

ENVIRONMENTS AND HEALTH: PLANNING DECISIONS AS PUBLIC-HEALTH DECISIONS

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## ENVIRONMENTS AND HEALTH: PLANNING DECISIONS AS PUBLIC-HEALTH DECISIONS

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*Although planning decisions have profound public-health implications, planning-health linkages have received relatively little attention in recent decades. Moreover, on the few occasions when such connections have been made, health outcomes have been narrowly construed, ignoring a wide array of well-documented linkages between the physical environment and human health. Planning decisions directly influence the character and quality of housing and neighborhoods including the external density of communities, the presence and size of parks, air and water quality, land-use mix, the height and size of residential structures, transit-mode mix, traffic density, retail-store location, road geometry, and community noise levels. Environmental characteristics of home and neighborhood, in turn, directly or indirectly affect physical health and psychological well-being. This paper presents a framework for considering the impact of planning decisions on a wide range of health issues. Empirical data from medical and social sciences illustrate connections between health outcomes among residents and residential-environment characteristics influenced by planning. This paper presents a critical summary of the current knowledge and the quality of the evidence. Where appropriate, we also note theoretically plausible leverage points where planning decisions may affect health, but which require further research to test their effects on health-related outcomes.*

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## INTRODUCTION

“The proposed project will bring jobs, bolster the local economy, and be an asset to this community,” the developer explains. It’s Tuesday, 9:20 p.m., and members of the town planning committee are considering the seventh item of business at the monthly meeting. The developer has done her due diligence, presenting her environmental-impact statement and an economically based argument for the acceptance of her proposal. A community member raises his hand:

*How will this affect our health? How will it influence the health of our children today and decades from now? It’s time we start being more proactive and thinking about the positive or negative effects that our decisions may have on the health and well-being of current and future generations. Although some members of this community may reap immediate, short-term financial gains by the proposed plan, I think the developer’s analysis is fundamentally flawed. We need to be proactive, make evidence-based decisions, and recognize that low-income families are going to bear a disproportionate share of the adverse health impacts of this proposal. There are relevant research data out there. Let’s use it to ensure a better quality of life for all members of the community, rich and poor, for the present and for generations to come.*

### ***Planning and Health: A Brief Historical Perspective***

The idea that planning theory and practice have potentially critical effects on human health and welfare is not new. During the industrialization of the 1800s and 1900s, epidemics of infectious diseases such as cholera, typhus, and tuberculosis were associated with poor housing conditions and led to sanitation reform efforts (Rosen, 1958) and, in the mid-1800s, passage of the New York Metropolitan Health Bill and the New York Tenement House Law. In the 1900s, the Progressive Era housing reformers worked to eliminate the dark, filthy, crowded conditions in housing tenements, relying on linkages with disease to make their case (Frank, *et al.*, 2003; Frumkin, *et al.*, 2004).

The efforts of Progressive Era reformers laid a foundation for zoning and focused on reducing congestion in the early 20th century (Frank, *et al.*, 2003; Sloane, 2006). Interest in decentralization, motivated in part by concern for the population’s physical health and well-being, led to zoning used to segregate housing types, set parameters for residential lot size, and separate residential, commercial, and industrial uses. In 1926, *Village of Euclid, Ohio, v. Ambler Realty Co.* established the legitimacy of zoning ordinances based on the notion that zoning was a tool for protecting the health and welfare of citizens (U.S. Supreme Court, 1926).

Given that planners have historically been motivated by concerns about public health, why does the community member’s question seem novel? First, the comment is unusual in the contemporary planning context because the explicit connection with public health has not been as salient as economic concerns. Second, the community member raises concerns about potential income disparities in the adverse health impacts of development. Third, the perspective is novel because he proposes a proactive, forward-looking approach to planning-health linkages, while historically the planning field has responded reactively to health crises such as cholera and tuberculosis in the early 1900s. Fourth, his question implies a more inclusive view of health, extending beyond infectious-disease control. Lastly, he suggests the use of health-related research evidence in the decision-making process.

This paper presents evidence that “planning” decisions are often, in effect, “public health” decisions (see Figure 1). We provide an overview of a wide range of environmental characteristics that planning decisions influence and which in turn affect health among both the general population and those at risk for inequities in environmental exposure — particularly low-income and racial minority communities. With evidence from public health, medicine, sociology, psychology, and planning, we illustrate the relevance of planning decisions for health. We then present a new framework for linking planning and healthy housing. We argue that health ought to be an explicit component of planning decision making.

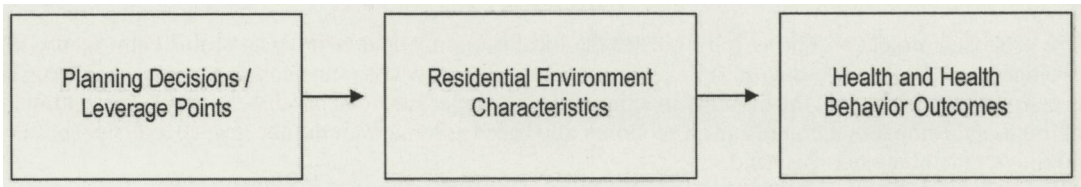


FIGURE 1. Schematic overview of planning, the residential environment, and health.

## PLANNING MATTERS

### *Contemporary U.S. Public-Health Issues*

A plethora of health problems face the United States' population today. Approximately 3% of adults aged 18 years and over living in the United States experienced serious psychological distress during the past 30 days (CDC, 2007b). An estimated 4.4 million children aged 4-17 have been diagnosed with attention deficit/hyperactivity disorder (ADHD) (CDC, 2005a). Sixty percent of the United States population is either overweight (36%) or obese (24%) (CDC, 2007a). Approximately 18% of children and adolescents aged 6-19 are overweight (CDC, 2008c). Heart disease and stroke are the leading causes of death in the United States for both women and men, accounting for more than a third of fatalities (CDC, 2008b). The rate of diabetes in the total population is 8%, but among ethnic minority groups, the rates are significantly higher (CDC, 2007c). Approximately 4.3% of persons of all ages experienced an episode of asthma in the past 12 months (CDC, 2007d). Nearly 200,000 people are diagnosed with lung cancer, the deadliest of all cancers, each year (CDC, 2004, 2005b). These public-health challenges range from psychological to physical. What do these diseases and ailments have in common? All are health problems with significant environmental causes (Friis, 2007; Wigle, 2003). Through daily decisions about policy, design, and practice, planners influence community health. Here's how.

### *How and Why Planning Matters*

According to the World Health Organization (WHO) (1946), health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." The U.S. Department of Health and Human Services' (2001) publication *Healthy People 2010* indicates that "environmental health" comprises *those aspects of human health, disease, and injury that are determined or influenced by factors in the environment ... not only pathological effects of chemicals [and] biological agents, but also the effects on health of the broad physical and social environment, which includes housing, urban development, land-use and transportation, industry and agriculture.*

Broadly speaking, planning impacts health by affecting the physical, chemical, biological, social, and psychosocial factors in the environment. Specifically, planning's health impacts are transmitted through decisions and actions concerning housing, urban development, land use, and transportation. Planners influence the size of the yards around homes; the configuration of neighborhoods; the number and character of parks and open space in a community; the quality of the air and water; the character, height, and density of housing; and the overall character of our communities. Planning also affects the distribution of environmental quality across neighborhoods, cities, towns, and wider regions. Socioeconomic status (SES) is a powerful shaper of physical and psychological morbidity (Adler, *et al.*, 1993). A primary reason for the strong relation between low SES and compromised health in America is the elevated risk of exposure to cumulative environmental risk factors accompanying low-income living (Evans and Kantrowitz, 2002).

Planning decisions are leverage points — small actions that can translate into big influences. The potency of a decision or a leverage point can be considerable. Planning decisions can both set policies that affect land-use practices county-wide and influence the design, character, or use of a specific lot, neighborhood, or region. We consider four dimensions of the environment — (1) nature and open space, (2) elements of urban form, (3) the food systems, availability, and affordability, and (4) housing characteristics and quality

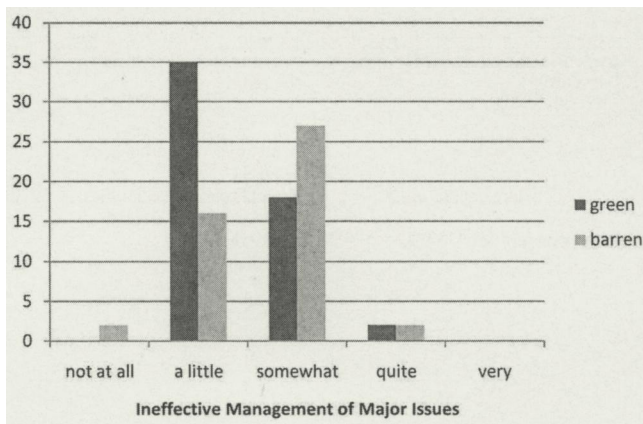


FIGURE 2. Nearby nature and urban residents' capacity to cope with poverty: histogram of life functioning score by green versus barren conditions. Adapted from Kuo (2001).

is an amenity that community members may appreciate, but it is not typically viewed as a health issue. Yet, there is a growing body of literature suggesting that access to nature or green space has a variety of positive effects on human health (see Frumkin, 2001; Louv, 2005). Furthermore, access to nature and open space is tied to SES. For instance, a poor child living in New York City has access to an average of 17 square yards of park space, compared to the 40 square yards of park space accessible to his middle- and upper-class counterparts (Sherman, 1994).

Frederick Law Olmsted, designer of New York City's Central Park and Boston's "emerald necklace" of parks, was one of the first to articulate the beneficial effects of the natural environment and to advocate for urban open space. Olmsted (1865/1952:21) wrote, "The enjoyment of scenery employs the mind without fatigue and yet exercises it, tranquilizes it and yet enlivens it; and thus, through the influences of the mind over the body gives the effect of refreshing rest and reinvigoration to the whole system." In fact, Olmsted's prescient sentiments have been borne out by research evidence.

Access to or views of the natural environment are linked with cognitive functioning (Kaplan, 1995; Kaplan and Kaplan, 1983). The natural environment helps people recover from cognitive fatigue by capturing involuntary attention (*i.e.*, fascination). Access to nature has been associated with enhanced cognitive functioning among children (Wells, 2000a), backpackers (Hartig, *et al.*, 1991), college students (Tennessen and Cimprich, 1995), girls in Chicago public housing (Faber Taylor, *et al.*, 2002), and low-income urban women (Kuo, 2001). For example, 145 residents of Chicago public housing randomly assigned to architecturally identical buildings with or without nearby trees and grass were compared using measures of functioning and well-being. Residents living in settings lacking vegetation reported more procrastination in dealing with their major life challenges and indicated that their problems were more severe, long-standing, and insoluble. Consistent with prior research on the restorative effects of nature, the underlying explanation for these differences was higher levels of cognitive functioning among residents of buildings with trees and grass (*ibid.*) (see Figure 2).

In addition, recent evidence suggests that there may be a parallel between cognitive fatigue and ADHD. Symptoms of ADHD appear to be reduced by exposure to nature (Faber Taylor, *et al.*, 2001; Kuo and Faber Taylor, 2004).

Trees and natural areas may also be a mechanism to draw people together, enhance social connections, and bolster a sense of community. Studies of low-income urban residents have found that spaces with trees and vegetation are associated with more social interaction (Coley, *et al.*, 1997) and stronger neighborhood social ties among both younger (Kuo, *et al.*, 1998) and older adults (Kweon, *et al.*, 1998). In a study of rural children,

— linking physical manifestations of planning to health outcomes. Rather than exhaustively reviewing the evidence, we summarize what is known or suspected about each dimension and describe the strength of the evidence for each.

### *Nature and Open Space*

One way planners affect a community's physical environment is through impacting the amount and character of open space. Through the planning process, land can be designated as a city or town park or for development, for example. Similarly, planners help to set rules about the amount of open space required when a new neighborhood is created. Open space



TABLE 1. Summary of planning decisions as leverage points that affect the environment and, in turn, health (based on Wrigley, *et al.*, 2003).

Planning Decisions/ Leverage Point	Residential-Environment Characteristics	Health and Health-Behavior Outcomes
<i>Nature and Open Space</i>		
Comprehensive Plan/General Plan (esp. function plans related to open-space system)	Proximity to park Access to nature, open space	Cognitive functioning ADHD Neighborhood social ties Recovery from illness Longevity Physical activity
Zoning and Subdivision Ordinances (land-use type, density, incentive zoning to obtain open space, open-space and conservation requirements, landscape ordinances)	Views of nature	
Other Land-Use Policies (encourage compact and mixed development through planned unit development; cluster and incentive zoning)		
<i>Urban Form</i>		
Comprehensive Plan/General Plan (esp. function plans related to transportation and street planning)	External density Lot sizes Mixed use Street network plans Road geometry Mass-transit availability Traffic volume	Car use Physical activity Obesity Stress Cardiovascular disease Social interaction Social connections Sense of community
Zoning (land-use type, density)		
Other Land-Use Policies (encourage compact and mixed development through planned unit development; cluster zoning; zoning overlay districts)		
<i>Food Environment</i>		
Zoning (land-use type)	Mixed use Proximity to supermarket	Diet ( <i>i.e.</i> , fruit and vegetables) Physical activity
<i>Housing</i>		
Zoning and Subdivision Ordinances (land-use type, density, allowable building height, minimum setbacks, lot dimensions, floor area ratios, street standards for sidewalks, parking requirements)	Building height Housing type Housing quality Interior density ( <i>i.e.</i> , people/room)	Injuries Psychological distress Social isolation Strained social relationships Physical health Safety Physiological stress Reduced social support

nearby nature was also found to bolster psychological resilience in the face of life stressors (Wells and Evans, 2003).

The natural environment has been associated with physical health and recovery from illness. Patients with views of nature recover more quickly from surgery, request less pain medication, and have shorter hospital stays (Ulrich, 1984). A study within a prison found that inmates with natural views visited the infirmary less often (West, 1986). Since hospital patients and prison inmates do not choose which room they inhabit, these effects of nature are not attributable to personality or some other individual characteristic. The environment influences health. Among older urban-dwelling adults, having space to take a walk and the presence of parks and tree-lined streets near the residence predicts longevity (Takano, *et al.*, 2002). Age, sex, marital status, and SES were statistically controlled in this study.

Proximity to parks and open space has been associated with higher rates of physical activity (*e.g.*, Macdonald, 2007). Most of this evidence is of an associational, rather than causal, nature. In a study of nearly 7,000 adults living in European cities, Ellaway, *et al.* (2005) found that among those living in residential areas with high levels of greenery, the likelihood of being physically active was three times greater and the

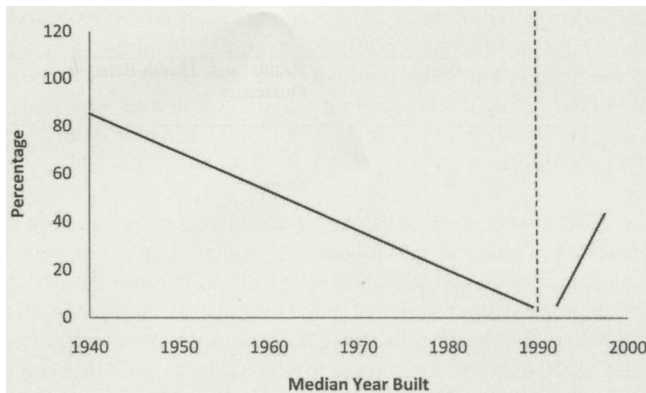


FIGURE 3. Percentage of single-family development units within 1/4 mile of commercial uses by age of neighborhood. Adapted from Song and Knaap (2004).

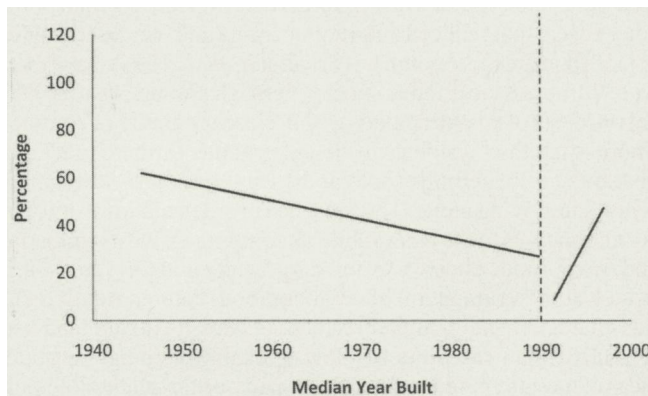


FIGURE 4. Percentage of single-family development units within 1/4 mile of bus stops by age of neighborhood. Adapted from Song and Knaap (2004).

likelihood of being overweight or obese was 40% less than for those living in the least green setting. Similarly, Giles-Corti, *et al.* (2005) found that Australians with access to large, attractive public open space were 50% more likely to achieve high levels of walking.

Planning decisions that increase people's access to trees, parks, and open space may contribute to better cognitive functioning and positive psychological well-being, encourage social connections and sense of community, and promote physical activity. Decisions that minimize the concentration of poverty in residential communities or interfere with the cascade of environmental inequities accompanying lower SES (including access to nature) can produce dramatic shifts in community health (see Table 1).

### *Elements of Urban Form*

Planning exhibits a clear impact on the character of the physical landscape. Through zoning regulations, subdivision ordinances, and other land-use (*e.g.*, growth management) policies, planning decisions affect various elements of urban form and urban development ranging from gross controls of density, land-use mix, noise attenuation, transportation systems, and street patterns to

specific streetscape features such as the presence of front porches, sidewalks, and trees. These environmental features, in turn, directly or indirectly affect health.

A compelling example of the potential influence of planning practices is provided by the regional government of Portland, Oregon, which in 1991 began work on the 2040 "Growth Concept" to encourage growth within the Urban Growth Boundary and to discourage sprawl. Plans were implemented through the *Urban Growth Management Functional Plan* in 1996 (Portland Metro Council, 1996). Song and Knaap (2004) examined the effects of Washington County's strong land-use and growth-management policies on pedestrian access and other measures of urban form. Their research showed that new neighborhoods developed after 1990 demonstrate patterns less characteristic of urban sprawl by having improved internal connectivity of streets, greater neighborhood densities, closer proximity of neighborhood to commercial use, and, as shown in Figures 3 and 4, greater pedestrian access to commercial use and bus stops (*ibid.*).

Zoning and subdivision standards, the classical (land-use) planning tools, were originally established for the purpose of protecting "community health, safety, morals, and general welfare" (Lautner, 1941, cited in Ben-Joseph and Szold, 2005:175). Aspects such as soil contamination, unsafe drinking water, and water, air, noise, and light pollution are often times directly controlled in land-use planning through location controls (*i.e.*, site location) and minimum development standards (*e.g.*, minimum setback, sewer and drainage, under-

ground utilities, waste control, street lighting, parking). All of these aspects of the environment have well-established pathological effects on health (see Matte and Jacobs, 2000). For example, planning decisions regarding transportation corridors, setbacks, and noise-attenuation treatments have clear impacts on community noise levels. Noise has a well-documented influence on reading acquisition among children, it elevates blood pressure and stress hormones (*e.g.*, cortisol) (Evans, 2001, 2006), and it is a major nuisance, producing widespread annoyance (Berglund, *et al.*, 1999).

Linkages between the environment and health have also been established via the effects of urban form on walking or automobile use. Auto-dependence and lack of physical activity occur in tandem. The same environmental characteristics that distinguish residential, commercial, and manufacturing land use from each other and make auto-dependence unavoidable also make walking and other means of travel impractical. Non-automotive travel, like the use of public transit, is associated with higher levels of walking. For example, Wener and Evans (2007) found that train users are four times more likely than car commuters in Manhattan to walk the recommended 10,000 steps daily. Excessive car use has been linked with obesity (Frank and Schmid, 2004), and sprawl is associated with less walking, higher rates of obesity, and a greater prevalence of hypertension (Ewing, *et al.*, 2003). Long commutes are associated with stress and cardiovascular disease (Koslowsky, *et al.*, 1995; Novaco, *et al.*, 1991), and traffic congestion is a major contributor to job stress (Downs, 1992).

Land-use mixture, density, and street patterns have been found to have important impacts on transportation-mode choice and walking behavior. Studies reveal that reduced automobile usage and increased public-transit ridership and walking are observed in places that are more compact (Friedman, *et al.*, 1994), have more mixed land use (Frank and Pivo, 1995; Handy, 1992), and have gridded street patterns (Kitamura, *et al.*, 1997). For example, Handy (1996a, 1996b) found that residents of neighborhoods within close proximity of commercial areas walked to the store significantly more often than residents of neighborhoods further from commerce. Cervero and Duncan (2003) found that mixed-use settings (both at the trip origin and destination) were associated with transit usage and alternatives to driving alone. The presence of sidewalk infrastructure was also associated with choosing commuting alternatives to the automobile. A comprehensive examination of linkages between the built environment and travel-mode choice is offered by Ewing and Cervero (2001) and Crane and Boarnet (2001). Other studies look at the aggregation of neighborhood features and find that residents of "highly walkable" neighborhoods characterized by higher residential density, mixed land use, and street connectivity are more physically active than residents of "low walkability" neighborhoods (Saelens and Black, *et al.*, 2003). Recent research has attempted to overcome many of the methodological shortcomings that prevailed in earlier research, such as selection bias, incorporating survey data to diminish self-selection (Nasar, 2003), and using longitudinal studies (Krizek, 2003; Wells and Yang, 2008). Frank and Engelke (2001), Handy, *et al.* (2002), Lee and Moudon (2004), and Saelens and Frank, *et al.* (2003) provide reviews of research on the environment and physical activity.

The environment also affects sense of community and social interaction, which have well-documented impacts on health and longevity (Berman and Syme, 1979; Cohen, *et al.*, 1997; House, *et al.*, 1988). Neighborhood configurations may influence sense of community (Kim and Kaplan, 2004; Lund, 2002; Plas and Lewis, 1996). Moreover, higher traffic volume on residential streets is associated with lower levels of social interaction among neighbors (Appleyard and Lintell, 1972). Parents on busier streets restrict their children's outdoor play behavior, which, in turn, strains interpersonal relationships within the home and is associated with fewer friendships among both children and parents (Huttenmoser, 1995).

### ***Food Systems, Availability, and Affordability***

Although early planners included food-systems planning as an integral part of their professional responsibilities (Donofrio, 2007; Stein and Bauer, 1934), dietary habits have generally not been considered within the province of planning (Pothukuchi and Kaufman, 1999, 2000). Nevertheless, planners' contributions to decisions about the location of food stores and the allowance of mixed use can affect the food retail landscape in ways that profoundly influence dietary practices with both immediate and long-term implications.

Morland, *et al.* (2002) found that African Americans residing in a census tract where a supermarket was located were 30% more likely to eat the recommended number of daily fruit and vegetable servings than



TABLE 2. Increases in fruit and vegetable consumption among those who ate two or fewer servings prior to grocery-store intervention (based on Wrigley, *et al.*, 2003).

Change Between Pre- and Post-Intervention Periods	Poor Diets in Pre-Intervention Period (n = 239)		
	Fruits and Vegetables	Vegetables	Fruit and Fruit Juice
Increased	143	129	130
No change	24	38	36
Decreased	72	72	73
In average consumption (portions per day)	+0.44	+0.18	+0.26
% change	+34%	+20%	+65%

TABLE 3. Increases in fruit and vegetable consumption among those who ate less than one serving prior to grocery-store intervention (based on Wrigley, *et al.*, 2003).

Change Between Pre- and Post-Intervention Periods	Poor Diets in Pre-Intervention Period (n = 60)		
	Fruits and Vegetables	Vegetables	Fruit and Fruit Juice
Increased	45	37	37
No change	8	14	15
Decreased	7	9	8
In average consumption (portions per day)	+0.82	+0.37	+0.45
% change	+139%	+77%	+409%

those living in a census tract without a supermarket. A rare “natural experiment” in England involved data collection before and after the construction of a grocery store in a “retail poor” urban area. The new store had no effect on community members’ diets on average, but among people with poor diets prior to the intervention, fruit and vegetable consumption increased significantly. For people who ate two or fewer servings of fruit and vegetables prior to the store opening, daily consumption increased by 1/3 — from 1.31 to 1.75 servings per day. Among individuals with the worst diets, who ate less than one serving of fruits and vegetables per day, 75% increased their consumption, and average consumption of fruits and vegetables more than doubled — from .59 to 1.41 servings daily. Moreover, among the 45% of the 615 nearby residents who switched to the new store, there was a 300% increase in walking as the mode of transportation to buy food. One valuable message from this study is that the environment can influence different people’s health or health behaviors differently. This intervention was particularly effective in promoting healthy eating among those most nutritionally at risk (Wrigley, *et al.*, 2003) (see Tables 2 and 3). An important strategy for planners and researchers interested in the environment and health is to be alert to natural experiments where changes in the physical environment afford opportunities to compare the health of the same residents before and after the implementation of planning initiatives. This research approach will strengthen the foundation of knowledge for evidence-based decision making.

Other research illustrates that patterns in the food environment parallel the health disparities evident in our society. For example, both availability of heart-healthy foods and the mean number of heart-healthy foods at local stores correlate with neighborhood SES in San Diego (Sallis, *et al.*, 1986). Similarly, Morland, *et al.* (2002) found that wealthier neighborhoods had significantly more supermarkets than poorer neighborhoods, while the poorest neighborhoods had three times more venues for alcohol consumption than the wealthiest neighborhoods.

Planning decisions related to the location of supermarkets, fast food, farmers’ markets, and convenience stores influence who has easy access to what kinds of food. Providing community members with access to healthy foods is likely to encourage consumption of those foods and may help, ultimately, to combat the obesity epidemic. Planners can help ensure that the traditional linkage between poverty and lack of access to healthy food is broken. Food-location decisions are particularly critical for low-income and ethnic minority populations who typically experience a wide range of health disparities and do not have the resources to overcome the friction of physical distance to frequent health-food retailers.

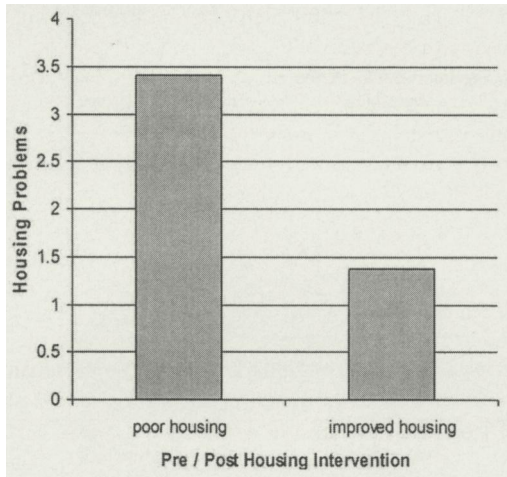


FIGURE 5. Reduced housing problems from pre- to post-housing intervention. Adapted from Wells (2000b).

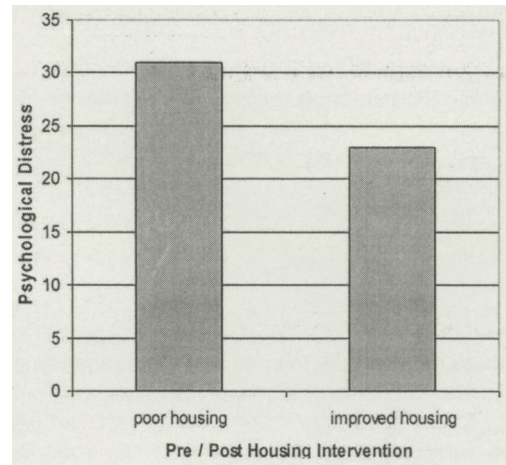


FIGURE 6. Reduced psychological distress from pre- to post-housing intervention. Adapted from Wells (2000b).

### ***Housing Characteristics and Quality***

Many planning decisions directly and indirectly influence the residential experience of people in ways that affect their health. Two aspects of residential settings and health need to be highlighted. First, multiple characteristics of residential settings are often simultaneously affected by housing decisions. To put it differently, planning often alters the ecological context of the residential experience for citizens (e.g., du Toit, 2009). The level of poverty in the community and the household is one very strong influence on exposure to multiple health risks. Second, research on housing characteristics and health typically isolates singular characteristics. Thus, there is a fundamental disjunction between the reality of what planners do and scientific evaluations of the consequences of those actions. Furthermore, as we discuss later in the paper, there is preliminary evidence showing that the health impacts on people of multiple environmental characteristics are more consequential than singular characteristics of the physical and social settings in which people live and work. The building type (e.g., multiple occupancy vs. single family), height, size, and setback; housing quality; and various housing regulations and codes impact residential characteristics. The quality of housing directly and indirectly influences human health and well-being. Sanitation practices (e.g., trash removal, siting of waste collection and storage), fire-prevention technology and location, sewage-system maintenance and capacity, and housing and related public-health code enforcement practices all contribute directly to the ecology of healthy living conditions (Matte and Jacobs, 2000).

Housing quality affects both physical and mental health. With respect to physical health, studies indicate that cold and dampness are associated with respiratory illnesses (Shaw, 2004). And elevated levels of allergens (e.g., cockroaches, dust mites) contribute to asthma (Wigle, 2003). Behavior toxins such as lead are affected by paint and plumbing materials, pesticide residues are influenced by human use as well as building characteristics, and several indoor air pollutants are influenced by housing characteristics such as ventilation exchange rates, use of gas for cooking, and certain building materials that release gas chemicals (Krieger and Higgins, 2002; Matte and Jacobs, 2000). In addition, children in low-income areas have greater numbers of injuries that occur in the home (Pomerantz, *et al.*, 2001; Roberts and Power, 1996; Scholer, *et al.*, 1999). This is due to poor housing quality coupled with lax enforcement of housing codes (O'Campo, *et al.*, 2000).

Turning to mental health, people living in better quality housing have fewer psychological symptoms. Evidence includes cross-sectional comparisons with good controls for SES, studies that randomly assigned people to different housing conditions, and longitudinal investigations comparing the same individuals before and after housing improvements (Evans, *et al.*, 2000, 2003; Wells, 2000b). For example, Halpern (1995) examined 117 low-income women living in public housing in the U.K. Half of the homes were remodeled and

upgraded. Anxiety and depression decreased in those receiving housing improvement whereas no changes in psychological symptoms occurred among the other half of the sample. Prior to the housing intervention, the groups had equivalent levels of mental health. Similarly, in a longitudinal study of low-income women living in urban areas throughout Michigan, relocation from inadequate to new housing was statistically linked to improvements in psychological well-being. Improvements in housing quality predicted post-move levels of psychological distress, explaining 12% of the variance in post-move psychological distress after controlling for pre-move distress. These longitudinal data help to establish a causal relationship rather than merely a cross-sectional association between housing and health (Evans, *et al.*, 2000; Wells, 2000b) (Figures 5 and 6).

The scale of housing, in terms of both height and size, has health effects. People living in high-rise housing are more prone to falls. Steep or uneven staircases and absent or poorly maintained handrails are major factors in home falls, particularly for children and frail elderly (Krieger and Higgins, 2002). High-rise housing elevates psychological distress, particularly among low-income mothers of young children. Studies are mostly cross-sectional, but most include statistical controls for SES, and a few are true experiments with random assignment to housing (Evans, *et al.*, 2003). In a landmark study of housing and health, Fanning (1967) examined 1,500 servicemen's wives who were randomly assigned to living accommodations. Physician-documented psychological distress was two times higher among women living on the fourth floor than among those on the ground floor. In another well-designed study, children residing in large, 14-story public housing had significantly greater behavioral problems than their counterparts living in three-story public housing. Families in this study were assigned to buildings according to seniority on waiting lists, which makes it unlikely that selection could account for the differences found (Saegert, 1982).

One likely explanation for some of the mental-health sequelae of high-rise housing, particularly among young families, is social isolation. It is more difficult to let children play outside when one lives high up in a large building (Kim, 1997). Playgrounds and public spaces likely serve a critical social-gathering function for parents of young children. Mental-health data are more equivocal for single-family detached housing than for multifamily housing, with some studies finding adverse effects of multifamily dwelling, but it is difficult to tease out the different roles played by floor level and scale. There is more consistent evidence, however, that interpersonal relationships with neighbors are less positive and that people who live in larger, multifamily dwellings experience lower levels of social support than those who reside in single-family homes (Evans, 2003). The impact of housing on socially supportive relationships is a good illustration of an indirect health effect of planning decisions. Social support is a critical component of mental and physical health. More socially isolated individuals have an elevated risk of ill health.

Crowding, particularly the ratio of people/room, has well-documented adverse effects on mental and physical health. Extremely high density levels exacerbate the spread of infectious diseases. Blood pressure and stress hormones (*e.g.*, cortisol) are also elevated by higher levels of people/room. This has been shown in field studies with controls for SES and in laboratory experiments where people were randomly assigned to different density levels (Evans, 2001). Psychological distress is higher among people in higher density homes. For example, in a prospective study, Lepore, *et al.* (1991) showed that, upon initial occupancy, college students had equivalent levels of psychological distress, but after nine months of living together, those living under higher-density conditions had significantly greater levels of psychological distress. This and other studies suggest that high residential density is inimical to mental health because it undermines the development and maintenance of socially supportive relationships (Evans, 2001; Wells and Harris, 2007). Counterintuitively, living physically closer to more people leads to less social support (Evans and Lepore, 1993). Parents in more crowded homes are also less responsive to their children (Evans, *et al.*, 1999).

## PLANNING AND THE ECOLOGICAL CONTEXT OF HEALTH

Planners make decisions that often affect more than one component of the physical and sociocultural environments. Although the research on environmental risk factors, as reviewed above, has focused on singular risks and health, the convergence of multiple risk factors likely has a stronger impact on mental and physical health compared to singular alterations. Thus, planning decisions that influence neighborhood

and housing quality jointly have more potent health impacts than decisions that affect either of these components singularly. Many of the leverage points that planners affect have direct as well as synergistic influences on health as they co-vary with other health agents. Perhaps the most potent example of this is the ecological context of SES and health. Planners directly and indirectly have the power to strongly affect the interrelations between SES, the physical environment, and health. A large, extensive international literature documents the relationship between both household and neighborhood SES and health (Adler, *et al.*, 1993). Decisions that planners influence have a lot to do with this. The higher the concentration of low SES in a neighborhood, the greater the exposure to environmental hazards including crowding, noise, toxins, substandard housing, hazardous wastes, and ambient pollutants (Evans and Kantrowitz, 2002). Neighborhood SES is also related to amenities that foster physical activity (*e.g.*, parks and low traffic volume) and retail opportunities that support healthy dietary practices (*e.g.*, access to fresh fruits and vegetables and fewer opportunities for fast-food purchases) (Taylor, *et al.*, 2006). Each of these environmental characteristics, in turn, is linked to health. Moreover, the convergence of multiple physical risk hazards mediates some of the well-established relations between SES and health (Evans, 2004). A principal reason why SES is directly related to health is the inverse correlation of SES and hazard exposures. Thus, planning decisions that increase the level and concentration of low SES residences in a neighborhood also foster bad health. Legal and economic barriers to SES segregation and incentives to economic heterogeneity foster better health. Planning practices that uncouple the linkages between SES and environmental inequities will improve the health of poor people.

Combinations of risk factors have ill effects that exceed the impacts of singular risk exposure. To provide a few illustrations, children living in multifamily houses at equivalent levels of people/room evince higher levels of psychological distress than their counterparts living in single-family detached or small row houses (Evans, *et al.*, 2002). Children residing in noisier neighborhoods who attend schools with loud ambient noise have lower reading scores than children in the same noisy schools who reside in quiet neighborhoods (Cohen, *et al.*, 1986). Substandard housing quality combined with deteriorated neighborhood conditions accentuates psychological distress (Kasl, *et al.*, 1982; Katz, *et al.*, 2000). All of this potential exposure to environmental risk is directly influenced by planning decisions.

## IMPLICATIONS FOR PLANNERS

Historically, when planning decisions have been made with public-health concerns in mind, it has been done with a reactive spirit — responding to an infectious-disease epidemic or other crisis. Today, the most common health challenges are of a chronic rather than acute nature. Concerns have shifted from tuberculosis and typhus, for example, to coronary heart disease and obesity. This transition in the profile of disease provides planners with an opportunity to proactively consider the health-related consequences of decision-making. Moreover, in the contemporary planning context, planners are armed with considerable research evidence that equips them to be *proactive*, rather than merely reactive. Planning decisions represent leverage points — small actions that can translate into large health impacts. These decisions are likely to have effects in the short term, as well as substantial long-term ripple effects that influence the health and quality of life of subsequent generations.

Given the considerable evidence indicating that a wide range of environmental characteristics does indeed affect health and the recognition that planners do influence the physical environment, we suggest the following guidelines:

- (1) *Explicitly consider health implications when making planning decisions.* Given the abundance of evidence indicating that planning influences the environment and the environment, in turn, affects health, health outcomes must be explicitly included in decision making. It is time for the field of planning to reconnect with public-health concerns in ways that are appropriate to the contemporary health profile of chronic rather than infectious diseases. Short-term economic efficiencies need to be carefully weighed against long-term economic costs resulting from less-healthy communities.
- (2) *Employ environmental quality as a leverage point to diminish the SES health gradient.* Income inequalities in health closely track disparities in environmental quality. Housing quality, pollution



- and toxins, high traffic volume, noise, natural amenities, places to exercise, and availability of healthy foods are not randomly distributed across populations.
- (3) *Use a proactive, forward-thinking mindset when making planning decisions.* Rather than merely reacting to the public-health concerns of the day, planners need to consider both short-term and long-term impacts of decisions.
  - (4) *Aim for resilience of individuals and communities, not merely avoiding risk and ill-health.* In the context of human development theory, Dunst and Trivette (1994) have proposed that attention be paid to factors that *promote*, as well as those that deter, healthy development. They suggest that the focus on health and well-being has historically been on reducing risk factors, rather than on bolstering resources to enhance resilience. We apply this notion to planning. Planning should be oriented toward the creation of healthy, thriving communities, not merely the avoidance of illness. Rather than treating diseases such as cardiovascular disease after symptoms are manifest, the planning profession is uniquely positioned to provide environmental contexts that support healthy lifestyles (e.g., physical activity, healthy eating) and minimize exposure to environmental risks (e.g., noise, traffic congestion, substandard housing). Preventative public health and medicine are highly dependent on the profile of environmental risk factors and resources, which is heavily influenced by the actions and policies proposed by planning professionals.
  - (5) *Employ evidence in decision making.* Considerable research evidence exists to link planning-related environmental outcomes to physical, psychological, and social well-being. This information needs to be integrated into the planning process.

One tool to help planners meet these five recommendations is the health-impact assessment (HIA) (CDC, 2008a; Cole, *et al.*, 2007; Dannenberg, *et al.*, 2006, 2008; Morris, 2006; Thomson, *et al.*, 2003; WHO, 2008). HIAs, analogous to environmental-impact statements, provide a mechanism for making decisions based on research evidence. HIAs vary considerably in form — from checklists to multistep procedures (Dannenberg, *et al.*, 2006). HIAs are not rigorous measurement instruments, but they are valuable tools for raising awareness among planners, public-health officials, and citizens alike (Morris, 2006:75). Although HIAs are in their infancy in the United States, they are a promising mechanism for incorporating health issues into the planning process.

Making health an explicit component of planning is critical (Morris, 2006; USGBC, 2006). By reconnecting with health issues, the field of planning can play a central role in health by reducing rates of illness and fostering healthy, thriving, resilient individuals and communities. The three pillars of contemporary planning policy and practice — law and regulations, economics, and public participation — provide a partial and unbalanced foundation for the profession. A firmer foundation for planning policy and practice will incorporate the conscious and active consideration of health impacts. Planners, whether or not they are aware of it, are major contributors to health and well-being. The more enlightened and active they become in this regard, the greater their contribution to the health and welfare of their fellow citizens will be.

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