, white immigrants, and U.S.-born whites. For women, Hispanic and black immigrants had

the lowest mortality, followed by API immigrants, U.S.-born APIs, U.S.-born Hispanics, white immigrants, and U.S.-born blacks. The largest U.S.-born/foreign-born mortality differential was for blacks: U.S.-born blacks had twice the mortality risk of their immigrant counterparts.

Singh GK, Yu SM. Adverse pregnancy outcomes: differences between U.S.- and foreign-born women in major U.S. racial and ethnic groups. *American Journal of Public Health.* 1996;86:837–843.

The proportion of the U.S. foreign-born population rose by 70 percent between 1970 and 1990 (from 4.7 percent to about 8 percent). Earlier studies of localized datasets have found that foreign-born mothers have better pregnancy outcomes than their U.S.-born counterparts. This study sought to investigate whether there are differences in pregnancy outcomes (infant mortality, low birthweight, and preterm birth) between U.S.-born and foreign-born mothers in a large national dataset. Researchers used National Linked Birth and Infant Death datasets to consider how these differences varied for the following race and ethnic groups: non-Hispanic white, black, Chinese, Japanese, Filipinos, other Asian and Pacific Islander, Mexican, Puerto Rican, Cuban, and Central and South American.

Foreign-born women had lower infant mortality rates than U.S.-born women for all race/ethnic group comparisons except Central and South Americans. With the exception of other Asians, immigrants had lower rates of low birthweight than did U.S.-born. Except for other Asians (not Filipino, Chinese, or Japanese) and non-Hispanic whites, immigrants had lower proportions of preterm birth than did people of the same race/ethnicity born in the United States. Immigrants had lower prevalence of several risk factors such as teenage birth, out-of-wedlock birth, and low educational attainment. After taking into consideration maternal age, maternal education, trimester when prenatal care began, and other demographic characteristics, U.S.-born women continued to have a higher risk for infant mortality and low birthweight than did their foreign-born counterparts. The differential for preterm birth did not remain. When the authors sought to find where the greatest differences were, they found that foreign-born Cuban, other Asian, and black women had the largest advantage for infant mortality compared to their U.S.-born counterparts of the same race/ethnicity. For low birthweight, Black, Chinese, and Mexican immigrant women had the largest advantage compared to their U.S.-born counterparts.

Vega WA, Amaro H. Latino outlook: good health, uncertain prognosis. *Annual Review of Public Health.* 1994;15:39–67.

The authors note that less acculturated, new Latino immigrant groups in the United States have better health behaviors (fiber consumption, breastfeeding practices, lower usage rates of tobacco and other substances) and health outcomes (disease-specific morbidity and

mortality) than do more acculturated immigrants. Migration stress due to the disruption of attachments to supportive networks; the tasks of adapting to the economic and social systems in the host culture; and the discrimination, prejudice, and exclusion that accompany a newly acquired minority status are attenuated by the networks of family and friends that ease adaptation to life in the United States. At the same time, the process of adaptation to life in the United States is thought to contribute to the abandonment of the cultural values and traditions over time that are thought to protect health. A better understanding of selective migration, social networks, social support systems, and the organization and cohesion of the varied communities in which Latinos live and work are needed.

Weigers ME, Sherraden MS. A critical examination of acculturation: the impact of health behaviors, social support, and economic resources on birthweight among women of Mexican descent. *International Migration Review*. 2001;35:804–839.

The authors of this study interviewed 58 pregnant and postpartum women of Mexican descent in the United States to examine the role of social support and access to resources in explaining how acculturation affects low birthweight. These interviews allowed the researchers to examine current theories about why first-generation Mexican immigrant women have better birth outcomes than do second-generation Mexican American women. The authors argue that explorations of the effects of acculturation on birth outcomes have been too simplistic, failing to consider how acculturation varies for different people and focusing too heavily on negative health behaviors and not enough on social support and access to economic resources.

B. MIGRANT COMMUNITIES AND HEALTH

Migrant workers face unique health challenges that are related to mobility, demographic factors, and shared experiences in this segment of the work force. As noted in the studies described in this section, many migrant farm workers have low educational and income levels, live in poor-quality housing, lack transportation, are geographically isolated from health clinics and other services, and face dangerous working conditions. Undocumented farm workers face additional challenges such as racism and difficulty claiming workers' compensation for illness related to pesticide exposure or injuries. These studies show that migrant farm workers are at risk for poor diet, pain, stress or anxiety, and chronic health conditions.

The authors make several recommendations about how to improve the health of migrant workers. These include improving migrant workers' access to health care services; implementing health promotion programs targeted to at-risk populations based on mobility; instituting binational approaches with Mexican organizations and officials; increasing access to affordable housing; improving housing code enforcement; and strengthening health and safety standards and their enforcement.

The California Endowment CEO Task Force on Agricultural Worker Health and the Tomás Rivera Policy Institute. *The bounty of food: the poverty of health*. Claremont, CA: Tomás Rivera Policy Institute; 2001.

This is the final report of The California Endowment's CEO Task Force on Agricultural Worker Health, which was created to advise The California Endowment on future grant-making strategies to address the needs of the state's 1 million migrant and seasonal workers. The report makes several grant-making recommendations to The California Endowment (e.g., support efforts to increase points of access to comprehensive health, dental, and mental health care where farm workers and their families work, and to provide a permanent funding source to improve access to affordable housing and improve housing conditions).

It also makes numerous public policy recommendations to address farm worker health. A few examples include increasing farm worker points of access to public programs; instituting binational approaches with appropriate Mexican organizations and officials to advance the health of Mexican farm workers and their families; increasing long-term funding to the farm worker housing endowment; eliminating barriers to improving farm worker housing

and living conditions by changing code enforcement law, planning and zoning laws, etc.; and formulating policies and programs to improve enforcement of occupational health and safety laws in agriculture.

Lighthall D. *Best practices for migrant workers: community health care by private clinics for migrant farmworkers: the case of the Sablan Medical Clinic.* Davis, CA: California Institute for Rural Studies; 2000.

This report underscores the lack of access to affordable health care among migrant workers, who are particularly vulnerable to hazardous conditions in their work. Among the health problems migrant workers face are: 1) very low wages, resulting in an inability to pay for their own health care; 2) lack of employer-provided health care; 3) lack of transportation, compounded by geographic isolation, to public clinics and hospitals; 4) undocumented immigration status, compounded by lack of formal education and English-language skills; 5) an inability to claim workers' compensation for maladies related to pesticide exposure or incremental musculoskeletal damage; 6) very high incidence rates of diabetes, reflecting genetic predisposition and worsened by poor preventative education, early diagnosis, and maintenance care; and 7) bureaucratic inflexibility that make it difficult to gain year-round eligibility to programs such as Medi-Cal or to access care in a new location.

One example of a private rural clinic that addresses many of the barriers to migrant health care is the Sablan Medical Clinic in Fresno County, California. The two doctors who run it have overcome the bureaucratic red tape involved in securing Medi-Cal reimbursement; offer access to a range of public and private supplemental programs for migrant health care (Healthy Families, breast cancer early detection, free medications from pharmaceutical donations, Child Health Disability Program, etc.); have hired and trained bilingual staff from the local population, invested in learning Spanish language skills for themselves; and have extended hours and open access to walk-ins to maximize accessibility and minimize use of emergency rooms among the farm worker population. The major lesson to be drawn from this best practice clinic is that private clinics inaccessible to federal reimbursement can overcome this and other constraints to serve such low-income and culturally isolated populations. The authors point to the overwhelming need for reform to better support the infrastructure of health care access in migrant farm worker communities.

Mines R, Mullenax N, Saca L. *The binational farmworker health survey: an in-depth study of agricultural worker health in Mexico and the United States.* Davis, CA: California Institute for Rural Studies; 2001.

The Binational Farmworker Health Survey, which focused on the health of Mexican farm workers from the state of Zacatecas who have migrated to the United States to find work,

used a binational sampling technique to collect data from current, temporary, and former U.S. farm workers of rural Mexican origin. The authors suggest that the younger members of this network are not engaged in farm work; rather, they leave for different sorts of work in the United States.

The key findings of the survey include significant health problems among Mexican farm workers. For example, one in four reported having a diagnosed chronic condition such as high blood pressure, gastrointestinal problems, and diabetes; 80 percent said they needed relief for stress or anxiety; and nearly half (44 percent) reported experiencing a pain problem for a week or more during the year before the interview. Participants reported occupational risks, including farm-related injuries that limited their ability to work (27 percent) and occupationally induced eye irritation (18 percent), rashes (12 percent), and headaches (11 percent) that lasted three months or more—with 87 percent first experiencing these symptoms in the United States. In addition, more than half (58 percent) had no medical insurance, 50 percent reported that no member of their family had insurance, and 47 percent had not seen a doctor in the past two years. The study found that participants tended to prefer the type of health care they received in rural Mexico, where they received prompt service, received quick diagnoses, and had providers who shared their language and cultural background. To improve farm worker health, the authors recommend increased collaboration between Mexican and American health care providers and programs.

Perilla JL, Wilson AH, Wold JL, Spencer L. Listening to migrant voices: focus groups on health issues in South Georgia. *Journal of Community Health Nursing*. 1998;15:251-263.

The authors note that unlike California, Florida, and Texas, Georgia provides limited services to its migrant workers and that most Georgians do not know that migrant workers live and work in their state. The authors had been part of teams of nurses providing well-child screenings and physical exams to children of migrant farm workers in south Georgia. This study was an effort to give the migrant workers a chance to express their health needs and concerns. The authors oversaw four focus groups with Mexican farm worker participants.

Three themes emerged from the content analysis of the focus groups. *Health care issues* was the most frequently identified theme. The main concern was the inadequacy of available services. People commonly mentioned the complete lack of dental and eye care services. On *living and working conditions*, everyone mentioned “tobacco illness,” intoxication, and skin conditions connected with working in the tobacco fields. There was also discussion about *social and community issues*. One of the four focus groups was a woman-only group. During their discussion, women brought up concerns surrounding prostitution. They said

white women prostitutes worked near the camps and threatened their families and their communities. All four groups raised the issues of racism and prejudice. Men and women told stories about encountering discrimination in medical facilities, grocery stores, shopping centers, restaurants, schools, and churches. In terms of needs, all four groups identified English classes as a top priority. Other top priorities include basic hygiene education, first aid education, information about legal issues, and education about pesticides.

Strong MF, Maralani VJ. *Farmworkers and Disability: Results of a National Survey.* Oakland, CA: Berkeley Planning Associates; 1998.

The authors note that farm work is generally recognized to be the second most dangerous occupation after mining. Supported by a grant from the National Institute on Disability and Rehabilitation Research, Berkeley Planning Associates, and the National Center for Farmworker Health conducted a survey of adult farm workers with disabilities and disabled children in farm worker families in six states (California, Washington, Texas, Colorado, Florida, and North Carolina). Adults were included if they had disabilities and had done farm work within the previous five years. Disability was determined with a functional definition, using a screening question asking if they had changed the amount or type of farm work they had done due to a disability or chronic health condition. Children were also included in the study; the authors note that children as young as age 10 can legally do farm work. Without targeting, the sample was uniformly Latino. The vast majority (79 percent) of the adults had authorization to work in the United States.

Although not the explicit intent of the study, the data indicated that 65 percent of the adults attributed their disabilities to the farm work they had done. The average age of onset of the primary disability was 32 years. About one-quarter (22 percent) reported a back condition as their primary disability. The second-largest primary disability category was other musculoskeletal conditions, including injuries to joints, carpal tunnel problems, or paralysis of limbs. Almost two-thirds (63 percent) of the adults reported more than one disabling condition, and almost everyone (92 percent) reported their physical health as "poor" or "fair." For children, more than half (56 percent) of them were disabled as a result of congenital conditions. Almost one-quarter (24 percent) of the children reported developmental delays as their primary disability. The report found that, unlike what is often assumed, when farm workers become disabled, they do not typically return to their home countries. The report also described the sort of services that these disabled adults and children used and whether they were satisfied with them.

Villarejo D, Baron SL. The occupational health status of hired farm workers. *Occupational Medicine*. 1999;14:613-635.

The authors review the health status of hired crop farm workers. According to the U.S. Department of Labor's National Agricultural Workers Survey, 10 percent of farm workers have some form of health insurance through their employer. The Migrant Health Act supports more than 120 community-based and state organizations that offer primary care services to farm workers. The authors cite studies estimating that these clinics provide services to about 15-20 percent of the eligible population. Farm workers primary health concerns include musculoskeletal conditions, pesticide-related illness, traumatic injuries, nonmalignant and noninfectious respiratory diseases, dermatitis, infectious diseases, cancer, eye problems, and mental health concerns (including social isolation, depression, and alcoholism).

Villarejo D, Lighthall D, et al. *Suffering in silence: a report on the health of California's agricultural workers*. Woodland Hills, CA: The California Endowment and California Institute for Rural Studies; 2000.

This report—a collaboration between The California Endowment and the California Institute for Rural Studies—summarizes the initial results of a large, population-based study of the health status of California's agricultural workers. Participants from randomly selected communities representing the state's major agricultural regions agreed to interviews at their residence and a comprehensive physical exam. According to this report, the survey population was made up primarily of young, married Mexican men with little formal education and very low annual incomes. About 96 percent say they are Mexican, Hispanic, or Latino, and 8 percent are indigenous people for whom Spanish, if spoken, is a second language.

Nearly one in five male agricultural workers surveyed had at least two of three risk factors—high cholesterol, high blood pressure, and obesity—for chronic diseases. The authors indicate that inadequate and unhealthful diets are major contributors to risk factors for chronic diseases among California's agricultural workers. The survey found that many agricultural workers in California have poor access to medical care (32 percent of male participants had never been to a doctor or clinic in their lives), although gender differences suggest that programs emphasizing maternal and child health have been able to attract women agricultural workers' participation. Occupational hazards were also common. Around 19 percent of those surveyed reported having had a workplace injury at some point in their farm working careers, and only 57 percent said they had received pesticide safety training. The authors highlight the need to address the health of agricultural workers, including efforts to address the lack of health insurance coverage and the shortage of providers and facilities in rural areas.

C. GEOGRAPHICALLY DISPERSED COMMUNITIES AND HEALTH

Some communities are geographically dispersed—that is, not clustered together in a particular neighborhood but, instead, spread across neighborhoods or regions. Such communities, which include rural populations and urban Indians, are the focus of the studies described in this section.

When comparing rural and urban areas, researchers find that rural populations are at increased risk for many health conditions, but at lesser risk for others. Access to services in distant rural areas is one critical challenge. Measurement challenges for rural areas include averaging health outcomes across many rural communities and masking important differences as a result, and inaccurate definitions of rural communities. The authors of the studies of rural communities described in this section make various recommendations to improve the health of rural residents, among them improving health insurance coverage, the distribution of health services, rural economic development policies, and regulation of pesticide use, and instituting or expanding community health worker and mobile health programs, e-health, telemedicine, and job training programs.

Urban American Indians also face many health challenges. They are often dispersed throughout cities and do not live in neighborhoods with other American Indians, do not have access to care through the Indian Health Service, and face high rates of poverty and other health risk factors. Studies have shown that urban Indians have a higher prevalence of low birthweight and neonatal mortality as well as lower rates of use of early prenatal care, than do American Indians in rural areas. Urban Indians are plagued by high rates of tuberculosis, alcoholism, diabetes, and other diseases and health conditions. The authors of these studies recommend that policymakers should target more resources to improving the health of this population. Few studies have investigated community factors that affect urban Indian health beyond health service access.

Azevedo K, Bogue HO. Health and occupational risks of Latinos living in rural America. In: Aguirre-Molina M, Molina CW, Zambrana RE, ed. *Health issues in the Latino community*. San Francisco, CA: Jossey Bass; 2001:359-380.

This study profiles the health and occupational risks of Latinos living in rural America. The authors note that Latinos concentrated in rural areas are poorer and have lower salaries and lower educational attainment than do Latinos employed in urban areas. Hired farm-workers often must migrate from one job to another as the crop seasons change throughout the year—56 percent of Latino agricultural workers migrate for employment. In the United States, there are three streams of migrant workers: the eastern stream (Florida home base), the midwestern stream (Texas home base), and the western stream (California home base). Health status studies among rural Latinos are small and local; there is no systematic, epidemiological profile of rural Latinos. Primary occupational hazards include pesticide and sun exposure, injuries, and poor field sanitation. Infectious disease cycles among Latino agricultural workers are common. Infant mortality among migrant farm worker women in California is more than twice as high as that of the general population nationwide.

To meet the needs of Latinos living in rural America, the authors suggest several approaches. Adequate funding for health services for this population is critical. Participatory outreach efforts, they note, are as effective as community-oriented primary health care for the rural poor, including migrant workers. Lay health worker programs bring information and resources into homes or temporary dwellings in a culturally appropriate manner and promote the use of existing, traditional health services. Mobile programs that support migrant health centers are ideal, the authors suggest, but too few health centers have the resources needed to establish them.

Evans GW, English K. The environment of poverty: multiple stressor exposure, psychophysiological stress, and socioemotional adjustment. *Child Development*. 2002;73:1238-1248.

The authors of this study replicated and extended earlier research on self-reported distress among inner-city minority children to low-income, rural white children. They demonstrated that low-income, rural children ages 8-10 confront a wider array of multiple physical (substandard housing, noise, crowding) and psychosocial (family turmoil, early childhood separation, community violence) stressors than do their middle-income, rural counterparts. The researchers found evidence that low-income, rural children had higher levels of self- and parent-reported psychological distress, greater difficulties in self-regulatory behavior (delayed gratification), and elevated psychophysiological stress (i.e., resting blood pressure) than did their middle-class counterparts. They report that preliminary analyses

with cross-sectional data suggest that cumulative stressor exposure may partially account for the well-documented, elevated risk of socioemotional difficulties accompanying poverty.

Farmer FL, Clarke LL, et al. Consequences of differential residence designations for rural health policy research: the case of infant mortality. *Journal of Rural Health*. 1993;9:17–26.

The authors argue that there is no single rural America, and that areas outside metropolitan areas constitute a complex mosaic of varying social and environmental settings. Thus, health outcome statistics averaged across rural communities mask important differences associated with sociodemographic parameters such as region of the country and race. Empirical results indicate that when considering infant mortality, the authors note, any rural disadvantage is contingent on how rural and urban have been defined. In states like California, where county geographic boundaries cover vast areas, defining a rural area is problematic. With large agricultural areas often designated as urban rather than rural nonmetropolitan counties, there is systematic undercounting of rural Latino residents working in agriculture.

Forquera R. Issue brief: urban Indian health. Menlo Park, CA: Henry J. Kaiser Foundation; 2001.

This issue brief describes the health status of the large and growing urban Indian population, along with major federal health programs and federal-state programs that are available to improve Native Americans' access to needed health services. More than half of individuals who identified themselves as solely American Indian in the 2000 census now live in urban areas. Urban Indians in a given city often include many different tribes, and the population tends to be dispersed throughout the area rather than living in particular neighborhoods. Urban Indians may travel back to their home reservations to maintain cultural connections. Overall, the conditions in which urban Indians find themselves put them at great physical and emotional risk for health problems. About one-third of American Indians are uninsured, and only around 1 percent of the Indian Health Service budget goes to urban programs for American Indians. There is limited information on urban Indians' health status, but their risk for infant mortality, alcoholism, alcohol-related deaths, tuberculosis, diabetes, and other diseases and conditions is higher than that of other Americans and similar to that of American Indians living on or near reservations. The authors recommend policies to increase urban Indians' access to health care.

Gaston MH. 100 percent access and 0 health disparities: changing the health paradigm for rural women in the 21st century. *Women's Health Issues*. 2001;11:7–16.

This article provides a status report on access to health care and health disparities among female rural residents: 1) rural minorities have higher rates of infant mortality, cancer

screening and management, HIV and AIDS, and childhood immunization coverage than do rural whites; 2) rural minorities fare better on infant mortality rates and HIV/AIDS than do urban minorities; 3) mental health and domestic violence are significant health issues in the rural setting, especially among minority populations, because of social stigma, difficulty with anonymity/confidentiality in smaller settings, lack of providers, and lack of a neutral criminal justice system in smaller settings; 4) geographic distances create disparities in access to services between rural and nonrural women; 5) rural hospitals are closing due to financial cuts, and access to medical services is limited; 6) pesticide-related health problems among agricultural workers are the cause of numerous acute and chronic health problems and can have a detrimental impact on workers' capacity to work and thus workers' economic security; and 7) rural, migrant women have serious health problems and barriers to care because of their ethnicity, cultural and language differences, extreme poverty, lack of education, frequent mobility, low literacy levels, substandard housing, and poor working conditions.

The author notes that recent migration of new ethnic and minority groups into rural areas creates a need for a more diverse provider base to overcome cultural and linguistic barriers. Recommended approaches to improve female rural residents' access to health care and reduce health disparities include e-health, telemedicine, better distribution of health services, pesticide use regulation, and greater policy and research attention to rural women's health issues.

Grossman DC, Baldwin LM, et al. Disparities in infant health among American Indians and Alaska natives in U.S. metropolitan areas. *Pediatrics*. 2002;109:627.

This article reports on disparities in infant health among whites and American Indian and Alaska Natives (AI/AN) in U.S. metropolitan areas. The authors found considerable disparity in the prevalence of risk factors associated with morbidity and mortality among AI/AN infants and white infants who live in the same metropolitan areas. In metropolitan areas with the greatest disparity between AI/AN infants and white infants in low birthweight, low birthweight rates among AI/AN infants were approximately 1.5 to 2 times higher than rates for white infants. In 1993, neonatal death rates among AI/ANs in Indian Health Service (IHS) areas were reported to be approximately 21 percent higher than rates among whites. In some urban areas, local rates of neonatal mortality among AI/AN infants were considerably higher than the rates reported by the IHS in 1993. Postneonatal mortality rates among AI/AN infants in some areas were three to five times higher than rates among whites living in the same areas.

Disparities in infant health are most likely associated with the higher poverty rates, lower levels of maternal education, and other pregnancy risk factors among AI/AN women than among white women. The health status of urban AI/AN women and infants is of importance, because in most cities, AI/AN children are not eligible for, or do not have access to, health

services provided directly by the Indian Health Service or tribal health programs. The lack of uniformity with regard to urban AI/ANs' access to maternal and child health care contrasts sharply with direct Indian Health Service care, where access to basic health care and prenatal services is generally similar across reservations and states. The authors suggest that urban health programs should play a larger role in efforts to reduce AI/AN infant mortality. They argue that policymakers should target resources and efforts to those communities with the greatest disparity in infant health, as measured by rates of low birthweight, neonatal mortality, and postneonatal mortality differences between AI/ANs and whites.

Grossman DC, Krieger J, et al. Health status of urban American Indians and Alaska natives: a population-based study. *Journal of the American Medical Association*. 1994;271:845.

The authors used vital statistics and communicable disease reports to characterize the health status of an urban American Indian and Alaska Native (AI/AN) population and compare it with urban whites and African Americans and with AI/ANs living on or near rural reservations in Washington state. The outcome measures used were low birthweight, infant mortality, and prevalence of risk factors for poor birth outcomes; age-specific and cause-specific mortality; and rates of several specific diseases.

The authors concluded that there were great disparities between the health of AI/ANs and that of whites across almost every health dimension they measured, but there were no consistent patterns in the comparison of health indicators between urban and rural AI/ANs. In terms of infant health, the researchers found that urban AI/ANs had a much higher rate of low birthweight than did urban whites or rural AI/ANs, and that rural AI/ANs had a much higher rate of infant mortality than did urban whites. Even though rural AI/ANs appeared to be the most disadvantaged group in the study in terms of socioeconomic characteristics, they were more likely than were urban AI/AN mothers to initiate prenatal care in the first trimester. This pattern may reflect the availability of comprehensive maternal and child health services offered by the Indian Health Service. The prevalence of low birthweight was higher among urban AI/ANs than it was among urban whites or rural AI/ANs, although it was lower than the prevalence of low birthweight among urban African Americans. During the 10 years from 1981 through 1990, urban AI/AN infant mortality rates rose from 9.6 per 1,000 live births to 18.6 per 1,000 live births, with no similar trend among the other populations. The authors recommend that federal, state, and local health authorities devote additional attention to improving the health status of urban AI/AN populations.

Jessop EG. Individual morbidity and neighborhood deprivation in a non-metropolitan area. *Journal of Epidemiology and Community Health*. 1992;46:543–546.

The objective of this U.K. study was to replicate, in a nonmetropolitan area, a study by Curtis based on data from different parts of London that found a significant relationship between individual morbidity and neighborhood deprivation. The researchers examined neighborhood deprivation effects in a rural area of England and found no association with self-reported health. They hypothesized that either the measures of deprivation used were not valid measures of deprivation in this area, or that health did not vary by area deprivation in these rural areas.

Mansfield CJ, Wilson, JL, et al. Premature mortality in the United States: the roles of geographic area, socioeconomic status, household type, and availability of medical care. *American Journal of Public Health*. 1999;89:893–898.

The authors examined premature mortality by county in the United States and assessed its association with metro/urban/rural geographic location, socioeconomic status, household type, and availability of medical care. Age-adjusted years of potential life lost (YPLL) before age 75 were calculated and mapped by county. Predictors of premature mortality were determined by multiple regression analysis.

Premature mortality was found to be greatest in rural counties in the southeast and southwest. The results revealed that rural counties had slightly higher YPLL than did urban or metropolitan counties. In rural counties, the proportion of female-headed households and the percentage of black population were the strongest predictors of YPLL. Low education, American Indian population, unemployment, and availability of physicians also contributed. In metropolitan counties, the proportion of female-headed households was the best predictor of YPLL, followed by less education, percentage of black population, vacant housing, and an inverse association with primary care. In urban counties, the best predictor of YPLL was the percentage of black population, followed by the percentage of female-headed households, and low education. Welfare spending, unemployment, vacant housing, elderly population, and percentage of American Indian population were also associated with YPLL in urban counties. The authors concluded that community structure statistically explains more of the variation in premature mortality in U.S. counties than does the availability of medical services. To reduce premature mortality, therefore, the authors recommended taking steps to “reduce social pathology (e.g., education, job training, economic development, and adolescent pregnancy prevention).”

Mueller KJ, Ortega ST, Parker K, Patil K, Askenazi A. Health status and access to care among rural minorities. *Journal of Health Care for the Poor and Underserved*. 1999;10: 230–249.

This is a review of literature on the health and health care problems of rural minority populations. The authors included literature primarily on African American and Hispanic populations published between 1970 and 1993. Studies in the 119 articles reviewed found less access to health care services among rural minority populations than among urban minority populations. Consequences of low access in rural areas included undetected cancer, inadequate treatment of hypertension, and fewer visits to physicians.

Most of the research was on samples drawn from a single state or geographic area. While 25 studies of African Americans were based on national data, most of the studies of *rural* African Americans were based on data from southern states. The authors are concerned that without large national samples, it is very difficult to determine whether a particular pattern of health needs or health care use is regionally specific. In addition, they argue that with only regional data, it is difficult to analyze the influence of size and density of minority populations and timing of immigration. Less than 30 percent of the studies were able to use or used multivariate statistical techniques, most likely because of the small sample sizes. Key questions cannot be answered without these techniques. For example: “Are racial/ethnic minority group members who live in rural areas in better or worse health than their urban counterparts?” or “Do some rural minority groups experience more barriers to appropriate health care than others?”

Mueller KJ, Patil K, et al. The role of uninsurance and race in healthcare utilization by rural minorities. *Health Services Research*. 1998;33:597–610.

The purpose of this study was to examine the independent effects of minority status, residence, insurance status, and income on physician use, controlling for general health status and the presence of acute or chronic health problems. Using data from the 1992 Health Interview Study, the researchers performed statistical techniques to detect independent effects of residence and minority status on whether individuals used physician services. They found the most important determinant of health services to be insurance status, regardless of race/ethnicity or place of residence (rural or urban). Other findings from this study included: 1) racial and ethnic minorities were less likely than were whites to use physician services, and rural residents' use of physician services was generally lower than that of urban residents; 2) except for Latinos, rural residence lowered the likelihood that the uninsured saw a physician in the previous 12 months; 3) insured rural residents surpassed urban residents in accessing physicians; 4) rural Asian and African Americans were the least likely to have used physician services; 5) there are regional differences across the United States in the likelihood of seeing a physician; 6) rural Latinos have the most limited

access to physician services, which is best addressed through economic development policies that include adequate insurance coverage; and 7) ensuring the cultural appropriateness of programs and policies is important for improving appropriate use of health care among rural minorities.

Vega WA, Kolody B, et al. Lifetime prevalence of DSM-III-R psychiatric disorders among urban and rural Mexican Americans in California. *Archives of General Psychiatry*. 1998;55:771-778.

The authors of this study used data on lifetime prevalence rates for 12 psychiatric disorders in a sample of adults of Mexican origin living in Fresno County, California. They found higher rates of psychiatric disorders among adults of Mexican origin in urban areas than among adults of Mexican origin in rural areas. The researchers suggested that the better psychiatric health of those in rural areas might be due to the continuing influx of new immigrants into rural areas, resulting in a less acculturated population and thus better mental health outcomes in rural settings.

Verheij RA. Explaining urban-rural variations in health: a review of interactions between individual and environment. *Social Science & Medicine*. 1996;42:923-935.

The author performed a meta-analysis of literature published between 1985 and 1994 on the relation between people's environment and their health. As background, the article reviews existing theories regarding geographic disparities: the geographical drift hypothesis and the breeder hypothesis. The *geographical drift hypothesis* suggests that selection processes lead to a higher concentration of ill people (direct selection) or in a spatial concentration of more susceptible people (indirect selection). Direct selection would be a result of healthy people staying in one place and ill people moving or the reverse. Indirect selection would be the result of people with certain health characteristics moving to or from specific places. The *breeder hypothesis* points to the role of environment on exposure and health behaviors. Nuclear plants, high traffic densities, and high levels of noise and pollution are a few examples of environmental factors.

The overall conclusion of this study is that there is an urban disadvantage regarding health; however, the extent to which the environment exerts its influence on a person's health depends on that person's individual characteristics. Several specific conclusions are drawn from the literature: 1) with regard to physical health, urban-rural health differences seem to be more pronounced in women; 2) most types of cancer are more common in urban areas and most likely associated with lifestyle characteristics, particularly among men; 3) urban morbidity is higher among women for musculoskeletal disorders; 4) the interaction between mental health and city life is particularly strong; and 5) well-being is poor in cities, affecting physical health through constraints in such areas as a physical environment that makes it more difficult to get around, street violence, and traffic.

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