The Impact of the Built Environment on Health: An Emerging Field

The drive from my office to my suburban Atlanta home is all too familiar: it begins with a scary 7-lane thoroughfare, infamous for its strip malls, lack of sidewalks, and high pedestrian fatality rates; progresses to a jumble of connecting interstate highways packed with rush-hour traffic despite 12 or more roadway lanes; and ends with clusters of new, low-density, single-family residential developments lacking public parks, playgrounds, libraries, nearby stores or cafés, sidewalks, bicycle trails, and public transit. Adults and children in my neighborhood travel by private automobile to virtually all of their destinations, because they have no practical transportation alternatives.

We humans often assume that what is, had to be that way. In reality, virtually everything in our built environment is the way it is because someone designed it that way. Central Park is beautiful and appears "natural" precisely because Frederick Law Olmsted designed and built it that way. Roadside signs advertising fast food restaurants strike the eye because they are designed to catch the attention of someone rushing by at high speed. Because children cannot buy homes or vote for parks, bicycle trails, small local schools, or nearby ball fields, many new residential areas in America are built without such community assets.

Despite the fact that many humans accept the world as it is, we have a remarkable capacity to plan ahead, shape the future, and adapt to new settings. This capacity serves us well when we are trying to build new societies or solve public health dilemmas. Our parents and grandparents helped extend our life expectancy and build great cities such as New York and San Francisco that became hubs for culture and diversity. Our predecessors left us an economically strong and well-educated nation with a high standard of living seen as a model for many around the world.

The current generation now faces its own challenges. One challenge is to better understand the broad impact of our built environment on health and then to build future communities that promote physical and mental health. Public health has traditionally addressed the built environment to tackle specific health issues such as sanitation, lead paint, workplace safety, fire codes, and access for persons with disabilities. We now realize that how we design the built environment may hold tremendous potential for addressing many of the nation's greatest current public health concerns, including obesity, cardiovascular disease, diabetes, asthma, injury, depression, violence, and social inequities.

Some of our current zoning laws that block high-density, live–work–play developments derive from interventions that helped prevent the spread of tuberculosis and other infectious diseases in the 19th century. Public health–based zoning laws were also instrumental in separating homes and schools from the odors and toxic emissions of abattoirs and tanneries. In the 20th century, the automobile and accompanying highway construction enabled the growth of suburbs and the vast expansion of metropolitan areas. Rail and trolley lines declined, and by the late 1960s, the cores of most major cities were sapped of economic vitality and left with failing schools and rising crime rates. Government incentives that subsidized mortgages and highways encouraged home-building further out from urban areas. As the US population grew and density dropped, vast stretches of forests and farmland were lost in the creation of roadways, megamalls, megaschools, and megasubdivisions.

Even our environmental policies exacerbated the flow. In urban areas with extensive preexisting infrastructure, the past contamination of land presents future investors with real or potential liability risks, so many of these urban "brownfields" go unsalvaged. Despite the availability of over 10 000 vacant land parcels in New York City,[1] some city workers there have chosen to face commutes of 4 or more hours per day to subdivisions that replaced forests in northern Pennsylvania. This commuting pattern has led to the paving of vast quantities of landscape for roadways, cloverleaf intersections, and parking lots. At this point, the United States has paved a land area equivalent in size to the state of Georgia.[2,3]

Typical American families earn in real dollars roughly what they earned in the 1970s,[4] but we spend much more now on motorized transportation. From 1969 to 1995, the number of

private vehicles per household rose more than 50% to roughly one vehicle per licensed driver.[5] Cars are such a necessity for work and other daily activities in American life that most adults manage to find the $7000 or more per year to own, maintain, insure, and drive a car,[6] even if faced with choosing between health insurance and a car. Since 1970, the US population has increased 37%,[7,8] but the distance traveled by the nation's fleet of cars, motorcycles, sport-utility vehicles, and small trucks increased 143%.[9] From 1982 to 2000, the annual hours of highway traffic delay per person in urban areas increased from 16 hours to 62 hours per year.[10] And Americans now work more hours than people in any other major industrial nation in the world.[11] With rising private vehicle costs, long commutes, increasing traffic delays, and long work hours, it is easy to understand why parents may feel overwhelmed by time and financial demands.

Private motor vehicle transportation made necessary by extensive low-density land use has important implications for health: people are less active because they walk less, vehicle exhaust degrades air quality, motor vehicle injuries increase, and mental health and social capital are adversely affected. Decreased opportunities for children to incorporate physical activity into their daily lives, such as the inability to walk to school because of hazardous streets and long distances,[12] have contributed to a threefold increase in the prevalence of overweight children over the last 3 decades.[13]

America's aging population faces its own challenges. In this country, the number of people aged older than 65 will double by the year 2020.[14] Communities that are adequately designed for a young adult with fast reflexes can be unnavigable for an elderly person. As chronic diseases such as arthritis, obesity, and diabetes increase in prevalence, the need becomes paramount for communities where elderly and disabled persons (and young persons with few resources) can function well and contribute to society without needing to own an automobile.

As Hippocrates, the Romans, and Jung knew, our physical environment affects our physical and mental health. We physicians focus well on our patients as individuals with health problems, but when so many of our patients have the same problems, such as cardiovascular disease, diabetes, and depression, we must realize that their poor health is not caused only by a lack of discipline but may be the result of the built environments in which we live.

It is time for a shift to communities intentionally designed to facilitate physical and mental well-being. To effect this change, we need to draw upon the unique ability of humans to plan creatively for healthy communities. The first step is to understand better the elements of the built environment that promote health. From the limited research to date, the public health community knows that some environments encourage walking, biking, and social interaction more than others do[15,16]; that many traffic injuries can be prevented[17]; that increasing motor vehicle exhaust exacerbates pulmonary disease[18]; and that the presence of neighborhood liquor stores increases alcohol consumption and associated adverse health consequences.[19] But overall, there is still much to learn about the effects of the built environment on health. To address the multitude of questions, public health professionals must work closely with experts in other fields: architects, planners, policymakers, social scientists, traffic engineers, developers, law enforcement officers, economists, social marketers, and others.

With its focus on the built environment and health, this issue of the Journal strives to promote this emerging field of research. Bringing together experts from many disciplines, this issue includes research on the relationship between the way we build our communities and walking/biking (Cervero, Powell, Saelens, Pucher, Bonnefoy), mental health (Kaplan, Leventhal), traffic safety (Evans, Retting, Egan, Ewing, Lucy), children's health (Everett), minority health (Duran), affordable housing (Garb, Saegert), crime (Carter), government policies and law (Perdue, Buzbee, Ashe, Librett), economics (Burchell), air quality (Samet, Künzli), and water quality (Greenberg, Gaffield). Other articles examine the effects of local community interventions (Dickerson, Staunton, Semenza, Wilson), the connection between the Smart Growth movement and health (Geller), the "sense of place" as a public health construct (Frumkin), and key questions for future research (Dannenberg, Srinivasan).

Many aspects of the built environment will resist rapid change, even when research has adequately revealed key aspects of healthy communities. Efforts to improve pedestrian facilities, preserve green space, and upgrade public transportation are under way in many communities. Whereas our generation may reap some benefits from the new field of the built environment and health, with a little vision and a lot of good science and hard work, our children and grandchildren will be able to walk or bicycle home from their workplaces through attractive communities designed to promote the physical and mental health of all people. ■

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A New Traffic Safety Vision for the United States

Although the tragic events of September 11, 2001, are indelibly burnished into America's consciousness, the equally tragic events of October 2001, November 2001, December 2001, January 2002, and all subsequent months attract little public note. In a typical month, more Americans are killed on our roads than were killed by the terrorists.[1]

If we could stimulate new approaches to the problems of risk in road traffic as we did about airline security after 9/11, every year we could save many times more lives than were lost that day. This can be achieved with far less reduction of mobility, convenience, freedom, or civil rights than was produced by our ongoing response to 9/11.

THE UNITED STATES COMPARED WITH OTHER COUNTRIES

Over 42 000 people died on US roads in 2002.[1] If US traffic safety policy had kept pace with the policy in a number of other countries, the total would have been about 15 000 less.[2,3] While traffic fatalities from 1979 to 2000 declined by 50% in Canada,[4] 46% in Britain,[5] and 48% in Australia,[6] the decline in the United States was only 18%.[1] The better-performing countries did nothing remarkable, let alone draconian. They made many poor decisions. All their laws are passed by democratic legislative bodies answerable to electorates similar to ours. Prior to the 1970s, the United States was number one in the world in traffic safety.[7] As measured by the number of traffic deaths per million vehicles, the United States has slipped to 13th place,[8] and is still sinking.

These better-performing countries view traffic deaths and injuries as much more of a public health problem than does the United States. They support more scientific research aimed at exploring and evaluating countermeasures. Sweden and Australia, with populations less than that of many US states, have more institutions devoted to road safety research than the United States. Rather than respecting technical knowledge, Americans have been persuaded that lawyers such as Ralph Nader and Joan Claybrook should guide policy.

ROLE OF US LITIGATION

Since the period when the United States was the world's safety leader, litigation here has acquired a role not approached anywhere else in the world. It has been spectacularly successful in directing focus away from the very countermeasures known to be successful in favor of vehicle factors that are of minor safety importance but are major sources of litigation wealth. The unbalanced nature of US safety policy is estimated to have killed well over 100 000 Americans in the last 2 decades.[2,3]

Airline safety has improved dramatically because it focuses mainly on preventing crashes, not on surviving them. We continue to kill so many people on our roads because of the mistaken belief that the main way to reduce these deaths is to make every crash marginally more survivable,